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VOLUME TV-12

Television

Servicing Information

Compiled by
M. N. BEITMAN

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1957

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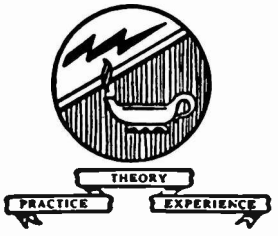

Compiled by

M. N. BEITMAN

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Highland Park, Illinois

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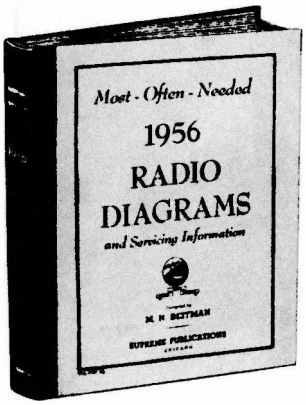
RADIO DIAGRAM MANUALS



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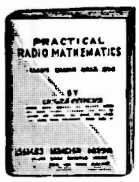

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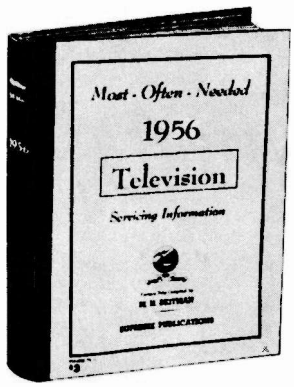

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TABLE OF CONTENTS

(Continued on page 4)

Table of Contents, Continued

Admiral

Chassis 14YP3B, 14YP3BK, 14YP3C, 14YP3D, 14UY3B, 14UY3C, 14UY3D

Chassis	Used in Models	Pages
14YP3B	T1010	6-7, 12
14YP3BK	T1011AL, T1012AL, T1013AL	6-7, 12
14YP3C	T140, T141, T142, T143, T144AL, T145AL	6-7
14YP3D	T171, T172AL, T173AL	8-9
14UY3B	TS1010, TS1011AL, TS1012AL	10-11
14UY3C	TS140, TS141, TS142, TS143, TS144AL, TS145AL	10-11
14UY3D	TS171, TS172AL, TS173AL	10-11, (8)

The chassis listed above are personal portable television receivers. These chassis are very similar in construction and circuitry. The main differences are described in the paragraphs below.

The 14YP3B and 14YP3BK chassis are 14-tube VHF-only receivers using a 10-inch rectangular picture tube and a 21 MC. IF amplifier. The 14YP3B and 14YP3BK chassis are identical with the exception of the VHF tuner. The 14YP3B chassis uses a turret type tuner, part No. 94E119-1. This tuner is shown with complete schematic on page 6. The 14YP3BK chassis uses a switch type tuner, part No. 94E128-1. Some alignment hints and B+ distribution explanation for these chassis are given on page 12.

The 14YP3C chassis is also a 14-tube VHF-only receiver using a 14-inch rectangular picture tube. This chassis is identical to the 14YP3B chassis with the exception of the picture tube mounting, the picture tube, and VHF tuner. VHF tuner 94E119-2 is used and has a longer shaft. The circuit on page 6 will apply.

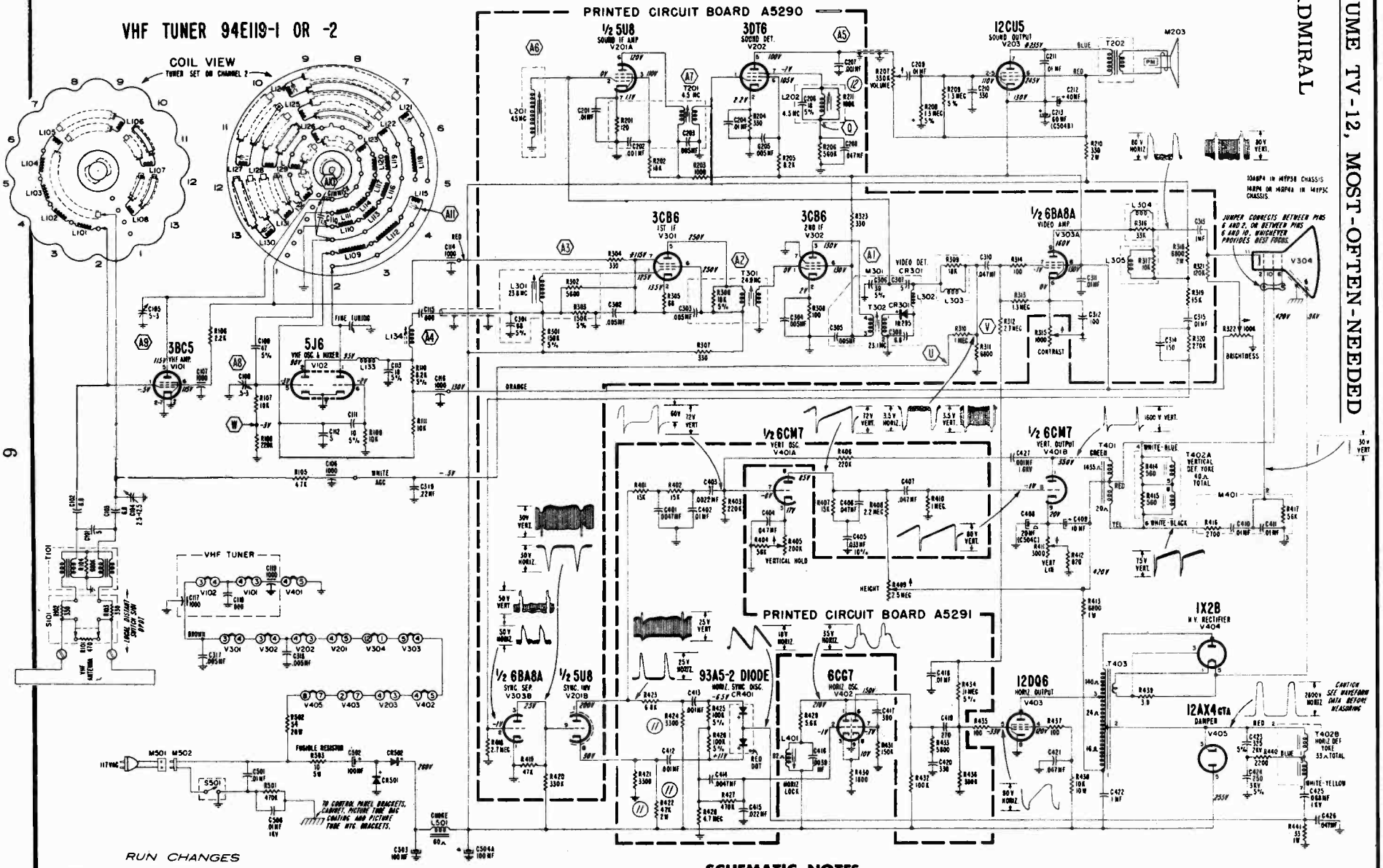
The 14YP3D chassis is a 14-tube VHF-only receiver having a 17-inch rectangular picture tube. This receiver is similar to the 14YP3B chassis with the exception of differences in the vertical output circuit, horizontal sweep circuit, and high voltage rectifier circuit. The circuit for this chassis is on page 8.

The 14UY3B chassis is a 15-tube VHF-UHF receiver having a 10-inch rectangular picture tube. These receivers use a 41 MC. IF system and have a combination VHF and UHF tuner assembly containing a switch type VHF tuner, part No. 94C118-1, and a continuous tuning UHF tuner, part No. 94D112-1. This circuit is on page 10.

The 14UY3C chassis is identical to 14UY3B, except that the tuner uses a longer shaft. The same material on pages 10 and 11 will apply.

The 14UY3D chassis is a 15-tube VHF-UHF type receiver having a 17-inch rectangular picture tube. This receiver is similar to the 14UY3B chassis with the exception of differences in the vertical output circuit, horizontal sweep circuit, and high voltage rectifier circuit. These circuits, being different from 14UY3B, are like the corresponding sections of the circuit of 14YP3D chassis. In servicing these sets, use the material on pages 10 and 11, and also refer to page 8 for the circuit differences.

Schematic for 14YP3B and 14YP3C Television Chassis Stamped Run 10 Through Run 14.



RUN CHANGES

(10) Start of production.

(11) For improved sync stability, R421 and R424 were changed from 4700 to 3300 ohms. R422 changed from 39K to 47K ohms.

(12) To improve sound on very weak signals, R211 was added across L202.

FUSIBLE RESISTOR

A pig-tail type fusible resistor (Part No. 61A22) is used as a B+ and initial surge fuse. It is located below the tuner.

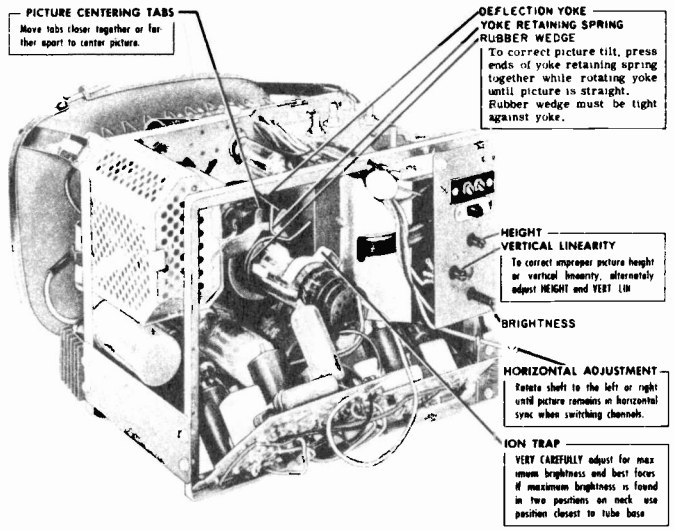
SCHEMATIC NOTES

Numbers and letters inside hexagons indicate alignment points.

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

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

ADMIRAL Chassis 14YP3B, 14YP3BK, 14YP3C, Service Information



Rear View of Chassis Showing Adjustment Locations.

VOLTAGES AND WAVEFORMS

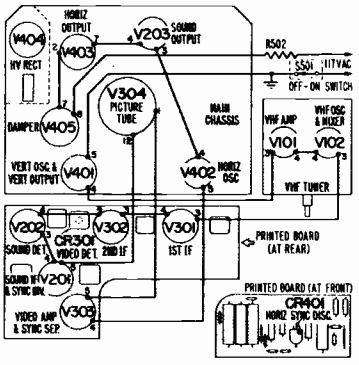
- Isolation transformer used. Line Voltage: 117 volts AC.
- Set Channel Selector on an unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Horizontal Lock adjustment.
- Antenna disconnected and terminals shorted together.
- DC voltages measured with VTVM between tube socket terminals and chassis, unless otherwise indicated.
- Voltages marked (*) will vary widely with control settings.
- Waveforms taken with transmitted signal input to television chassis.
- For waveform measurement, all controls set for normal picture.

REPLACING TUBES

The tubes of this receiver (with the exception of picture tube and tubes in the VHF tuner) are accessible for replacement by removing the cabinet back. The tubes on the main (rear) printed circuit board can more conveniently be removed after removing the mounting screws from the printed circuit board and tilting it back.

Replacement of picture tube and VHF tuner tubes require chassis removal. The tube shields of some tubes are captivated (telescopic) type. To remove tubes, press upper section of tube shield toward tube base.

TUBE LOCATIONS



IMPORTANT CAUTION: Limited space is available when adjusting picture centering tabs and ion trap. Picture centering tabs may be adjusted using a non-metallic rod.

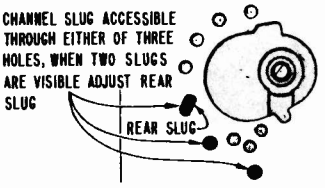
CHANNEL ADJUSTMENT

Channel adjustment of each station should be checked upon installation and at every service call. With proper adjustment, best picture is obtained at approximately center rotation of **Fine Tuning** control.

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

Before proceeding with adjustment, see illustration for location of channel slugs, then adjust as follows:

a. Turn the set on and allow 15 minutes to warm up.
b. Set **Channel Selector** for lowest channel to be adjusted.
   Set other controls for normal picture and sound.
c. Set **Fine Tuning** control at center of its range by rotating it approximately halfway between its stops.
d. Remove **Channel Selector** and **Fine Tuning** knobs and the gold escutcheon under the knobs.
e. Using a 1/8" blade non-metallic tool (Part No. 98A 30-19), carefully adjust the channel slug for best picture. (Note that sound is not loudest at this point.) Repeat procedure for remaining stations, adjusting them in order of their channel number (from lowest channel to highest channel).



View of VHF Tuner. Knobs and Escutcheon removed.

REMOVING CABINET BACK & FRONT

The cabinet back and front are removable. Remove mounting screws; then pull away from set. In sets with carrying handle, mounting screws must be removed from handle.

To remove chassis from cabinet shell, remove back, front and screws at bottom. Remove chassis through front.

SERVICE HINTS

PICTURE TURNS NEGATIVE OR HAS SILVERY APPEARANCE AT HIGH CONTRAST LEVELS

If the picture has a tendency to turn negative or has a silvery appearance at high contrast levels, trouble may be due to any of the following.

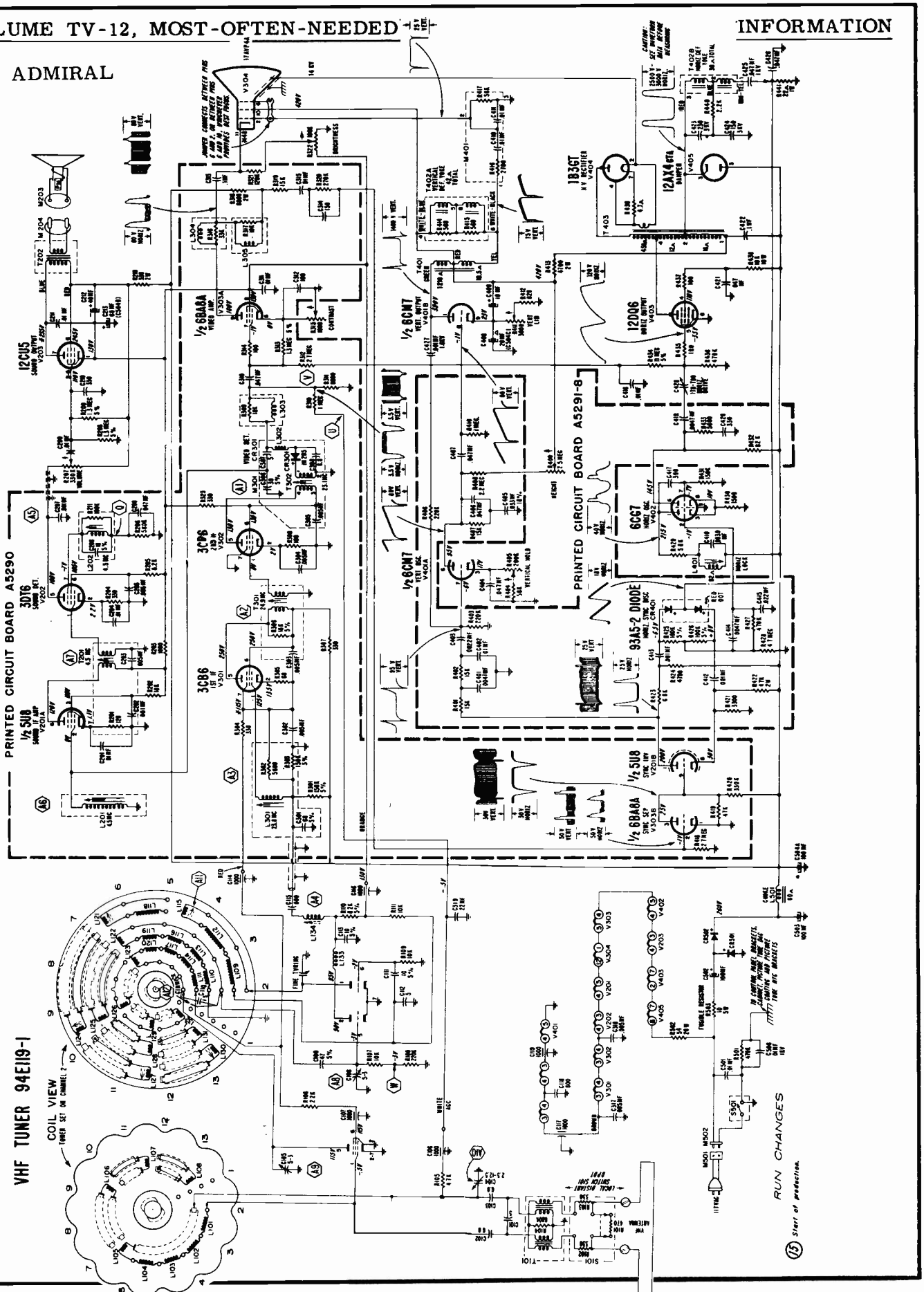
a. Receiver is operated in a very strong signal area with the "Local-Distant" switch set in the Distant position. Check picture with "Local-Distant" switch set in the Local position.

b. Defective video amplifier tube V303 (6BA8A). Tube may be gassy, thus causing it to draw negative (reverse) grid current. This effect may be apparent after the receiver is operated a short period of time at high contrast level. After replacing tube, check resistors mentioned in the paragraph below.

c. Video amplifier grid resistor R313 (1.3 megohms, 1/2 watt) and plate resistor R318 (6,800 ohms, 2 watts) may have changed value. Check resistors, replace if incorrect value.

d. Picture tube may be at fault due to low emission or gassy condition. IMPORTANT: Before deciding that the picture tube is at fault, be sure to make all checks given in the paragraphs above.

ADMIRAL


Schematic for 14YP3D Television Chassis Stamped Run 15.
PRINTED CIRCUIT BOARD A5290
PRINTED CIRCUIT BOARD A5291-8
VHF TUNER 94E19-1
COIL VIEW
RUN CHANGES
12CU5
3DT6
½ 5U8
3CB6
½ 6BA8A
½ 6CM7
6CG7
93A5-2 DIODE
1B3GT
12AX4GTA
12DQ6

ADMIRAL Chassis 14YP3D Schematic and Service Information

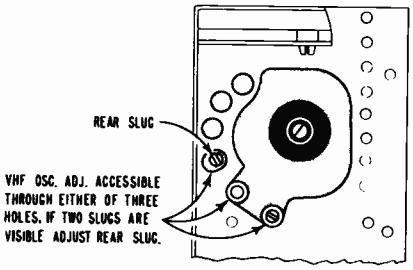
INSTALLATION ADJUSTMENTS

To insure best performance, it is important to make all checks and adjustments shown in the figures below. Note: Removal of cabinet back is required only for adjustment of ion trap, picture tilt and centering.

IMPORTANT CAUTION: Limited space is available when adjusting picture centering tabs and ion trap. Picture centering tabs may be adjusted using a non-metallic rod.

CHANNEL ADJUSTMENT

Channel adjustment of each station should be checked upon installation and at every service call. This adjustment should be made only by a qualified television technician in channel number order starting with lowest channel using a non-metallic tool with a ⅛" blade. Instructions for making channel adjustment are available from Admiral distributors.



REPLACING TUBES

The tubes of this receiver are accessible for replacement by removing the cabinet back. The tubes on the main (rear) printed circuit board can more conveniently be removed after removing the mounting screws from the printed circuit board and tilting it back.

FUSIBLE RESISTOR

A pig-tail type fusible resistor (Part No. 61A22) is used as a B+ and initial surge fuse. It is located below the tuner.

HIGH VOLTAGE WARNING

High voltage is present at some points in this receiver. Operation of the set without the cabinet or with cabinet back removed involves shock hazard. Exercise necessary high voltage precautions.

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 grounded 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.

Do not ground chassis or connect test equipment directly to it unless an isolation transformer is used. If an isolation transformer is not available, a neon lamp can be used to determine if the chassis is "hot".

MISCELLANEOUS CHASSIS PARTS

CR301	Video Detector, 1N295	Part of T302
CR401	Diode, Dual Selenium	93A 5-2
CR501	Rectifier, Selenium	93A 4-2
CR502	Rectifier, Selenium	93A 4-2
M401	Couplate, Vertical Blanking (includes R416, R417, C410 and C411)	63C 6-12
M501	Interlock Plug	88A 36
S101	Switch, Local-Distant	77B 59-3
S501	Switch, On-Off	Part of R207
Centering Device		94A 121-1
Ion Trap		94A 15-5
Jumper Strip (for picture tube socket)		18A 134

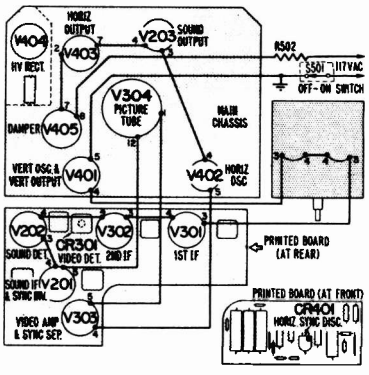
VOLTAGES AND WAVEFORMS

- Isolation transformer used. Line Voltage: 117 volts AC.
- Set Channel Selector on an unused channel. Contrast control fully clockwise; all other controls counterclockwise. Do not disturb Horizontal Lock adjustment.
- Antenna disconnected and terminals shorted together.
- DC voltages measured with VTVM between tube socket terminals and chassis, unless otherwise indicated.
- Voltages marked (*) will vary widely with control settings.
- Waveforms taken with transmitted signal input to television chassis.
- For waveform measurement, all controls set for normal picture.
- Peak-to-peak voltages may vary slightly from those shown.

COILS AND TRANSFORMERS

Sym.	Description	Part No.
L201	Sound Take-off Coil	72C 132-20
L202	Quadrature Coil	72C 132-18
L301	IF Input Coil	72C 132-17
L302	Resonant Choke Coil	73A 24-8
L303	Video Peaking Coil	73B 5-8
L304	Video Peaking Coil	73B 25-9
L305	Video Peaking Coil	73B 11-1
L401	Horizontal Lock Coil	94C 17-7
L501	Filter Choke	74B 18-19
T201	Sound IF Transformer	72C 132-19
T202	Audio Output Transformer	79B 43-10
T301	1st IF Transformer	72C 132-8
T302	2nd IF Transformer (includes CR301, C308 and L302)	72C 176-3
T401	Vert. Output Transformer	79B 43-10
T402	Deflection Yoke (less cap and centering device)	94D 87-16
T403	Horiz. Output Transformer	79C 60-11

TUBE LOCATIONS



SCHEMATIC NOTES

Numbers and letters inside hexagons indicate alignment points.

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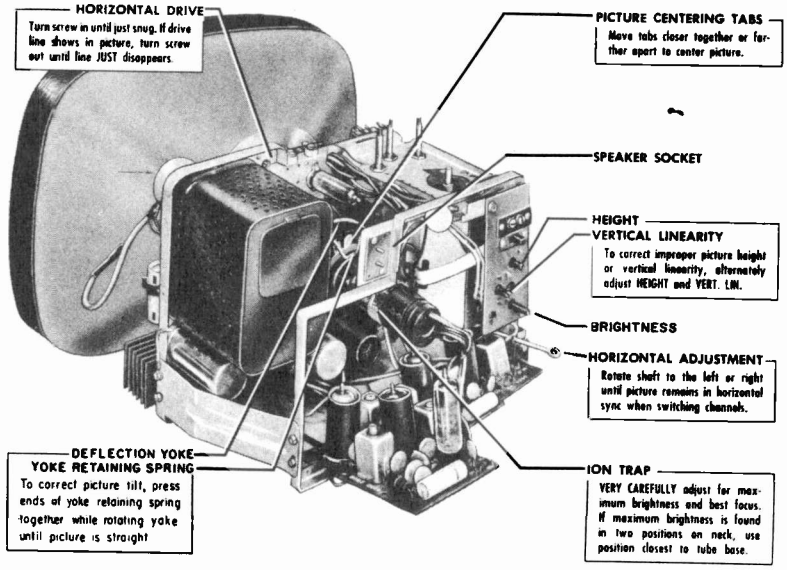
NOTE: K = x 1000, MEG = x 1,000,000, MF = microfarad.

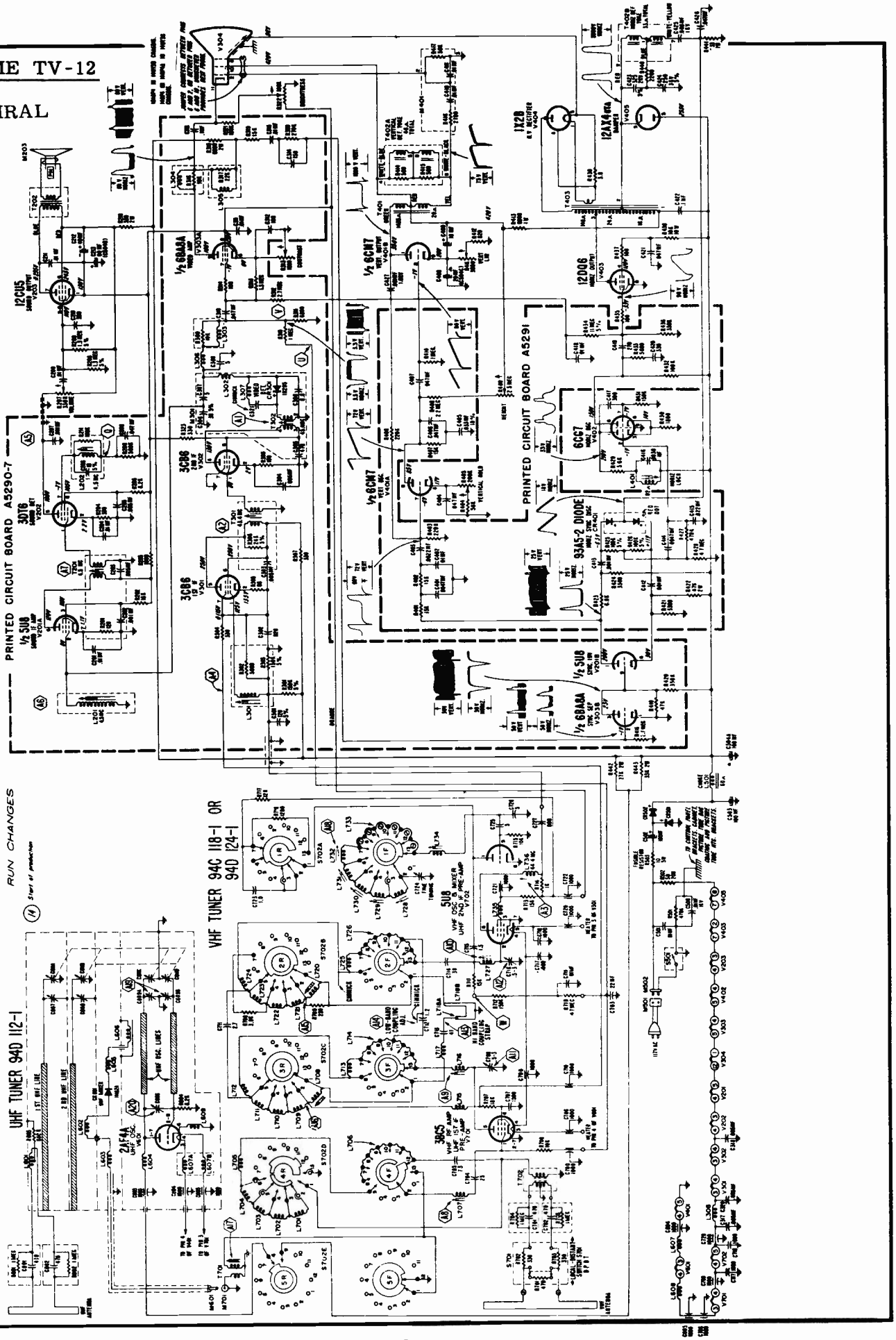


Rear View of Chassis Showing Adjustment Locations. Printed Circuit Board Shown Tilted Away from Chassis.

VOLUME TV-12

ADMIRAL

Schematic for 14UY3B and 14UY3C Television Chassis Stamped Run 14.



ADMIRAL Chassis 14UY3B and 14UY3C Service Information

INSTALLATION ADJUSTMENTS

To insure best performance, it is important to make all checks and adjustments shown in the figures below. Note: Removal of cabinet back is required only for adjustment of ion trap, picture tilt and centering.

VHF CHANNEL ADJUSTMENT

VHF channel adjustment of each station should be checked upon installation and every service call. With proper adjustment, best picture is tunable with rotation of the **Fine Tuning** control.

IMPORTANT: Always make adjustment on the highest channel first, since adjustment on one channel will affect all lower channels.

Before proceeding with adjustment, see illustration for location of channel screws, then adjust as follows:

a. Turn the set on and allow 15 minutes to warm up.

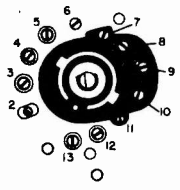
b. Set **Channel Selector** for highest VHF channel to be adjusted. Set other controls for normal picture and sound.

c. Set **Fine Tuning** control at center of its range by rotating it approximately two turns in one direction and then one-quarter turn in the opposite direction.

d. Remove **Channel Selector, Fine Tuning** and **UHF Indicator** knobs and the escutcheon under knobs.

e. Using a non-metallic screwdriver (preferably with a ⅛" metal-tipped blade), engage the proper channel screw and carefully adjust it for best picture. (Note that sound is not loudest at this point.) Repeat procedure for remaining stations, adjusting them in order of their channel number (from highest channel to lowest channel).

NOTE: If adjustment screws for channels 7 to 12 do not have sufficient range, make adjustment using channel 13 screw; then check adjustment of each lower channel. If adjustment screws for channels 2 to 5 do not have sufficient range, make adjustment using channel 6 screw; then check adjustment on each lower channel. If channels 13 or 6 are in operation, use the next lower channel for extending adjustment range.



View of VHF-UHF Tuner.
Knobs and Escutcheon removed.

FUSIBLE RESISTOR

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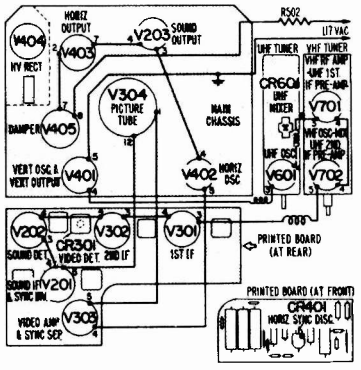
TUBE LOCATIONS & HEATER CIRCUIT



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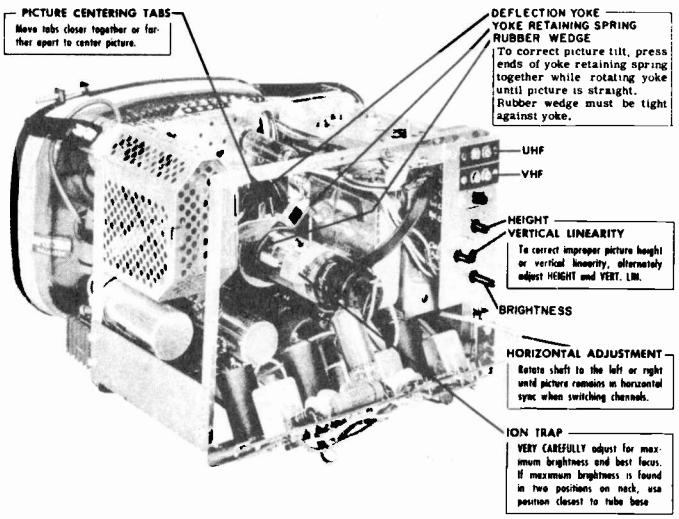
Fixed resistor values shown in ohms ± 10% tolerance, ½ watt; capacitor values shown in micromicrofarads ± 20% unless otherwise specified.

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



Rear View of Chassis Showing Adjustment Locations.
Printed Circuit Board Shown Tilted Away from Chassis.

ADMIRAL Chassis 14YP3B, 14YP3BK, 14YP3C, Additional Service Information

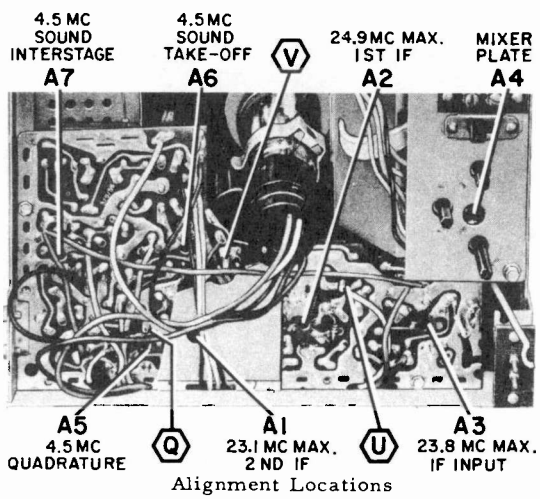
4.5 MC SOUND IF ALIGNMENT USING A TELEVISION SIGNAL

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 below.

The 4.5 MC Sound IF Amplifier can be aligned using a strong transmitted television signal. Make alignment 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. Set Local-Distant switch in "Distant" position.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Admiral part number 98A30-12), very slowly turn slug "A5" several turns clockwise until a buzz is heard in the sound. Then turn it counterclockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately 1/2 turn apart) at which the 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 a clockwise rotation.
4. 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 "A6" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal to maintain hiss level.
6. Carefully adjust slug "A7" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal to maintain hiss level.
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 "A5" without retouching adjustment of slugs "A6" and "A7".



Alignment Locations

B PLUS DISTRIBUTION

The B plus power supply of this receiver consists of two 300 milliampere selenium rectifiers operated in a voltage doubler circuit. Efficient filtering with excellent voltage regulation is obtained through use of a pi type filter network consisting of two 100 mf. electrolytic capacitors and an iron core filter choke.

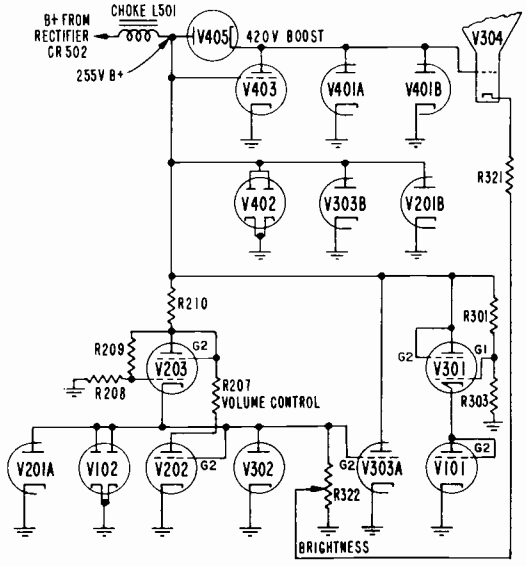
The B plus voltage supply (after filtering) provides approximately 255 volts. The B plus distribution diagram, see figure below, shows the various stages operated from the 255 volt B plus circuit.

The cathode of the damper tube V405 (12AX4GTA) supplies 420 volts B plus boost voltage to the horizontal output stage V403, vertical oscillator V401A, vertical output V401B and to the 1st anode of the picture tube.

The sound output tube V203 (12CU5), in addition to its regular function, also operates as a voltage dropping tube, supplying 130 volts B plus to the various tubes operated from this voltage source. The cathode of the sound output tube is operated at approximately 130 volts with respect to chassis ground.

The 1st IF tube V301 (3CB6), in addition to its regular function, also operates as a voltage dropping tube for supplying approximately 135 B plus to the plate and screen of the VHF amplifier tube V101 (3BC5). The B plus voltage at V101 will vary widely depending on signal strength and AGC voltage.

Note also that the Volume control R207 is connected as a plate load in the sound detector circuit V202 (3DT6).



B Plus Distribution Diagram

Admiral

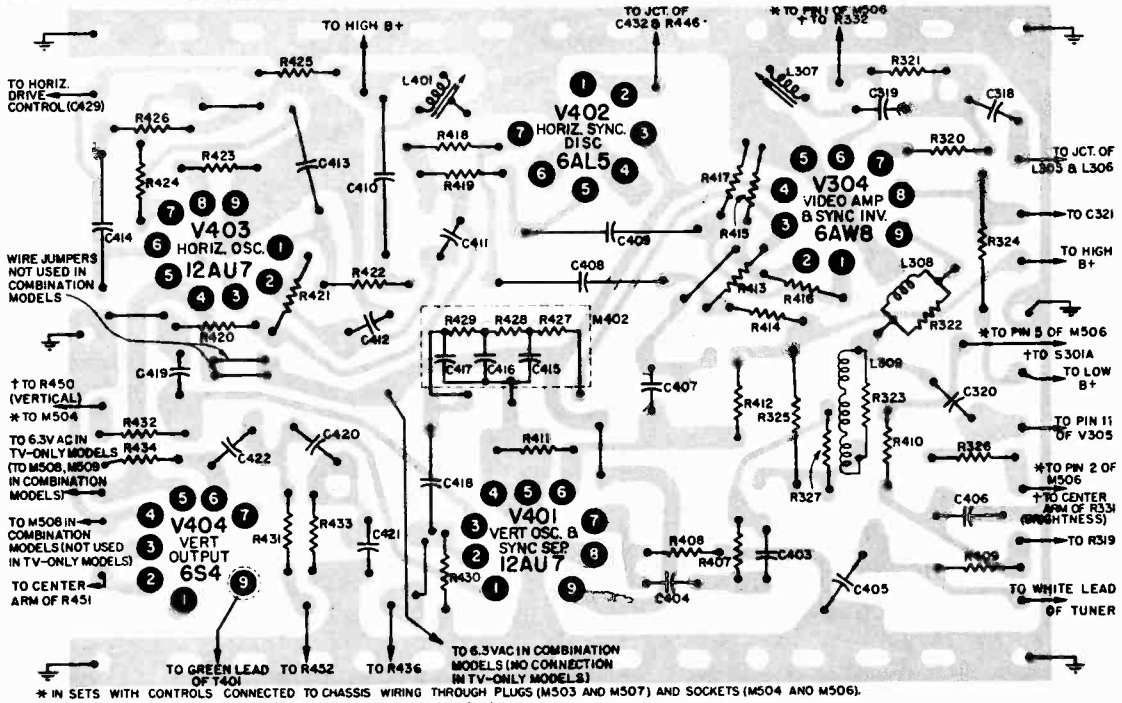
18Y4E, 18Y4L, 18Y4EF, 18Y4ES, 18Y4LS

CHASSIS STAMPED RUN 1 THROUGH RUN 16

The material below and on pages 14-15 is exact for chassis listed above. In addition Chassis 18Y4B and 18Y4BS are practically identical to these chassis. Also chassis 18Y4BSA, 18Y4EFA, 18Y4ESA, 18Y4LSA, 18Y4PSA are almost the same in their main circuits to these other sets, but use other type tuners. Chassis 19Y4G, 19Y4GF are combinations with their TV circuitry like those of the other sets. Chassis 19Y4RF and 19Y4PRS are also similar but have automatic tuning switch assembly.

Below is a cross-index of chassis and models released to the time of publication. Some of these models will use other chassis of this group and additional model numbers may be assigned to sets that will use these various chassis.

18Y4B	T2301D, T2306D, T2307D
18Y4BS	T2301DL, T2305D, T2306D, T2307D
18Y4E	C23A1, C23A2, C23A3, C23A6, C23A7, C23A8
18Y4EF	C23A6, C23A7
18Y4ES	C23A1, C23A2, C23A3, C23A8
18Y4ESA	C23A1A, C23A2A, C23A3A, C23A8A
18Y4L	T2301DR, T2302DR, T2303DR
18Y4LS	T2301DR, T2302DR, T2303DR
19Y4G	K23A6, K23A7
19Y4GF	K23A6, K23A7



* IN SETS WITH CONTROLS CONNECTED TO CHASSIS WIRING THROUGH PLUGS (M503 AND M507) AND SOCKETS (M504 AND M506).
† IN SETS WITH CONTROLS CONNECTED DIRECTLY TO CHASSIS WIRING.

View of PRINTED WIRING SIDE of Sync Board. 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. **Local-Distant** switch in "Distant" position. All other controls fully counterclockwise. Do not disturb **Horiz. Lock** and **Horiz. Drive** 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.
- Voltages at V101 and V102 measured from the top of the tuner with tubes in socket. Use of an adapter is recommended.
- Voltages at V305 socket measured with socket removed from tube.

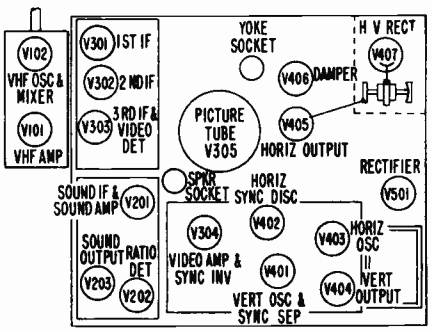
CONDITIONS FOR OBSERVING WAVEFORMS

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. Waveforms at these points may be taken with a capacitive voltage divider probe. The waveform at pin 3 of V406 may also be taken by clipping or twisting the lead from the high side of the oscilloscope over the insulation on the lead connecting to pin 3. If the waveform is taken in this manner, its shape will be the same, but the peak-to-peak voltage will be lower, depending on the degree of coupling between the oscilloscope and the lead connecting to pin 3 of V406.

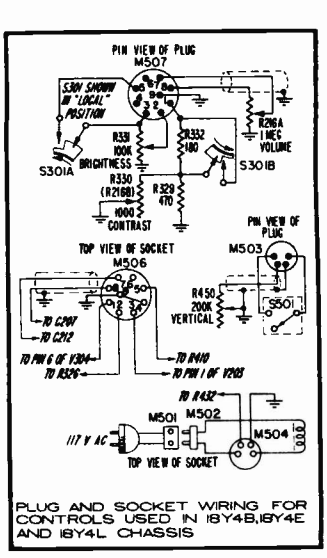
- Waveforms should resemble those shown on the schematic.
- Waveforms are taken with a transmitted signal input to the television chassis.
- Set all controls for normal picture. After the receiver is set for a normal picture, turn the **Contrast** control fully clockwise.
- Oscilloscope sweep is set 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 test equipment employed and chassis parts tolerances.

Service material continued from page 13.

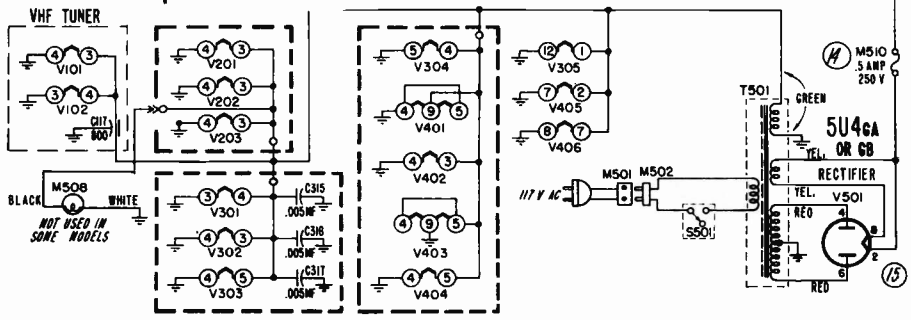
Rear View of Chassis.

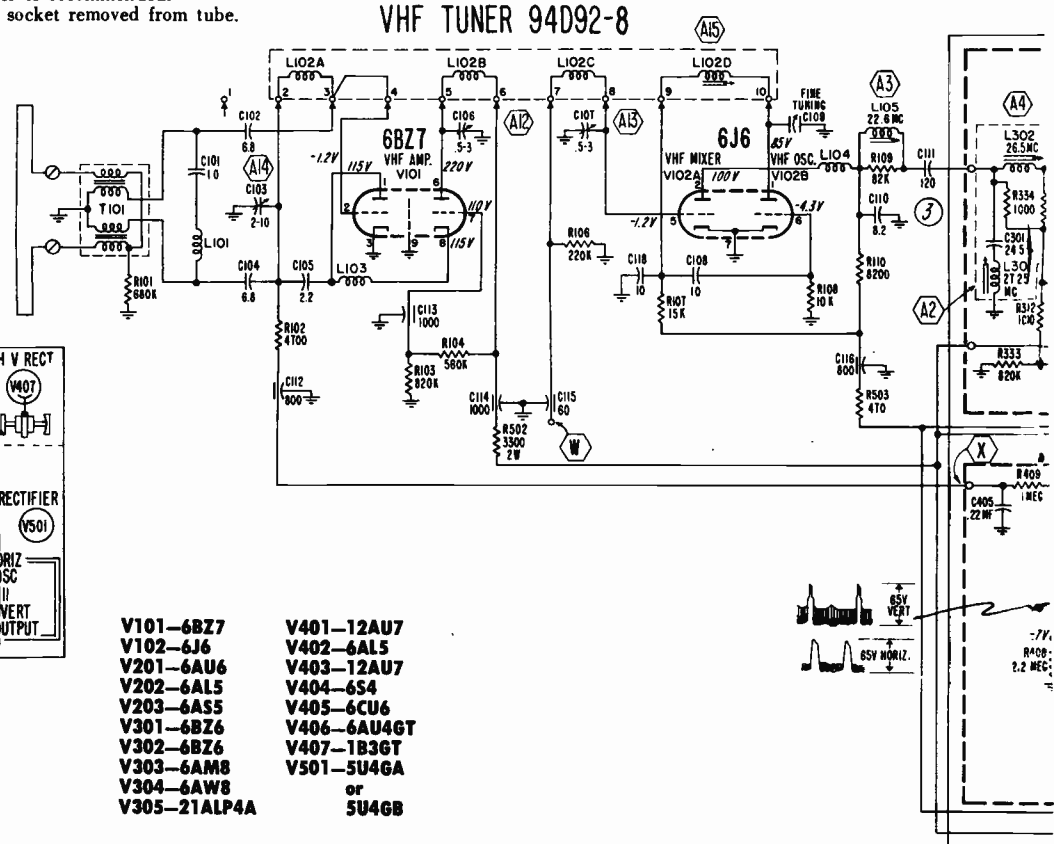


V101—6BZ7
V102—6J6
V201—6AU6
V202—6AL5
V203—6AS5
V301—6BZ6
V302—6BZ6
V303—6AM8
V304—6AW8
V305—21ALP4A
V401—12AU7
V402—6AL5
V403—12AU7
V404—6S4
V405—6CU6
V406—6AU4GT
V407—1B3GT
V501—5U4GA or 5U4GB



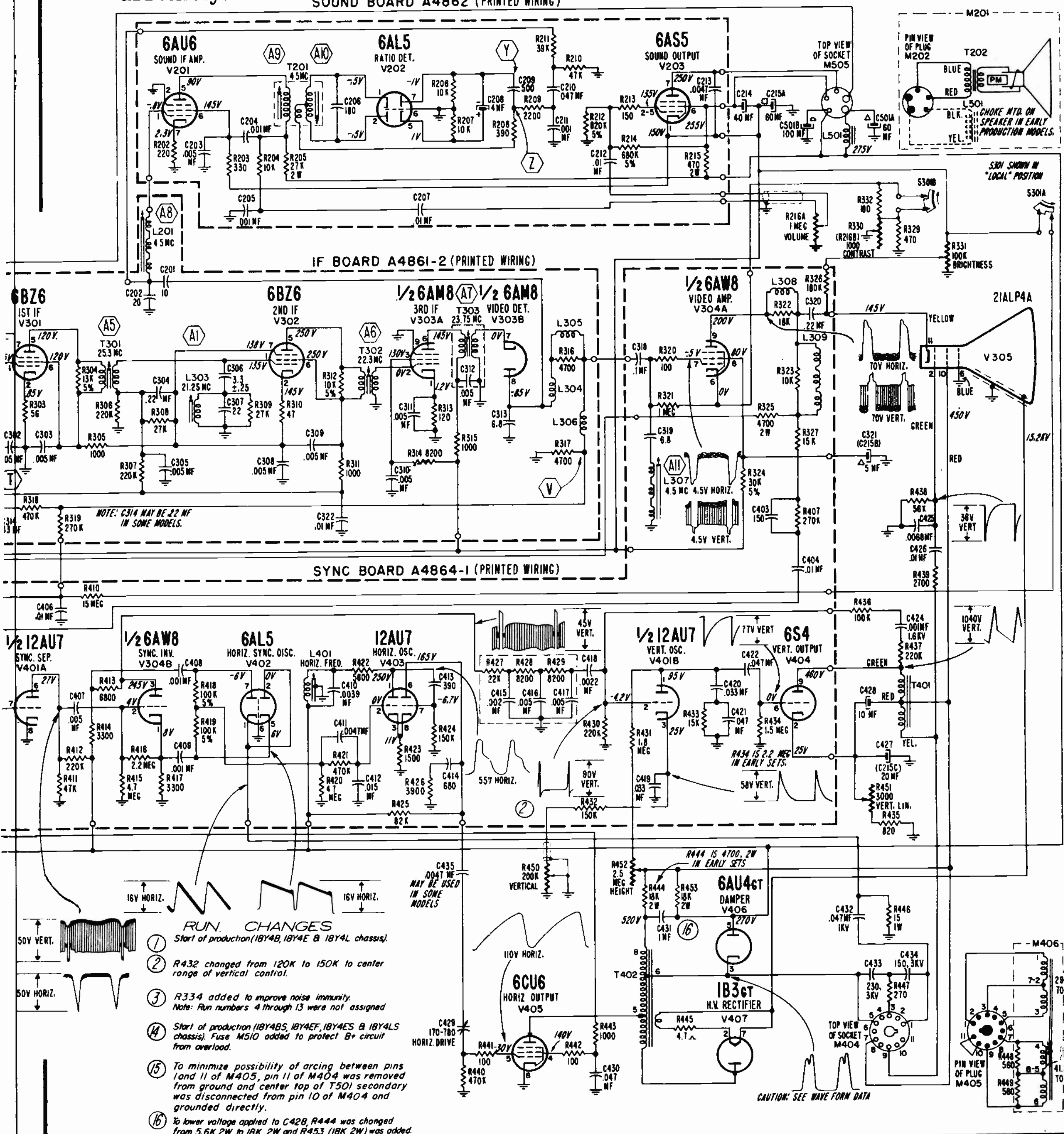
PLUG AND SOCKET WIRING FOR CONTROLS USED IN 18Y4B, 18Y4E AND 18Y4L CHASSIS





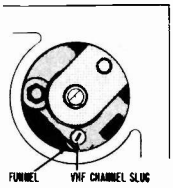
Admiral Schematic for 18Y4E, 18Y4L, 18Y4EF, 18Y4ES, 18Y4LS Television Chassis.

Chassis 18Y4B and 18Y4BS are practically identical to the chassis listed above. Also Chassis 18Y4BSA, 18Y4EFA, 18Y4ESA, 18Y4LSA, 18Y4PSA are the same in their main circuits to these other sets, but use other type tuners. Chassis 19Y4G and 19Y4GF are combinations with their TV circuitry like these other chassis. Chassis 19Y4RF and 19Y4PRS are also similar but have automatic tuning switch assembly.

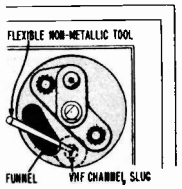


ADMIRAL

Chassis	Used in Models
17Z3D	T23A1, T23A2, T23A3
17Z3DC	C23A26, C23A27
17Z3DT	C23A11, C23A12, C23A13, T23A6, T23A7

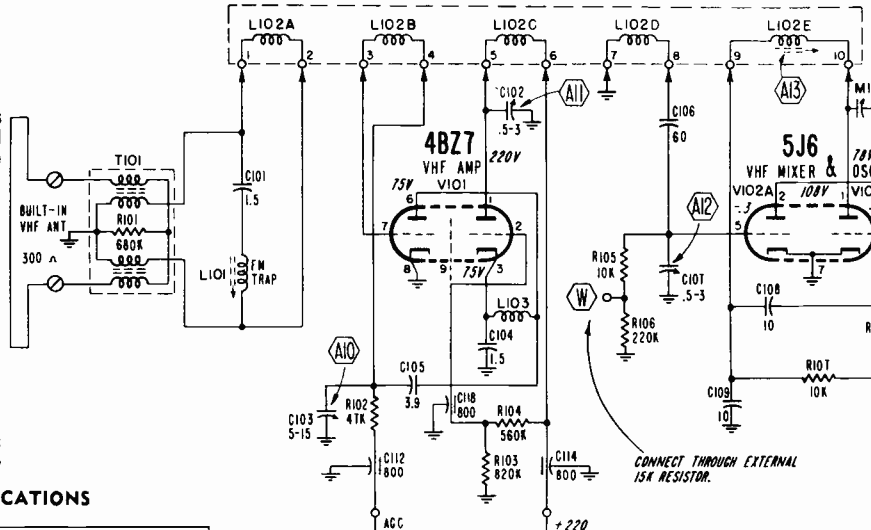


View through hole in glass and mask, knobs removed in models with Removable Molding.

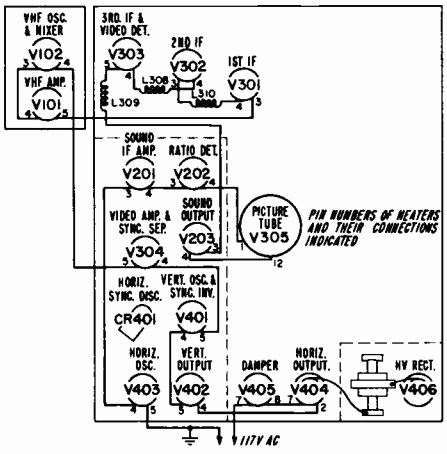


View through holes in picture window retaining disc in models with Golden Picture Frame.

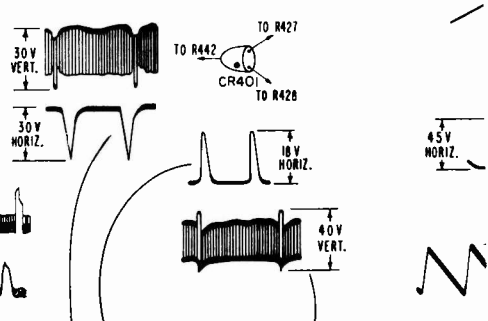
VHF TUNER 94D 122-1



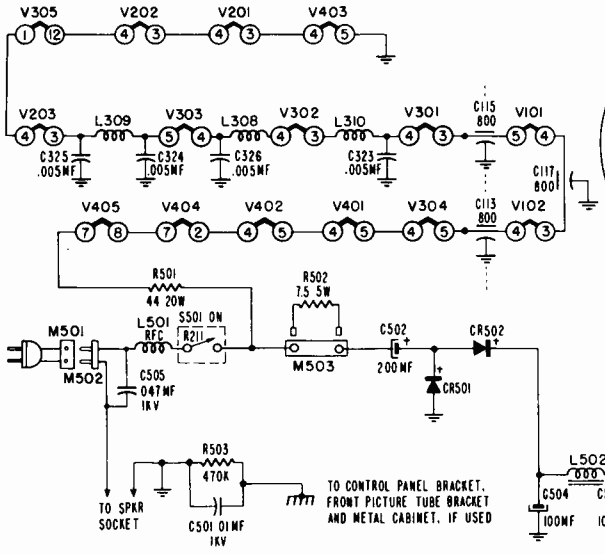
TUBE LOCATIONS

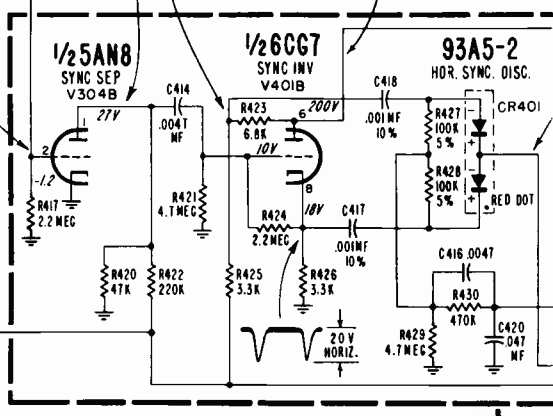


For schematic notes, conditions for observing waveforms and for measuring voltages see similar material on page 14.



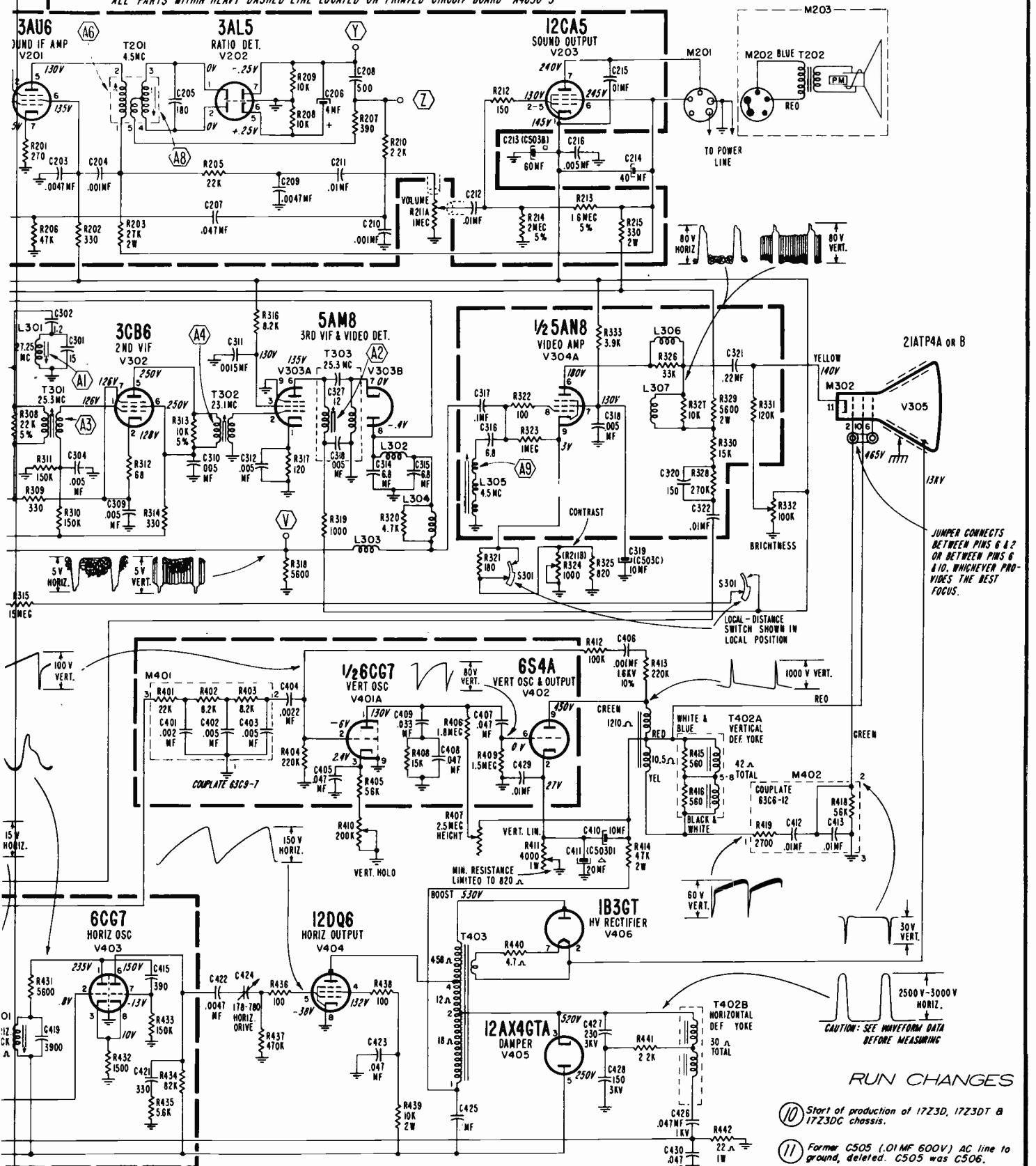
V101—4BZ7
V102—5J6
V201—3AU6
V202—3AL5
V203—12CA5
V301—3CB6
V302—3CB6
V303—5AM8
V304—5AN8
V305—21ATP4A or 21ATP4B
V401—6CG7
V402—6S4A
V403—6CG7
V404—12DQ6
V405—12AX4GTA
V406—1B3GT
CR401—Dual selenium diode 93A5-2





Admiral Corporation — Schematic for 17Z3D, 17Z3DT, and 17Z3DC Television Chassis Stamped Run 10 Through 11

ALL PARTS WITHIN HEAVY DASHED LINE LOCATED ON PRINTED CIRCUIT BOARD A4630-3



RUN CHANGES

(10) Start of production of 17Z3D, 17Z3DT & 17Z3DC chassis.

(11) Former C505 (.01 MF 600V) AC line to ground, deleted. C505 was C506.

ADMIRAL Chassis 18Z4ES, 18Z4ESA, 18Z4FS, 18Z4FSA, 18Z4LSA, 18Z4PS, 18Z4PSA.

This schematic is exact for 18Z4ESA and 18Z4PSA (Run 10). The remaining chassis listed above differ in tuner types used or in other minor ways.

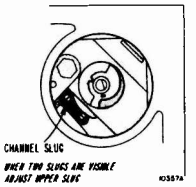
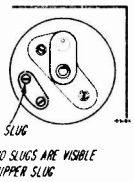


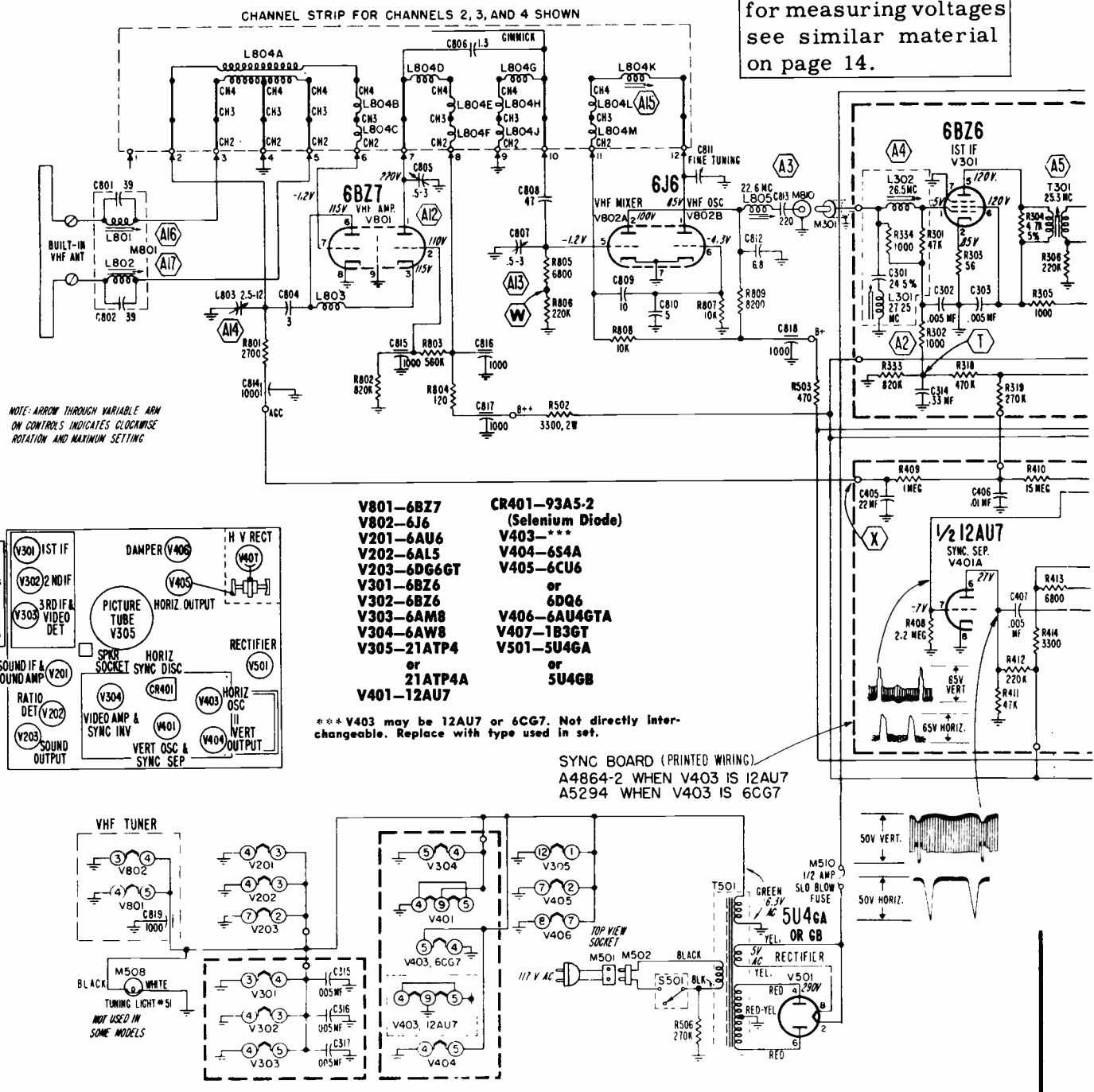
TABLE MODELS
View through hole in glass and mask, knobs removed.



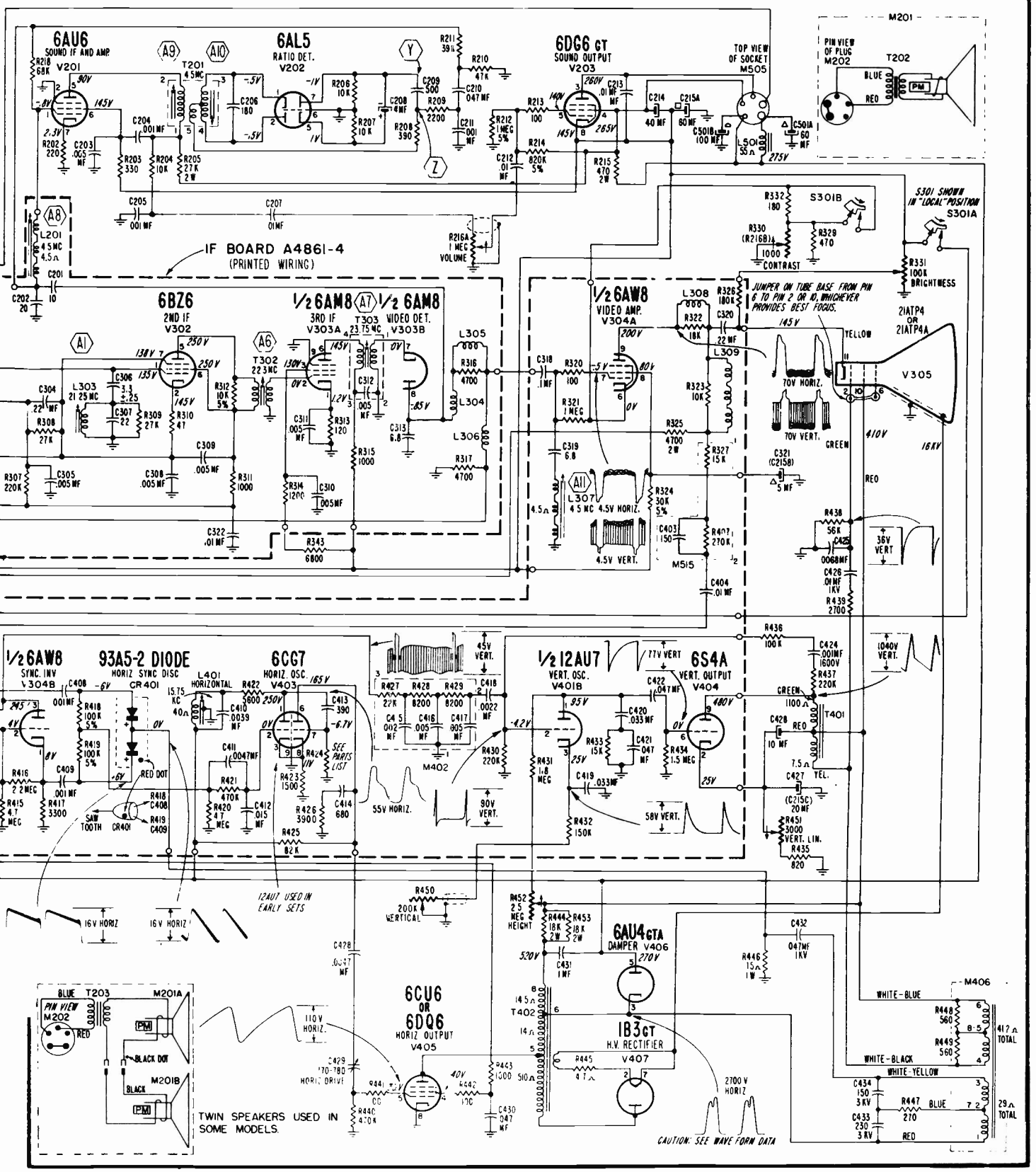
CONSOLE MODELS
View through holes in picture window retaining disc.

For schematic notes, conditions for observing waveforms and for measuring voltages see similar material on page 14.

VHF TUNER 94D100-2



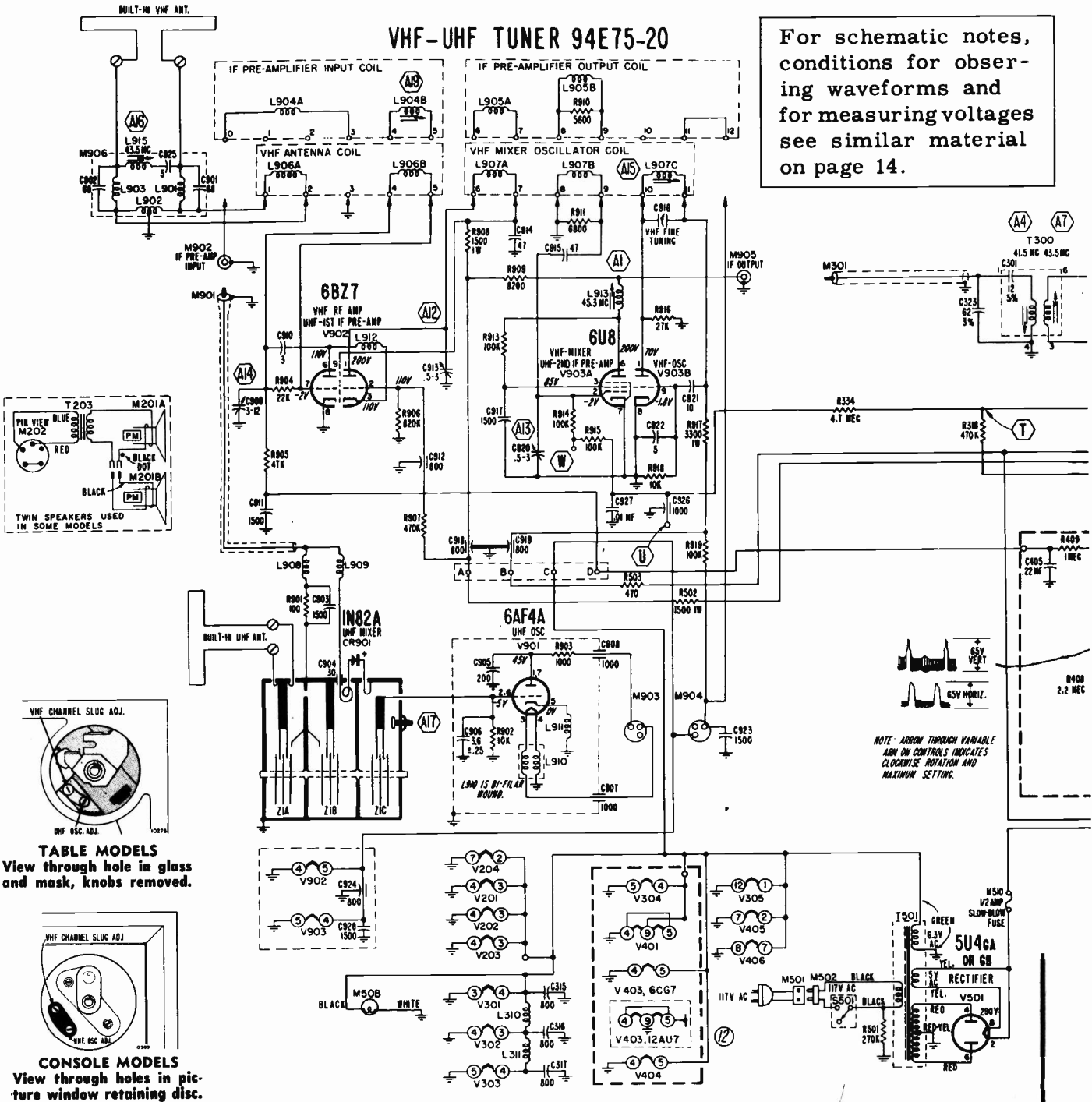
ADMIRAL Chassis 18Z4ES, 18Z4ESA, 18Z4FS, 18Z4FSA, 18Z4LSA, 18Z4PS, 18Z4PSA, Used in Models C323A6, C323A7, C323A16, C323A17, C323A19, C325A6, -A, C325A7, -A, T323A1, -A, T323A2A, T323A3, -A, T2301DSA, T2302DSA, T2303DSA.



Admiral Schematic for 19SZ4D, 19SZ4DT, 19SZ4ES, 19SZ4FS, 19SZ4PS Television Chassis

Stamped Run 10 Through Run 13

Chassis	Used in Models
19SZ4D	TS23A1, TS23A2, TS23A3
19SZ4DF	CS23B16C, CS23B17C (This chassis is similar to others)
19SZ4DT	CS23A11, CS23A12, CS23A13, CS23A16C, TS23A6, TS23A7
19SZ4ES	CS23A26, CS23A27, CS323A6, CS323A7, CS323A16, CS323A17, CS323A19
19SZ4FS	CS325A6, CS325A7
19SZ4PS	TS323A1, TS323A2, TS323A3



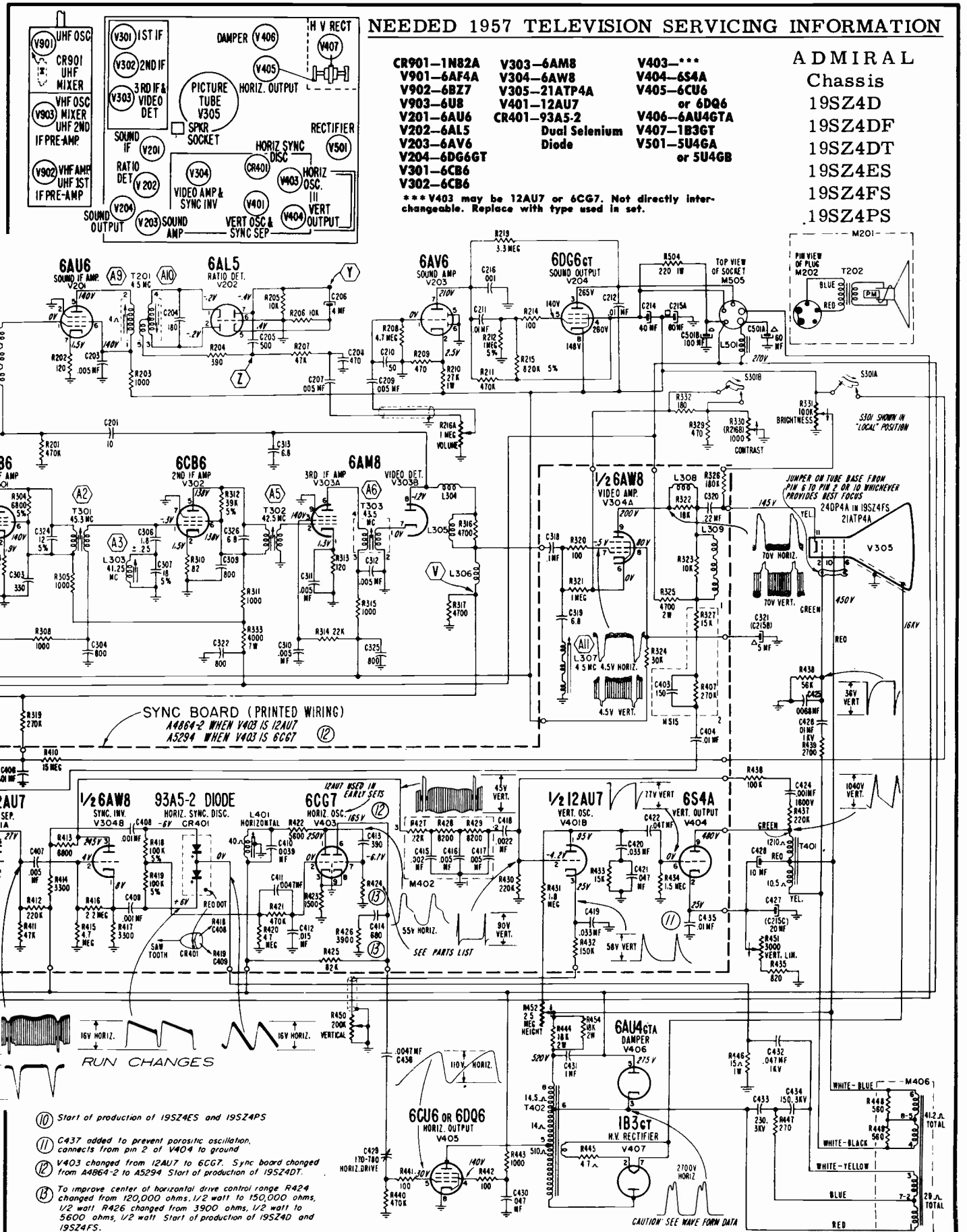
For schematic notes, conditions for obsering waveforms and for measuring voltages see similar material on page 14.

NEEDED 1957 TELEVISION SERVICING INFORMATION

CR901—1N82A
V901—6AF4A
V902—6BZ7
V903—6U8
V201—6AU6
V202—6AL5
V203—6AV6
V204—6DG6GT
V301—6CB6
V302—6CB6
V303—6AM8
V304—6AW8
V305—21ATP4A
V401—12AU7
CR401—93A5-2 Dual Selenium Diode
V403—***
V404—6S4A
V405—6CU6 or 6DQ6
V406—6AU4GTA
V407—1B3GT
V501—5U4GA or 5U4GB

***V403 may be 12AU7 or 6CG7. Not directly interchangeable. Replace with type used in set.

ADMIRAL
Chassis
19SZ4D
19SZ4DF
19SZ4DT
19SZ4ES
19SZ4FS
19SZ4PS



(10) Start of production of 19SZ4ES and 19SZ4PS

(11) C437 added to prevent parasitic oscillation, connects from pin 2 of V404 to ground

(12) V403 changed from 12AU7 to 6CG7. Sync board changed from A4864-2 to A5294 Start of production of 19SZ4DT.

(13) To improve center of horizontal drive control range R424 changed from 120,000 ohms, 1/2 watt to 150,000 ohms, 1/2 watt R426 changed from 3900 ohms, 1/2 watt to 5600 ohms, 1/2 watt Start of production of 19SZ4D and 19SZ4FS.

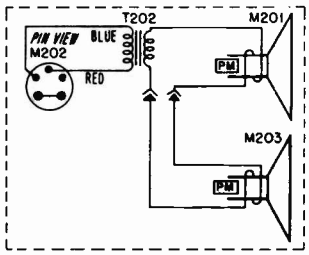
Admiral Schematic for 20Z4EF, 20Z4PS Television Chassis Stamped Run 10 Through Run 13

Chassis 20Z4FF is similar to other chassis.

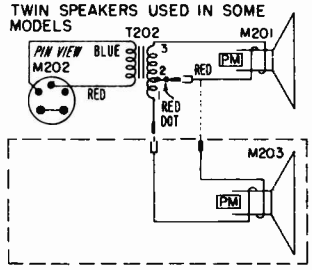
Chassis	Used in Models
20Z4EF	C323B2, C323B3, C323B26, C323B27
20Z4FF	C325B26, C325B27
20Z4PS	T323B1, T323B2, T323B3

For schematic notes, conditions for observing waveforms and for measuring voltages, see similar material on page 14.

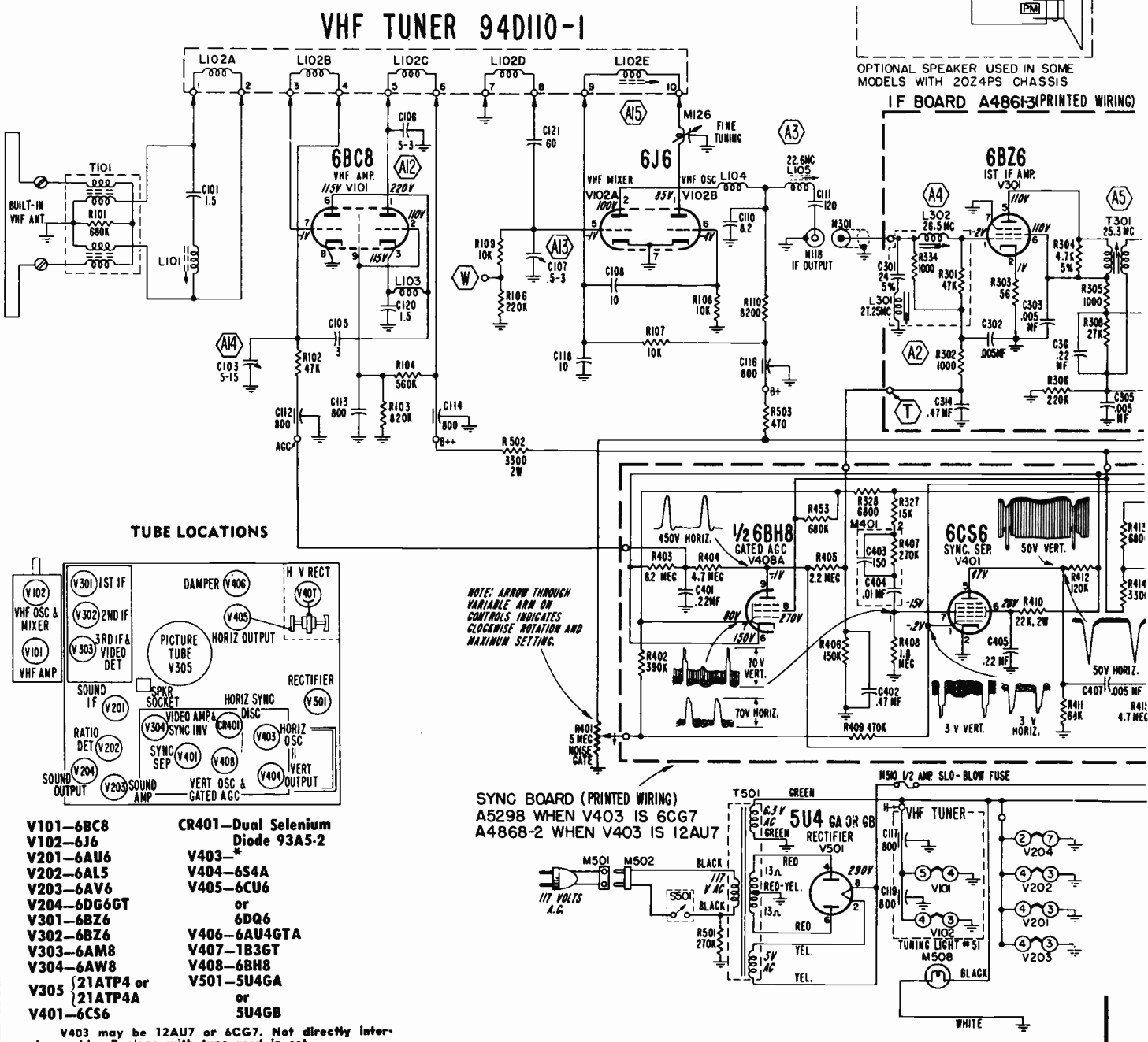
For additional service material see page 26.



TWIN SPEAKERS USED IN SOME MODELS



OPTIONAL SPEAKER USED IN SOME MODELS WITH 20Z4PS CHASSIS



TUBE LOCATIONS

V101—6BC8
V102—6J6
V201—6AU6
V202—6AL5
V203—6AV6
V204—6DG6GT
V301—6BZ6
V302—6BZ6
V303—6AM8
V304—6AW8
V305 {21ATP4 or 21ATP4A}
V401—6CS6
CR401—Dual Selenium Diode 93A5-2
V403—*
V404—6S4A
V405—6CU6 or 6DQ6
V406—6AU4GTA
V407—1B3GT
V408—6BH8
V501—5U4GA or 5U4GB

V403 may be 12AU7 or 6CG7. Not directly interchangeable. Replace with type used in set.

RUN CHANGES

(10) *Start of production*

(11) *To prevent possibility of parasitic oscillation V404 circuit C440 was added from cathode to chassis ground.*

(12) *V402 changed from 12AU7 to 6CG7 tube. Syns board changed from A4868-2 to A5298.*

(13) *For improved centering of C429 Horiz. Drive control, R424 was changed from 120K to 150K ohms. R426 was changed from 3,900 to 5,600 ohms in sync boord A5298.*

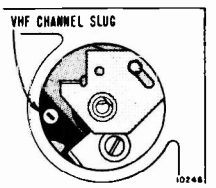
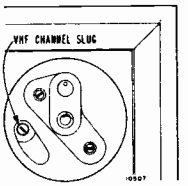
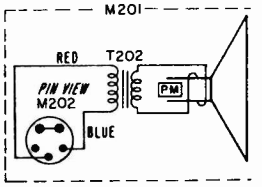


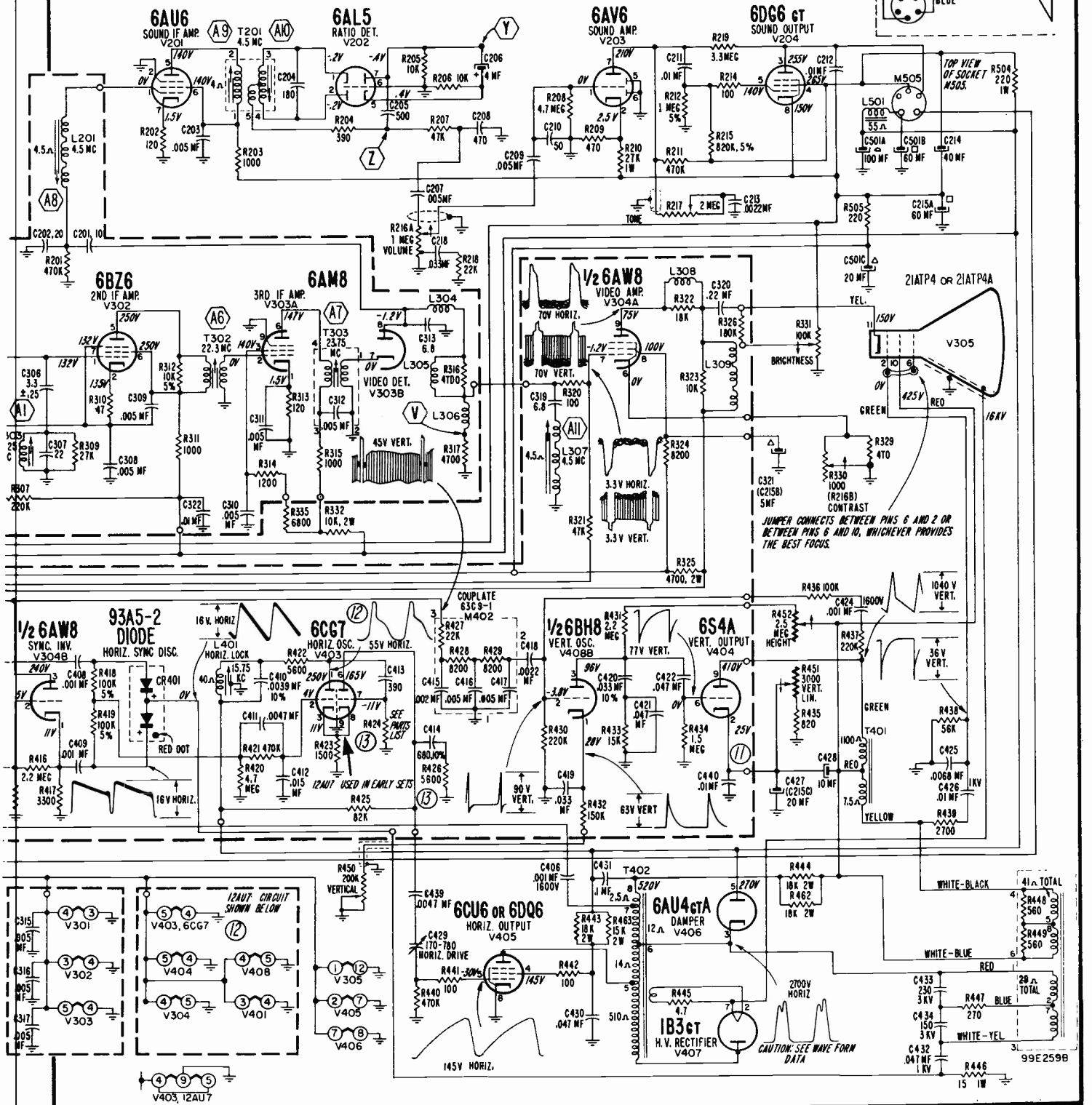
TABLE MODELS
View through hole in glass and mask, knobs removed.



CONSOLE MODELS
View through holes in picture window retaining disc.

Admiral





Admiral Corporation Schematic for 20SZ4EF, 20SZ4PS Television Chassis

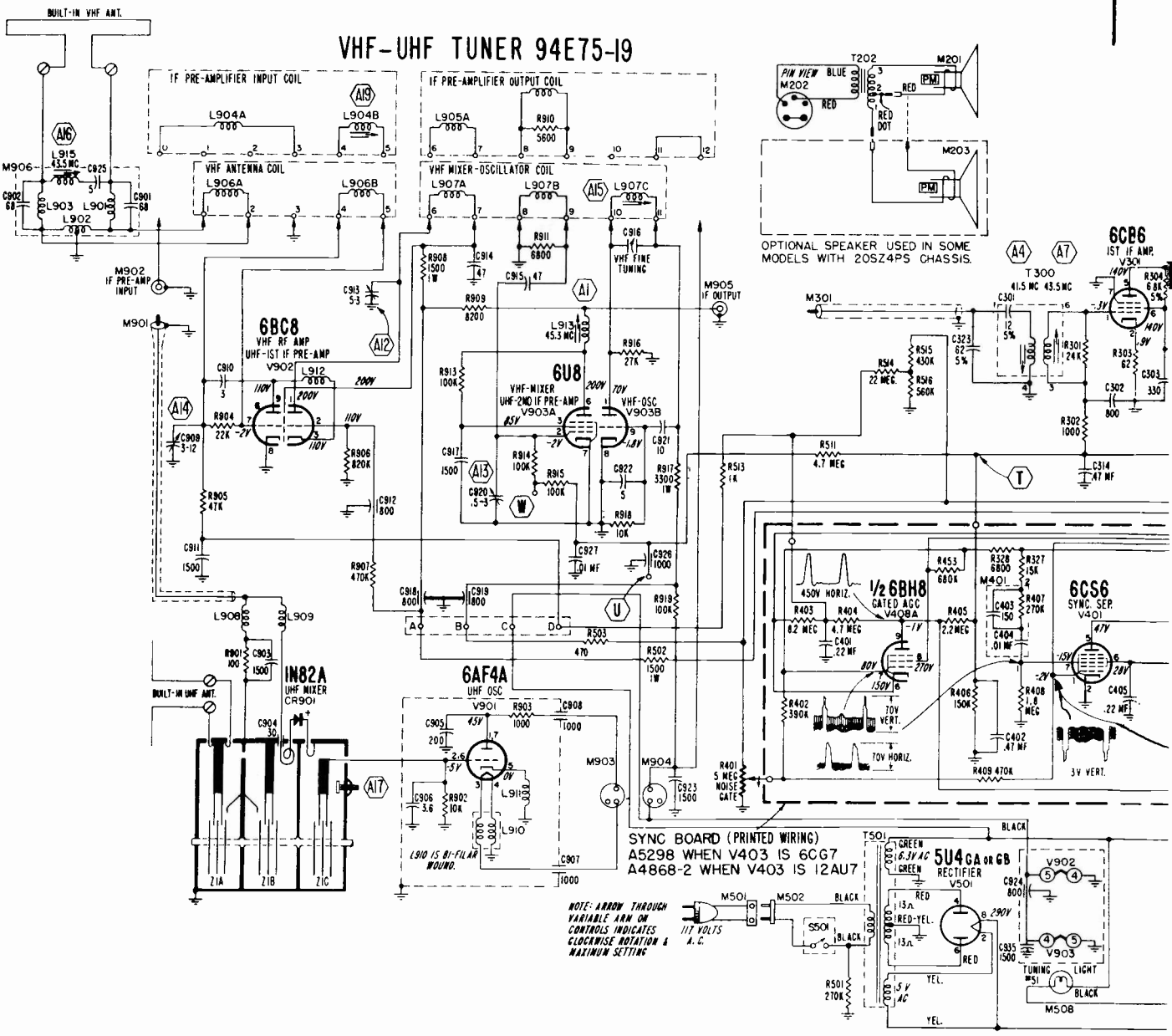
CHICAGO, ILLINOIS

Stamped Run 10

Chassis 20SZ4FF is similar to other chassis. List of models is given below.

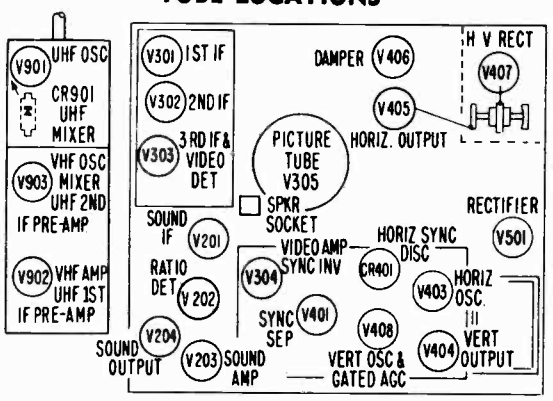
Chassis	Used in Models
20SZ4EF	CS323B2, CS323B3, CS323B26, CS323B27
20SZ4FF	CS325B26, CS325B27
20SZ4PS	TS323B1, TS323B2, TS323B3

For schematic notes, conditions for observing waveforms and for measuring voltages, see similar material on page 14.



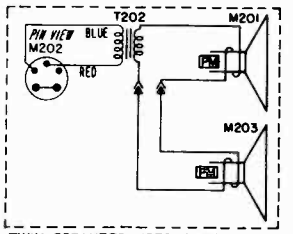
ADMIRAL

TUBE LOCATIONS

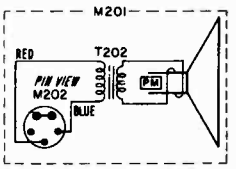


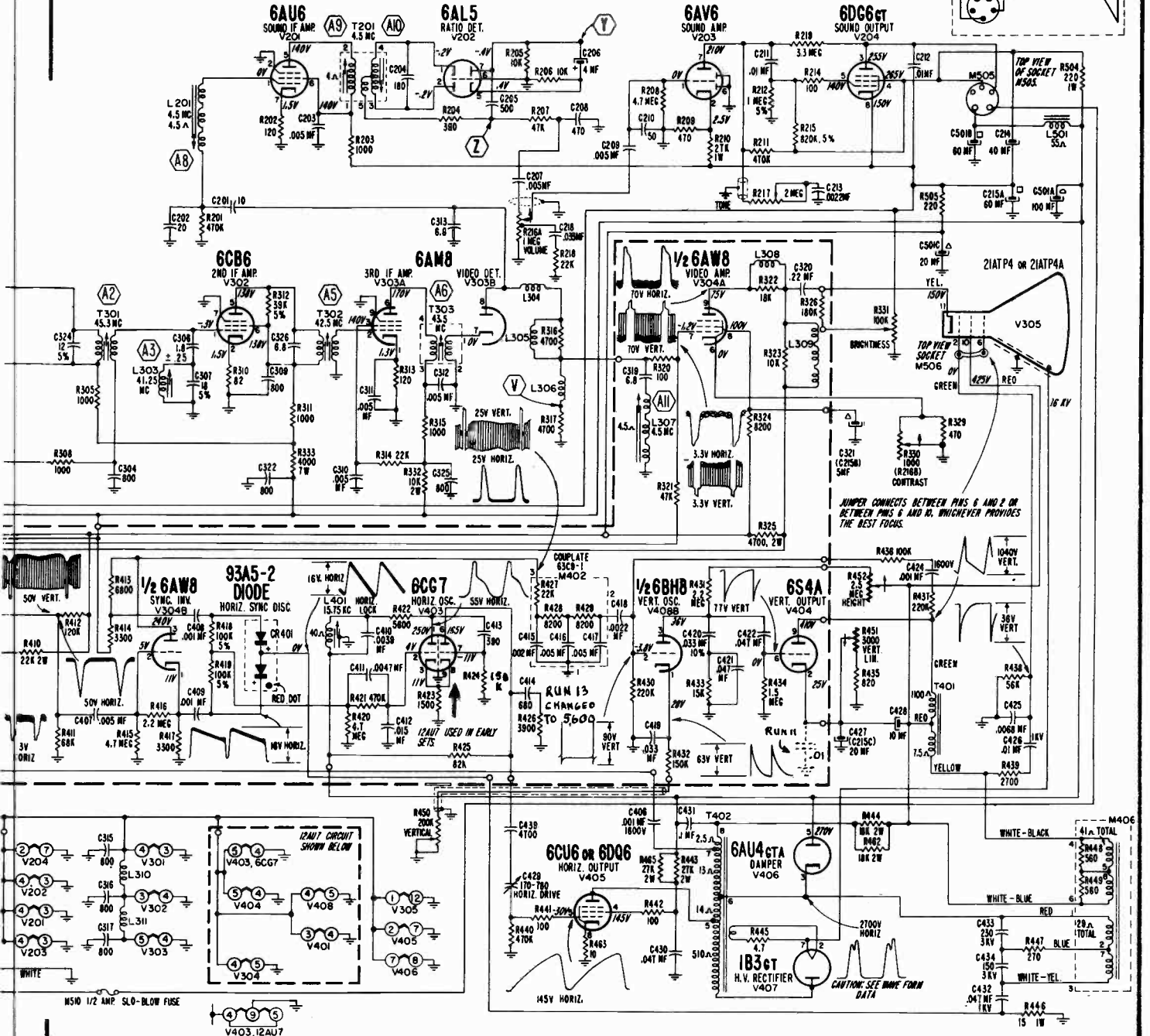
TUBE COMPLEMENT

CR901—1N82A	V305—21ATP4 or 21ATP4A
V901—6AF4	V401—6CS6
V902—6BC8	CR401—Dual Selenium Diode 93A 5-2
V903—6U8	V403—see * note below
V201—6AU6	V404—6S4A
V202—6AL5	V405—6CU6 or 6DQ6
V203—6AV6	V406—6AU4GTA
V204—6DG6GT	V407—1B3GT
V301—6CB6	V408—6BH8
V302—6CB6	V501—5U4GA or 5U4GB
V303—6AM8	
V304—6AW8	



TWIN SPEAKERS USED IN SOME MODELS





ADMIRAL Chassis 20Z4EF, 20Z4FF, 20Z4PS

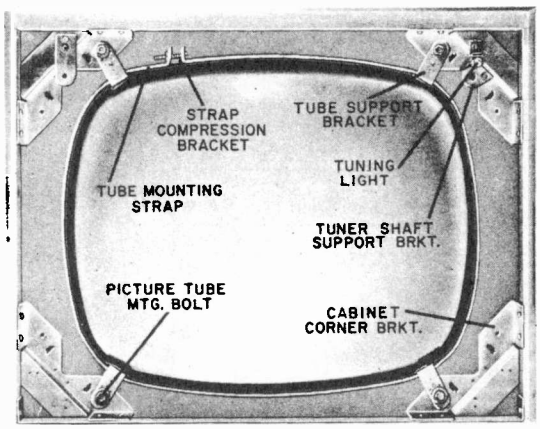
(Continued from pages 22-23)

CHECK NOISE GATE

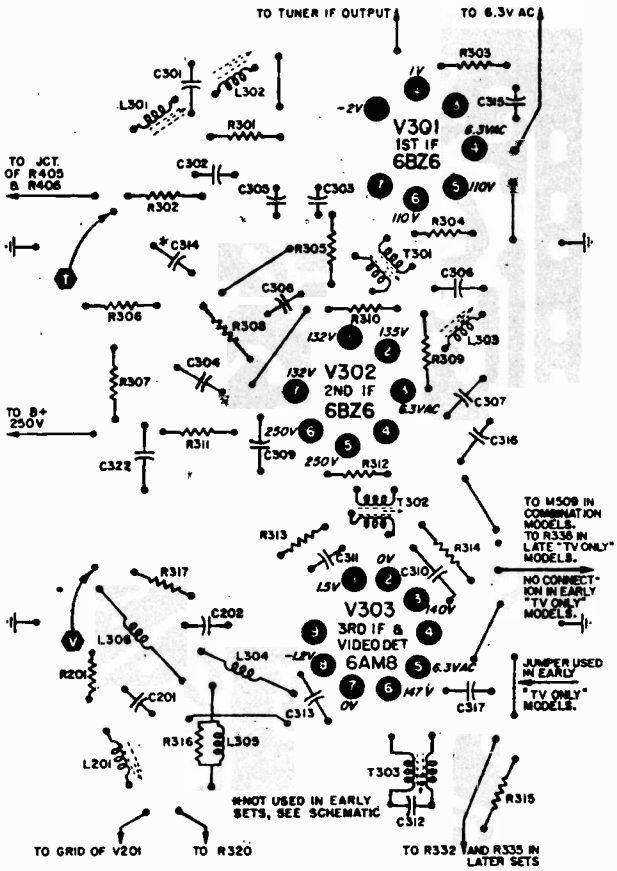
The **Noise Gate** control is used to improve sync stability in fringe and noisy areas.

Set the **Noise Gate** fully to the left (counterclockwise). Set the **Channel Selector** for the strongest TV station. (Be sure that the **Vertical** and **Horizontal** adjustments are correct.) If the picture is unstable (jitters or rolls), slowly turn the **Noise Gate** control to the right until the picture just becomes stable. Check adjustment on other TV stations, and if necessary, readjust control.

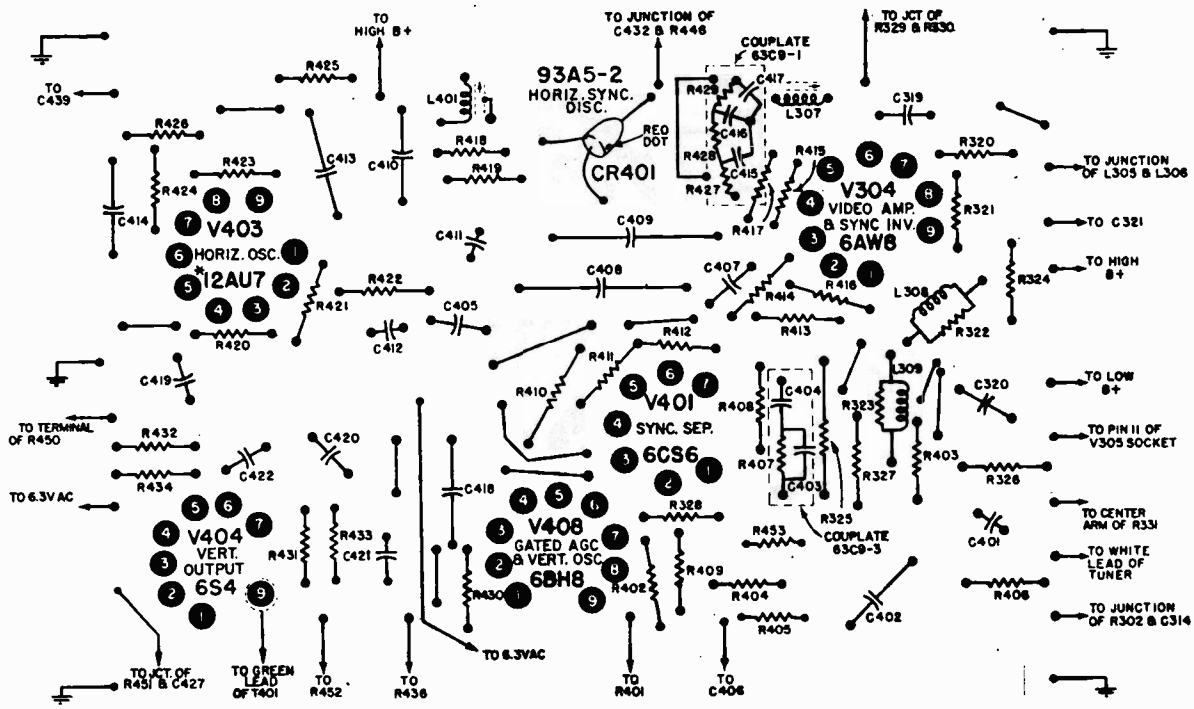
Caution: If the **Noise Gate** is turned too far clockwise for a strong signal, the picture may roll vertically, tear horizontally or disappear.



Front View of Cabinet, Glass and Mask Removed.



View of PRINTED WIRING SIDE of IF Board. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.



* V403 IS 12AU7 IN SYNC. BOARD A4868-2; V403 IS 6CG7 IN SYNC. BOARD A5298. WHEN V403 IS 12AU7, PINS 4 & 5 CONNECT TO 6.3V. AC, PIN 9 IS GROUNDED. WHEN V403 IS 6CG7, PIN 5 CONNECTS TO 6.3V. AC, PINS 4 & 9 ARE GROUNDED.

View of PRINTED WIRING SIDE OF Sync Board. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

T20
T20-1

Chassis T20 and T20-1, used in Models K2250, K2251, T2250, T2251

(See next page, over, for schematic diagram. Other tuners also used.)

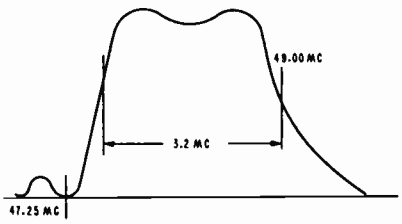
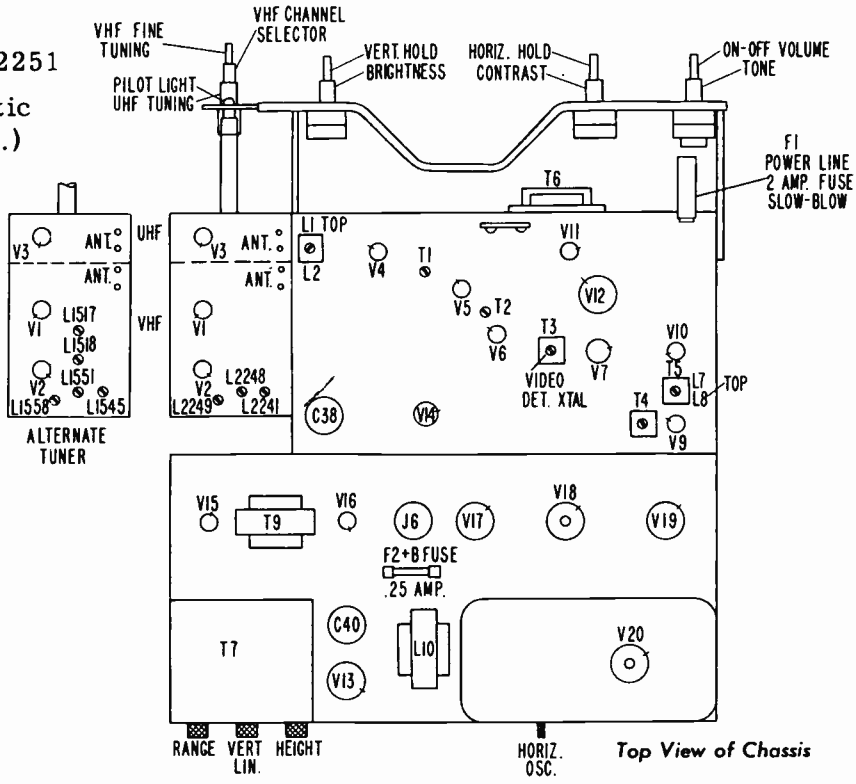


Figure 4. I-F Response Curve



Top View of Chassis

CURRENT DISTRIBUTION DIAGRAM

Current flow throughout the T20 television receiver can be traced by using the simplified distribution diagram (figure 5). Power distribution is unique in that voltage cascading is utilized, which means that two or more tubes are connected in what is termed "plate current series" with one another. Such an arrangement consumes less power, due to the fact that tubes are used as plate voltage dropping resistors for the succeeding stages; therefore the voltage drop that normally takes place across this resistance is utilized for amplification. In the receiver, the audio output tube V12 acts as a voltage dropping resistor for several stages; namely V2, V3, V6, V7B, and V9. The parallel impedance of these stages, in conjunction with resistor R24P (brightness) and R41, forms the cathode resistor of V12; consequently, if V12 becomes defective, the supply voltage to the tubes in its cathode circuit will be altered causing inefficient operation. Another case of "plate current series" is in the i-f strip involving V4 and V5. The second i-f amplifier, V5, acts as the voltage dropping resistor for the first i-f amplifier, V4.

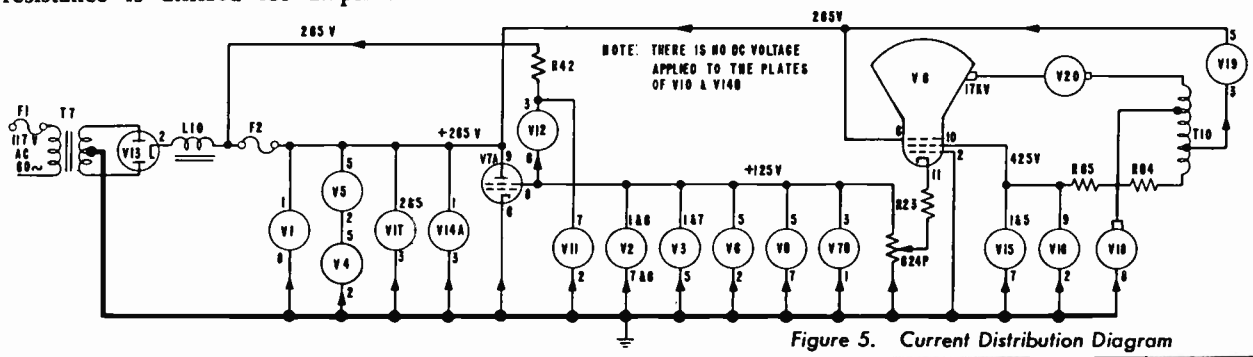
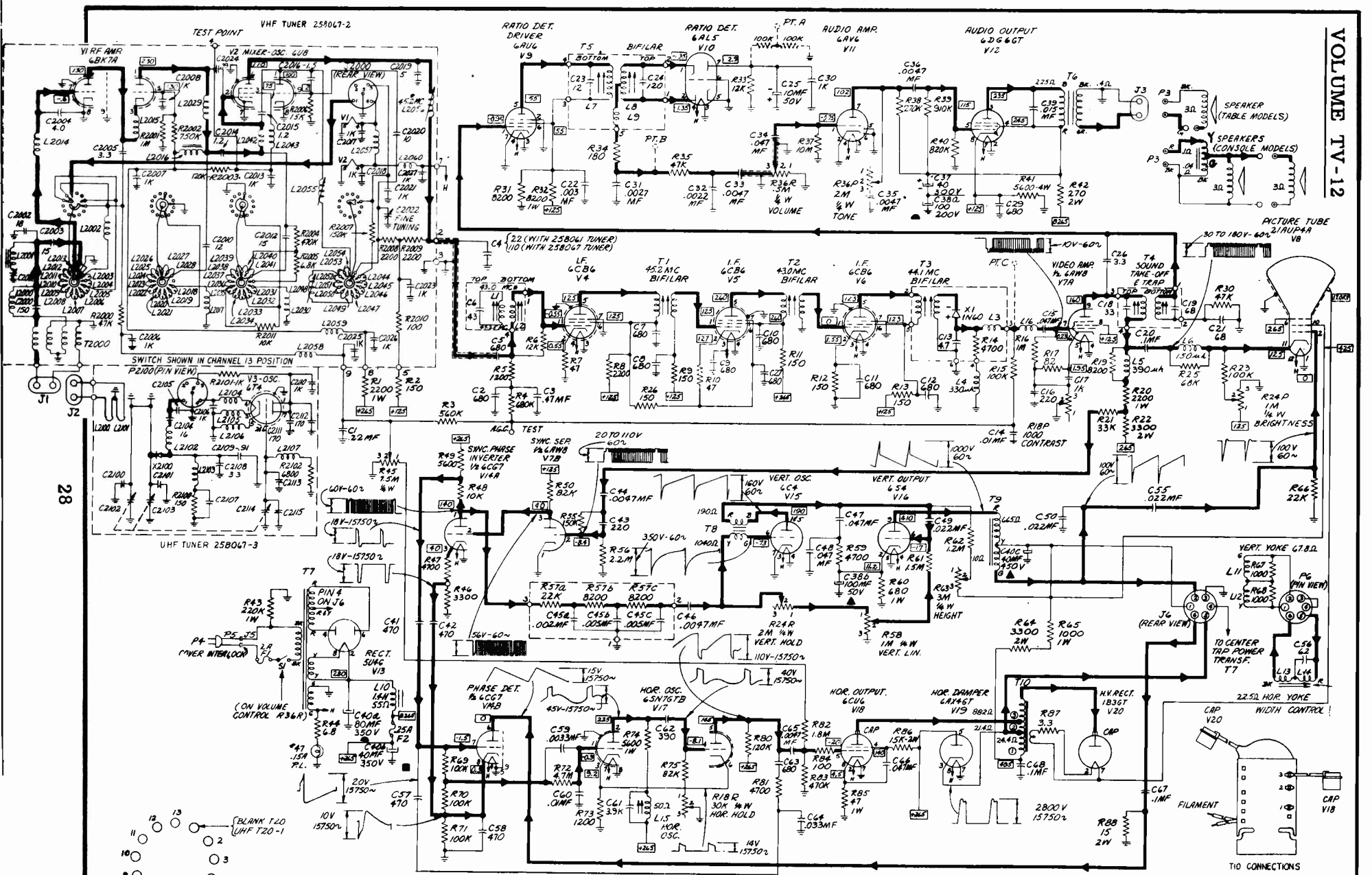


Figure 5. Current Distribution Diagram



Schematic Diagram for Bendix TV Chassis T20 and T20-1

Models K2250, K2251, T2250, T2251

CAPEHART-FARNSWORTH COMPANY

"CX-38S" SERIES

Picture Size and Linearity

Adjust the horizontal drive control in a CCW direction until drive lines and/or compression appear near the center of the raster. Then turn the drive control CW until the drive lines and/or compression just disappear. If no drive lines and/or compression appear, leave control 2 full turns from full CW position. Then adjust the Width control for proper picture width.

Adjust the Height and Vertical Linearity controls to obtain the proper height and vertical linearity. It may be necessary to adjust the Vertical Hold control while making these adjustments if the picture should roll.

Picture Lock Adjustment

The Picture Lock control allows for proper adjustment of the noise clipping action of the Sync Separator. This control is normally left in the extreme clockwise position and should only be adjusted if the received signal is being distorted (picture tear) by noise pulses. Then the adjustment is as follows:

Rotate the control slowly in the counter-clockwise direction while observing the picture on the CRT screen. As the control is rotated, a slight shift will be noticed in the picture. The control should be set to a position just prior to the point where it causes the shift.

If the picture shift is not noticed when adjusting this control, then this control should be adjusted in conjunction with the sync controls and set to the position which provides best stability. This will be evident as good interlace, no jitter, etc.

MODEL INFORMATION

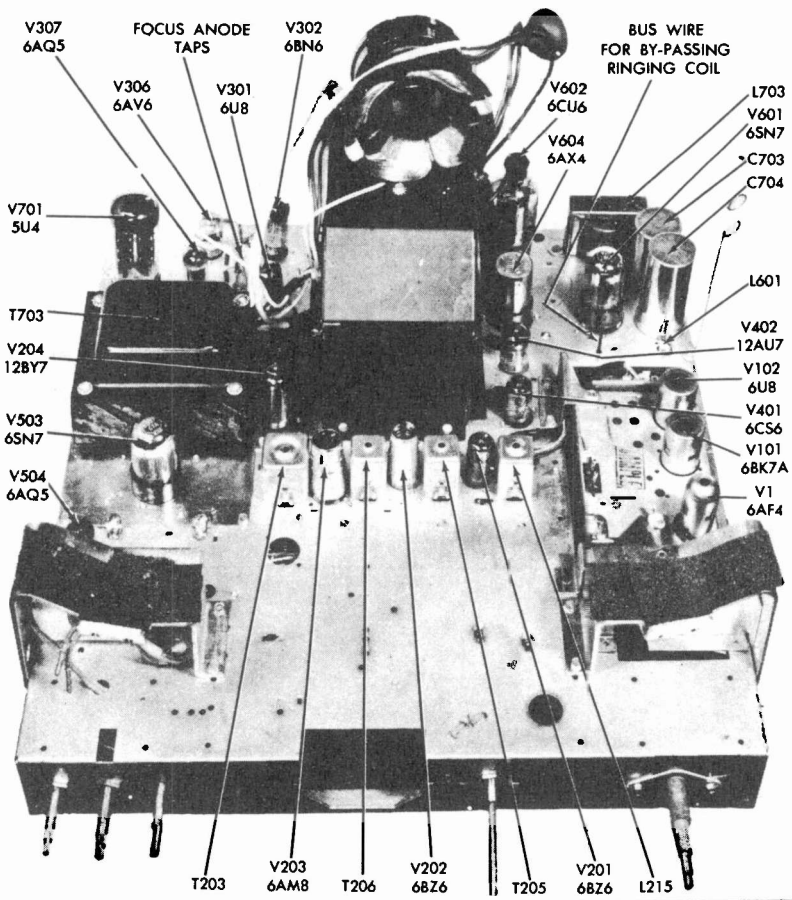
There have been four basic models released in this series to date. These models are available either with or without UHF. The UHF/VHF models can be easily identified by the suffix "-5" that appears after the model number. The VHF only models can be easily identified by the suffix "-4" that appears after the model number and these models can be adapted to all-channel operation by the insertion of the TK-3 Tuner Kit.

These new models numbers are:

3T216MD-4	11C216MD-5
3T216MD-5	11C216BD-4
3T216BD-4	11C216BD-5
3T216BD-5	16C216MD-4
6T216MD-4	16C216MD-5
6T216MD-5	16C216BD-4
6T216BD-4	16C216BD-5
6T216BD-5	16C216FD-4
11C216MD-4	16C216FD-5

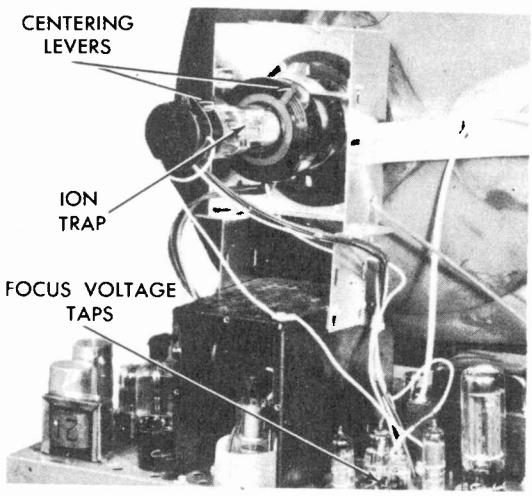
MD—Mahogany BD—Bisque FD—Fruitwood

(Material also on the next three pages)



Picture Centering and Focus

If the picture is off center and/or has a neck shadow, rotate either or both centering magnet levers to the right or left until the picture is centered on the screen. Then readjust the Ion Trap.



The tube used in this receiver is the new 90° deflection, electrostatic focus type 21ATP4. Since the characteristics of each tube may vary slightly, different focus electrode voltage taps are made available on a terminal board just to the right of the Hi Voltage Cage, as viewed from the rear of the chassis. It may be necessary to plug the focus lead into each tap to determine which voltage provides best focus. When checking each tap for the best focus the receiver should be turned off when making the change, as it is possible to receive a shock from the connectors. Voltage as high as 600 volts is present on this connector strip.

CAPEHART "CX-38S" SERIES TV CHASSIS

(21"-27" CRT Version)

Adjustment of the Horizontal Oscillator

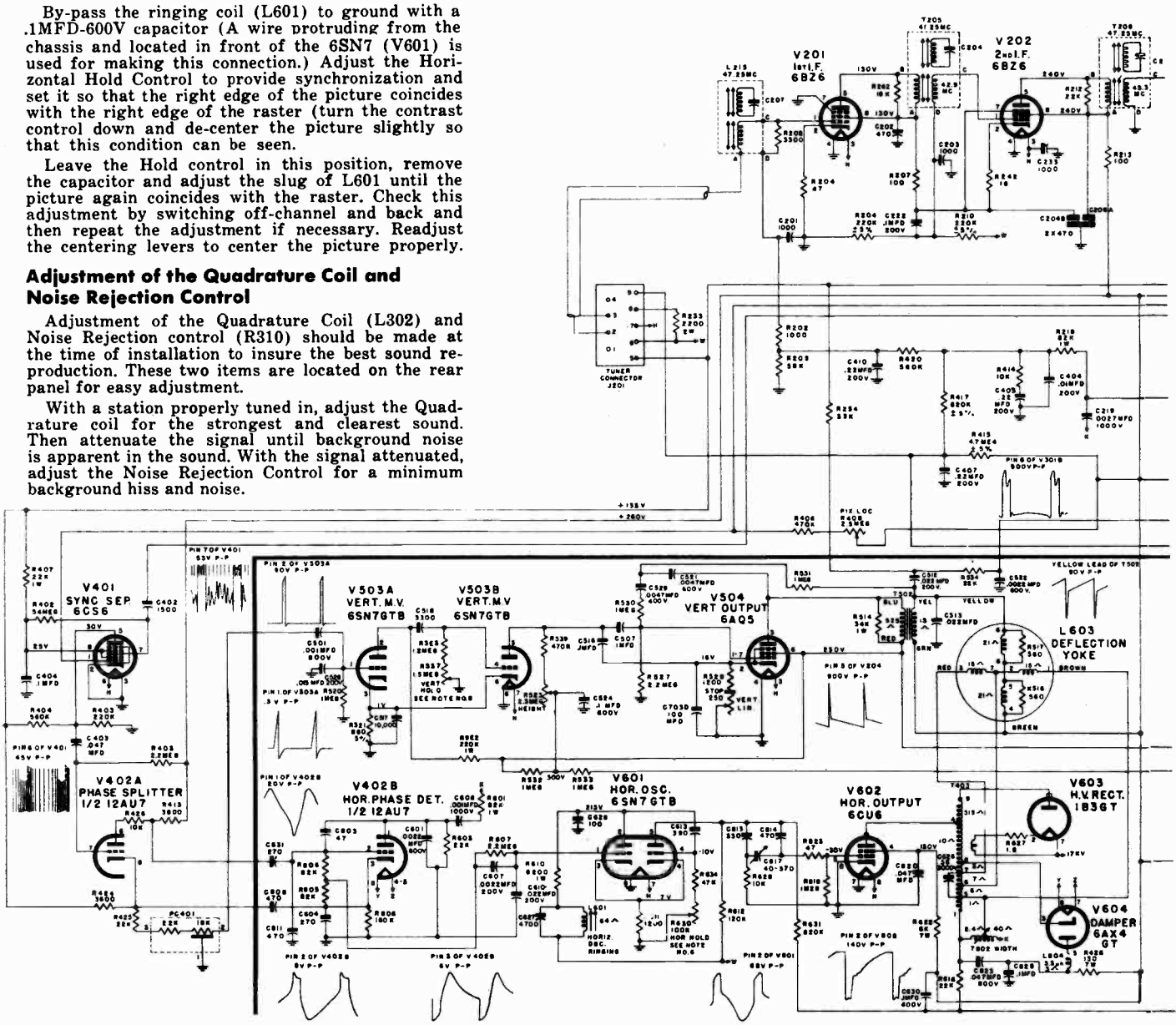
By-pass the ringing coil (L601) to ground with a .1MFD-600V capacitor (A wire protruding from the chassis and located in front of the 6SN7 (V601) is used for making this connection.) Adjust the Horizontal Hold Control to provide synchronization and set it so that the right edge of the picture coincides with the right edge of the raster (turn the contrast control down and de-center the picture slightly so that this condition can be seen.

Leave the Hold control in this position, remove the capacitor and adjust the slug of L601 until the picture again coincides with the raster. Check this adjustment by switching off-channel and back and then repeat the adjustment if necessary. Readjust the centering levers to center the picture properly.

Adjustment of the Quadrature Coil and Noise Rejection Control

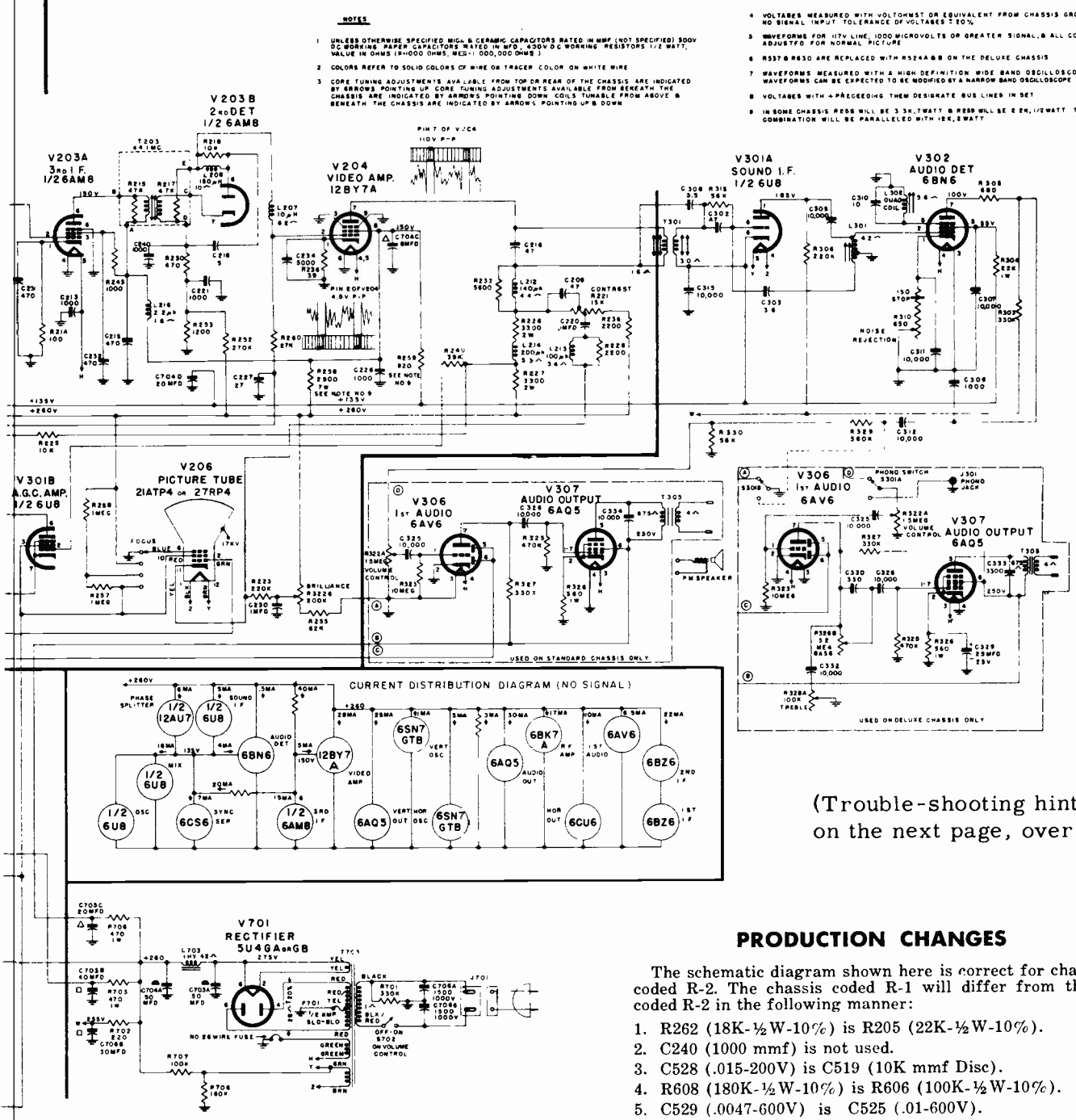
Adjustment of the Quadrature Coil (L302) and Noise Rejection control (R310) should be made at the time of installation to insure the best sound reproduction. These two items are located on the rear panel for easy adjustment.

With a station properly tuned in, adjust the Quadrature coil for the strongest and clearest sound. Then attenuate the signal until background noise is apparent in the sound. With the signal attenuated, adjust the Noise Rejection Control for a minimum background hiss and noise.



CAPEHART CX-38S CHASSIS TUBE SOCKET RESISTANCE CHART

REF. TUBE NO.	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V1 6AF4	INF	7.5K	Short	Short	Short	7.5K	70K		
V101 6BK7A	50K	470K	INF	Short	Short	INF	1.2 meg	Short	Short
V102 6U8	200K	500K	150K	Short	Short	7K	Short	Short	1.5K
V201 6BZ6	60K	47 ohm	Short	Short	INF	INF	Short		
V202 6BZ6	120K	INF	Short	Short	75K	75K	Open		
V203 6AM8	100. ohm	Short	75K	Short	Short	75K	1.8K	6K	Short
V204 12BY7	39 ohn	6.0K	Short	Short	Short	Short	60K	75K	Short
V205 CRT	100K	100K	Pin 10 1.2 meg	Pin 11 1.1 meg	Pin 12 100K	**Short			
V301 6U8	300K	100K	1.2 meg.	100K	100K	700K	75K	75K	120K
V302 6BN6	*850 ohm	3.6 ohm	Short	Short	80K	5.5 ohm	400K		



(Trouble-shooting hints on the next page, over.)

PRODUCTION CHANGES

The schematic diagram shown here is correct for chassis coded R-2. The chassis coded R-1 will differ from those coded R-2 in the following manner:

1. R262 (18K-½W-10%) is R205 (22K-½W-10%).
2. C240 (1000 mmf) is not used.
3. C528 (.015-200V) is C519 (10K mmf Disc).
4. R608 (180K-½W-10%) is R606 (100K-½W-10%).
5. C529 (.0047-600V) is C525 (.01-600V).

REF. TUBE NO.	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V306 6AV6	1. meg	Short	Short	Short	1.1 meg	1.1 meg	400K		
V307 6AQ5	470K	560 ohm	Short	Short	75K	75K	470K		
V401 6CS6	33K	Short	Short	Short	160K	75K	5 meg		
V402 12AU7	22K	330K	100K	100K	100K	70K	2.7 meg	INF	80K
V503 6SN7	1.1 meg	270K	680 ohm	*2.7 meg	*3. meg	680 ohm	Short	Short	
V504 6AQ5	2.2 meg	*1.5K	Short	Short	70K	70K	2.2 meg		
V601 6SN7	2.2 meg	70K	1200 ohm	*147K	190K	1200 ohm	Short	Short	
V602 6CU6	1.2 meg	Short	1.2 meg	70K	1. meg	180K	Short	Short	
V603 1B3	NC	INF	NC	NC	NC	NC	INF	NC	
V604 6AX4	60K	NC	1.25 meg	NC	70K	1.25 meg	100K	100K	
V701 5U4GA	1.2 meg	70K	1.0 meg	13	90K	13	90K	50K	

(With 20,000 Ohm per Volt Meter) *Varies with a Control Setting. **Varies with Focus Tap Position.

CAPEHART **TROUBLE-SHOOTING NOTES ON THE CX-38S SERIES TV CHASSIS (Con't)**

Picture Circuits

1. No Picture, No Sound, Raster Present.
   Use Oscilloscope to trace video signal. If video is not present at output of video detector, check:
   (A) R-F tubes V101 and V102 or I-F tubes V201, V202, V203 and associated components.
   (B) Voltage readings on all R-F and I-F tube pins.
   (C) Plate and screen load-resistors and by-pass capacitors in the R-F and I-F stages.
   If video signal at Video Detector is normal, check:
   (A) Video Amplifier tube V204.
   (B) Voltage readings on the video amp. (12BY7) V204.
   (C) Resistors R226 and R227. Peaking Coil L209 and L214 for open.

2. No Picture, Sound O.K., Raster Present.
   Use oscilloscope to trace video signal from video detector to isolate defective component. If video checks normal at the plate of the video amp., but is not present at cathode of picture tube, check:
   (A) Contrast control R221 for open.
   (B) Coupling capacitor C220 for open.

3. A Single Wide Black Bar (60 cycle hum) in Picture.
   Use oscilloscope to observe video signal at output of video detector. If video shows hum modulation, check:
   (A) Tubes in R-F and I-F stages for heater-to-cathode leakage.
   If no hum is present at the detector output, check:
   (A) Video amp. (12BY7 V204) and the picture tube for heater-to-cathode leakage.

4. Smear in Picture, Check:
   (A) Video amp. tube (12BY7) V204.
   (B) Peaking coils L212 and L213 for open.
   (C) Capacitor C220 for leak.
   (D) Alignment of I-F Stages—Check response curve with sweep generator and oscilloscope.

5. Trailing Whites (Ringing in Picture)
   If condition is not present on all channels, check:
   (A) Fine tuning adjustment for proper tuning. If not obtainable, check adjustment of local oscillator on the channels involved.
   If conditions are present on all channels, check:
   (A) Value of Detector load-resistors R217-230-253.
   (B) Alignment of I-F Stages.

Sound Circuit

1. No Sound or Weak Sound—Picture O.K. Check:
   (A) 1st Audio Tube 6AV6 (V306) and 6AQ5.
   (B) Audio Detector tube 6BN6 (V302) by substitution.
   (C) Sound I-F tube ½6U8 (V301A) by substitution.
   (D) Voltage readings on 6BN6 (V302) and 6U8 (V301A).
   (E) Volume Control R322A and R323.
   (F) Resistors R310, R306, R305, R304.
   (G) Coupling Capacitors C305 and C306 for open.
   (H) Output Transformer, T301 and speaker.
   (I) Alignment of 4.5 MC Sound and I-F and sound detector.

2. "Buzz" In Sound—Picture Okay
   In some instances "buzz" in the sound may be the result of a transmitter difficulty. If the buzz is not a transmission difficulty, check:
   (A Adjustment of Noise Rejection Control (R310) and/or Quadrature Coil (L302). Follow procedure outlined in Service Manual.
   If satisfactory adjustment cannot be made, check:
   (A) Quadrature Coil (L302) for short or open.
   (B) Noise Rejection Control (R310).
   (C) By-Pass capacitor—(C-311) for short.

3. Distorted Sound
   Check Audio Output stage by feeding audio signal into grid of 6AQ5 tube and observe signal at plate of this tube with a scope. Also check tone through speaker. If signal is distorted, check:
   (A) Output transformer and speaker.
   If audio section shows no evidence of distortion, check:
   (A) Coupling capacitor C312 for leak.
   (B) By-Pass capacitor C307 for open.
   (C) Alignment of Sound I-F and Detector circuits.

Horizontal Sync — AFC and Sweep Circuits

1. Loss of horizontal sync:
   If vertical sync is also critical, check:
   (A) Sync Separator 6CS6 (V401) and Phase Splitter 12AU7 (V402) tubes.
   (B) Sync Coupling Capacitors C402 and C403.
   (C) Resistors R225, R404, R424, R426, R424 and R413 for open.
   If Vertical Sync is normal check:
   (A) Capacitors C631 and C608 for open.
   (B) Resistors R606 and R601 for open.

2. "Jittery" Horizontal Sync:
   Check:
   (A) Horizontal Phase Detector 12AU7 (V402B) tube.
   (B) Value of resistors R604, R605 and R607.
   (C) Capacitor C607 for open.

3. Extreme Horizontal Sweep Distortion (Picture Distorted—Horizontal Sync Critical) Check:
   (A) Horizontal Phase Detector 12AU7 (V402B) and Horizontal Oscillator 6SN7 (V601) tubes for heater-to-cathode leakage.

4. Three Overlapping Pictures (Horizontal Osc. frequency too high).
   If adjustment of horizontal osc. cannot correct condition, check:
   (A) Horizontal Osc., 6SN7 (V601) tube by substitution.
   (B) Capacitor C615 for open.
   (C) Resistor R629 for open.

5. Tearing at Top of Picture:
   If adjustments of Horizontal Osc., AGC and Pix Lock Control do not correct condition, check:
   (A) Capacitor C627 for open.

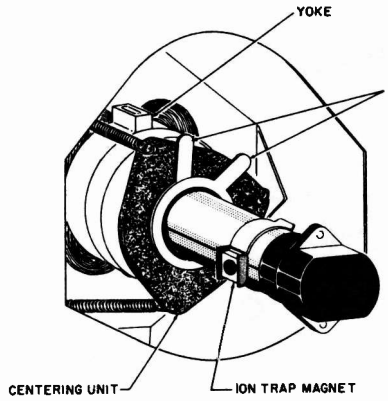
6. No Raster—No High Voltage:
   Use Oscilloscope to check waveform at grid (pin 5) of Horizontal Output 6CU6 (V602). If waveform is normal, check:
   (A) Horizontal Output 6CU6 (V602) H.V. rectifier 1B3GT (V603) and Damper 6AX4 (V604) tubes.
   (B) Horizontal Winding of Deflection Yoke and Horizontal Output Trans. (T603) for open.
   (C) Resistor R627 open.
   If waveform at grid (pin 5) of 6CU6 (V602) is not normal, check:
   (A) Horizontal Osc. 6SN7 (V601) tube.
   (B) Coupling capacitor C614 and resistor R625 for open.
   (C) Horizontal Osc. plate-load resistors R610 and R612 for open.
   (D) Horizontal ringing coil L601 for open. Also check valves of other components in horizontal osc. circuit.

7. Insufficient Horizontal Sweep:
   If condition cannot be corrected by adjustment of Horizontal Drive and Width, check:
   (A) Horizontal Osc. 6SN7 (V601) Horizontal Output 6CU6 (V602), and Damper 6AX4 (V604) tubes.
   (B) Voltage readings on Horizontal Osc. 6SN7 and Horizontal Output 6CU6.
   (C) Valve of capacitor C623 in damper circuit, also capacitors C614, C615 and other components in Horizontal Osc. circuit.
   (D) Capacitor C620 for open.

8. Insufficient Horizontal Sweep with Foldover on Right Side:
   (A) Capacitor C614 for leakage.

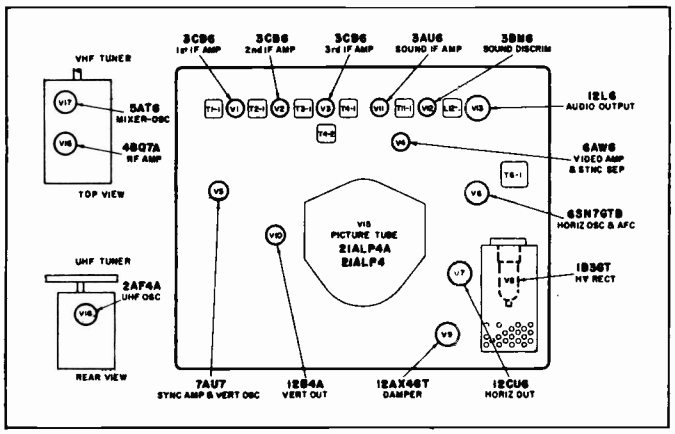
CBS

for Chassis	Models
2001	6T301, 6T303, 6T304, 6K321, 6K322
2002	6T301U, 6T303U, 6T304U, 6K321U, 6K322U, 6K327U, 6K328U
2003	6TR305, 6TR306, 6KR323, 6KR324, 6KR327, 6KR328

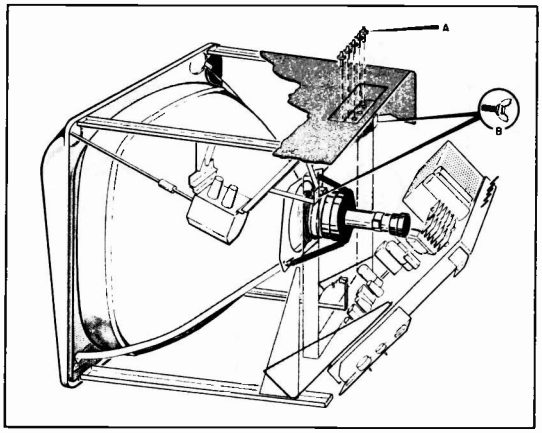


Chassis 2017, used in Models 6T101, 6T103, 6T104, is very similar to this material.

Horizontal Drive—If a bright vertical drive line appears in the picture, or if the picture is not wide enough to fill the mask, check the setting of the Drive control. The control is accessible through the hole in the back cover numbered 4. To adjust the control tune the receiver to a station and adjust all controls for best picture and sound. Using an insulated screwdriver, turn the Drive control counter-clockwise until a bright vertical line appears in the picture, then turn the control clockwise until the line just disappears.

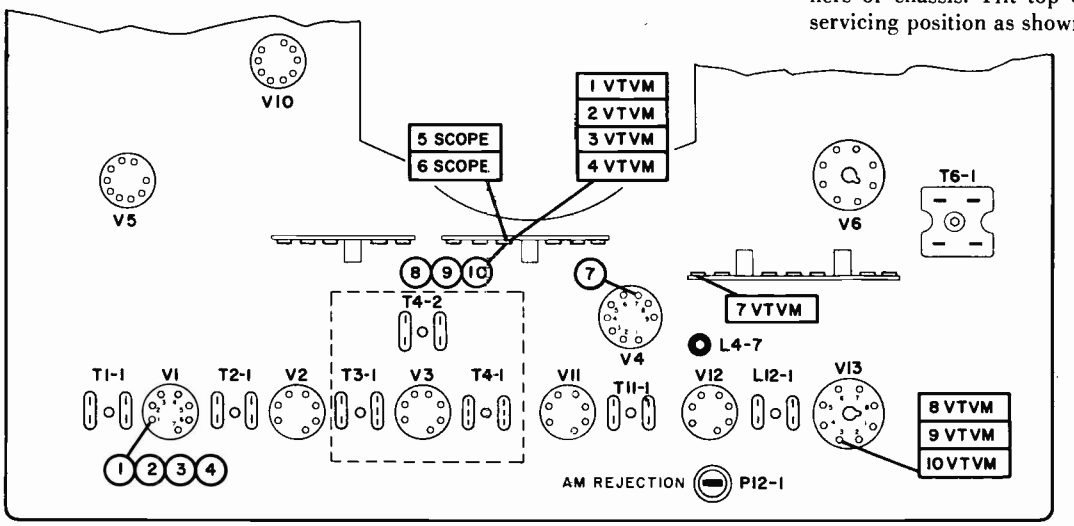


Tube Locations



Servicing Small Tubes—Remove cabinet back, knobs (A in figure 6) in top well, and two wing screws, (B) fastening upper left and right hand corners of chassis. Tilt top of chassis back into tube servicing position as shown in figure.

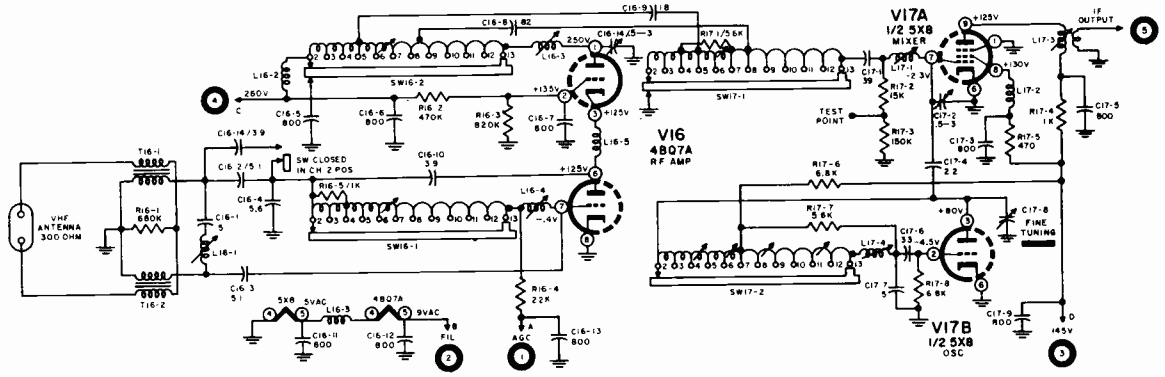
ALIGNMENT TEST POINTS



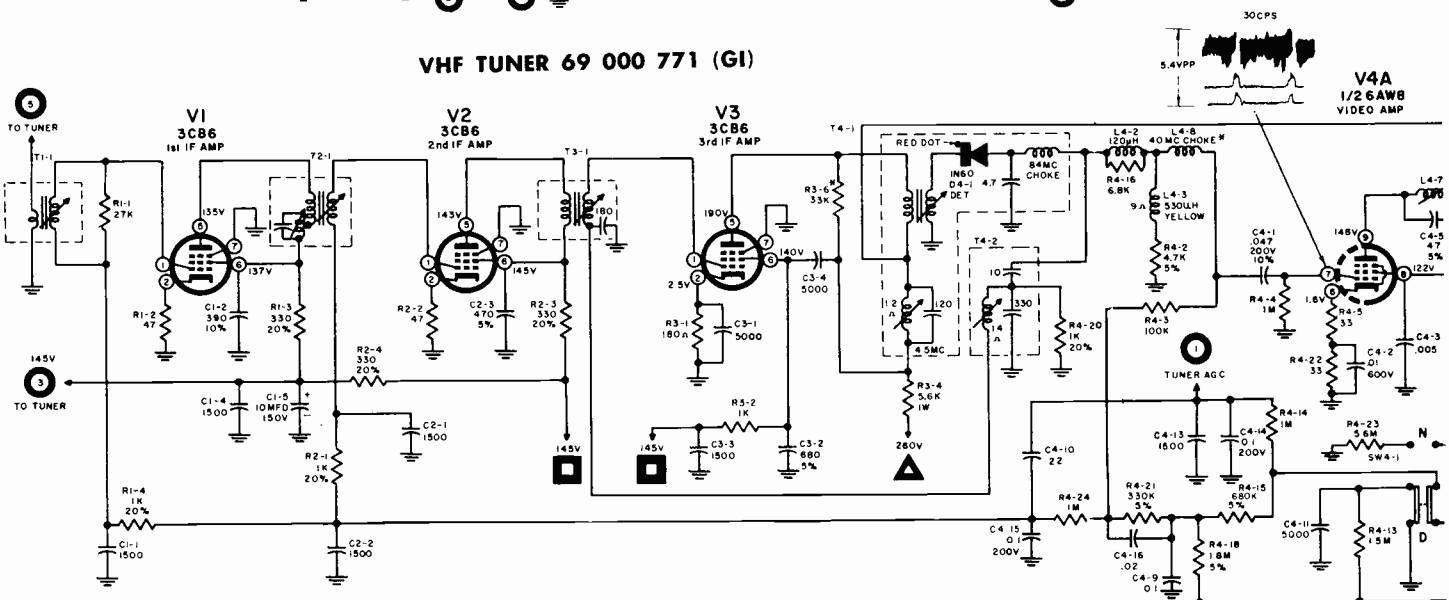
Alignment is on page 36. Circuit diagram is on pages 34-35.

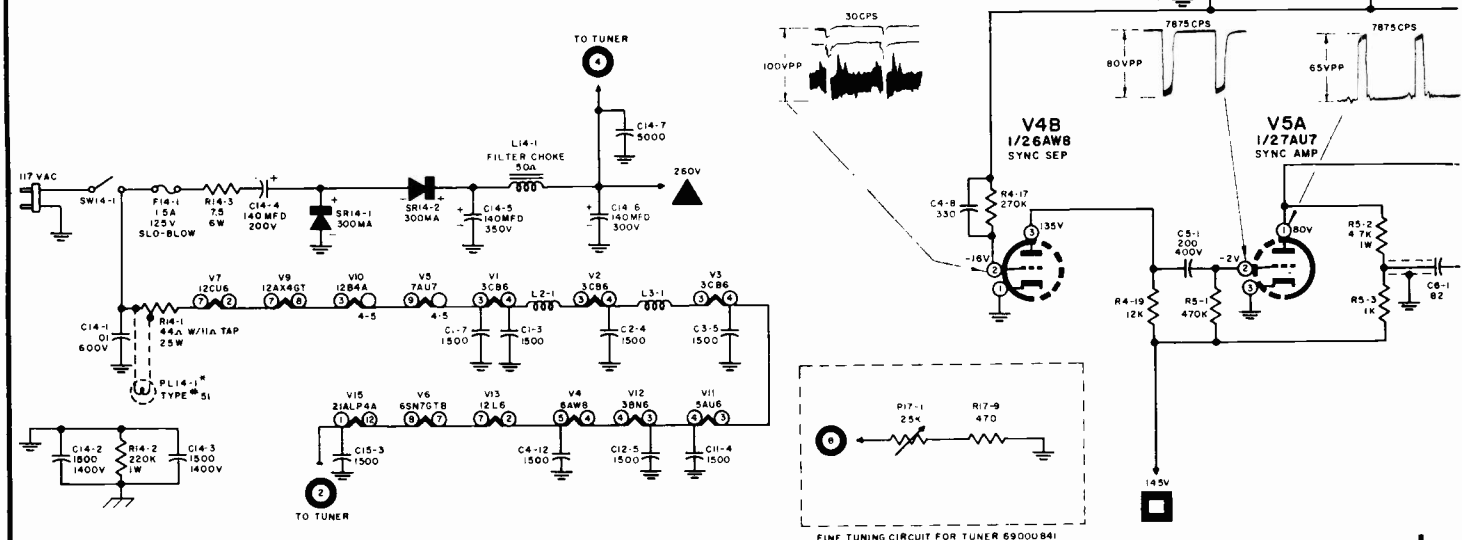
CBS-Columbia / A Division of the Columbia Broadcasting

2001, 2002 and 2003 Television Receiver Chassis



VHF TUNER 69 000 771 (GI)





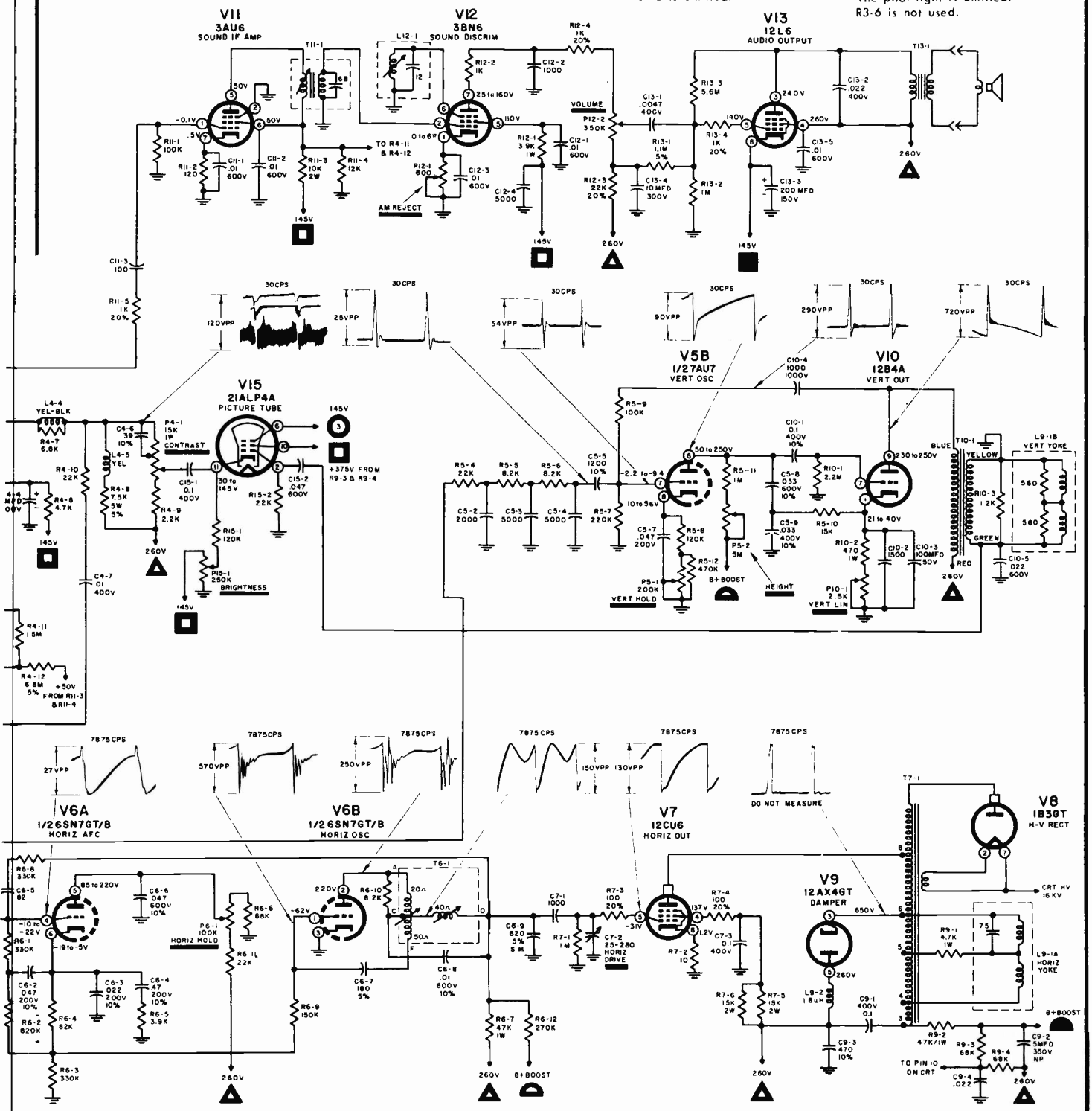
SCHEMATIC NOTES

1. Solid geometric symbols indicate B + voltage sources — open symbols indicate points of application.
2. Numbered circles indicate tuner lead connections.
3. Component symbols are coded to indicate tube near which component is located on schematic. Ex. C9-2; capacitar, located near V9.
4. All d-c voltages measured with a VTVM connected between the chassis and tube socket terminals, with channel selector set between channels and the Normal-Distant switch (SW4-1) in the normal position. Where readings are affected by control settings, voltages are shown for the clockwise and counterclockwise positions of the controls. Tuner voltages taken with channel selector set to an unused channel and the Normal Distant switch in the normal position.
5. All waveforms and peak to peak readings taken with strongest signal available; horizontal and vertical holds set at normal position.
6. All resistors are ½W, ±10% unless otherwise indicated. K=X1,000· M=X1,000,000.
7. All capacitors are 500 WV unless otherwise indicated. Values less than one are microfarads and values more than one are micro-microfarads, unless otherwise indicated.

*Indicates change in schematic, as listed below.

In 2001 & 2003 chassis
L4-8 is omitted.

In some chassis
The pilot light is omitted.
R3-6 is not used.

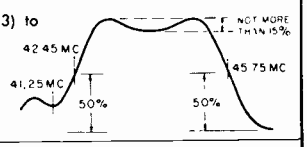


CBS – Columbia Chassis 2001, 2002, 2003, Alignment, Continued

ALIGNMENT PROCEDURE

VIDEO ALIGNMENT

Place channel selector between channels (to disable oscillator) and set Normal-Distant switch in NORMAL position. Disconnect ground lead from the cathode (pin 8) of V7, the 12CU6 horizontal-deflection amplifier Apply -3V bias to AGC line. Use lowest possible VTVM range for all steps.

Step	Signal Generator		Output Indicator	Connect to	Adjust
	Freq.	Connect to			
1	42.7 mc No sweep	Pin #1 of V1, thru 1000 mmf. (1)	VTVM	Junction L4-2 & L4-3 1 VTVM	Front slug T2-1 for maximum reading. Set sig. gen. for VTVM reading of —2.5 to —3V with T2-1 properly adjusted.
2	41.25 mc No sweep	As above (2)	VTVM	As above 2 VTVM	Rear slug T2-1 for minimum reading. Set sig. gen. for reading of —2.5 to —3V with T2-1 properly adjusted.
3	45.5 mc No sweep	As above (3)	VTVM	As above 3 VTVM	T3-1 for maximum reading. Set sig. gen. for VTVM reading of —2.5 to —3V with T3-1 properly adjusted.
4	44.2 mc No sweep	As above (4)	VTVM	As above 4 VTVM	Rear slug T4-1 for maximum reading. Set signal generator for reading of —2.5 to —3V with T4-1 properly adjusted.
5	43 mc Center freq. 10 mc deviation 42.45 mc and 45.75 mc	Mixer shield See Note 1 (5)	SCOPE	As above 5 SCOPE	T1-1 and tuner i-f coil (L17-3) to place 45.75 & 42.45 markers at 50% point (see curve). 
6	43 mc Center freq. 10 mc deviation	As above (6)	SCOPE	As above 6 SCOPE	If necessary retouch T2-1 & T3-1 to correct positions of 45.75 & 42-45 mc markers and rear slug of T4-1 for symmetrical curve.
7	4.5 mc No sweep	Pin #7 of V4, thru 1000 mmf. (7)	VTVM thru hi-Z xtal probe	Junction L4-4 & P4-1 7 VTVM	L4-7 for minimum reading.

SOUND ALIGNMENT

Step	Signal Generator		Output Indicator	Connect to	Adjust
	Freq.	Connect to			
8	4.5 mc AM 30% mod.	Junction L4-2 & L4-3 (8)	VTVM (AC)	Pin #3 V6 thru 0.01 mfd 8 VTVM	Front slug of T4-1, T4-2 and T11-1 for maximum output indication. Use lowest signal generator output that gives satisfactory indication. Increase bias to —6V and set Local-Distant switch to Normal before performing this step.
9	4.5 mc FM 25 kc dev.	As above (9)	VTVM (AC)	As above 9 VTVM	Volume control to approximate center and adjust L12-1 (quadrature coil) for maximum output indication.
10	4.5 mc AM 30% mod.	As above (10)	VTVM (AC)	As above 10 VTVM	P12-1 (A-M Rejection) for minimum output indication and repeat step 9.

NOTES: 1. Connect signal generator output lead to mixer-oscillator shield. Slip shield partially off tube and hold in place with tape. Do not ground shield.

CROSLEY

CHASSIS 474 **CHASSIS 475**

Models: JR-21CDBF **Models: JR-21CDBU**
JR-21CGDBF **JR-21CGDBU**
JR-21CDTMF **JR-21CDTMU**

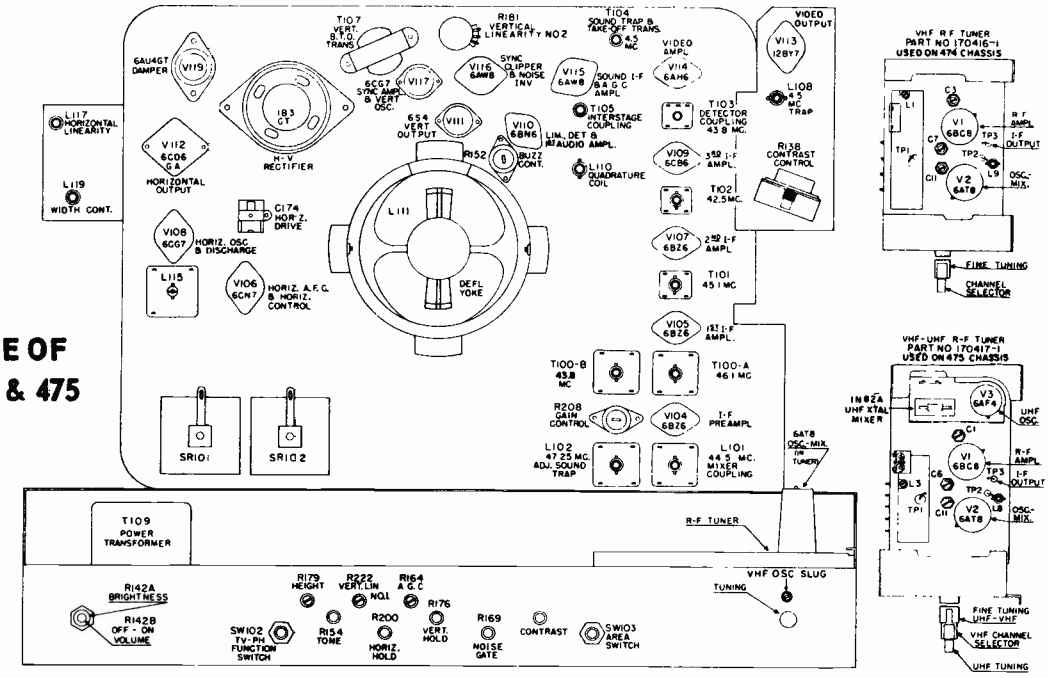
The service material on pages 37 through 42 is exact for sets listed above. The combination sets listed below have TV sections that are practically identical to sets described on these pages.

CHASSIS 478 **CHASSIS 479**

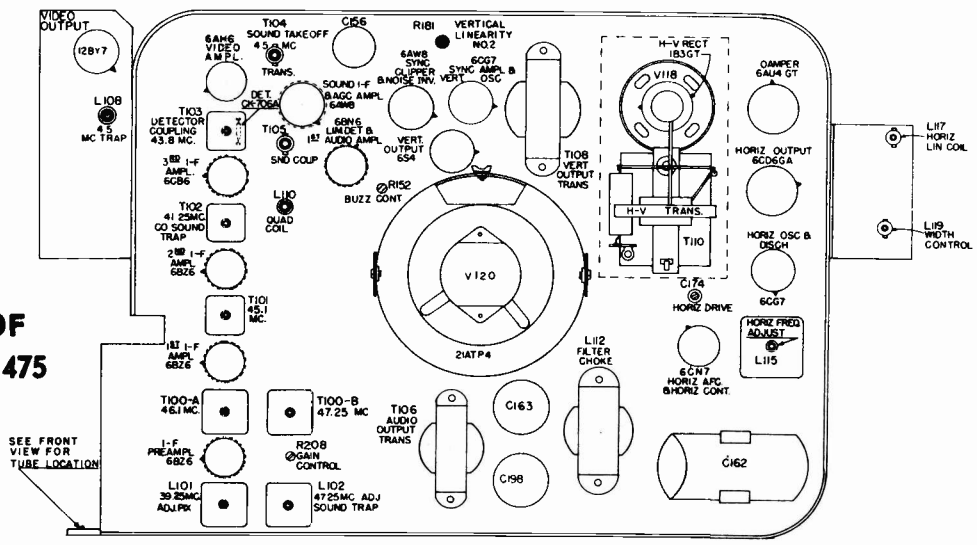
(Used with AM-FM Chassis 362-2)

Models: JR-21PDMF **Models: JR-21PDMU**
JR-21PDBF **JR-21PDBU**

WIRING SIDE OF CHASSIS 474 & 475



TUBE SIDE OF CHASSIS 474 & 475



VIDEO I. F. ALIGNMENT (with VTVM) CROSLEY Chassis 474, 475, 478, 479, Continued

NOTE: **BIAS FOR I.F. ALIGNMENT** - Connect the negative lead of a 3 volt bias battery to the junction of R226 and R227 (RF bias). Connect jumpers from that point to the junction of R228 and C111 (Pre-amp bias), and to the junction of R124 and C113, (1st I. F. Bias). Connect the positive lead of the battery to chassis.

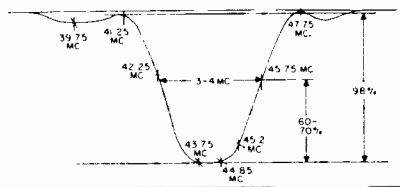
VTVM CONNECTION: Ground the detector load at L108 lug 2. Connect VTVM to junction of R127 2700 ohm detector load and L106. Connect VTVM ground lead to chassis.

Always limit input of signal generator so that VTVM reading does not exceed 2 v. dc.

Step No.	Connect Signal Generator thru a 1000 mmf capacitor	Signal Gen. Alignment Frequency	Miscellaneous Connections and Instructions	Adjust
1.	Test Point No. 2 wire protruding from Tuner closest to 6AT8 (V2).	43. 8 mc.	----	T103 for maximum indication on meter. Use first peak from bottom end of coil.
2.	"	42. 5 mc.	----	Bottom slug of T102 for maximum. Use first peak from bottom end of coil.
3.	"	41. 25	----	Top slug of T102 for minimum. Use first null from top end of coil.
4.	"	Repeat step 2.		
5.	"	45. 1 mc.	----	Bottom slug of T101 for maximum. Use first peak from bottom end of coil.
6.	"	44. 5 mc.	Before adjusting bottom slug of L101A, detune top of T100B (L103C).	Bottom slug of L101A for maximum. Use first peak from bottom end of coil.
7.	"	39. 25 mc.	----	Top slug of L101B for minimum. Use first null from top end of coil.
8.		Repeat step 6.		
9.	"	47. 25 mc.	----	Top slug of L102 for minimum. Use first null from top of coil.
10.	"	Repeat steps 7 and 9.		
11.	"	46. 1 mc.	Connect dummy load (100 mmf in series with 100 ohms) from lug C of T100B (Pin #1 of V105) to ground.	Bottom slug of T100A (L103A) for maximum. Use first peak from bottom end of coil. (Remove dummy load).
12.	"	43. 8	Connect dummy load (100 mmf in series with 100 ohms) across T100A (L103A).	Bottom slug of T100B (L103B) for maximum. Use first null from top end of coil. (Remove dummy load).
13.	"	47. 25 mc.	Ground lug B of L102 with short clip lead.	Top slug of T100B (L103C) for minimum. Use first null from top end of coil. (Remove clip lead).
14.	"	Repeat step 12, then 13, using the correct dummy load or shorting lead.		
15.	Test Point No. 1. See Tube and Alignment Diagram.	44. 5 mc.	Connect dummy load (100 mmf in series with 100 ohms) from lug C of L101A (Pin #1 of V104) to ground	Mixer output coil on tuner for maximum. (L9 on VHF chassis; L8 on UHF-VHF chassis). Use first peak as Slug enters coil. (Remove dummy load, VTVM, and ground from detector load, L108).

TO CHECK I.F. ALIGNMENT (with Scope)

NOTE: Be sure, when checking the I. F. alignment, to set the channel selector switch to a channel where moving the fine tuning control does not affect the shape or position of the I. F. response curve.

Sweep Generator Connected to	Scope Connected	Bias	Set Sweep Generator	**NOMINAL OVERALL I-F RESPONSE CURVE** A slight deviation in response is tolerable, but if any great deviation is noted, the I. F. stages will have to be realigned.
High side to ungrounded tube shield on V2 (6AT8). (If necessary, insulate bottom of shield with tape to prevent grounding). Low side to tuner case.	Through 68K ohms to junction of R127&L106. Ground detector load at L108 lug 2.	Connect negative lead of one 3 v. bias battery to junction R226 and R227. Connect jumpers from that point to the junction of R228 and L111, and to the junction of R124 and C113. Connect positive lead to chassis.	To sweep from 39 to 49 mc.	Provide markers as shown on curve. 

CROSLEY Chassis 474, 475, 478, 479

AGC LEVEL CONTROL ADJUSTMENT

To adjust the AGC, use one of the two procedures below. The method using an oscilloscope is the best and most satisfactory way.

WITH AN OSCILLOSCOPE

Tune the receiver to a medium to strong signal (Use the strongest signal available when making this adjustment. If only a weak signal is available, use the procedure without a scope). Set the Area switch to the "Fringe" position, and the Noise Gate and Contrast controls to maximum Counterclockwise position. Connect scope between lug 6 to T103 and the junction of R127 and L120. Adjust AGC Level Control R164 to give 1.5 v. signal, being careful not to exceed this. If the signal is so strong that the picture begins to overload or shows sync instability with the Area Switch in the "Fringe" position, put the switch in the "normal" position; if it still overloads here, set it to "Local" and then adjust for the 1.5 v. p-p. signal.

WITHOUT AN OSCILLOSCOPE

Use the strongest signal available and set the Contrast Control to the halfway position. Set the AGC Level Control and the Noise Gate Control to the maximum counterclockwise positions. Set the Area Switch to the position where the picture does not overload (AGC Level control still in counterclockwise position). Then adjust the AGC Control to the point where the picture just begins to overload or show sync instability. Then back off 20°.

SOUND ALIGNMENT

SOUND TRAP ALIGNMENT (L-108)

Step No.	Channel Set to	Signal Generator Connected to	Scope Connected to	Adjust
1	Any unused channel	Pin 8 of V-114 and chassis. Set generator for 4.5 mc. 400 cycle AM signal (modulated 30% or greater).	High side (thru detector probe) to cathode of picture tube. Low side of scope to chassis.	Remove V-109. Adjust L-108 (rear slug) for minimum 400 cycle indication on scope. Replace V-109.

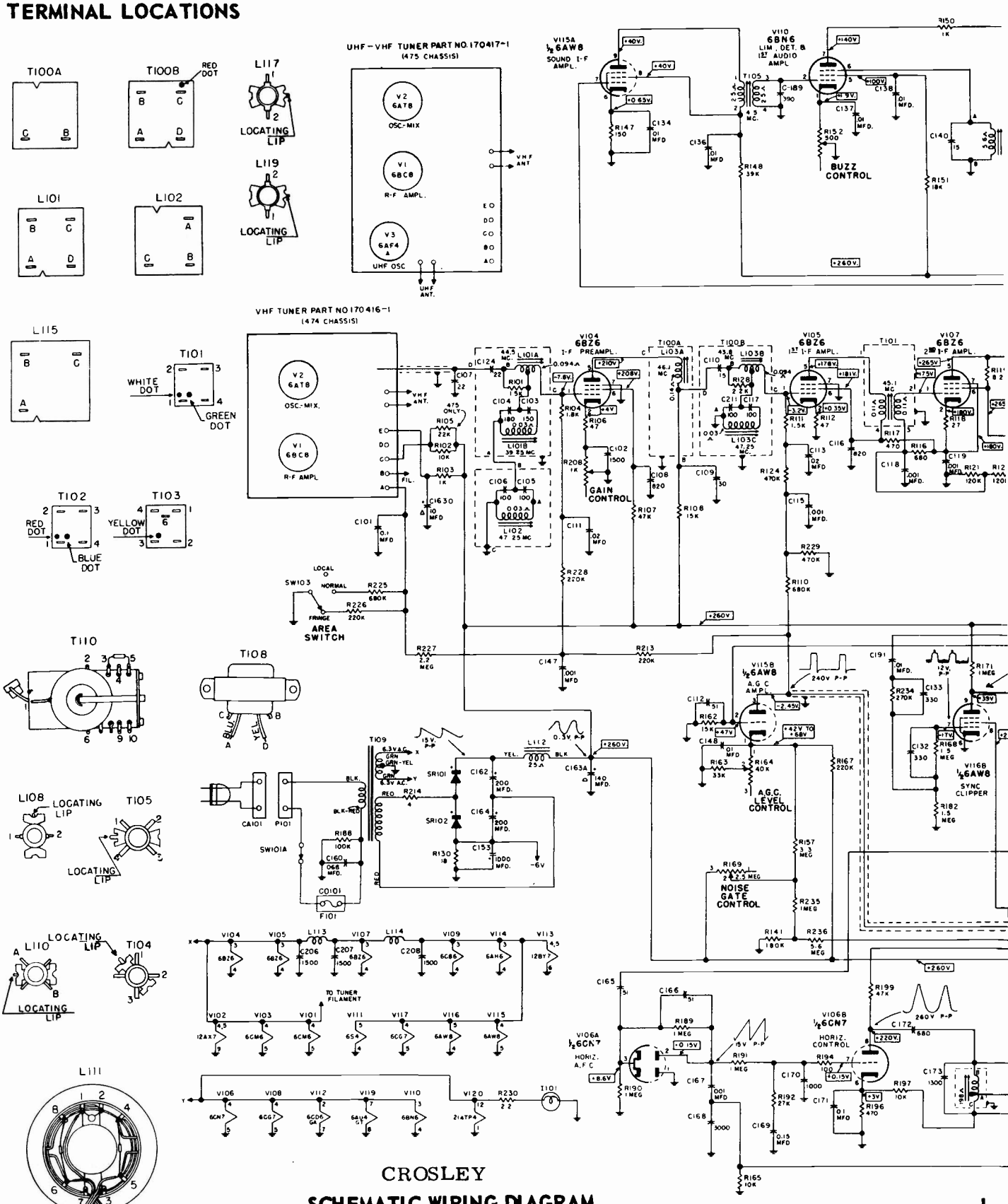
SOUND ALIGNMENT , PROCEDURE A - (with signal from station)

Step No.	Channel Set to	Adjust	Remarks
1	Strong signal	L-110 for maximum sound output. 2nd peak from open end of coil is the correct peak.	Set Buzz Control approximately 90° from clockwise stop.
2	Weak signal	T104 and T105 (front slug) for maximum sound output.	If the signal in the area is too strong to obtain these peaks, remove the antenna from the receiver.
3	Weak signal	Buzz Control (R152) for minimum noise (hash).	This signal should be weak enough to allow noise (hash) to come through with the sound.
4	Strong signal	L-110 again for maximum sound output.	Limit the volume control setting so that this peak can be heard.
5	Repeat Steps 3 & 4.		

PROCEDURE B - (with alignment equipment)

Step No.	Connect Signal Gen.	Signal Gen. Freq. MC.	Connect Scope	Miscellaneous Instructions	Adjust
1	Pin 1 of V-114 and ground side to junction of R-127 & L-120	4.5 mc. FM modulated 400 c.p.s. 7.5 kc. deviation.	Across speaker or dummy load (3.2 ohm).	Set Buzz Control (R152) to approximately 90° from clockwise stop. Set the Volume Control (R142B) at a low level. Use a high input level on the signal generator.	L-110 for maximum 400 cycle indication on scope. Keep signal high enough to assure limiting. 2nd peak from open of coil is the correct peak.
2	"	"	"	Set generator output so that FM signal is below the point of limiting.	T-104 for maximum response keeping input signal at a low level (below limiting). 2nd peak is correct one.
3	"	"	"	"	T-105 for maximum response keeping input signal at a low level (below limiting).
4	Repeat Step 2 & 3.				
5	"	4.5 MC. AM modulated 400 c.p.s.	"	Use a high input level on signal generator	Buzz Control (R152) for null (minimum 400 c.p.s. amplitued on scope).
6	"	4.5 MC. FM modulated 400 c.p.s. 7.5 kc. deviation.	"	Set the Volume Control (R-142B) at a low level. Use a high input level on signal generator.	Re-peak L-110 for maximum 400 cycle indication on scope so that the FM signal is above the point of limiting.
7	Repeat Steps 2, 3, 5, and 6.				

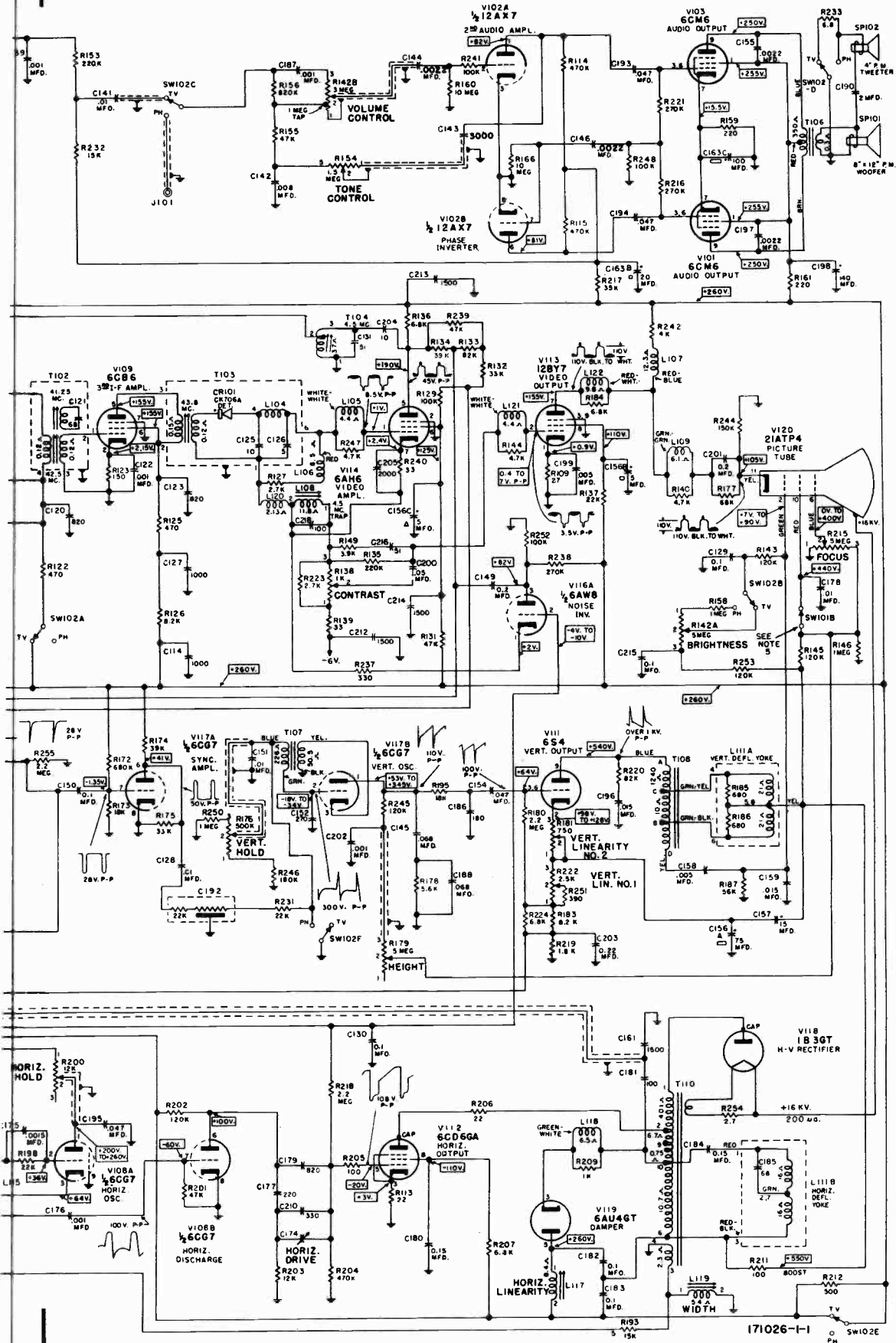
TERMINAL LOCATIONS



CROSLEY

SCHEMATIC WIRING DIAGRAM

Chassis 474 Code A & 475 Code A

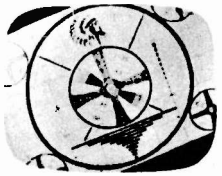


NOTES:

1. All voltages measured with an electronic voltmeter connected from socket lug to chassis. Some voltages are variable: voltages shown were measured with a normal picture on the picture tube and the Contrast and Brightness controls set for 110 volts black to white on the cathode (pin 11) of the picture tube. Socket voltage tolerance 10%. Input signal 6000 microvolt minimum for these readings. Area switch in "normal" position; Function Switch in "TV" position. Voltages shown on schematic were taken on a typical chassis. Voltages will vary between different chassis.
2. Supply voltage 117 volts 60 cycle A.C.
3. K = 1000.
4. All capacitance values in mmf and all resistance values in ohms unless otherwise noted.
5. SW101B is closed when SW101A is open.
6. Terminals on the following transformers and coils are viewed from the wiring side: T100A, T100B, T101, T102, T103, T104, T105, L101, L102, L115, L117, L119.

CROSLEY Chassis 474, 475, 478, 479, Adjustment Information, Continued

REAR VIEW

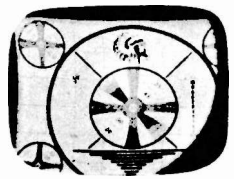


Picture Tilted

DEFLECTION YOKE ADJUSTMENTS - The deflection yoke must be positioned as far forward as possible on the neck of picture tube. To make this adjustment, loosen the wing screw enough to permit the yoke to be pushed forward. While holding the yoke in the forward position, tighten wing screw.

If the picture is tilted as shown at right, loosen wing screw. Then, rotate the yoke to right or left as required to make the picture parallel with respect to top and bottom of window frame. Be sure to push the yoke as far forward as possible and hold the yoke in position while tightening the wing screw.

CENTERING MAGNET ADJUSTMENT If the picture is off center and/or has neck shadow as shown in the illustration, rotate either or both centering magnet levers to the right or left until the picture is centered on the screen and free of all neck shadow.



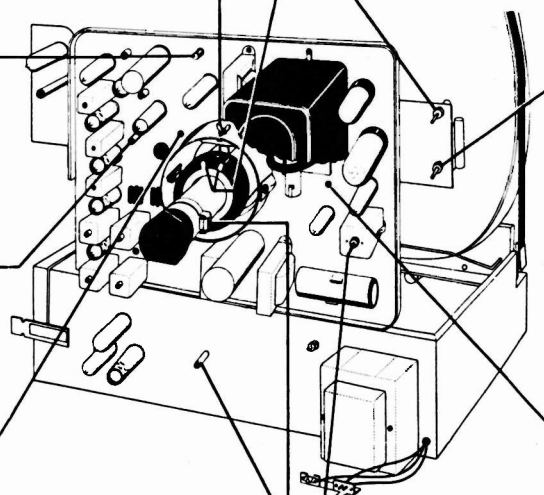
Off Center and Neck Shadow

HORIZONTAL LINEARITY ADJUSTMENT - If the picture is compressed on one side and stretched out on the other side turn the horizontal linearity adjustment screw counter-clockwise or clockwise as may be required until equality of both sides is obtained.

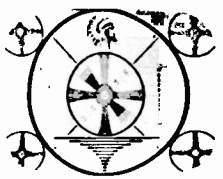
VERTICAL LINEARITY ADJUSTMENT NO. 2 This control required adjusting only when the vertical output or picture tube is replaced with a new one. This control should then be adjusted simultaneously with Vertical Linearity Adjustment No. 1 to increase or decrease the height of the upper portion of the picture. Sight readjustment of the Height Control may be required after adjusting the Vertical Linearity Controls.

QUADRATURE COIL - In extreme fringe areas, a slight adjustment of the quadrature coil slug can, in some cases, improve the sound signal to noise ratio. It will usually not require more than 1/8 turn from the original setting to obtain best results. (Be sure the AGC Control, Area Switch and the Noise Gate, are properly adjusted before adjusting the coil slug.)

BUZZ CONTROL - In a strong signal area, if buzz is encountered, adjust for minimum noise. In a weak signal area, if hiss is encountered, adjust for minimum (Be sure the AGC control, Area Switch, and Noise Gate are properly adjusted before adjusting buzz control). See also SOUND ALIGNMENT.



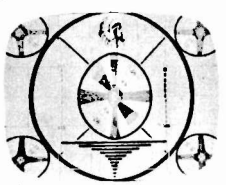
WIDTH ADJUSTMENT - If the picture is too narrow turn the width adjusting screw clockwise until the picture fills the viewing area. Turning the screw counter-clockwise reduces the width of picture. (Also see Horizontal Drive Adjustment).



Misadjusted Horizontal Linearity

Misadjusted Width and "Pincushioning" at side

PINCUSHION CORRECTING MAGNET ADJUSTMENT (not shown) These magnets are not used on all models. On models where they are used, if top and bottom are not parallel to each other or if the sides are not parallel ("Pincushion"), adjust one or more of the four bar magnets attached to the front of the deflection yoke housing by pushing them forward or pulling them back, with a tool made of insulating material as required to make the top and bottom and both sides of the picture straight and square to each other. DO NOT USE A METAL TOOL.



Misadjusted Horizontal Drive

HORIZONTAL DRIVE ADJUSTMENT - Connect electronic voltmeter between the grid of the horizontal output tube and the chassis. Adjust the Drive Trimmer for -20 volts D. C. As an alternate adjusting method reduce the width of the picture with the width adjusting screw just enough to be able to observe both sides of the picture. Then adjust the horizontal drive adjustment to a point where maximum width of the picture is obtained. When this adjustment is properly made, no white line or compression at the center of the picture should be noticeable. After this adjustment is completed, adjust the picture width as explained under "Width Adjustment".

GAIN CONTROL If the control can be turned from one end of its range to the other without affecting the picture, when the receiver is tuned to the weakest signal available (Area Switch in the "Fringe" position), set the control to its maximum clockwise position. If a change is noted in the picture, set the control to the position which gives maximum contrast.

FOCUS CONTROL - Rotate to the right or left until the sharpest picture or sharpest horizontal lines (lines of minimum width) are obtained.

ION TRAP MAGNET ADJUSTMENT

HORIZONTAL FREQUENCY ADJUSTMENT - If the hold range of the Horizontal Hold Control needs broadening, or if the picture does not lock-in horizontally, adjust the Horizontal Frequency control in the following manner:

After tuning-in a station, turn core adjusting screw counter-clockwise until the picture goes out of sync, then clockwise until picture just pulls into sync. Turn the Horizontal Hold Control fully clockwise and shock horizontal out of sync by momentarily turning the set off. When turned on, set should fall into sync. Repeat the operation with the Horizontal Hold control set fully counter-clockwise. Again set should fall into sync. If it does not, readjust the core adjusting screw until set falls into sync. When properly adjusted, the set should remain in sync over the full range of the Horizontal Hold control and switching from station to station or when first turning set on.

CROSLEY

CHASSIS 483

Models: J-21TAMH, J-21CAMH
J-21TABH, J-21CABH
J-21TAWH, J-21RABH
J-21RAMH

CHASSIS 484

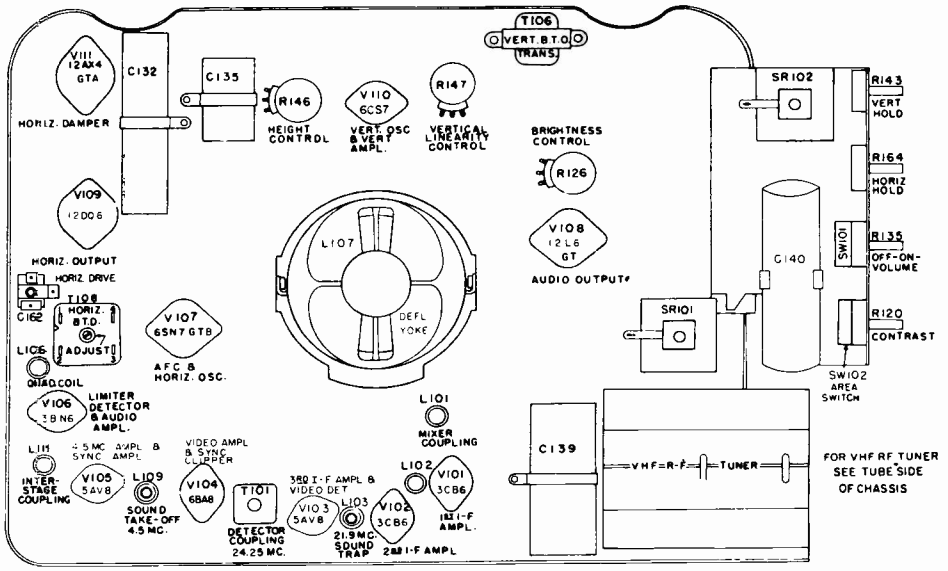
Models: J-21TAMU, J-21CAMU
J-21TABU, J-21CABU
J-21TAWU, J-21RABU
J-21RAMU,

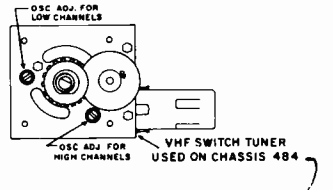
The service material on pages 43 through 50, is exact for sets listed above. The two groups of sets listed below use 17" picture tubes and are very similar to these 21" sets. Chassis 482 uses a different tuner, Chassis 481 uses 6BA8 for V104, and both chassis use 12BH7A for V110. There are also other minor differences.

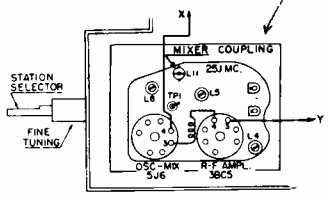
Chassis 481, used in Models J-17TABH, J-17TAMH, J-17TAWH, AT-70B, AT-70M, AT-70W
Chassis 482, used in Models J-17TABU, J-17TAMU, J-17TAWU, AT-71B, AT-71M, AT-71W

Chassis 487, used in Models AC-10B, -M, AH-10B, AT-10B, -M, is also similar to these group of sets.

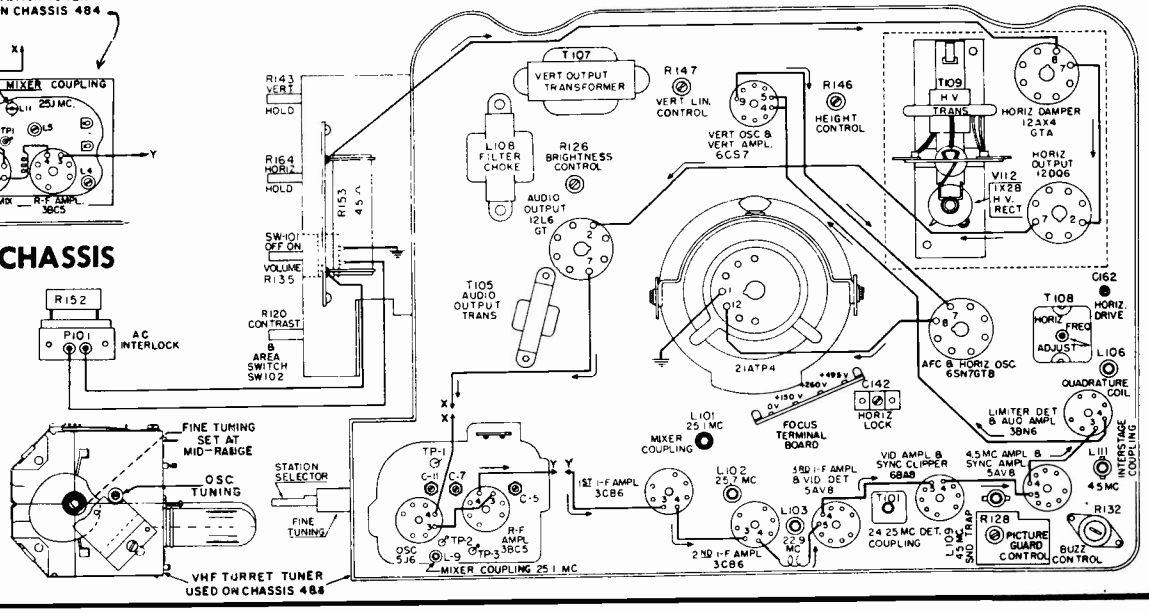
FRONT VIEW OF CHASSIS 483 & 484







REAR VIEW OF CHASSIS 483 & 484



CROSLEY Chassis 481, 482, 483, 484, Alignment Information, Continued

SOUND ALIGNMENT

The 4.5 mc. trap (rear slug of L109) must be aligned first, regardless of which procedure is used for the remainder of the alignment (Procedure A or B).

Step No.	Channel Set to	Signal Generator Connected to	Scope Connected to	Adjust
1.	Any unused channel	Pin 7 of V-104 and chassis. Set generator for 4.5 mc. 400 cycle AM signal (modulated 30% or greater).	High side (thru detector probe) to cathode of picture tube. Low side of scope to chassis.	Adjust L-109 (rear slug) for minimum 400 cycle indication on scope.

Proceed with the remainder of the Sound Alignment, using either a signal from a TV station as in Procedure A, or alignment equipment as in Procedure B.

PROCEDURE A (with signal from station)

Step No.	Channel Set to	Adust	Remarks
1.	Strong Signal	L106 for maximum sound output. 2nd peak from open end of coil is the correct peak.	Set Buzz Control approximately 90° from clockwise stop.
2.	Weak Signal	L111 and L109 (front slug) for maximum sound output.	If the signal in the area is too strong to obtain these peaks, remove the antenna from the receiver.
3.	Weak Signal	Buzz Control (R132 for minimum noise (hash).	This signal should be weak enough to allow noise (hash) to come through with the sound.
4.	Strong Signal	L106 again for maximum sound output.	Limit the volume control setting so that this peak can be heard.
5.	Repeat Steps 2, 3 and 4.		

SEE NOTE "A".

PROCEDURE B (with alignment equipment)

Step No.	Connect Signal Gen.	Signal Gen. Freq. MC.	Connect Scope	Miscellaneous Instructions	Adjust
1.	Pin 7 of V104	4.5 mc. FM modulated 400 c.p.s. 7.5 kc. deviation.	Across speaker or dummy load (3.2 ohm).	Set Buzz Control (R132) to approximately 90° from clockwise stop. Set the Volume Control (R135) at a low level. Use a high input level on the signal generator.	L106 for maximum 400 cycle indication on scope. Keep signal high enough to assure limiting. 2nd peak from open end of coil is the correct peak.
2.	"	"	"	Set generator output so that FM signal is below the point of limiting.	L111 for maximum response keeping input signal at a low level (below limiting).
3.	"	"	"	"	L109 (Front slug) for maximum response keeping input signal at a low level.
4.	"	4.5 mc. AM modulated 400 c.p.s.	"	Use a high input level on signal generator.	Buzz Control (R132) for null (minimum 400 c.p.s. amplitude on scope).
5.	"	4.5 mc. FM modulated 400 c.p.s. 7.5 kc. deviation.	"	Set the Volume Control (R135) at a low level. Use a high input level on signal generator.	Re-peak L106 for maximum 400 cycle indication on scope so that the FM signal is above the point of limiting.
6.	Repeat Steps 2, 3, 4, and 5.				

SEE NOTE "A".

NOTE "A" In extreme fringe areas, and areas subjected to heavy impulse noise, it may be possible to improve the rejection of noise in the sound by a slight readjustment of the quadrature coil at the time the set is installed. The Picture Guard and Area Switch Controls should be properly adjusted before readjusting the quadrature coil (L106). The adjustment of the quadrature coil is fairly sharp and critical, therefore the slug will usually not require more than 1/8 of a turn from its original setting to obtain best results.

CROSLEY Chassis 481, 482, 483, 484, Alignment Information, Continued

I. F. ALIGNMENT

All lead connections from the signal marker generator and sweep generator must be shielded. Keep exposed ends and ground leads as short as possible (about one inch). Always locate the ground lead connections as close as possible to their respective "hot" leads in the television chassis. The sweep generator output, signal generator output, and contrast control must be kept low enough to prevent overloading the television receiver circuits.

CAUTION: One side of the chassis is connected to the power line. Therefore, test equipment should not be connected to the receiver unless an isolation transformer is used between the power line and the receiver. DO NOT GROUND THE RECEIVER CHASSIS UNLESS AN ISOLATION TRANSFORMER IS USED.

The front side of the chassis as referred to below means the side opposite the tubes.
The rear side of the chassis means the side on which the tubes are mounted.

VIDEO I.F. ALIGNMENT (with VTVM)

In the I. F. Alignment, limit input of signal generator so that reading on VTVM does not exceed 2 volts d. c.

Step No.	Connect Signal Generator Through a .01 Capacitor	Signal Gen. Freq. MC.	Connect VTVM	Miscellaneous Connections and Instructions	Adjust
1.	Test Point No. 2 on Tuner. See Tuner layout for tube & adjustments & test point locations.	24.25 mc.	Junction of R118 and C113 and chassis.	Connect a 3 volt bias battery, negative lead to junction of R117 and C111, positive lead to chassis.	T101 for maximum indication on meter.
2.	"	22.9 mc.	"	"	L103 (rear slug) for maximum. Use first peak from tinnerman clip end of coil.
3.	"	21.9 mc.	"	"	L103 (front slug) for minimum. Input level should be high enough to produce at least .5 volts at null on VTVM. Use first null obtained from end of coil form opposite tinnerman clip.
4.	Repeat steps 2 and 3				
5.	"	25.7 mc.	"	"	L102 for maximum.
6.	"	25.1 mc.	"	"	L101 (front slug) for maximum. Use first peak from tinnerman clip end of coil.
7.	"	27.9 mc.	"	"	See Note 1. L101 (rear slug) for minimum deflection on VTVM. Use first null obtained from end of coil form opposite tinnerman clip.
8.	Repeat steps 6 and 7, if adjacent channel trap is used.				
9.	Test Point No. 1. Tunner.	25.1 mc.	"	Connect a 100 ohm resistor in series with a 1000 mmf. cap. across L101.	L11 (brass screw) on the Tuner for maximum, Chassis 484. L9 on Tuner for maximum, Chassis 483.

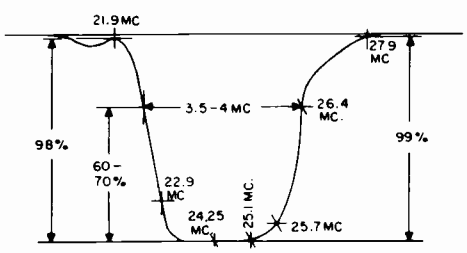
Note 1. This adjustment can be made only on receiver where the Adjacent Channel Trap has been added.

TO CHECK I.F. ALIGNMENT (with scope)

Excessive sweep input will overload the circuit and cause distortion in the wave form. Check for possible overload by temporarily increasing and decreasing the signal input level and noting any change on the wave form.
Excessive signal from the marker generator will sale distort the wave form. Be sure to keep the marker at the minimum usuable amplitude.

NOTE: Be sure, when checking the I. F. alignment, to set the channel selector switch to a channel (other than UHF) where moving the fine tuning control does not affect the shape or position of the I. F. response curve.

Sweep Gen Connected to	Scope Connected to	Bias	Sweep Gen. Set to	Remarks
Ungrounded shield of V2 and chassis	High side of contrast control R120 and chassis. Contrast control at minimum contrast, & Area Switch set to the distant position.	Connect a 3 volt bias battery negative lead to junction of R117 and C111, positive lead to chassis.	Sweep from 20 to 30 megacycles	Provide markers as shown on curve.



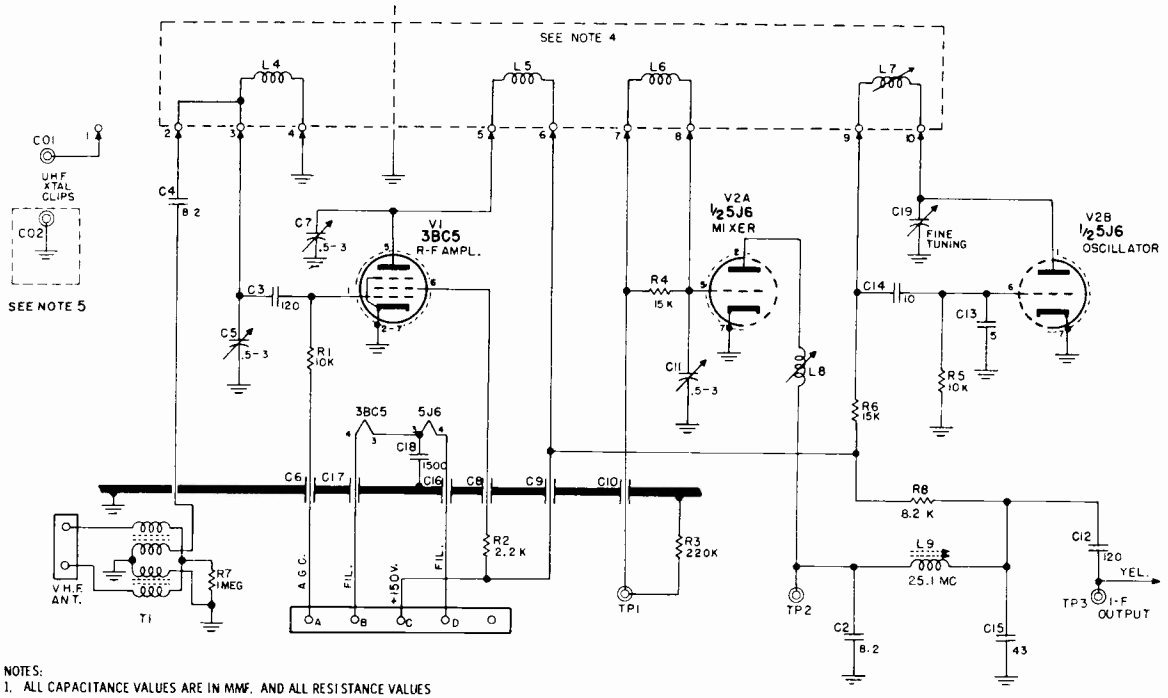
NOMINAL OVERALL I-F RESPONSE CURVE

A slight deviation in response curve is tolerable, but if any great deviation is noted, the I. F. stages will have to be realigned.

CROSLEY Chassis 483 and 484, Tuner Schematic Diagrams, Continued

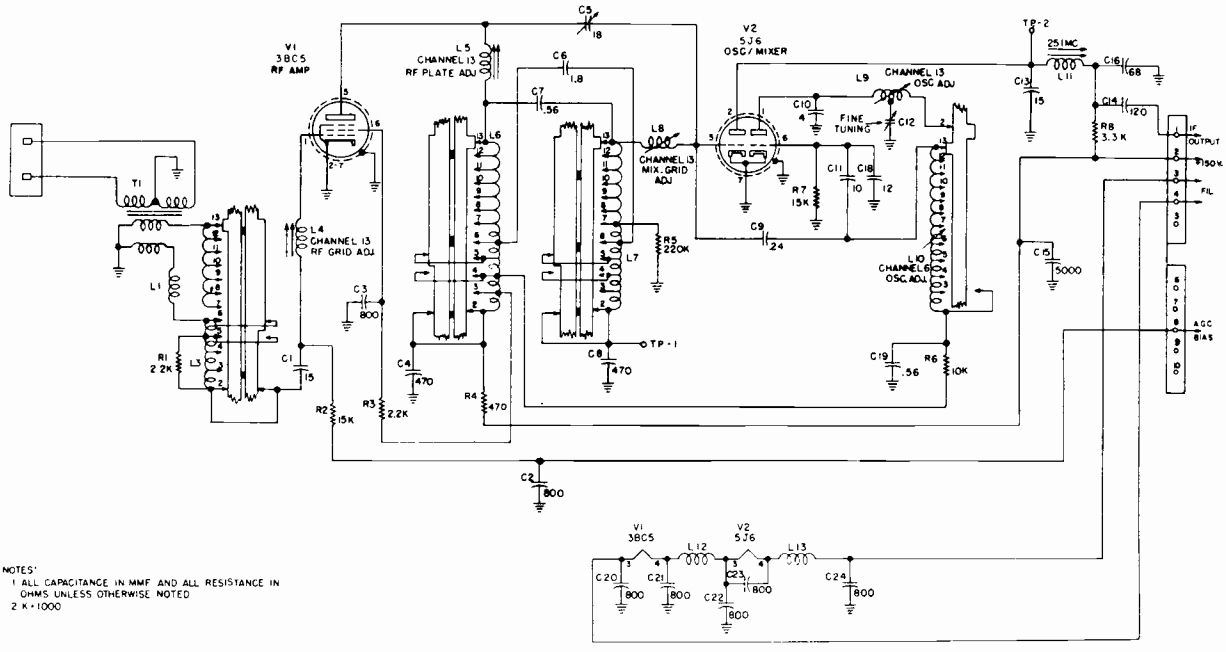
VHF TURRET TYPE TUNER SCHEMATIC

Part No. 158847-1



NOTES:
1. ALL CAPACITANCE VALUES ARE IN MMF. AND ALL RESISTANCE VALUES IN OHMS UNLESS OTHERWISE SPECIFIED.
2. K = 1000.
3. FEED THRU CAPACITORS ARE 800 MMF. MINIMUM UNLESS OTHERWISE NOTED.
4. ONE OF TWELVE VHF CHANNEL STRIPS MOUNTED IN DRUM.
5. C02 IS INSTALLED WITH FIRST UHF CHANNEL STRIP.

VHF SWITCH TYPE TUNER, Part No. 158674-1



NOTES:
1. ALL CAPACITANCE IN MMF AND ALL RESISTANCE IN OHMS UNLESS OTHERWISE NOTED
2. K = 1000

CROSLEY Chassis 483 and 484, Service Information, Continued

CODE CHANGES

Code letters are stamped on the chassis directly following the chassis number, and are used to indicate that certain circuit changes are incorporated in that chassis which are not found in chassis with earlier code letters. Unless otherwise stated, the circuit changes identified by a certain code letter are also carried over into chassis with later letters. The schematic shows the circuits found in chassis coded C and D.

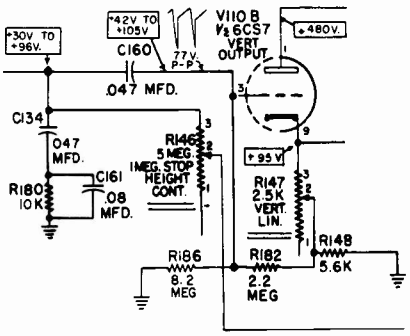
CODE A - These chassis differ in two respects from the large schematic. On code A, there was no 5000 mmf capacitor C163 between pin 7 of the Damper tube and ground. That capacitor was added only on code B chassis and later. On code A chassis, the Horizontal Drive Trimmer C162 was omitted, and the value of C150 was 560 mmf.

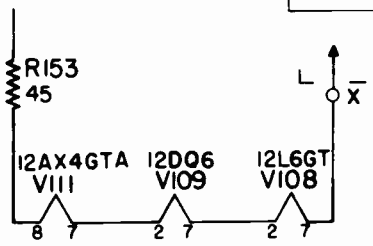
CODE B - Code B designates the addition of the 5000 mmf capacitor C163 between pin 7 of the Damper Tube and ground. It was added to prevent the H.V. pulse from being radiated into the video and AGC circuits and affecting their operation. On code B chassis, the Horizontal Drive Trimmer C162 was omitted, and the value of C150 was 1300 mmf.

CODE C - On code C chassis, the Horizontal Drive Trimmer C162 was added across C150, and the value of C150 was changed from 1300 to 390 mmf. Adjustment of the Horizontal Drive Trimmer compensates for variations between different manufacturers' tubes. Many production chassis have a 430 mmf capacitor in this position instead of 390 mmf, for the two values are interchangeable in this location. On code C chassis, the trimmer is accessible from the wiring side of the chassis after the cabinet is removed.

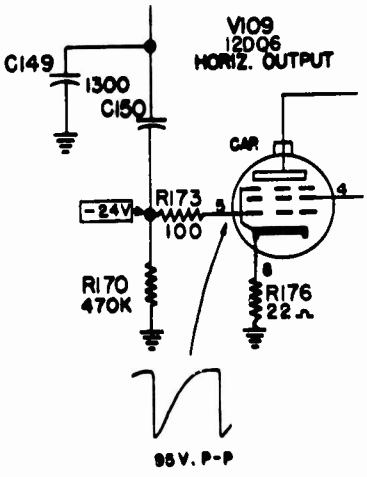
CODE D - On code D chassis, the Horizontal Drive Trimmer is adjustable through the hole in the chassis located next to the Horizontal Oscillator Coil T108 (see sketch of Tube Side of Chassis). Except for change in location of the trimmer, chassis code C and D are the same.

On chassis 483 and 484 stamped with code letter E or later, a change has been made to improve vertical linearity. Chassis with code letter D or earlier have the circuit shown in the large schematic.
The circuit was changed as shown in the schematic below.



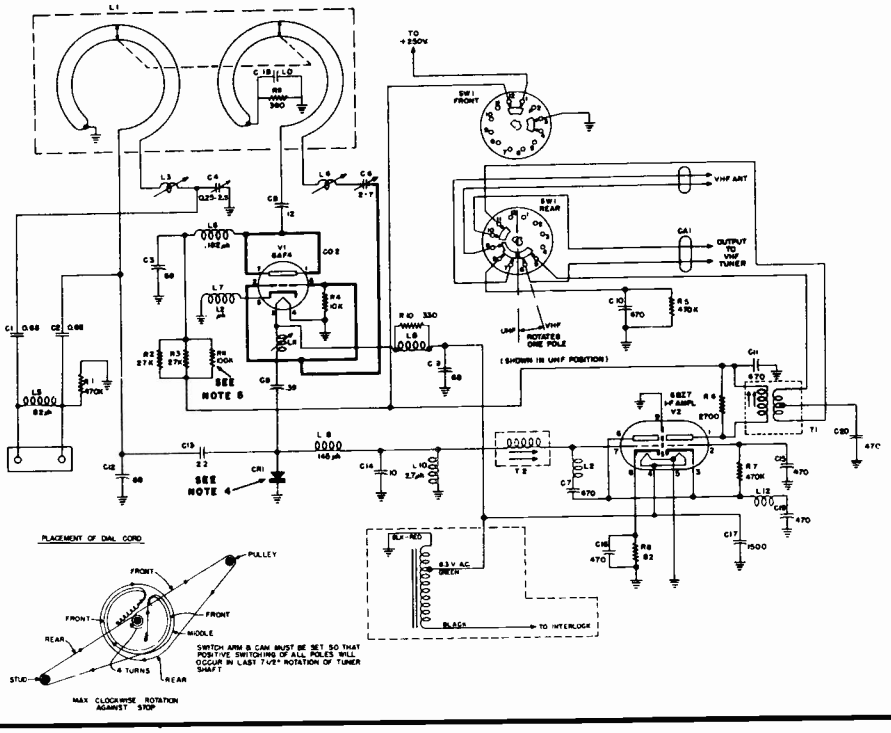


USED ON CODE A ONLY



USED ON CODE A and B ONLY

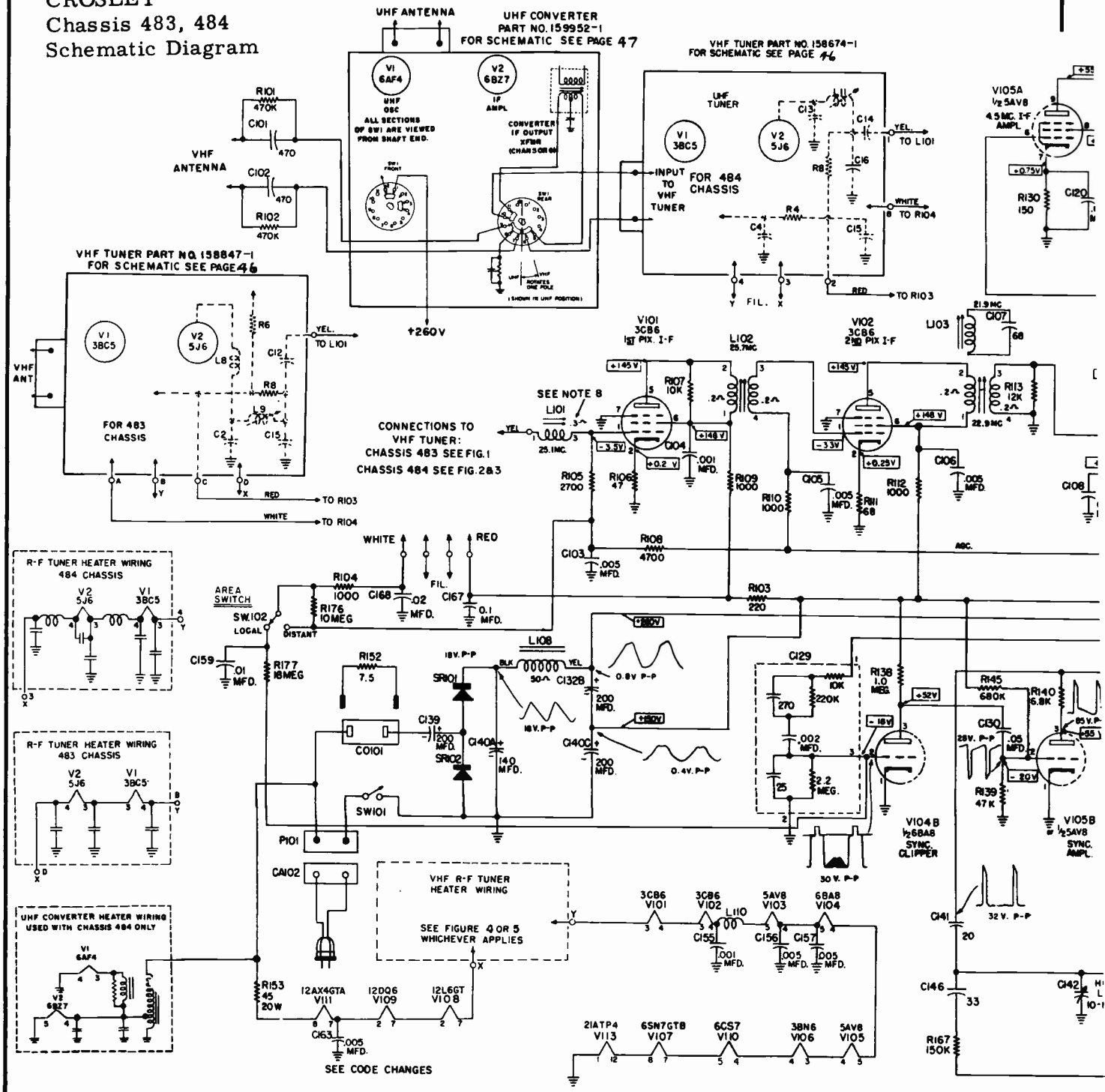
UHF CONVERTER, Part No. 159952-1



NOTE:

1. K 1000
2. All Capacities Values in MMF. And all Resistance in Ohms Unless Otherwise Noted.
3. All Sections of Switch SW1 are Viewed From The Shaft End.
4. When Possible, Replace The Crystal Mixer With One Of The Same Type. When The Same Type Is Not Available, One Of The Types Can Ordinarily Be Used As A Substitute. However Because of Individual Crystal Characteristic The Substitution Of The IN72 (Part No. 151871) For The IN82 (Part No. 155459) Or K3D May Be Less Satisfactory.
5. In Some Early Production UHF Tuners, R11 Was Not Used. In some Later UHF Tuners, R11 Is 87,000 Ohm, 10%, 1/2 Watt.

CROSLEY
Chassis 483, 484
Schematic Diagram



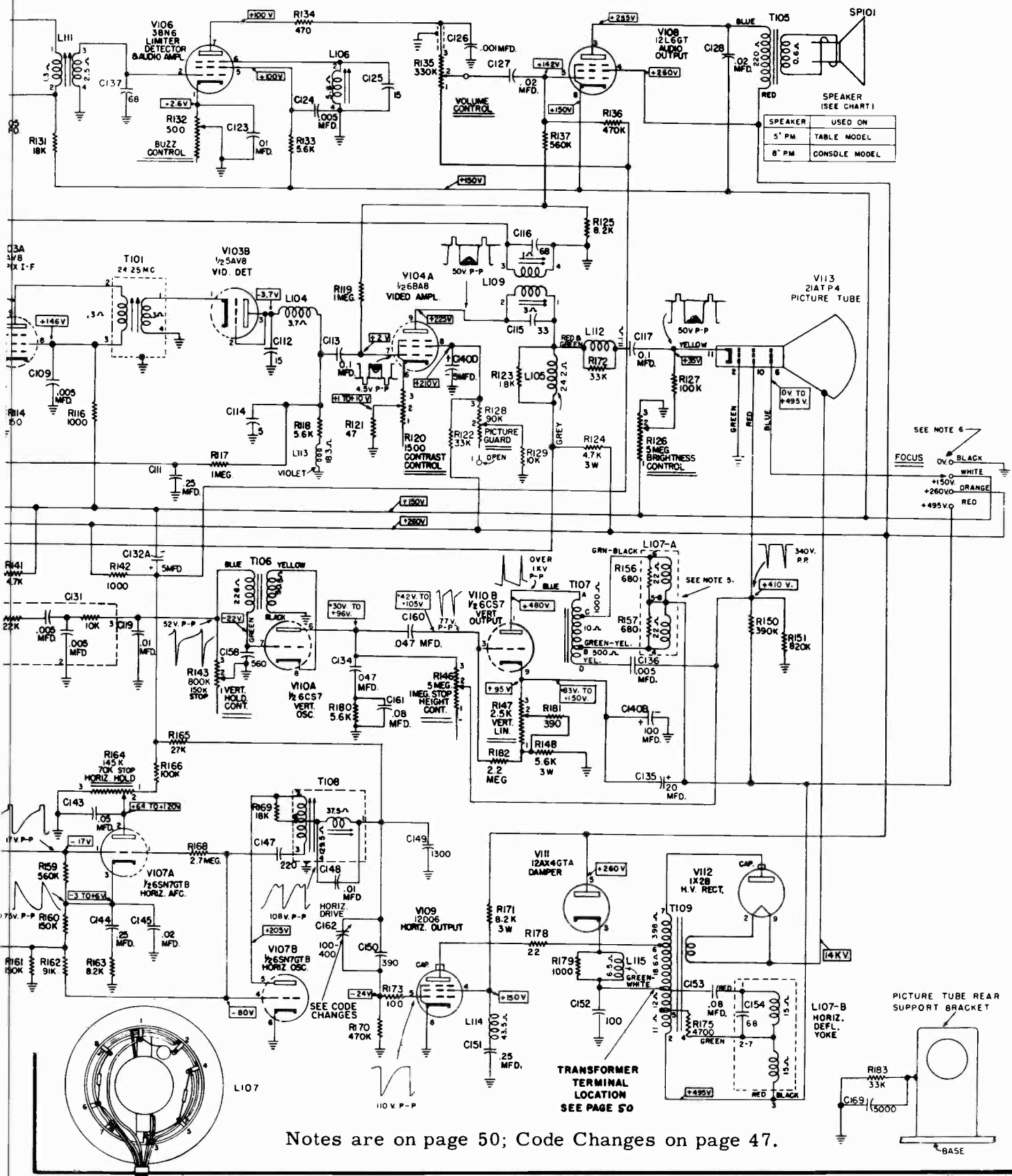
Removing The Chassis and Base (or Shelf) From The Cabinet

Table Models:

1. Remove the control knobs, the cabinet back, the antenna terminal plate, the wires connected to the antenna terminals, and the wires from the speaker (or the speaker from the cabinet.
2. Remove the two wood screws on the inside rear corner braces that hold the cabinet to the cabinet base.
3. Remove the two wood screws that hold the chassis to the wood strip on the inside of the cabinet above the chassis.
4. Remove the six head screws and lockwashers on the underside of the base (along the sides of the cabinet). Also remove the one wood screw that is through the base at the center front on the bottom.
5. Lift the cabinet up and off the base.
6. To replace the chassis and base in the cabinet, reverse the removal procedure.

SCHEMATIC WIRING DIAGRAM

CHASSIS 483 & 484 CODE C and D



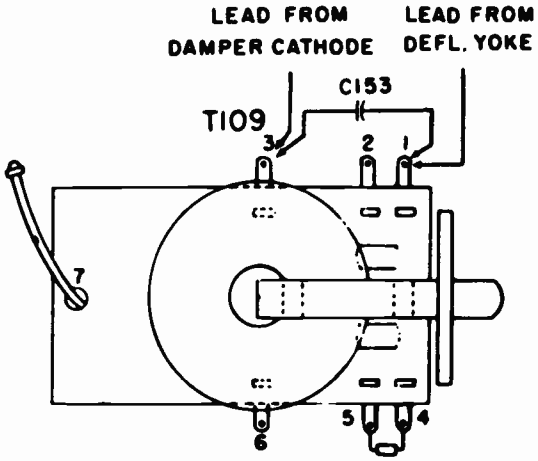
Notes are on page 50; Code Changes on page 47.

CROSLEY Chassis 483 and 484, Service Data and Notes, Continued

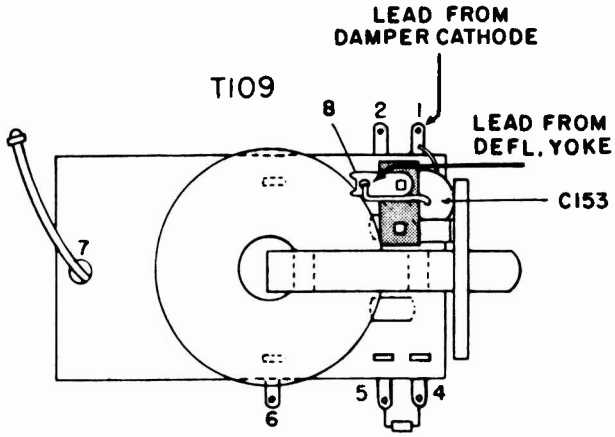
HORIZONTAL DEFLECTION TRANSFORMER TERMINAL LOCATIONS

The two terminal location diagrams and schematics for T109 correspond to earlier and later production Horizontal Deflection transformers T109. They are interchangeable, and Service Replacement Transformers 159412-2 will be either or both types intermixed.

It will be noted from the diagrams that when one type transformer is used in place of the other, the lead from the damper cathode and the lead from C153 must be connected to different terminal lugs. The diagrams show the correct connections in each case. The connections of the other leads remain the same. When using the earlier transformer as a replacement, remove C153 from the defective transformer and re-use it on the new transformer. (Dress away from H.V. coil).



EARLY PRODUCTION

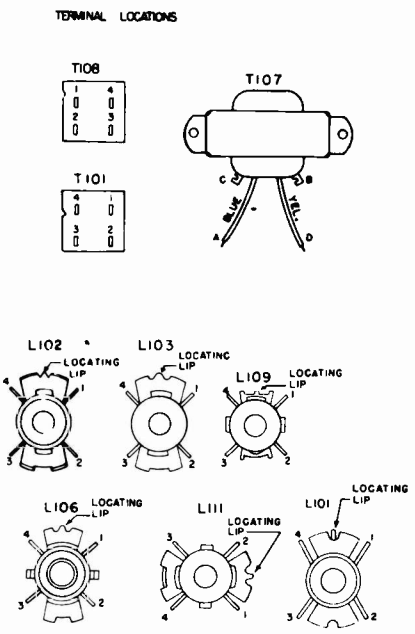


LATER PRODUCTION

NOTES

1. All voltages measured with an electronic voltmeter connected from socket lug to chassis. Voltages shown on schematic were taken on a typical chassis. Voltages will vary between chassis and also with input signal and other settings of the controls. Some voltages are variable; Voltages shown were measured with a normal picture on the picture tube and the Contrast and Brightness controls set for 50 volts peak to peak on the cathode (pin 11) of the picture tube. Socket voltage tolerance ±10%. Noise Gate in open position for these readings. Input signal 3000 microvolts minimum.
2. Supply voltage 117 volts 60 cycle AC.
3. K = 1000
4. All capacitance values in mmf. and all resistance values in ohms unless otherwise noted.
5. Lug 3 connected to boost voltage and lug 3, 8 and 5 connected internally.
6. Terminal board located to lower right of Deflection Yoke allows adjustment of Focus voltage to individual tube characteristics.
7. Outlines of the following transformers and coils are viewed from the wiring side of Chassis: L101, L102, L103, L106, L109, L111, T101, and T108.
8. L101 is designed so that an adjacent sound channel trap (Part No. 158194-1) can be added in areas where such interference is prevalent.

COIL AND TRANSFORMER LUGS



DUMONT RA-356,357 CHASSIS

(Schematic on pages 52-53; Alignment data on page 54)

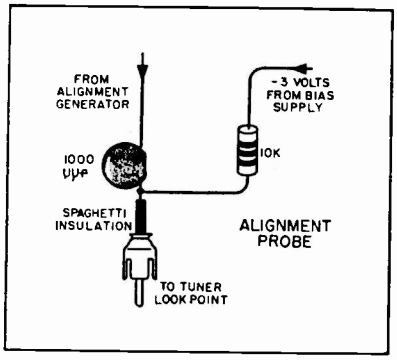


Figure 1. Probe for use in connecting alignment equipment and bias to grid of mixer stage. The probe is plugged into the tuner look point.

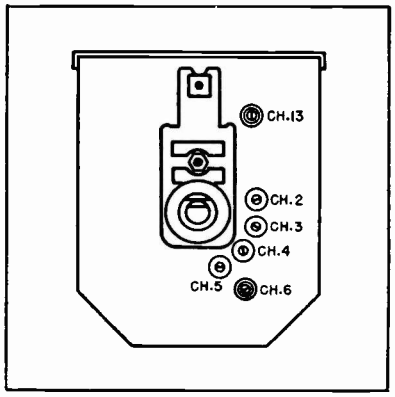


Figure 2. Oscillator slugs for VHF tuner 89 013 555.

TUNER OSCILLATOR ADJUSTMENT

If one or more stations cannot be tuned in properly, within the range of the Fine Tuning control, the tuner oscillator slugs require readjustment.

If the highest frequency station that cannot be tuned in properly is between channels 2 and 6 readjust the oscillator slugs as follows:

1. Turn the Station Selector knob to the highest channel that does not tune in properly.

2. Readjust the oscillator slug of that channel (see figure 2) so that proper tuning, within the range of the Fine Tuning control, is obtained.

3. Turn the Station Selector knob to each lower channel and check the fine tuning. Repeat steps 1 and 2 of the above procedure for each available lower frequency station that does not tune properly.

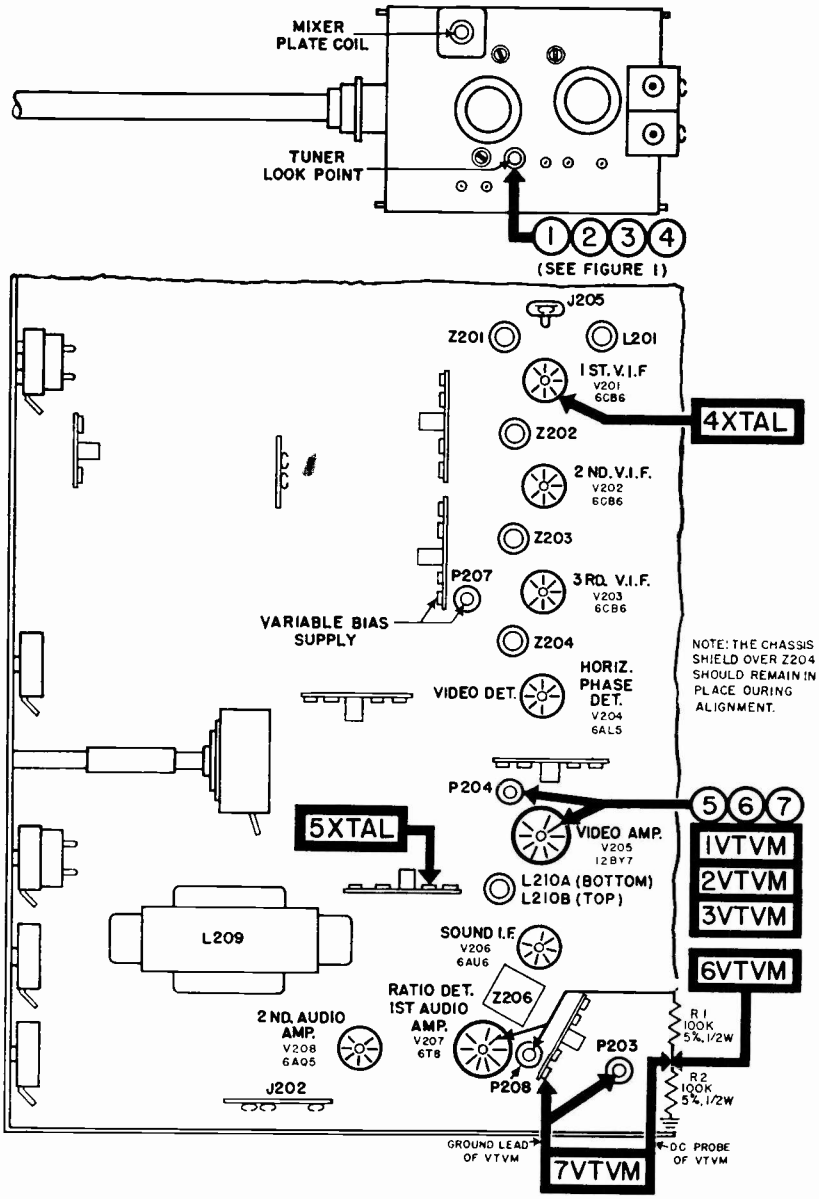
Note: If channel 5 is the highest low channel station available, readjust the channel 6 oscillator slug when the channel 5 slug does not have sufficient range. If a lower channel oscillator slug does not have sufficient range for proper tuning, the next highest channel oscillator slug should also be readjusted.

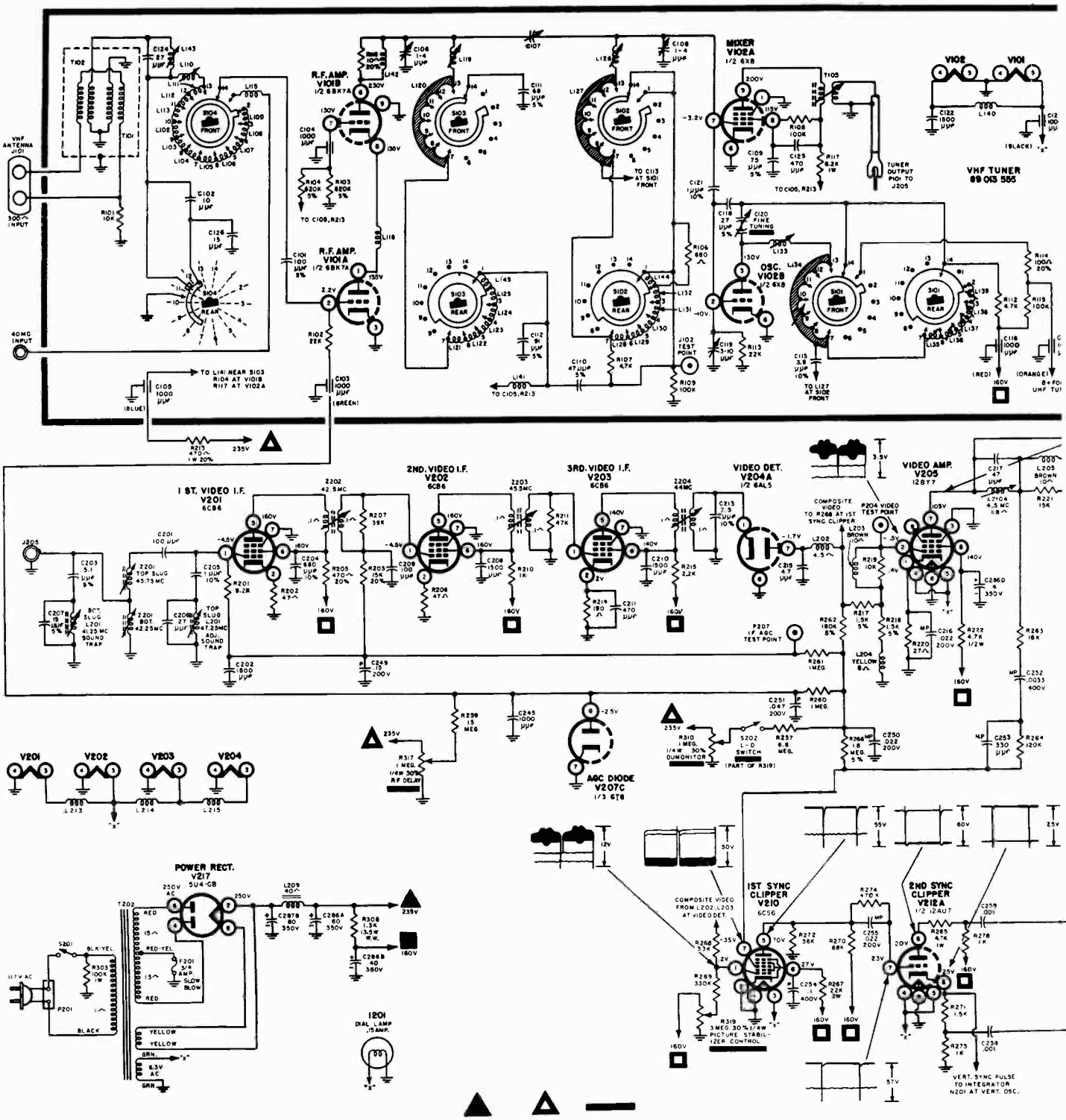
If the highest frequency station that cannot be tuned in properly, within the range of the Fine Tuning control, is between channels 7 and 13, readjust the oscillator slugs as follows:

1. Check the tuning of the available stations between channels 7 and 13. If one or more stations does not tune properly, adjust the channel 13 oscillator slug so that all available stations between channel 7 and 13 can be properly tuned, within the range of the Fine Tuning control.

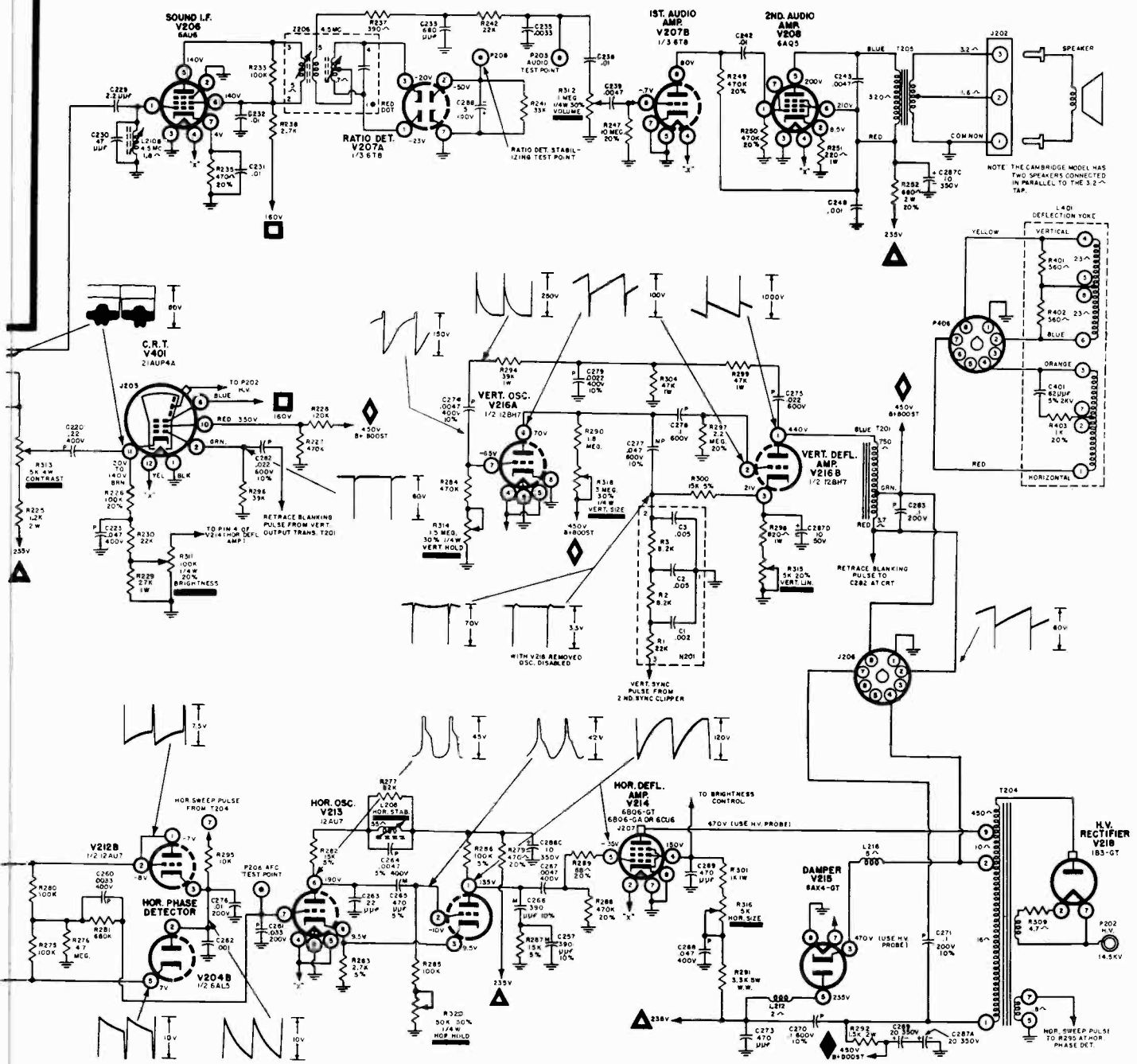
2. Check the tuning of all available stations between channels 2 and 6. If the tuning of one or more stations is not proper, repeat the previous procedure on the adjustment of the oscillator slugs for stations between channels 2 and 6.

ALIGNMENT TEST POINTS




MIXER V101A 1/2 6X8
R.F. AMP. V101B 1/2 6BK7A
R.F. AMP. V101A 1/2 6BK7A
OSC. V102B 1/2 6X8
VHF TUNER 89013 585
VHF ANTENNA J101
300Ω INPUT
40MC INPUT
TUNER OUTPUT PIN TO J205
J102 TEST POINT
1ST. VIDEO I.F. V201 6CB6
2ND. VIDEO I.F. V202 6CB6
3RD. VIDEO I.F. V203 6CB6
VIDEO DET. V204A 1/2 6AL5
VIDEO AMP. V205 12BY7
J205
P204 VIDEO TEST POINT
P207 I.F. AGC TEST POINT
AGC DIODE V207C 1/3 6T8
V201 V202 V203 V204
POWER RECT. V217 5U4-GB
T202
S201
F201 3/4 AMP SLOW BLOW
I201 DIAL LAMP .15 AMP.
1ST SYNC CLIPPER V210 6CS6
2ND SYNC CLIPPER V212A 1/2 12AU7
COMPOSITE VIDEO FROM L202, L203 AT VIDEO DET.
R319 3 MEG. 30% 1/4W PICTURE STABILIZER CONTROL
VERT. SYNC PULSE TO INTEGRATOR N201 AT VERT. OSC.
S202 L-O SWITCH (PART OF R319)
R310 1 MEG. 1/4W 30% DUMONITOR
R317 1 MEG. 1/4W 30% R.F. DELAY
USE OF SYMBOLS
Solid symbol indicates source of voltage.
Open symbol indicates point to which voltage is applied.
Solid bar indicates an adjustable control.

Du Mont RA-356/357 CHASSIS

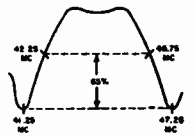


(See page 54 for Schematic Notes)

ALLEN B. DU MONT

VIDEO IF ALIGNMENT RA-356/357

Remove the Horizontal Deflection Amplifier and Damper tubes. Use the tuner look point probe (see figure 1) to connect the alignment generator and a −3 volts bias supply to the mixer grid. Connect a second variable bias supply to P207. Rotate the Station Selector one position clockwise from Channel 13.

Step	Signal Generator Frequency	Signal Generator Connect To	Output Indicator	Connect To	Bias	Adjust
1	44 MC (Marker) (No Sweep)	Tuner Look Point (See Figure 1) ①	VTVM	Pin 2, V205 1VTVM	Tuner Look Point −3 volts. P207 −4.5 volts.	Z204 for maximum negative reading.
2	45.5 MC (Marker) (No Sweep)	As Above ②	As Above	As Above 2VTVM	As Above	Z203 for maximum negative reading.
3	42.5 MC (Marker) (No Sweep)	As Above ③	As Above	As Above 3VTVM	As Above	Z202 for maximum negative reading.
4	43.5 MC Center Freq. 10 MC Deviation	As Above ④	Oscillo-graph through XTAL	Pin 5, V201 4XTAL	Tuner Look Point −3 volts. P207 −3 volts.	L201 (top) for 47.25 MC trap. L201 (bottom) for 41.25 MC trap. Adjust simultaneously Mixer plate coil and Z201 (top) for 45.75 MC Marker. Z201 (bottom) for 42.25 MC Marker. Note: Repeat adjustments until markers are positioned as specified. 
5	4.5 MC 400 CPS AM	Pin 2, V205 ⑤	As Above	Junction of L205 & R313 5XTAL	None Required	L210A (bottom) for minimum amplitude.

SOUND IF ALIGNMENT

6	4.5 MC (Morker) (No Sweep)	Pin 2, V205 ⑥	VTVM	Junction of R1-R2 6VTVM	None Required	(Note: Add R1 and R2, see Alignment Test Point Drawing) Z206 (bottom) and L210B (top) for maximum negotive reading.
7	As Above	As Above ⑦	VTVM	Between P203 and junction of R1-R2 7VTVM	As Above	(Note: Set VTVM to zero center scale. Connect VTVM D-C probe to junction of R1-R2 and VTVM ground lead to P203). Z206 (top) for null point. Remove R1-R2.

ALTERNATE SOUND IF ALIGNMENT – USING TV SIGNAL

6	TV Signal, Teleset must be tuned for best picture	VTVM	Junction of R1-R2 6VTVM	None Required	(Note: Add R1 and R2, see Alignment Test Point Drawing) Z206 (bottom) and L210B (top) for moximum negative reading.
7	As Above	VTVM	Between P203 and junction of R1-R2 7VTVM	As Above	(Note: Set VTVM to zero center scale. Connect VTVM D-C probe to junction of R1-R2 and VTVM ground lead to P203) Z206 (top) for null point. Remove R1-R2.

NOTE: When the sound i-f alignment has been completed, adjust the tuning slug of L210B (top) approximately ¼ turn far best sound quieting (least sound background hiss). Make this adjustment with a weak TV signal exhibiting picture snow.

CHASSIS NOTES

1. All waveforms and voltages were taken under operating conditions. The receiver was tuned to an average strength TV signal, the Contrast control rotated fully clockwise and the Picture Stabilizer control was rotated fully counter-clockwise.
2. The Picture Stabilizer control and switch consists of a potentiometer, R319, and a snap switch, S202. When R319 is rotated fully counter-clockwise S202 opens (Local position as shown in the schematic).
3. Voltages ± 20% of those shown are normal.
4. All resistors are 10%, one-half watt, unless otherwise indicated. W. W. indicates wire wound resistor.
5. All capacitors are 20%, 500V, unless otherwise indicated. All capacitors are ceramic, unless indicated as follows: M-Mica, P-Paper, ± -Electrolytic, MP-Molded Paper

Emerson Television

TYPE	MODEL NUMBERS	TV CHASSIS	TUBE SIZE	TV TUNER	TYPE UHF STRIP
VHF Receivers	1138, 1150, 1152, 1154, 1164	120284-P	21ALP4B	470867	TD
	1124, 1156, 1174	120286-P	24DP4A		
(See Note Below)	1158C	120290-P	24DP4A	470866	TD
UHF-VHF Receivers	1151, 1153, 1155, 1165	120285-T	21ALP4B	470825	NO UHF STRIPS NEEDED
	1125, 1157, 1175	120287-T	24DP4A	470825	

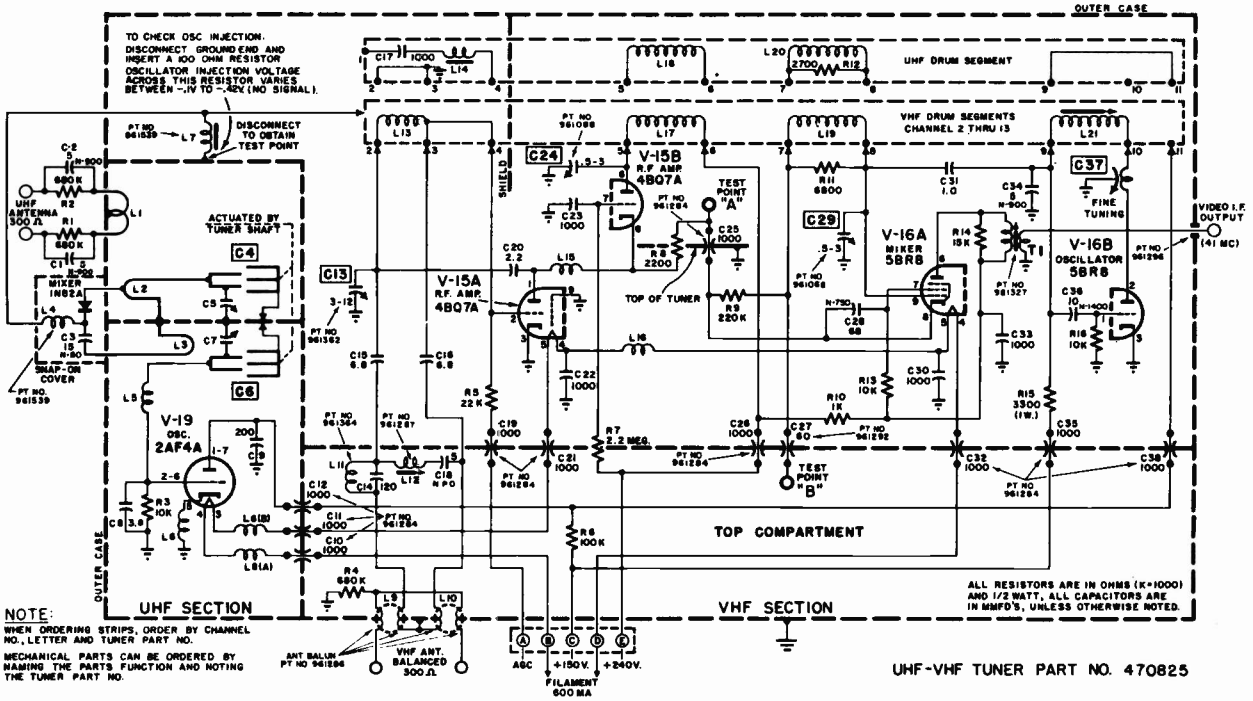
The VHF models listed above can, if desired, be easily adapted to UHF by means of interchangeable tuner channel coil strips or by use of an external UHF converter.

The chassis listed above are electrically similar to the group described in the 1956 Television manual. Important service information, production changes, and a complete circuit diagram are printed on pages 55 through 58. For alignment information please refer to pages 41-43 of Supreme Publications, Volume TV-11, "Most-Often-Needed 1956 Television Servicing Information."

TUNER 470825
VHF SECTION:

The front section of the assembly contains a new type 12 channel, single-strip VHF cascode turret tuner, with an extra coil strip (13 instead of 12). The 13th position is used for UHF operation and automatically converts the VHF tuner to an additional two stage I.F. amplifier since the extra strip in this position is resonant at the I.F. frequency. The VHF oscillator (1/2 5BR8) is disabled in the UHF position since it receives no plate voltage.

The operation of the tuner on VHF is similar to a conventional cascode tuner except that now the R.F. A.G.C. voltage indirectly controls the bias voltage on the mixer tube (1/2 5BR8). The voltage that is developed across the first triode section of the R.F. amplifier tube (4BQ7A) is the cathode bias voltage of the mixer tube. (See tuner schematic). Since the operation of the R.F. tube is A.G.C. controlled, any small variations of A.G.C. voltage will in turn cause a change in the cathode bias voltage of the mixer tube. In this manner, changes in the A.G.C. voltage controls the operation of both the R.F. and mixer tubes. This greatly increases the operating range of the tuner. Separate VHF and UHF antenna inputs to the tuner are required.

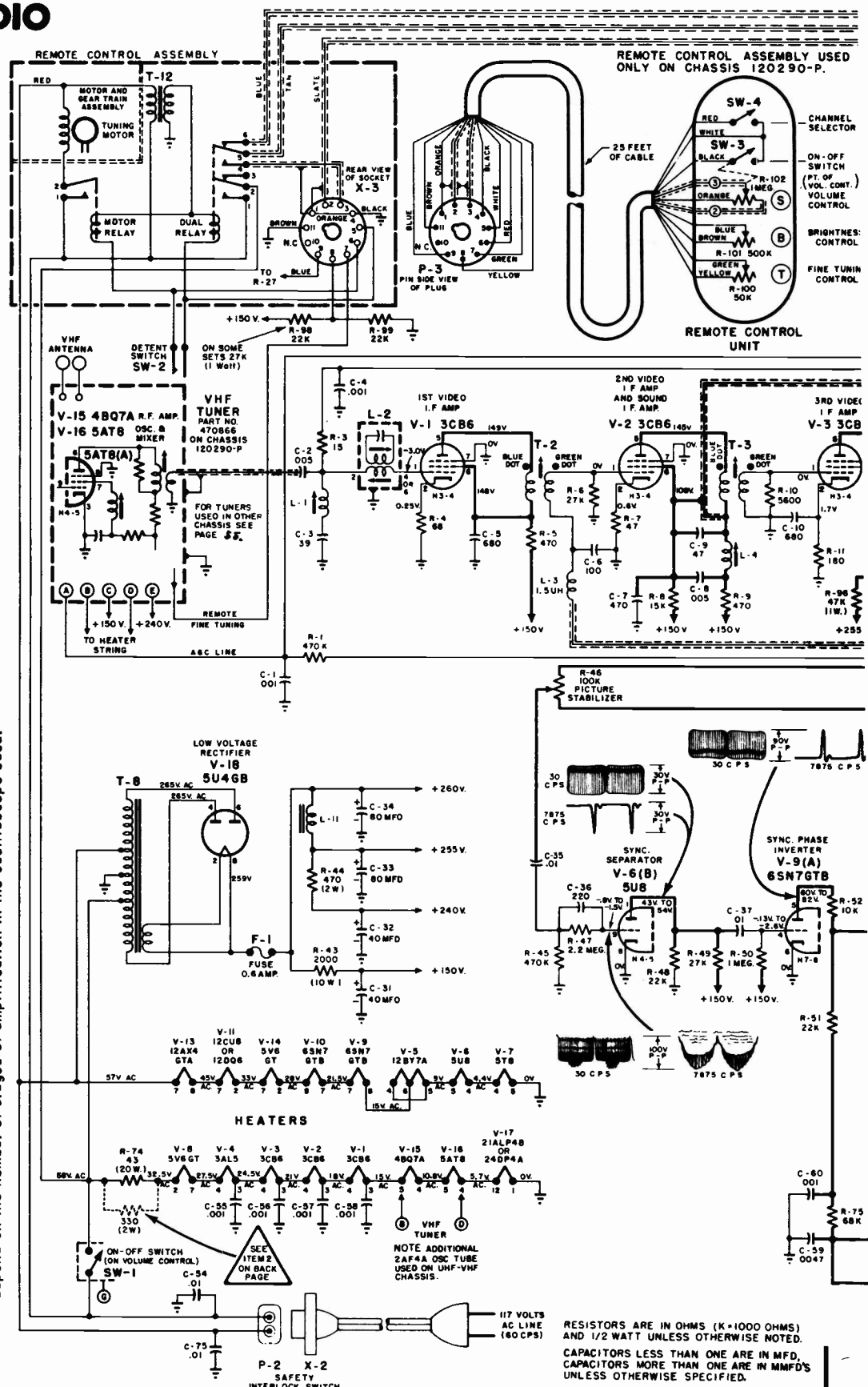


SCHEMATIC DIAGRAM OF UHF-VHF TURRET TYPE TUNER PART NO. 470825

EMERSON RADIO

MODELS USING CHASSIS

120284-P
120285-T
120286-P
120287-T
120290-P



WAVE SHAPE ANALYSIS CHART

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

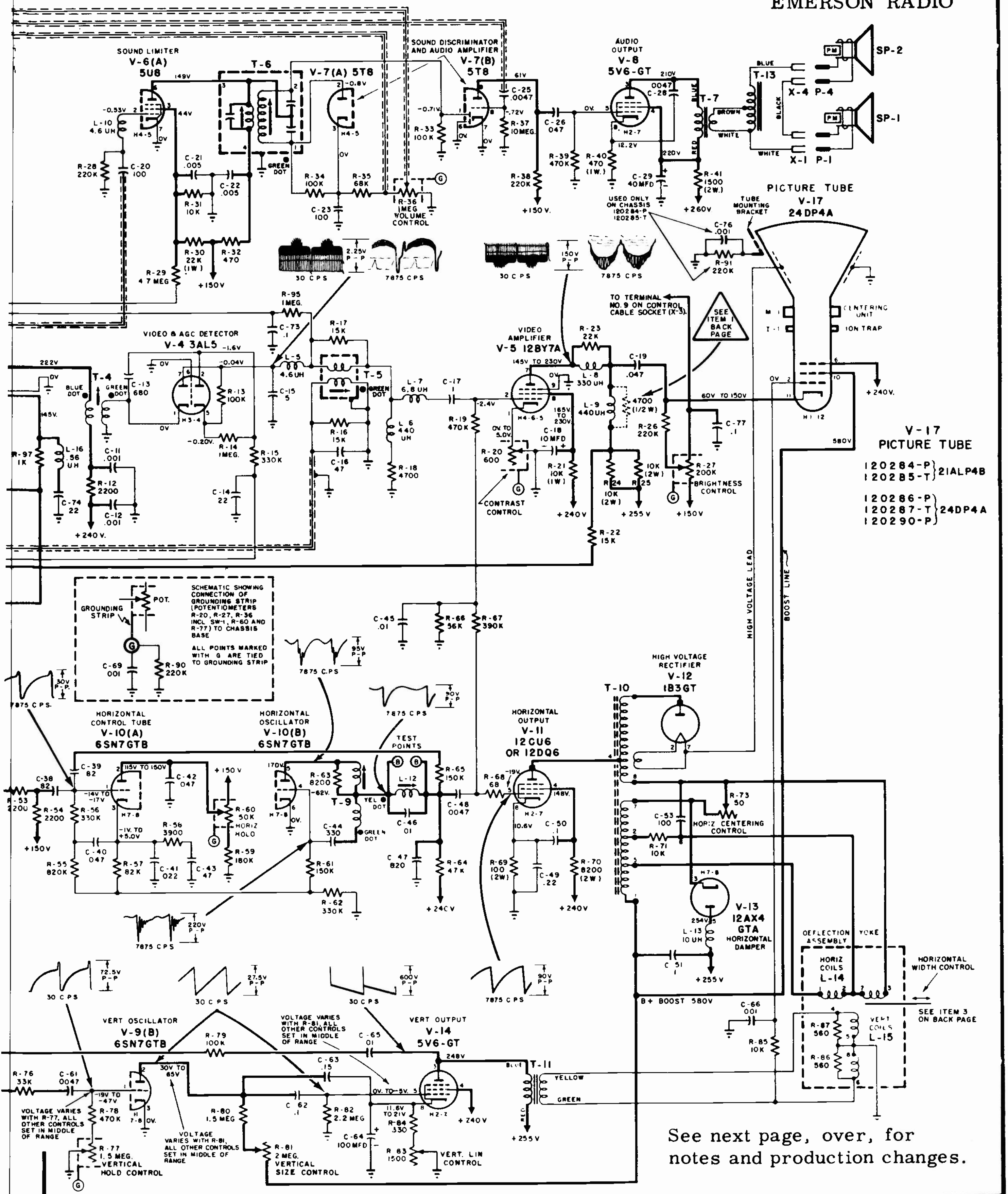
The peak to peak voltage given may also vary slightly depending on signal strength and component variations.

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.

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 at MAXIMUM CONTRAST.
3. The 30 and 7875 C.P.S. oscilloscope sweep settings are used so as to permit the serviceman to observe two cycles of the wave shape.

NOTE: A wave shape seen in 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.

EMERSON RADIO



See next page, over, for notes and production changes.

EMERSON TV Chassis 120284P, 120285T, 120286P, 120287T, 120290P, Continued

CONDITIONS FOR TAKING VOLTAGE AND RESISTANCE READINGS

The voltage and resistance measurements listed were taken on chassis 120285-T coded triangle. △

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 R-95, C-73 and C-1, R-1. BIAS BATTERY USED FOR VOLTAGE READINGS ONLY.
4. All controls in position for normal picture. (Varied when it directly effects reading).
5. All measurements taken with a vacuum tube voltmeter and ohmmeter.
6. All readings listed in tables were taken between points shown and chassis.
7. Resistance readings are given in ohms unless otherwise noted.
8. N.C. denotes no connection.

RESISTANCE READINGS

Symbol	TUBE PIN NUMBERS								
	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9
V-1	1.25 MEG.	68Ω	4.0Ω	4.4Ω	*15K	*15K	0Ω		
V-2	2.2Ω	47Ω	4.4Ω	5.0Ω	*15K	*15K	0Ω		
V-3	0.1Ω	180Ω	5.0Ω	5.5Ω	*18K	50K	0Ω		
V-4	0.1Ω	1.0 MEG.	5.5Ω	6.0Ω	120K	0Ω	4700Ω		
V-5	0-600Ω	500K	0Ω	1.8Ω	1.8Ω	2.6Ω	*20K	*26K	0Ω
V-6	14K	220K	8K	1.1Ω	1.9Ω	*15K	0Ω	0Ω	2.6 MEG.
V-7	95K	95K	170K	1.1Ω	0Ω	0Ω	0Ω	10 MEG.	220K
V-8	N.C.	7.0Ω	*16K	*16K	470K	4500Ω	6.0Ω	470Ω	
V-9	470K-2 MEG.	INF.	0Ω	900K	*28K	0Ω	3.2Ω	2.8Ω	
V-10	1.5 MEG.	*16K-50K	450K	500K	60K	0Ω	3.3Ω	3.6Ω	
V-11	16K *	3.5Ω	450K	*24K	450K	N.C.	3.0Ω	100Ω	
V-12	INFINITE RESISTANCE								
V-13	N.C.	N.C.	INF.	N.C.	*15K	N.C.	1.2Ω	2.8Ω	
V-14	1.6Ω	3.6Ω	*16K	*16K	2.2 MEG.	INF.	3.6Ω	330-1800Ω	
V-18	N.C.	*16K	N.C.	25Ω	N.C.	25Ω	N.C.	*16K	

Symbol	TUBE PIN NUMBERS					
	PIN 1	PIN 2	PIN 6	PIN 10	PIN 11	PIN 12
V-17	0Ω	10K	16K	INF.	260K	1.6Ω

*INDICATE VARYING RESISTANCE WAIT UNTIL METER SETTLES.

PRODUCTION CHANGES

In the course of production various changes were incorporated in the order shown below. Changes as listed under a particular letter also include changes as listed under all previous letters unless otherwise noted.

1. To reduce video ringing in certain areas.

We have found that in areas where a transmitting station is peaking the high frequency components of their picture transmission some video ringing might result. To eliminate this possibility a 4700 ohm 1/2 watt resistor has been added across the video plate shunt peaking coil (L-9, 440 uh). Chassis already incorporating this change are coded as follows:

120284P
120285T
120286P
120287T
120290P

A

2. Intermittent operation of certain 2AF4 UHF oscillator tubes.

It has been found that under low line voltage conditions certain 2AF4 tubes would oscillate intermittently. To eliminate this possibility and make the selection of 2AF4 tubes less critical a 330 ohm 2 watt resistor has been placed in parallel with filament dropping resistor R-74 (43 ohm 20 watt). Chassis already incorporating this change have been coded as follows:

120285T
120287T

B

3. Addition of Horizontal Width Control

After production started on those chassis covered by this addendum, an aluminum shim type of horizontal width control was added. This aluminum shim (part #412302, 2 1/4" x 6") is wrapped around the neck of the picture tube and is held in place by the centering device. To control picture width, it is only necessary to move this aluminum shim in or out of the deflection yoke field.

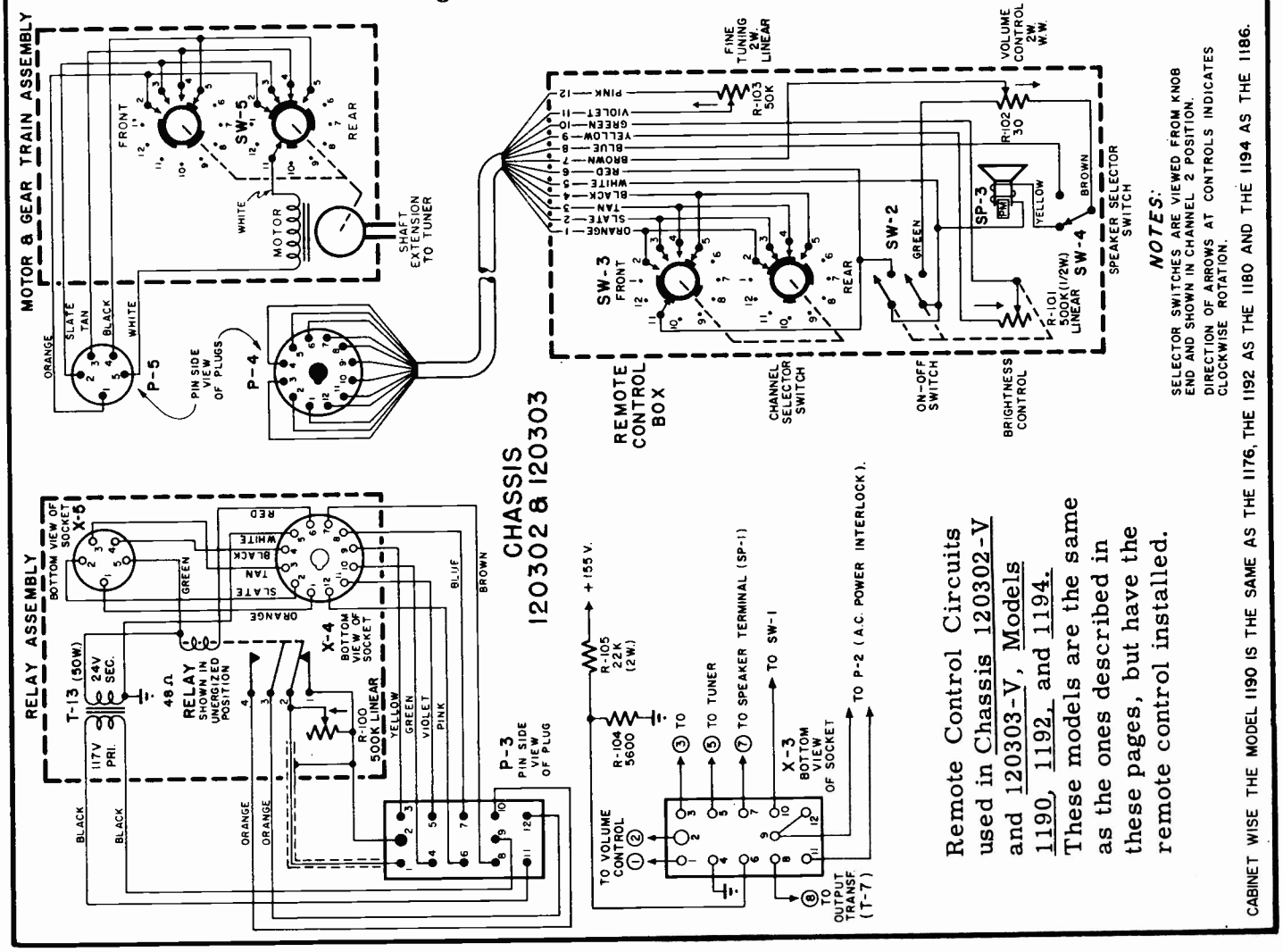
After adjusting the horizontal width device, make certain that the ion trap is correctly readjusted.

Emerson Television

TYPE	MODEL NUMBER	TV CHASSIS	TUBE SIZE	TV TUNER	TYPE UHF STRIP
"V.H.F." RECEIVERS (see note below)	1176, 1178, 1180	120292-P	21ALP4B	470869	"TD"
	1176, 1178, 1180	120292-V		470868	"TDB"
	1186, 1188	120299-V	24DP4A	470889	"TDB"
"UHF-VHF" RECEIVERS	1177, 1179, 1181	120293-T	21ALP4B	470870	No UHF strips needed
	1177, 1179, 1181	120293-X		470876	
	1187, 1189	120300-X	24DP4A	470892	

The VHF models listed above can, if desired, be easily adapted to UHF by means of interchangeable tuner channel coil strips or by use of an external converter. Make sure the correct type of UHF strip is used as indicated above.

Material on pages 59 through 64. Alignment point diagram on page 60, over; for alignment instructions see material in Supreme Publications, Volume 11, "Most-Often-Needed 1956 Television Servicing Information," pages 41-43, which also applies to these similar sets. See right hand corner below for a list of similar sets using remote control Chassis 120302V and 120303V.



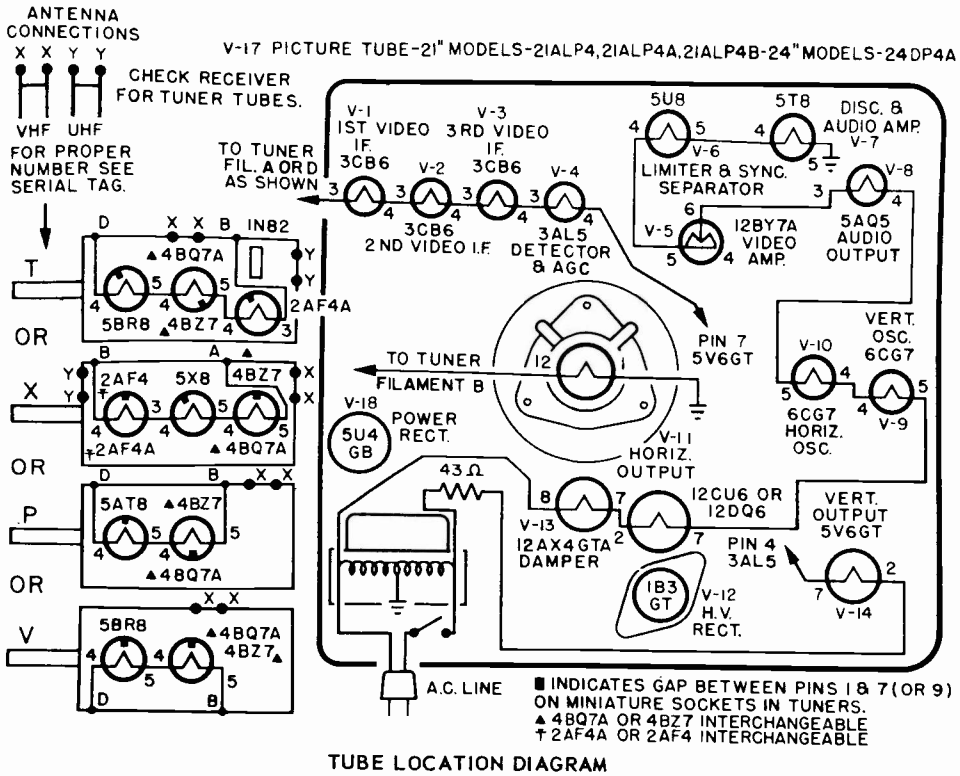
Remote Control Circuits used in Chassis 120302-V and 120303-V, Models 1190, 1192, and 1194. These models are the same as the ones described in these pages, but have the remote control installed.

CABINET WISE THE MODEL 1190 IS THE SAME AS THE 1176, THE 1192 AS THE 1180 AND THE 1194 AS THE 1186.

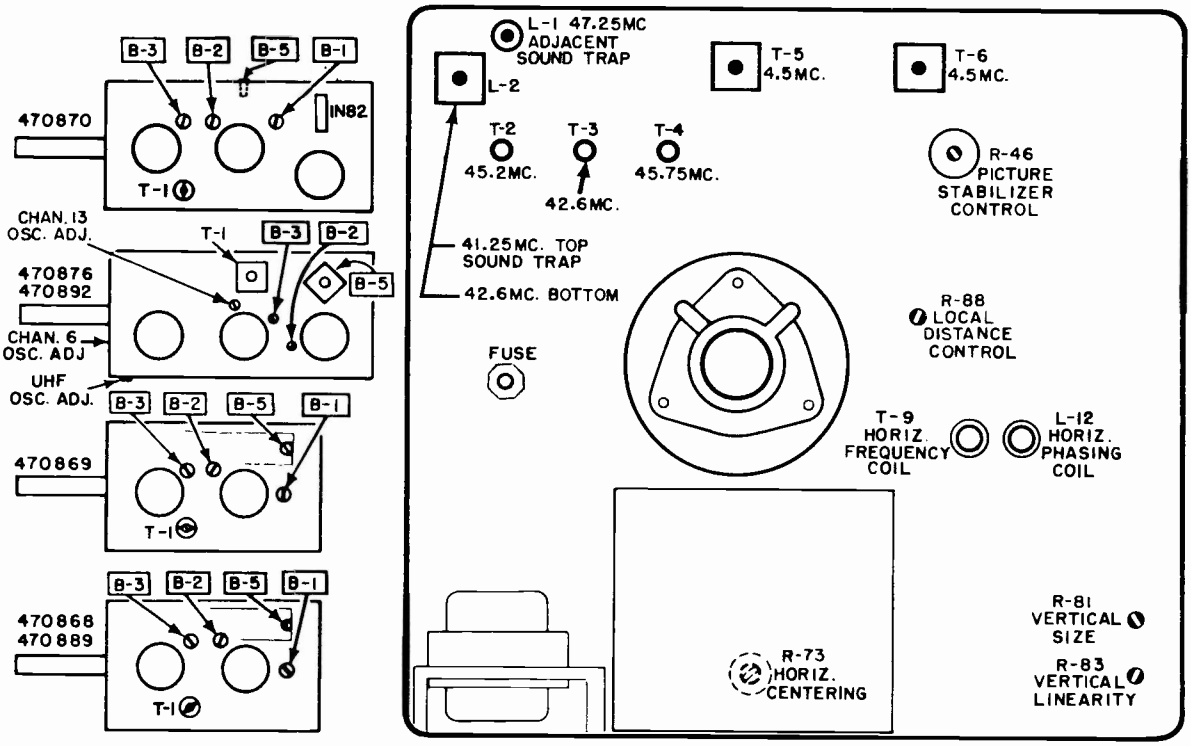
EMERSON TV Chassis 120292P, -V, 120293T, -X, 120299V, 120300X, Continued

TO REMOVE FRONT MASK:

Remove knobs at top of mask and insert fingers into spaces formerly occupied by knobs. Pull mask out and then up to clear bottom channel.

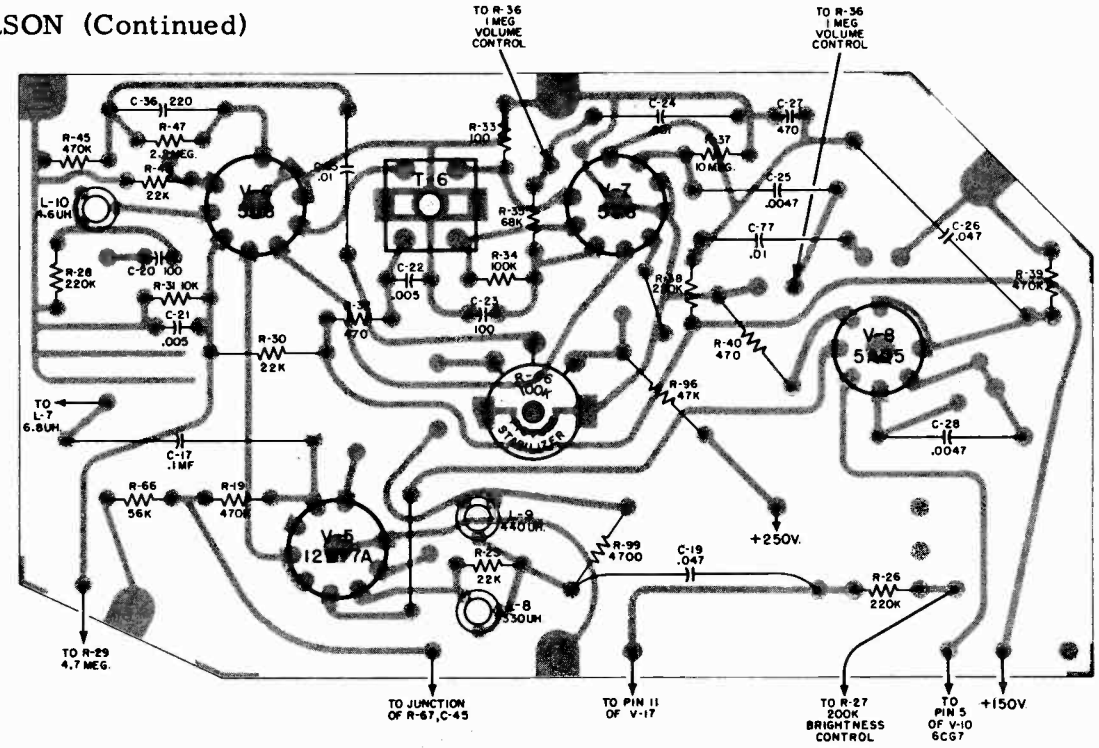


TUBE LOCATION DIAGRAM



ALIGNMENT POINT DIAGRAM

EMERSON (Continued)



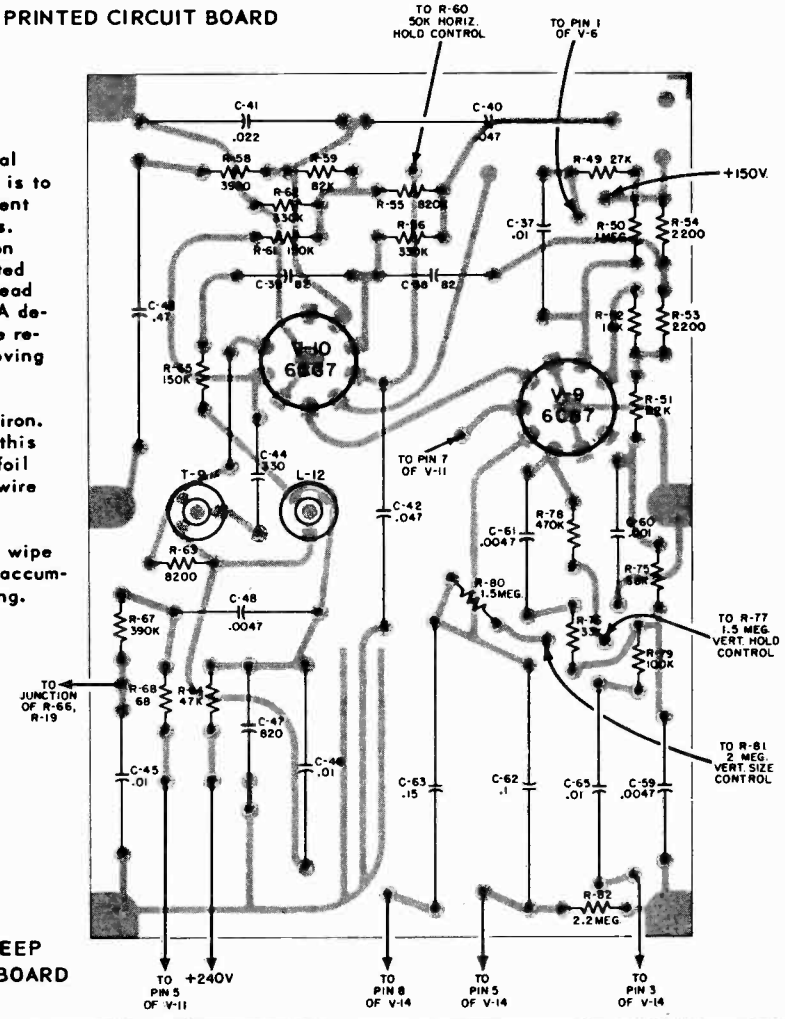
SOUND & VIDEO PRINTED CIRCUIT BOARD

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. Broken foil leads may be repaired by soldering a hookup wire across the break.

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



HORIZ. & VERT. SWEEP PRINTED CIRCUIT BOARD

EMERSON RADIO

Schematic Diagram Chassis 120292P, -V, 120293T, -X, 120299V, and 120300X.

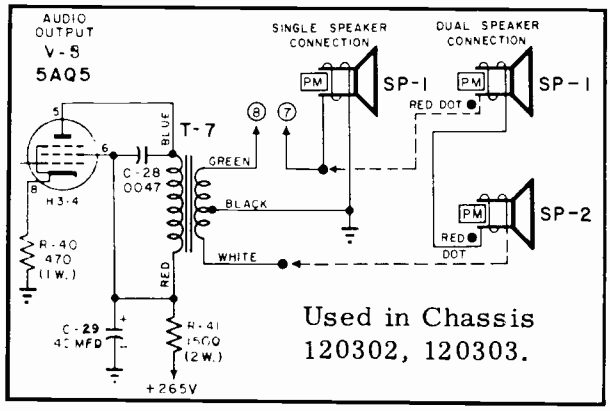
VHF TUNER 470868 ON CHASSIS 120292-V.

VHF TUNER 470889 ON CHASSIS 120299-V.

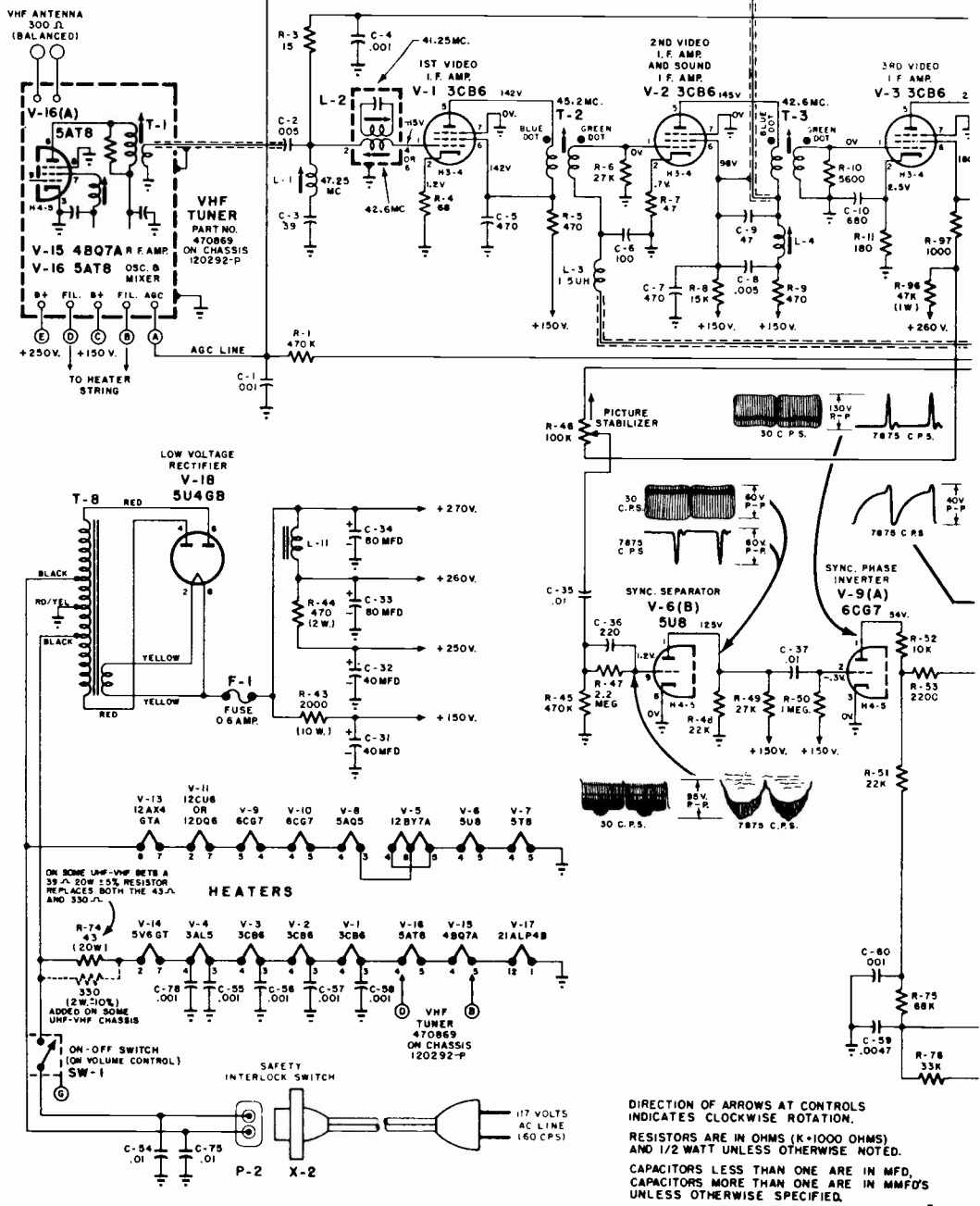
UHF-VHF TUNER 470870 ON CHASSIS 120293-T.

UHF-VHF TUNER 470876 ON CHASSIS 120293-X.

UHF-VHF TUNER 470892 ON CHASSIS 120300-X.



Used in Chassis 120302, 120303.



DIRECTION OF ARROWS AT CONTROLS INDICATES CLOCKWISE ROTATION.

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

CAPACITORS LESS THAN ONE ARE IN MFD. CAPACITORS MORE THAN ONE ARE IN MMFD'S UNLESS OTHERWISE SPECIFIED.

WAVE SHAPE ANALYSIS CHART

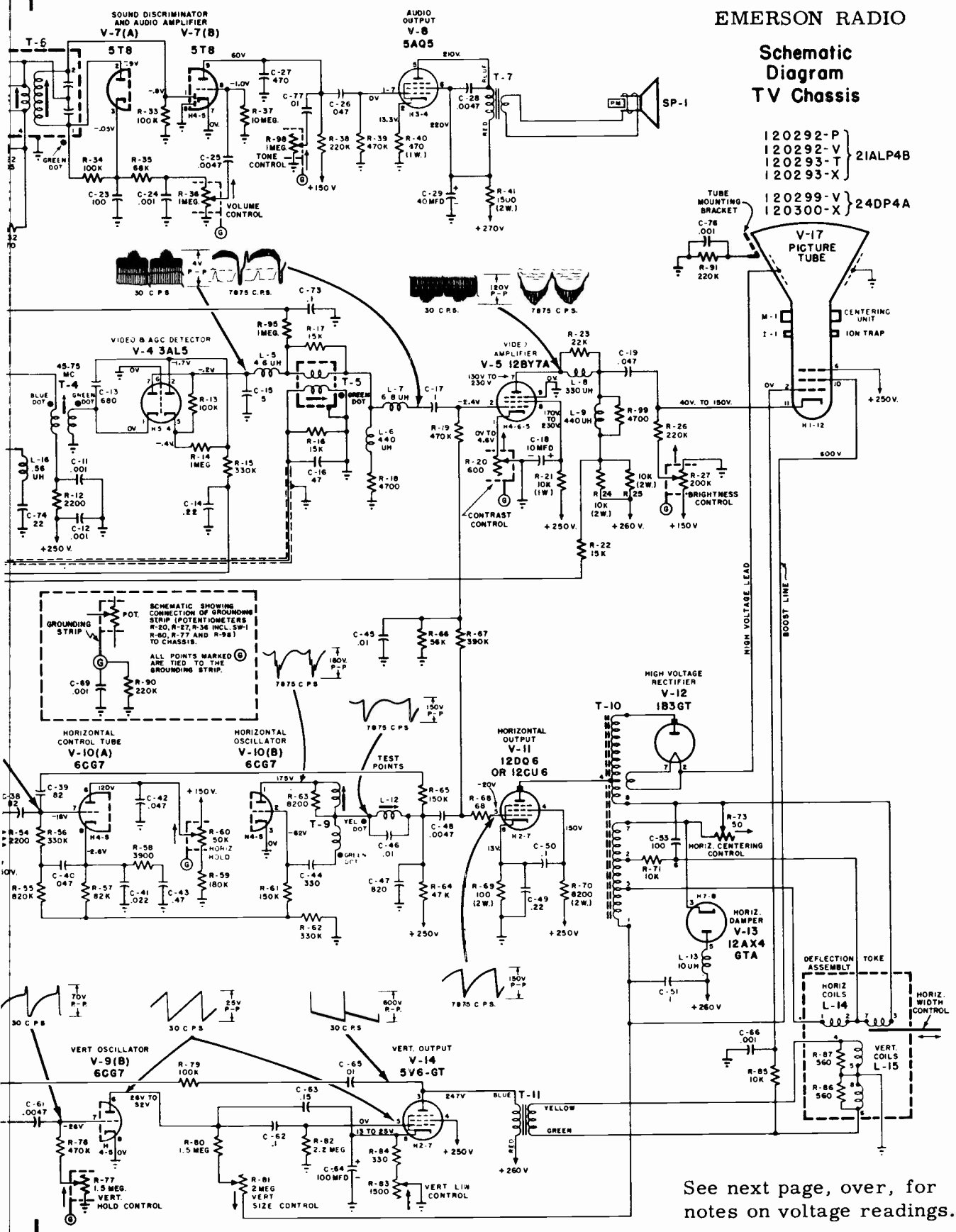
Slight peak to peak voltage differences may be noticed on chassis of later triangle codes.

The peak to peak voltage given may also vary slighly 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 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 sweet 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.



See next page, over, for notes on voltage readings.

EMERSON TV Chassis 120292P, -V, 120293T, -X, 120299V, 120300X, Continued

REMOVAL OF CHASSIS FROM CABINET

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: (Slight variations may exist due to differences in cabinets).

1. Remove knobs and front mask as described above.
2. Remove screws which hold the tuner shaft support to cabinet and those which hold the contrast, volume and on-off control to cabinet. Also remove the screws holding the ears of the pix tube assembly bracket.
3. Remove rear cover, antenna binding post and tuner support bracket from cabinet. Also remove the two top chassis braces from roof of cabinet.
4. Remove two nuts which hold the side control assembly to control escutcheon. Unsolder speaker leads.
5. Remove screws holding base to cabinet.
6. On table models lift cabinet up and off chassis mounting board.
   On console models remove chassis with its mounting board from cabinet.

HORIZONTAL CENTERING CONTROL (R-73)

This control is mounted on the Horizontal Output Transformer.

When necessary this control is factory adjusted to eliminate corner shadows which might occur with some picture tubes and/or deflection yokes. Use a fiber type screwdriver to adjust.

CONDITIONS FOR TAKING VOLTAGE AND RESISTANCE READINGS

The voltage and resistance measurements were taken on Chassis 120292P.

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 R-1, C-1, BIAS BATTERY USED FOR VOLTAGE READINGS ONLY.
4. All controls in position for normal picture. (Varied when it directly effects reading).
5. All measurements taken with a vacuum tube voltmeter and ohmmeter.
6. All readings listed in tables were taken between points shown and chassis.
7. Resistance readings are given in ohms unless otherwise noted.
8. N.C. denotes no connection.

RESISTANCE READINGS

SYMBOL	TUBE PIN NUMBERS									
	PIN 1	PIN 2	PIN 3	PIN 4	PIN 5	PIN 6	PIN 7	PIN 8	PIN 9	TOP CAP
V-1	1.0 MEG.	68Ω	3Ω	3.5Ω	*17K	*17K	0			
V-2	1.6Ω	47Ω	3.5Ω	4.1Ω	*17K	*32K	0			
V-3	0	180Ω	4.1Ω	4.6Ω	*22K	*50K	0			
V-4	0	1 MEG.	4.6Ω	5.1Ω	100K	0	4700Ω			
V-5	CONTRAST CONTROL 0 - 600Ω	500K	N.C.	1.8Ω	1.8Ω	2.7Ω	*22K	*29K	0	
V-6	15K	220K	10K	1.7Ω	1.0Ω	*17K	0	0	2.7 MEG.	
V-7	100K	100K	180K	1.0Ω	0	0	0	10 MEG.	250K	
V-8	470K	470	2.7Ω	3.2Ω	*20K	*20K	470K			
V-9	*30K	1 MEG.	0	3.5Ω	3.6Ω	INF.	VERT. HOLD CONTROL 470K TO 2 MEG.	0	N.C.	
V-10	*64K	480K	0	3.5Ω	3.2Ω	HORIZ. HOLD CONTROL *18K TO 55K	1.5 MEG.	400K	N.C.	
V-11	N.C.	2.8Ω	N.C.	*28K	450K	N.C.	3.6Ω	100Ω		INF.
V-12	N.C.	INF.	N.C.	N.C.	N.C.	N.C.	INF.	N.C.		INF.
V-13	N.C.	N.C.	INF.	N.C.	*18K	N.C.	2.8Ω	1.5Ω		
V-14	N.C.	5.7Ω	*18K	*19K	2.2 MEG.	N.C.	5.1Ω	VERT. LIN. CONTROL 330 TO 1830Ω		
V-18	N.C.	*18K	N.C.	*15Ω	N.C.	*17Ω	N.C.	*18K		

SYMBOL	TUBE PIN NUMBERS					
	PIN 1	PIN 2	PIN 6	PIN 10	PIN 11	PIN 12
V-17	0Ω	10K	*18K	*INF.	BRIGHTNESS CONTROL 220K TO 450K	1.5Ω

* INDICATES VARYING RESISTANCE WAIT UNTIL METER SETTLES

GENERAL ELECTRIC COMPANY

"ST" Line Receivers, Models 21C133, 21C134, 21C135, 21C136, 21C141, 21C142

FOCUS:

On the base of the picture tube is located a focus jumper. This jumper should be placed between picture tube pins 6 and 10 or pins 6 and 2, whichever provides best focus. The ion trap should again be adjusted for maximum brightness consistent with best focus.

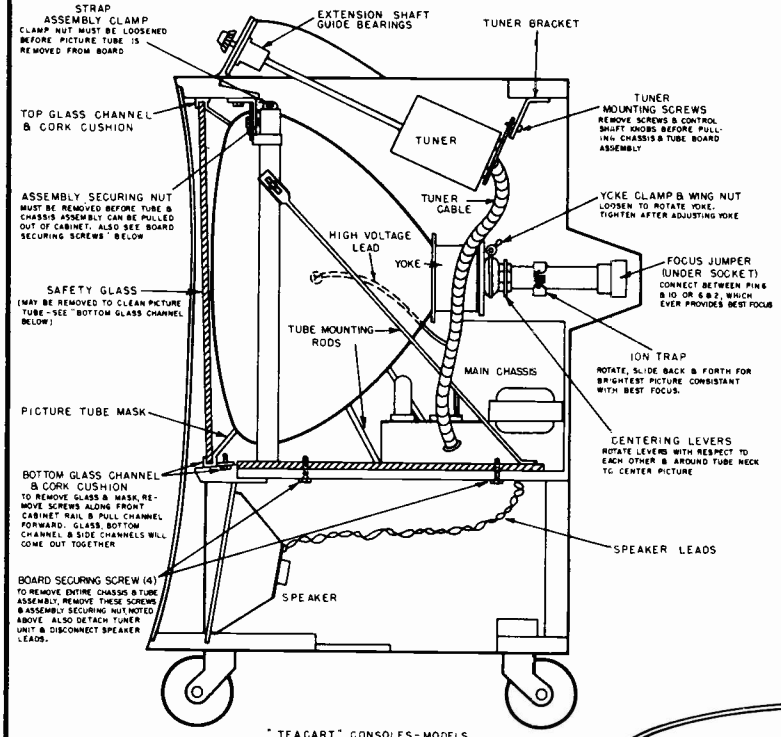
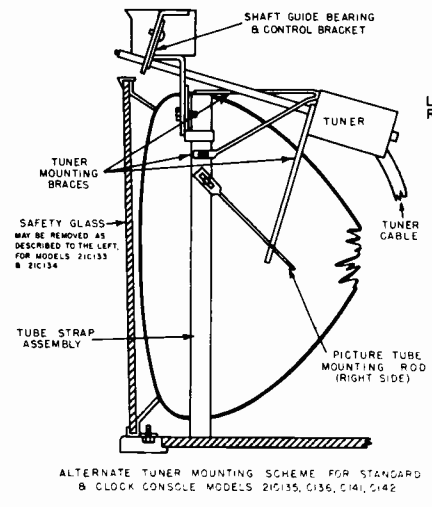


FIGURE 1.

CUT-AWAY VIEW OF RECEIVERS



ALTERNATE TUNER MOUNTING SCHEME FOR STANDARD & CLOCK CONSOLE MODELS 21C135, C136, C141, C142

Continued on pages 66 through 70.

TO CLEAN PICTURE TUBE WITHOUT REMOVING IT:

1. Make sure receiver is turned off. Remove screws arranged along cabinet front rail.
2. Pull out bottom glass channel and glass. Mask and side rails will also come out, leaving tube face exposed.
3. After cleaning tube and/or safety glass, replace mask, safety glass and glass rails. Use caution to avoid chipping safety glass. Replace bottom rail securing screws.

REMOVAL AND REPLACEMENT OF PICTURE TUBE

Refer to Figures 1 and 2 during this procedure.

1. Remove knobs. Disconnect speaker leads.
2. Remove screws arranged along edges of board assembly.
3. Remove securing screw atop tube assembly.
4. Remove entire tube and chassis board assembly.
5. Disconnect high voltage lead and picture tube socket.
6. Loosen clamp nut and remove tube.

HEIGHT & VERTICAL LINEARITY:

These controls (R210 & R214), see Fig. 2, should be adjusted simultaneously to provide proper picture height consistent with good vertical linearity. The final adjustment should extend the picture approximately 1/8 inch beyond the mask limits.

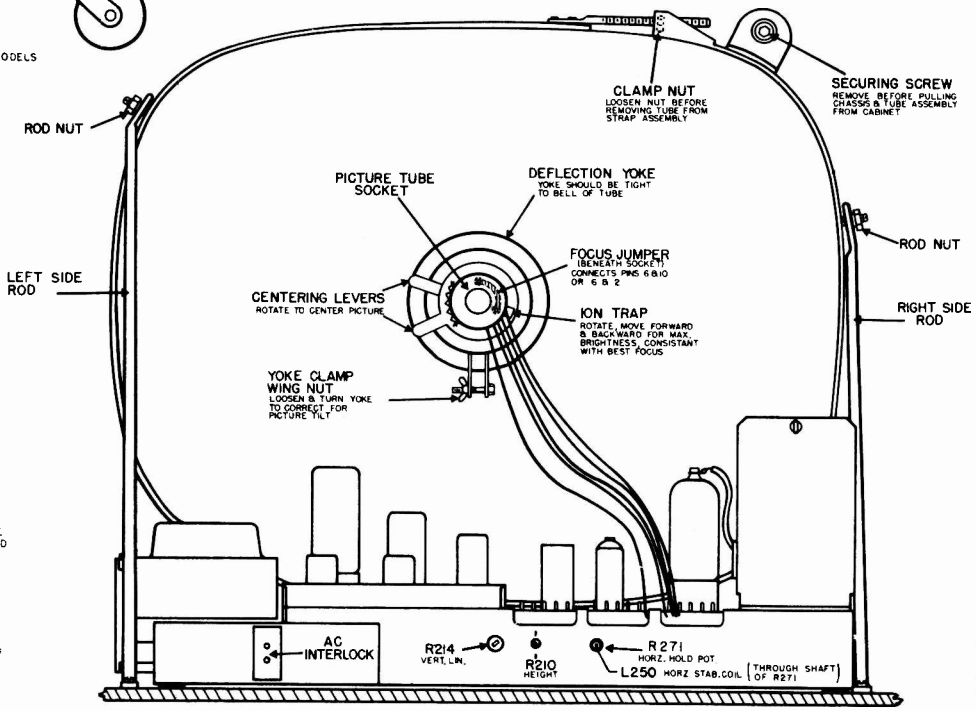


FIGURE 2. REAR VIEW, PICTURE TUBE & REAR CHASSIS ADJUSTMENTS (TUNER UNIT & FRONT CONTROL BRACKETS NOT SHOWN)

GENERAL ELECTRIC Models 21C133 to 21C136, 21C141, 21C142, Continued

RECEIVER ALIGNMENT

VIDEO I-F SYSTEM

The alignment of the I-F system involves the adjustment of 1 trap and 5 pass-band tank circuits. Allow at least 15 minutes warm-up for the receiver and test equipment before proceeding. Follow the usual precautions regarding equipment termination and cable dress. Some tuning cores will apparently go through two peaks. In all cases, the cores should be tuned to the first peak starting from the "out" position. Adjustment locations are indicated in Figure 11.

NOTES:

1. Set channel selector and volume control to channel 11. Turn fine tuning control fully counterclockwise. Set contrast control fully clockwise.
2. Connect sweep generator to capacity type jig shown in Figure 9. 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, V111.
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 2 inch deflection. When aligning, base-line to 45mc marker should be kept at 2 inches. Refer to pre-peaking chart if alignment difficulty is experienced. Align as follows:

A-M PRE-PEAKING FREQUENCIES

L136	44.5 MC
L150 TRAP	47.25 MC
L151	43.3 MC
L157 TRAP	47.25 MC
T151	45.25 MC
T152	42.9 MC
T153	44.15 MC

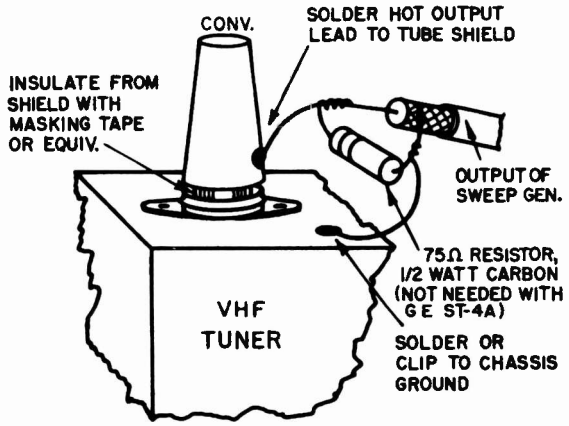
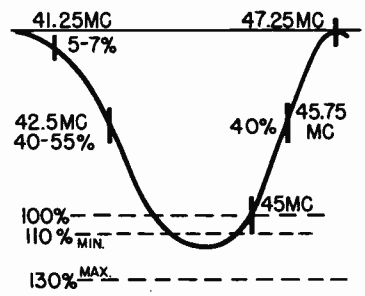


FIGURE 9. I-F SWEEP JIG

VIDEO I-F ALIGNMENT CHART

STEP	ADJUST	DESIRED RESPONSE	REMARKS
1	L150,L157,for minimum at 47.25 mc.		"Blow-up" scope pattern to see traps. After setting traps, set scope gain per above.
2	T152 to set 42.5 mc marker at 40-55%		
3	T151 to set 45.75 mc marker at 45%.		Ajust L136 last. 41.25 mc marker is very critical and should be kept between limits of 5 to 7%. Peak of curve may fall between limits of 110% and 130% using 45 mc as the 100% reference.
4	L151 & T153 for peak region symmetry.		
5	L136 to set width of peak region of curve.		

AUDIO I-F ALIGNMENT

NOTES:

1. Tune in a television signal. This will provide a 4.5 mc signal source for audio i-f alignment. Keep the volume control turned down unless the speaker is connected.
2. Connect two 100,000 ohm resistors (in series) between pin #2 of V114 (6T8) and chassis.

AUDIO ALIGNMENT CHART

STEP	CONNECT VTVM OR 20,000 OHMS/VOLT METER	ADJUST	METER INDICATION	REMARKS
1	Between Pin #2 of V114A 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.	

RECEIVER ALIGNMENT (CONT'D)

4.5 MC TRAP ALIGNMENT:

1. Turn contrast control fully clockwise.
2. Connect detector network (Figure 10) 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.

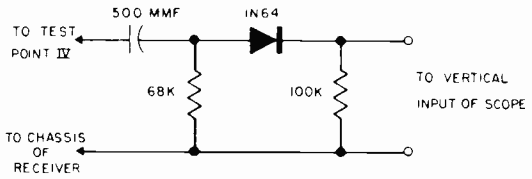


FIGURE 10. DETECTOR NETWORK

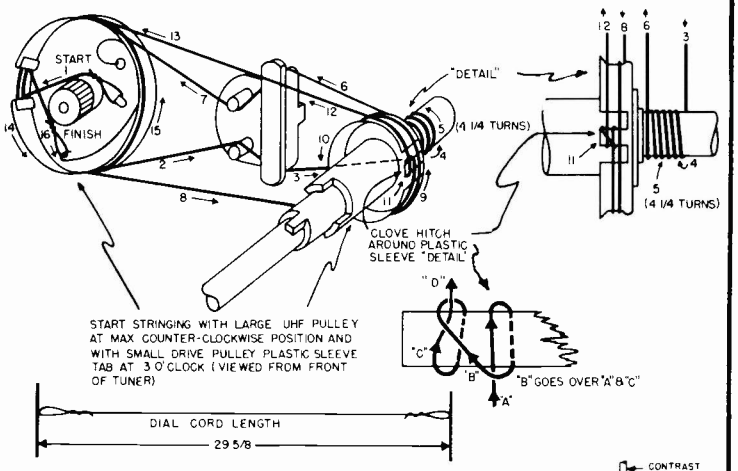


FIGURE 13. UHF DIAL STRINGING

(USED WITH VHF TUNER RJX-082)

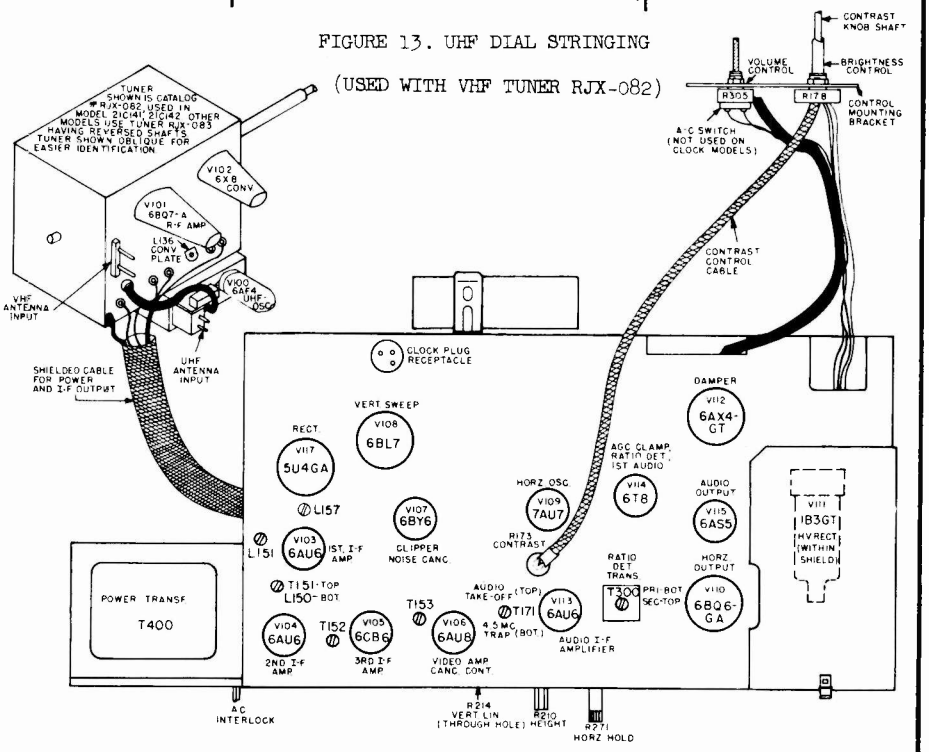


FIGURE 11. TUBE & TRIMMER LOCATION

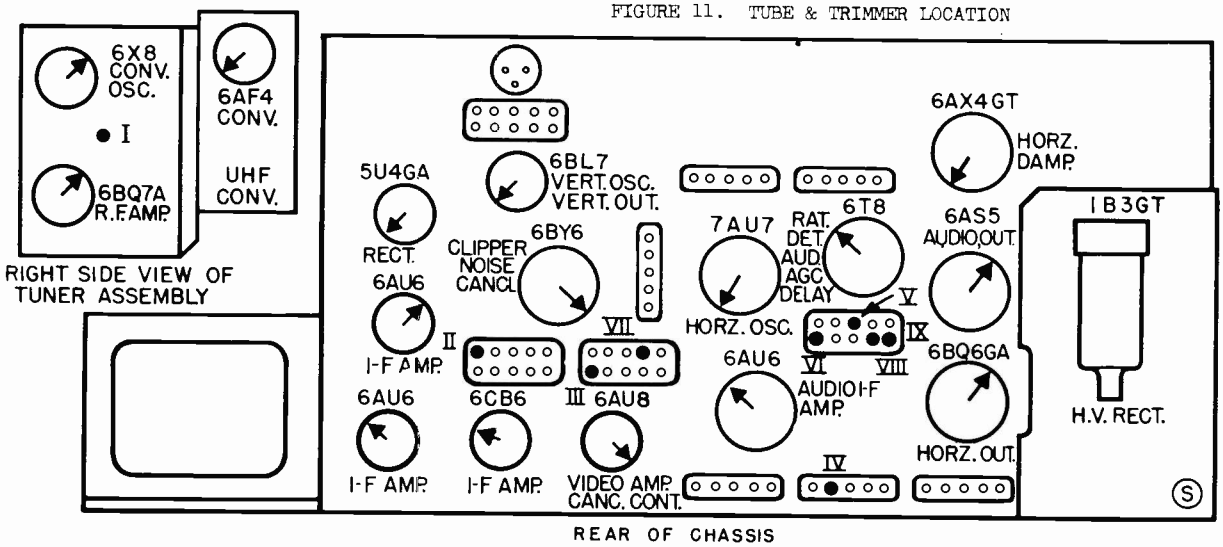


FIGURE 12. TEST POINT DIAGRAM

GENERAL ELECTRIC Models 21C133, 21C134, 21C135, 21C136, 21C141, 21C142, Schematic Diagram, "ST" Line Receivers

2. Shunt Horizontal Stabilizer Coil, L250, with 1000 ohms. See test point VIII and IX on figure 11.

3. Adjust Horizontal Hold Potentiometer, R271, so that picture "floats" back and forth through synced position. Leave R271 set, as is.

4. Remove 1000 ohm shunt across L250. Adjust L250 so that picture again "floats" back and forth through synced position.

5. Remove chassis connection from test point VI. Check horizontal pull-in on normal strength signal and re-adjust R271, if necessary.

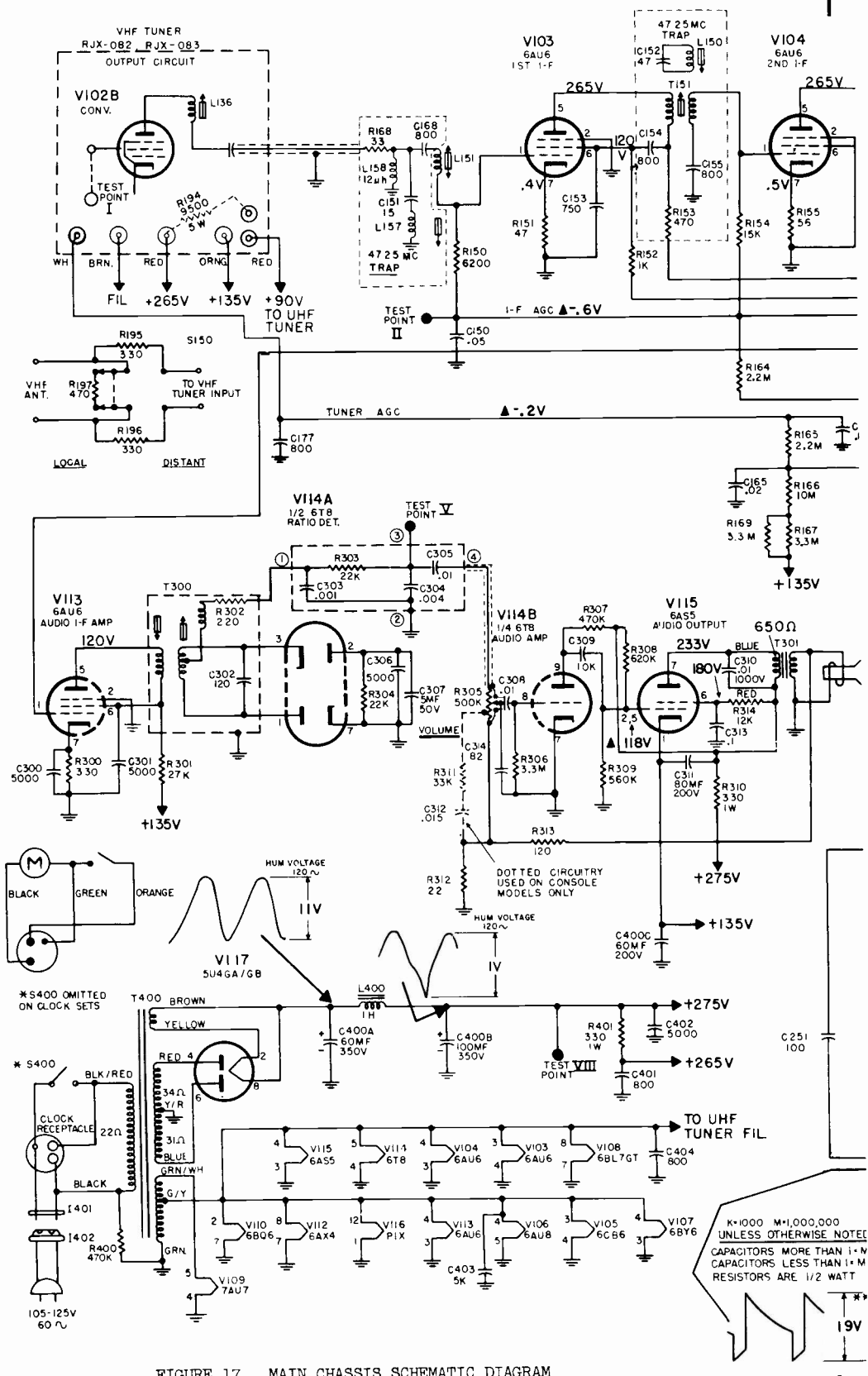
CAUTION

DO NOT REMOVE 7AU7 HORIZONTAL OSCILLATOR WITH SET TURNED ON. DAMAGE TO 6BQ6 TUBE WILL RESULT. BEFORE REPLACING 6BQ6, FIRST CHECK 7AU7 TO PREVENT DAMAGE TO NEW TUBE.

HORIZONTAL STABILIZER ADJUSTMENT:

This is not considered an installation adjustment but should be performed whenever the horizontal oscillator tube is changed. Use barely visible signal.

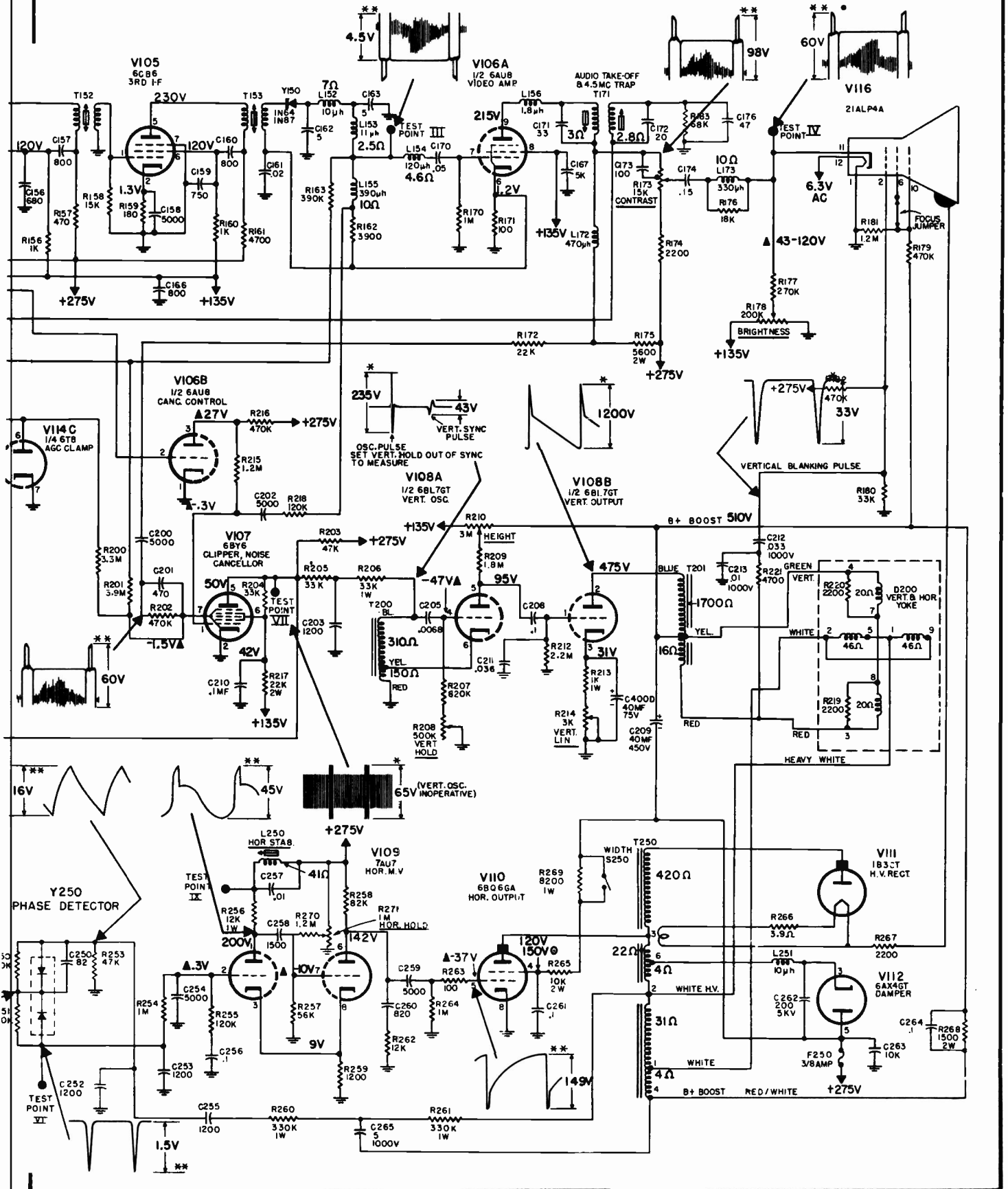
1. Short test point VI to chassis. See figure 11.



* SCOPE SYNCED AT 1/2 VERT. FREQUENCY
** SCOPE SYNCED AT 1/2 HORIZ. FREQUENCY.
WAVE SHAPES TAKEN WITH NORMAL CONTROL SETTINGS & NORMAL SIGNAL APPLIED.
VOLTAGE MEASUREMENTS ARE IN RESPECT TO CHASSIS WITH A 20,000Ω/VOLT METER, WITH CONTROLS SET FOR NORMAL OPERATION, NO SIGNAL APPLIED.
▲ MEASURED WITH VTVM
● VARIES WITH CONTRAST CONTROL.
⊙ VARIES WITH WIDTH SWITCH POSITION

FIGURE 17. MAIN CHASSIS SCHEMATIC DIAGRAM

GENERAL ELECTRIC Models 21C133, 21C134, 21C135, 21C136, 21C141, 21C142



GENERAL ELECTRIC Models 21C133 to 21C136, 21C141, 21C142, Continued

FIGURE 15. "FRONT" UHF DIAL STRINGING (USED WITH VHF TUNER RJX-083)

FIGURE 14. "REAR" UHF DIAL STRINGING (USED WITH VHF TUNER RJX-083)

FIGURE 16. SCHEMATIC DIAGRAM, VHF TUNERS RJX-082 & RJX-083

the hallicrafters co.

Chassis A2005, B2005, C2005, D2005

Chassis Type Number	Models Chassis May Be Used In
A2005 Run 1	17TT700M, 17TT700E, 17TT760T, 17TT710
B2005 Run 1	17TT701M, 17TT701E, 17TT761T, 17TT711
C2005 Run 1	21TT750M, 21KT850M, 21KT850B
D2005 Run 1	21TT751M, 21KT851M, 21KT851B

GENERAL ALIGNMENT INSTRUCTIONS

1. To nullify AGC, connect negative terminal of 3 volt battery to point E and positive terminal to chassis.

2. Couple generator to input test points through 1000 mmf. capacitor.

3. A detector circuit (Fig. 6) is required to couple the scope to the output test points in alignment steps 1 and 2. The detector in the receiver functions for steps 3 and 4.

4. Disable oscillator section of mixer/oscillator tube (5AT8 in tuner) by replacing with a 5AT8 tube with pin 1 removed, or disconnect antenna from set and short antenna input.

5. Set signal generator to IF frequency band.

6. Adjust marker frequencies to 42.75 and 45.75 MC to establish band width of desired curve (Fig. 9).

7. It is necessary that all interconnecting leads be as short as possible.

I.F. ALIGNMENT

GENERATOR — MARKER CONNECTIONS	SCOPE CONNECTION	ADJUSTMENTS
1. Grid test point on mixer See Figs. 3,	Through Det. Ckt. to "A"	Mixer plate coil and L-103 for curve (Fig. 8).
2. 1st I. F. grid.	Through Det. Ckt. to "B"	T-102 for curve in Fig. 8
3. 2nd I. F. grid.	"C"	T-103 for curve in Fig. 8
4. Mixer grid test point.	"C"	Refine adjustments on coils above for curve in Fig. 9.
5. Remove battery from AGC line and re-establish oscillator circuit in tuner.		

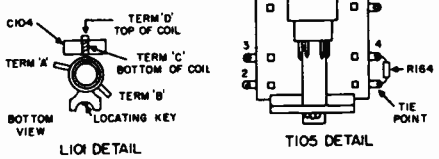
INSTRUCTIONS FOR SOUND ALIGNMENT (Continued on page 74)

1. Couple generator to set at point "C" through 1000 mmf capacitor.
2. For step 1 couple scope to set through detector circuit of Fig. 7.
3. Set contrast control to maximum clockwise, volume control to 1/2 maximum clockwise, and buzz control 90 degrees from clockwise stop.
4. Keep generator output below level where limiting occurs except as shown in chart.
5. Coil slug adjustments are indicated as from the underside of chassis. Slug adjustment into coil is counterclockwise. Slug adjustment out of coil is clockwise.

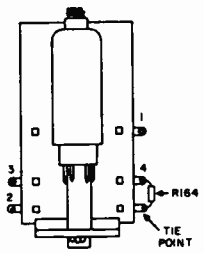
HALLICRAFTERS Chassis A2005, B2005, C2005, D2005

NOTES:

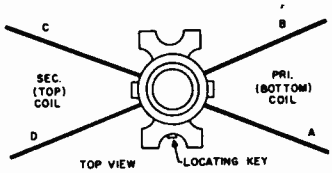
1. ALL VOLTAGES MEASURED WITH A VACUUM TUBE VOLTMETER TO CHASSIS GROUND.
2. SUPPLY VOLTAGE 117 VOLTS 60 CYCLE AC.
3. ALL VOLTAGES ARE DC + POSITIVE UNLESS OTHERWISE INDICATED.
4. ALL CAPACITANCES ARE IN MMFD AND ALL RESISTANCES ARE IN OHMS UNLESS OTHERWISE INDICATED.
5. ■ INDICATES MULTIPLE SECTION CAPACITOR.
6. ■ 12AX4GTA ON SETS 2005A,B,E, ONLY. 19AU4GT ON SETS 2005C,D,F, ONLY.
7. ⊗ T105-A,B,E, CHASSIS. T105A-C,D,F, CHASSIS.
8. ● SETS 2005 A,E, 45 OHMS. SET 2005B-40 OHMS. SETS 2005 C,F, -35 OHMS. SET 2005D-30 OHMS.
9. ▲ MAY BE 390 ON SOME SETS, WHEN REPLACING USE 680 UUF.



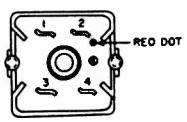
L101 DETAIL



T105 DETAIL



T102 DETAIL



T103 DETAIL

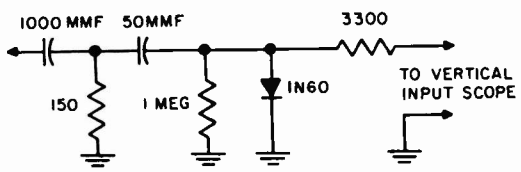


Fig. 6. IF Detector Ckt.

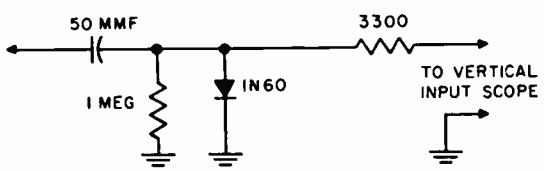


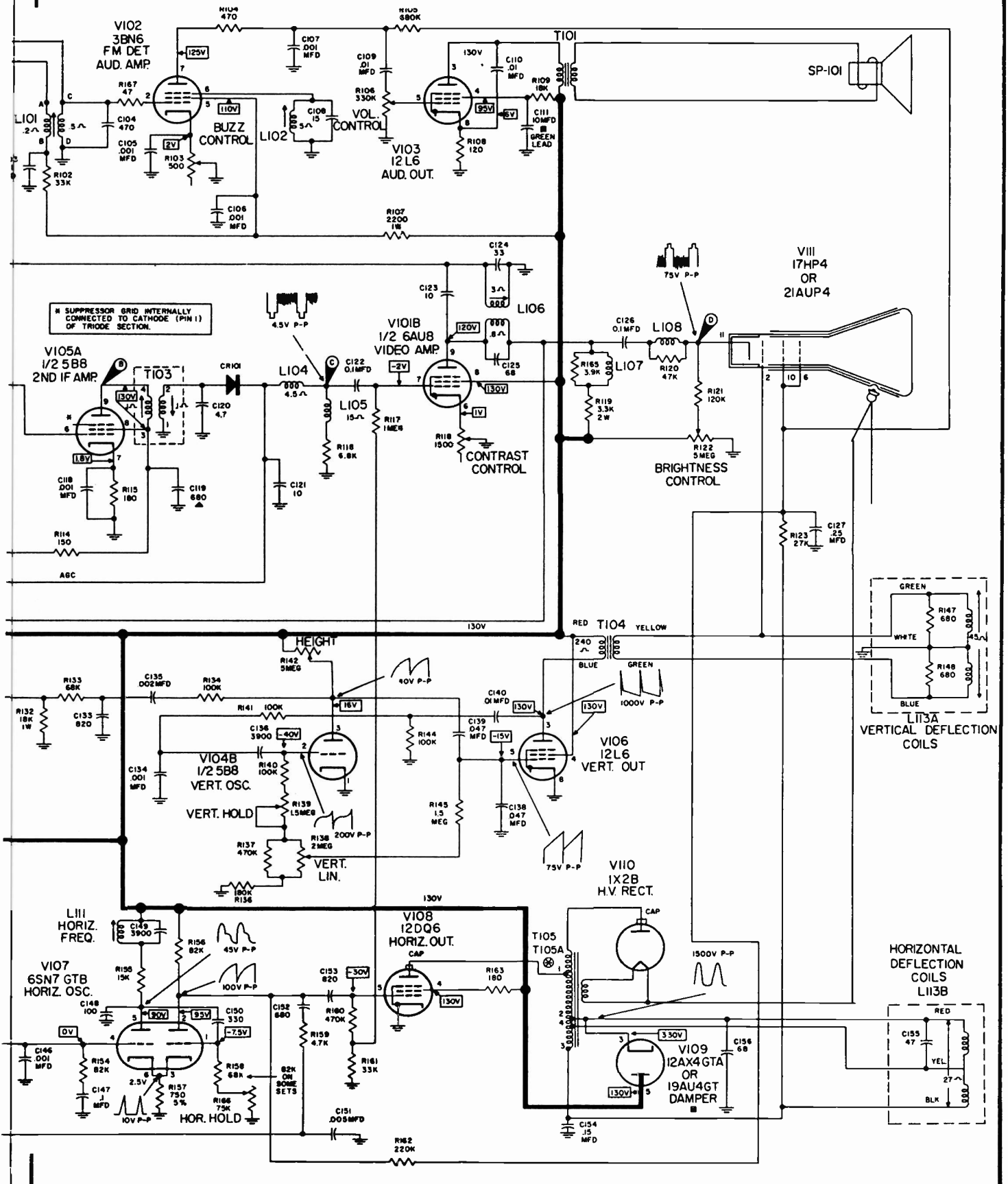
Fig. 7. FM Detector Ckt.

HALLICRAFTERS

2005 TV CHASSIS

RUN 1 SERIES A,B,C,D,E,F

HALLICRAFTERS Chassis A2005, B2005, C2005, D2005, Schematic Diagram



HALLICRAFTERS 2005 Series Chassis

(Alignment continued from page 71)

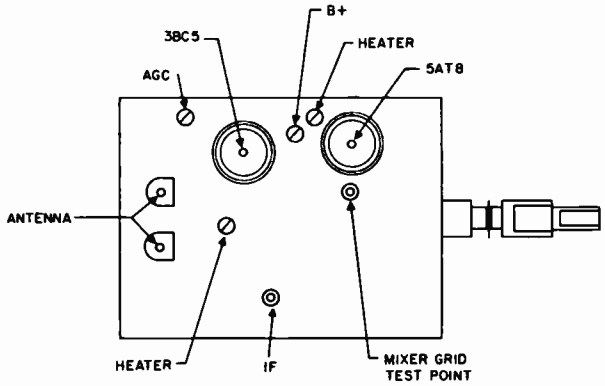


Fig. 3. 1E2619 VHF Tuner

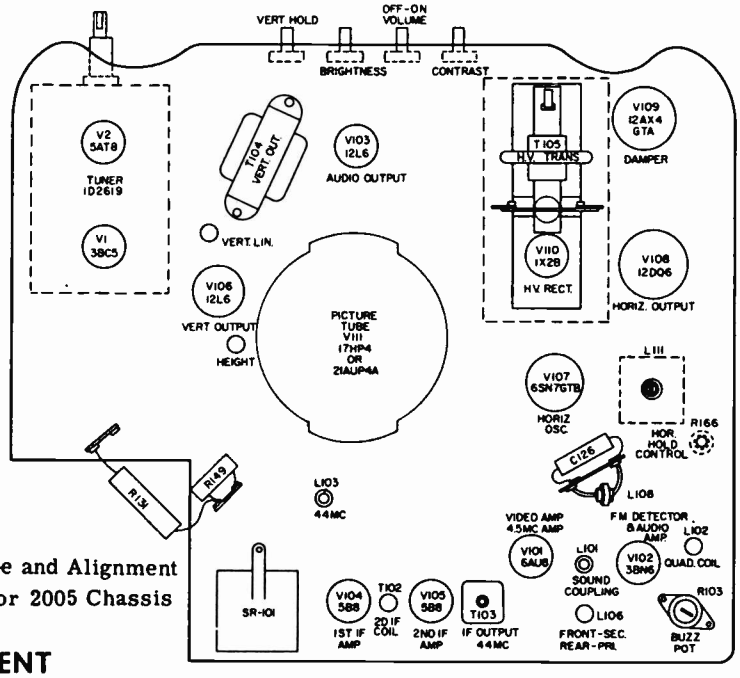


Fig. 1. Tube and Alignment Locations for 2005 Chassis

SOUND ALIGNMENT

GENERATOR FREQ	SCOPE CONNECTION	ADJUSTMENTS
1. 4.5 mc/30% 400 cps AM modulation	Detector ckt Point "D".	L-106 primary slug completely out of coil. L-106 secondary slug completely out of coil. L-106 primary slug into coil for minimum scope indication.
2. 4.5 mc/7.5 kc. deviation FM	Across secondary of audio output transformer.	L-102 slug out of coil and then in for maximum scope indication. L-101 slug into coil for maximum indication. L-106 secondary slug into coil for maximum indication.
3. Increase output level above limiting - 4.5 mc/30% 400 cps AM	Across secondary of audio output transformer.	Buzz control for minimum scope indication.
4. Output level above limiting. 4.5 mc/7.5 kc. deviation FM	Across secondary of audio output transformer.	L-102 slug in for maximum scope indication. Refine adjustments for L-101, L-102, and L-106 for maximum scope indication.

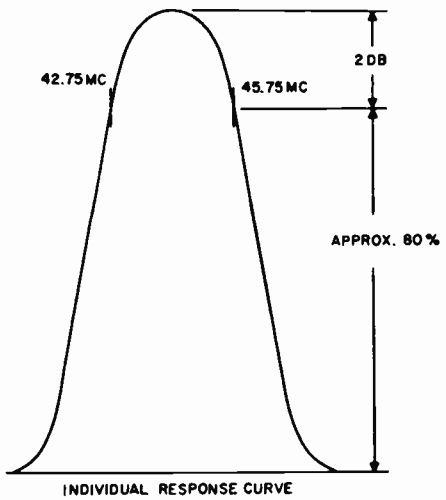


Fig. 8. Individual Response Curve

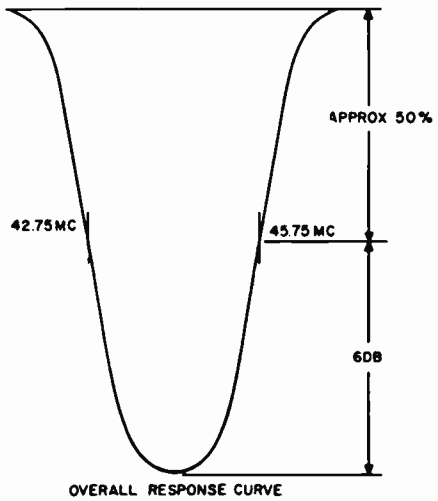


Fig. 9. Overall Response Curve

Hoffman SERVICE DATA

HOFFMAN ELECTRONICS CORPORATION

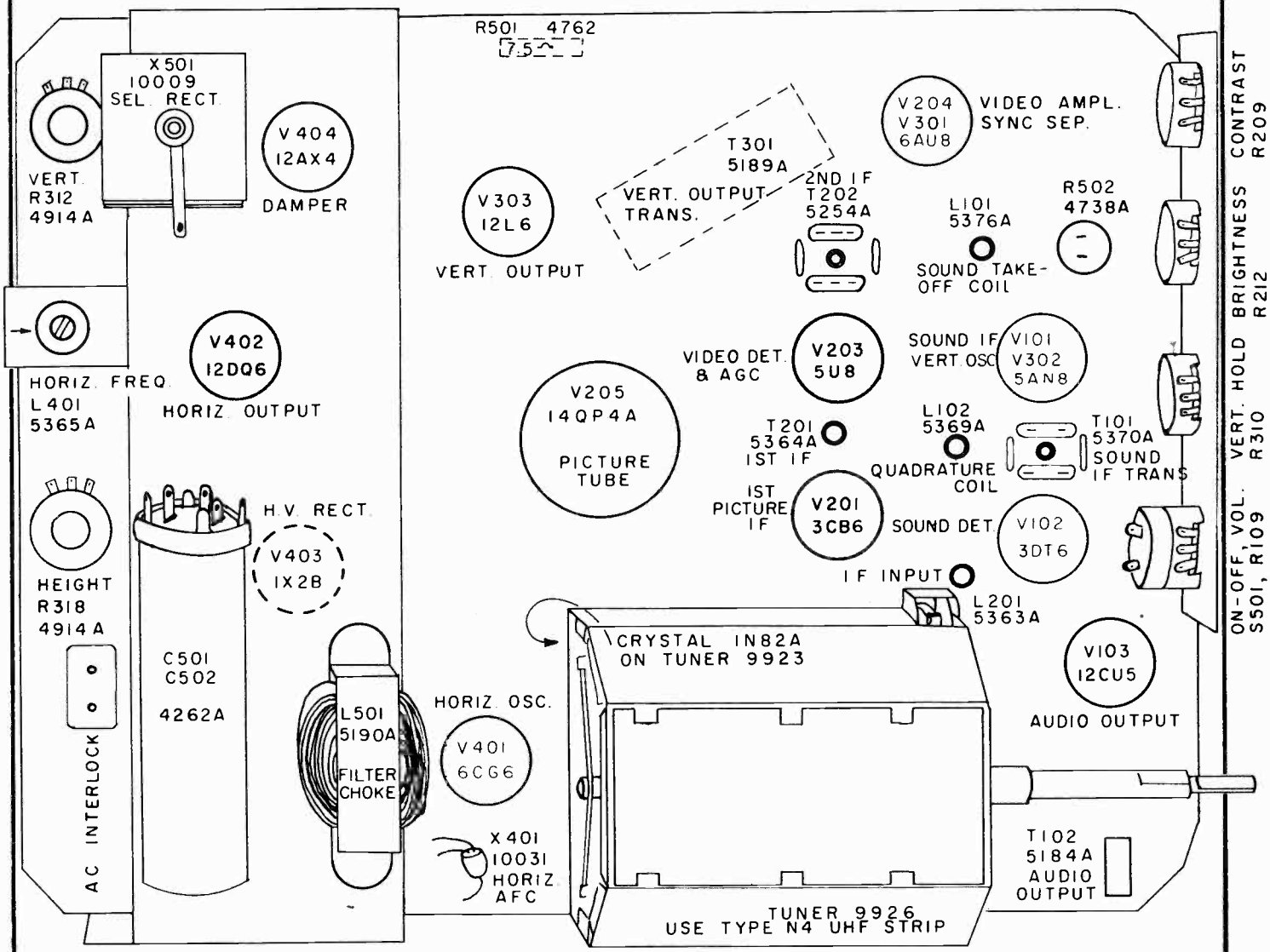
CHASSIS: 326

MODELS PG-1144, SG-1144
FEATHERLITE TELEVISION

(Schematic Diagram on pages 76-77; alignment on page 78.)

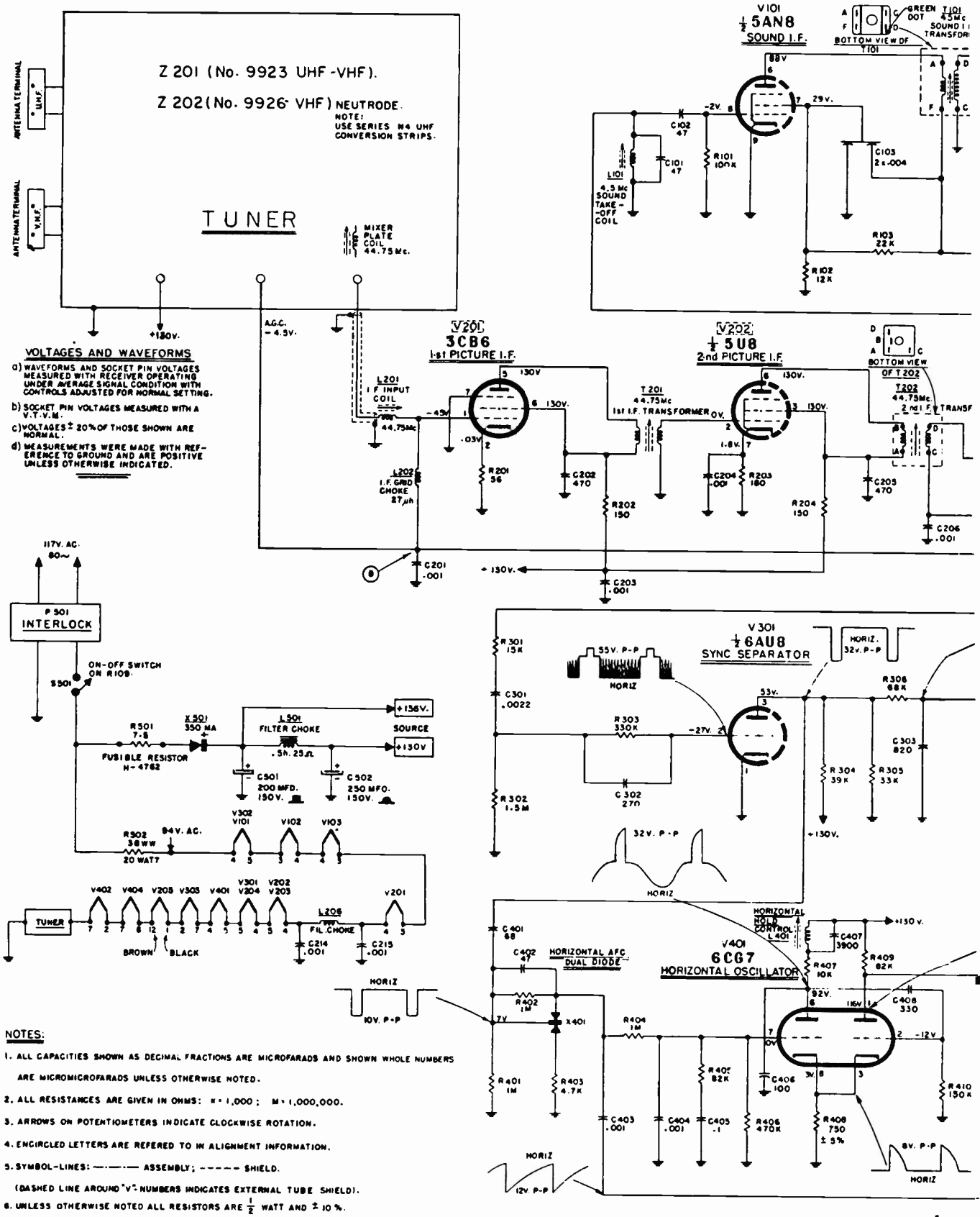
FOCUS adjustment of the picture tube is provided by a focus bar jumper on the base pins of the picture tube. The bar is of correct design to allow its use as a jumper between pins 6 and 2 or pins 6 and 10. The bar is installed to connect one of the two above combinations of pins which gives the best focus for the particular tube used in the receiver. When servicing the receiver, check the focus by alternately connecting the focus bar in both positions.

CLEANING OF LENS AND CABINET may be done as part of any service repair of the Featherlite portable receiver. Disconnect the receiver's AC power cord from the electrical outlet while cleaning the receiver. Use a soft cloth with mild soap and water for cleaning both the cabinet and lens. Be sure no water is allowed to get inside the cabinet or the lens frame.
Note: Do not use any type of commercial glass cleaners or polish to clean the lens or damage to the lens may result.



MAJOR COMPONENT IDENTIFICATION CHART

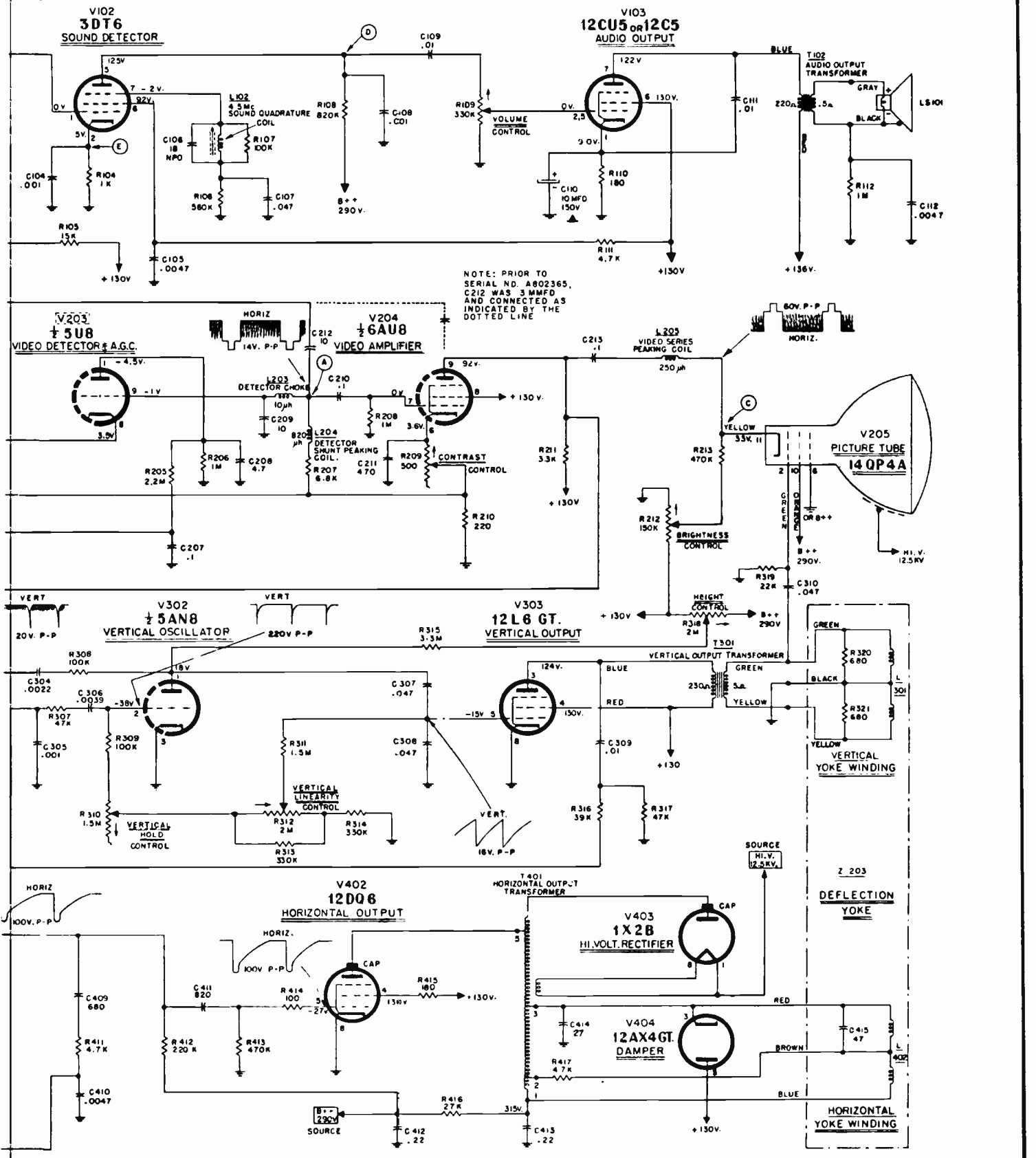
HOFFMAN Chassis 326 Schematic Diagram



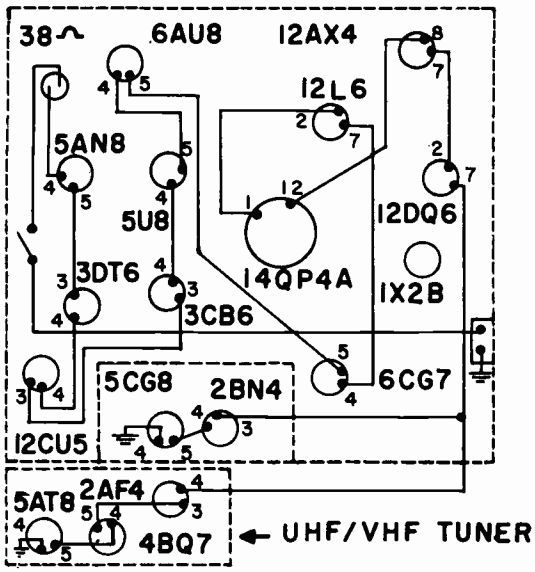
NOTES:

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED.
2. ALL RESISTANCES ARE GIVEN IN OHMS: K = 1,000; M = 1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
4. ENCIRCLED LETTERS ARE REFERED TO IN ALIGNMENT INFORMATION.
5. SYMBOL-LINES: —·—·— ASSEMBLY; – – – – SHIELD. (DASHED LINE AROUND "V" NUMBERS INDICATES EXTERNAL TUBE SHIELD).
6. UNLESS OTHERWISE NOTED ALL RESISTORS ARE ½ WATT AND ± 10 %.

SCHEMATIC DIAGRAM FOR HOFFMAN CHASSIS 326, 326U



HOFFMAN Chassis 326, 326U, Alignment Information (Continued)



TUBE LAYOUT & FILAMENT STRING

I.F. ALIGNMENT

Adjust the contrast control for maximum contrast during sound alignment and minimum for picture IF alignment. Set the channel selector between channels during alignment. Keep the input signal sufficiently low to avoid overloading during all steps of the alignment procedure. The high voltage section of the receiver may be disabled during alignment by applying a negative 60 volt bias to the grid of the horizontal output tube V402, 12DQ6.

SOUND IF ALIGNMENT

1. Connect the positive lead of a VTVM to point "E" (pin 2, cathode of V102, 3DT6) through a 10K 1/2 watt isolation resistor. Connect negative lead of meter to receiver chassis. Use 10 volt scale.

2. Apply a 4.5 MC unmodulated RF signal to point "A" (junction of L203, detector choke, and L204, detector shunt peaking coil) through a .005 mfd. capacitor. Keep leads as short as possible.

3. Detune Sound Quadrature Coil L102 by turning the slug to the maximum outward position.

4. Tune the 4.5 MC Sound Take-Off Coil for maximum voltage reading on the meter. Vary the input signal as necessary to keep the meter reading between 3.5 and 5 volts DC during this adjustment.

5. Tune the 4.5 MC Sound IF Transformer T101 for maximum reading on the meter. Reduce the input signal to keep reading between 3.5 and 5 volts DC.

6. Move the positive meter lead from point E to point D (pin 5, plate of V102, 3DT6) and change meter scale to 150 volts minimum.

7. Increase the input signal to maximum and adjust the slug of the Sound Quadrature Coil (L102) inward until the voltage at point "D" is reduced to minimum. Continue turning the slug inward until the voltage increases to 125 volts plus or minus 5 volts."

8. Remove the input signal and touch up the adjustment of the Sound IF Transformer T101 for maximum reading on the meter at point "D".

Note: Adjustment of T101 affects current flow in V102 with no signal input because under this condition the quadrature coil circuit goes into oscillation. Touch up of the T101 adjustment is necessary to provide correct frequency and phase relationship between T101 and the quadrature coil.

PICTURE IF ALIGNMENT should be made with the same general set up conditions specified prior to Sound IF Alignment. Apply a negative 3 volt bias to the AGC bus, point B, during Picture IF Alignment. Be sure contrast is set at minimum. Apply the required RF signal, unmodulated, through a .005 mfd capacitor to the grid of the mixer-oscillator tube or RF test point on the tuner. Before beginning the picture IF alignment detune all picture IF coils, except the mixer plate coil on the tuner, by turning them to their maximum outward position.

1. Use 10K 1/2 watt in series and 1000 mmfd in parallel with meter leads, and connect a voltmeter across the video detector load (point A). Set meter on 5 volt scale and for negative DC reading.

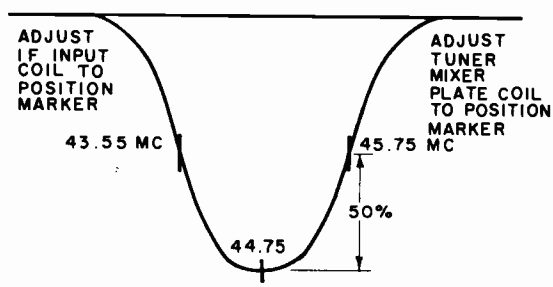
2. With a 44.75 MC input signal, tune for maximum meter reading in the following order: (a) Tuner mixer plate coil, (b) T202, 2nd IF Transformer, (c) T201, 1st IF Transformer, (d) L201, IF Input Coil.

3. Remove the voltmeter connections from point A and connect a high vertical gain oscilloscope in its place. Use the same isolation network of 10K in series with the hot lead and 1000 mmf in parallel with the oscilloscope.

4. Replace the 44.75 MC input signal with a sweep generator signal having approximately 43.5 MC center frequency.

5. Apply a marker signal at 45.75 MC and adjust the tuner mixer plate coil to position the marker at the 50% position on the response curve.

6. Apply a marker signal at 43.55 MC and adjust the IF Input Coil (L201) to position the marker at the 50% position on the low frequency side of the response curve.



NOTE: 45.75 MC MARKER TOL. ± 5%
BANDPASS TOL. ± 10% AT 50% POSITION

IF RESPONSE CURVE

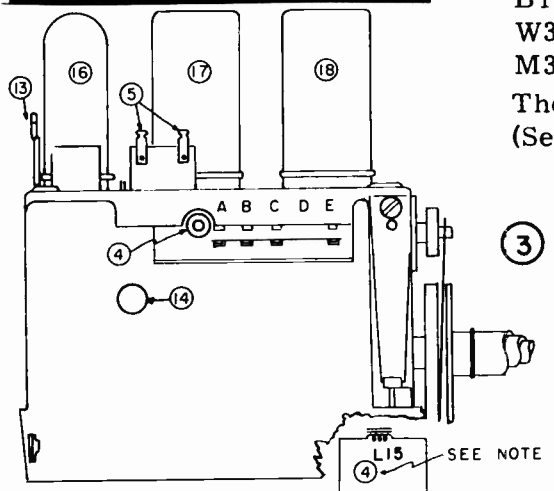
Hoffman
SERVICE DATA

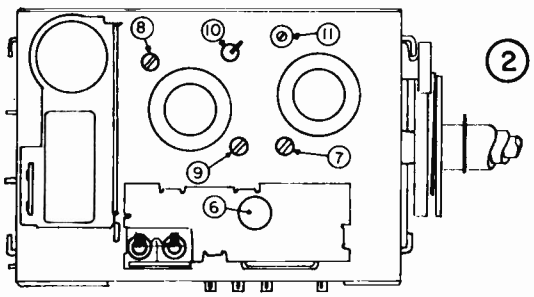
HOFFMAN ELECTRONICS CORPORATION

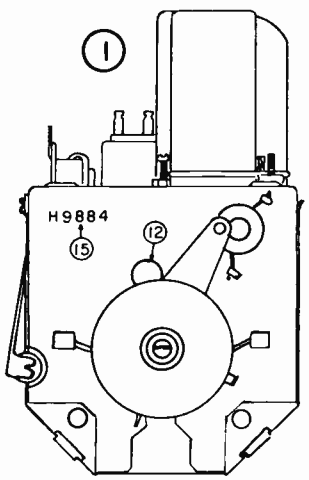
CHASSIS: 321, 322 (MARK 10)

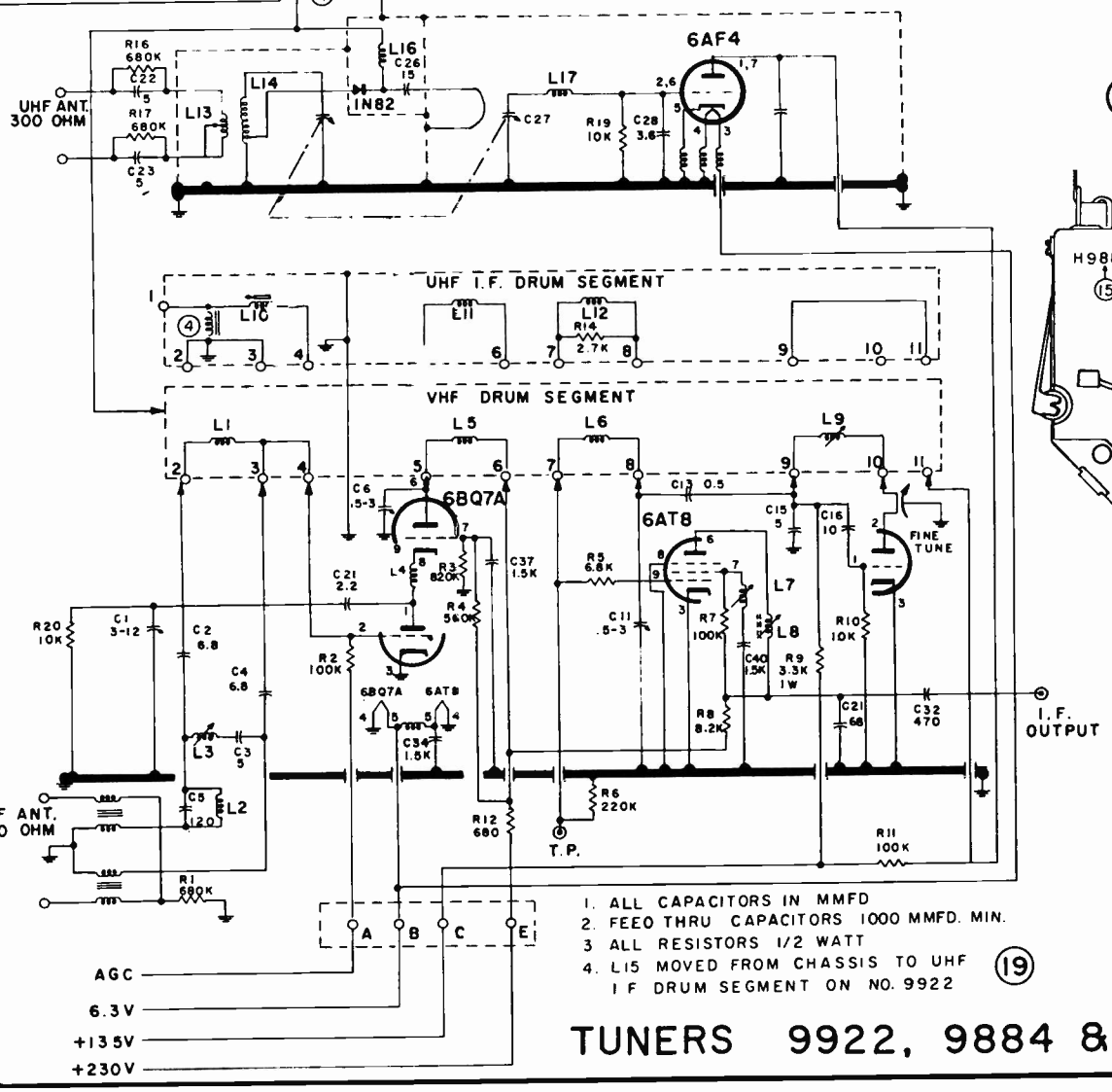
Models B1081, K1081, M1081, B1111, M1111, W1111, B1121, P1121, M1121, W1121, B3061, M3061, SP3061, W3061, B3071, M3071, P3071, W3071, P3091, B3101, M3101, P3101, W3101, B3114, M3114, P3114, W3114.

The same models with a suffix "U" use UHF/VHF chassis.
(See page 80 for description of similar chassis and models.)









1. ALL CAPACITORS IN MMFD
2. FEED THRU CAPACITORS 1000 MMFD. MIN.
3. ALL RESISTORS 1/2 WATT
4. L15 MOVED FROM CHASSIS TO UHF I F DRUM SEGMENT ON NO. 9922

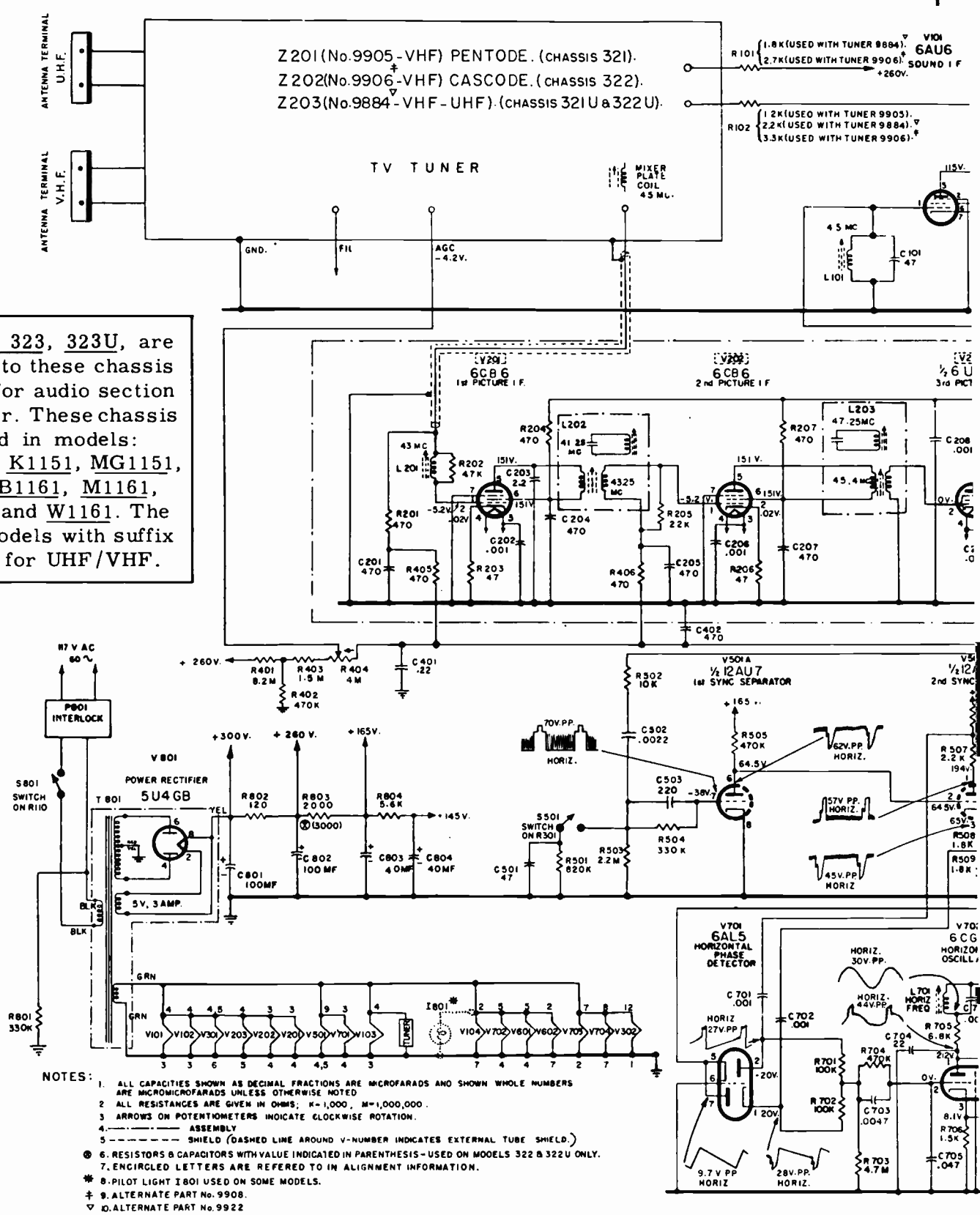
IDENTIFICATION

1. FRONT VIEW
2. TOP VIEW
3. SIDE VIEW
4. L3 41MC TRAP
5. VHF ANT.
6. VHF TEST POINT
7. C11
8. C1
9. C6
10. I F OUTPUT
11. L8 I F ALIGN. ADJ.
12. OSC. ADJ.
13. UHF ANT
14. UHF TEST POINT
15. PART NUMBER
16. 6AF4
17. 6BQ7A
18. 6AT8
19. SCHEMATIC NOTES

TUNERS 9922, 9884 & 9880

HOFFMAN Chassis 321, 321U, 322, 322U, Schematic Diagram

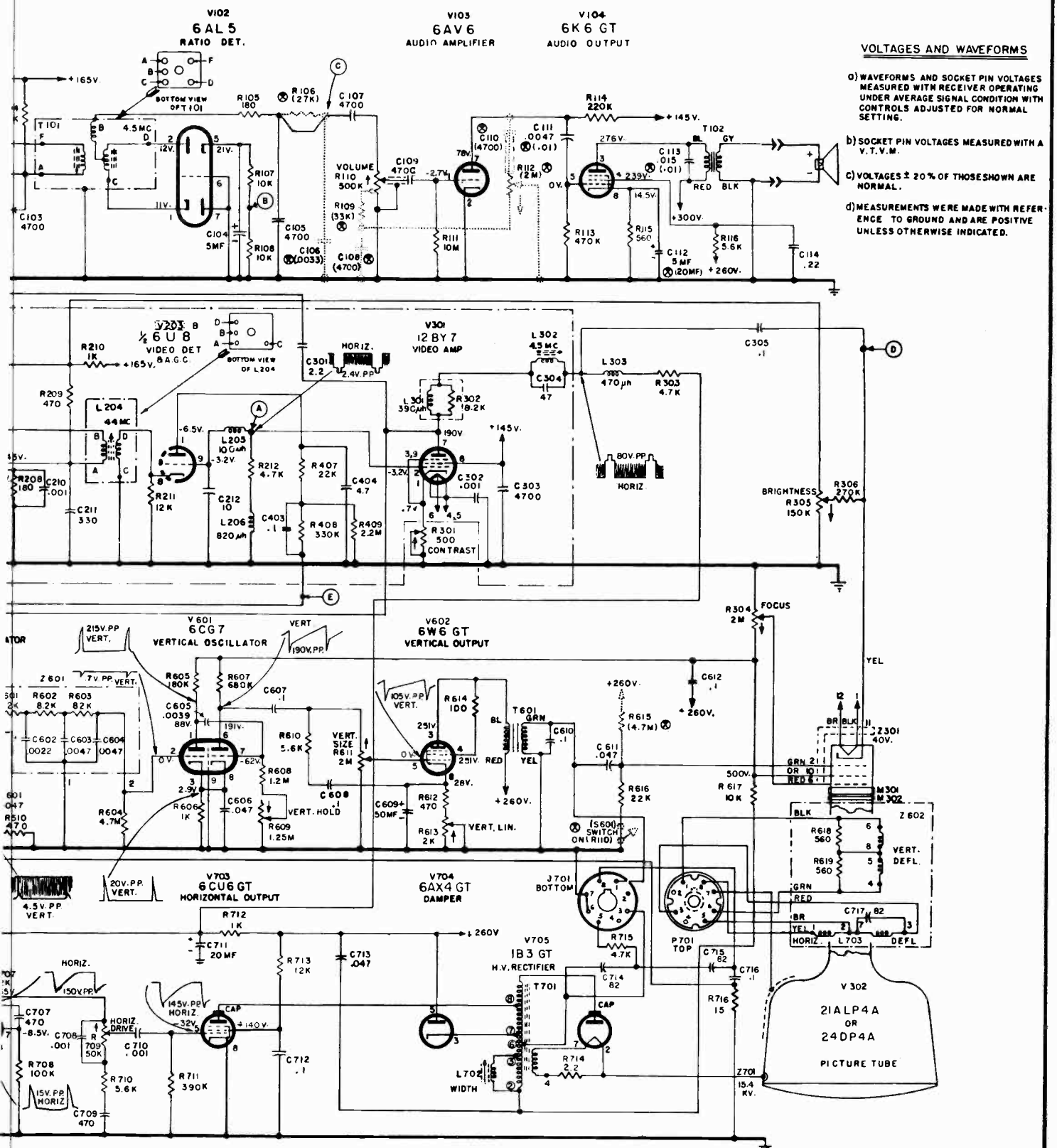
Chassis 323, 323U, are similar to these chassis except for audio section and tuner. These chassis are used in models: BG1151, K1151, MG1151, P1151, B1161, M1161, SP1161, and W1161. The same models with suffix "U" are for UHF/VHF.



NOTES:

1. ALL CAPACITIES SHOWN AS DECIMAL FRACTIONS ARE MICROFARADS AND SHOWN WHOLE NUMBERS ARE MICROMICROFARADS UNLESS OTHERWISE NOTED
2. ALL RESISTANCES ARE GIVEN IN OHMS; K = 1,000, M = 1,000,000.
3. ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION.
4. —·—·— ASSEMBLY
5. - - - - - - - SHIELD (DASHED LINE AROUND V-NUMBER INDICATES EXTERNAL TUBE SHIELD.)
6. ⊛ RESISTORS & CAPACITORS WITH VALUE INDICATED IN PARENTHESIS - USED ON MODELS 322 & 322U ONLY.
7. ENCIRCLED LETTERS ARE REFERED TO IN ALIGNMENT INFORMATION.
8. ✱ PILOT LIGHT I801 USED ON SOME MODELS.
9. ‡ ALTERNATE PART No. 9908.
10. ▽ ALTERNATE PART No. 9922

HOFFMAN Chassis 321, 321U, 322, 322U, Schematic Diagram



SCHEMATIC DIAGRAM FOR HOFFMAN MARK 10 CHASSIS 321, 321U, 322, 322U

HOFFMAN Chassis 321, 321U, 322, 322U, Alignment Information (Continued)

Alignment should be performed with the set operating on 117 volts AC, contrast set for maximum, channel selector set between channels and 3 volts negative bias on the AGC buss. Allow ten minutes warm-up period before starting alignment.

SOUND I. F. ALIGNMENT

1. Connect voltmeter from junction of R106 and R107 (B on schematic) to chassis ground. Apply a 4.5 MC unmodulated signal through a .005 mfd capacitor to the grid of the video amplifier tube.
2. Align the primary of T101 (bottom slug) and L101 for maximum indication on the meter. Keep the 4.5MC signal from the generator to a level which gives approximately 4 volts reading on the meter.
3. Keep one voltmeter lead attached to T. P. as in step 1 and move the other lead from chassis to the audio take-off, point C.
4. Adjust the secondary of the ratio detector transformer (top slug of T101) for zero indication on the meter. Keep 4.5 MC input at the same level as in step 2. Tune in a station on the receiver and readjust Ratio Detector to point of best sound if any buzz is evident in the sound.

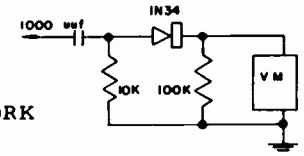


Figure 3.

DETECTOR NETWORK

5. With 4.5 MC input signal applied as in steps 2, 3 and 4, connect a detector network to the picture tube cathode lead and connect the meter across it. Refer to Figure 3, above, for detector network.
6. Adjust L303 (4.5 MC trap in picture tube cathode circuit) for minimum indication on the meter.

VIDEO I. F. ALIGNMENT

Connect a voltmeter from the chassis to grid of V301 with 10K 1/2W resistor in series with the meter lead. Apply unmodulated R. F. signal to the grid of the tuner converter tube, with frequencies listed in Table B, below and adjust for minimum or maximum indication on the voltmeter as indicated.

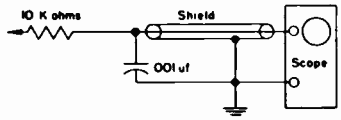


Figure 4. OSCILLOSCOPE ISOLATION

Note: In all steps of the Video IF Alignment the input signal level should be maintained at a value which develops approximately one (1) volt across the voltmeter.

To check the over-all response of the I. F. strip, use an oscilloscope with high vertical gain. Remove the voltmeter from grid of the video amplifier and connect the oscilloscope through the isolation network (Figure 4). Connect a sweep generator with center frequency of 43.50 MC to the tuner converter grid. Slight readjustment of the I. F. transformers and converter coil may be necessary to give the best response curve. The 10% limits specified in Figure 5 should be carefully considered before deciding that further adjustment is necessary. This is especially important outside the normal reception area where sensitivity becomes more important.

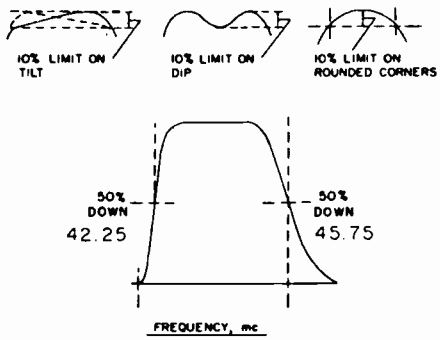


Figure 5. IF RESPONSE CURVE

TABLE B

VIDEO IF ALIGNMENT FREQUENCIES			
INPUT FREQUENCY	ADJUST	TUNE FOR	DESCRIPTION
(1) 44MC	L204	Maximum	3rd I F Transformer
(2) 47.25MC	L203 (top)	Minimum	Adjacent Channel Sound Trap
(3) 45.4MC	L203 (bottom)	Maximum	2nd I F Transformer
(4) 41.25MC	L202 (top)	Minimum	Co-channel Sound Trap
(5) 43.25MC	L202 (bottom)	Maximum	1st I F Transformer
(6) 43MC	* Tuner Converter Plate Coil	Minimum	* Located on Tuner Chassis
(7) 43MC	L201	Maximum	I F Input Coil
(8) 45MC	* Tuner Converter Plate Coil	Maximum	* Located on Tuner Chassis

Magnavox

117 SERIES TELEVISION CHASSIS

MODELS - CTA/CMUA 487AA, 488AA, 489AA, 490AA, CTA/CMUA 491AA, 492AA, CTE/CMUE 493AA, 494AA, CTD/CMUD 495AA

Circuit diagram for sets listed above is on page 84, over. The following models are similar: CTA/CMUA 487CC, 490CC, 491CC, 499CC, 501CC, CTE/CMUE 493CC, CTD/CMUD 495CC.

VIDEO I-F ALIGNMENT

Note 1: Before attempting alignment of the chassis, allow a 10-20 minute warm up of the chassis and test equipment
Note 2: Connect positive terminal of a tapped 4½ volt "C" battery to chassis, -3 volt tap to junction of R201 and R204, and -1½ volt tap to junction of C213 and R224.

SWEEP GEN. COUPLING	SWEEP GEN. FREQUENCY	MARKER GEN. COUPLING	MARKER GEN. FREQUENCY	CONNECT SCOPE	ADJUSTMENTS
1st i-f grid (test point TP1 on main chassis)	43 mc. Adjust gain so trap suckout is visible.	Converter grid. (Use test point lead wire thru top of VHF tuner.)	47.25mc modulated. Adjust gain so pip is just visible.	Across vid. det. load R211. Place 10 K res. in series with probe.	Adjust traps (top of T202 and top of T203) to center pip in suckout. See Fig. 1. Max. attenuation is at two core positions, use one with slug furthest out.
"	43 mc. Set gen. output for approx. 3V P/P output at scope.	"	Unmodulated 42.25 mc 45.0 mc. 45.75 mc.	"	Check for response curve similar to Fig. 2. Tune T203 for max. gain between 42.25 mc and 45.75 mc. Tune T202 (bottom slug) to place 45.75 mc marker at 50% response. Tune T201 to place 42.25 mc marker at 50% of response. Recheck 47.25 mc trap.
Converter grid. (Use test point wire thru top of VHF tuner).	43 mc. Adjust gain so trap suckout is visible.	" Loosely couple.	41.25 mc.	"	Adjust trap (top of T201) to center pip in suckout. Max. attenuation is at two core positions. Use one with slug furthest out.
Converter grid. (Use wire test point lead fed thru top of VHF tuner).	43 mc. Set gen. output for approx. 3V P/P output at scope.	"	Unmodulated 42.25 mc. 45.0 mc. 45.75 mc.	"	Set VHF tuner to clear channel (4 or 5). Tune converter plate coil L3 for max. gain with 45.75 mc marker at 50% response. (See Fig. 2) Tune 1st i-f grid coil T201 for max. gain and proper tilt. Interaction might require repeating these two adjustments until Fig. 2 is duplicated. Recheck 41.25 mc. trap.
VHF ant. terms. Use network in Fig. 4 if cable is unbalanced.	Channels 2 thru 13 r-f	"	Same as above.	"	Check all channels for bandwidth, slope and position of carrier. Use oscillator trimmers to set osc. for middle of fine tuner range on all channels.
UHF xtal term. nearest i-f input jack 1K isolation resistor	43 mc. same gain.	"	Same as above	"	Set VHF tuner to UHF position. Adjust r-f amp. grid coil A41 for min. tilt (slug of A41 is at top rear of VHF tuner). Response should conform to Fig. 2.

SOUND IF ALIGNMENT

SIG. GEN. COUPLING	SIG. GEN. FREQUENCY	VTVM CONNECTION	ADJUSTMENTS
Couple thru .005 mfd. capacitor to terminal "D" of video detector transformer.	Unmodulated 4.5mc ±.01%	Probe to pin 3 of 6T8 discriminator tube in series with 10K isolation resistor at probe end. low side of meter to chassis.	Tune primary of T101, L102 and L101 all for max. output on meter. Keep input signal at lowest point possible for an accurate indication.
"	"	"	Tune secondary of T101 descriminator transformer for zero indication on meter. True indication is point where indicating voltage swings positive or negative.

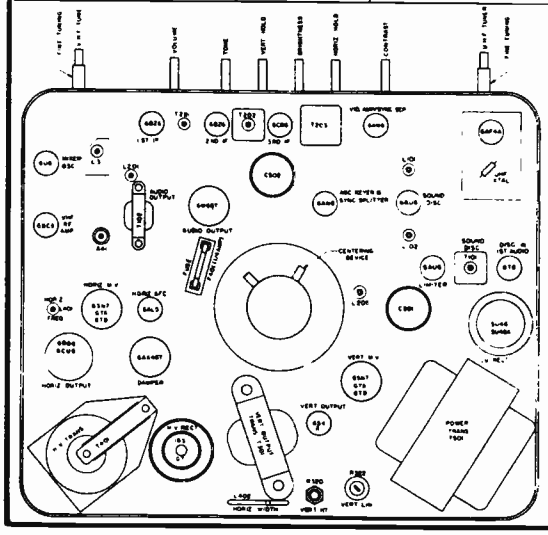


Fig. 1

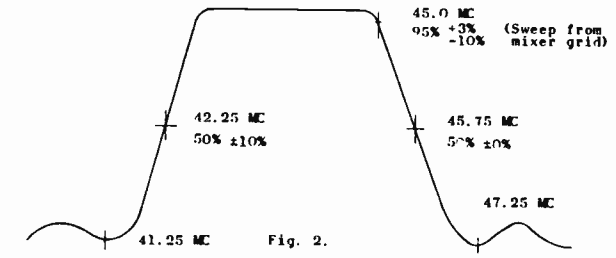
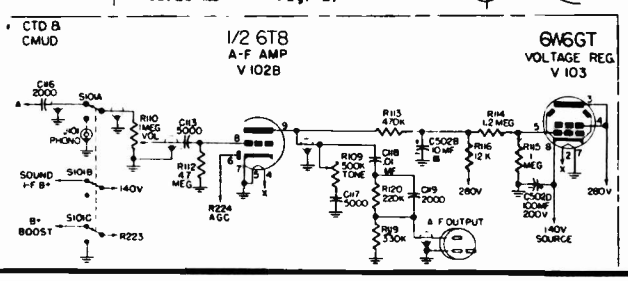


Fig. 2.



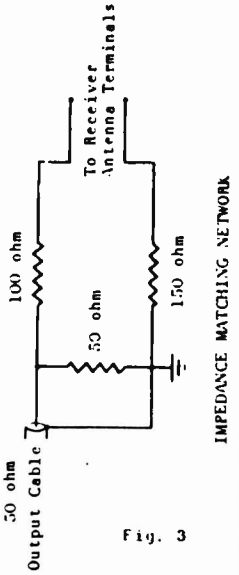
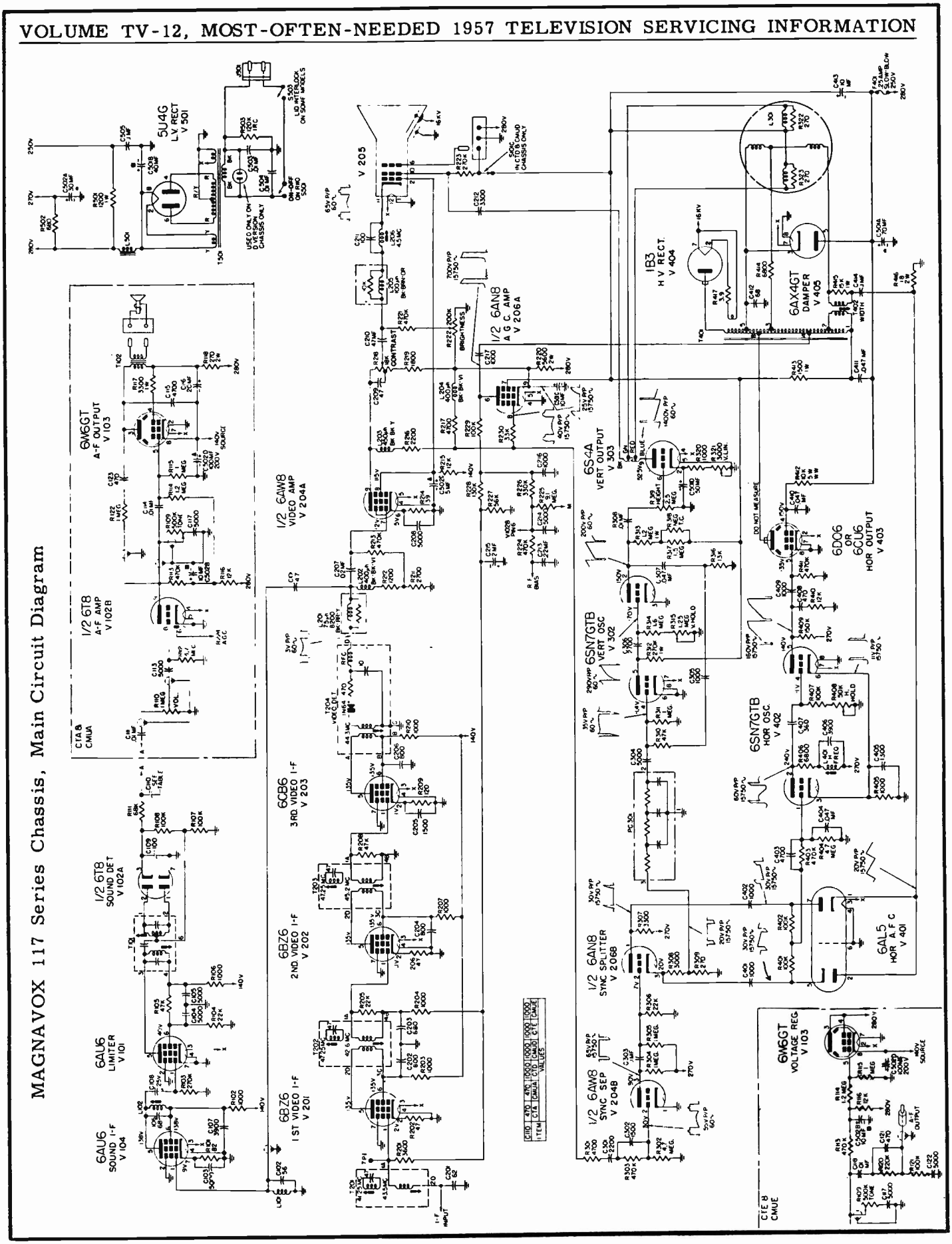


Fig. 3

MAGNAVOX 117 Series Chassis, Main Circuit Diagram



Magnavox

18 SERIES TELEVISION CHASSIS

MODELS - V/U 18-01AA, 18-02AA, 18-03AA, 18-04AA

Circuit diagram for sets listed above is on page 86, over. The additional sets listed below are similar, but incorporate AGC and use dry-disc rectifiers. Alignment is applicable to all sets.

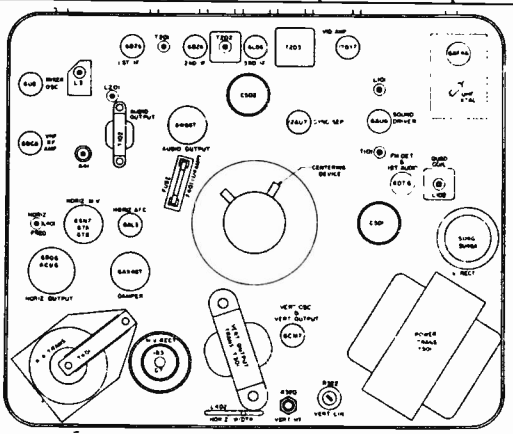
21 SERIES MODELS - V/U 21-01AA, 21-02AA, 21-03AA, 21-04AA

VIDEO I-F ALIGNMENT

Connect positive terminal of a tapped 4½ volt "C" battery to chassis, -1½ volt tap to junction of C208 and R213, and -3 volt tap to junction of C207 and R212. Set "Local-Distant" switch to local position and Contrast control fully counter-clockwise (min. contrast).

SWEEP GEN. COUPLING	SWEEP GEN. FREQUENCY	MARKER GEN. COUPLING	MARKER GEN. FREQUENCY	CONNECT SCOPE	ADJUSTMENTS
1st i-f grid (test point TP1 on main chassis) Detune mixer plate coil by adjusting slug fully out.	43 mc. Adjust gain so trap suckout is visible.	Converter grid. (use test point lead wire thru top of VHF Tuner).	47.25mc modulated. Adjust gain so pip is just visible.	Across vid. det. load R211. Place 10K res. in series with probe.	Adjust trap (top of T202) to center pip in sickout. See Fig. 1. Max. attenuation is at two core positions, use one with slug furthest out.
"	43 mc. Set gen. output for approx. 2V P/P output at scope.	"	"	"	Check for response curve similar to Fig. 2. Tune T203 for max. gain between 42.75 mc and 45.75 mc. Tune T202 (bottom slug) to place 45.75 mc marker at 50% response. Tune T201 to place 42.75 mc marker at 60% of response. Recheck 47.25 mc trap.
Converter grid (use wire test point lead fed thru top of VHF Tuner).	"	Loosely Couple	"	"	Set VHF Tuner to clear channel (6-13). Tune converter plate coil L3 for max. gain with 45.75 mc marker at 45% response. (See Fig. 2.) Tune 1st i-f grid coil L201 for max. gain and proper tilt. Interaction might require repeating these two adjustments until Fig. 2 is duplicated.
VHF ant. terms. Use network in Fig. 3 if cable is not balanced.	Channels 2 thru 13 r-f	"	"	"	Check all channels for bandwidth, slope and position of carrier. Use oscillator trimmers to set osc. on each channel for center of fine tuning range.
UHF crystal hot term. Use 1K isolation resistor.	43 mc. same gain.	"	"	"	Set VHF Tuner to UHF position. Adjust r-f amp. grid coil A41 for min. tilt (slug of A41 is at top rear of VHF Tuner). Response should conform to Fig. 2.

Fig. 1



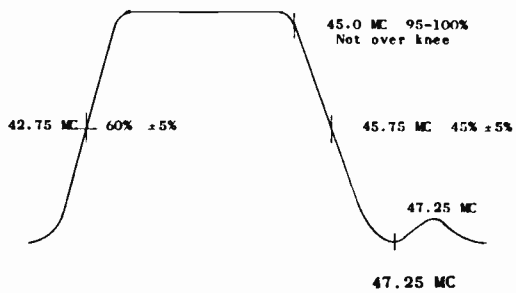


Fig. 2

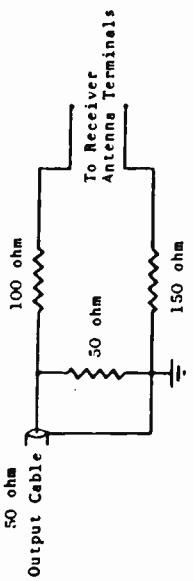


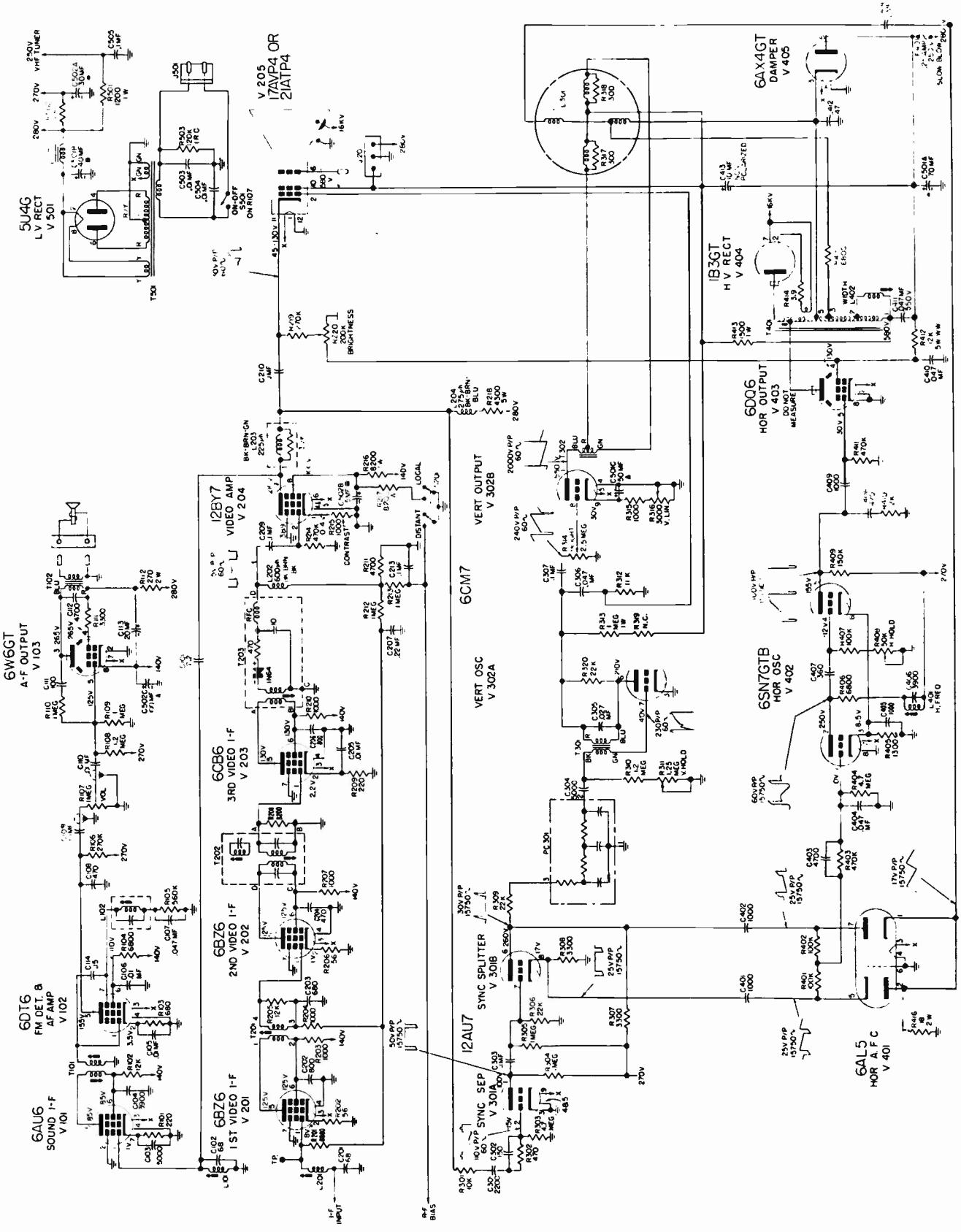
Fig. 3

SOUND ALIGNMENT

Use J-Tran tuning tool No. 3496 for all sound alignment adjustments. Adjust Contrast control to maximum.

1. Tune receiver to a strong local station and adjust quadrature coil L102 for maximum sound output with minimum distortion.
2. Reduce signal input by removing antenna or by placing an adjustable pad across antenna terminals so that, with Volume control set at maximum, the sound signal is barely audible. Adjust the core closest to chassis (grid tuning) of detector driver transformer T101 for minimum noise and clearest sound.
3. With same weak signal input, adjust sound takeoff coil L101 and top core of T101 (plate tuning) for minimum noise and clearest sound.
4. Reduce signal input further until noise is present and touch up adjustment of grid tuning core of T101 for minimum noise and clearest sound.

MAGNAVOX 18 Series Chassis, Models V/U 18-01AA through V/U 18-04AA, Diagram



MOTOROLA

RECEIVER MODEL BREAKDOWN CHART

Model	Description	TV Chassis
21T32B	Table, blonde: metal	TTS-537
Y21T32B	Table, blonde: metal	TTS-537Y
21T32BA	Table, blonde: metal	TS-537
Y21T32BA	Table, blonde: metal	TS-537Y
21T32CH	Table, charcoal: metal	TTS-537
Y21T32CH	Table, charcoal: metal	TTS-537Y
21T32CHA	Table, charcoal: metal	TS-537
Y21T32CHA	Table, charcoal: metal	TS-537Y
21T32MGA	Table, grained mahogany: metal	TS-537
Y21T32MGA	Table, grained mahogany: metal	TS-537Y
21T34B	Table, blonde: masonite	TTS-537
Y21T34B	Table, blonde: masonite	TTS-537Y
21T34BA	Table, blonde: masonite	TS-537
Y21T34BA	Table, blonde: masonite	TS-537Y
21T34M	Table, mahogany: masonite	TTS-537
Y21T34M	Table, mahogany: masonite	TTS-537Y
21T34MA	Table, mahogany: masonite	TS-537
Y21T34MA	Table, mahogany: masonite	TS-537Y
21K53B	Console, blonde: masonite	TTS-537
Y21K53B	Console, blonde: masonite	TTS-537Y
21K53BA	Console, blonde: masonite	TS-537
Y21K53BA	Console, blonde: masonite	TS-537Y
21K53M	Console, mahogany: masonite	TTS-537
Y21K53M	Console, mahogany: masonite	TTS-537Y
21K53MA	Console, mahogany: masonite	TS-537
Y21K53MA	Console, mahogany: masonite	TS-537Y
21K55B	Console, blonde: masonite	TTS-537
Y21K55B	Console, blonde: masonite	TTS-537Y
21K55BA	Console, blonde: masonite	TS-537
Y21K55BA	Console, blonde: masonite	TS-537Y
21K55M	Console, mahogany: masonite	TTS-537
Y21K55M	Console, mahogany: masonite	TTS-537Y
21K55MA	Console, mahogany: masonite	TS-537
Y21K55MA	Console, mahogany: masonite	TS-537Y
24T5BG	Console, grained blonde: metal	WTS-537
Y24T5BG	Console, grained blonde: metal	WTS-537Y
24T5MG	Console, grained mahogany: metal	WTS-537
Y24T5MG	Console, grained mahogany: metal	WTS-537Y
24K13B	Console, blonde: masonite	WTS-537
Y24K13B	Console, blonde: masonite	WTS-537Y
24K13M	Console, mahogany: masonite	WTS-537
Y24K13M	Console, mahogany: masonite	WTS-537Y

TS-537 SERIES A switch-type VHF tuner incorporates a cascode type amplifier and has provision for individual channel oscillator adjustment by means of screws which may be reached from the front of the cabinet. The antenna, RF and oscillator switch sections are removable for ease of servicing. Chassis having a "Y" suffix contain a factory-installed "continuous tuning" UHF tuner. (For tuner types, see CHASSIS BREAKDOWN CHART).

TTS-537 SERIES Same as TS-537 except for VHF tuner. See Chassis Breakdown Chart.

WTS-537 SERIES Same as TS-537 except for addition of pushbutton ON-OFF switch.

CHASSIS BREAKDOWN CHART

Chassis	VHF Tuner	UHF Tuner
TS-537	TT-86	-
TS-537Y	TT-86Y	WTT-87
TTS-537	RTT-77	-
TTS-537Y	QTT-78	NTT-37
WTS-537	TT-86	-
WTS-537Y	TT-86Y	WTT-87

HORIZONTAL OSCILLATOR ADJUSTMENT

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

1. Set all controls for a normal picture.

2. Short HORIZ AFC to ground with a piece of wire at pin #4 of Service Test Receptacle.

3. Connect a .1 mfd 400 volt capacitor across L-501 HORIZONTAL OSCILLATOR coil (Pins #2 & 3 -Service Test Receptacle).

4. Adjust HORIZONTAL HOLD control (front panel) to the point where the picture almost remains stationary...as far as horizontal sync is concerned.

5. Remove the .1 mfd capacitor shunting the HORIZ OSC coil and without turning the horizontal hold control, adjust the HORIZONTAL OSCILLATOR COIL to the center of the range in which the picture almost remains in sync horizontally. (Use opening located between VERT SIZE and VERT LIN control shafts to reach coil screw.)

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

DEFLECTION YOKE ADJUSTMENT

If the deflection yoke shifts, the picture will be tilted. To correct, loosen the clamp at the rear of the deflection yoke holding the rubber wedge against the yoke. Push the yoke as far forward as possible, then rotate until the picture is straight. Loosen rubber wedge clamp and push rubber wedge tight against rear of yoke. Release wedge clamp.

ALIGNMENT

IF AND MIXER ALIGNMENT

REQUIRED PRELIMINARY STEPS

1. REMOVE...the yoke plug to eliminate RF interference. Connect an 1800 ohm resistor (40 watts or more) from chassis ground to B++ (250 volt bus) to normalize the voltages. Use pins #3 and #5 of SERVICE TEST RECEPTACLE.

2. APPLY...-6 volts to IF AGC by connecting a 6 volt battery between pin #1 (IF AGC bus) of the SERVICE TEST RECEPTACLE and ground. Positive side of battery goes to ground (see illustration).

3. DISABLE TUNER OSCILLATOR...by grounding pin #9 of V 2 or VV-2 (5U8) and turn channel selector to channel #13.

4. TUNE...the sweep generator center frequency to 44 Mc with a sweep width of 10 Mc and do not change these settings. Adjust generator output below point of receiver limiting (approximately 3 volts peak-to-peak at the detector load). Maintain 1 to 3 volts peak-to-peak at the input to the oscilloscope.

5. ADJUST...the receiver's contrast control to minimum (fully counterclockwise).

(Service material on these sets continued on the next seven pages.)

MOTOROLA Chassis TS-537, IF and Mixer Alignment, Continued

6. CONNECT...a .001 to .005 mf capacitor in series with the generator lead and connect generator as given in the procedure (see illustration).

7. REMOVE...the receiver's antenna and short out terminals, if required, to remove transmitted signals.

8. CONNECT THE OSCILLOSCOPE...with a 47K ohm resistor in series with the input lead, to the VIDEO DETECTOR TEST RECEPTACLE. This location does not change for entire IF and mixer alignment.

PROCEDURE

With the sweep generator connected to the IF TEST RECEPTACLE and the oscilloscope at the VIDEO DETECTOR TEST RECEPTACLE:

1. DETUNE...mixer transformer primary (T-1 on TT-86 & Y tuner - T-51 on RTT-77 & QTT-78 tuners located on the tuner chassis) so that it is tuned out of the IF response curve bandpass. The core of this coil should be turned into the tuner (clockwise rotation) being careful not to turn the core to the extent of disengagement from the coil. Failure to position the core in this manner will upset the coupling and make alignment difficult...if not impossible.

NOTE: Two tuner types will be encountered with the mixer transformer located in different positions...use the tuner illustrations at top of IF alignment detail to locate correct coil. Reference alignment numbers are: T-1 for the TT-86 tuner and T-51 for the RTT-77 tuner.

2. ADJUST...the 1st IF transformer (T-102) to position the 42.25 Mc marker (set marker with marker generator) as shown in curve #3. The core must be tuned as far from the chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

3. ADJUST...the 2nd IF transformer (T-103) to position the 45.75 Mc marker as shown in curve #3. The core must be tuned as far from the chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

4. ADJUST...the 3rd IF transformer (T-104) to shape the center of the curve for best symmetry and least tilt. The core must be tuned as far from the chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

5. MOVE...the sweep generator from the IF TEST RECEPTACLE and connect it to the MIXER TEST RECEPTACLE located on the tuner (see illustration and use correct tuner receptacle).

6. ADJUST...the trimmer capacitor (C-101), mixer transformer secondary (T-101) bandwidth coil (L-101A) and the 41.4 Mc trap coil (L-101B) to get the response curve, trap dip and markers as shown in curve #2.

To see the trap clearly, it may be necessary to either increase the generator output appreciably or remove the IF bias momentarily.

CORRECT CORE POSITIONS (for step 6)

a. The core of the mixer secondary transformer must be tuned as close as possible to chassis metal (maximum counterclockwise rotation position as viewed from the tube side of chassis).

b. The core of the bandwidth coil must be tuned as far as possible from chassis metal (maximum counterclockwise position as viewed from the PARTS-SIDE of the chassis). REMEMBER: the core cannot be tuned from the tube-side of the chassis without turning the trap coil slug.

c. The core of the trap must be tuned as close as possible to chassis metal (maximum counterclockwise position as viewed from the tube-side of the chassis).

7. ADJUST...mixer transformer primary (T-1 in TT-86 - T-51 in RTT-77) into the center of the IF response so as to place the markers as shown in curve #1. Add tilt with this adjustment (see curve #1).

SOUND ALIGNMENT (Station-signal method)

The sound system used in the TS-537 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.

The quadrature coil has a different mode of operation, as compared to the grid-input coils and must be aligned with a medium-to-strong signal.

PROCEDURE (For strong signal areas)

1. CONNECT...the negative prod of the VTVM to the quadrature coil test point (see IF alignment detail). Connect the positive meter lead to chassis ground. This test point is the junction of R-308 (560K) and the quadrature coil.

2. CONNECT...the antenna and tune in a station.

3. SET...the CONTRAST control to maximum (fully clockwise).

4. SET...the VOLUME control for average usable sound amplification.

5. ADJUST...the quadrature coil (L-304) for maximum negative reading on the VTVM (tune slug toward chassis).

NOTE: There are two points of tuning for the quadrature coil...one of which is incorrect. The correct tuning point will produce approximately -5 volts. The incorrect tuning point will produce approximately -2 1/2 volts. Severe misalignment of the driver and detector grid coils will reduce the value of this tuned voltage. If this occurs, tune for maximum negative reading on the VTVM....later adjustment of the input coils will produce the -5 volts.

After the correct tuning point has been established, make the final adjustment of the quadrature coil based on minimum sound distortion. MAKE NO FURTHER ADJUSTMENTS OF THE QUADRATURE COIL DURING THE REMAINDER OF THE ALIGNMENT.

Proper adjustment of the quadrature coil is important to proper sound operation on all signal strength levels.

6. REDUCE...the signal at the antenna (adjusting the volume control will not reduce the signal) until the picture has been considerably weakened. Reduce signal by disconnecting antenna.

7. ADJUST...the audio interstage transformer (T-301) for best signal-to-noise ratio as determined by listening to the sound. If signal is too strong, exact tuning will be difficult (tune core toward chassis metal).

8. ADJUST...the audio take-off coil (L-302) for best signal-to-noise ratio as determined by listening to the sound output. If signal is too strong, exact tuning will be difficult (tune core away from chassis metal).

9. RE-ADJUST...the interstage transformer (T 301) for best possible signal-to-noise condition.

10. If considerable alignment was required, it would be advisable to re-check the tuning of the quadrature coil using a strong signal as in step 5. However, if the quadrature coil is re-aligned, it will be necessary to repeat steps 6, 7 and 8 for tuning of the audio take-off coil and interstage transformer using a weak signal.

MOTOROLA Chassis TS-537, Alignment Information, Continued

PROCEDURE (For weak signal areas)

1. Connect VTVM at quadrature coil test point (see IF alignment detail).

2. Using maximum available signal input, roughly align the interstage transformer (T-301), the take-off coil (L-302) and the quadrature coil (L-304) for maximum quadrature grid bias (meter reading) of -5 volts. (See note under part 5 of the procedure for strong signal areas.)

3. Using maximum available signal, align the quadrature coil (L-304) for minimum sound distortion.

4. Using the weakest signal possible, adjust the interstage transformer (T-301) for best signal-to-noise conditions.

5. Using a weak signal, adjust the take-off coil (L-302) for best signal-to-noise ratio.

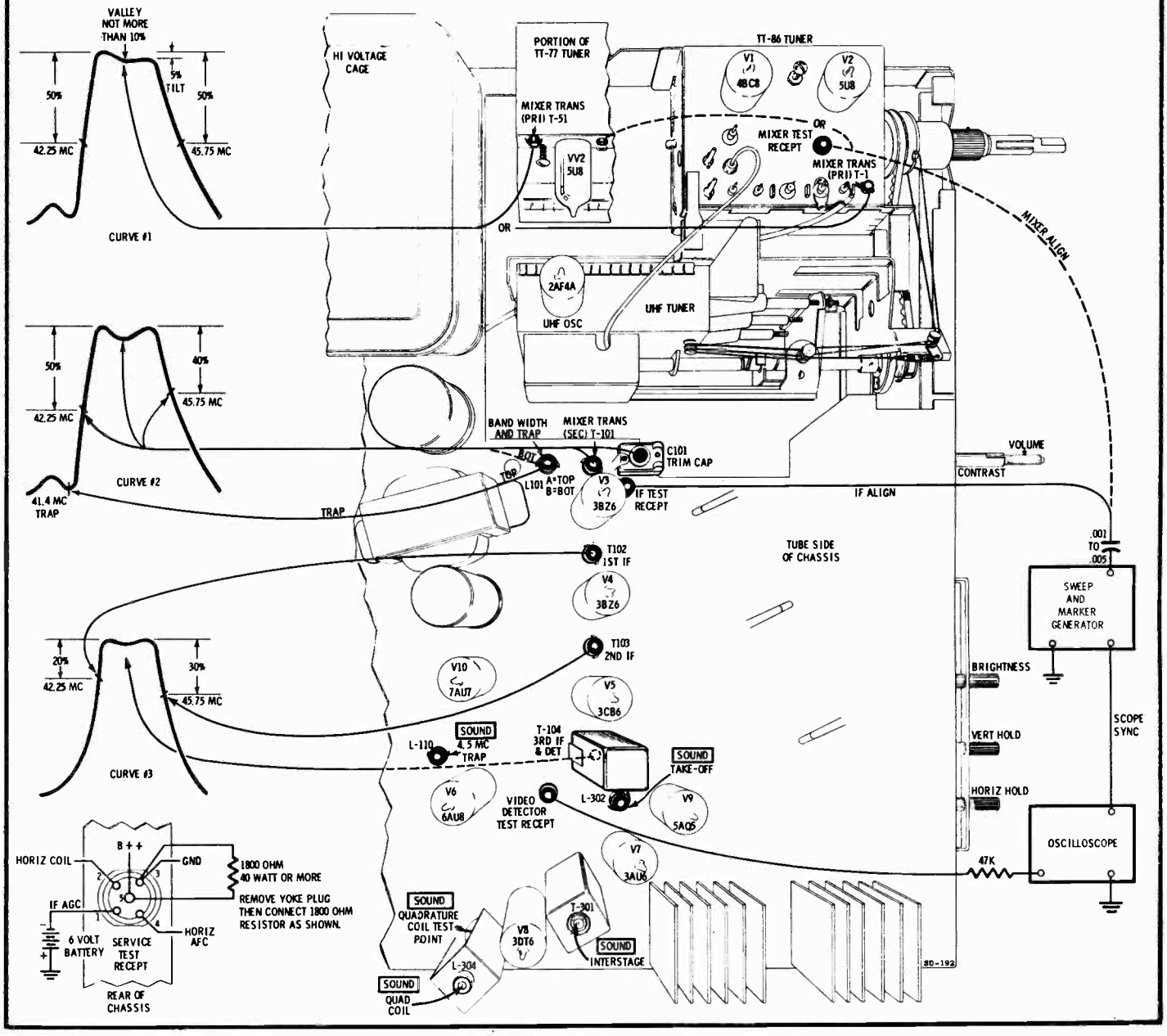
6. Repeat the procedure several times, if required, until the optimum adjustment is obtained. Keep in mind that the IF amplifier and detector input coils must always be re-adjusted on a weak signal if the quadrature coil setting is changed.

4.5 MC TRAP ADJUSTMENT

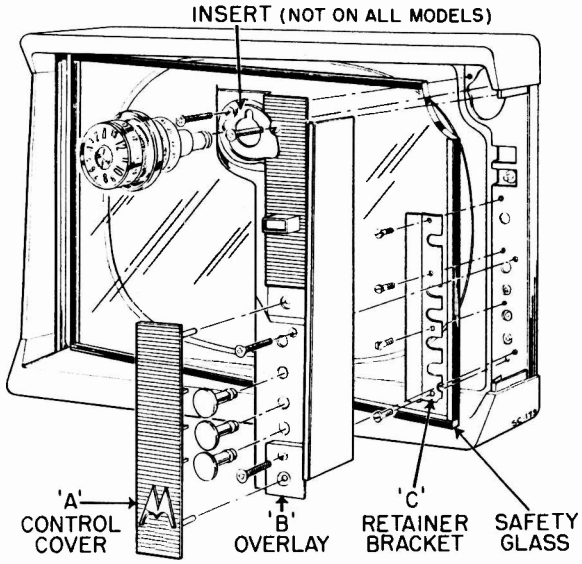
1. Carefully tune receiver to local station and advance contrast control.

2. Adjust local oscillator (fine tuning) to bring 4.5 Mc interference dots into picture by tuning video carrier down side of response (toward sound break up).

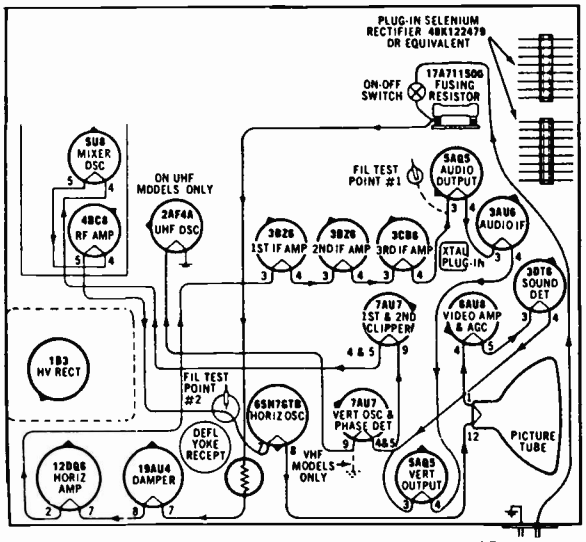
3. Adjust sound trap (L-110) to find the two points of adjustment at which sound beat is just noticeable on the picture tube screen. Rotate the core toward center of the two points. Use minimum amount of inductance (core out of coil) that will result in no apparent beat interference.



MOTOROLA Chassis TS-537, TTS-537, WTS-537, Continued



RECTANGULAR GLASS REMOVAL

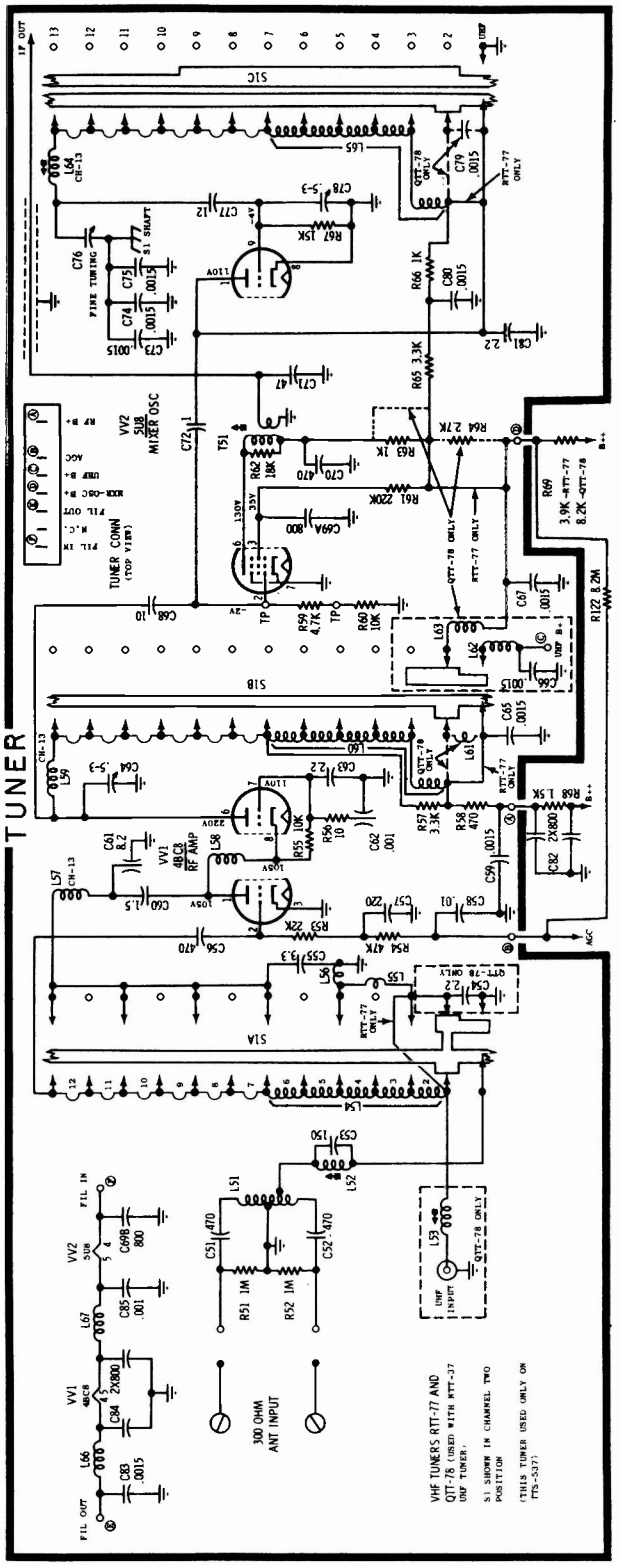


TS, WTS-537 SERIES TUBE LOCATION DETAIL

PRODUCTION CHANGES

TS-537A-01 thru A-04

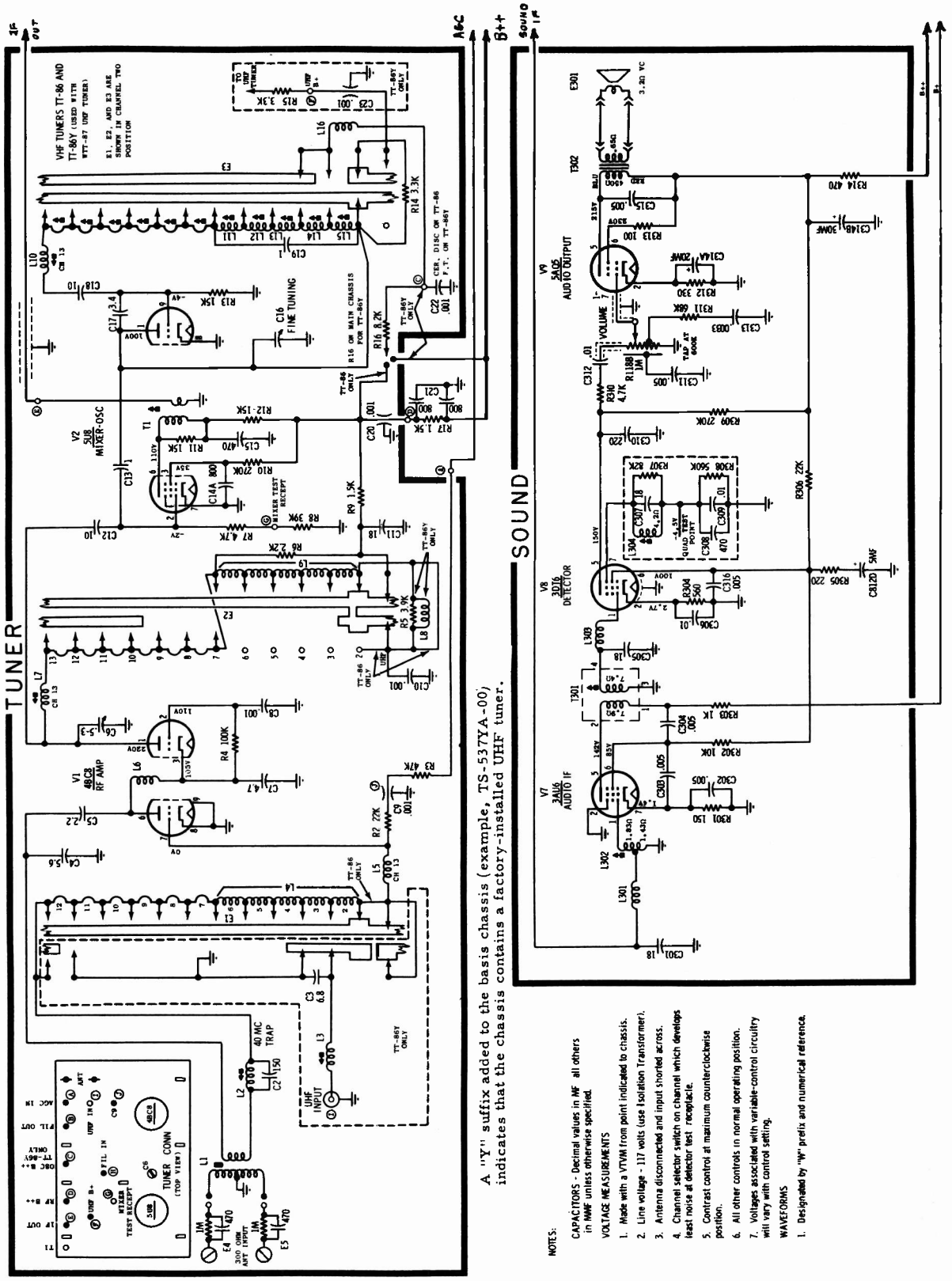
Chassis Coding	Changes
A-01	To eliminate size variation with brightness control setting, R-201 (150K) changed to 220K and moved from end lug to center lug of R-202 (brightness control); R-203 (100K) moved from center lug to end lug of R-202 (brightness control).
A-02	To increase horiz osc sensitivity, improve stability and reduce horiz size variation with change of horiz hold control R-507 (5.6K) changed to 8.2K; R-509 (100K) changed to 56K; R-523 (220K) added between junction of R-509 (56K) and R-510 (horiz hold) and ground. To reduce horiz size R-519 (12K) changed to 15K; R-514 (1 meg) changed to 2.2 meg.
A-03	R-514 (2.2 meg) changed to 1 meg.
A-04	R-611 (vert size - 5 meg & 1 meg stop) changed to 4 meg & no stop; R-620 (1 meg) added between former grounded lug of control and chassis.



Circuit of another tuner. Corresponding wires connected to main schematic shown on page 92.

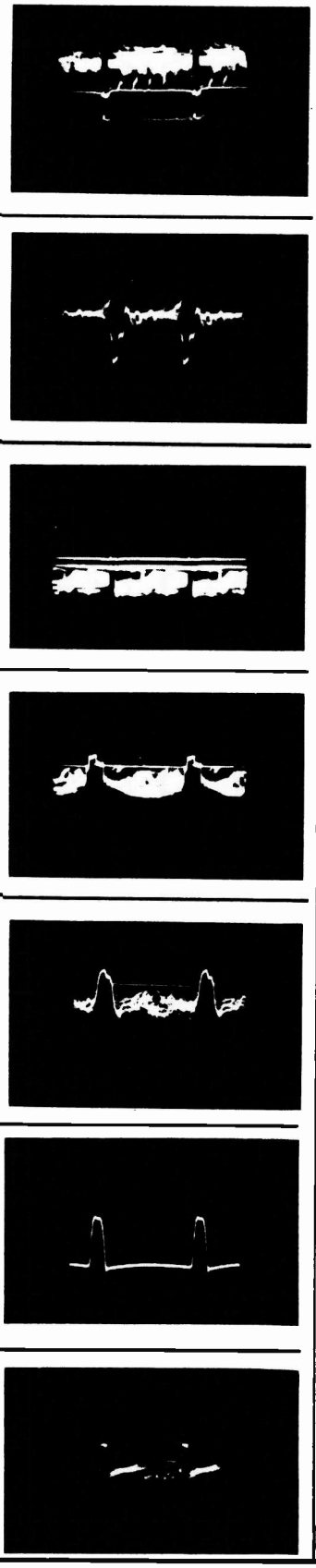
MOTOROLA Chassis TS-537, TTS-537, WTS-537, Part of Schematic, Continued

The various wires shown connect to corresponding wires of the main schematic on page 92.

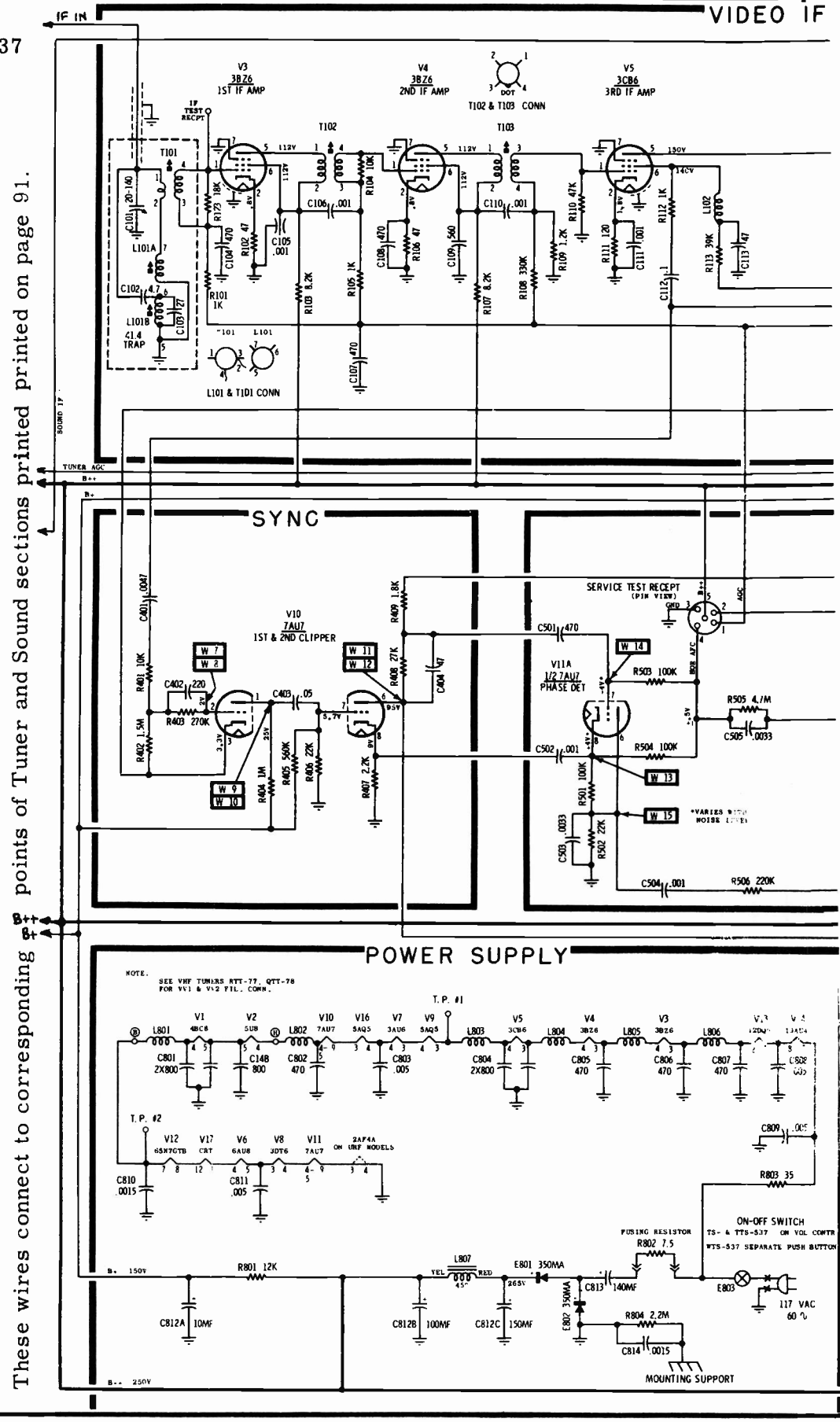


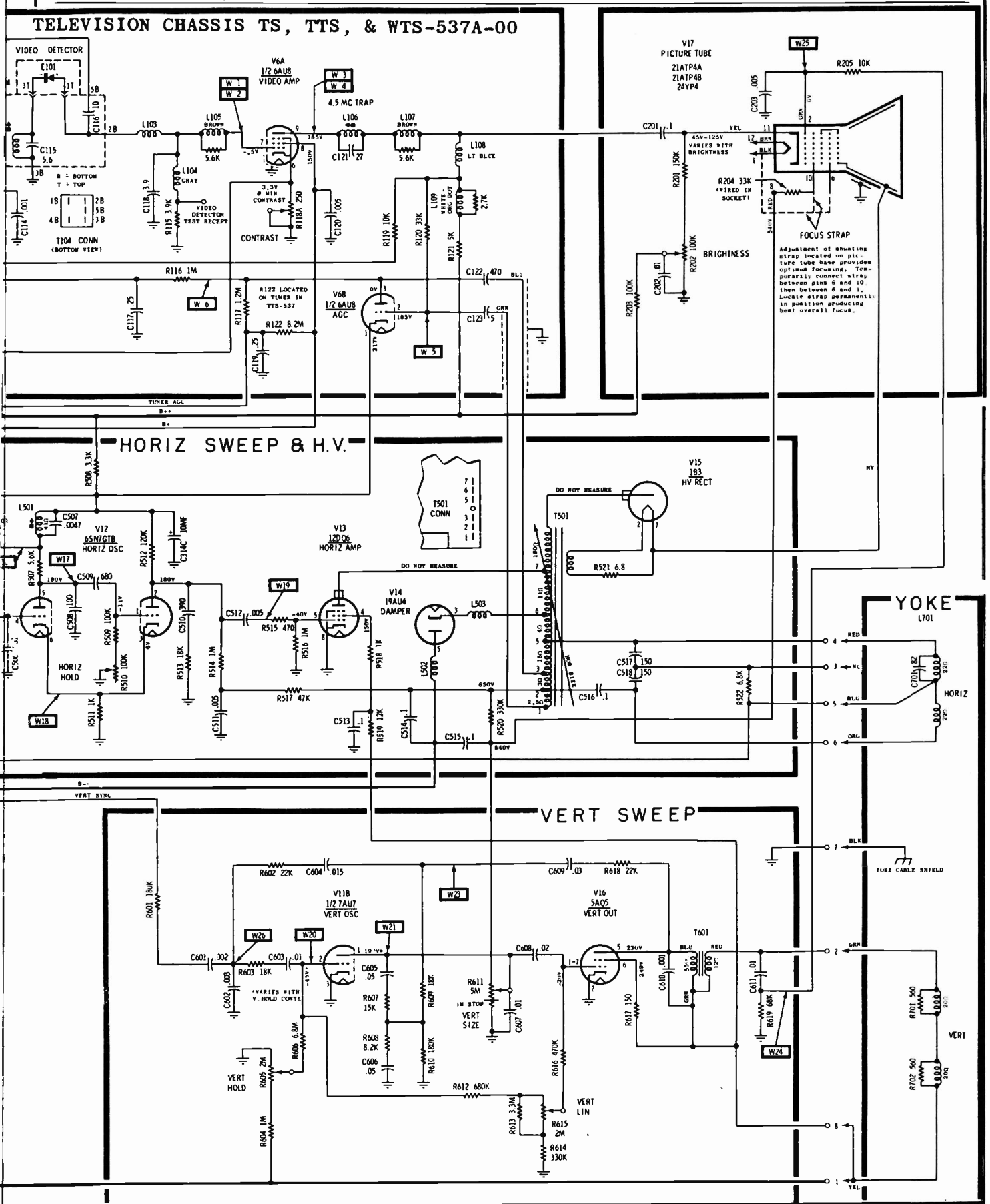
Above is shown a section of the schematic. Corresponding wires connect to main schematic diagram printed on pages 92-93. This separation is made for printing convenience. Note the circuit of another tuner used in some models, as printed on page 90.

MOTOROLA
Chassis TS, TTS, WTS-537



These wires connect to corresponding points of Tuner and Sound sections printed printed on page 91.




TELEVISION CHASSIS TS, TTS, & WTS-537A-00
VIDEO DETECTOR
E101
V6A
1/2 6AU8
VIDEO AMP
4.5 MC TRAP
V17
PICTURE TUBE
21ATP4A
21ATP4B
24YP4
R205 10K
C203 .005
R201 150K
R204 33K
(WIRED IN SOCKET)
R202 100K
BRIGHTNESS
C202 .01
R203 100K
C201 .1
FOCUS STRAP
Adjustment of shunting strap located on picture tube base provides optimum focusing. Temporarily connect strap between pins 6 and 10 then between 6 and 1. Locate strap permanently in position producing best overall focus.
T104 CONN
(BOTTOM VIEW)
CONTRAST
VIDEO DETECTOR TEST RECEPT
R116 1M
R117 1.2M
R122 8.2M
R122 LOCATED ON TUNER IN TTS-537
V68
1/2 6AU8
AGC
C122 470
C123
C117 .25
C119 .25
TUNER AGC
B++
B+
HORIZ SWEEP & H.V.
R508 3.3K
L501
C507 .0047
V12
6SN7GTB
HORIZ OSC
R507 5.6K
C509 680
R509 100K
R510 100K
C508 100
C506
HORIZ HOLD
R511 1K
R512 120K
C314C 10MF
V13
12DQ6
HORIZ AMP
R515 470
R516 1M
R518 1K
C512 .005
C510 390
R513 18K
R514 1M
C511 .005
R517 47K
C513 .1
R519 12K
C514 .1
C515 .1
R520 330K
T501 CONN
V15
1B3
HV RECT
T501
R521 6.8
V14
19AU4
DAMPER
L503
L502
C516 .1
C517 150
C518 150
R522 6.8K
YOKE
L701
RED
BLU
ORG
BLK
HORIZ
C701 82
YOKE CABLE SHIELD
VERT SWEEP
R602 22K
C604 .015
C609 .03
R618 22K
R601 18UK
V11B
1/2 7AU7
VERT OSC
V16
5AQ5
VERT OUT
T601
C601 .302
R603 18K
C603 .01
C602 .003
C605 .05
R607 15K
R608 8.2K
C606 .05
R609 18K
R610 180K
R606 6.8M
VERT HOLD
R605 2M
R604 1M
R611 5M
VERT SIZE
C607 .01
C608 .02
R612 680K
R613 3.3M
R614 330K
R615 2M
VERT LIN
R616 470K
C610 .001
R617 150
C611 .01
R619 68K
R701 560
R702 560
VERT
W1
W2
W3
W4
W5
W6
W17
W18
W19
W20
W21
W23
W24
W25
W26

MOTOROLA, Waveshapes, for TS, TTS, WTS-537, and TS, VTS, WTS-538

The following photographs were taken at some of the more important points in the receiver. To facilitate photography, a Tektronix oscilloscope was used. The waveshapes will appear much the same on the average wideband oscilloscope. When a limited bandwidth oscilloscope is used, some interpretation may be necessary to compensate for the waveshape differences (rounding of corners, for example).

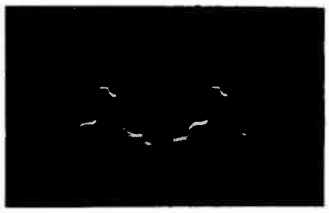
The input signal used during photography was a medium-strength television station signal. All receiver controls were set for normal picture viewing.

Note that waveshape amplitudes are based on a 3.3 volt peak-to-peak composite video voltage at the grid of the video amplifier. When analyzing a receiver with these waveshapes, keep in mind that peak-to-peak voltages of many check points will change with a different input voltage at the grid of the video amplifier.

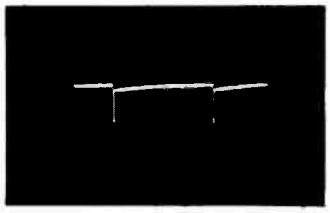
Variations in composite video signal (actual picture-forming video detail) are due to variations in the type of scene being scanned at the time the photograph was taken.

Vertical gain of the oscilloscope was adjusted so that, regardless of the value of peak-to-peak voltage, all traces would be approximately the same height on the photograph.

W8

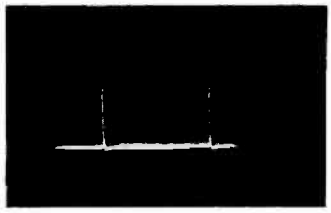


W9

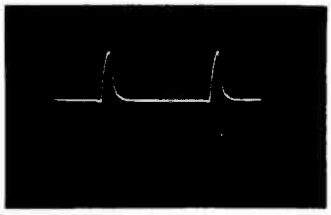


W10

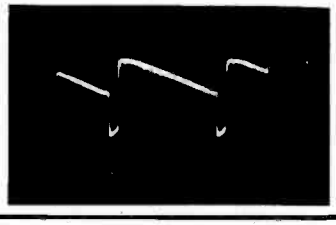
W11



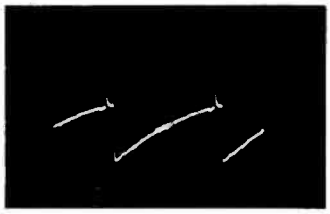
W12



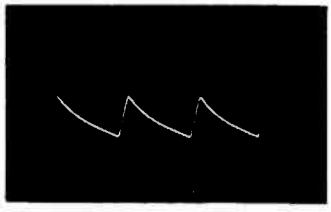
W13



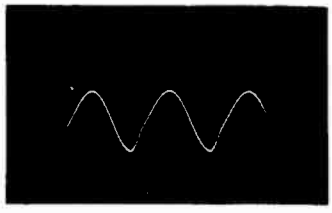
W14



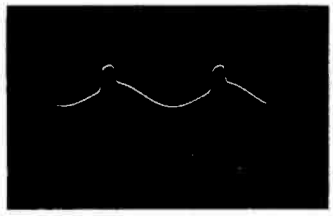
W15



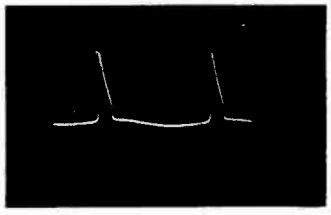
W16



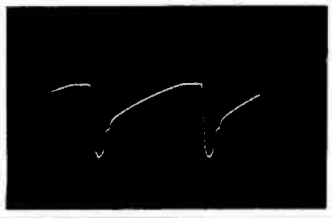
W17



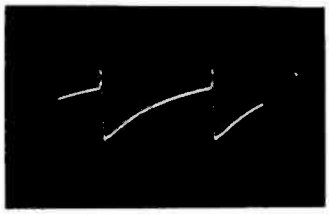
W18



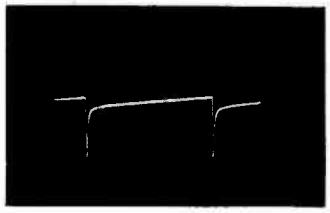
W19



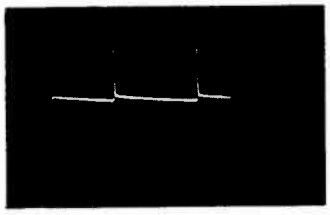
W20



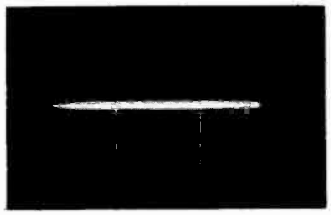
W21



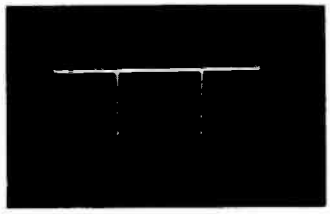
W23



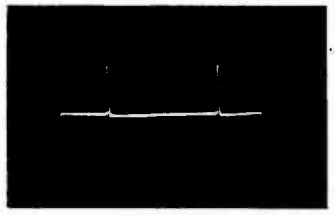
W24



W25



W26



MOTOROLA

RECEIVER MODEL BREAKDOWN CHART

Model	Description	TV Chassis
21T33BG	Table, grained blonde: metal	TS-538
Y21T33BG	Table, grained blonde: metal	TS-538Y
21T33CH	Table, charcoal: metal	TS-538
Y21T33CH	Table, charcoal: metal	TS-538Y
21T33MG	Table, grained mahogany: metal	TS-538
Y21T33MG	Table, grained mahogany: metal	TS-538Y
21T35B	Table, blonde: masonite	TS-538
Y21T35B	Table, blonde: masonite	TS-538Y
21T35M	Table, mahogany: masonite	TS-538
Y21T35M	Table, mahogany: masonite	TS-538Y
21T36B	Table, blonde: masonite	WTS-538
Y21T36B	Table, blonde: masonite	WTS-538Y
21T36M	Table, mahogany: masonite	WTS-538
Y21T36M	Table, mahogany: masonite	WTS-538Y
21K54B	Console, blonde: masonite	TS-538
Y21K54B	Console, blonde: masonite	TS-538Y
21K54M	Console, mahogany: masonite	TS-538
Y21K54M	Console, mahogany: masonite	TS-538Y
21K56B	Console, blonde: masonite	WTS-538
Y21K56B	Console, blonde: masonite	WTS-538Y
21K56M	Console, mahogany: masonite	WTS-538
Y21K56M	Console, mahogany: masonite	WTS-538Y
21K57B	Console, blonde: masonite	WTS-538
Y21K57B	Console, blonde: masonite	WTS-538Y
21K57M	Console, mahogany: masonite	WTS-538

Model	Description	TV Chassis
Y21K57M	Console, mahogany: masonite	WTS-538Y
21K57MCH	Console, champagne mahogany: masonite	WTS-538
Y21K57MCH	Console, champagne mahogany: masonite	WTS-538Y
21K57M	Console, mahogany: masonite	WTS-538
Y21K57M	Console, mahogany: masonite	WTS-538Y
21K58B	Console, blonde: masonite	WTS-538
Y21K58B	Console, blonde: masonite	WTS-538Y
21K58M	Console, mahogany: masonite	WTS-538
Y21K58M	Console, mahogany: masonite	WTS-538Y
21K59M	Console, mahogany: masonite	VTS-538
Y21K59M	Console, mahogany: masonite	VTS-538Y
21K59MCH	Console, champagne mahogany: masonite	VTS-538
Y21K59MCH	Console, champagne mahogany: masonite	VTS-538Y
24T6B	Table, blonde: masonite	VTS-538
Y24T6B	Table, blonde: masonite	VTS-538Y
24T6M	Table, mahogany: masonite	VTS-538
Y24T6M	Table, mahogany: masonite	VTS-538Y
24K14B	Console, blonde: masonite	VTS-538
Y24K14B	Console, blonde: masonite	VTS-538Y
24K14M	Console, mahogany: masonite	VTS-538
Y24K14M	Console, mahogany: masonite	VTS-538Y

CHASSIS DESCRIPTION

TS-538 SERIES Utilizes 19 circuit tubes, a 21ATP4A or 24YP4 aluminized rectangular picture tube (90 degree deflection angle) plus a germanium diode detector of the plug-in type.

Chassis having a "Y" suffix contain a factory-installed "continuous tuning" UHF tuner. (For tuner types, see CHASSIS BREAKDOWN CHART).

VTS-538 SERIES Same as the TS-538 except for the addition of pushbutton ON-OFF switch, tone control and pilot light.

WTS-538 SERIES Same as the TS-538 except for the addition of pushbutton ON-OFF switch and a pilot light.

FOCUS

A marked difference in the focus can be noticed when the ion trap, magnetic centering device and the shunting strap are properly placed. The adjustments are necessary because of gun structure differences.

To properly focus the picture tube, proceed as follows:

1. Adjust ion trap.

2. Adjust centering device as described in centering instructions. At times, focus may be improved by rotating the magnetic centering device 180° and repeating the centering procedure.

3. Readjust the ion trap for maximum raster brightness.

4. Adjust shunting strap for best focus. The shunting strap is located on the base of the picture tube between pin #6 (focus anode) and either pin 1 (chassis ground) or pin #10 (bootstrap). Recheck steps #2 and #3.

DEFLECTION YOKE ADJUSTMENT

If the deflection yoke shifts, the picture will be tilted. To correct, loosen the clamp at the rear of the deflection yoke holding the rubber wedge against the yoke. Push the yoke as far forward as possible, then rotate until the picture is straight. Loosen rubber wedge clamp and push rubber wedge tight against rear of yoke. Release wedge clamp.

CHASSIS BREAKDOWN CHART

Chassis	VHF Tuner	UHF Tuner
TS-538	TT-83	-
TS-538Y	TT-83Y	TT-87
VTS-538	TT-83	-
VTS-538Y	TT-83Y	TT-87
WTS-538	TT-83	-
WTS-538Y	TT-83Y	TT-87

RASTER CORRECTOR MAGNETS (not on all models)

Raster corrector (pincushion) magnets, when used, will be found on either side of the deflection yoke 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 or backward so that raster sides are straight.

4. Tighten screws holding magnet mountings.

PICTURE CENTERING

NOTE: The ion trap should be properly adjusted before centering. To center the picture correctly, follow these steps.

Starting with the magnetic centering device arms together for minimum field strength, and turned horizontally.....

1. Separate the arms of the centering device to center the picture vertically.

2. Adjust horizontal centering by rotating the magnetic centering device, as a unit, one way or the other. It may then be necessary to readjust vertical centering by slightly rotating the relative position of the arms.

3. Recheck adjustment of ion trap after centering is completed.

MOTOROLA Chassis TS-538, Service and Alignment Information, Continued

HORIZONTAL OSCILLATOR ADJUSTMENT

The HORIZONTAL HOLD control 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. Short HORIZ AFC to ground with a piece of wire at pin #4 of the SERVICE TEST RECEPTACLE (see Figure 4).

3. Connect a .1 mfd 400 volt capacitor across L-501 (HORZONTAL OSC COIL). Connect between pins #2 and #3 of the SERVICE TEST RECEPTACLE (see Figure).

4. Adjust HORIZONTAL HOLD control (front panel) to the point where the picture almost remains stationary...as far as horizontal sync is concerned.

5. Remove the .1 mfd capacitor shunting the HORIZ COIL and without turning the horizontal hold control, adjust the HORIZ COIL to the center of the range in which the picture almost remains in sync horizontally. (Use opening located between VERT SIZE and VERT LIN control shafts to reach the coil screw.)

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

IF AND MIXER ALIGNMENT

Equipment Required and Notes

Sweep Generator: 18 to 220 Mc, 12 Mc sweep width, linear output and capable of .1 volt output.

Accurately calibrated, adjustable marker generator and/or AM signal generator.

Cathode Ray Oscilloscope: preferably with calibrated attenuator.

Variac: To set line voltage to required value of 117 volts.

Keep the marker generator output low at all times to prevent marker from distorting the response curve.

Some coils resonate at two settings of the core...follow the core-setting instructions for each coil as given in the procedure.

REQUIRED PRELIMINARY STEPS

1. REMOVE...the yoke plug to eliminate RF interference. Connect an 1800 ohm resistor (40 watts or more) from chassis ground to 250 volt bus to normalize the voltages. (Use pins #3 and #5 of SERVICE TEST RECEPTACLE.)

2. APPLY...minus 6 volts to IF AGC by connecting a 6-volt battery between pin #1 (IF AGC bus) of the SERVICE TEST RECEPTACLE and ground. Positive side of battery goes to ground (see illustration).

3. DISABLE TUNER OSCILLATOR...by grounding pin #9 of V-2 (6U8), and turn channel selector to channel #13.

4. TUNE...the sweep generator center frequency to 44 Mc with a sweep width of 10 Mc, and do not change these settings. Adjust generator output below point of receiver limiting (approximately 3 volts peak-to-peak at the detector load). Maintain 1 to 3 volts peak-to-peak at the input to the oscilloscope.

5. ADJUST...the receiver's contrast control to minimum (fully counterclockwise).

6. CONNECT...a .001 to .005 mf capacitor in series with the generator lead, and connect generator as given in the procedure.

7. REMOVE...the receiver's antenna and short out terminals, if required, to remove transmitted signals.

8. CONNECT THE OSCILLOSCOPE...with a 47K ohm resistor in series with the input lead, to the VIDEO DETECTOR TEST RECEPTACLE. This location does not change for the entire IF and mixer alignment.

PROCEDURE

With the sweep generator connected to the IF TEST RECEPTACLE and the oscilloscope at the VIDEO DETECTOR TEST RECEPTACLE:

1. DETUNE...the mixer transformer primary (T-1) located on the tuner chassis so that it is tuned out of the IF response curve bandpass. The core of this coil should be turned into the tuner (clockwise rotation from tube side of chassis), being careful not to turn the core to the extent of disengagement from the coil. Failure to position the core in this manner will upset the coupling and make alignment difficult...if not impossible.

2. ADJUST...the 1st IF transformer (T-102) to position the 42.25 Mc marker (Set marker with marker generator) as shown in curve #3. The core must be tuned as far from chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

3. ADJUST...the 2nd IF transformer (T-103) to position the 45.75 Mc marker as shown in curve #3. The core must be tuned as far from the chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

4. ADJUST...the 3rd IF transformer (T-104) to shape the center of the curve for best symmetry and least tilt. The core must be tuned as far from the chassis metal as possible (maximum clockwise position as viewed from the tube side of the chassis).

5. MOVE...the sweep generator from the IF TEST RECEPTACLE and connect it to the MIXER TEST RECEPTACLE located on the tuner (see illustration).

6. ADJUST...the trimmer capacitor (C-101), mixer transformer secondary (T-101) and the bandwidth coil (L-101A bottom) to get the response curve and marker positions as shown in curve #2.

CORRECT CORE POSITIONS (for step #6)

a. The core of the mixer secondary transformer must be tuned as close as possible to chassis metal (maximum counterclockwise rotation position as viewed from the tube side of the chassis).

b. The core of the bandwidth coil must be tuned as far as possible from chassis metal (maximum counterclockwise position...as viewed from the PARTS SIDE of the chassis). REMEMBER: The core cannot be tuned from the tube side of the chassis without turning the trap-coil slug.

7. ADJUST...the 41.4 Mc trap (L-102) for the trap dip shown in curve #1. The core of the trap must be tuned as far as possible from chassis metal (maximum clockwise position as viewed from the tube side of the chassis).

8. ADJUST...the 47.25 Mc trap (L-101B) for the trap dip shown in curve #1. The core of the trap must be tuned as close as possible to chassis metal. (Maximum counterclockwise position as viewed from the tube side of the chassis.)

NOTE: To see the trap response clearly, it may be necessary to either increase the generator output appreciably, or remove the IF bias momentarily.

9. ADJUST...mixer transformer primary (T-1) into the center of the IF response, so as to place the markers as shown in curve #1. Add tilt (shown on curve) with this adjustment.

MOTOROLA Chassis TS-538, Alignment Information, Continued

SOUND ALIGNMENT

This alignment is made by injecting an accurate 4.5 Mc signal into the VIDEO DETECTOR TEST RECEPTACLE (see IF alignment drawing or top view of chassis for location). A second practical method is the use of a station transmission. The latter method will produce an accurate 4.5 Mc signal at the output of the video detector.

The station signal method is given in the following procedure, however, the procedure would be the same whether the test signal originates from a station or from a generator.

PREPARATION AND TEST EQUIPMENT

1. Connect positive lead of VTVM from positive terminal of the 3 mfd electrolytic capacitor (C-311)...this is also pin 5 of V-10 (ratio detector). Connect negative meter lead to chassis ground.

2. Set contrast control at maximum (fully clockwise).

3. Tune in a station--or--connect a 4.5 Mc crystal-controlled generator to the VIDEO DETECTOR TEST RECEPTACLE in series with a 3300 ohm resistor.

4. Adjust signal generator to maintain 5 to 10 volts at the VTVM--or--keep station signal as near this value as possible.

PROCEDURE

5. ADJUST...the audio take-off coil (L-302), interstage coil (L-303) and the primary of the ratio detector (T-301... tuned from the parts side of the chassis) for a maximum reading on the VTVM.

6. MOVE...the VTVM to the junction of R-310 (33K) and C-314 (.001 feed-thru). Other meter lead goes to ground.

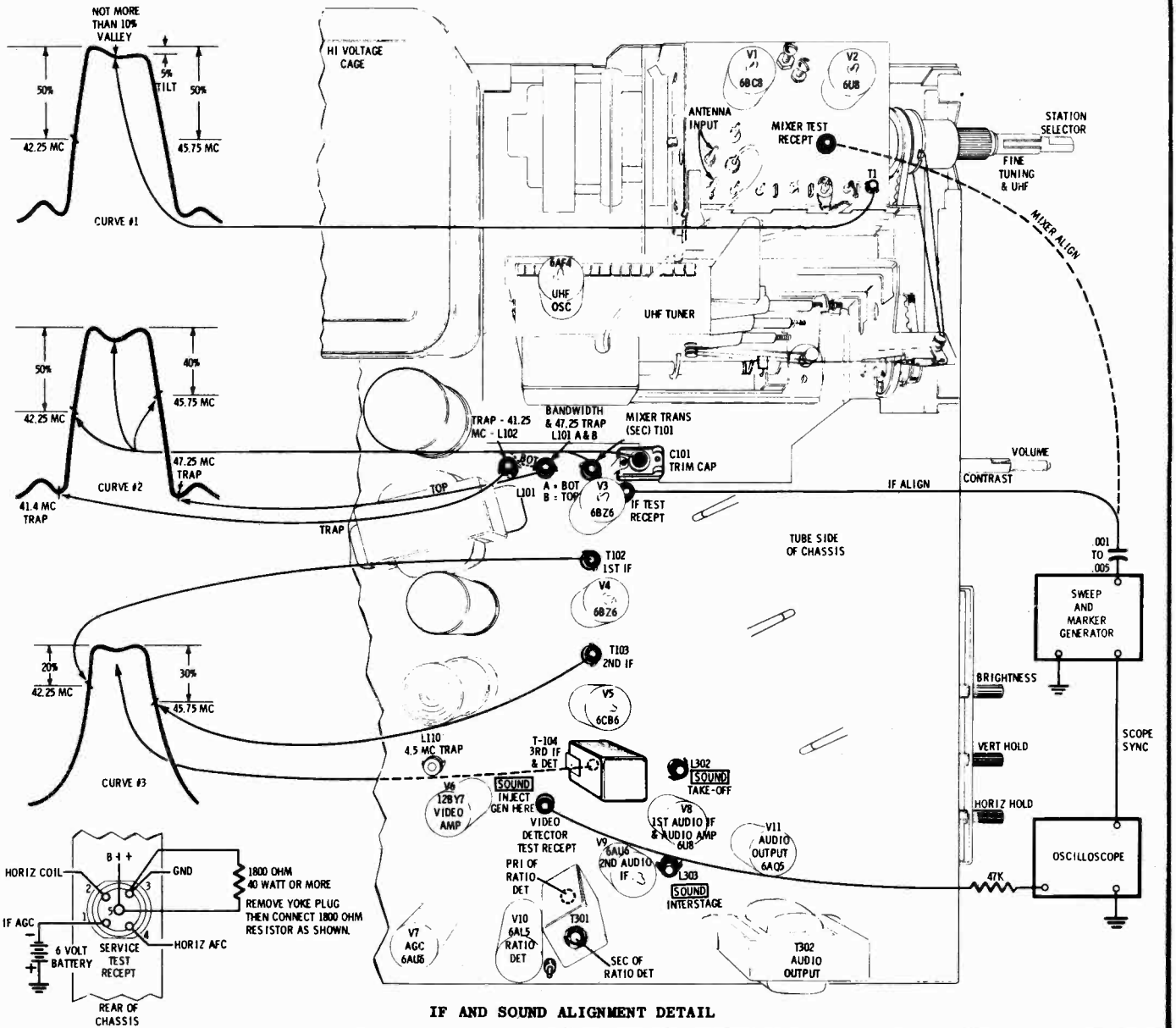
7. ADJUST...the secondary of the ratio detector (T-301... tuned from tube side of chassis) for zero reading

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-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.



IF AND SOUND ALIGNMENT DETAIL

MOTOROLA Chassis TS-538, Receiver Disassembly Instructions, Continued

The chassis position in the cabinet has been designed for ease of servicing at all times. The tubes are easily accessible, and the chassis has been provided with an abundance of test points. However, for the receiver that proves to be a "bench job" and must be taken to the shop, it is possible to remove the chassis from the rear of the cabinet (models with cut-out at top of cabinet...inside back cover), or to remove the entire receiver as a unit from the front of the cabinet.

Two types of cabinets will be encountered in this series of chassis...one having a rectangular safety glass, and the other having an oval-shaped safety glass. Although the chassis used in these two types of cabinets are identical, and thus mounted with bolts located in mechanically similar locations, there are still differences in the methods of chassis removal.

In most of the models, it is possible to remove the chassis out the rear of the cabinet...in some models this is not possible and it is necessary to remove the entire front of the receiver and then remove the chassis. The determining factor as to whether the chassis can or cannot be removed from the rear of the cabinet, is the rear cabinet opening. If the opening is not larger than the chassis size, it will be impossible to remove the chassis from the rear, since there is insufficient room to tilt or twist the chassis inside the cabinet.

CABINETS WITH OVAL-SHAPED GLASS

Removing the receiver as a unit

1. Remove the hex head screw in back cover (located between the serial number and the power cord inlet). Remove screws on masonite cabinets--or--pry back cover off using a screwdriver on metal cabinets.

2. Disconnect the speaker plug. Speaker is of the PM type and not required for receiver operation.

3. Remove the fibre L-shaped tie-down strip in the upper portion of the chassis. (The strip bolts to chassis and edge of cabinet.)

4. Working at front of cabinet: remove the decorative strip located at the top edge of the safety glass.

5. Hold safety glass and remove glass retainer screw and remove the retainer. Remove safety glass and place in a safe location.

6. Remove the two Phillips head screws exposed by the top safety glass retainer removal.

7. Place cabinet into a suitable position so that bolts underneath cabinet may be reached. Remove bolts holding bottom pan to the cabinet only. Do not remove the bolts holding the bottom pan to the chassis. (Correct bolts may be seen from rear of receiver).

8. Remove entire front of cabinet with bottom pan, chassis and picture tube attached.

Removal of chassis only (oval-glass cabinets)

1. Remove back-of-cabinet and notice if rear opening (height) of cabinet will permit chassis to be removed from the rear. If so, disconnect the speaker plug, yoke plug, high voltage lead and the picture tube socket.

2. Remove the channel selector and fine tuning knobs. Remove the escutcheon plate by removing the two Phillips head screws. Remove the Phillips head screw revealed by removal of the escutcheon. Remove remaining control knobs.

3. Working from rear of receiver: remove the fibre L-shaped tie-down strip located in the upper portion of the chassis. (This strip bolts to chassis and edge of cabinet.)

4. Remove the metal brace on left-hand (rear) of cabinet. This brace holds chassis to bottom pan. Leave capacitor and resistor unit attached to the brace for remainder of hook-up.

5. Place cabinet into required position and remove bolts holding chassis to bottom of cabinet (metal pan) on underside of receiver.

6. Remove chassis.

7. Remove deflection yoke for shop use.

CABINETS WITH RECTANGULARLY-SHAPED GLASS

Removing the receiver as a unit

1. Remove bolt in back cover (located between the serial number and the power cord inlet). Pry back cover off carefully, using a screwdriver.

2. Disconnect the speaker plug (speaker is of the PM type and not required for receiver operation).

3. Remove the fibre L-shaped tie-down strip located in the upper portion of the chassis. The fibre strip bolts to chas- and edge of cabinet.

4. Working at front of cabinet: remove control cover "A" by prying outward and then remove all front panel knobs (see drawing for removal of safety glass).

5. Remove the four screws in overlay panel "B", then remove the panel (see drawing).

6. Remove Phillips head screw at upper right-hand side holding cabinet front to cabinet.

7. Reach in through rear of receiver and remove 10-32 hex nut at extreme right-hand side of cabinet...located near the top of the cabinet.

8. Place cabinet in required position and remove the bolts located underneath the cabinet and holding the bottom pan to the cabinet. (Do not remove the bolts holding the chassis to the bottom pan.)

9. Remove entire front of cabinet with bottom pan, chassis and picture tube attached.

10. CAUTION: Bending or warping bottom pan or cabinet front will make replacement of the unit difficult.

Removal of chassis only (rectangular-glass cabinets)

1. Remove bolt in back cover (located between the serial number and the power cord inlet). Remove screws on masonite cabinets--or--pry back cover off carefully using a screwdriver on metal cabinets.

2. Determine if the height of the cabinet is sufficient to allow removal of the chassis. If it is not, it will be necessary to refer to the preceding procedure for removal of the entire receiver...then remove the chassis.

3. Disconnect the speaker plug (speaker is of the PM type and is not required for receiver operation), yoke plug, high voltage lead and the picture tube socket.

4. Remove the fibre L-shaped tie-down strip located in the upper portion of the chassis. The fibre strip bolts to chassis and edge of cabinet.

5. Remove brace on left-hand (rear) of cabinet. This brace holds chassis to the bottom pan. (Leave capacitor and resistor leakage unit attached to the brace.)

6. Working at front of cabinet: remove control cover "A" by prying outward and then remove all front panel knobs (see drawing "removal of safety glass").

7. Remove Phillips head screw (holding chassis to cabinet front).

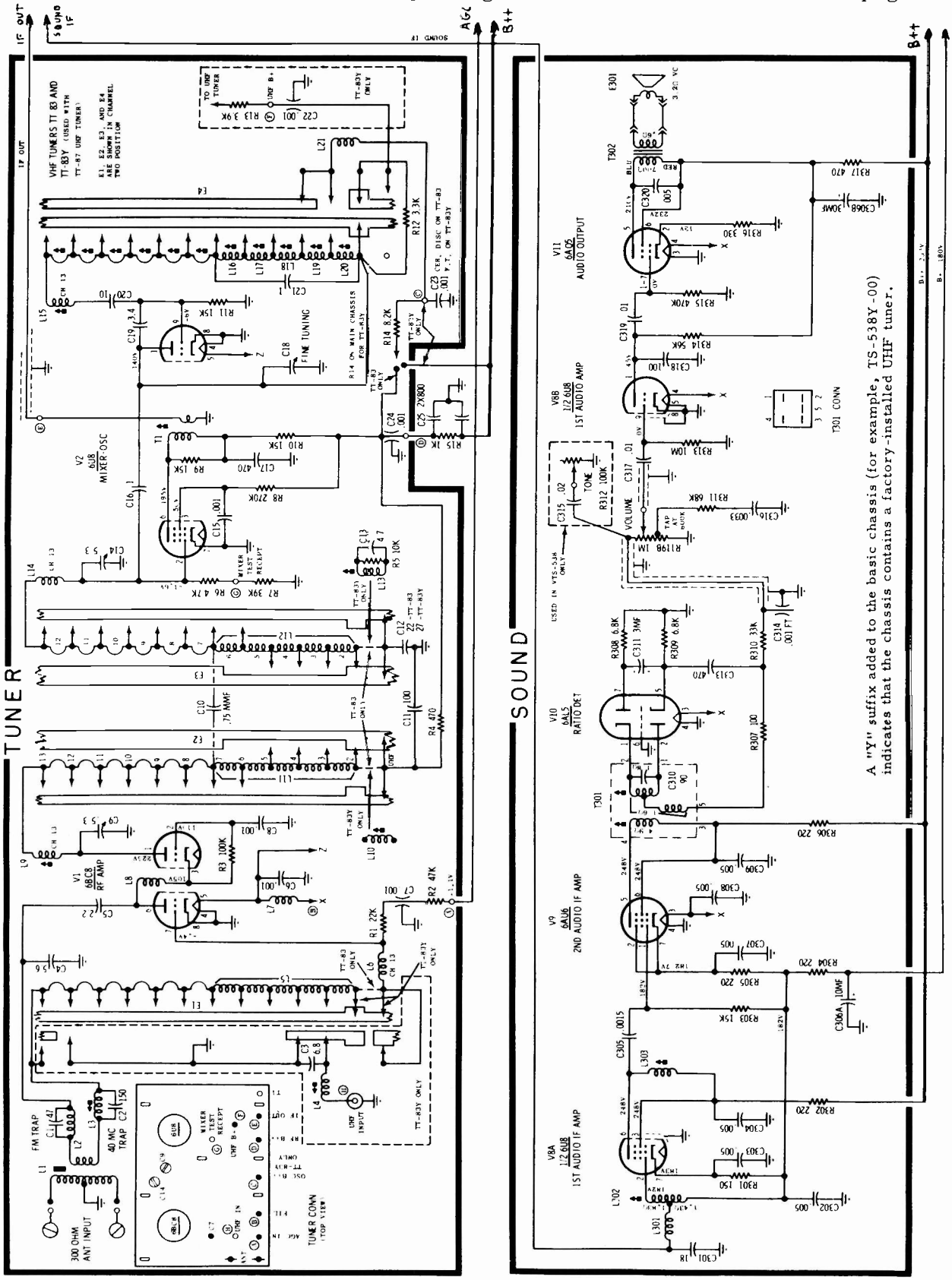
8. Place receiver in required position and remove bolts (two) from underneath cabinet, holding chassis to bottom pan. (Do not remove bolts holding pan to cabinet.)

9. Remove chassis.

10. Remove deflection yoke for shop use.

MOTOROLA Chassis TS-538, VTS-538, WTS-538, Part of Schematic, Continued

Marked wires connect to corresponding wires of the main schematic on page 100.

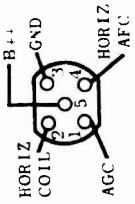


Above is shown a section of the schematic. Marked wires connect to corresponding wires of main circuits diagram on pages 100-101. This separation is made for printing convenience.

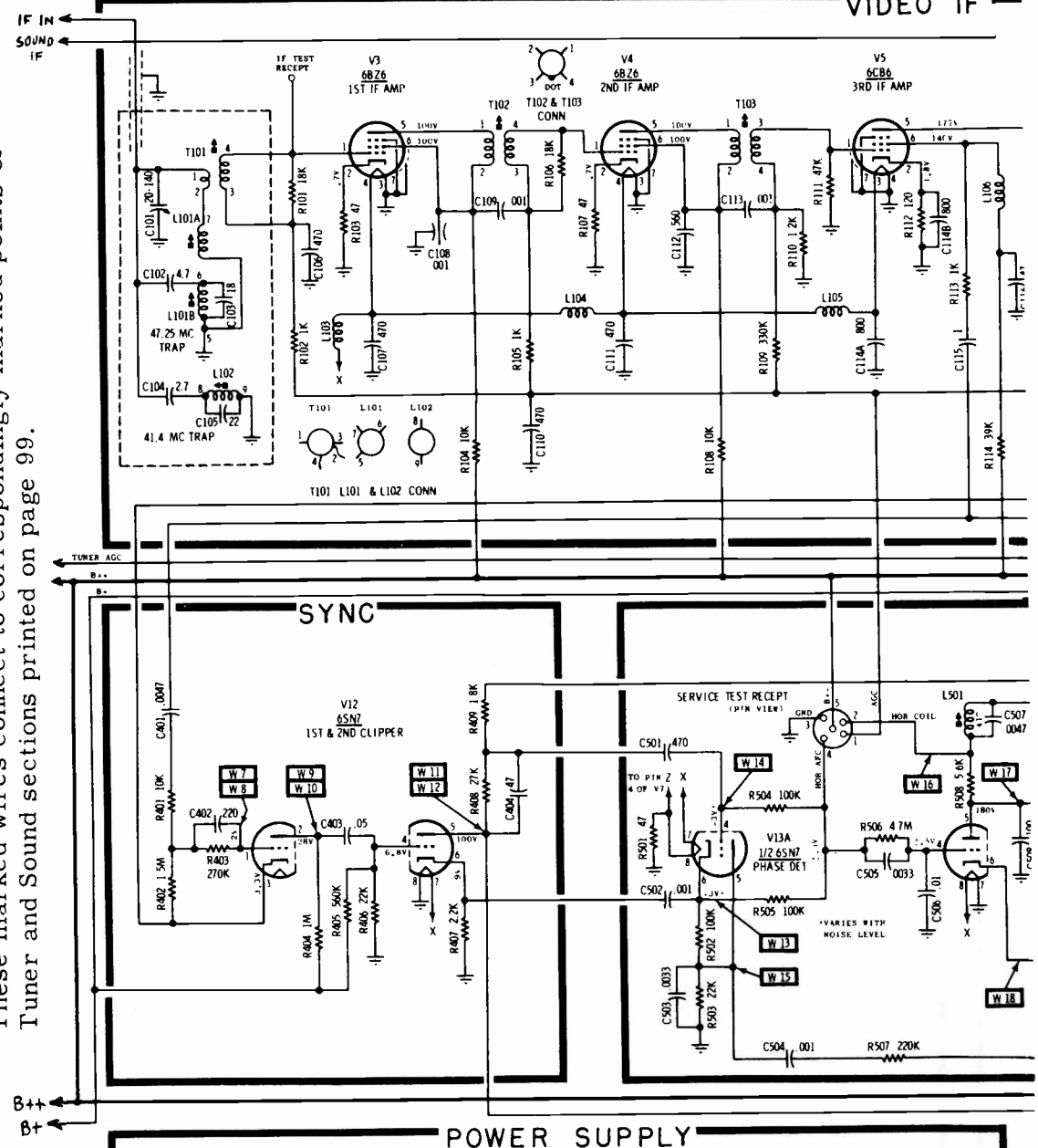
MOTOROLA
Chassis TS-538, VTS-538, WTS-538

A SERVICE TEST RECEPTACLE accessible from the rear of the cabinet, after the back has been removed, provides the following test points...

Pin	Connection
1	IF AGC bus
2	Horiz coil
3	Chassis ground
4	Horiz AFC
5	B++ (250 volts)



These marked wires connect to correspondingly marked points of Tuner and Sound sections printed on page 99.



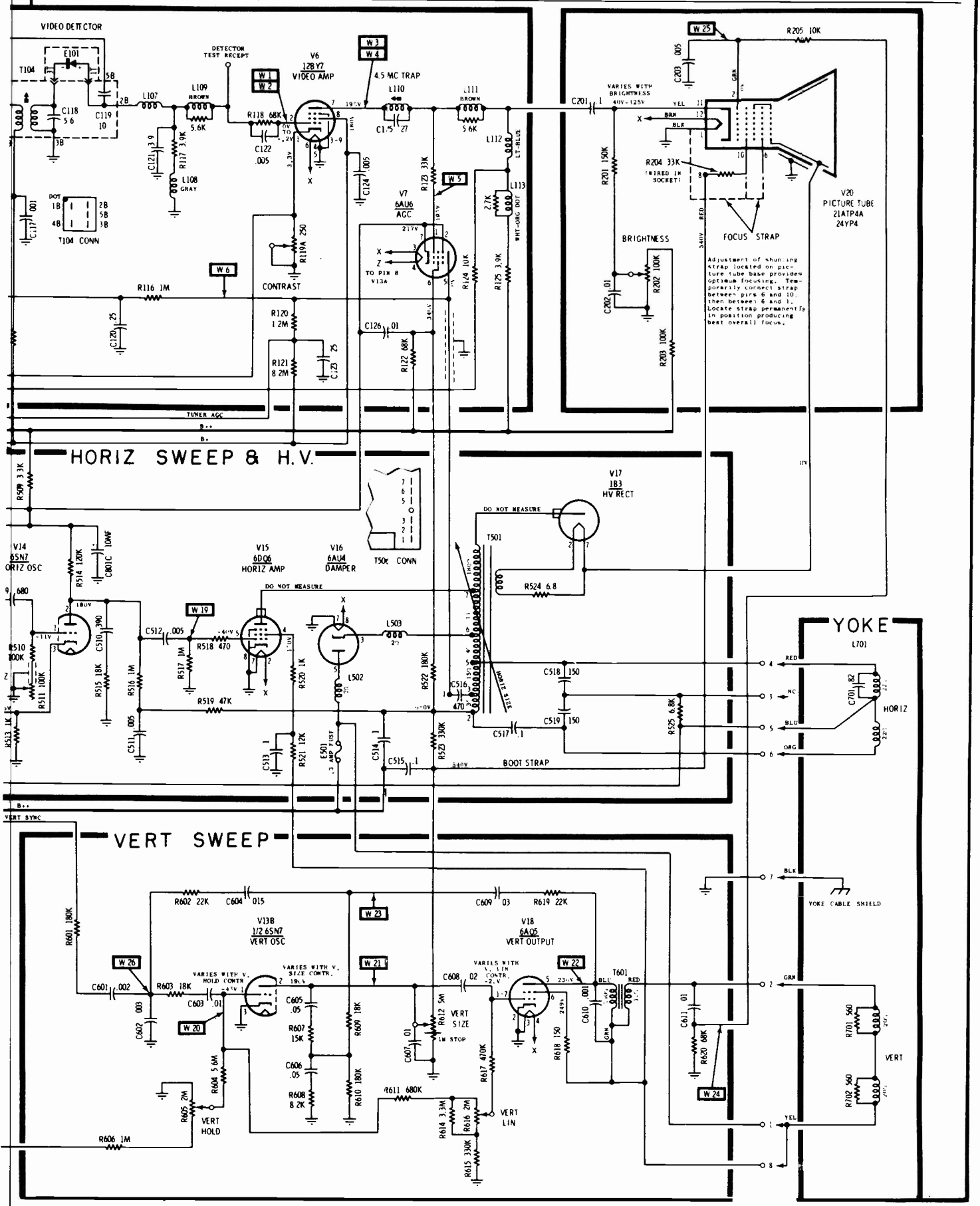
(See page 102 for service hints.)

VOLTAGE MEASUREMENTS
1. Made with a VTVM from point indicated to chassis
2. Line voltage 117 volts
3. Antenna disconnected and input shorted across
4. Channel selector switch on channel which develops least noise at detector test receptacle
5. Contrast control at maximum counterclockwise position.
6. All other controls in normal operating position
7. Voltages associated with variable-control circuitry will vary with control setting.

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

WAVEFORMS

For illustration of wave-shapes see same material for TS-537, pages 92, 94.


VIDEO DETECTOR
E101
T104
DETECTOR TEST RECEPT
V6
12BY7
VIDEO AMP
4.5 MC TRAP
L110
L111
L107
L109
L108
C118
C119
C121
C122
C124
R117 3.9K
R118 68K
R123 33K
L112
L113
V7
6AU6
AGC
R125 3.9K
R124 10K
R119A 250
CONTRAST
R116 1M
R120 1.2M
R121 8.2M
C126 .01
R122 68K
C120 25
C125 25
T104 CONN
TUNER AGC
B+
HORIZ SWEEP & H.V.
V17
1B3
HV RECT
DO NOT MEASURE
T501
R524 6.8
V14
6SN7
ORIZ OSC
V15
6DQ6
HORIZ AMP
V16
6AU4
DAMPER
T502 CONN
R509 3.3K
R514 120K
C801C 10MF
R510 100K
R511 100K
R515 18K
R516 1M
R517 1M
R518 470
R519 47K
C510 .390
C511 .005
C512 .005
R520 1K
R521 12K
C513 .1
E501
C514 .1
C515 .1
L502
L503
R522 180K
R523 330K
C516 470
C517 .1
C518 150
C519 150
R525 6.8K
BOOST STRAP
YOKE
L701
HORIZ
C701 .82
VERT SYNC
VERT SWEEP
V13B
1/2 6SN7
VERT OSC
V18
6AQ5
VERT OUTPUT
R601 180K
R602 22K
C604 .015
C609 .03
R619 22K
C601 .002
R603 18K
C603 .01
C602 .003
C605 .05
R607 15K
C606 .05
R608 8.2K
R609 18K
R610 180K
R611 680K
R612 5M
VERT SIZE
1M STOP
C607 .01
R617 470K
R618 150
C610 .001
T601
C611 .01
R620 68K
R604 5.6M
R605 2M
VERT HOLD
R606 1M
R614 3.3M
R616 2M
VERT LIN
R615 330K
R701 560
R702 560
VERT
YOKE CABLE SHIELD
W 1
W 2
W 3
W 4
W 5
W 6
W 19
W 20
W 21
W 22
W 23
W 24
W 25
W 26
R205 10K
C203 .005
R201 150K
R204 33K
WIRED IN SOCKET
C202 .01
R202 100K
R203 100K
BRIGHTNESS
FOCUS STRAP
V20
PICTURE TUBE
21ATP4A
24YP4
Adjustment of shunting strap located on picture tube base provides optimum focusing. Temporarily connect strap between pins 6 and 10, then between 6 and 1. Locate strap permanently in position producing best overall focus.

MOTOROLA Service Aid Chart for Chassis TS-538, VTS-538, WTS-538, Continued

SYMPTOM	CONTROLS	CHECK OR ADJUST	TUBES	MISCELLANEOUS CHECKS
NO RASTER (sound OK)	Brightness		V14(horiz osc) V15(horiz output) V16(damper)	Fuse E-501
WEAK PICTURE (Insufficient contrast)	Contrast. Fine tuning Channel selector on correct channel?	Antenna connections. Booster and/or ant dist systems (if used).	V1 (RF) V2 (osc-mix) V3, 4 & 5 (video IF) V6 (video amp) V7 (AGC)	AGC voltage. Contrast control. RF, IF, mixer & AGC stages. Video amps.
LOW BRIGHTNESS OR NO RASTER	Brightness	Ion trap adj	V14 (horiz osc) V15 (horiz output) V16 (damper) V17 (HV rect) V20 (picture tube)	High voltage at picture tube anode. Drive voltage, pin 5 V15. Bootstrap voltages. Solder connections at base of CRT. Voltages & waveforms in V14 & V15 circuits. Horizontal output transformer & deflection yoke.
POOR VERTICAL LINEARITY AND/OR SIZE. HORIZ WHITE LINE (no vert sweep)	Vertical size. Vert lin. Reduce brightness & return to normal when trouble is cleared.		V13 & V18 (vert osc & output)	Bootstrap voltage. Voltages in V13, V18 circuit. Vertical output transformer & deflection yoke.
VERTICAL INSTABILITY, PICTURE ROLLS	Vertical hold		V7 (AGC) V12 (clipper) V13 & 18 (vert osc & output)	Voltages in V12, V13 & V18 circuits. Interference. Sync clipping at video amp. Refer to tests under WEAK PICTURE. Abnormal power supply ripple. Insufficient bootstrap filtering. Video detector.
LOSS OF VERTICAL AND HORIZ HOLD	Horiz hold. Vert hold.	Weak signal. Antenna and lead-in	V12 (clipper)	B+ and B++ voltages. AGC voltage. Refer to test under VERTICAL INSTABILITY & NO HORIZ HOLD.
NO HORIZ HOLD OR CRITICAL HORIZ HOLD	Horiz hold.	Horiz osc coil (adj)	V12 (clipper) V13 (phase det) V14 (horiz osc)	Waveforms in V13 & V14 circuits. Refer to tests under WEAK PICTURE.
INSUFFICIENT HORIZ SIZE	Horiz size.	Picture centering	E-501 V14 (horiz osc) V15 (horiz output) V16 (damper)	Bootstrap voltage. Drive voltage, pin 5, V15. Deflection yoke and horiz output transformer. B++ voltage.
PICTURE NORMAL, NO SOUND OR WEAK SOUND	Fine tuning. Volume.		V8A (audio IF) V8B (audio amp) V9 (audio IF) V10 (ratio det) V11 (audio output)	Speaker & speaker plug. Output transformer. Voltages of V8A, V8B, V9, V10 & V11. Sound alignment.
BUZZ IN SOUND	Fine tuning. Contrast.	Excessive signal	V8A (audio IF) V8B (audio amp) V9 (audio IF) V10 (ratio det) V11 (audio output)	Ratio det alignment. Improper AGC action. Power supply filter & sweep circuit bypass capacitors. Heater-cathode shorts in sound tubes.
VHF -NO UHF	UHF tuning. UHF switch.	Antenna connections	6AF4 (UHF osc)	
MICROPHONICS VISUAL AND AUDIBLE		Binding knobs & control shafts		Tap tubes--look & listen for microphonics
INSUFFICIENT PICTURE SIZE, HORIZ & VERT		Check AC line voltage	V19 (LV rect)	Power supply voltages.
WIDE HORIZ BAR OR GRADUATION IN SHADING, VERTICALLY (Set may have poor vert sync)			V1 (RF) V2 (mix-osc) V3 (IF) V4 (IF) V5 (IF) V6 (video amp) V18(vert output) V20(picture tube)	Heater-cathode short in any video circuit. Excessive power supply ripple (may have hum in audio). Heater-cathode short in V11 (Loud hum in audio). Picture tube.

Muntz TV Inc.

CHASSIS MODELS

624TS/624TW/624C SERIES

627TS/627C SERIES

CENTERING

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

MAGNETIC FOCUS C.R.T.

FOCUS: The focus adjustment screw is shown in Fig. 1A.

CENTERING: The picture centering lever is coupled to the focalizer by a universal joint. Movement of the lever will enable the picture to be centered on the picture tube screen.

DEFLECTION YOKE T2

If picture tilt exists, temporarily loosen the wing screw on the yoke and rotate the yoke until tilt is eliminated. Some sets have a rubber wedge holding the yoke in place. Loosen this rubber to position the yoke. Be sure that the yoke is seated as far forward on the neck of the CRT as possible before securing.

ION TRAP

The proper setting of the Ion Trap is of great importance and should be made AFTER all centering and focus changes. Set the brilliance control to maximum and adjust Ion Trap on the neck of the CRT for maximum screen brilliance. CAUTION: Two points of brilliance may be obtained in some tubes. The proper setting is at the maximum point of brilliance closest to the base of the CRT.

INDIVIDUAL CHANNEL ADJUSTMENT

ADJUSTING THE STANDARD COIL PR-0252, PR-0253

The tuning slugs may be reached by removing the Channel selector and fine tuning knobs. Set the fine tuning to the center of its range. (On the PR 0252 (VHF) the flat of the shaft parallel with the chassis. On the PR 0253 (UHF/VHF) mid point between the stops.) Adjust each individual channel for best compromise of picture and sound.

ADJUSTING THE SARKES PR-0251, PR-0254

Set the fine tuning in the center of its range. (On the PR-0251 VHF the red line on the wheel parallel with the chassis. On the PR-0254 UHF/VHF the knob slot of the center shaft parallel with the chassis.) Turn the channel selector to the highest channel of channels 7 to 13 operating in your locality. Adjust high band oscillator for best association of sound and picture. Re-set channel selector for highest operating band channel (2 to 6) and adjust low band oscillator for best association of sound and picture.

NOTE: The UHF sections of both tuners are prealigned by the factory and have extremely critical settings and wire dress.

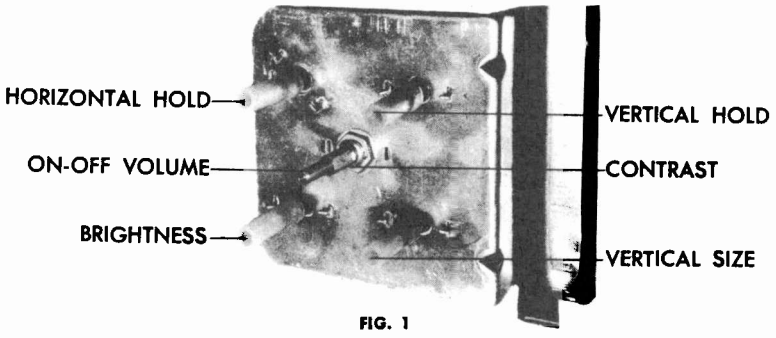


FIG. 1

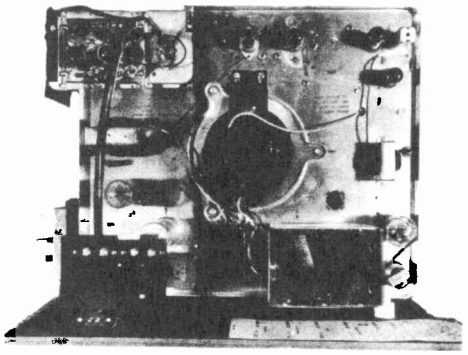


FIG. 2

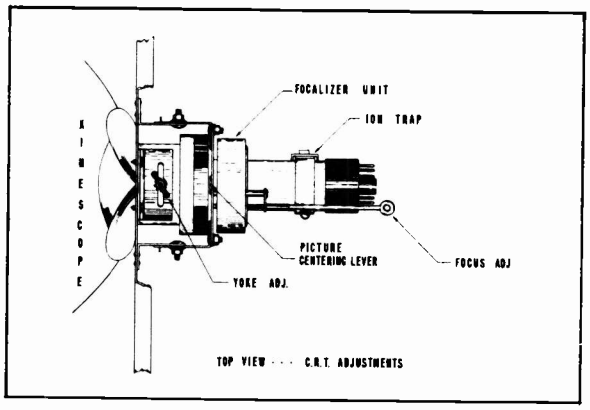
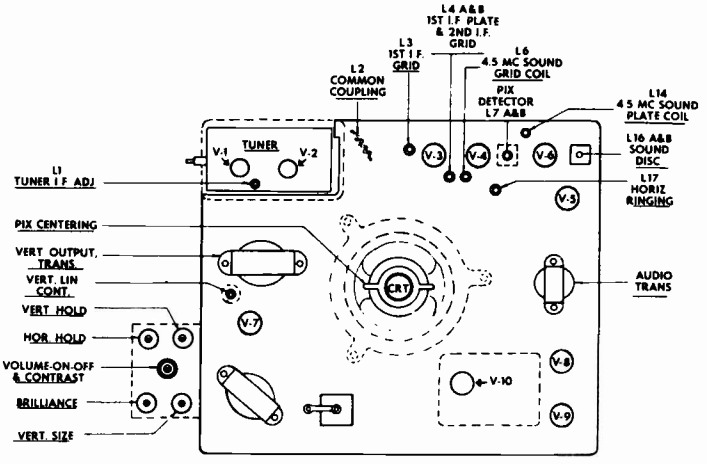


FIG. 1a



TUBE LAYOUT–REAR VIEW

Circuit diagram on pages 104-105, alignment instructions on page 106.

ALIGNMENT OF HORIZONTAL OSCILLATOR

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

1. Tune in the receiver properly and adjust the picture below an over-contrast condition.
2. Short out Ringing Coil (L17) with a jumper directly across the coil.
3. Short out the AFC diodes with a jumper from test point G to ground.
4. After receiver is warmed up, adjust Horizontal Hold Control for a single picture.
5. Remove short from Ringing Coil and adjust Ringing Coil with the core entering the coil from the chassis side until a single picture is attained. Then back off approximately a ¼ of a turn counterclockwise for final adjustment of this coil.
6. Remove short from diodes, and the picture will snap into sync.
7. Set Horizontal Hold Control to maximum clockwise and turn slowly counterclockwise until picture is in sync. This is the proper setting of the Horizontal Hold Control and will maintain sync for any signal level.

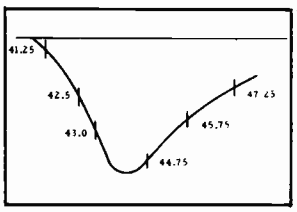


FIG. 3

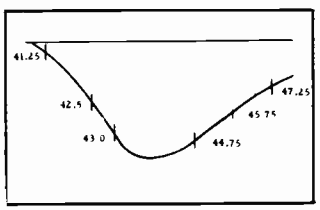


FIG. 4

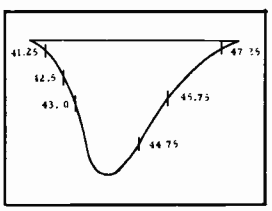


FIG. 5

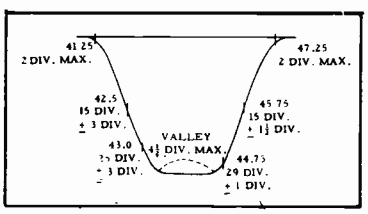


FIG. 6

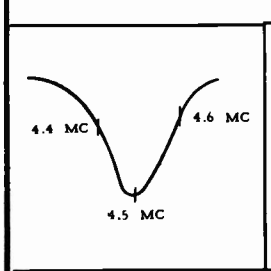


FIG. 10

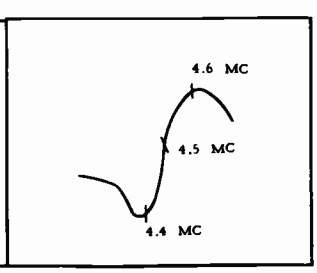
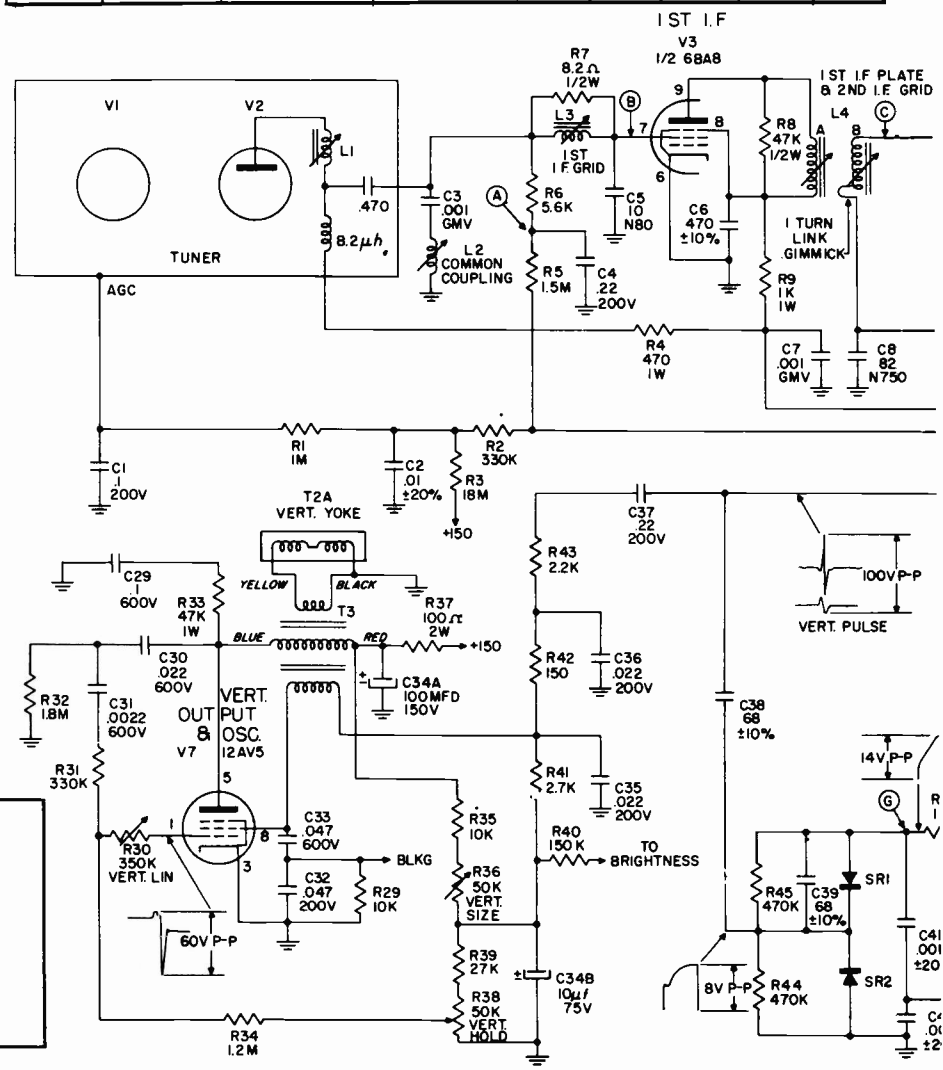


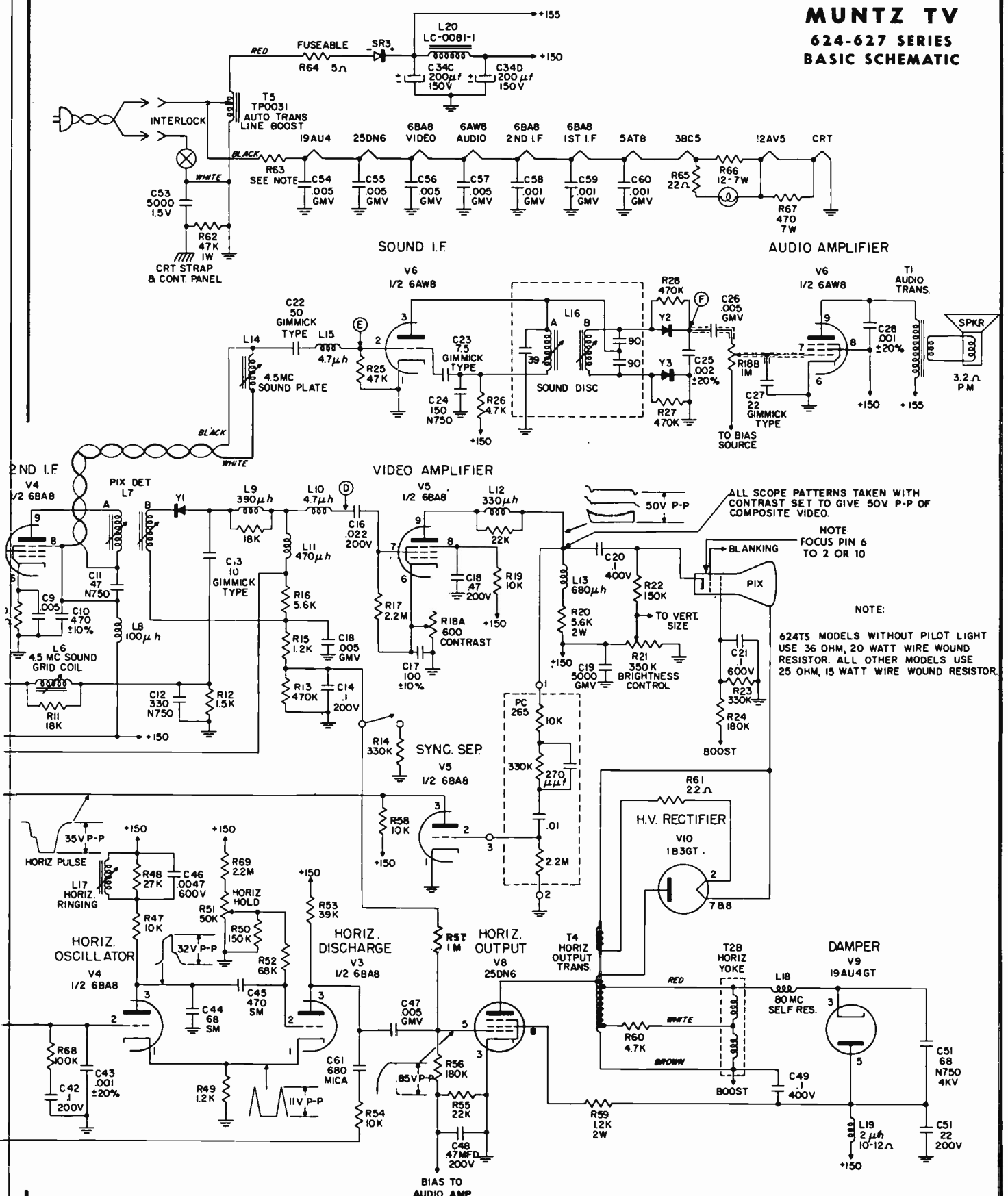
FIG. 11

All readings are subject to 10% variation. All voltages were taken with 4000 microvolt input and the contrast adjusted to have the composite video measure 50 volts P-P at the plate of the video amplifier.

Symbol	Function	1	2	3	4	5	6	7	8	9
V3	1st I.F. Hor. Disch.	4.5	—8	100	Fil	Fil	G	—6	130	130
V4	2nd I.F. Hor. Osc.	4.5	—.5	100	Fil	Fil	1.7	0	130	130
V5	Video Amp. Sync. Sep.	G	—16	100	Fil	Fil	2.5	—.5	90	90
V6	Sound I.F. Audio Amp.	G	—2	110	Fil	Fil	G	—2	125	130
V7	Vert. Osc. Vert. Out.	NC	Fil	130	46	—5	NC	Fil	G	NC
V8	Hor. Out.	NC	Fil	NC	128	—16	NC	Fil	G	NC
V9	Damper	NC	NC	350	NC	130	NC	Fil	Fil	NC
V10	H.V. Rect.							12KV		
CRT		Pin 10 350		Pin 11 40						



MUNTZ TV
624-627 SERIES
BASIC SCHEMATIC



MUNTZ TV 624-627 Series
Alignment Instructions

The letters A and B after the coil numbers designate the position of the coils on the coil forms in relation to the chassis. Coil A is closest to the chassis and Coil B is the furthest from the chassis.

CAUTION: The receiver chassis is connected to one

Before alignment it is recommended that the following lead dress be made.

1. Adjust the one turn link on the interstage coil (L4B) tightly around the coil form midway between the two coils.
2. Dress the orange gimmick wire on the sound grid coil (L6) flat against the video detector shield.
3. Dress the green wire on L4B as close to the chassis as possible and away from the orange gimmick.

VIDEO I.F. ALIGNMENT

Step No.	*Sweep Generator Coupling*	*Sweep Generator Frequency*	*Marker Generator Frequency*	*Channel*	*Scope Connection*	*Adj.*	*Remarks*
1.	To green grid lead on coil form L4B. Test point "C."	44 MC (10 MC Sweep)	41.25 42.5 43.0 44.75 45.75 47.25	Any noise-free channel on VHF.	Through a 15K resistor in series with the hot lead of scope to test point "D."		Apply negative 5.5 volt Bias (See Service Notes) to junction of 5.6K resistor and white wire on the high A.G.C. buss. Test point "A."
2.	Same	Same	Same	Same	Same	L7A	Per figure peaking at approximately 44.25 M.C.
3.	Same					L7B	Per figure 4 peaking at approximately 44.25 M.C.
4.	Grid pin 7 of V 3 Test point "B."					L4A	Per figure 3 peaking at approximately 44.25 M.C.
5.	Same					L4B	Per figure 5.
6.	High side through an ungrounded tube shield floating over Osc.-mixer tube.					L3	Per figure 5 peaking at approximately 44.5 M.C.
						L1	For maximum gain consistent with wave form per Figure 6. To control the steepness of the low frequency side of the curve, spread or squeeze common coupler L2. Readjust L3 to maintain wave form per Fig. 6.

SOUND ALIGNMENT PROCEDURE
(With a Locally Generated Signal)

A method of varying the input signal strength should be devised prior to alignment, such as the use of a step attenuator or variation of the antenna coupling. Location of the sound adjustments are found in Fig. 12.

Step No.	*Coupling for Sweep Gen. with 100 KC Sweep 4.5 MC Center Freq.*	*Marker Freq.*	*Scope Conn.*	*Adj.*	*Remarks*
1.	To a floating shield over tuner osc. tube.	4.4 4.5 4.6	Through a 470K resistor in series with scope lead to pin 2 of V6 test point "E."	Adjust L14 to place 4.5 MC marker at center of curve. Adjust L6 for maximum deflection and wave form similar to Fig. 10. Re-touch L14 to maintain 4.5 MC marker at center frequency.	NOTE: Wave form and marker placement should remain constant regardless of variation in sweep amplitude. If not, regeneration exists. This may also be noted as a sharp spike in the wave form. To correct this, vary the dress of the orange gimmick attached to coil form L6. This dress is very critical in relation to the green lead from the grid of V4.
2.	Same	Same	Through a 470K resistor to yellow volume control lead on V6 test point "F."	Adjust L16B to place 4.5 marker to center of "S" curve. Adjust 16A for maximum deflection consistent with wave form per Fig. 11. Readjust L16B if necessary to maintain symmetrical wave form per Fig. 11.	Applicable figures printed on page 104

ALTERNATE SOUND ALIGNMENT PROCEDURE
(Without Equipment)

To align Sound Coils with a PROPERLY TUNED local operating channel, use the following procedure.

Step No.	*Signal*	*Adjustment*	*Remarks*
1.	Weak	L6, L14 and L16A for maximum sound and minimum hiss.	Maintain a weak signal by loosely coupling the antenna to the receiver.
2.	Strong	L16B for maximum sound.	
3.	Repeat Step 1 for optimum performance and elimination of buzz and distortion.		

OLYMPIC RADIO & TELEVISION INC.

MODELS

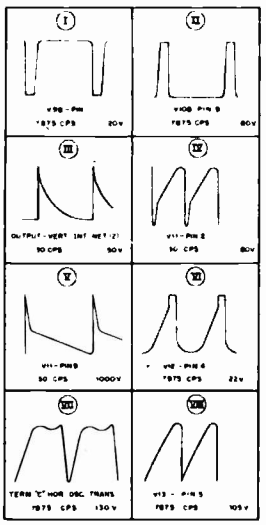
CC CHASSIS	CD CHASSIS	CG CHASSIS	CH CHASSIS
1CC22	1CD24	4CG26	4CH28
1CC23	1CD25	4CG27	4CH29
1KC41	1TD13	4KG44	
1KC42		4KG45	
1KC43			
1TC12			

HORIZONTAL DRIVE ADJUSTMENT

The Horizontal Drive Trimmer C67 should be screwed in tight (clockwise) and then backed off (counterclockwise) until horizontal drive bars appear. Then turn the trimmer clockwise again, until the drive bars just disappear.

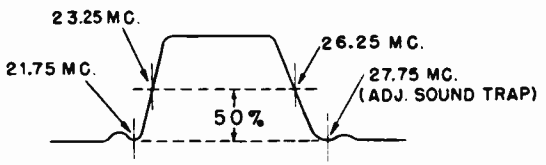
Note: In some sets horizontal drive bars will not appear, regardless of horizontal drive trimmer adjustment. In these sets, the trimmer should be set for proper width.

Important: The horizontal oscillator frequency must be checked for proper range of horizontal control after every adjustment of the horizontal drive (C67). Adjustment of C67 usually requires resetting of the Horizontal Frequency Coil L16.



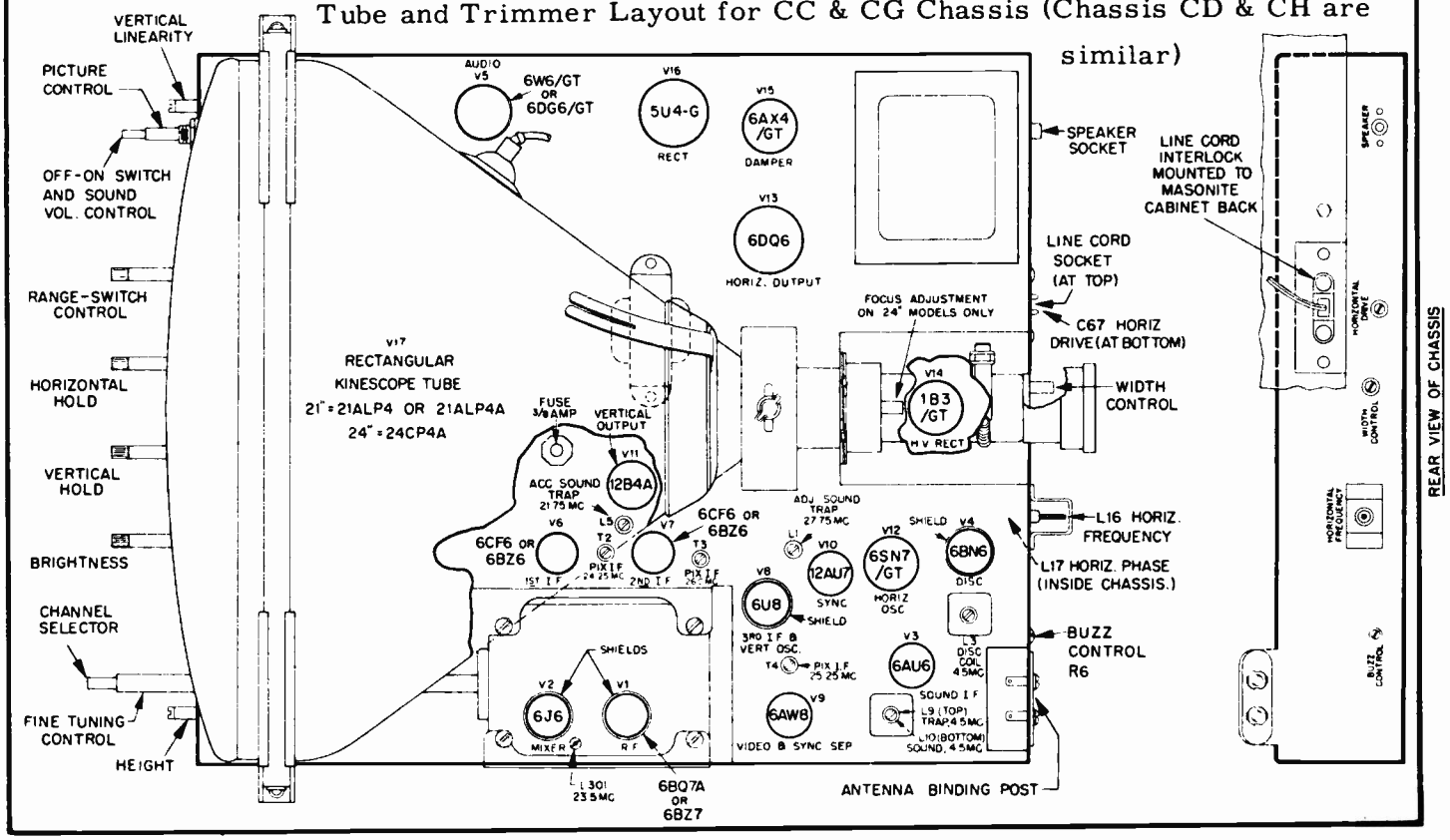
WAVESHAPES →

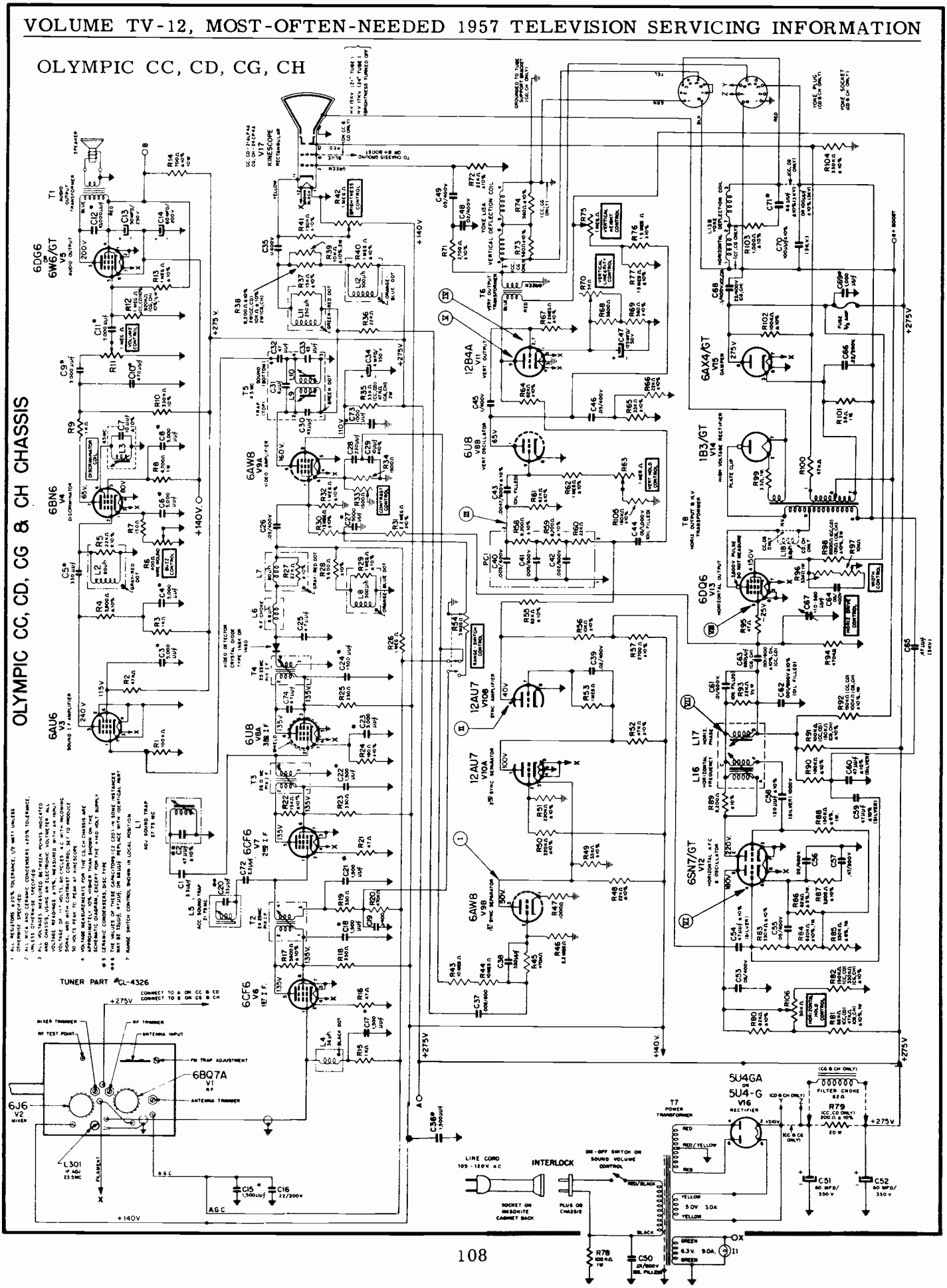
For test point-references see schematic diagram on page 108, over.



STANDARD RESPONSE CURVE

Tube and Trimmer Layout for CC & CG Chassis (Chassis CD & CH are similar)

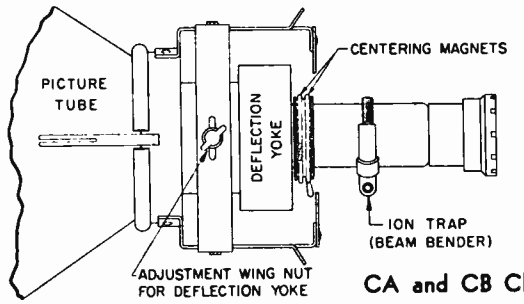



OLYMPIC CC, CD, CG, CH
OLYMPIC CC, CD, CG & CH CHASSIS
TUNER PART #CL-4326
6DG6 OR 6W6/GT V5 AUDIO OUTPUT
6BN6 V4 DISCRIMINATOR
6AU6 V3 SOUND I.F. AMPLIFIER
6AW8 V9A VIDEO AMPLIFIER
6U8 V8B VERT. OSCILLATOR
12B4A V11 VERT. OUTPUT
6U8 V8A 3RD I.F.
6CF6 V7 2ND I.F.
6CF6 V6 1ST I.F.
6J6 V2 MIXER
6BQ7A V1 R.F. AMPLIFIER
12AU7 V10B SYNC. SEPARATOR
12AU7 V10A 2ND SYNC. SEPARATOR
6AW8 V9B 1ST SYNC. SEPARATOR
6SN7/GT V12 HORIZONTAL A.F.C. & MULTIVIBRATOR
6DQ6 V13 HORIZONTAL OUTPUT
1B3/GT V14 HIGH VOLTAGE RECTIFIER
6AX4/GT V15 DAMPER
5U4GA OR 5U4-G V16 RECTIFIER
KINESCOPE RECTANGULAR
+275V
+140V
AGC
AC
LINE CORD 105-120V A.C.
INTERLOCK
ON-OFF SWITCH OR SOUND VOLUME CONTROL
SOCKET ON MASONITE CABINET BACK
PLUG ON CHASSIS
6.3V. 9.0A.
5.0V 3.0A

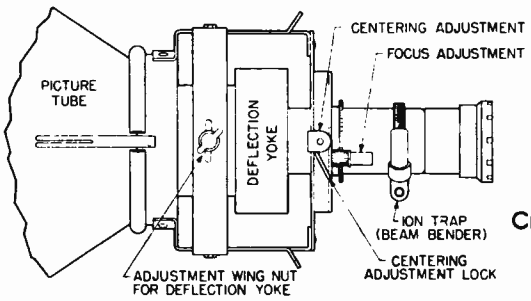
OLYMPIC RADIO & TELEVISION INC.

MODELS

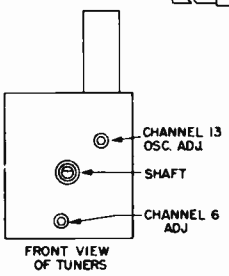
CA CHASSIS	CB CHASSIS	CE CHASSIS
1CA20	1CB21	4CE15
1KA40	1DB17	
1TA10	1TB11	

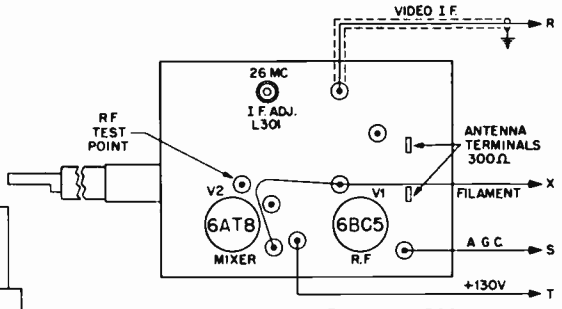


CA and CB Chassis

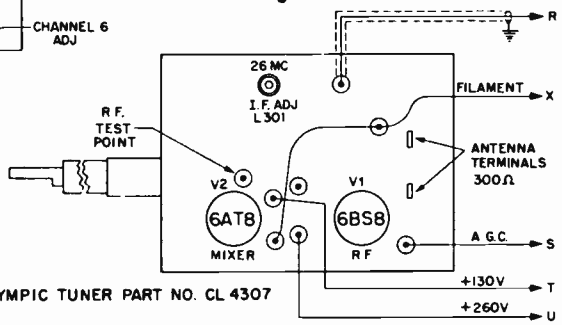


CE Chassis

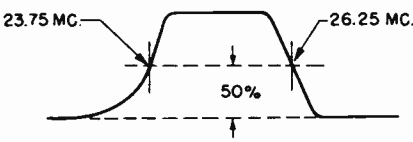




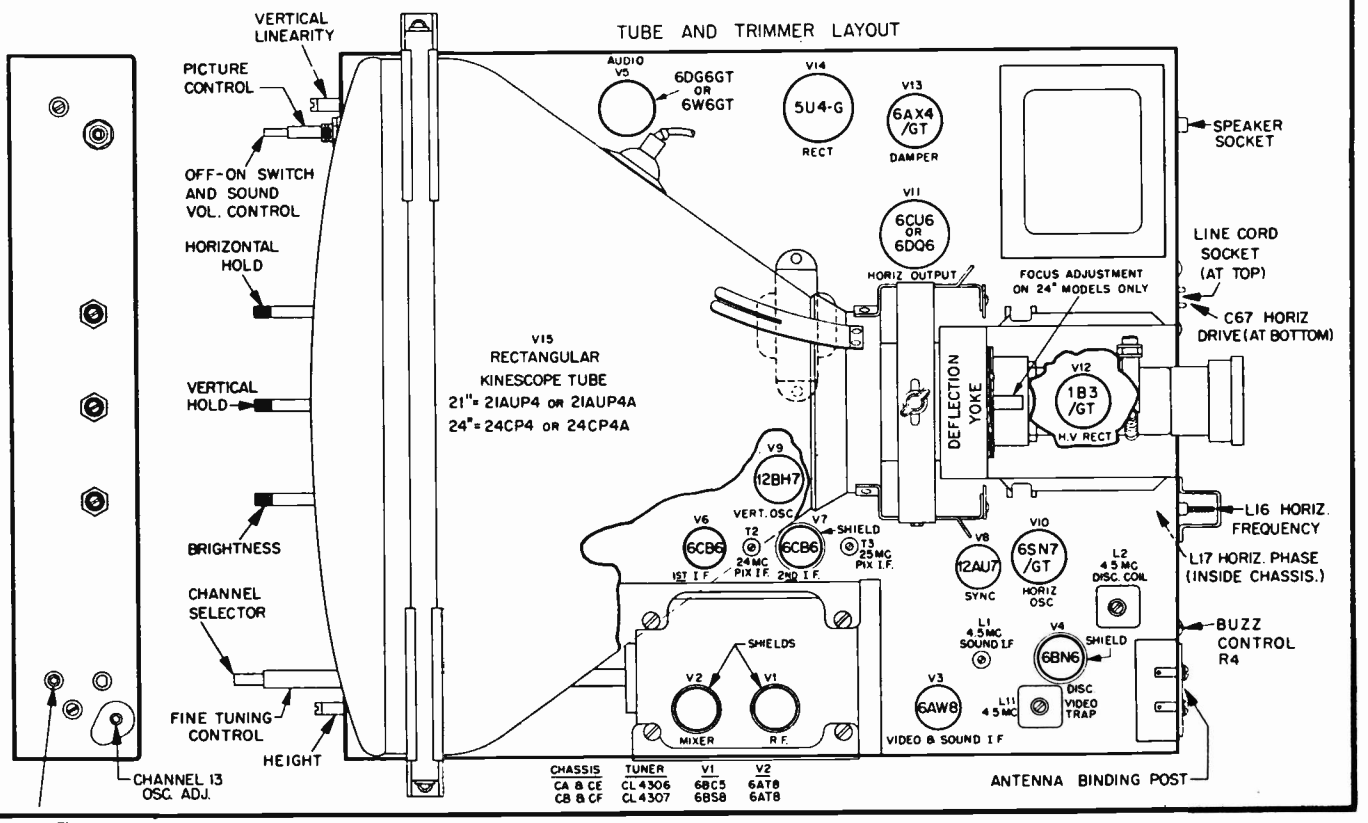
OLYMPIC TUNER PART NO. CL 4306



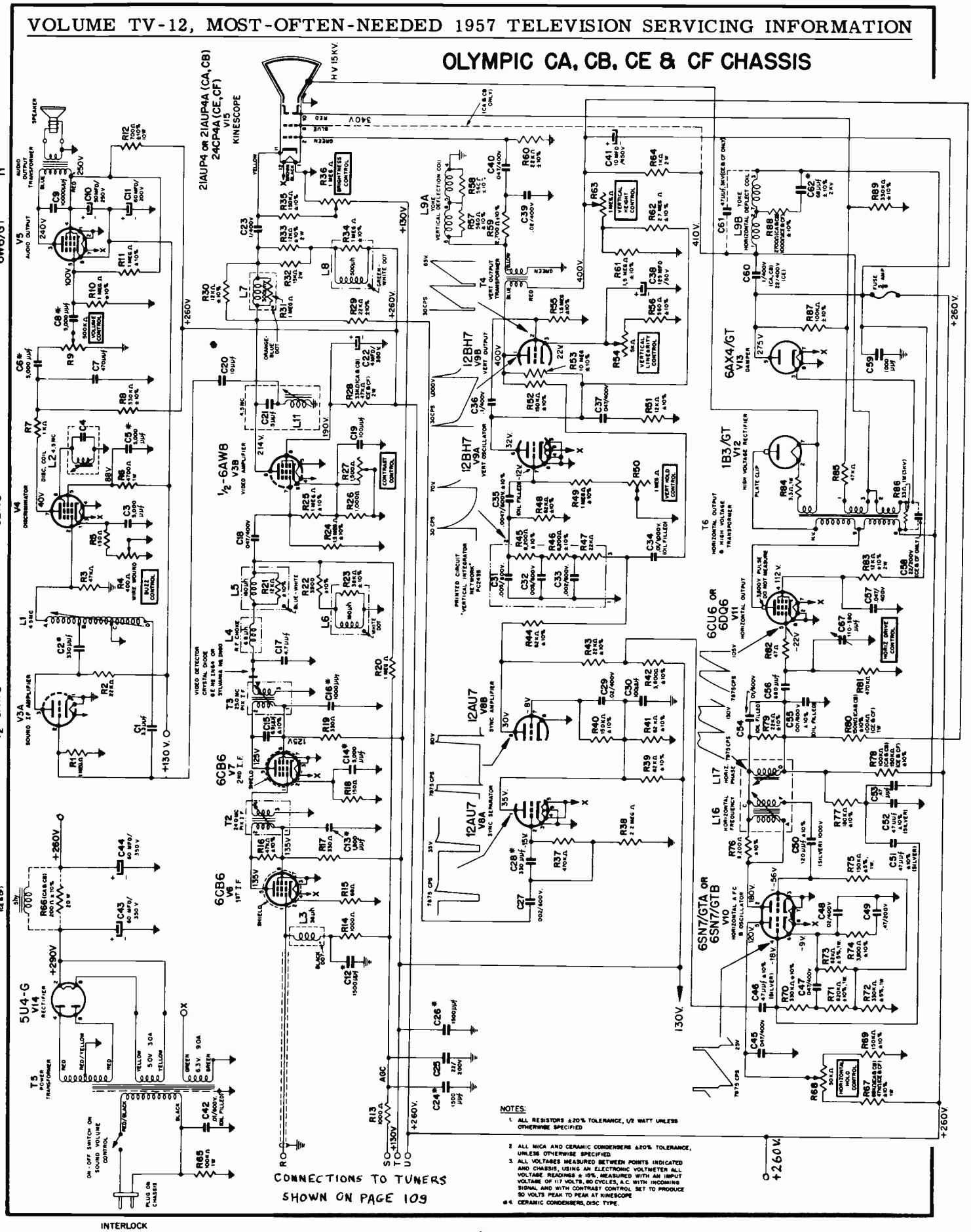
OLYMPIC TUNER PART NO. CL 4307



STANDARD RESPONSE CURVE

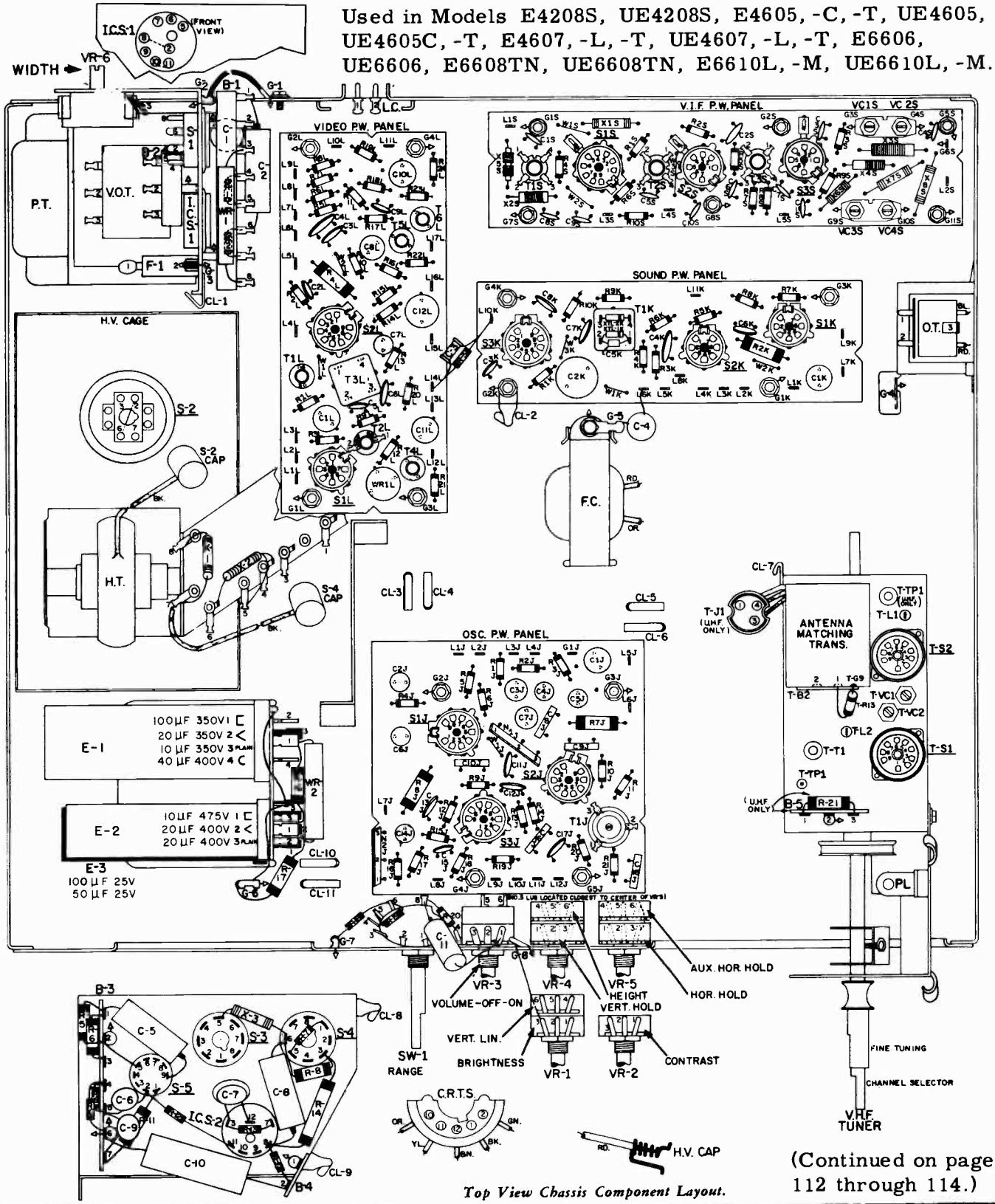


OLYMPIC CA, CB, CE & CF CHASSIS



PHILCO TELEVISION
7L70, 7L71, 7L70-U, 7L71-U CHASSIS

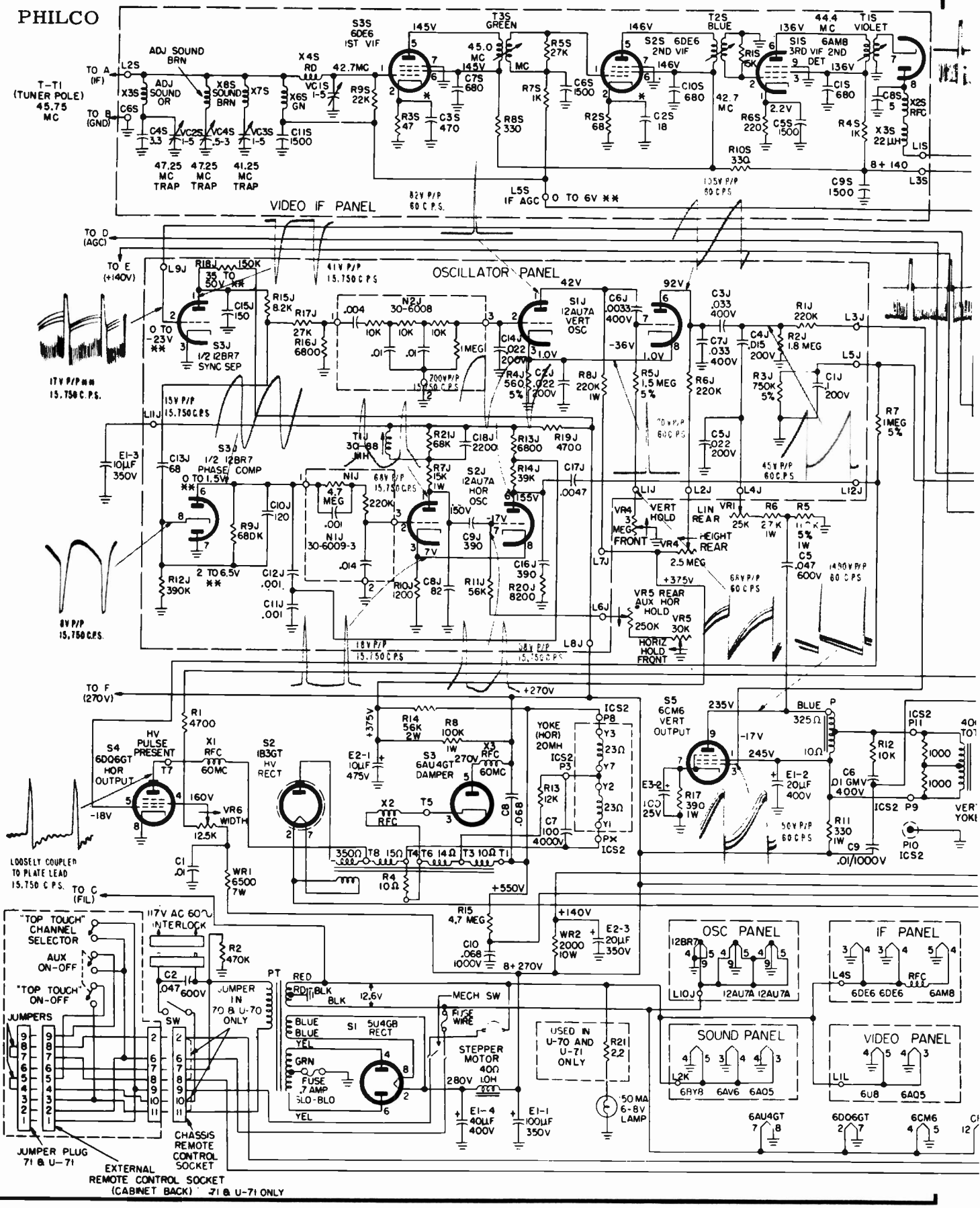
Used in Models E4208S, UE4208S, E4605, -C, -T, UE4605, UE4605C, -T, E4607, -L, -T, UE4607, -L, -T, E6606, UE6606, E6608TN, UE6608TN, E6610L, -M, UE6610L, -M.

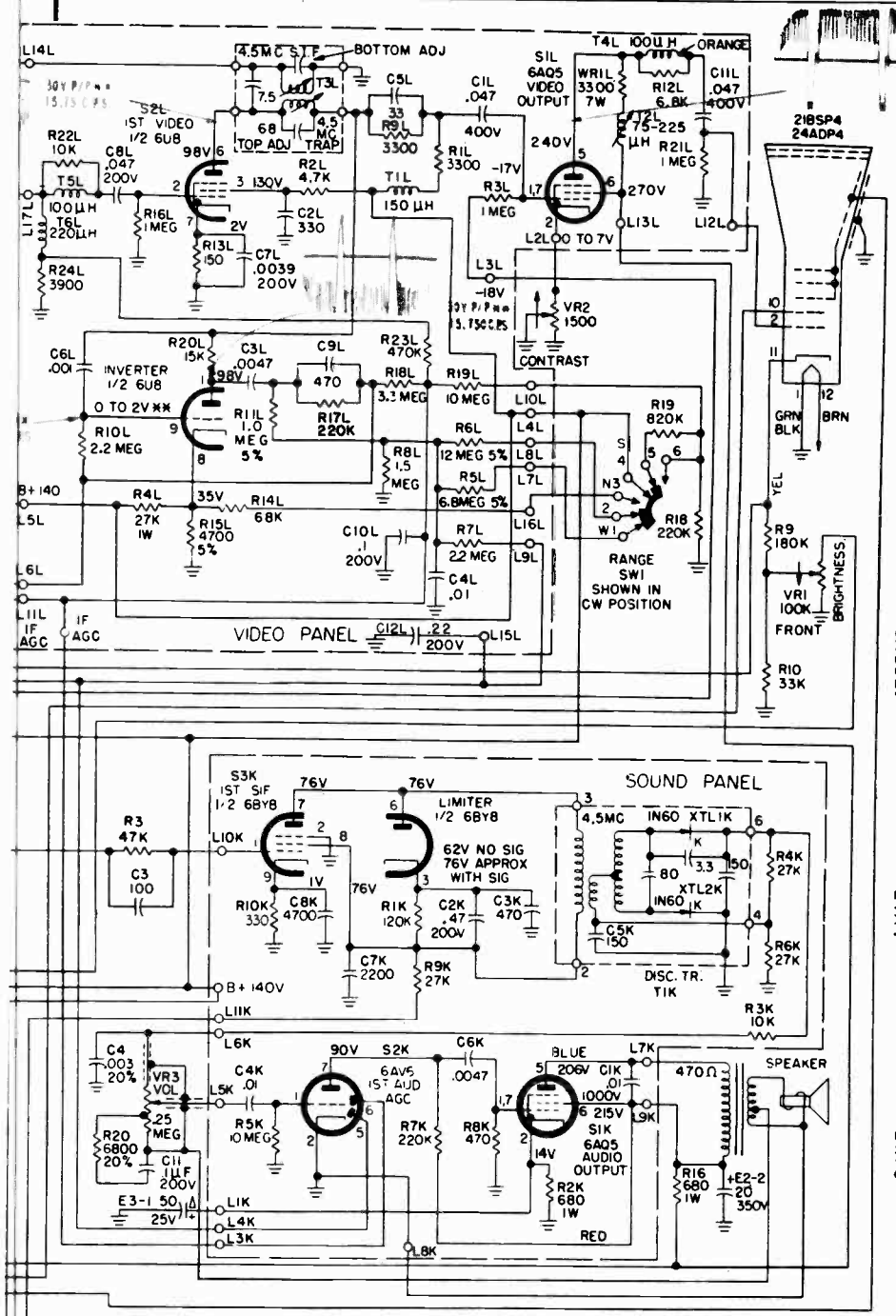


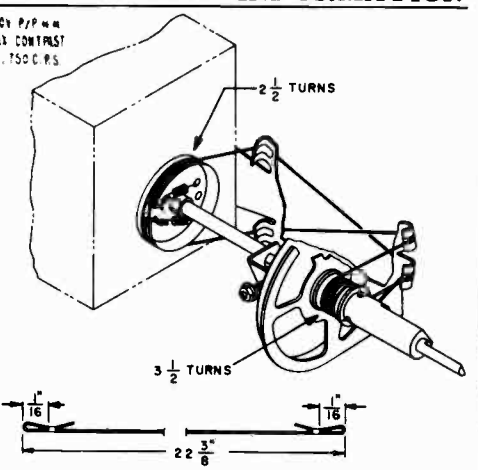
Top View Chassis Component Layout.

(Continued on pages 112 through 114.)

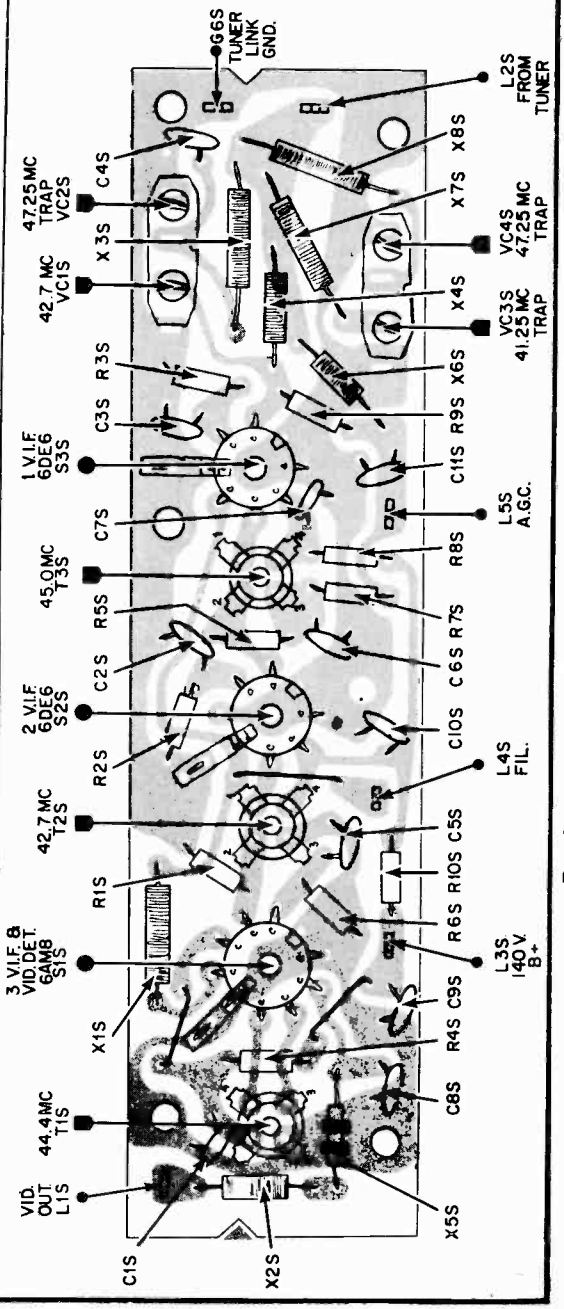
PHILCO


VIDEO IF PANEL
OSCILLATOR PANEL
OSC PANEL
IF PANEL
SOUND PANEL
VIDEO PANEL
T-TI (TUNER POLE) 45.75 MC
TO A (IF)
TO B (GND)
ADJ SOUND BRN
ADJ SOUND OR
47.25 MC TRAP
47.25 MC TRAP
41.25 MC TRAP
S3S 6DE6 1ST VIF
T3S GREEN
T2S BLUE
T1S VIOLET
S2S 6DE6 2ND VIF
SIS 6AM8 3RD VIF 2ND DET
42.7MC
45.0 MC
44.4 MC
145V
146V
136V
L5S IF AGC 0 TO 6V **
TO D (AGC)
TO E (+140V)
S3J 1/2 12BR7 SYNC SEP
S4 6DO6GT HOR OUTPUT
S2 1B3GT HV RECT
S3 6AU4GT DAMPER
S5 6CM6 VERT OUTPUT
S1J 12AU7A VERT OSC
S2J 12AU7A HOR OSC
S3J 1/2 12BR7 PHASE COMP
HV PULSE PRESENT
VR1 LIN REAR HEIGHT
VR2 VERT HOLD FRONT
VR3 VERT HOLD REAR
VR4 HEIGHT REAR
VR5 REAR AUX HOR HOLD
VR5 30K HORIZ HOLD FRONT
VR6 WIDTH
YOKE (HOR) 20MH
+270V
+375V
+550V
+140V
+1700V
LOOSELY COUPLED TO PLATE LEAD 15,750 C.P.S.
TO C (FIL)
117V AC 60~
INTERLOCK
"TOP TOUCH" CHANNEL SELECTOR
AUX ON-OFF
"TOP TOUCH" ON-OFF
JUMPERS
JUMPER IN 70 & U-70 ONLY
CHASSIS REMOTE CONTROL SOCKET
JUMPER PLUG 71 & U-71
EXTERNAL REMOTE CONTROL SOCKET (CABINET BACK)
71 & U-71 ONLY
STEPPER MOTOR 400Ω 10H
FUSE .7 AMP SLO-BLO
USED IN U-70 AND U-71 ONLY
.50 MA 6-8V LAMP
6AU4GT
6DO6GT
6CM6
6BY8
6AV6
6AQ5
6U8
12BR7
12AU7A
6DE6
6AM8





Drive Cord — String Guide.



Base Layout Video I-F Printed Wiring Panel.

All capacitor values greater than 1 are in uuf unless otherwise noted.
All resistor values are 1/2 watt unless otherwise noted.
Voltages marked * are less than 1 volt.
Voltages marked ** depend on signal level.

PHILCO CORP.

Schematic Diagram for Chassis 7L70, 7L71, 7L70-U and 7L71-U.

(Reproduced through the courtesy of the Philco Corp.)

PHILCO CORP. Chassis 7L70, 7L70-U, 7L71, 7L71-U, Alignment, Continued

VIDEO I-F ALIGNMENT

AM ALIGNMENT

Channel Selector—T-67 set to channel 4.
T-65 to UHF position.
Signal Injection—T-67 to I-F output at TP-1.
T-65 to UHF input (TP-1).
Bias—5.0 volts to L11L on the video panel.
Scope—Connect to video detector ouput, L17L on video panel.
Output Level—Not greater than 2 volts peak to peak during pole and sweep alignment.
Not greater than 0.1 volt peak to peak during trap alignment.

1. 41.25 MC. adjust trap VC-3S for minimum.
   Bias may be reduced as minimum is approached.
2. 47.25 MC. adjust traps VC-2S and VC-4S for minimum.
   Bias may be reduced as minimum is approached.
3. 45.75 MC. adjust tuner T-1 for maximum.
4. 42.7 MC. adjust VC-1S and T2S for maximum.
5. 45.0 MC. adjust T3S for maximum.
6. 44.4 MC. adjust T1S for maximum.

SWEEP ALIGNMENT

Channel selector to channel 4.
Signal injection to the antenna terminals through an antenna matching network (generator to 300 ohm ant.).

1. 65.75 MC., AM. 30% modulation to antenna. Tune fine tuning control for minimum output. Do not touch fine tuning during balance of Video I-F sweep adjustments.
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 curves). Do not change the setting of VC-1S, VC-2S, VC-3S or VC-4S.
3. Adjust 67.25 MC. to fall at the 50% point with cores tuner T-1 and T-3S.
4. Level curve with core T1S.
5. Position ,70.50 MC. slope with core T2S.

4.5 MC. TRAP ALIGNMENT

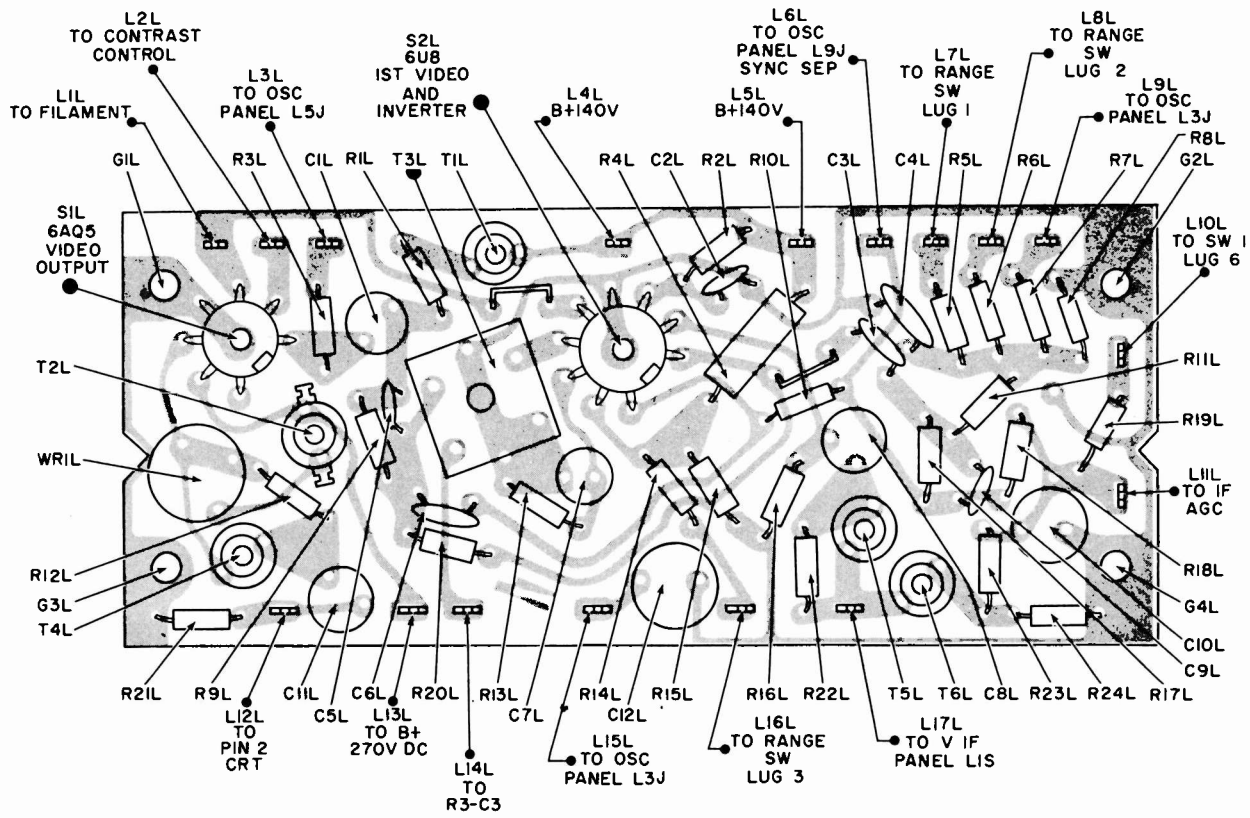
1. Remove S4, the horizontal output tube, and S3S, the 1st V-I-F tube.
2. Inject 4.5 MC., 30% modulated signal into L17L of video panel.
3. Connect scope through a high frequency probe to L12L of video panel (the video output lug).
4. Turn contrast control fully clockwise.
5. Adjust 4.5 MC. trap (top core of T3L) for minimum indication.

SOUND I-F ALIGNMENT

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

1. Connect 20,000 ohm/volt meter (10V. range) to L6K.
2. Inject a 4.5 MC. AM signal into L17L or use station signal.
3. Adjust T1K top core for zero voltage. It is possible to obtain zero crossover at two positions of the tuning core. The correct one is the first crossover from the maximum ccw position of the core.
4. Connect a 20,000 ohm/volt meter across the limiter diode load resistor, R1K.
5. Adjust T3L bottom core, and T1K bottom core for maximum voltage. (It is possible to obtain two peaks while adjusting T1K. The correct one is the first peak from the maximum cw position of the core).
6. Connect a 20,000 ohm/volt meter to L6K and readjust T1K top for zero voltage.

NOTE: During alignment it is necessary to maintain the voltage across R1K below 40 volts, in order to prevent limiter action. If using the station's signal, this may be accomplished by connecting a 330 uuf condenser from L1S to ground and adjusting the fine tuning control toward the smear region. If using a signal generator decrease the output of the generator.



Video I-F Printed Wiring Panel.

PHILCO TELEVISION

7L40, 7L40U, 7L41, 7L41U, 7L45U, 7P50, 7P50U CHASSIS

Model No.	Chassis	Tuner	Picture
E4204	7L40	(T-36E) 76-8946-12	21ZP4B
UE4204	7L40	(T-63) 76-11190	21BTP4
E4204L	7L40	(T-63) 76-11190	21BTP4
UE4204L	7L40	(T-64) 76-11106	21BTP4
E4206SL	7L40	(T-63) 76-11190	21BTP4
UE4206SL	7L40	(T-64) 76-11106	21BTP4
E4206STM	7L40	(T-63) 76-11190	21BTP4
UE4206STM	7L40	(T-64) 76-11106	21BTP4
E4207SC	7L40	(T-63) 76-11190	21BTP4
UE4207SC	7L40	(T-64) 76-11106	21BTP4
E4600	7L40	(T-63) 76-11190	21BTP4
UE4600	7L40	(T-64) 76-11106	21BTP4
E4602	7L40	(T-63) 76-11190	21BTP4
UE4602	7L40	(T-64) 76-11106	21BTP4
E4602L	7L40	(T-63) 76-11190	21BTP4
UE4602L	7L40	(T-64) 76-11106	21BTP4
E4602TL	7L40	(T-63) 76-11190	21BTP4
UE4602TL	7L40	(T-64) 76-11106	21BTP4
E4602TM	7L40	(T-63) 76-11190	21BTP4
UE4602TM	7L40	(T-64) 76-11106	21BTP4
E4604	7L40	(T-63) 76-11190	21BTP4
UE4604	7L40	(T-64) 76-11106	21BTP4
E4604HM	7L40	(T-63) 76-11190	21BTP4
UE4604HM	7L40	(T-64) 76-11106	21BTP4
E4608	7L40	(T-63) 76-11190	21BTP4
UE4608	7L40	(T-64) 76-11106	21BTP4
E4610N	7L40	(T-63) 76-11190	21BTP4
UE4610N	7L40	(T-64) 76-11106	21BTP4
E4612G	7L40	(T-63) 76-11190	21BTP4
UE4612G	7L40	(T-64) 76-11106	21BTP4
E4614S	7L40	(T-63) 76-11190	21BTP4
UE4614S	7L40	(T-64) 76-11106	21BTP4
E4614SL	7L40	(T-63) 76-11190	21BTP4
UE4614SL	7L40	(T-64) 76-11106	21BTP4
E4700N	7L40	(T-63) 76-11190	21BTP4
UE4700N	7L40	(T-64) 76-11106	21BTP4
UE4802M	7L45	(T-64) 76-11106	21BTP4
UE4802L	7L45	(T-64) 76-11106	21BTP4
UE4804L	7L45	(T-64) 76-11106	21BTP4
E6200	7P50	(T-63) 76-11190	24ADP4
UE6200	7P50	(T-64) 76-11106	24ADP4
E6204M	7P50	(T-63) 76-11190	24ADP4
UE6204M	7P50	(T-64) 76-11106	24ADP4
E6204L	7P50	(T-63) 76-11190	24ADP4
UE6204L	7P50	(T-64) 76-11106	24ADP4
E6602M	7P50	(T-64) 76-11106	24ADP4
UE6602M	7P50	(T-64) 76-11106	24ADP4
E6602L	7P50	(T-63) 76-11190	24ADP4
UE6602L	7P50	(T-64) 76-11106	24ADP4
E6602T	7P50	(T-63) 76-11190	24ADP4
UE6602T	7P50	(T-64) 76-11106	24ADP4
E6602TL	7P50	(T-63) 76-11190	24ADP4
UE6602TL	7P50	(T-64) 76-11106	24ADP4
E6604M	7P50	(T-63) 76-11190	24ADP4
UE6604M	7P50	(T-64) 76-11106	24ADP4
E6604L	7P50	(T-63) 76-11190	24ADP4
UE6604L	7P50	(T-64) 76-11106	24ADP4
E6604T	7P50	(T-63) 76-11190	24ADP4
UE6604T	7P50	(T-64) 76-11106	24ADP4

MODEL NO.	CHASSIS	TUNER	PICTURE
E4202	7L40	(T-63) 76-11190	21BTP4
UE4202	7L40U	(T-64) 76-11106	21BTP4
E4203	7L40	(T-63) 76-11190	21BTP4
UE4203	7L40U	(T-64) 76-11106	21BTP4
E4205L	7L40	(T-63) 76-11190	21BTP4
UE4205L	7L40U	(T-64) 76-11106	21BTP4
E4205M	7L40	(T-63) 76-11190	21BTP4
UE4205M	7L40U	(T-64) 76-11106	21BTP4
E4206SD	7L40	(T-63) 76-11190	21BTP4
UE4206SD	7L40U	(T-64) 76-11106	21BTP4
E4601SL	7L40	(T-63) 76-11190	21BTP4
UE4601SL	7L40U	(T-64) 76-11106	21BTP4
E4601SM	7L40	(T-63) 76-11190	21BTP4
UE4601SM	7L40U	(T-64) 76-11106	21BTP4
E4603L	7L40	(T-63) 76-11190	21BTP4
UE4603L	7L40U	(T-64) 76-11106	21BTP4
E4603M	7L40	(T-63) 76-11190	21BTP4
UE4603M	7L40U	(T-64) 76-11106	21BTP4
E4606L	7L40	(T-63) 76-11190	21BTP4
UE4606L	7L40U	(T-64) 76-11106	21BTP4
E4606M	7L40	(T-63) 76-11190	21BTP4
UE4606M	7L40U	(T-64) 76-11106	21BTP4
E4606T	7L41	(T-63) 76-11190	21BTP4
UE4606T	7L41U	(T-64) 76-11106	21BTP4
E4606TL	7L41	(T-63) 76-11190	21BTP4
UE4606TL	7L41U	(T-64) 76-11106	21BTP4
E4615T	7L40	(T-63) 76-11190	21BTP4
E4615M	7L40	(T-63) 76-11190	21BTP4
UE4800	7L45U	(T-64) 76-11106	21BTP4

VIDEO I-F ALIGNMENT

AM ALIGNMENT

Channel Selector — T-63 set to channel 4; T-64 set to UHF position.
Signal Injection — T-63 to I-F output at TP-1; T-64 to UHF input (TP-1).
Bias — 5.0 volts to L8T on the video panel.
Scope — Connect to video detector output, L15T on video panel.
Output Level — Not greater than 2 volts peak to peak during pole and sweep alignment; not greater than 0.1 volt peak to peak during trap alignment.

1. 41.25 MC. Adjust trap VC-3S for minimum. Bias may be reduced as minimum is approached.
2. 47.25 MC. Adjust traps VC-2S and VC-4S for minimum. Bias may be reduced as minimum is approached.
3. 45.75 MC. Adjust tuner T-1 for maximum.
4. 42.7 MC. Adjust VC-1S and T2S for maximum.
5. 45.0 MC. Adjust T3S for maximum.
6. 44.4 MC. Adjust T1S for maximum.

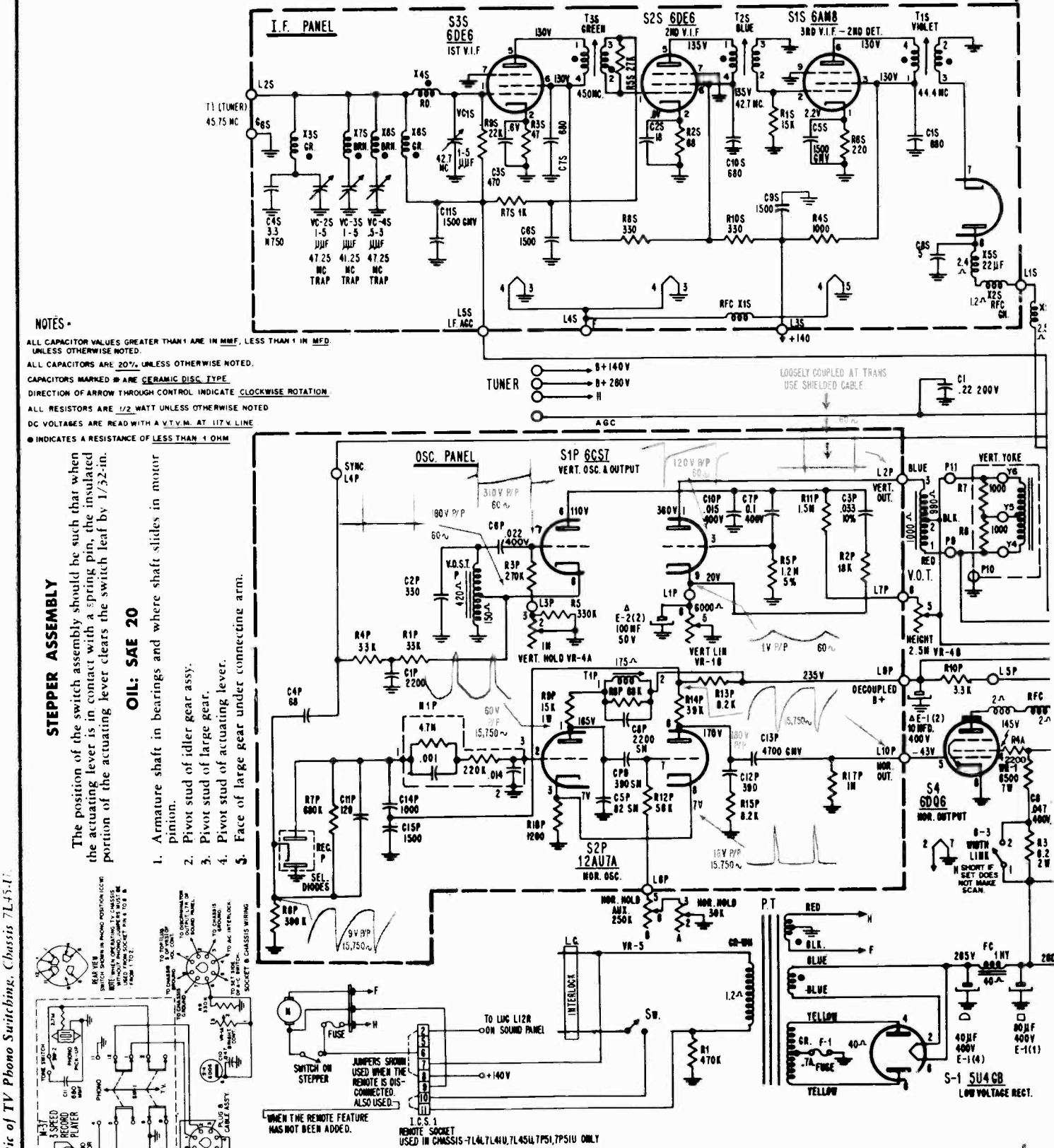
SWEEP ALIGNMENT

Channel selector to channel 4.
Signal Injection to the antenna terminals through an antenna matching network (generator to 300 ohm ant.).

1. 65.75 MC. AM, 30% modulation to antenna. Tune fine tuning control for minimum output. Do not touch fine tuning during balance of Video I-F sweep adjustments.
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). Do not change the setting of VC-1S, VC-2S, VC-3S or VC-4S.
3. Adjust 67.25 MC. to fall at the 50% point with cores tuner T-1 and T-3S.
4. Level curve with core T1S.
5. Position 70.50 MC. slope with core T2S.

Schematic diagram on pages 116-117; alignment information continued on page 118.

PHILCO Circuit Diagram 7L40, 7L40U, 7L41, 7L41U, 7L45U, 7P50, 7P50U Chassis



NOTES:

ALL CAPACITOR VALUES GREATER THAN 1 ARE IN MMF, LESS THAN 1 IN MFD. UNLESS OTHERWISE NOTED.

ALL CAPACITORS ARE 20% UNLESS OTHERWISE NOTED.

CAPACITORS MARKED * ARE CERAMIC DISC TYPE

DIRECTION OF ARROW THROUGH CONTROL INDICATE CLOCKWISE ROTATION

ALL RESISTORS ARE 1/2 WATT UNLESS OTHERWISE NOTED

DC VOLTAGES ARE READ WITH A V.T.V.M. AT 117 V. LINE

● INDICATES A RESISTANCE OF LESS THAN 1 OHM

STEPPER ASSEMBLY

The position of the switch assembly should be such that when the actuating lever is in contact with a spring pin, the insulated portion of the actuating lever clears the switch leaf by 1/32-in.

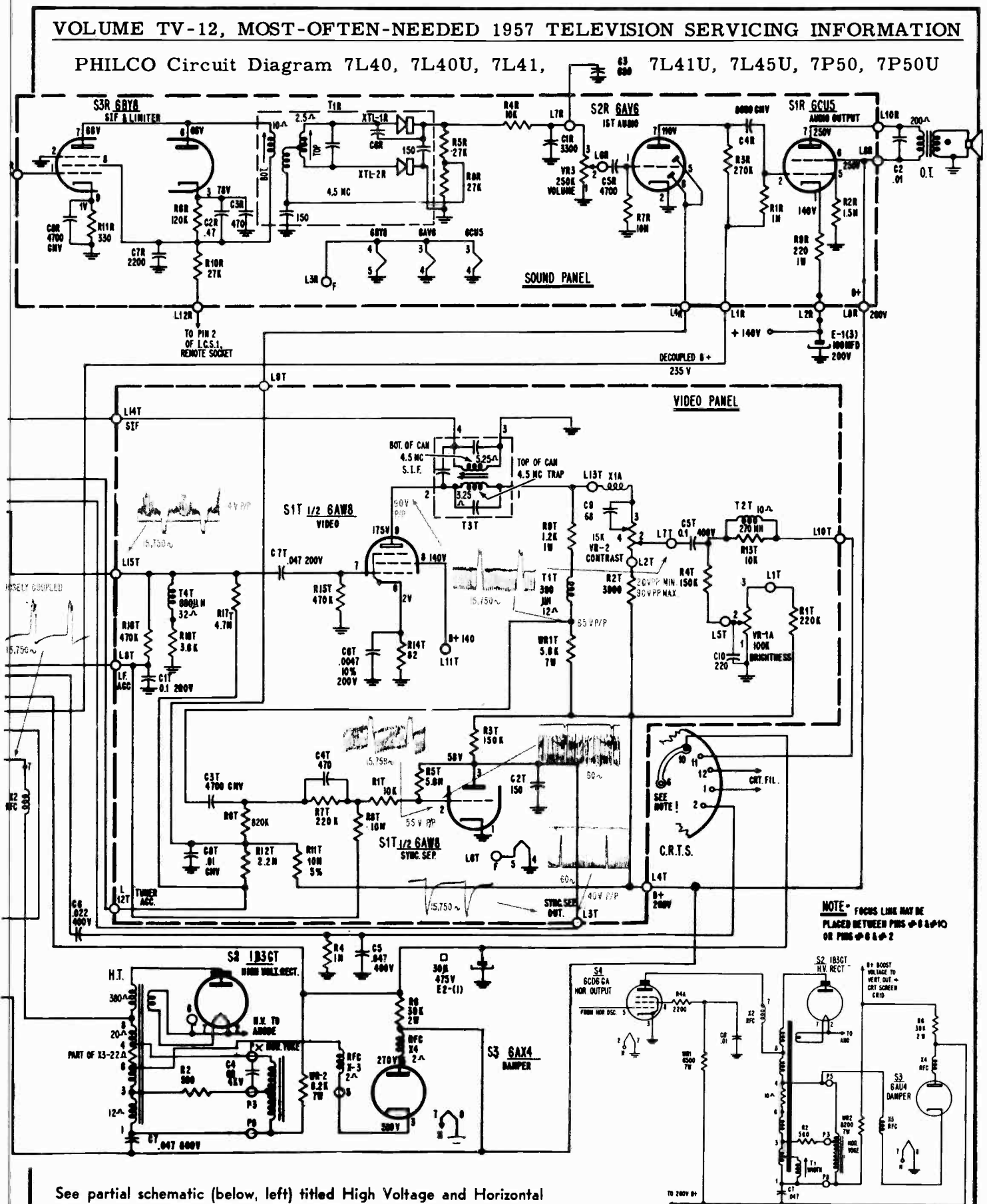
OIL: SAE 20

1. Armature shaft in bearings and where shaft slides in motor pinion.
2. Pivot stud of idler gear assy.
3. Pivot stud of large gear.
4. Pivot stud of actuating lever.
5. Face of large gear under connecting arm.

Basic Schematic above covers 7L40, 7L40-U, 7L41, 7L41-U, 7L45-U, 7P50, 7P50-U, 7P51, 7P51-U. See note for differences in 7L41, 7L41-U, 7L45-U, 7P51, 7P51-U. See Phono-TV Schematic (below, left) for 7L45-U.

Schematic of TV Phono Switching, Chassis 7L45-U

PHILCO Circuit Diagram 7L40, 7L40U, 7L41, 7L41U, 7L45U, 7P50, 7P50U



See partial schematic (below, left) titled High Voltage and Horizontal Output Circuit 7P50, 7P50-U, 7P51, 7P51-U.

High Voltage and Horizontal Output Circuit 7P50, 7P50-U, 7P51, 7P51-U. Balance of Schematic Identical to 7L40, 7L40-U, 7L41, 7L41-U.

PHILCO Chassis 7L40, 7L40U, 7L41, 7L41U, 7L45U, 7P50, 7P50U, Continued

4:5 MC TRAP ALIGNMENT

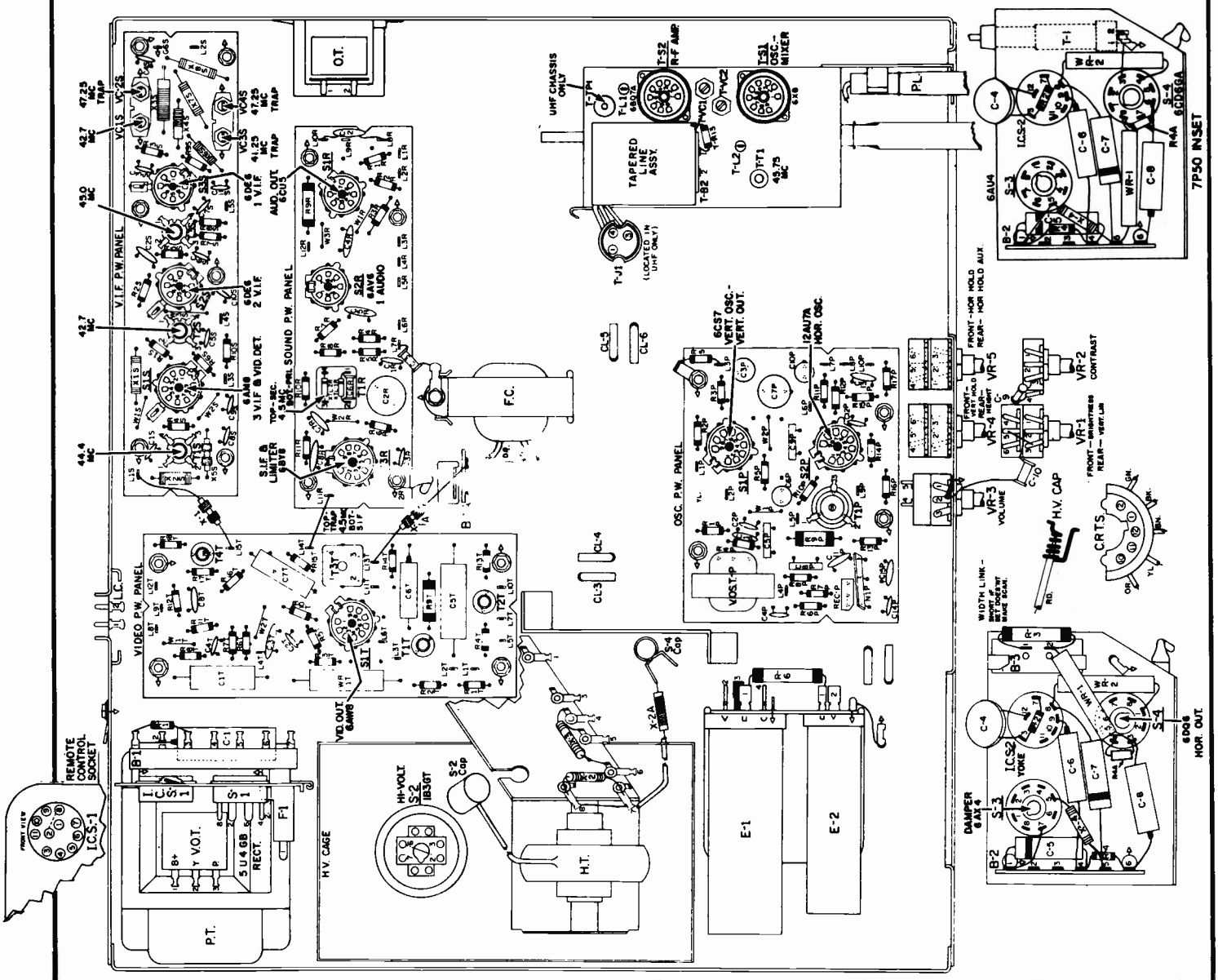
1. Remove S4, the horizontal output tube, and S3S, the 1st V-I-F tube.
2. Inject 4.5 MC., 30% modulated signal into L15T of video panel.
3. Connect scope through a high frequency probe to L10T of video panel (the video output lug).
4. Turn contrast control fully clockwise.
5. Adjust 4.5 MC. trap (top core of T3T) for minimum indication.

SOUND I-F ALIGNMENT

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

1. Connect 20,000 ohm/volt meter (10V. range) to L7R.
2. Inject a 4.5 mc. AM signal into L15T or use station signal.
3. Adjust T1R (top core for zero voltage). It is possible to obtain zero crossover at two positions of the tuning core. The correct one is the first crossover from the maximum ccw position of the core.
4. Connect a 20,000 ohm/volt meter across the limiter diode load resistor, R6R.
5. Adjust T3T bottom core and T1R bottom core for maximum voltage. It is possible to obtain two peaks while adjusting T1R. The correct one is the first peak from the maximum cw position of the core.
6. Connect a 20,000 ohm/volt meter to L7R and readjust T1R top for zero voltage.

NOTE: During alignment it is necessary to maintain the voltage across R6R below 40 volts, in order to prevent limiter action.



Top Chassis View Component Layout — 7L40, 7L41, 7L45; 7P50, 7P51 are identical except for Horizontal Output Circuit — see inset.

PHILCO TELEVISION

7E10, 7E10-U, 7E11, 7E11-U CHASSIS

Models E2002C, UE2002C, E2004F, UE2004F, E2004G, UE2004G, E2004SP, UE2004SP

(Material on pages 119 through 124. Reproduced through the courtesy of the Philco Corp.)

VIDEO IF ALIGNMENT

AM ALIGNMENT

BIAS: 3V applied to L6U, the AGC line.
CHANNEL SELECTOR: Channel 4
CONTRAST: Fully clockwise.
SCOPE: Connected through a 10,000 ohm resistor to L1U, the video detector output lug. Calibrate scope for 2 volts peak to peak.
AM GENERATOR: Connected to test lug #2 on tuner strip.
INPUT LEVEL: Adjust input level to maintain scope level below 2 volts peak to peak.

Input Frequency	*Adjust for Maximum*
44.4 MC	T1U
43.5 MC	T2U
45.75 MC	T3U
45.0 MC	T1 (on tuner)
42.0 MC	T4U

SWEEP ALIGNMENT

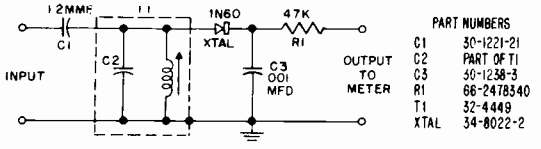
SWEEP GENERATOR: Channel 4 sweep signal (69mc with 6mc sweep width) to antenna terminals through a 70 Ω/300 Ω matching network.
MARKERS: 67.25 MC marker fed into antenna. 45.75 MC marker fed into test lug #2 of tuner. Adjust fine tuning until the 67.25 MC marker becomes coincident with the 45.75 MC marker. *DO NOT disturb the fine tuning during balance of alignment.* Remove the 45.75 MC signal.
ADJUST: T1 (tuner) to position carrier (67.25 MC marker at 50%).
T1U to level curve if tilted.
T2U to position 43.0 MC slope (70.0 MC marker at 50%).
DO NOT adjust poles T3U or T4U from their original AM settings.

4.5 MC TRAP ADJUSTMENT

(1) Connect a 4.5 MC detector to CRT cathode, video output lug, L2Y. (see circuit below) Preliminary padding of 4.5 MC detector:— Connect detector to an accurate source of 4.5 MC signal and pad core of transformer for maximum D.C. voltage.
(2) Connect a V.T.V.M. or 20,000 ohms/volt meter to the detector output.
(3) Detune fine tuning control slightly, in a CW direction, from the point of best picture.
(4) Adjust TC1Y (T4Y top core) of transformer (4.5 MC trap) for minimum output.

SOUND IF ALIGNMENT — USING STATION SIGNAL

(1) Connect a V.T.V.M. or 20,000 ohms/volt meter to top of volume control.
(2) Detune TC4Y (top core of transformer T5Y) to give a positive peak voltage.
(3) Detune the fine tuning control CCW, or reduce signal input to receiver, so as not to exceed .75 volts during alignment (this is to insure non-limiting action). In some areas it may be necessary to apply bias voltage to AGC, L6U of the IF panel, to maintain meter reading below .75 volts.
(4) Adjust TC2Y (bottom core of T4Y) and TC3Y (bottom core of T5Y) for maximum DC voltage.
(5) Adjust fine tuning for best picture (remove bias voltage if used) and adjust TC4Y for zero voltage (crossover).

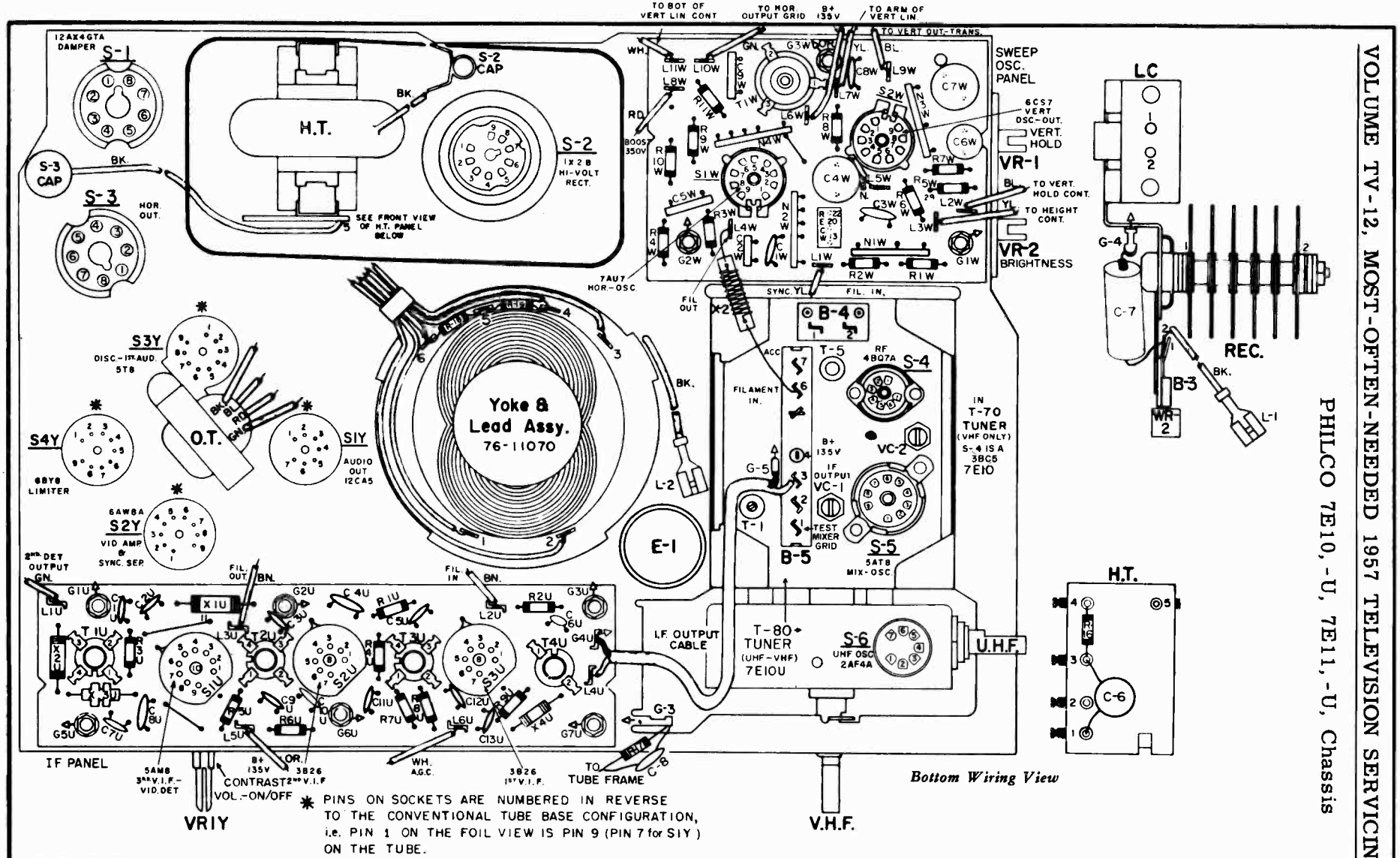


4.5MC DETECTOR PROBE

TUNER OSCILLATOR ALIGNMENT, T-70 and T-80

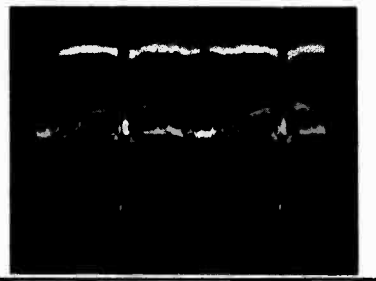
1. Pre-set fine tuning control to center of its mechanical range.
2. Use station air signal. Receiver connected to either set's built-in antenna or external antenna.
3. Channels must be adjusted from the highest frequency channel receivable, in descending order.
4. T4 is the oscillator core for channels 13 through 7. Where an optimum setting of T4 can not be made to allow all receivable high channels to be tuned in by the fine tuning, the individual coils may be adjusted. Adjusting the coil towards the wafer decreases frequency. This procedure normally is not necessary but if so, must be done in a descending order, with the chassis removed from the cabinet and the tuner cover removed.
5. T8 is the oscillator core for channel 6. Core is accessible only with switch in channel 6 position but controls oscillator for both 6 and 5.
6. T7 is the oscillator core for channel 4. Core is accessible only with switch in channel 4 position but controls oscillator for both 4 and 3.
7. T6 is the oscillator core for channel 2.

NOTE: In the T-80 tuner the channel cores are accessible through holes in the UHF tuner.

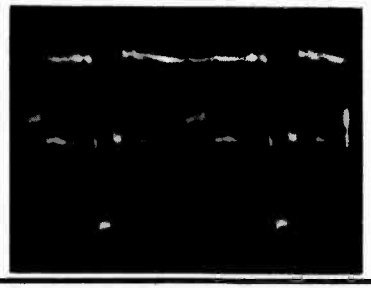


PHILCO 7E10, -U, 7E11, -U, Chassis

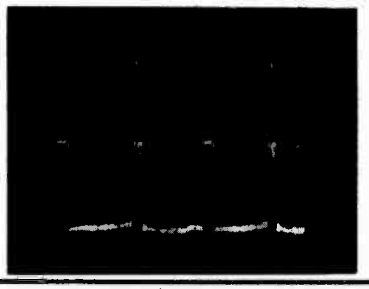
Waveshapes (See next page)



Composite signal, 2nd det. output (L1U of IF panel) or video input (L13Y of video panel), 5 volts, maximum contrast, 60 c.p.s.



Composite signal, 2nd det. output (L1U of IF panel) or video input (L13Y of video panel), 5 volts, max. contrast, 15,750 c.p.s.

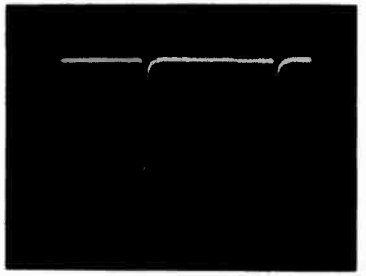


Composite signal, video output (L2Y of video panel), 25 volts, minimum contrast, 65 volts, maximum contrast, 60 c.p.s.

Composite video, sync. separator grid, pin 2 of 6AW8A, 38 volts, maximum contrast, 60 c.p.s.

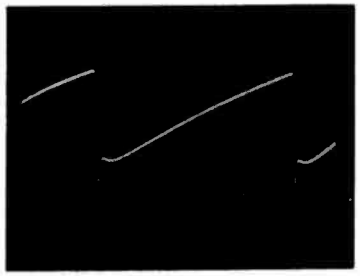
OSCILLOSCOPE WAVEFORM PATTERNS – 7E10 and 7E11

These waveforms were taken with the receiver adjusted for an approximate peak-to-peak output of 5.0 volts at the video detector. The voltages given are approximate peak-to-peak values. The frequencies shown are those of the waveforms — not the sweep rate of the oscilloscope. They were taken with an oscilloscope having good high-frequency response. With oscilloscopes having poorer response, the peaks of the horizontal waveforms will be more rounded than those shown, and the peak-to-peak voltages will differ.

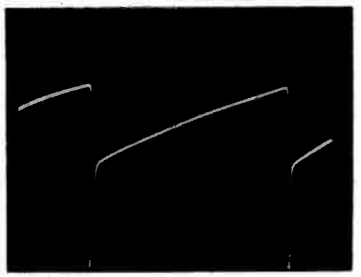


Sync separator output (L10Y of video panel) or sync input (L1W of osc. panel), 30 volts, 60 c.p.s.

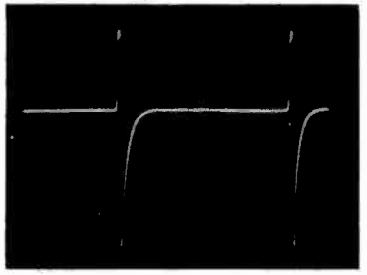
Sync separator output (L10Y of video panel) or sync input (L1W of osc. panel), 30 volts, 15,750 c.p.s.



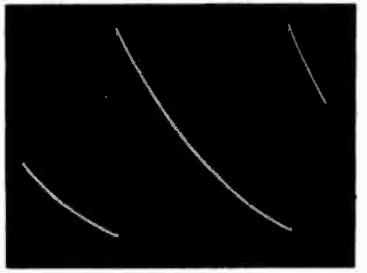
Input of vertical integration network, contact 1 of N1W, 38 volts, 60 c.p.s.



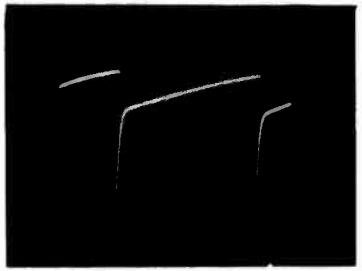
Vertical oscillator plate, pin 6 of 6CS7, 85 volts, 60 c.p.s.



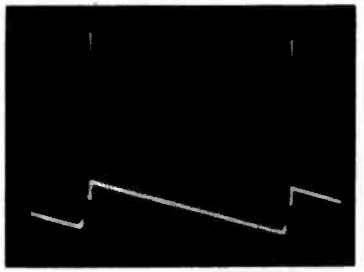
Vertical oscillator grid, pin 7 of 6CS7, 90 volts, 60 c.p.s.



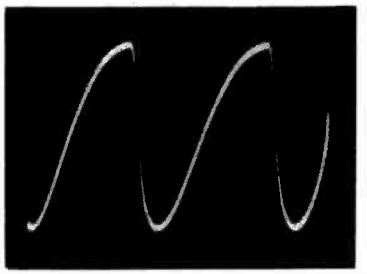
Vertical oscillator cathode, pin 8 of 6CS7, 13 volts, 60 c.p.s.



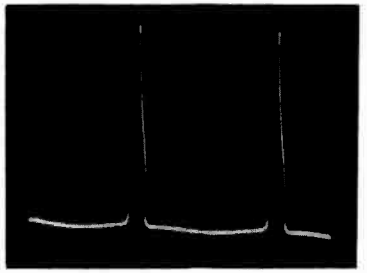
Vertical output grid, pin 3 of 6CS7, 80 volts, 60 c.p.s.



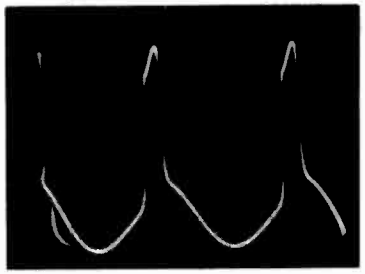
Vertical output plate, pin 1 of 6CS7, 1320 volts, 60 c.p.s.



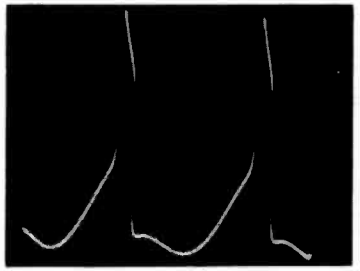
Phase comparater, contact 4 of N2W, contact 1 of N4W and RECW, 10 volts, 15,750 c.p.s.



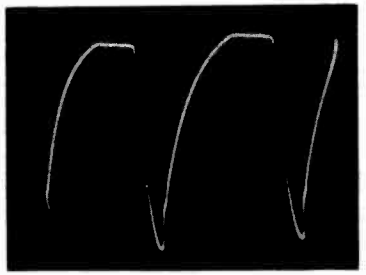
Horizontal oscillator cathode, pins 3 & 8 of 7AU7, 12 volts, 15,750 c.p.s.



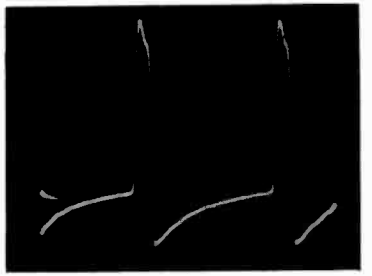
Horizontal oscillator plate, pin 1 of 7AU7, 45 volts, 15,750 c.p.s.



Horizontal buffer grid, pin 7 of 7AU7, 40 volts, 15,750 c.p.s.

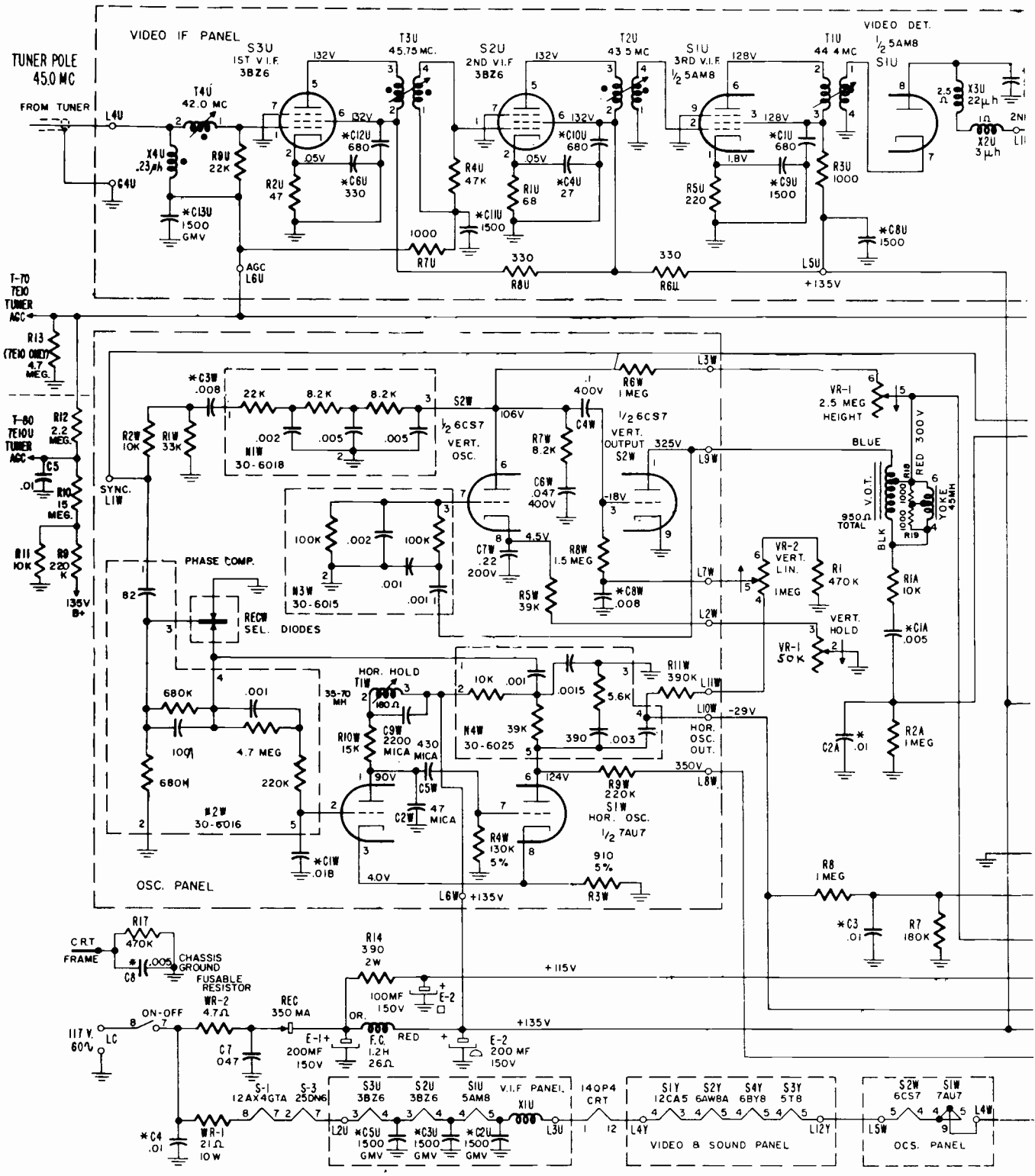


Horizontal output grid, L10W of osc. panel or pin 5 of 25DN6, 90 volts, 15,750 c.p.s.



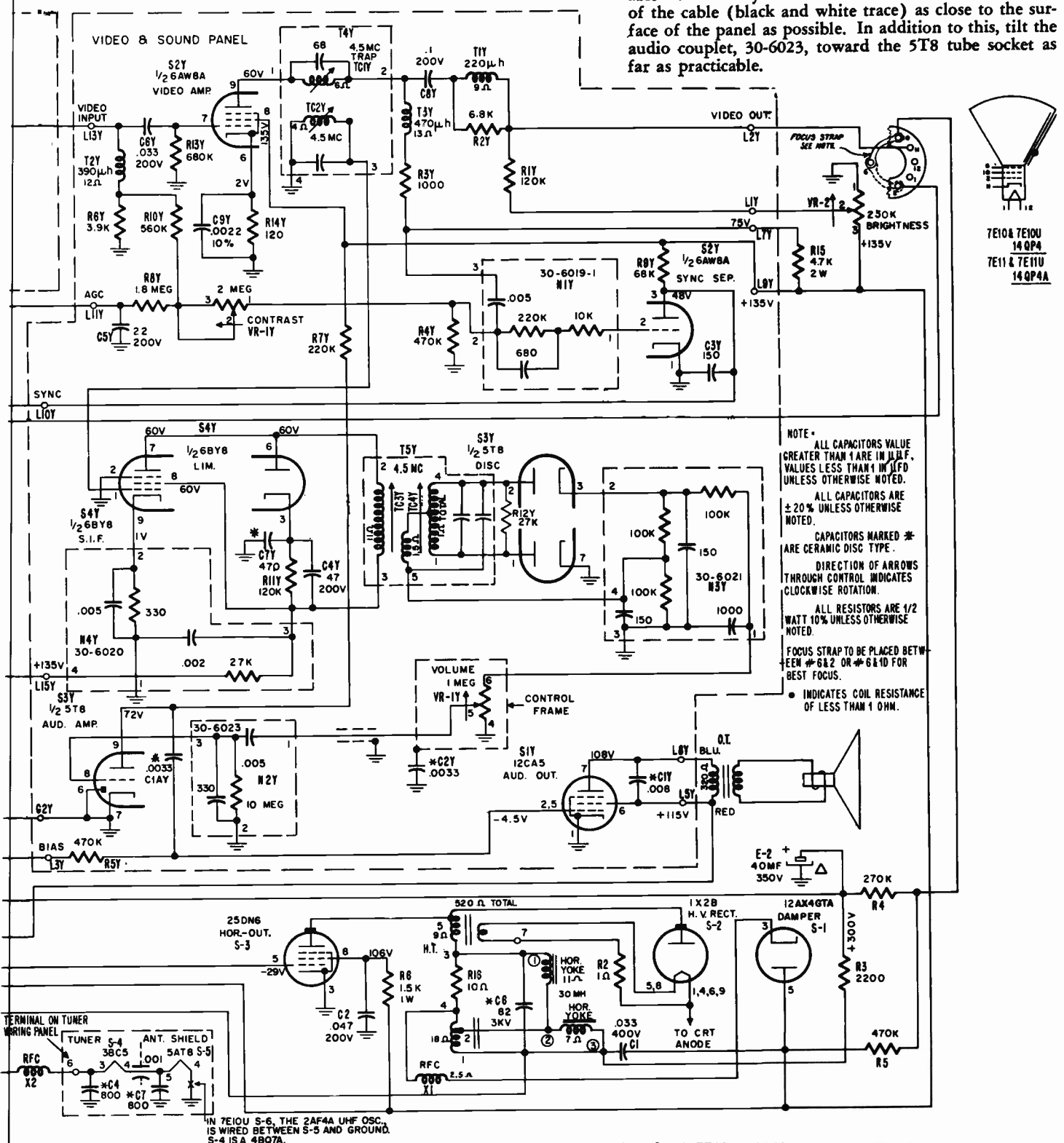
High voltage pulse, loosely coupled to yoke lead, 15,750 c.p.s.

PHILCO Schematic Diagram for Chassis 7E10, 7E10-U, 7E11, 7E11-U



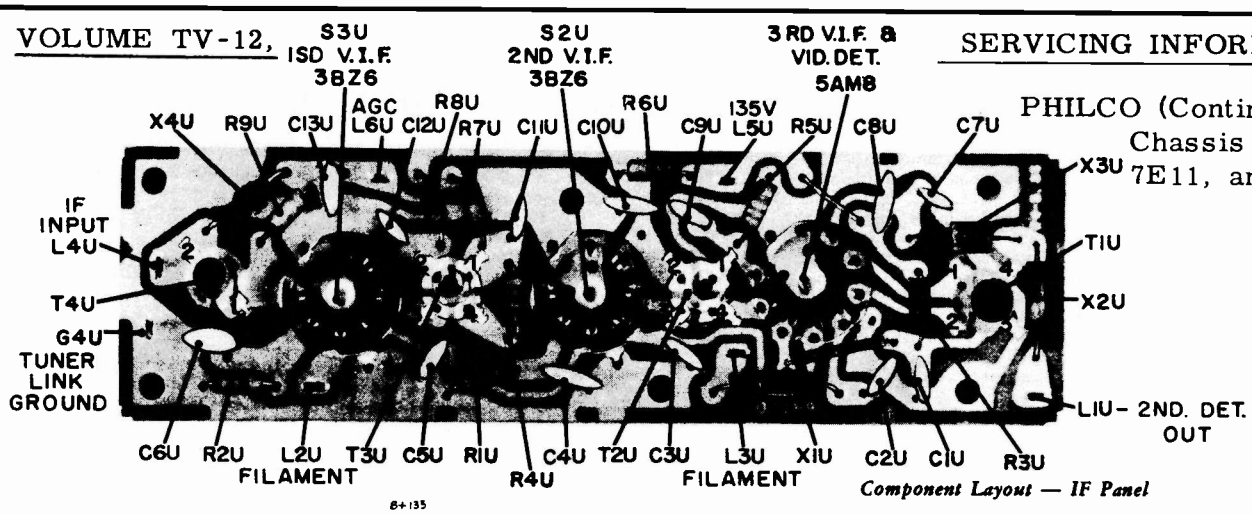
PHILCO Schematic Diagram for Chassis 7E10, 7E10-U, 7E11, 7E11-U

If the volume control cable, connecting the arm of the control to the grid of the 5T8 Audio Amplifier tube, is not dressed properly, a feedback squeal of objectionable volume may be heard. Dress the inner conductor of the cable (black and white trace) as close to the surface of the panel as possible. In addition to this, tilt the audio couplet, 30-6023, toward the 5T8 tube socket as far as practicable.



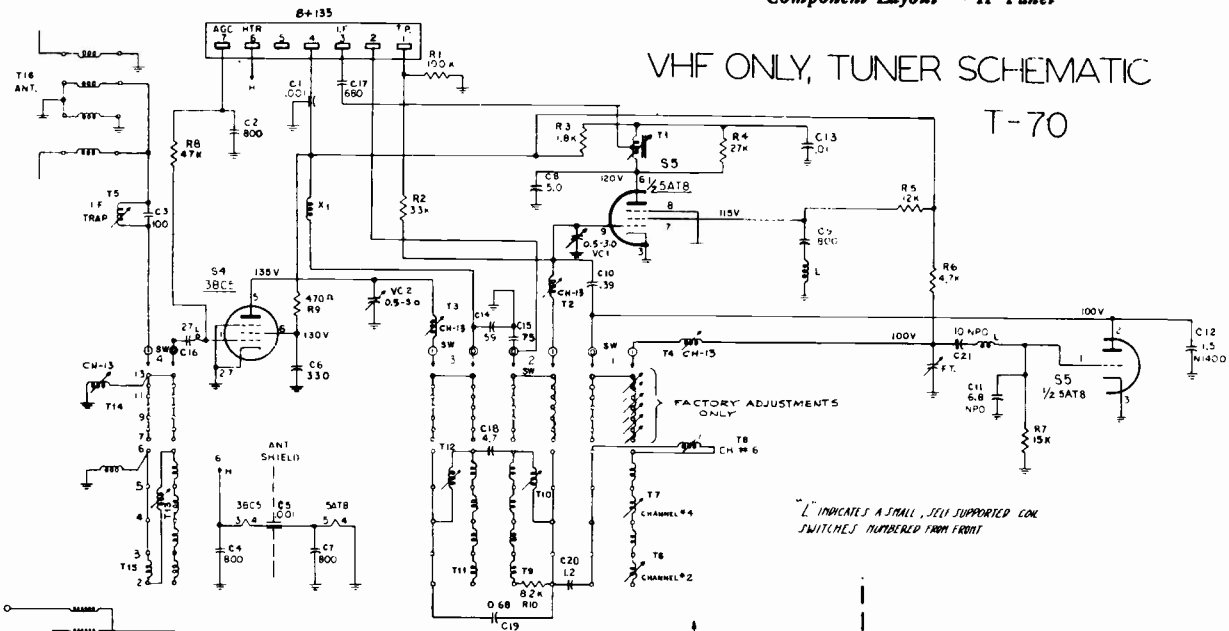
Schematic Diagram for Chassis 7E10, 7E10-U, 7E11 and 7E11-U

PHILCO (Continued)
Chassis 7E10, -U,
7E11, and 7E11-U

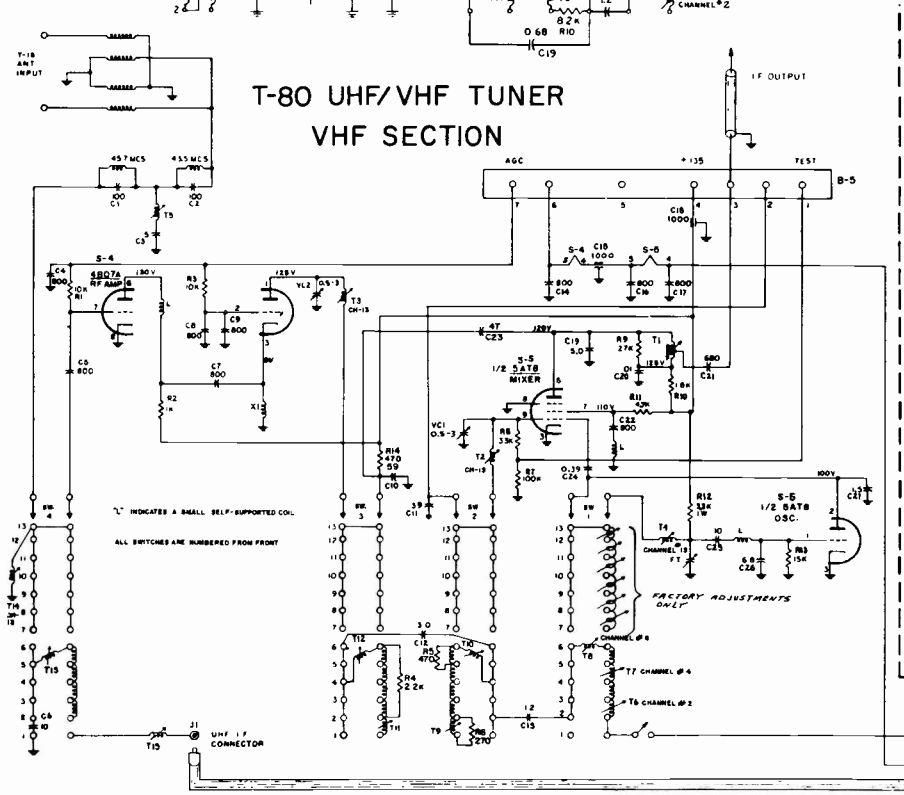


Component Layout — IF Panel

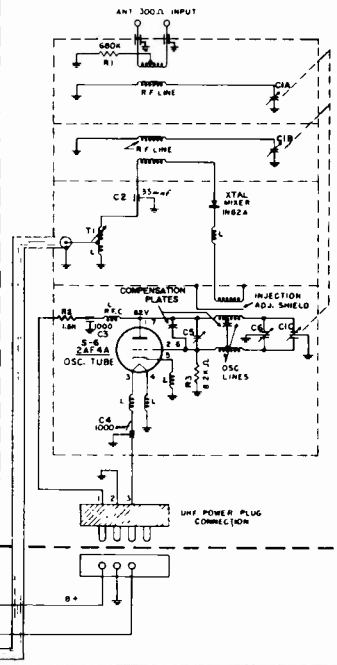
VHF ONLY, TUNER SCHEMATIC T-70



T-80 UHF/VHF TUNER VHF SECTION



UHF SECTION



RCA VICTOR

TELEVISION RECEIVERS — MODELS

21-T-7112(U), 21-T-7113(U)
21-T-7117(U), 21-T-7152(U)
21-T-7153(U), 21-T-7157(U)
21-T-7355(U), 21-T-7357(U)

Chassis Nos. KCS98A, KCS98C, KCS98E or KCS98F

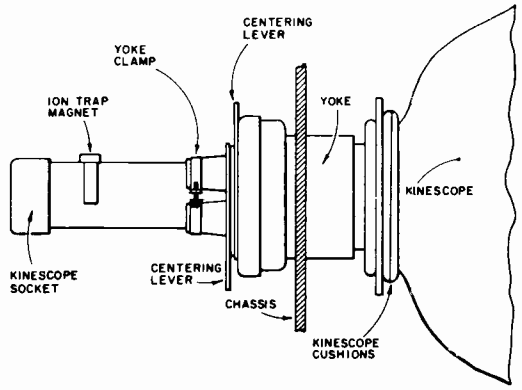


Figure 3—Yoke and Magnet Adjustments

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 3. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 3) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.

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

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT.—Turn the horizontal hold control to the extreme clockwise position. The picture should be out of sync, with approximately twelve 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 full turns 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" and proceed with "Focus Magnet Adjustment."

ADJUSTMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync over two full turns 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 paragraph below, before adjusting the sine wave coil.

Set the sine wave coil L601 fully counter-clockwise.

Adjustment of the horizontal frequency control in the coun. ter-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 frequency control is rotated counter-clockwise from the fall out point.

CENTERING ADJUSTMENT.—Centering is accomplished by means of a separate plate on the focus magnet. The centering plate includes a locking lever which must be loosened before centering. Up and down adjustment of the plate moves the picture from side to side and sidewise adjustment moves the picture up and down.

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

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 control 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.

FOCUS.—Adjust the focus control for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

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 or L53 and is located on the rear of the antenna matching transformer.

(Continued on the next three pages)

RCA Victor Chassis KCS-98A, -C, -E, -F, Service Material, Continued

CAUTION.—In some receivers, the FM trap L5 or L53 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.

Replace the cabinet back and connect the receiver antenna leads. Make sure that the screws holding the back are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

KINESCOPE HANDLING PRECAUTION.—Do not install, remove, or handle the kinescope in any manner, unless shatter-proof goggles are worn. People not so equipped should be kept away while handling the kinescope. Keep the kinescope away from the body while handling.

KINESCOPE AND SAFETY GLASS CLEANING.—The front safety glass may be removed to allow for cleaning of the kinescope faceplate and the safety glass if required.

All models except 21-T-7152(U), 21-T-7153(U) and 21-T-7157(U) have a "U" shaped channel under the front top edge of the cabinet, in front of the top of the safety glass. Take out the screws holding the channels and remove the channel and safety glass.

The safety glass for Models 21-T-7152(U), 21-T-7153(U) and 21-T-7157(U) is held in place with three flat springs holding the bottom metal trim.

Press in on each spring at the open end. Slide the spring out of the slot in the bottom trim.

Remove bottom metal trim and allow safety glass to slide down and out of top metal trim.

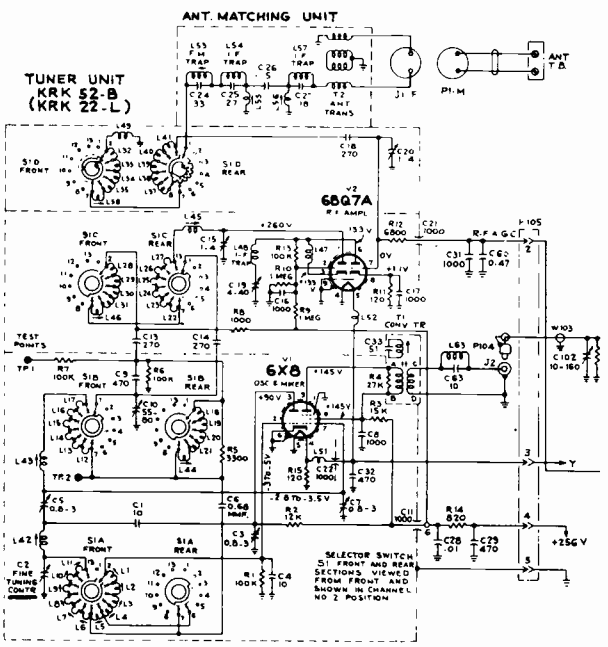
The Kinescope faceplate and the safety glass should only be cleaned with a soft cloth and "Windex" or similar cleaning agent.

Replace the safety glass and retainer by reversal of either of the above procedures.

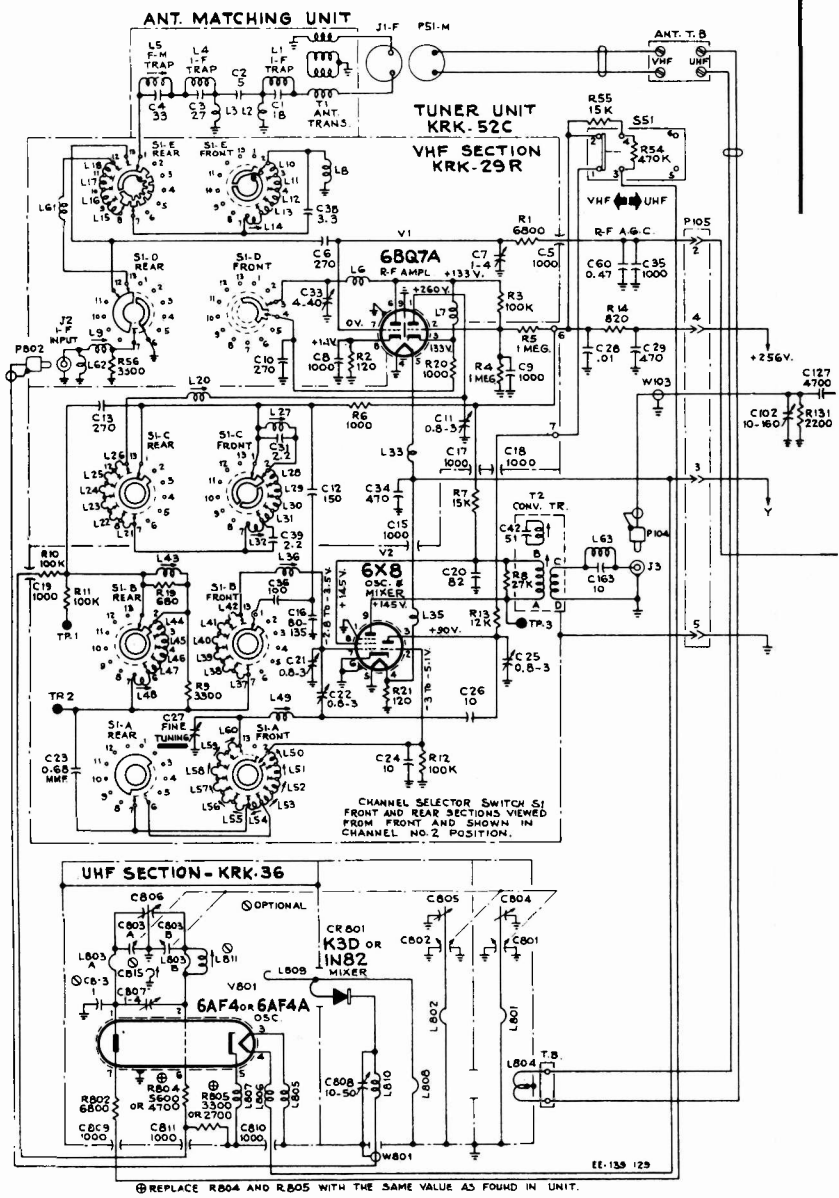
CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, ion trap, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts. Withdraw the chassis from the back of the cabinet.

The tuner assembly should be fastened to the chassis, if it is to be transported out of the cabinet. To do this, turn the tuner bracket upside down from its normal position. With the front of the VHF Tuner toward the chassis front, fasten the bracket to the right side of the chassis, with self-tapping screws, through the two top mounting holes. Holes are provided in the chassis for this purpose. (Refer to figure 6.)

KRK52B TUNER CIRCUIT SCHEMATIC FOR MODELS 21-T-7112 TO 21-T-7357 INCL.



21-T-7112U to 21-T-7357U Incl.



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

Direction of arrows at controls indicates clockwise rotation.

The schematic is shown in the latest condition at the time of printing.

All resistance value in ohms. K = 1000.

21-T-7112
21-T-7112U
SERIES

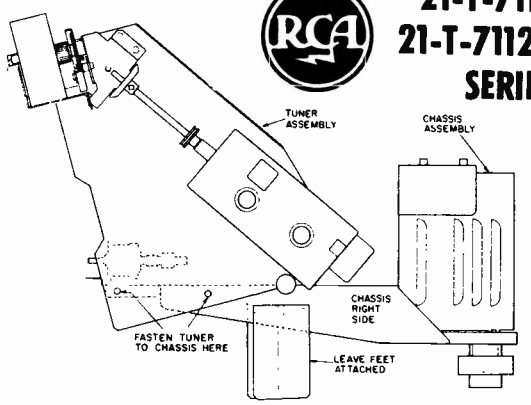
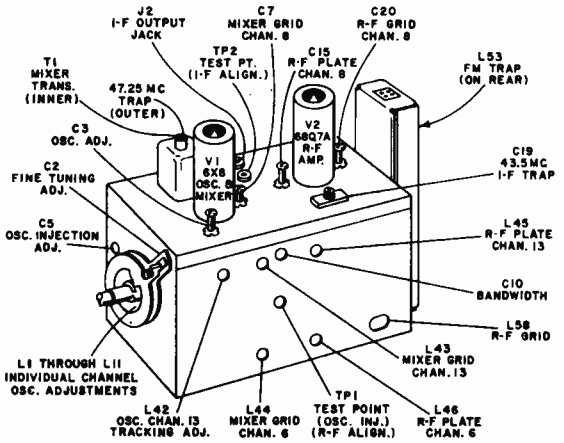
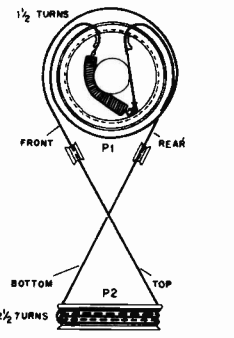


Figure 6—Tuner Bracket Fastened to Chassis

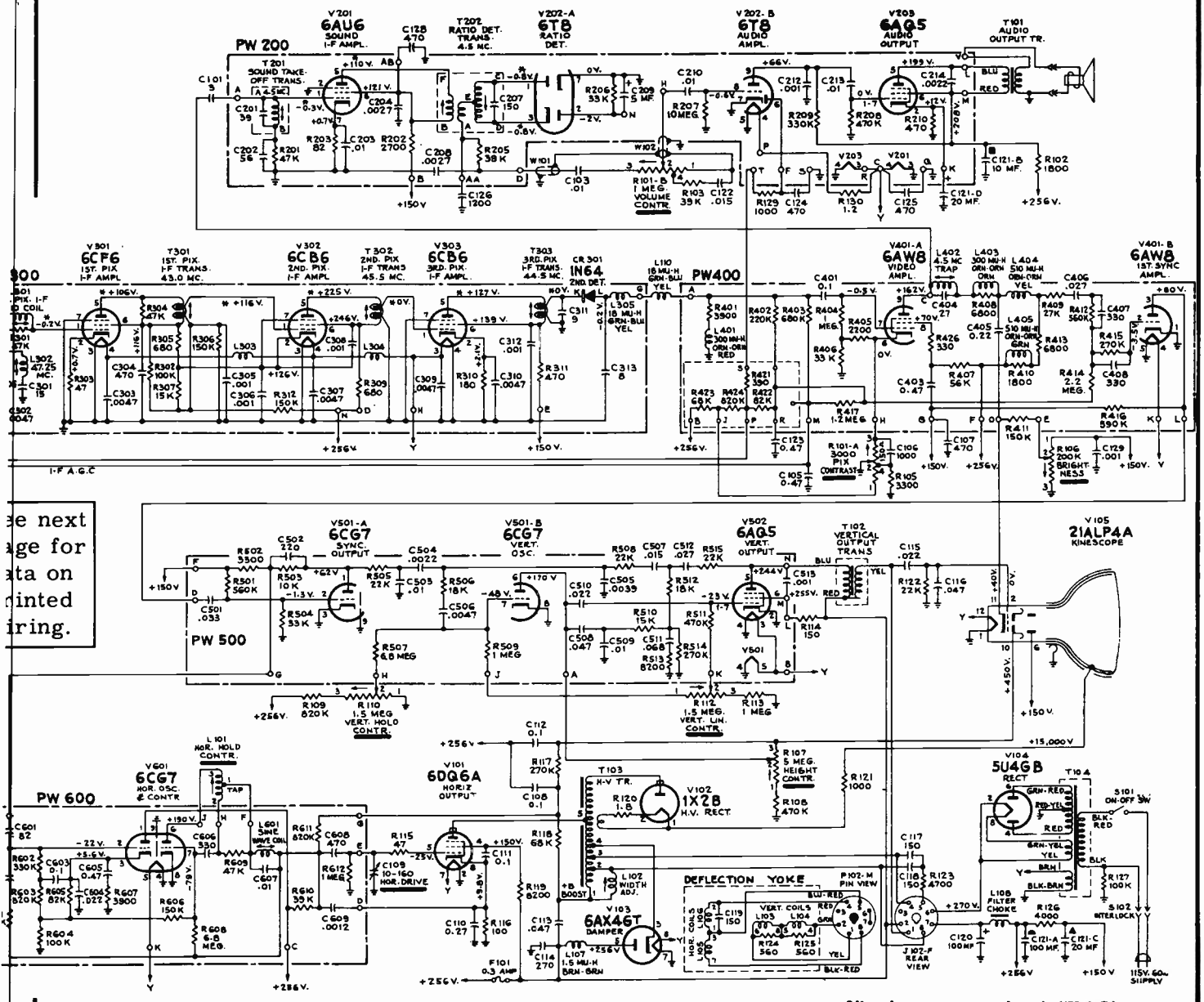


KRK52B VHF TUNER ADJUSTMENTS



DIAL CORD

TO REPLACE DIAL CORD - TURN FINE TUNING SHAFT WITH PULLEY P1 FULLY CLOCKWISE & ASSEMBLE CORD AS SHOWN ABOVE



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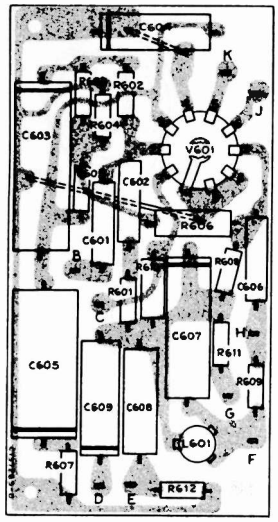
CIRCUIT SCHEMATIC DIAGRAM KCS98C & KCS98F CHASSIS
(KCS98A & KCS98E with KRK52B Tuner—see other side)

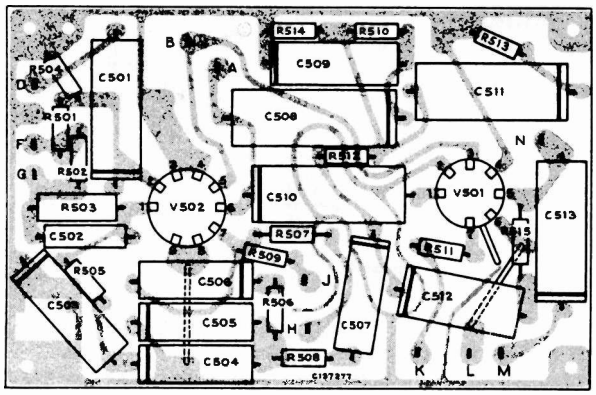
All voltages measured with "VoltOhmyst" and with no signal input. Voltages should hold within ±20% with 117 v. a-c

RCA Victor Chassis KCS-98A-C, -E, -F, Continued

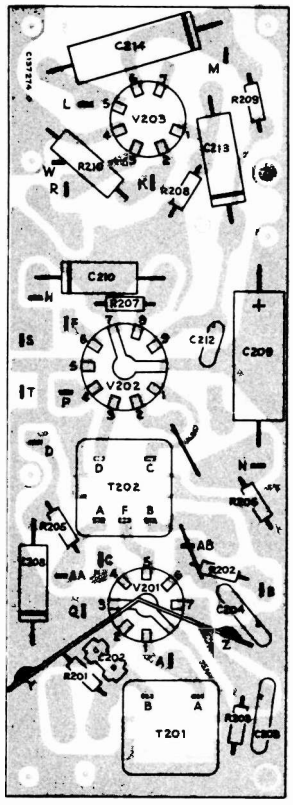
PRINTED WIRING ASSEMBLIES



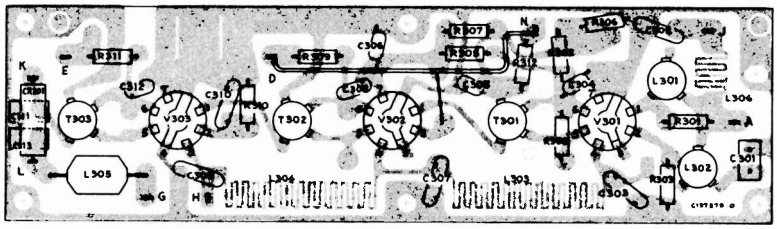
PW600—Horizontal Oscillator Unit Layout



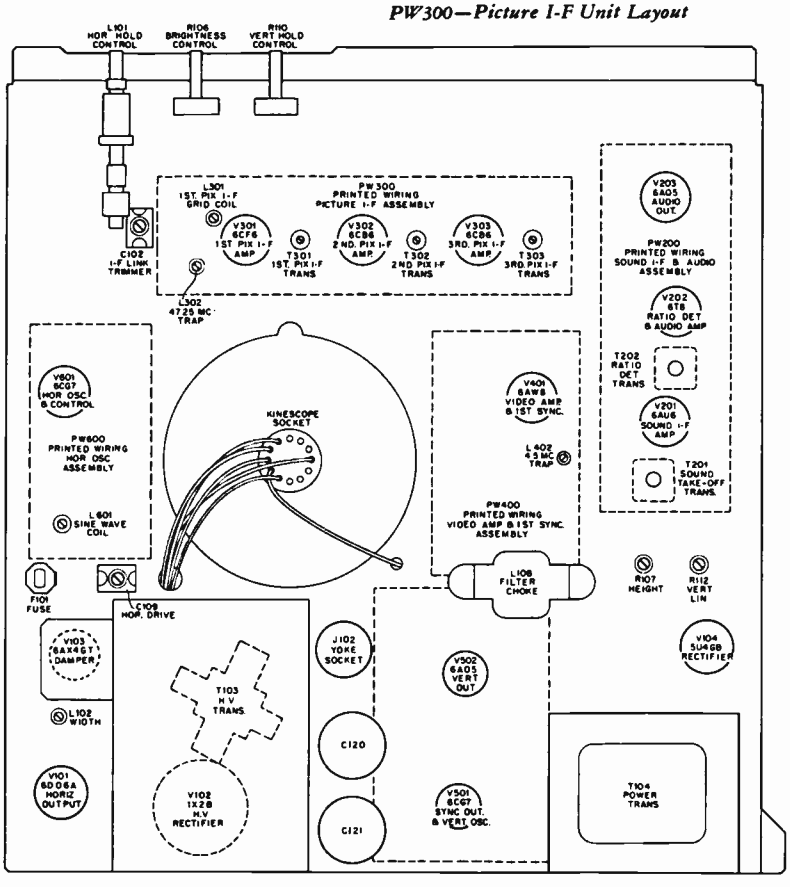
PW500—Vertical & Sync. Unit Layout



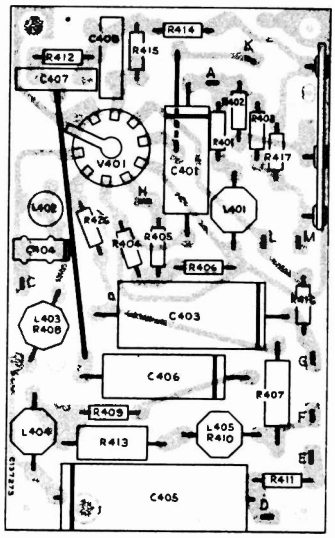
PW200—Sound I-F & Audio Unit Layout



PW300—Picture I-F Unit Layout



CHASSIS REAR VIEW



PW400—Video & Sync. Unit 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.

RCA VICTOR

8-PT-7010, 8-PT-7011, 8-PT-7012, 8-PT-7014, 8-PT-7030(T), 8-PT-7031(T), 8-PT-7032(T), 8-PT-7034(T)

Chassis No. KCS100B, KCS100D or KCS100K

See list of models at left. Material on pages 129 through 132 is exact for sets with Chassis KCS-100B, others using Chassis KCS-100D or KCS-100K are very similar.

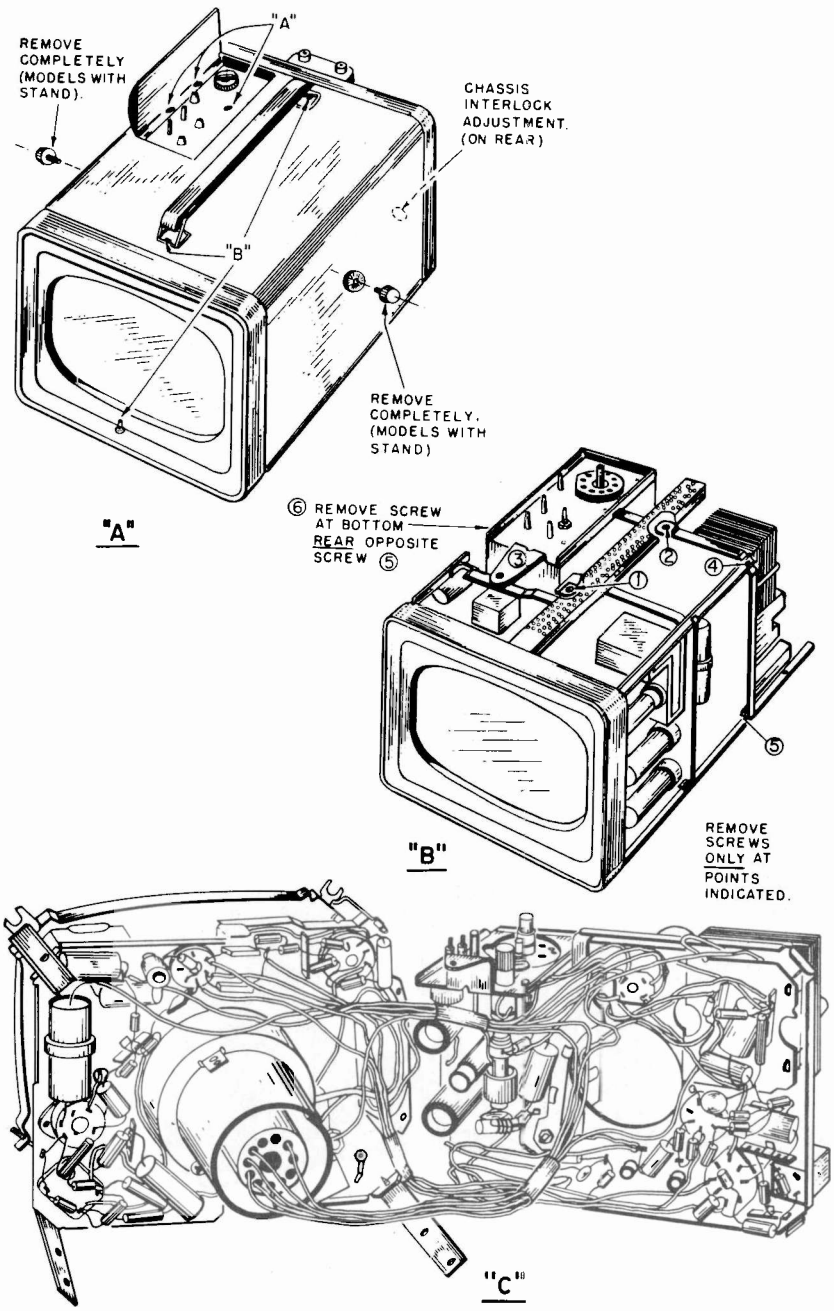


Figure 2—Chassis Removal

ADJUSTMENT CHECK LIST

Extend the rods of the cabinet antenna making sure the bottom section is fully extended. Adjust the angle, rotation and rod length for best picture and sound on channel being used.

Plug the power cord into the 117V. AC outlet and turn the receiver "ON." The receiver should operate normally. However, a check of the following adjustments should be made.

*1. Check position of ion trap magnet and if necessary readjust the ion trap magnet for maximum raster brightness with the brightness control as far clockwise as possible with which good line focus can be maintained.

*2. Check raster for proper framing (tilt) in mask. Adjust yoke positioning by rotating. To do this insert a screwdriver into the serrated collar at either point "A" or "B" shown in MAGNET ADJUSTMENTS drawing and pry against the edge of the hood.

3. Check width of the picture. Readjust width and drive adjustments, if necessary, as indicated below.

*4. Check for normal operation of the horizontal hold control. Should hold sync for two full turns or more of the control. (See below if adjustment is required.)

*5. Check centering of picture. Adjustment is made with the individual discs of the centering magnet or by rotating both discs together. Rotate the discs with a small screwdriver inserted in the teeth of the discs.

6. Check height and vertical linearity. Reset controls where necessary for ¼" overscan at both top and bottom.

*7. Check for sound and picture tracking on a *weak* signal. Readjust 41.25 mc. sound boost adjustment, if necessary, as follows:

Adjust fine tuning for maximum picture signal, then adjust sound boost adjustment for maximum sound signal. The weakest channel must be used when making this adjustment.

8. Check R-F oscillator adjustments *at 84° point of fine tuning shown on drawing.* Readjust if necessary starting at highest channel proceeding to the lowest. *Be sure fine tuning is at 84° point when making adjustments.*

Width, Horizontal Drive and Sinewave Adjustments

A. Set brightness control fully clockwise.

B. Adjust drive for overdrive line then clockwise until line just disappears. If no line appears set fully counter-clockwise.

C. Adjust width for ¼" overscan at each side, with normal line voltage and normal brightness. Repeat Step B.

D. Turn the horizontal hold control to the left, out of sync, to the point where interrupted oscillation occurs.

E. Adjust sinewave core, as the horizontal hold control is rotated to the left beyond the locked-in position, until 3 to 4 bars occur between the fall out point and interrupted oscillation.

*Chassis must be removed from the case to make these adjustments, see CHASSIS REMOVAL.

CHASSIS REMOVAL.—The chassis must be removed from the cabinet to replace tubes or the kinescope and to perform certain adjustments as explained above.

Take the receiver off its stand and completely remove the two knurled screws at the sides of the cabinet. Never attempt to remove the chassis unless these two screws are completely removed, as their projection inside the cabinet may result in internal damage as the chassis is pulled from the case. See Figure 2A.

Remove the knobs on the controls located in the cover and case assembly and take out the three screws holding the assembly to the cabinet. Their location is indicated at "A" in Figure 2A. Lift the control case and cover directly upward to remove.

Take off the carrying handle by removing the two screws at the ends of the handle. Also, remove the screw at the bottom front edge of the receiver case. These three screws are indicated in Figure 2A at "B."

Slide the chassis assembly, which includes the front frame and kinescope, out of the receiver cabinet. The antenna and A.C. interlock will automatically disengage as the chassis is removed.

CHASSIS SERVICING.—Adjustment of the yoke position, centering magnets and the ion trap magnet may be made with the chassis completely assembled. The location of these adjustments is shown in Figure 4.

Replacement of the tubes in the tuner unit requires removal of the speaker. To remove the speaker, loosen the speaker clamp screw shown in Figure 4 and slide the speaker out of its clamp. This will allow room to make tube replacement in the tuner unit.

Service which requires circuit tracing or voltage measurements must be performed with the front and rear chassis sections separated. To do this, remove the six (6) self-tapping screws holding the front and rear chassis sections together. See Figure 2B. The positions of the insulating boards should be noted for replacement when reassembling the chassis.

Unplug the kinescope socket and slide the rear chassis section off the end of the kinescope neck. Turn the chassis around making the bottom wiring side visible. Slip the kinescope socket leads out of the hole in the chassis, through which they are normally dressed, and pass the socket through the large opening in the chassis and reconnect to the kinescope. With the chassis in this position, which is shown in Figure 2C and Figure 3, all points will be accessible for servicing. Greater separation of the two chassis sections may be accomplished by the use of a short extension cable for the kinescope leads if desired.

REPLACING THE CHASSIS IN THE CABINET.—Replacement of the chassis in the cabinet is simply a reversal of the removal procedure with several important additional steps to be performed.

Make sure the insulating boards have been replaced in their proper positions. The boards are provided to prevent any thin metal object, which may fall or be inserted through the cabinet ventilating louvres, from coming in contact with high voltage circuits or from causing a short circuit to the cabinet.

If the speaker was removed for tube replacement in the tuner, the speaker must be properly positioned before replacement of the chassis in the cabinet. The face of the speaker baffle must be exactly four and one-quarter inches (4¼") from the centerline of the chassis as shown in Figure 4. The chassis will not slide into the case properly if the speaker extends out too far. When the speaker does not extend sufficiently, sound echoes may occur within the cabinet.

The A.C. interlock screw, located under the snap-out button on the cabinet rear, should be readjusted if the front and rear chassis sections were separated when servicing. Refer to Figure 2A for adjustment location. Turn the adjustment screw fully counter-clockwise moving the interlock plug toward the cabinet rear. Proper alignment of the interlock plug and the antenna terminals is automatically achieved, by the locating stud on the interlock, as the chassis is inserted in the cabinet. After the chassis has been replaced in the cabinet and securely fastened, the A.C. interlock adjustment screw should be turned fully clockwise to insure proper contact in its receptacle. When replacing the screws holding the chassis in the cabinet, the screw under the bottom front edge of the cabinet should be replaced first.

KINESCOPE REPLACEMENT.—Remove the chassis from the cabinet as outlined under CHASSIS REMOVAL. Take off the front safety glass frame by removing the three screws holding the frame to the kinescope mounting strap. Turn the screw shown at point "C" in MAGNET ADJUSTMENTS drawing counter-clockwise moving the yoke away from the bell of the kinescope. Take off the kinescope socket, the ion trap magnet with its sleeve and disconnect the high voltage lead.

Loosen the screw on the kinescope mounting strap, refer to MAGNET ADJUSTMENTS drawing, and slide the kinescope out of the yoke.

Install the new kinescope and tighten the screw on the strap around the front edge of the kinescope. Turn the yoke positioning screw clockwise to bring the yoke forward against the kinescope bell. Replace the front safety glass frame, ion trap magnet and sleeve and the kinescope socket.

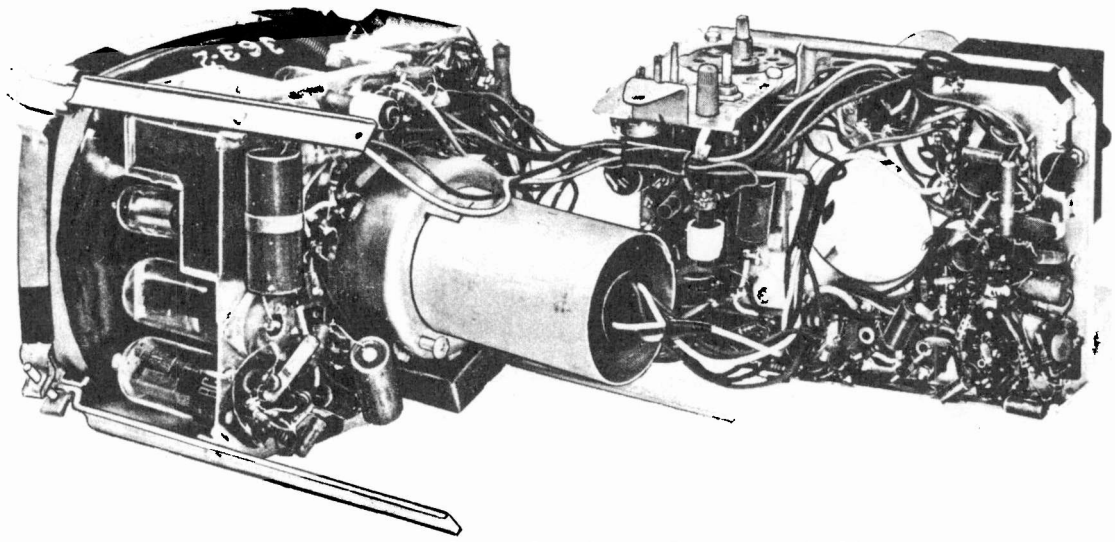
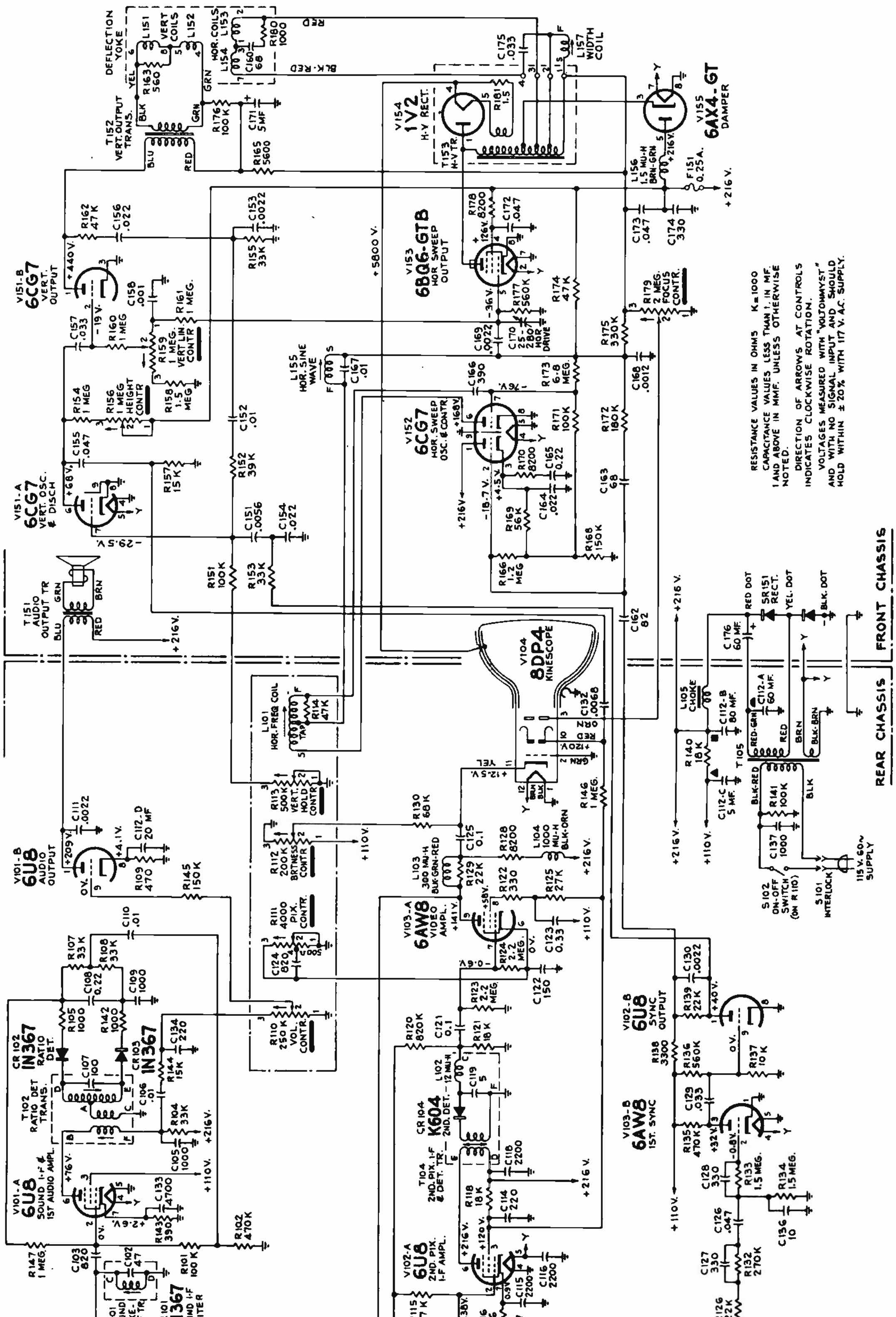


Figure 3—Front and Rear Chassis Sections Separated for Servicing

RCA Victor — CIRCUIT SCHEMATIC DIAGRAM KCS 100B CHASSIS — 8-PT-7030, 8-PT-7031, 8-PT-7034



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

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

The schematic is shown in the latest condition at the time of printing.
All resistance value in ohms. K = 1000.

Direction of arrows at controls indicates clockwise rotation

KINESCOPE AND SAFETY GLASS CLEANING.—The front safety glass frame may be removed to allow for cleaning of the kinescope faceplate and the safety glass if required.

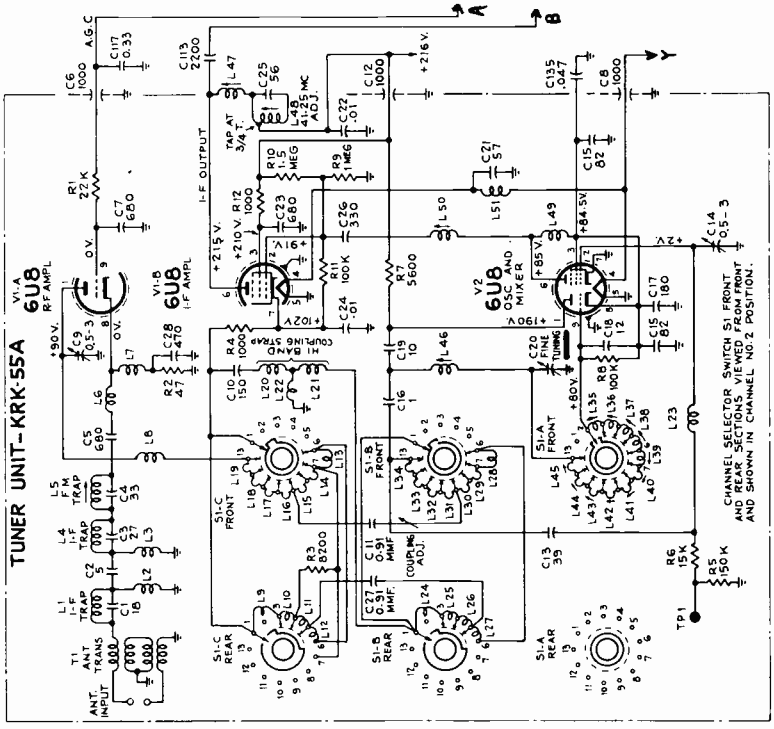
To do this the chassis assembly must be removed from the cabinet (See section on CHASSIS REMOVAL). With the chassis out of the cabinet remove the three screws holding the front mask and safety glass frame to the kinescope mounting strap assembly.

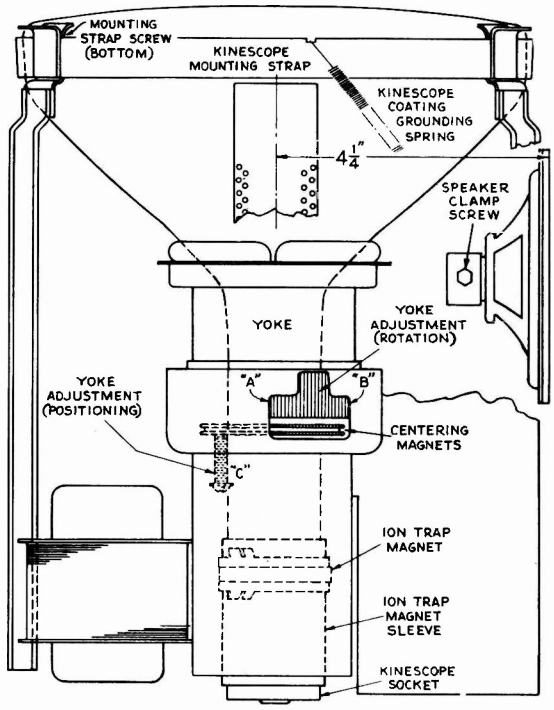
The kinescope faceplate and the safety glass should only be cleaned with a soft cloth and "Windex" or similar cleaning agent.

Wires marked A, B, and Y, connect to correspondingly marked wires of tuner circuit on the next page, over.

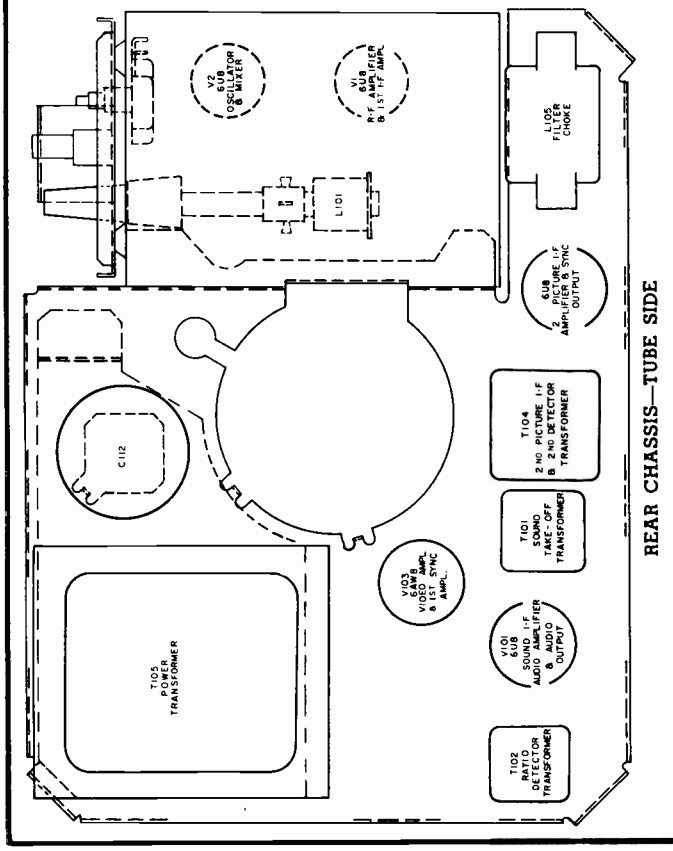
RCA Victor Models 8PT7030, 8PT7031, 8PT7034, Chassis KCS-100B, Continued

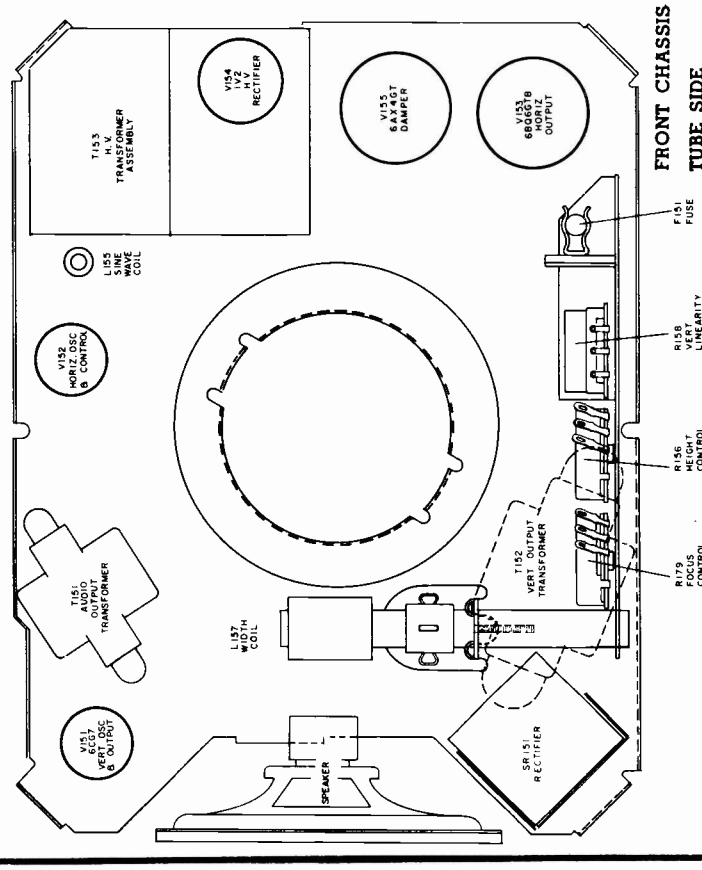
Wires marked A, B, Y, connect to corresponding main circuit points as shown on previous page.





MAGNET ADJUSTMENTS





RCA VICTOR

MODELS 21-T-639, 21-T-639U

Chassis No. - KCS101 or KCS101A

INSTALLATION CHECK LIST

Connect the antenna transmission line to the receiver antenna terminals. (Refer to schematic diagrams for correct input connections.)

Plug the power cord into the 117V. AC outlet and turn the timer clock VIEW TIME control clockwise to "ON." The receiver should operate normally. However, a check of the following adjustments should be made.

1. Check position of ion trap magnet and readjust for maximum raster brightness if necessary.

2. Check raster for proper framing (tilt) in mask. Adjust yoke position by rotating.

3. Check AGC and Noise Limiter control settings. Adjustment should be made as outlined in separate section in next column.

*4. Check width and horizontal linearity, readjust width and drive controls as outlined below, if adjustment is necessary.

*5. Check for normal operation of horizontal hold control. Should hold sync for two full turns or more of the control.

6. Check centering of picture. Adjustment is made with the centering lever on the focus magnet.

7. Check height and vertical linearity, reset controls where required for 1¼" overscan.

8. Adjust focus control for maximum overall definition in fine detail areas of the picture.

9. Check RF oscillator adjustment on all channels. Readjust if necessary, starting at the highest frequency channel, proceeding to the lowest. Do not adjust the UHF rf oscillator in the field.

10. Adjust the FM trap—where FM interference is encountered—for minimum interference in the picture.

*Width Horizontal Drive & Sinewave Adjustments

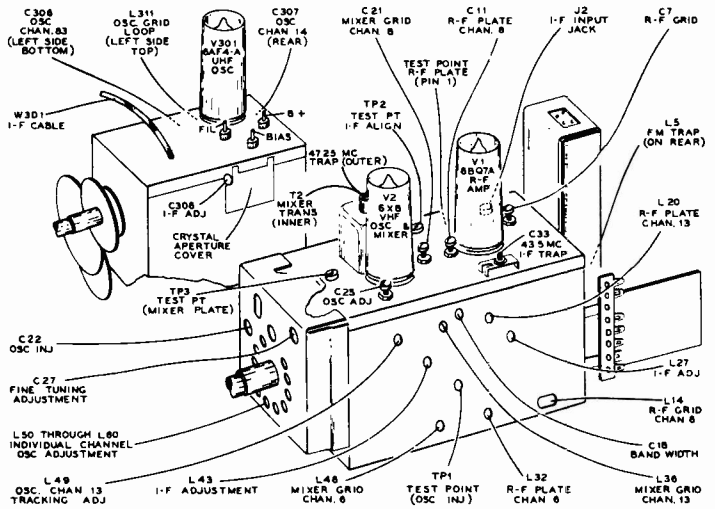
A. Set width coil fully counter-clockwise.

B. Adjust drive for overdrive line then clockwise until line just disappears. If no line appears set fully counter-clockwise.

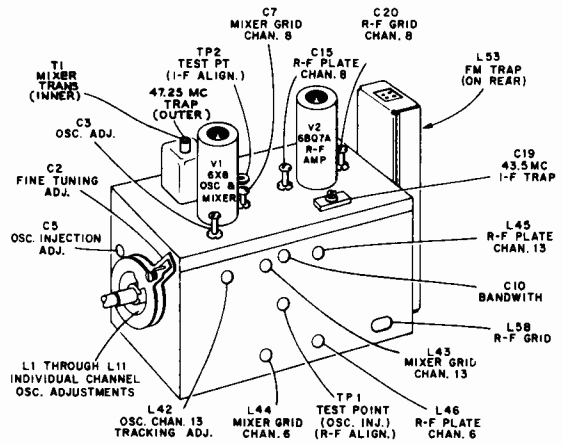
C. Adjust width for ¾" overscan at each side, with normal line voltage and normal brightness. Repeat Step B.

D. Turn horizontal hold control to the left, out of sync., to the point where interrupted oscillation occurs.

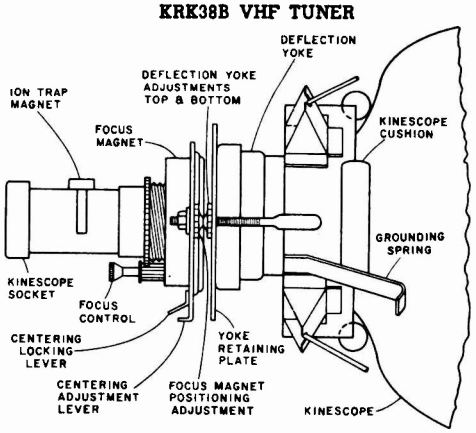
E. Adjust sinewave core, as the horizontal hold control is rotated to the left beyond the locked-in position, until 3 to 4 bars occur between the fall out point and interrupted oscillation.



KRK38C UHF/VHF TUNER



KRK38B VHF TUNER



YOKE AND FOCUS MAGNET

AGC and NOISE LIMITER ADJUSTMENTS.—Careful adjustment of the AGC and Noise Limiter controls is very important for the proper functioning of the receiver.

Turn the Noise Limiter control fully clockwise.

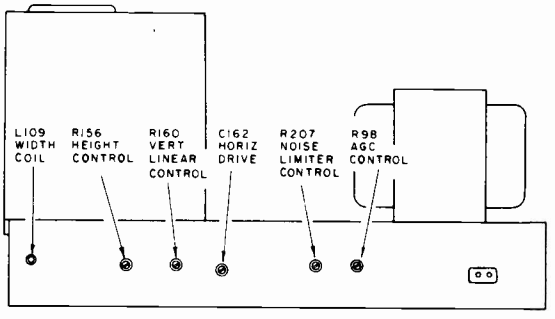
Adjust the AGC control until a bend just occurs in the picture then counter-clockwise 90° from this point.

Set fine tuning for barely perceptible 4.5 mc. beat. Readjust the AC 3 control for picture bend then counter-clockwise 45°.

Set horizontal hold counter-clockwise as far as possible without making sync unstable.

Turn Noise Limiter control counter-clockwise until horizontal shift or bend just occurs then clockwise 30° from this point.

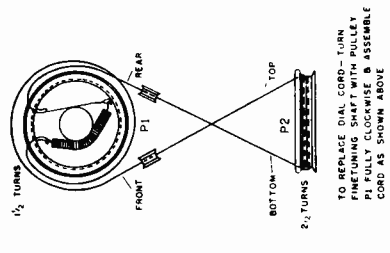
Reset horizontal hold to center of holding range.



REAR CHASSIS ADJUSTMENTS

RCA Victor Models 21T639, 21T639U, Material Continued

Tuner circuits on this page, main schematic on the next page, at right. Chassis top view and printed circuit assemblies information on the next page following main diagram.



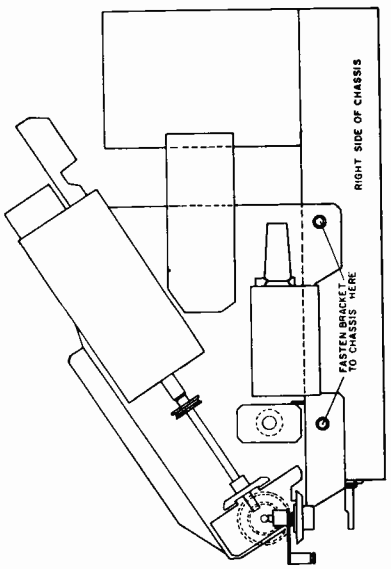
DIAL CORD

KINESCOPE AND SAFETY GLASS CLEANING.—Remove the rear panel of the receiver. There are a number of flat springs holding the front metal trim of the cabinet to the cabinet front.

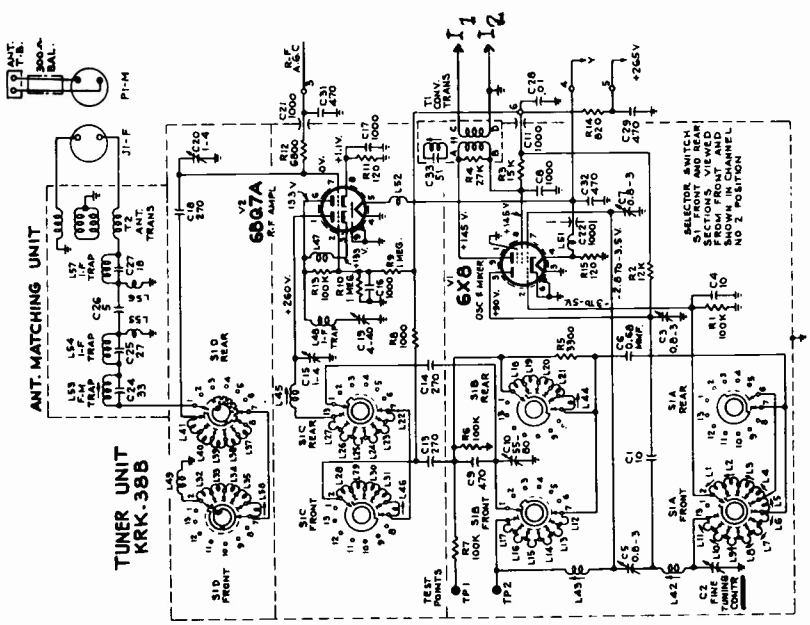
Reach in from the rear of the receiver and press in on each spring at the open end. Slide the spring out of the slot provided.

Remove the metal trim and the safety glass.

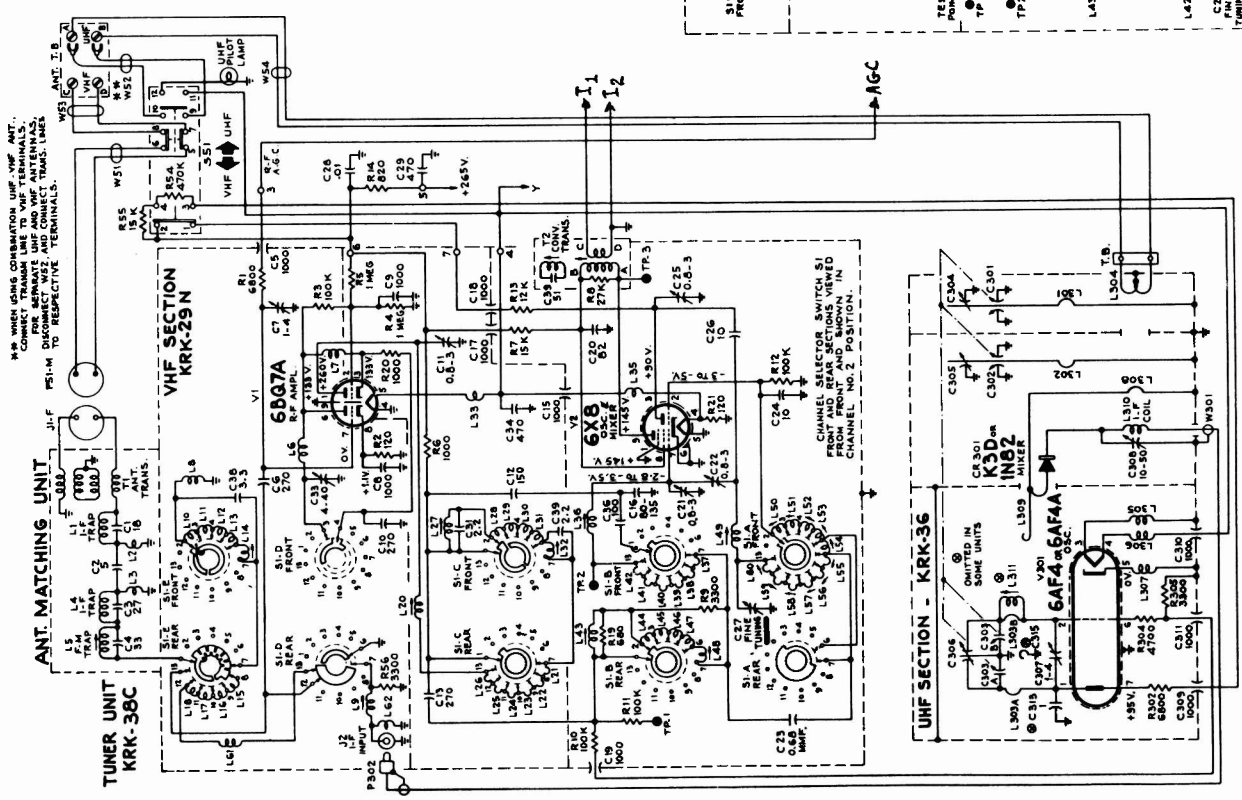
The kinescope faceplate and the safety glass should be cleaned only with a soft cloth and "Windex" or similar cleaning agent.



TUNER BRACKET FASTENED TO CHASSIS



Tuner used in 21T639. See note at left.



Tuner used in 21T639U. Correspondingly marked wires of tuner and main schematic on next page at right, connect together.

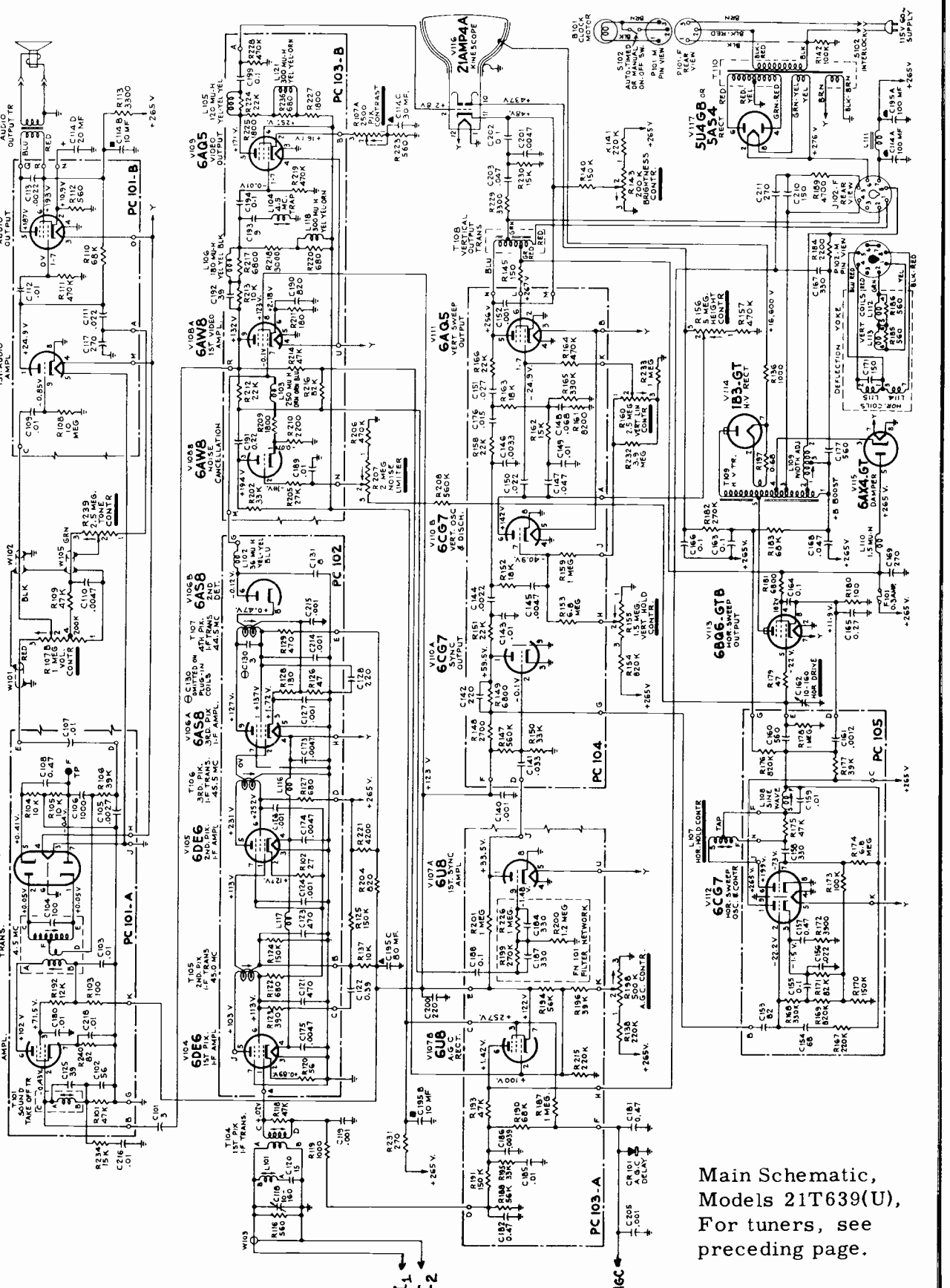
RCA Victor **CHASSIS CIRCUIT SCHEMATIC DIAGRAM KCS101A** Models 21T639, 21T639U

The schematic is shown in the latest condition at the time of printing.
All resistance value in ohms. K = 1000.

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

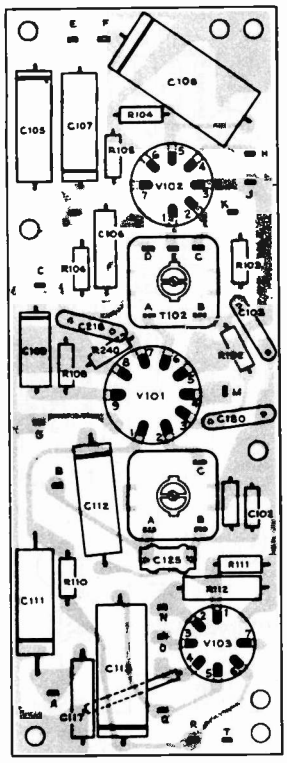
All voltages measured with "VoltOhmyst" ® and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.

Direction of arrows at controls indicates clockwise rotation.

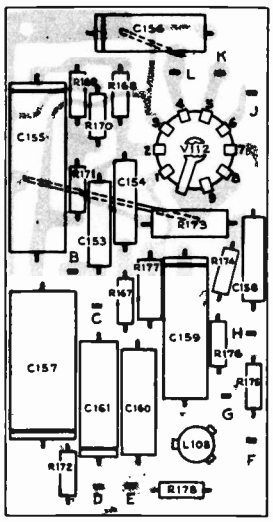


Main Schematic, Models 21T639(U), For tuners, see preceding page.

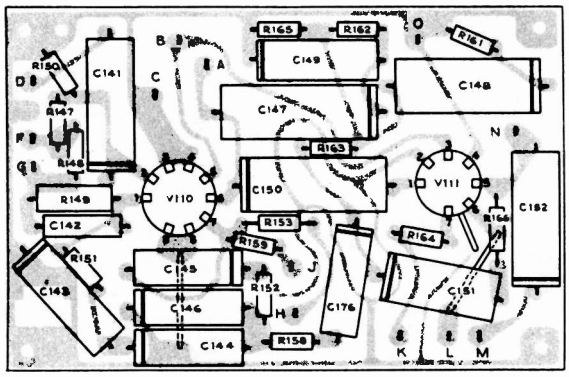
RCA Victor Models 21T639, 21T639U, Chassis KCS-101, -A, PRINTED CIRCUIT ASSEMBLIES



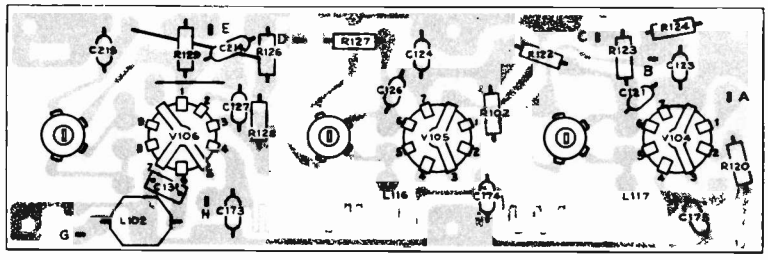
PC-101—SOUND I-F & AUDIO UNIT LAYOUT



PC105—HORIZONTAL OSCILLATOR UNIT LAYOUT



PC-104—VERTICAL & SYNC OUTPUT UNIT LAYOUT



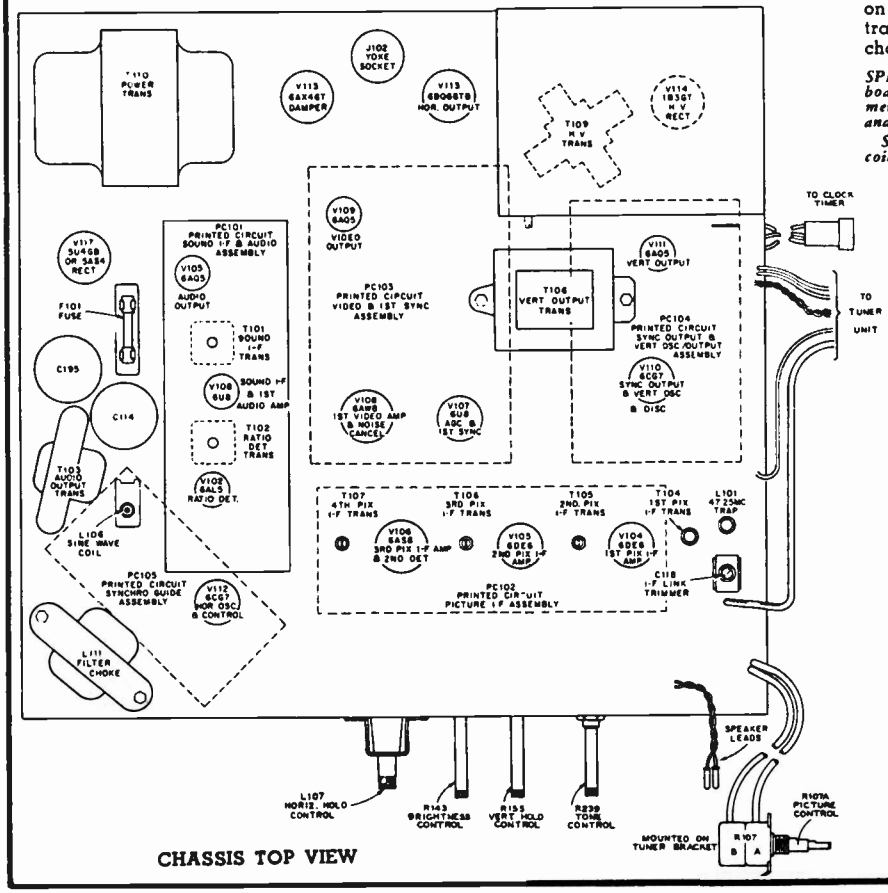
PC102—PICTURE I-F UNIT LAYOUT
(See Note below)

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.

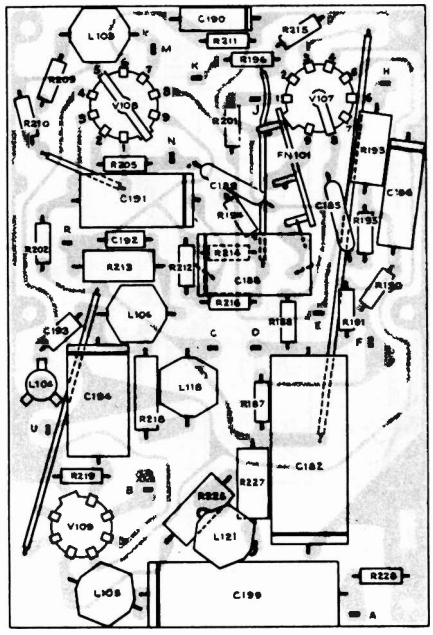
The printed writing, on the reverse side of the boards, is presented in "phantom" views super-imposed on the component layouts. This will enable circuit tracing without removing the assemblies from the chassis to see the printed wiring on the reverse side.

SPECIAL NOTE: Some receivers employ PC102 picture I.F. boards with printed coils for T105, T106 & T107 (for replacement use 76433 coil with 47,000 ohm resistor 502347 across plate and screen when used as T106).

Some receivers employ PC102 picture I.F. boards with plug-in coils for T105, T106 & T107 (for replacement use 101588 coil).



CHASSIS TOP VIEW



PC-103—VIDEO & 1ST SYNC UNIT LAYOUT

RCA VICTOR

(Material below and on the next 3 pages.)

MODELS
14-S-7052(U), 14-S-7070(U)
14-S-7071(U), 14-S-7074(U)

Chassis No. KCS102B or KCS102D

INSTALLATION CHECK LIST

Connect the antenna transmission line to the receiver antenna terminals.

Plug the power cord into the 117V. AC outlet and turn the receiver "ON". The receiver should operate normally. However, a check of the following adjustments should be made.

1. Check position of ion trap magnet and readjust for maximum raster brightness, if necessary.
2. Check raster for proper framing (tilt) in mask. Adjust yoke position by rotating.
*3. Check width and horizontal linearity, readjust width control as outlined below, if adjustment is necessary.
*4. Check for normal operation of horizontal hold control. Should hold sync for two full turns or more of the control.
5. Check centering of picture. Adjustment is made with the centering lever on the focus magnet.
6. Check height and vertical linearity, reset controls where required for 1¼" overscan.
7. Check R-F oscillator adjustment on all channels. Readjust if necessary, starting at the highest frequency channel, proceeding to the lowest.

***Width and Sinewave Adjustments**

It is possible to adjust the horizontal oscillator in the field by the following method when such adjustment is indicated.

A. Set the width coil fully counter-clockwise.
B. Adjust width for ¾" overscan at each side, with normal line voltage and normal brightness.
C. Turn horizontal hold control to the left, out of sync, to the point where interrupted oscillation occurs.
D. Adjust sinewave core, as the horizontal hold control is rotated to the left beyond the locked-in position, until 3 to 4 bars occur between the fall out point and interrupted oscillation.

KINESCOPE AND SAFETY WINDOW CLEANING.—The front safety window may be removed to allow for cleaning of the kinescope faceplate and the safety window if required.

To do this, remove three screws from under the front edge of the metal trim. This will allow the metal clip and metal trim to be removed.

Bend up the tabs holding the window at the top and lift the window out.

The kinescope faceplate and safety window should be cleaned with a soft cloth and water only.

Replace the window, bend the metal tabs down, and replace the metal trim. Secure the trim with the metal clip and three screws.

CHASSIS REMOVAL AND REPLACEMENT.—Remove the knobs from the side of the receiver.

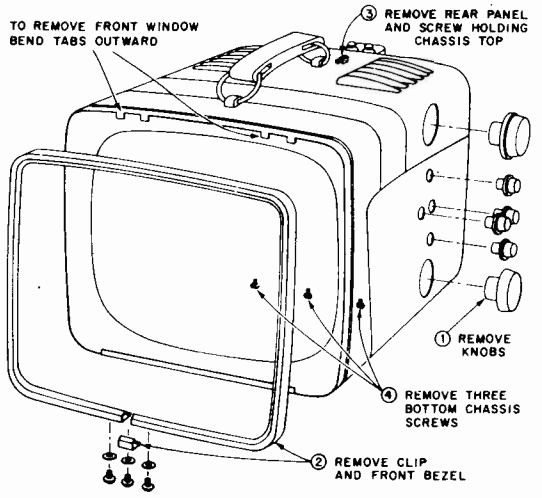
Remove the three screws from under the front edge of the metal trim. This will allow the metal clip and bezel to be removed.

Take out the screws holding the rear panel and remove the panel. Remove the screw holding the top of the chassis to the handle brace located inside the cabinet at the top.

Unplug the speaker leads.

Turn the receiver face downward on a protective cloth or pad and remove the three screws from the bottom. Slide the case upward off the chassis and kinescope assembly.

Reverse the above procedure to reassemble the chassis and kinescope in the cabinet.



CHASSIS REMOVAL

ANTENNA INPUT

Models 14-S-7052, 14-S-7070, 14-S-7071 and 14-S-7074

The KRK32F tuner unit is designed for VHF reception only, with a 300 ohm antenna input provided.

Model 14-S-7052U

The KRK29W tuner unit is designed for UHF-VHF reception with 300 ohm inputs provided for UHF and VHF use. When using a UHF antenna or a VHF antenna (or both) connect the transmission line from each antenna to the proper receiver antenna terminals.

Models 14-S-7070U, 14-S-7071U and 14-S-7074U

In these models the antenna input to the UHF and VHF tuner is connected to a crossover network to provide a single antenna input to the receiver. This provides for antenna input from a single VHF antenna, a UHF antenna, a combination UHF/VHF antenna, or the receiver cabinet antenna.

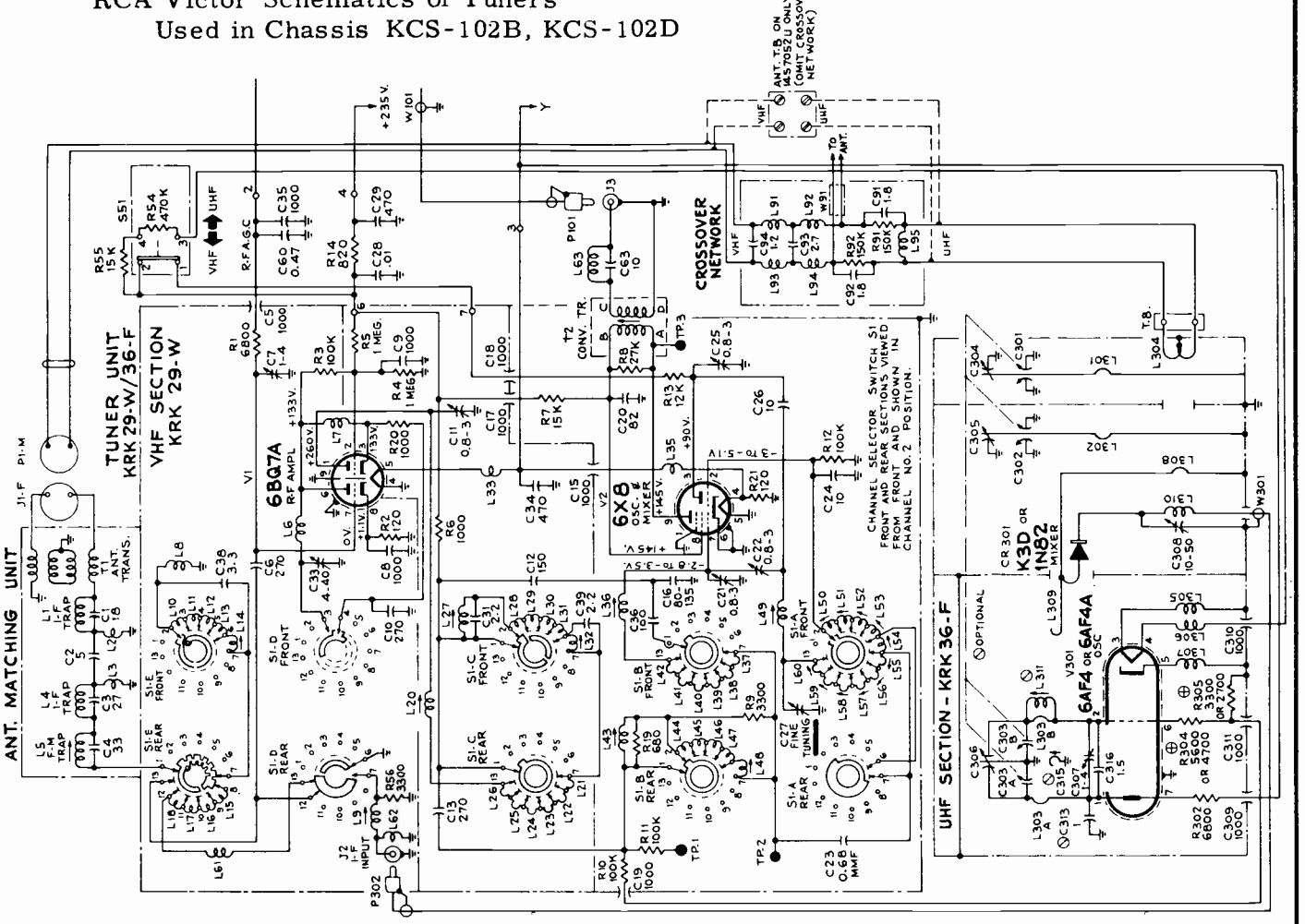
The attached cabinet antenna is automatically connected to the tuner inputs when the bottom rod sections are *fully* extended. When the cabinet antenna is being used disconnect the external antenna. When using the external antenna retract the rod antenna fully.

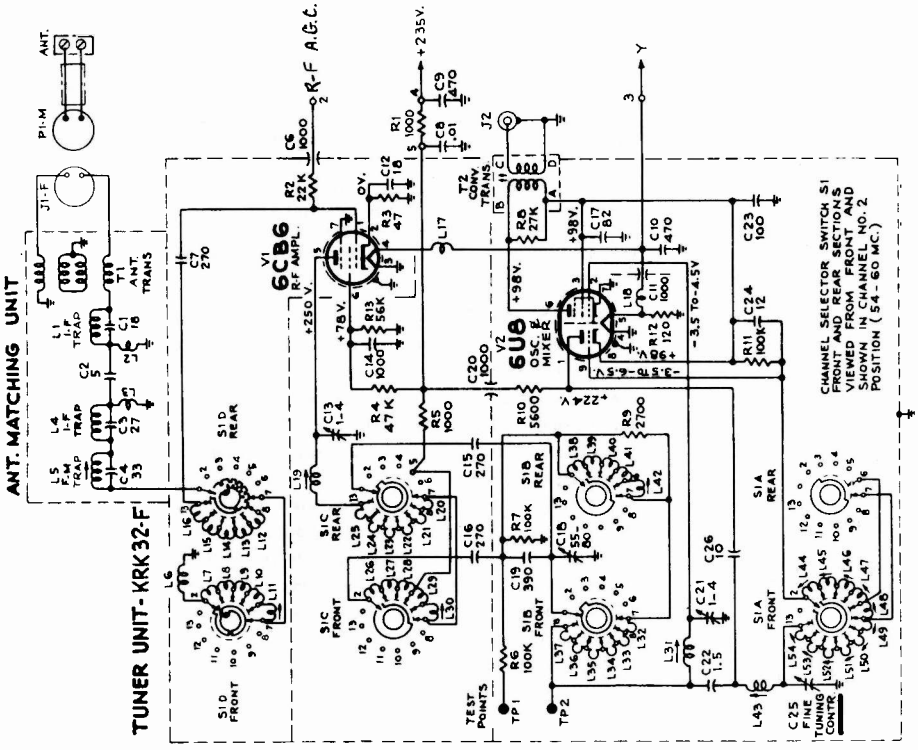
FM TRAP ADJUSTMENT.—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. The trap is L5 and is located on the antenna matching transformer.

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.

Replace the cabinet back and connect the receiver antenna leads to the cabinet back. Make sure that the screws holding the back are up tight, otherwise it may rattle or buzz when the receiver is operated at high volume.

RCA Victor Schematics of Tuners Used in Chassis KCS-102B, KCS-102D

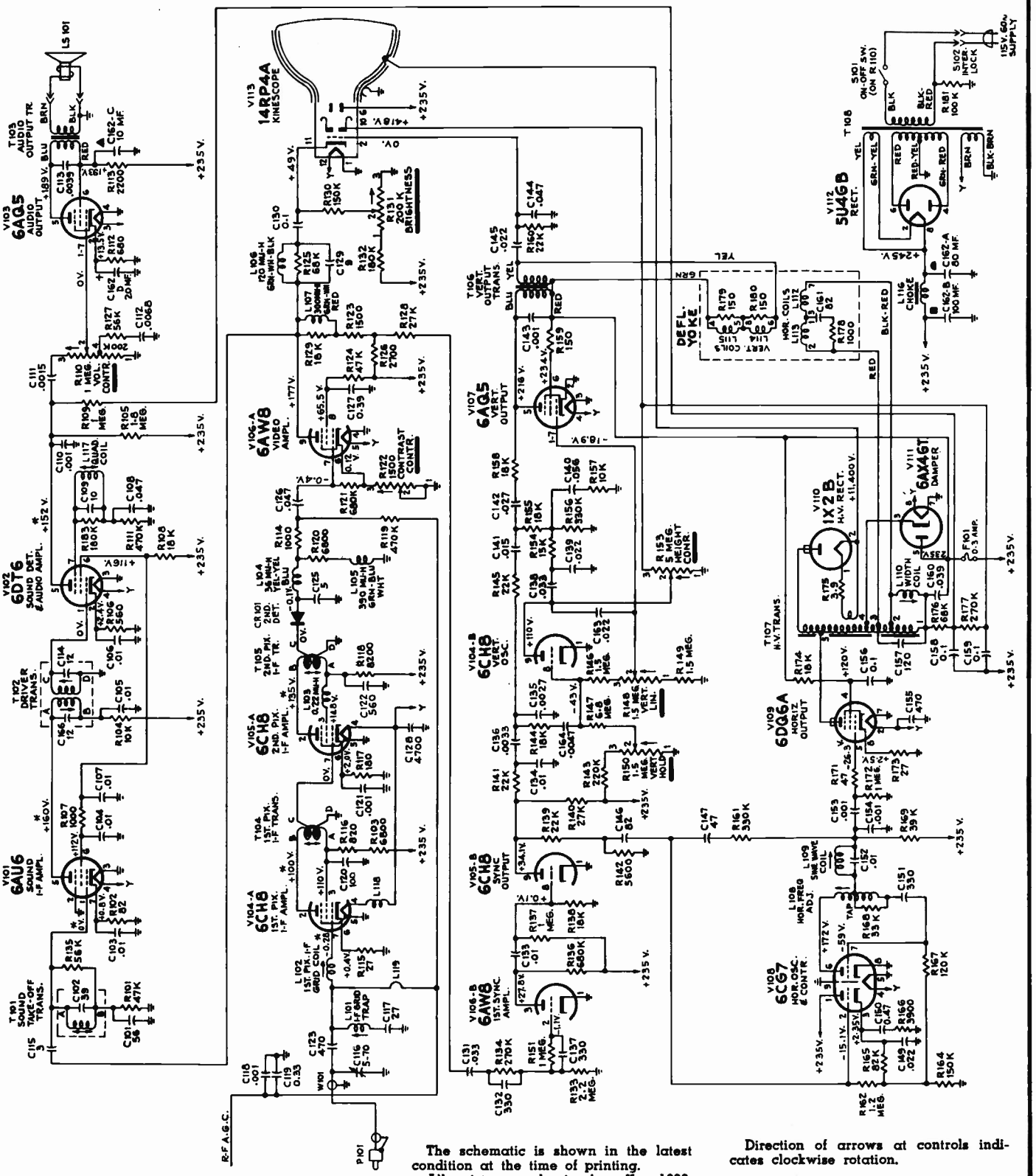




*Measured with 1 megohm ½ watt resistor in series with meter probe.

Tuner KRK32F (circuit above) is used in Chassis KCS-102B. Tuner KRK29W/36 (circuit at right, on this page) is used in Chassis KCS-102D. Wires marked Y(3), R-F AGC(2), B+235 V., connect to similarly marked wires of main schematic printed on the next page. Plug P101 connects to jack J2.

CHASSIS CIRCUIT SCHEMATIC DIAGRAM KCS102B & KCS102D



For tuner circuits and connection information see page adjacent at left.

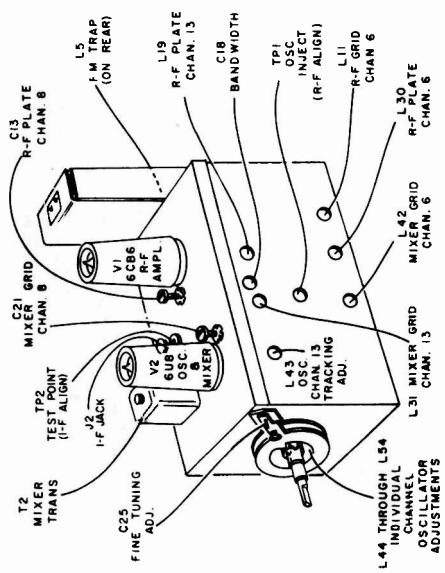
The schematic is shown in the latest condition at the time of printing.
All resistance value in ohms. K = 1000.

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

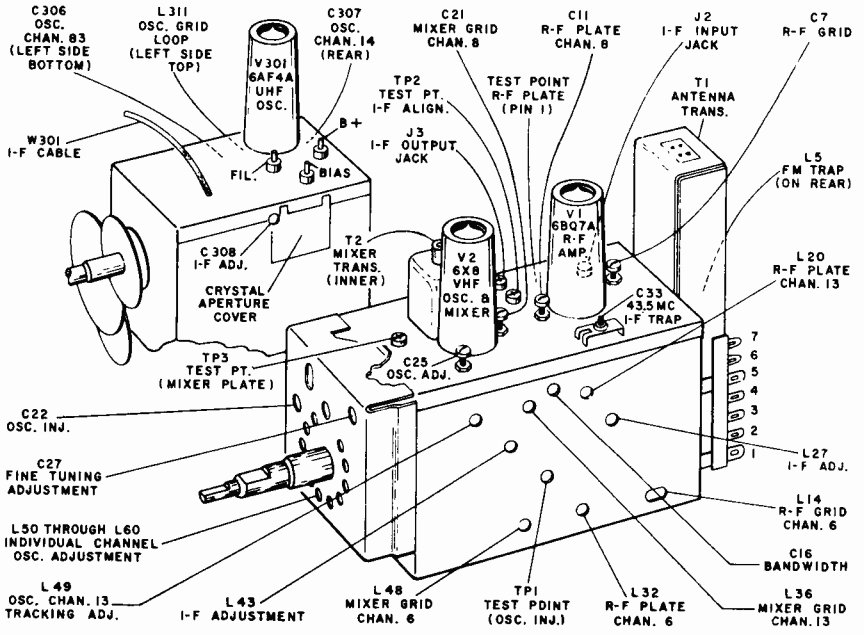
Direction of arrows at controls indicates clockwise rotation.

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

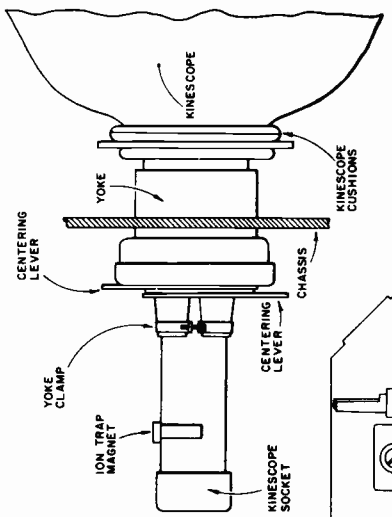
RCA Victor Chassis KCS-102B, KCS-102D, Models 14-S-7052(U), 14-S-7070(U), 14-S-7071(U), and 14-S-7074(U), Material Continued



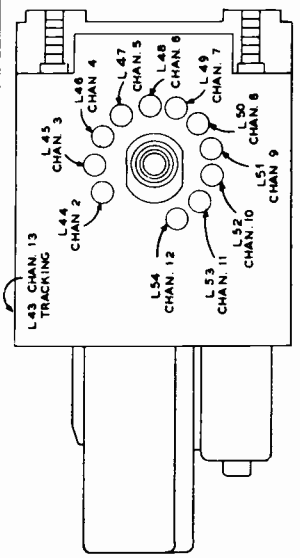
KRK32F TUNER ADJUSTMENTS



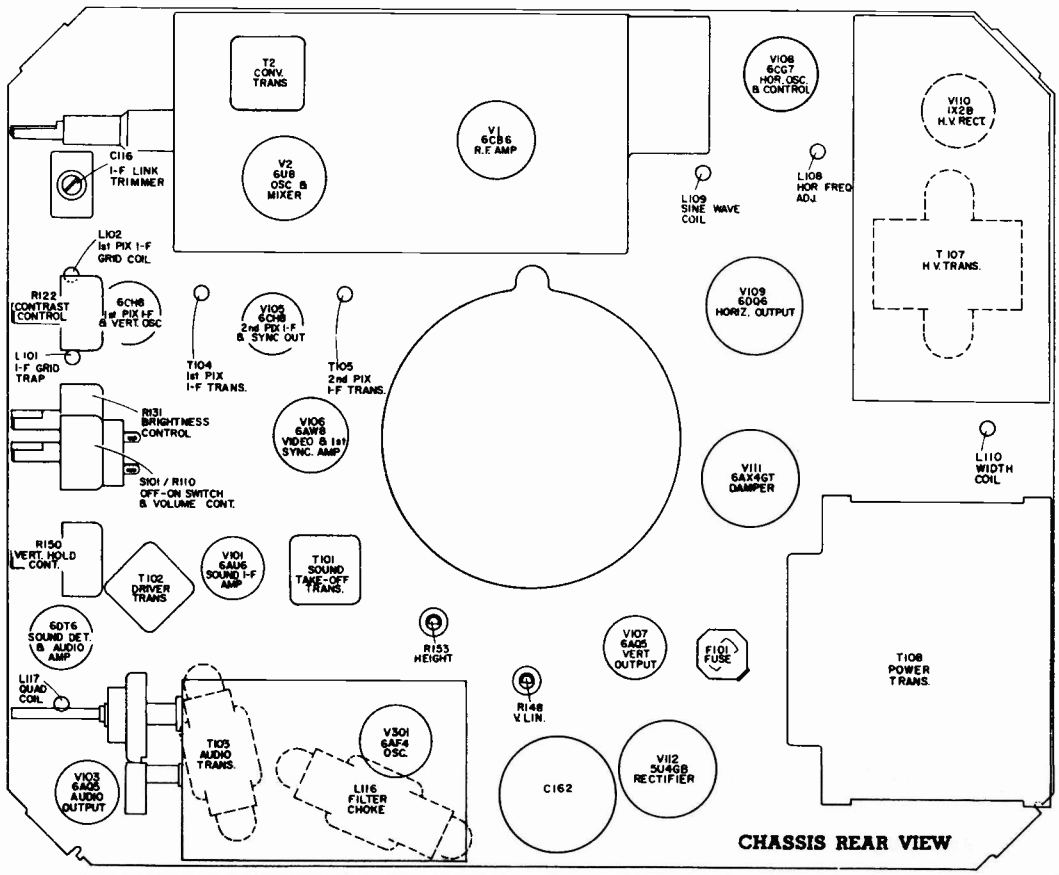
KRK29W/36 TUNER ADJUSTMENTS



YOKE AND MAGNET ADJUSTMENTS



R-F OSCILLATOR ADJUSTMENTS



CHASSIS REAR VIEW

RCA VICTOR

TELEVISION RECEIVERS—MODELS

21-D-7174(U), 21-D-7175(U), 21-D-7176(U), 21-D-7177(U), 21-D-7215(U), 21-D-7216(U), 21-D-7217(U), 21-D-7235(U), 21-D-7237(U)

Chassis No. KCS103A, KCS103B, KCS103C or KCS103D

The service material on the following six pages is exact for the group of sets listed above. The two groups of models listed at right and directly below, while using 24" picture tubes, are practically identical electrically to sets covered.

MODELS 24-T-7272(U) 24-T-7275(U), 24-T-7277(U)

Chassis No. KCS103N or KCS103P

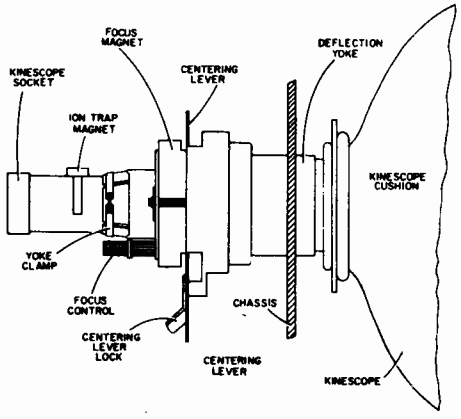
ADJUSTMENT OF HORIZONTAL OSCILLATOR. If the receiver failed to hold sync over two full turns of counter-clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments.

The width and drive adjustment 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 frequency control is rotated counter-clockwise from the fall out point.

If it is impossible to sync the picture and the AGC system is in proper adjustment it will be necessary to align the Horizontal Oscillator by the method outlined.



CENTERING ADJUSTMENT.—Centering is accomplished by means of a separate plate on the focus magnet. The centering plate includes a locking lever which must be loosened before centering. Up and down adjustment of the plate moves the picture from side to side and sidewise adjustment moves the picture up and down.

TELEVISION RECEIVERS—MODELS

24-D-7295, 24-D-7295U 24-D-7296, 24-D-7296U 24-D-7297, 24-D-7297U 24-D-7315, 24-D-7315U 24-D-7317, 24-D-7317U

Chassis Nos. KCS103R or KCS103T

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

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 ⅛" 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.

FOCUS.—Adjust the focus control for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

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 L53 on KRK52D or L5 on KRK52E tuners and is located on the rear of the antenna matching transformer.

RCA Victor Chassis KCS-103A, etc., Continued

AGC AND NOISE LIMITER CONTROLS.—The AGC and

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 R133 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.

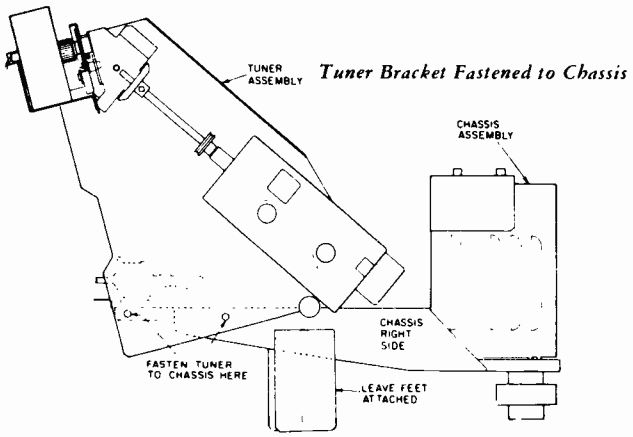
Set the horizontal hold control as far counter-clockwise as possible (toward motorboat condition) without sync becoming unstable.

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.

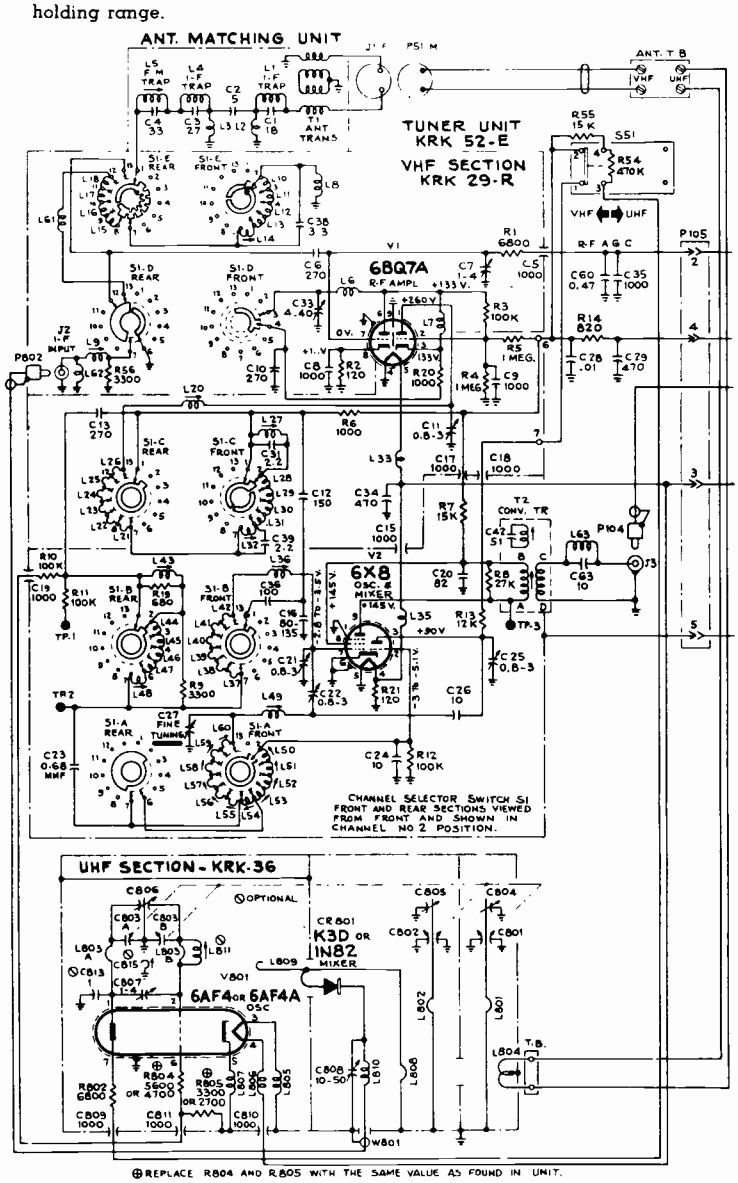
Return the horizontal hold control to the center of its holding range.

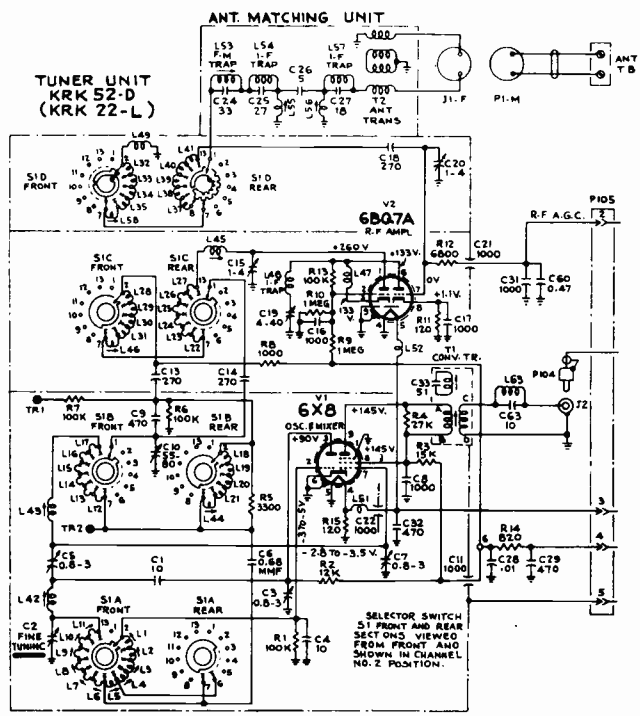
CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair, remove the control knobs, the cabinet back, the ion trap, unplug the speaker cable, the kinescope socket, the yoke and high voltage cable. Take out the bolts at the bottom and the nuts at the top of the chassis. Withdraw the chassis from the back of the cabinet.

The tuner assembly should be fastened to the chassis, if the chassis is to be transported out of the cabinet. To do this, turn the tuner bracket upside down from its normal position. With the front of the VHF Tuner toward the chassis front, fasten the bracket to the right side of the chassis, with self-tapping screws, through the two top mounting holes.



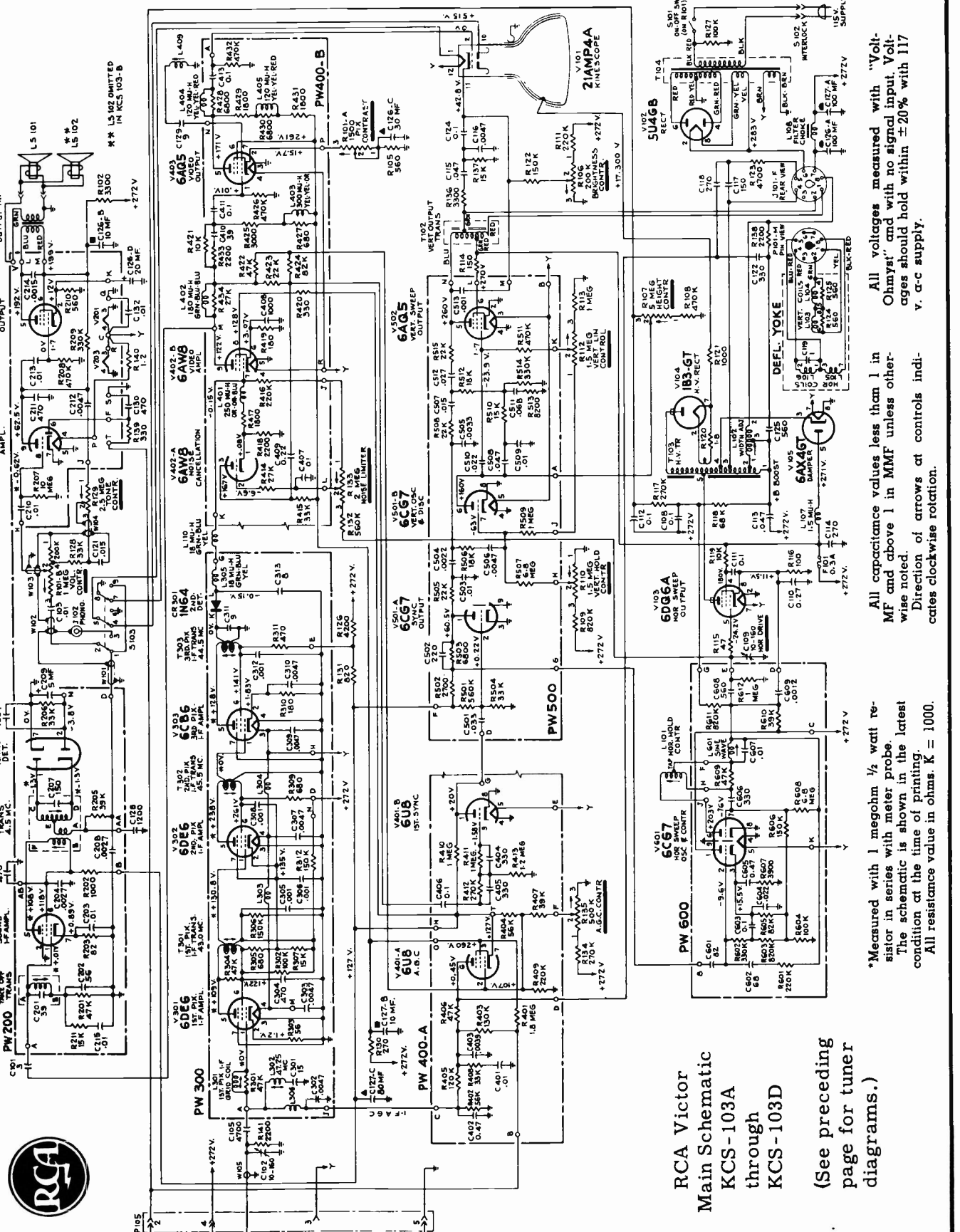
Tuner Bracket Fastened to Chassis





Circuit above is of tuner used with VHF models. Tuner circuit at left used with UHF/VHF models. Terminals 2, 3, 4, 5, connect to corresponding terminals of P105 of main chassis (diagram on adjacent page at right). Note also lead to plug P104 which connects to jack J3. In servicing, observe difference in terminal placement on P105 for chassis types.

CHASSIS CIRCUIT SCHEMATIC DIAGRAM



RCA Victor
Main Schematic
KCS-103A
through
KCS-103D

(See preceding page for tuner diagrams.)

*Measured with 1 megohm ½ watt resistor in series with meter probe. The schematic is shown in the latest condition at the time of printing. All resistance value in ohms. K = 1000.

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

Direction of arrows at controls indicates clockwise rotation.

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

Terminals connect to tuner used, see circuits on page at left.

RCA Victor Chassis KCS-103A to -D, -N, -P, -R, -T, Alignment Information

PICTURE I-F TRANSFORMER ADJUSTMENTS.—

All Models

Connect the i-f signal generator, in series with a 1500 mmf. ceramic capacitor, to the mixer grid test point TP2.

Connect the "VoltOhmyst" to the junction of R402 and R405 (Terminal "C" of PW400) and to ground.

Turn the Noise Limiter control fully clockwise.

Turn the AGC control fully clockwise.

Note: Improper alignment will result if the above controls are not set as indicated. If the horizontal circuit is disabled during alignment, a bias of —20V. must be applied to the grid, pin 2 of V402A and the AGC control must be fully clockwise to avoid damage to V401 and V402.

Obtain two 7.5 volt batteries capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across each. Connect the battery positive terminal of one to the chassis and the potentiometer arm to the junction of R402 and R405. The second battery will be used later.

Set the bias to produce approximately —5.0 volts of bias at the junction of R402 and R405.

Connect the "VoltOhmyst" to terminal "K" of PW400 and to ground.

Set the VHF signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "VoltOhymst." During alignment, reduce the input signal if necessary in order to produce 3.0 volts of d-c at terminal "K" of PW400 with —5.0 volts of i-f bias at the junction of R402 and R405.

44.5 mc. T303
45.5 mc. T302
43.0 mc. T301

Set the VHF signal generator to the following frequency and adjust the picture i-f trap for minimum d-c output at terminal "K" of PW400. Use sufficient signal input to produce 3.0 volts of d-c on the meter when the adjustment is made.

47.25 mc. .....L302 & T1 or T2 (top core)

SWEEP ALIGNMENT OF PICTURE I-F.—

For VHF Models

To align the mixer plate circuit, connect the sweep generator to the mixer grid test point TP2, in series with a 1500 mmf. ceramic capacitor. Use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable. Connect the sweep ground lead to the top of the tuner.

Set the channel selector switch to channel 4.

Preset C102 to minimum capacity.

Adjust the bias box potentiometer to obtain —5.0 volts of bias as measured by a "VoltOhmyst" at the junction of R402 and R405.

Connect a 180 ohm composition resistor between pin 5 and pin 6 of V301. Connect the oscilloscope diode probe to pin 5 of V301 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

Adjust T1 (bottom core) and L301 for maximum gain and with 45.75 mc. at 75% of maximum response.

Set the sweep output to give 0.3 to 0.5 volt peak-to-peak when making the final touch on the above adjustment.

Adjust C102 until 42.5 mc. is at 70% response with respect to the low frequency shoulder of the curve as shown in Figure 9. Maximum allowable tilt is 20%.

Disconnect the diode probe and the 180 ohm resistor.

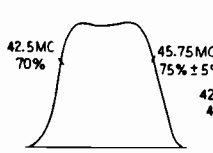


Figure 9— T1(T2) and L301 Response

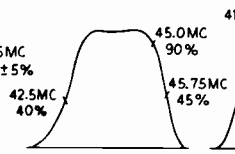


Figure 10— Overall I-F Response

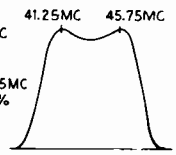


Figure 11— KRK52E L9 and C808 I-F Response

Connect the oscilloscope to terminal "K" of PW400.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible.

Adjust the output of the sweep generator to obtain 5.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T301, T302 and T303 to obtain the response shown in Figure 10.

Increase sweep output ten times and check attenuation at 41.25 mc. Adjust T301 and T303 to set 41.25 mc. between 25 and 35 times down with curve as shown in Figure 10.

Move the sweep generator to the antenna terminals. Connect —3.0 volts bias to terminal "B" of PW400. Adjust T302 and T303 slightly to correct for any overall tilt while switching from channel to channel.

For VHF/UHF Models

To align the mixer plate circuit, connect the sweep generator to the mixer grid test point TP2, in series with a 1500 mmf. ceramic capacitor. Use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable. Connect the sweep ground lead to the top of the tuner.

Set the channel selector switch to channel 4.

Preset C102 to minimum capacity.

Adjust the bias box potentiometer to obtain —5.0 volts of bias as measured by a "VoltOhmyst" at the junction of R402 and R405.

Connect a 180 ohm composition resistor between pin 5 and pin 6 of V301. Connect the oscilloscope diode probe to pin 5 of V301 and to ground.

Couple the signal generator loosely to the diode probe in order to obtain markers.

Adjust T2 (top core) and L301 for maximum gain and with 45.75 mc. at 75% of maximum response.

Set the sweep output to give 0.3 to 0.5 volt peak-to-peak when making the final touch on the above adjustment.

Adjust C102 until 42.5 mc. is at 70% response with respect to the low frequency shoulder of the curve as shown in Figure 9. Maximum allowable tilt is 20%.

Disconnect the diode probe and the 180 ohm resistor.

Connect the oscilloscope to terminal "K" of PW400.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible.

Adjust the output of the sweep generator to obtain 5.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T301, T302 and T303 to obtain the response shown in Figure 10.

Increase sweep output ten times and check attenuation at 41.25 mc. Adjust T301 and T303 to set 41.25 mc. between 25 and 35 times down with curve as shown in Figure 10.

To align the I-F amplifier circuit of the KRK52E, connect the VHF sweep generator to the front terminal of the 1N82 crystal holder in series with a 100 ohm resistor and a 1500 mmf. ceramic capacitor. Use the shortest leads possible, grounding the sweep ground lead to the tuner case.

To do this, remove the crystal cover and connect the resistor, after insulating the lead with tubing, to the crystal front terminal.

Set the UHF CHANGEOVER switch to the UHF position, and the UHF TUNING between channels 68 and 69 at 800 mc.

Connect a 220 ohm composition resistor and a 1500 mmf. capacitor in series between the plate, pin 1, of V1 6BQ7A and ground with the capacitor connected to pin 1 and the resistor to ground. This point is accessible through the hole in the left side of the tuner (refer to Figure 18). Connect the oscilloscope diode probe to the junction between the resistor and capacitor.

Couple the VHF signal generator loosely to the diode probe in order to obtain markers.

RCA Victor Chassis KCS-103A to -D, -N, -P, -R, -T, Alignment Information

Connect the potentiometer arm of the second bias supply to terminal "B" of PW400 and ground the battery positive terminal to the chassis. Adjust the bias potentiometer to produce −3.0 volts of bias, as measured by the "VoltOhmyst" at terminal "B" of PW400.

Set the sweep generator to produce 0.5 volt or less peak-to-peak on the oscilloscope.

Adjust C808, on the UHF section, and L9, on the VHF section, of the tuner for maximum gain with 45.75 mc. and 41.25 mc. markers as shown in Figure 11.

Move the diode detector to test point TP3 and adjust L27 and L43 for curve as shown in Figure 11.

Remove the resistor, capacitor and diode probe from TP3 and connect the oscilloscope to terminal "K" of PW400. Use 3.0 v peak-to-peak on the oscilloscope.

Connect the VHF sweep generator to the VHF antenna terminals. Keep the AGC bias at −3.0 V and the I-F bias at −5.0 volts.

Couple the signal generator loosely to the grid of the first picture I-F amplifier.

Switch through all VHF channels and check for proper curve shape as in Figure 10. Retouch T302 and T303 slightly to correct for any overall tilt that is essentially the same on all channels.

Disconnect the VHF sweep generator and connect the UHF sweep generator to the UHF antenna terminals. Check on all UHF channels for proper wave shape as shown in Figure 10, retouching L27 and L43 if necessary to correct any overall tilt.

Do not retouch C808, L9, T2, T301, T302 or T303.

Remove the sweep and marker generators and the bias supplies.

RATIO DETECTOR ALIGNMENT.—Set the signal generator at 4.5 mc. and connect it to the first video amplifier grid, pin 7 of V402B (terminal "K" of PW400), in series with a .01 mfd. capacitor.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed. In such a case, connect the calibrator to the grid of the third pix i-f amplifier, pin 1 of V303.

Set the frequency of the calibrator to 45.75 mc. (pix carrier) and modulate with 4.5 mc. crystal. The 4.5 mc. signal will be picked off at pin 9 of V402B and amplified through the sound i-f amplifier.

Connect the "VoltOhmyst" to pin 2 of V202A (terminal "N" of PW200).

Tune the ratio detector primary, T202 top core for maximum d-c output on the "VoltOhmyst." Adjust the signal level from the signal generator for 10 to 12 volts on the "VoltOhmyst" when finally peaked. This is approximately the operating level of the ratio detector for average signals.

Connect two matched 100,000 ohm resistors in series between terminal "N" of PW200 (pin 2 of V202A) and ground.

Connect the "VoltOhmyst" to terminal "D" of PW200 and the ground lead to the junction between the two 100,000 ohm resistors.

Tune the ratio detector secondary T202 bottom core for zero d-c on the "VoltOhmyst."

Repeat adjustments of T202 top for maximum d-c at pin 2 of V202 and T202 bottom for zero d-c at terminal "D" of PW200. Make the final adjustments with the signal input level adjusted to produce 10 to 12 volts d-c on the "VoltOhmyst."

SOUND TAKE-OFF ALIGNMENT.—Connect the signal generator to terminal "K" of PW400.

As an alternate source of signal, the RCA WR39B or WR39C calibrator may be employed as above.

Connect the "VoltOhmyst" to pin 2 of V202A (terminal "N" of PW200).

Tune the T201 top core for maximum d-c on the "VoltOhmyst."

The output from the signal generator should be set to produce approximately 10 to 12 volts on the "VoltOhmyst" when the final touches on the above adjustment are made.

4.5 MC. TRAP ADJUSTMENT.—Connect the signal generator in series with a .01 mf. capacitor to pin 7 of V402B (terminal "K" of PW400). Set the generator to 4.5 mc. and modulate it 30% with 400 cycles. Set the output to approximately 0.5 volt.

Short the third pix i-f grid to ground, pin 1, V303, to prevent noise from masking the output indication.

Set the picture control R101A to its maximum clockwise position.

Connect the crystal diode probe of an oscilloscope to terminal "A" of PW400.

Adjust the core of L109 for minimum output on the oscilloscope.

Remove the short from pin 1, V303 to ground.

As an alternate method, this step may be omitted at this point in the alignment procedure and the adjustment made "on the air" after the alignment is completed.

If this is done, tune in a station and observe the picture on the kinescope. If no 4.5 mc. beat is present in the picture, when the fine tuning control is set for proper oscillator-frequency, then L109 requires no adjustment. If a 4.5 mc. beat is present, turn the fine tuning control slightly clockwise so as to exaggerate the beat and then adjust L109 for minimum beat.

HORIZONTAL OSCILLATOR AND OUTPUT ALIGNMENT.—Normally the alignment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustments in the field. However, the waveform adjustment should be checked whenever the receiver is aligned.

The proper setting of the width and drive adjustments, should be made before making adjustment of the sine wave coil L601.

Place a jumper across the terminals of the sine wave coil L601 and adjust the horizontal hold control until the picture pulls into sync. Remove the short across the sine wave coil.

Connect the low capacity probe of an oscilloscope to terminal "F" of PW600. Turn the horizontal hold control clockwise until the picture falls out of sync, then counter-clockwise until the picture just pulls into sync. The pattern on the oscilloscope should be as shown in Figure 22C. Adjust the sine wave adjustment core L601 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the horizontal hold control if necessary.

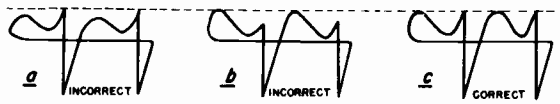


Figure 22—Horizontal Oscillator Waveforms

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator may occur. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Drive Adjustment.—Turn the horizontal hold control until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal control counter-clockwise and note the number of diagonal bars obtained just before the picture pulls into sync.

Pull-in should occur with one and one-half to three bars present.

Set the width control fully counter-clockwise.

With the horizontal control set at the pull-in point, adjust the horizontal drive trimmer C109 counter-clockwise for a bright vertical line in the center of the picture. Turn the trimmer clockwise until the line just disappears. If no line appears set the drive trimmer fully counter-clockwise.

Set the brightness control to normal and adjust the width control so the picture overscans the mask ¾" at each side with normal line voltage (117V. AC). Readjust the horizontal drive trimmer as above.

RCA Victor Chassis KCS-103A to -D, Service Material, Continued

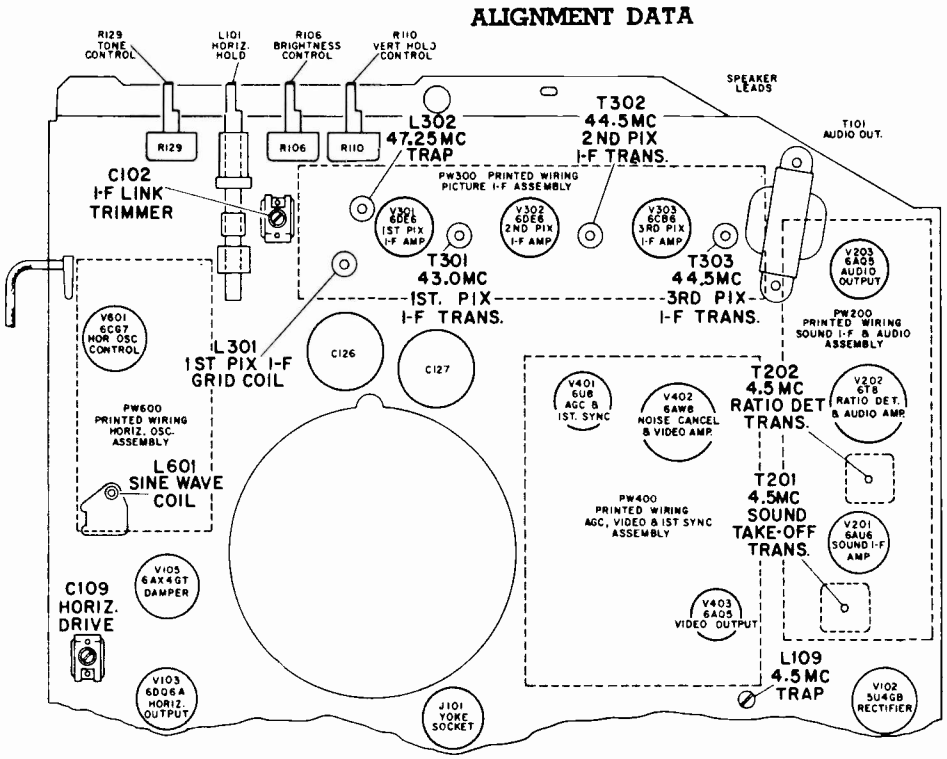
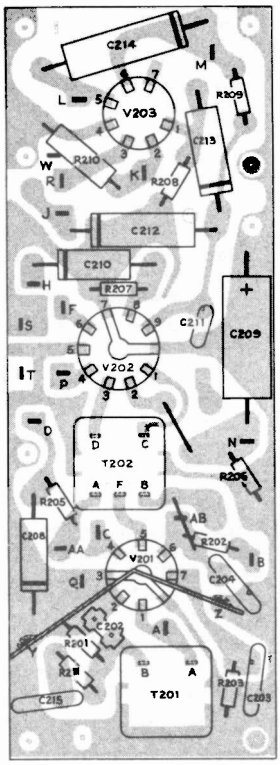


Figure 23—Rear Chassis Adjustments



PW200—SOUND I-F & AUDIO UNIT LAYOUT

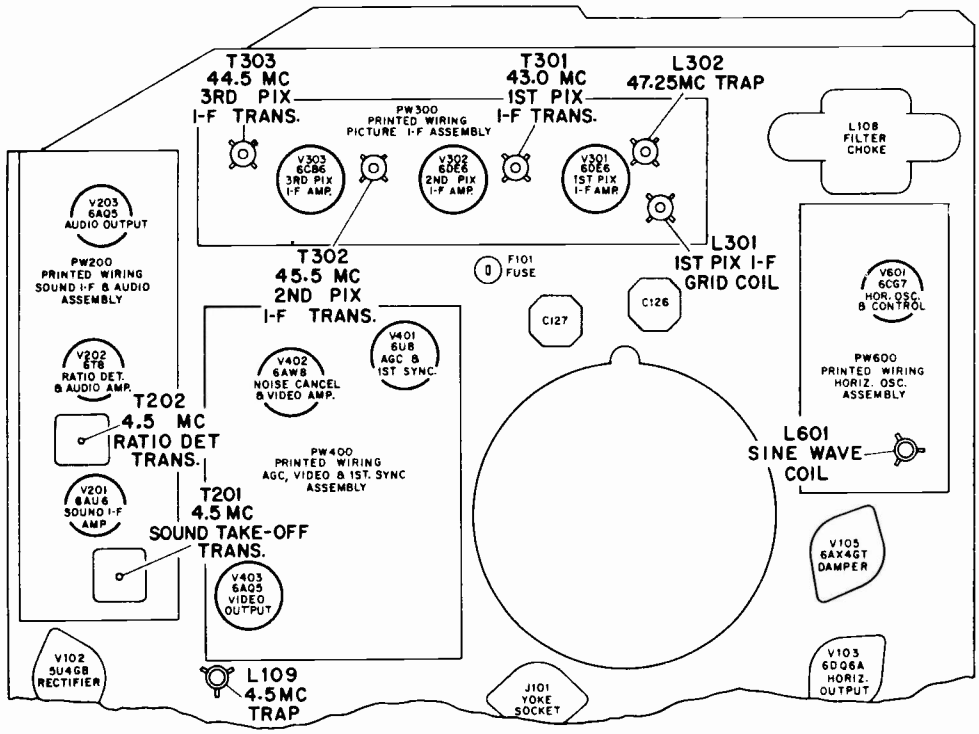
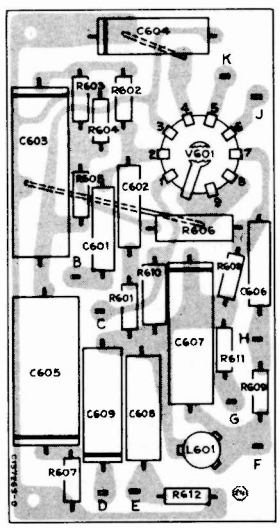


Figure 24—Front Chassis Adjustments



PW600—HORIZONTAL OSCILLATOR UNIT LAYOUT

For material on other printed circuit assemblies, see data presented on KCS-103 Chassis in preceding RCA section.

RCA VICTOR

The service material on the following eight pages is exact for the group of sets listed at right. The group of models listed below is practically identical electrically to this group and the same service material will apply. The 24D Series listed at right (below first group) are also practically identical to these sets although they use a 24CP4A picture tube.

TELEVISION RECEIVERS — MODELS

21-T-7385(U), 21-T-7386(U), 21-T-7387(U), 21-T-7415(U), 21-T-7416(U), 21-T-7417(U)

Chassis Nos. KCS104A, KCS104B, KCS104C, KCS104D

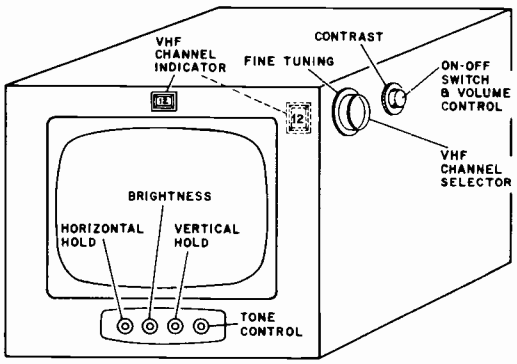
TELEVISION RECEIVERS — MODELS

21-D-7425(U), 21-D-7427(U), 21-D-7445(U), 21-D-7446(U), 21-D-7447(U), 21-D-7479(U), 21-D-7485(U), 21-D-7487(U), 21-D-7488(U), 21-D-7505(U), 21-D-7506(U), 21-D-7507(U)

Chassis Nos. KCS104E, KCS104F, KCS104H, KCS104J, KCS104K or KCS104L

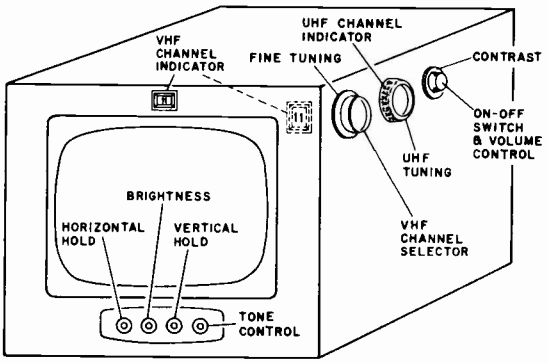
24-D-7545(U), 24-D-7547(U), 24-D-7566(U), 24-D-7568(U), 24-D-7587(U), 24-D-7705(U), 24-D-7706(U), 24-D-7708(U), 24-D-7726(U), 24-D-7728(U)

Chassis Nos. KCS104AA, KCS104AB, KCS104AC, KCS104AD, KCS104AE or KCS104AF



21-D-7425 to 21-D-7507 Incl.

Figure 1—Operating Controls — VHF Models



21-D-7425U to 21-D-7507U Incl.

Figure 2—Operating Controls — UHF/VHF Models

ION TRAP MAGNET ADJUSTMENT.—Set the ion trap magnet approximately in the position shown in Figure 3. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Turn the focus control (shown in Figure 3) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches of this adjustment should be made with the brightness control at the maximum clockwise position with which good line focus can be maintained.

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

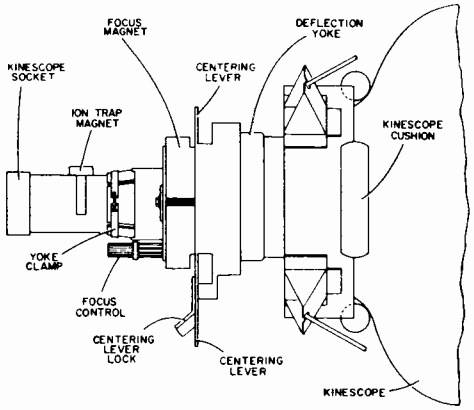


Figure 3—Yoke and Magnet Adjustments

RCA Victor Chassis KCS-104A, etc., KCS-104AA, etc., Service Material, Continued

PICTURE ADJUSTMENTS.—It will now be necessary to obtain a test pattern or picture in order to make further adjustments.

When the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC control is misadjusted, and the receiver is overloading, it may be impossible to sync.

If the receiver is overloading, turn R135 on the rear apron (see Figure 4) counter-clockwise until the set operates normally and the picture can be synced.

CHECK OF HORIZONTAL OSCILLATOR ADJUSTMENT.—Turn the horizontal hold control in the extreme clockwise position. The picture should be out of sync, with approximately twelve 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 full turns 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 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".

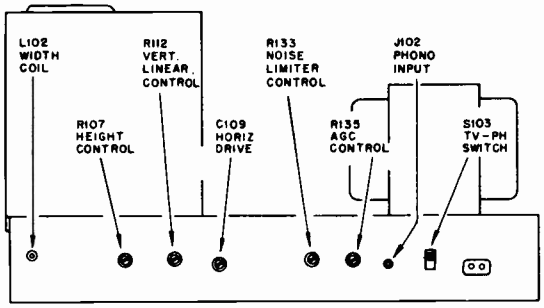


Figure 4—Rear Chassis Adjustments

ADJUSTMENT OF HORIZONTAL OSCILLATOR.—If in the above check the receiver failed to hold sync over two full turns 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 frequency control is rotated counter-clockwise from the fall out point.

If it is impossible to sync the picture and the AGC system is in proper adjustment it will be necessary to align the Horizontal Oscillator by the method outlined in the alignment procedure.

CENTERING ADJUSTMENT.—Centering is accomplished by means of a separate plate on the focus magnet. The centering plate includes a locking lever which must be loosened before centering. Up and down adjustment of the plate moves the picture from side to side and sidewise adjustment moves the picture up and down.

If a corner of the raster is shadowed, check the position of the ion trap magnet. Reposition the magnet within the range of maximum raster brightness to eliminate the shadow and recenter the picture by adjustment of the focus magnet plate. In no case should the magnet be adjusted to cause any loss of brightness since such operation may cause immediate or eventual damage to the tube. In some cases it may be necessary to shift the position of the focus magnet in order to eliminate a corner shadow.

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 apron) until the picture overscans approximately ⅜" at both top and bottom. Adjust vertical linearity (R112 on chassis rear apron) 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.

FOCUS.—Adjust the focus control for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

Recheck the position of the ion trap magnet to make sure that maximum brightness is obtained.

VHF R-F OSCILLATOR ADJUSTMENT (All Models).—Tune in all available stations to assure that the receiver r-f oscillator is adjusted to the proper frequency on all channels.

To perform oscillator adjustments the tuner bracket must be unmounted from the cabinet. To do this, remove all the knobs on the side of the cabinet. Take off the nuts holding the tuner bracket and drop the bracket down to a position where adjustment can be made.

Adjustments for channels 2 through 12 are available through the holes on the front of the tuner and progress clockwise from 2 to 12 starting at the large blank space at the upper right. Adjustment for channel 13 is on top of the tuner chassis.

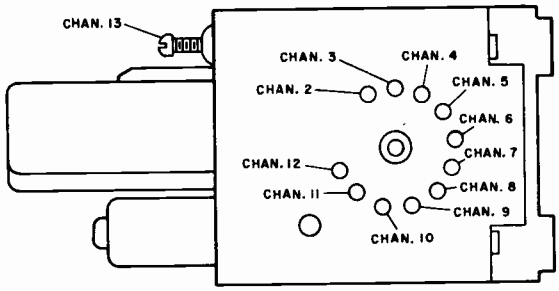


Figure 5—VHF R-F Oscillator Adjustments

AGC AND NOISE LIMITER CONTROLS.—The AGC and Noise Limiter controls should be checked for proper adjustment at the time of installation of the receiver.

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 R133 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 location set at 15° from point of bend.

Return the horizontal hold control to the center of its holding range.

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 L53 on VHF tuners or L5 on UHF/VHF tuners and is located on the rear of the antenna matching transformer.

KINESCOPE AND SAFETY GLASS CLEANING.—The safety glass may be removed from the front of the cabinet to allow for cleaning of the kinescope faceplate and safety glass if required.

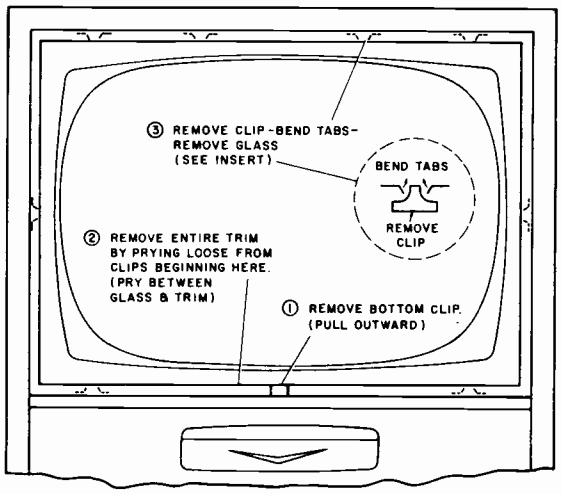


Figure 6—Safety Glass Removal

To do this, pull off clip on bottom metal trim and pry off entire trim beginning at bottom.

Straighten the tabs on the nine metal fasteners referred to in figure 6. Remove the clips and the safety glass.

The kinescope faceplate and the safety glass should be cleaned only with a soft cloth and "Windex" or similar cleaning agent.

Replace the safety glass and the nine clips. Bend the tabs on the metal fasteners and replace the trim.

Replace the safety glass, the four retainers and the metal trim.

CHASSIS REMOVAL.—To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the control knobs, the cabinet back, unplug the speaker cable, the kinescope socket, the antenna cable, the yoke and high voltage cable. Take out the chassis bolts under the cabinet. Remove the nuts holding the tuner bracket assembly to the side of the cabinet. Withdraw both the chassis and tuner assembly from the rear of the cabinet.

The tuner assembly should be fastened to the chassis, if the chassis is to be transported out of the cabinet. To do this, turn the tuner bracket upside down from its normal position. With the front of the VHF Tuner toward the chassis front, fasten the bracket to the right side of the chassis, with self-tapping screws, through the two top mounting holes. Holes are provided in the chassis for this purpose. (Refer to figure 7.)

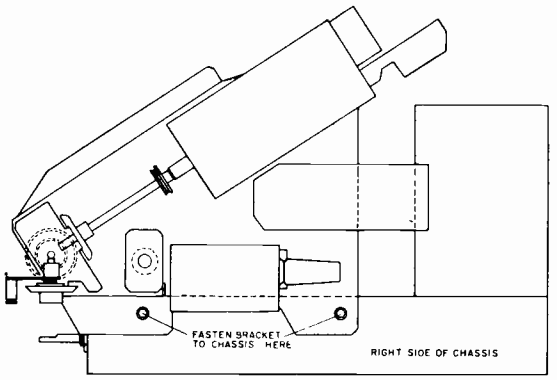


Figure 7—Tuner Bracket Fastened to Chassis

ALIGNMENT DATA

PICTURE I-F TRANSFORMER ADJUSTMENTS.—
All Models

Connect the i-f signal generator, in series with a 1500 mmf. ceramic capacitor, to the mixer grid test point TP2.

Connect the "VoltOhmyst" to the junction of R402 and R405 (Terminal "C" of PW400) and to ground.

Turn the Noise Limiter control fully clockwise.

Turn the AGC control fully clockwise.

Note: Improper alignment will result if the above controls are not set as indicated. If the horizontal circuit is disabled during alignment, a bias of —20V. must be applied to the grid, pin 2 of V402A and the AGC control must be fully clockwise to avoid damage to V401 and V402.

Obtain two 7.5 volt batteries capable of withstanding appreciable current drain and connect the ends of a 1,000 ohm potentiometer across each. Connect the battery positive terminal of one to the chassis and the potentiometer arm to the junction of R402 and R405. The second battery will be used later

Set the bias to produce approximately —5.0 volts of bias at the junction of R402 and R405.

Connect the "VoltOhmyst" to terminal "K" of PW400 and to ground.

Set the VHF signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "VoltOhmyst." During alignment, reduce the input signal if necessary in order to produce 3.0 volts of d-c at terminal "K" of PW400 with —5.0 volts of i-f bias at the junction of R402 and R405.

44.5 mc.	T303
45.5 mc.	T302
43.0 mc.	T301

Set the VHF signal generator to the following frequency and adjust the picture i-f trap for minimum d-c output at terminal "K" of PW400. Use sufficient signal input to produce 3.0 volts of d-c on the meter when the adjustment is made.

47.25 mc. ..... L302 & T1 or T2 (Top core)

SWEEP ALIGNMENT OF PICTURE I-F.—
All Models

To align the mixer plate circuit, connect the sweep generator to the mixer grid test point TP2, in series with a 1500 mmf. ceramic capacitor. Use the shortest leads possible, with not more than one inch of unshielded lead at the end of the sweep cable. Connect the sweep ground lead to the top of the tuner.

Set the channel selector switch to channel 4.

Preset C102 to minimum capacity.

Adjust the bias box potentiometer to obtain —5.0 volts of bias as measured by a "VoltOhmyst" at the junction of R402 and R405.

Connect a 180 ohm composition resistor between pin 5 and pin 6 of V301. Connect the oscilloscope diode probe to pin 5 of V301 and to ground.

RCA Victor Chassis KCS-104A, etc., KCS-104AA, etc., Service Material, Continued

Couple the signal generator loosely to the diode probe in order to obtain markers.

Adjust T1 or T2 (bottom core) and T104 (top) for maximum gain and with 45.75 mc. at 75% of maximum response.

Set the sweep output to give 0.3 to 0.5 volt peak-to-peak when making the final touch on the above adjustment.

Adjust C102 until 42.5 mc. is at 70% response with respect to the low frequency shoulder of the curve as shown in Figure 10. Maximum allowable tilt is 20%.

Disconnect the diode probe and the 180 ohm resistor.

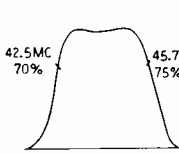


Figure 10— T1(T2) and L301 Response

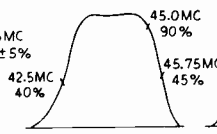


Figure 11— Overall I-F Response

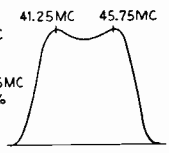


Figure 12— L9 and C808 I-F Response

Connect the oscilloscope to terminal "K" of PW400.

Leave the sweep generator connected to the mixer grid test point TP2 with the shortest leads possible.

Adjust the output of the sweep generator to obtain 5.0 volts peak-to-peak on the oscilloscope.

Couple the signal generator loosely to the grid of the first pix i-f amplifier. Adjust the output of the signal generator to produce small markers on the response curve.

Retouch T301, T302 and T303 to obtain the response shown in Figure 11.

Increase sweep output ten times and check attenuation at 41.25 mc. Adjust T301 and T303 to set 41.25 mc. between 25 and 35 times down with curve as shown in Figure 11.

Move the sweep generator to the antenna terminals. Connect —3.0 volts bias to terminal "B" of PW400. Adjust T302 and T303 slightly to correct for any overall tilt while switching from channel to channel.

UHF/VHF Models only

To align the I-F amplifier circuit of the UHF/VHF tuner, connect the VHF sweep generator to the front terminal of the 1N82 crystal holder in series with a 1000 ohm resistor and a 1500 mmf. ceramic capacitor. Use the shortest leads possible, grounding the sweep ground lead to the tuner case.

To do this, remove the crystal cover and connect the resistor, after insulating the lead with tubing, to the crystal front terminal.

Set the UHF CHANGEOVER switch to the UHF position, and the UHF TUNING between channels 68 and 69 at 800 mc.

Connect a 220 ohm composition resistor and a 1500 mmf. capacitor in series between the plate, pin 1, of V1 6BQ7A and ground with the capacitor connected to pin 1 and the resistor to ground. This point is accessible through the hole in the left side of the tuner (refer to figure 19). Connect the oscilloscope diode probe to the junction between the resistor and capacitor.

Couple the VHF signal generator loosely to the diode probe in order to obtain markers.

Connect the potentiometer arm of the second bias supply to terminal "B" of PW400 and ground the battery positive terminal to the chassis. Adjust the bias potentiometer to produce —3.0 volts of bias, as measured by the "VoltOhmyst" at terminal "B" of PW400.

Set the sweep generator to produce 0.5 volt or less peak-to-peak on the oscilloscope.

Adjust C808, on the UHF section, and L9, on the VHF section, of the tuner for maximum gain with 45.75 mc. and 41.25 mc. markers as shown in figure 12.

Move the diode detector to test point TP3 and adjust L27 and L43 for curve as shown in figure 12.

Remove the resistor, capacitor and diode probe from TP3 and connect the oscilloscope to terminal "K" of PW400. Use 3.0v peak-to-peak on the oscilloscope.

Connect the VHF sweep generator to the VHF antenna terminals. Keep the AGC bias at —3.0 V and the I-F bias at —5.0 volts.

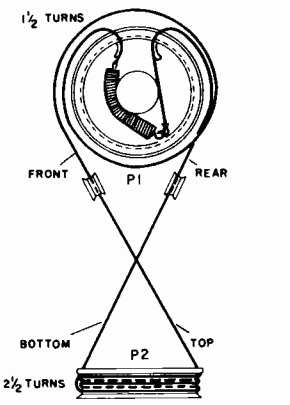
Couple the signal generator loosely to the grid of the first picture I-F amplifier.

Switch through all VHF channels and check for proper curve shape as in figure 11. Retouch T302 and T303 slightly to correct for any overall tilt that is essentially the same on all channels.

Disconnect the VHF sweep generator and connect the UHF sweep generator to the UHF antenna terminals. Check on all UHF channels for proper wave shape as shown in figure 11. retouching L27 and L43 if necessary to correct any overall tilt.

Do not retouch C808, L9, T2, T301, T302 or T303.

Remove the sweep and marker generators and the bias supplies.



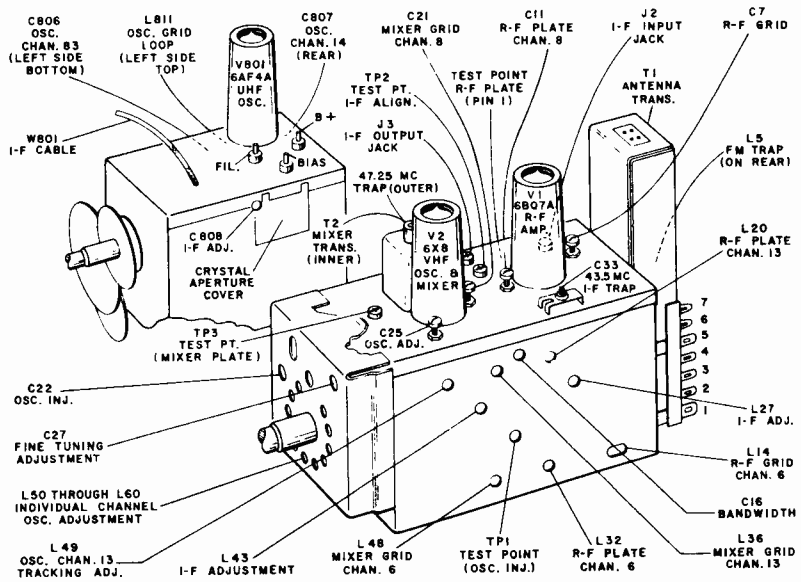


Figure 19—UHF/VHF Tuner Adjustments

RCA Victor Chassis KCS-104A, etc., KCS-104AA, etc., Service Material, Continued

RATIO DETECTOR AND SOUND I-F ALIGNMENT.—Set the signal generator at 4.5 mc. and connect it to the video amplifier grid, pin 7 of V402B (terminal "K" of PW400) in series with a .01 mfd. capacitor.

Connect the "VoltOhmyst" to pin 2 of V202A. (Terminal "N" of PW200.)

Tune the ratio detector secondary T202 bottom core for maximum d-c on the "VoltOhmyst."

Tune the ratio detector transformer T202 (top) core for maximum d-c output on the "VoltOhmyst." (Peak with core at end of coil away from chassis.) Adjust the signal level from the signal generator for 10 to 12 volts on the "VoltOhmyst" when finally peaked, when making the above adjustments.

Tune the T201 (top) core for maximum d-c on the "VoltOhmyst."

The output from the signal generator should be set to produce approximately 10 to 12 volts on the "VoltOhmyst" when the final touches on the T201 adjustment are made.

Connect two matched 100,000 ohm resistors in series between terminal "N" of PW200 and ground.

Connect the "VoltOhmyst" to terminal "D" of PW200 and the ground lead to the junction between the two 100,000 ohm resistors.

Tune T202 bottom for zero d-c on the "VoltOhmyst."

4.5 MC. TRAP ADJUSTMENT.—Connect the signal generator in series with a .01 mf. capacitor to pin 7 of V402B (terminal "K" of PW400). Set the generator to 4.5 mc. and modulate it 30% with 400 cycles. Set the output to approximately 0.5 volt.

Short the third pix i-f grid to ground, pin 1, V303, to prevent noise from masking the output indication.

Set the picture control R101A to its maximum clockwise position.

Connect the crystal diode probe of an oscilloscope to terminal "A" of PW400.

Adjust the core of L109 for minimum output on the oscilloscope.

Remove the short from pin 1 of V303 to ground.

As an alternate method, this step may be omitted at this point in the alignment procedure and the adjustment made "on the air" after the alignment is completed.

If this is done, tune in a station and observe the picture on the kinescope. If no 4.5 mc. beat is present in the picture, when the fine tuning control is set for proper oscillator-frequency, then L109 requires no adjustment. If a 4.5 mc. beat is present, turn the fine tuning control slightly clockwise so as to exaggerate the beat and then adjust L109, for minimum beat.

HORIZONTAL OSCILLATOR AND OUTPUT ALIGNMENT.—Normally the alignment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment may require the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned.

Place a jumper across the terminals of the sine wave coil L601 and adjust the horizontal hold control until the picture pulls into sync. Remove the short across the sine wave coil.

Connect the low capacity probe of an oscilloscope to terminal "F" of PW600. Turn the horizontal hold control clockwise until the picture falls out of sync, then counter-clockwise until the picture just pulls into sync. The pattern on the oscilloscope should be as shown in Figure 23C. Adjust the sine wave adjustment core L601 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the horizontal hold control if necessary.

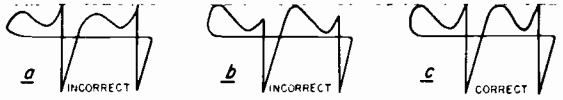


Figure 23—Horizontal Oscillator Waveforms

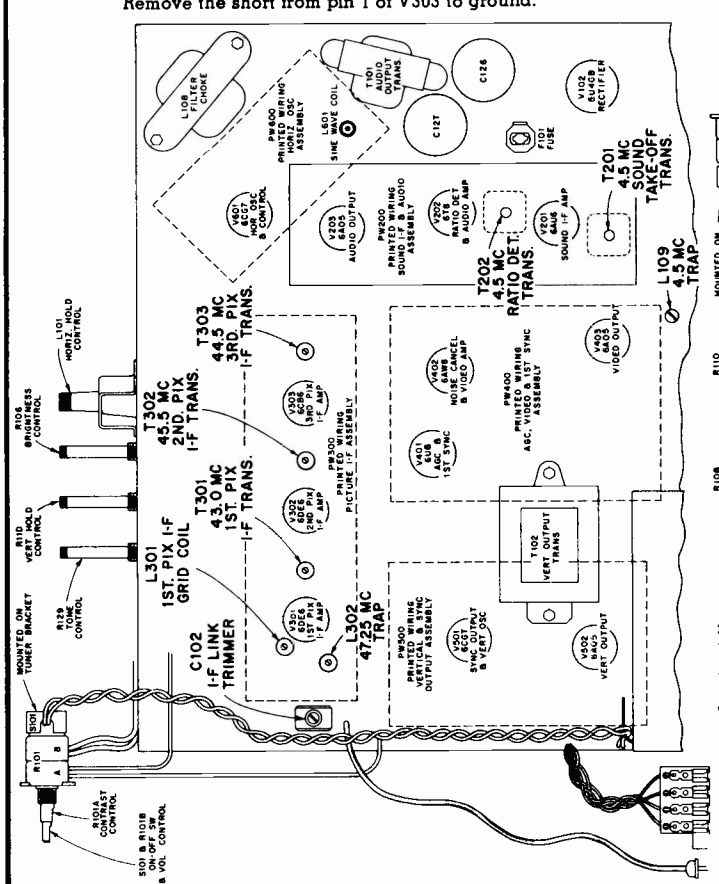


Figure 25—Top Chassis Adjustments

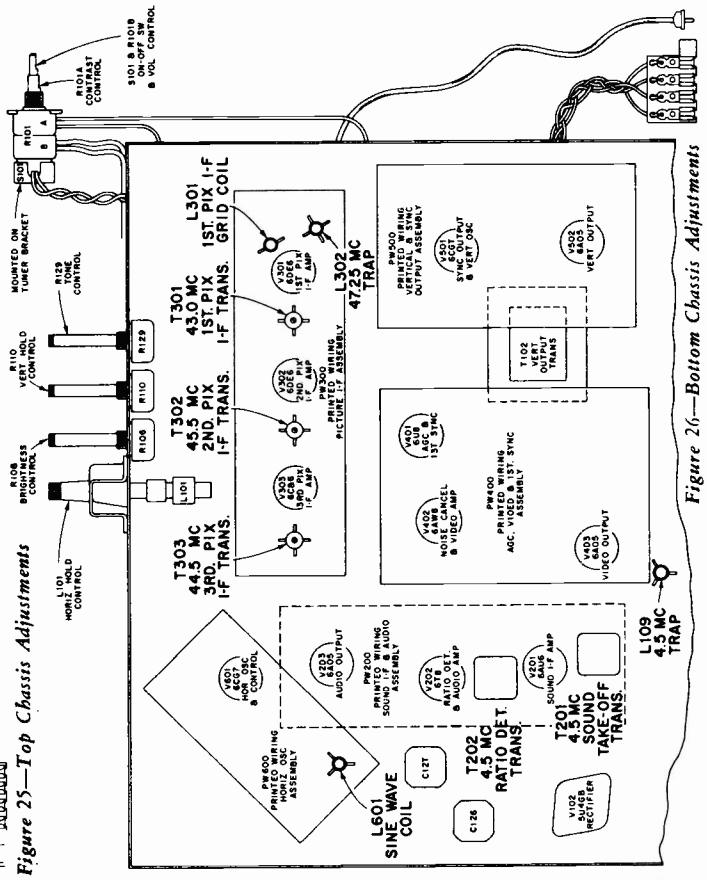


Figure 26—Bottom Chassis Adjustments

RCA Victor Chassis KCS-104A, etc., KCS-104AA, etc., Service Material, Continued

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator may occur. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Horizontal Drive Adjustment.—Turn the horizontal hold control until the picture falls out of sync with the diagonal lines sloping down to the left. Slowly turn the horizontal control counter-clockwise and note the number of diagonal bars obtained just before the picture pulls into sync.

Pull-in should occur with one and one-half to three bars present.

Set the width control fully counter-clockwise.

With the horizontal control set at the pull-in point, adjust the horizontal drive trimmer C109 counter-clockwise for a bright vertical line in the center of the picture. Turn the trimmer clockwise until the line just disappears. If no line appears set the drive trimmer fully counter-clockwise.

Set the brightness control to normal and adjust the width control so the picture overscans the mask ¾" at each side with normal line voltage (117V. AC). Readjust the horizontal drive trimmer as above.

The picture should pull into sync with one and one-half to three bars present, remain in sync for approximately two full turns counter-clockwise from pull-in, and fall out of sync with between 2 and 5 bars present before interrupted oscillation (motorboating) occurs.

AGC AND NOISE LIMITER ADJUSTMENTS.—Disconnect all test equipment except the oscilloscope which should be connected to pin 1 of V403.

Connect an antenna to the receiver antenna terminals.

Tune in a strong signal and adjust the oscilloscope to see the video waveform.

Turn the Noise Limiter control fully clockwise.

From a counter-clockwise position, advance the AGC control until the tips of sync become compressed then counter-clockwise until no compression is observed.

Observe the peak-to-peak voltage on the oscilloscope and adjust the AGC control for a reading 60% of the original value observed.

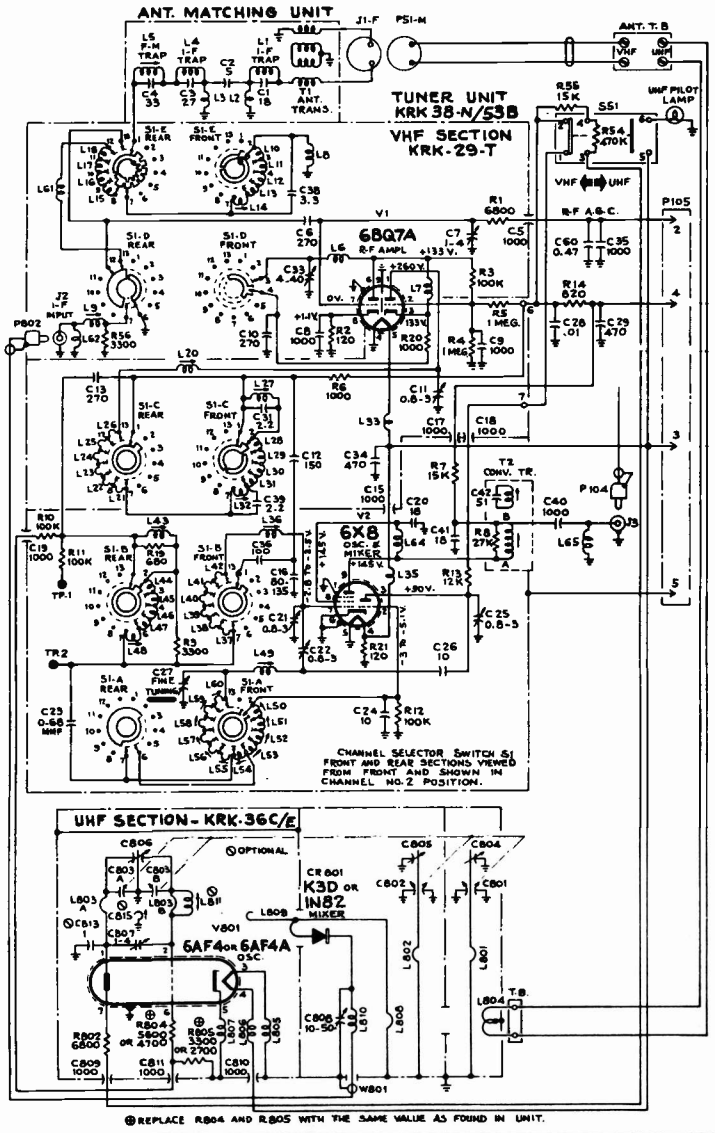
Set the fine tuning control until a 4.5 mc. sound beat is just perceptible in the picture.

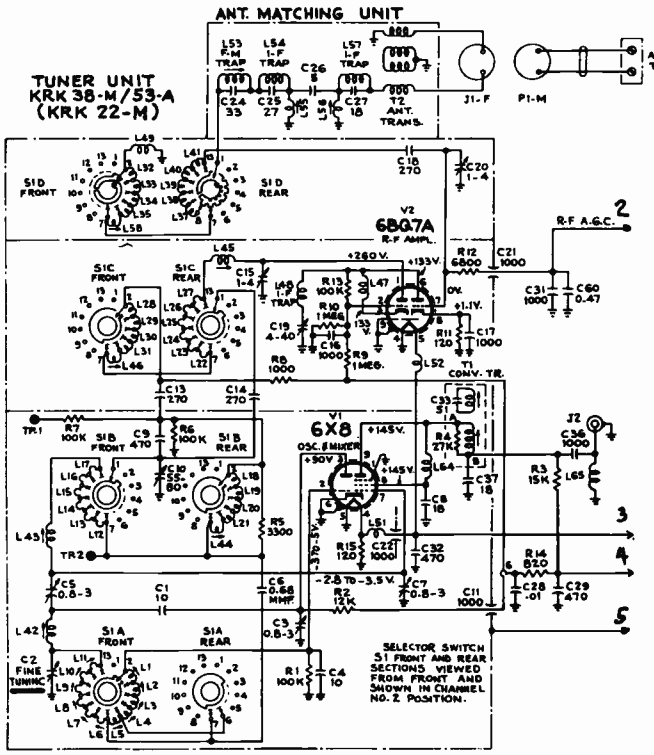
Readjust the AGC control clockwise until compression occurs then counter-clockwise until the compression just disappears.

Set the horizontal hold control as far counter-clockwise (toward motorboat) as possible without making the horizontal sync unstable.

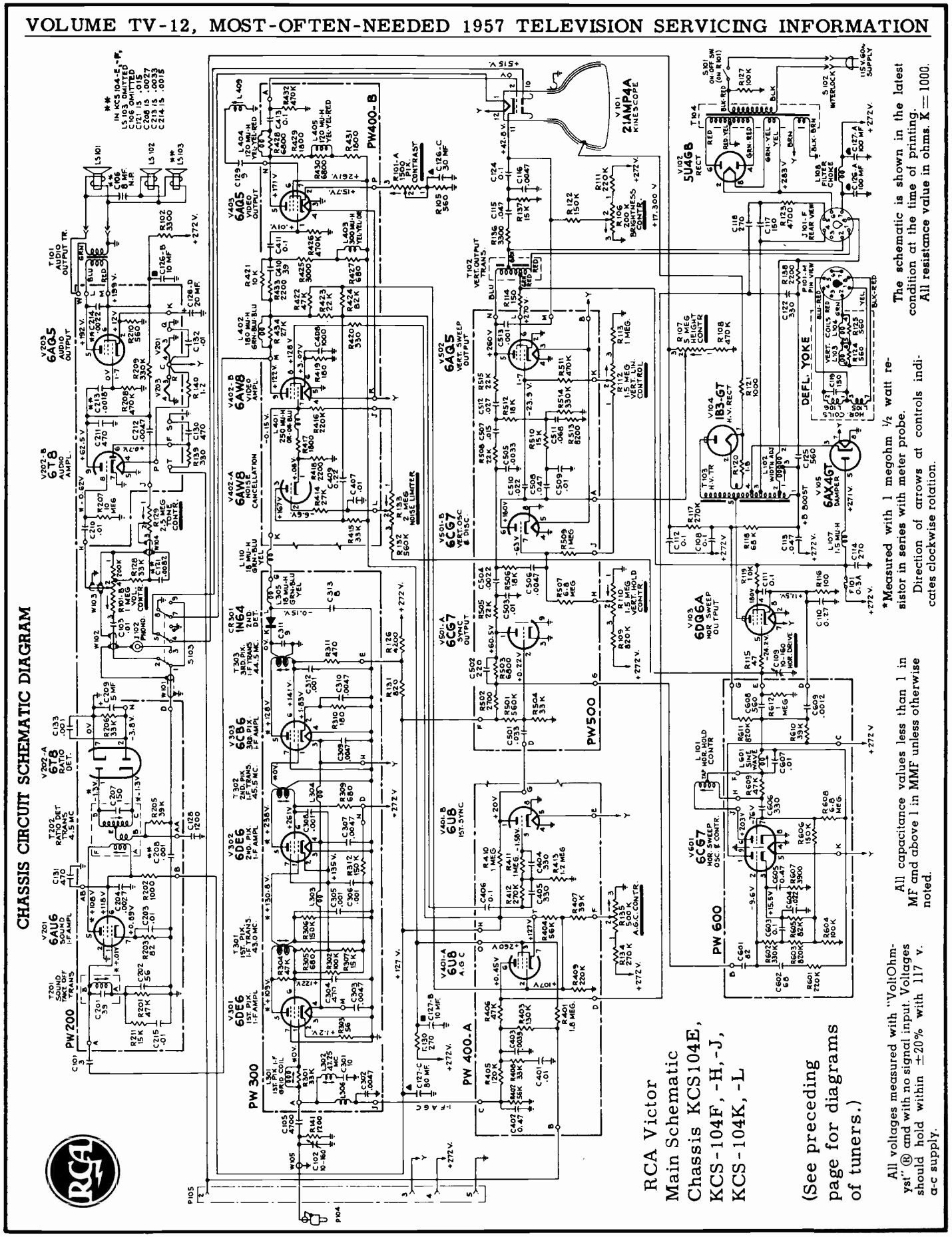
Adjust the noise limiter control counter-clockwise until sync tips show compression then clockwise until the compression just disappears.

Return the horizontal hold control to the center of its holding range.



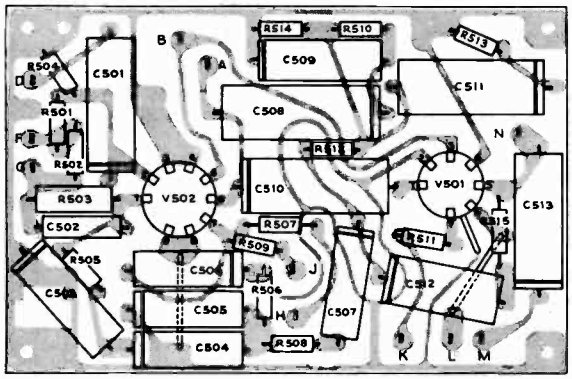


Circuit above is of tuner used with VHF models. Tuner circuit at left used with UHF/VHF models. Terminals 2, 3, 4, 5, connect to corresponding terminals of P105 of main chassis (diagram on adjacent page at right). In servicing, note difference in terminal placement on P105 for chassis types.

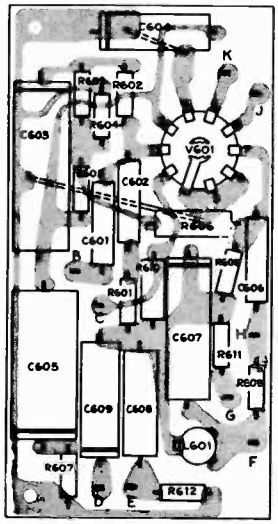

CHASSIS CIRCUIT SCHEMATIC DIAGRAM
RCA Victor
Main Schematic
Chassis KCS104E,
KCS-104F, -H, -J,
KCS-104K, -L
(See preceding page for diagrams of tuners.)
All voltages measured with "VoltOhmyst" ® and with no signal input. Voltages should hold within ±20% with 117 v. a-c supply.
All capacitance values less than 1 in MF and above 1 in MMF unless otherwise noted.
*Measured with 1 megohm ½ watt resistor in series with meter probe.
Direction of arrows at controls indicates clockwise rotation.
The schematic is shown in the latest condition at the time of printing.
All resistance value in ohms. K = 1000.

RCA Victor KCS-104A, etc., KCS-104AA, etc.

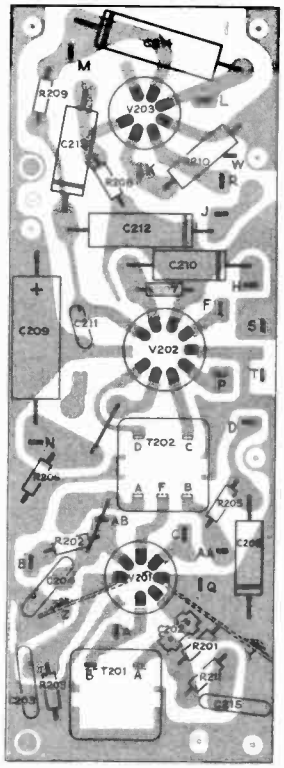
PRINTED WIRING ASSEMBLIES



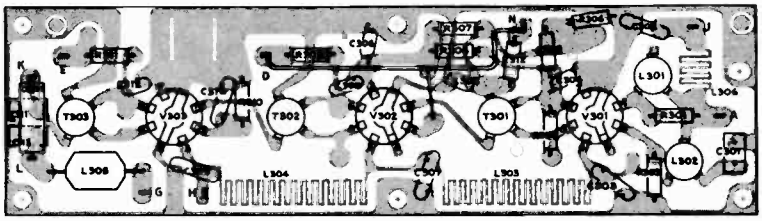
PW500—VERTICAL & SYNC OUTPUT UNIT LAYOUT



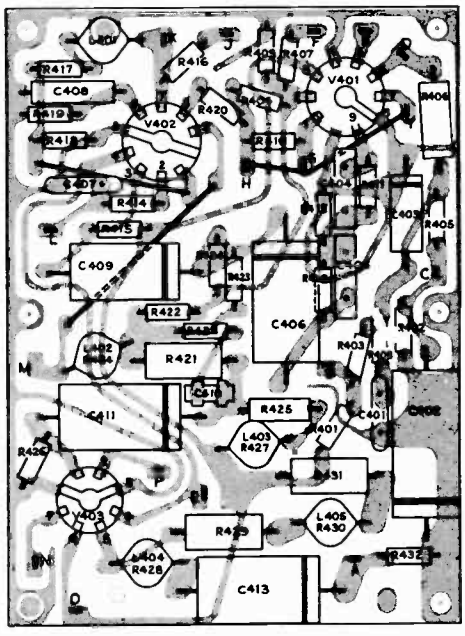
PW600—HORIZONTAL OSCILLATOR UNIT LAYOUT



PW200—SOUND I-F & AUDIO UNIT LAYOUT



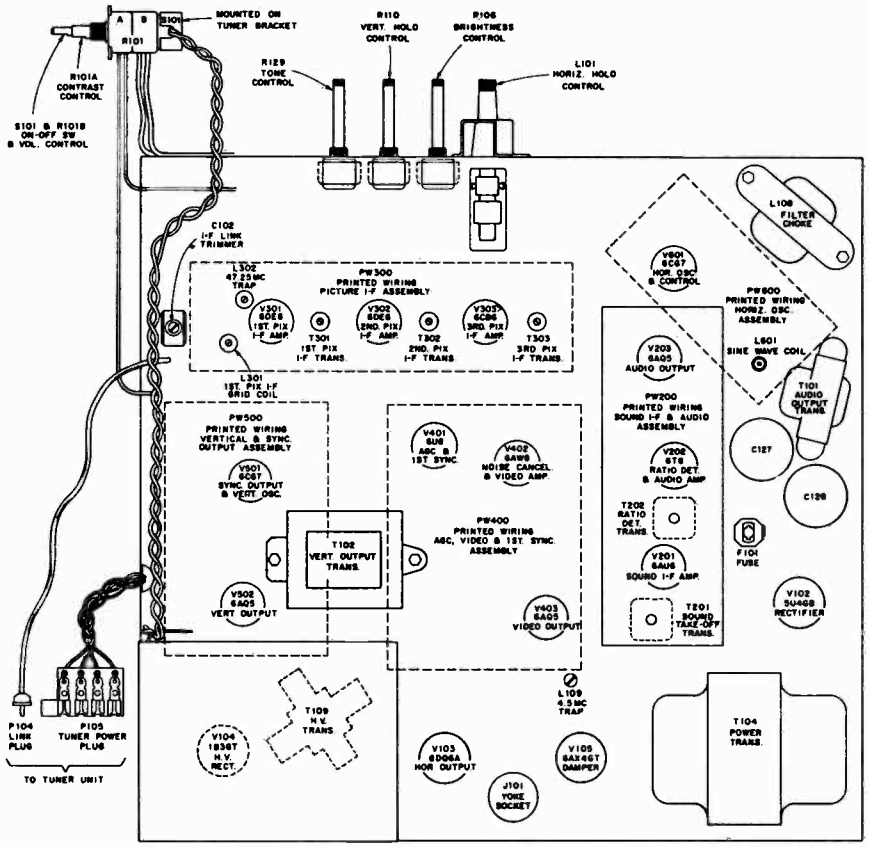
PW300—PICTURE I-F UNIT LAYOUT



PW400—VIDEO & 1ST SYNC UNIT 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 super-imposed 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.



CHASSIS TOP VIEW

RCA VICTOR PRINTED CIRCUIT BOARD SERVICE DATA

PRINTED CIRCUIT BOARDS ARE NOW A MAJOR PART OF TELEVISION RECEIVER CIRCUITRY. SERVICING TECHNIQUES DIFFER SOMEWHAT FROM THOSE THAT HAVE BEEN USED IN THE PAST. HOWEVER, PRINTED CIRCUIT COMPONENTS CAN BE SERVICED AND REPLACED EASILY WHEN THE PROPER TECHNIQUE AND TOOLS ARE USED. IN MOST CASES IT IS NOT NECESSARY TO REMOVE THE PRINTED CIRCUIT BOARD.

THE INFORMATION GIVEN IN THIS SERVICE DATA IS INTENDED TO PROVIDE THE TECHNICIAN WITH ALL THE NECESSARY INFORMATION REQUIRED TO ENABLE HIM TO EFFECTIVELY SERVICE PRINTED CIRCUIT BOARDS IN AN EASY AND SIMPLE MANNER.

There are many types of printed circuits in use today. The use of printed circuit boards are very much on the increase and will continue to increase.

Although no actual printing process is employed to produce printed circuit boards the term "printed circuit" is most frequently used to describe this type of construction.

Printed circuits are manufactured in many different ways but the method known as the etched copper process, developed by RCA, will be explained here.

The production of a printed circuit board begins with a layout drawing of the required circuit. A photographic negative is made of this drawing. A basic board made of a phenolic laminate, the "chassis" on which the circuit is constructed, has bonded to it a very thin sheet of copper. The copper sheeting is coated with a substance which makes it photosensitive. A contact print of the photographic negative of the circuit drawing is made on the copper sheeting after which it is photographically developed. After development of the photographic image on the copper sheeting, the entire board is placed in an etching solution. In the etching process the unexposed portions of the copper are eaten away, leaving an accurate, sharply defined copper reproduction of the desired circuit bonded to the board. (See figure 1.)

(Continued on pages 156 through 160.)

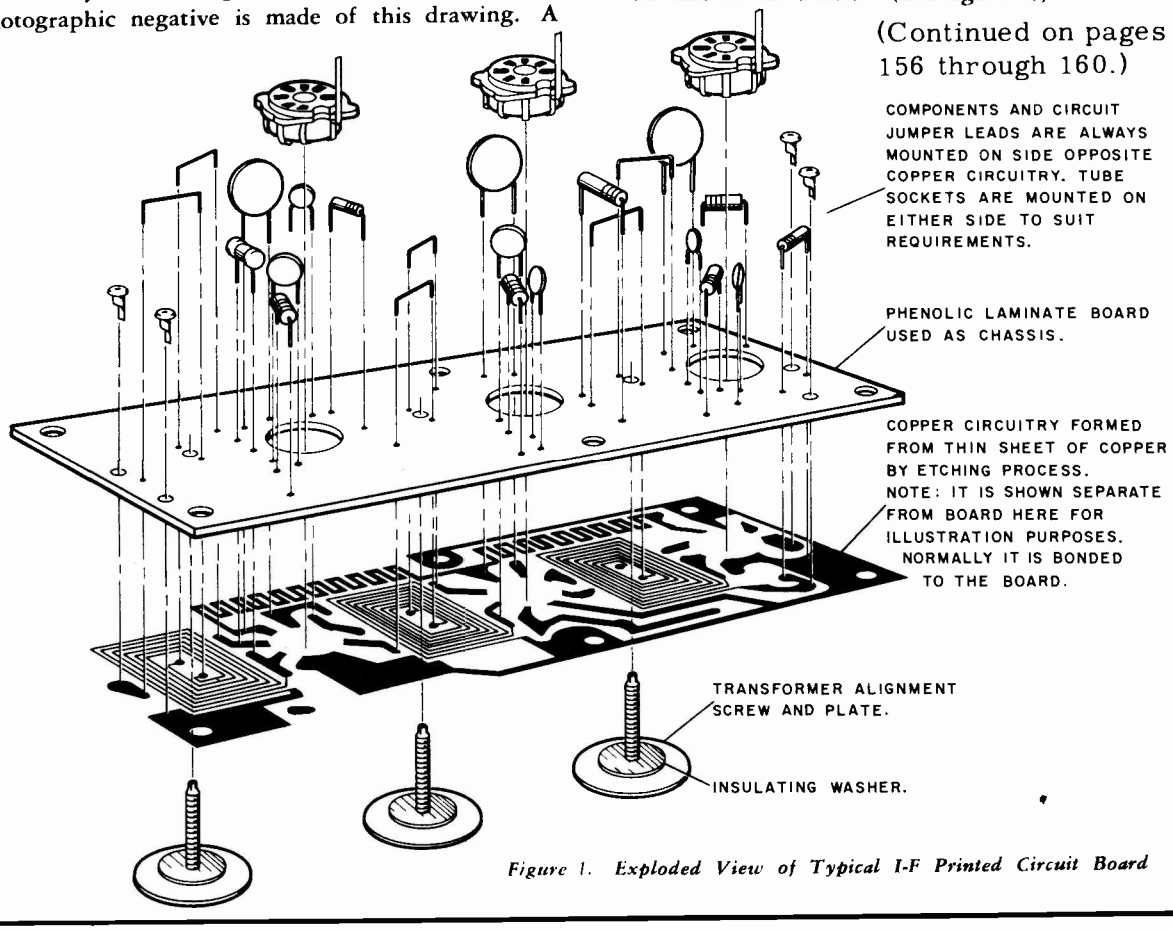


Figure 1. Exploded View of Typical I-F Printed Circuit Board

RCA Victor Printed Circuit Board Service Data (Continued)

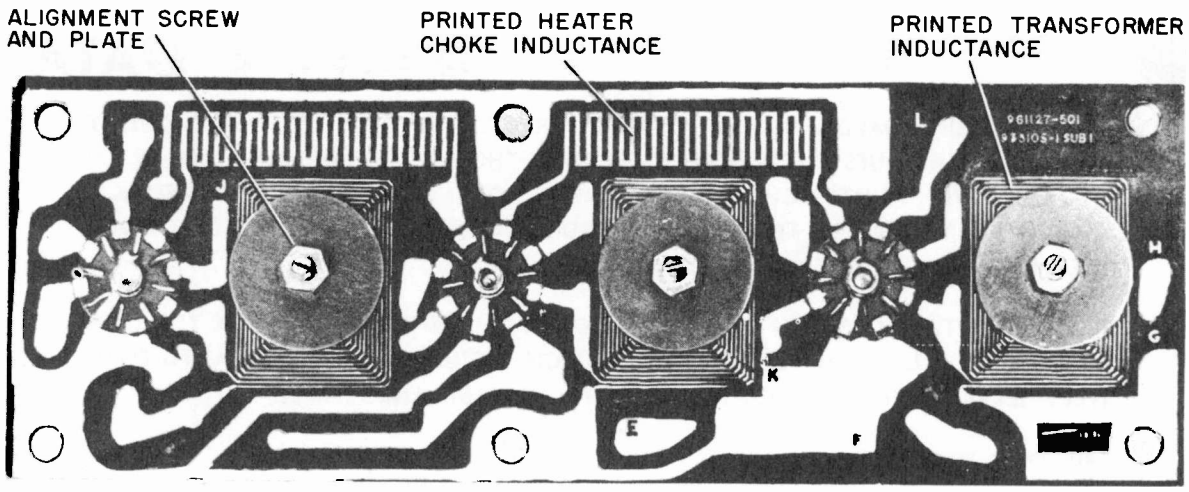


Figure 2. Printed Circuit Side of Typical I-F Printed Circuit Board Employed in RCA Television Receivers

This method has been developed by RCA to such precision that line widths of copper as fine as one-hundredth of an inch can be faithfully reproduced. Uniformity of any quantity of units is assured because any number of circuitry units can be made from a master negative.

After the desired circuit has been reproduced in copper, components are mounted on the board on the side opposite the copper circuit. See figure 1. Lead lengths are pre-cut and component leads are inserted in pre-drilled or punched holes so that they contact the proper point on the copper circuitry on the underside of the board. After the components have been mounted and the leads have been crimped to further insure mechanical stability, the entire underside of the board is immersed in hot solder. The solder adheres to the copper and securely bonds all component leads to the copper circuitry in a single simple operation. The "printed circuit side" of a typical printed circuit board is shown in figure 2. The transformer inductances are prevented from being solder coated, during the dipping operation, by glass fibre insulation applied directly to the inductances.

In order to preclude any possibility of short circuits due to exposed inductances, additional insulation is applied to the picture I-F transformers. A section of glass cloth is bonded under approximately 2,000 lbs. pressure directly to the strip inductances and provides insulation sufficient to prevent arc-over up to 1500 volts.

The printed circuit provides many practical advantages over the conventional point-to-point wiring methods. As mentioned previously, absolute uniformity and thus, consistent high quality, is inherent. Circuit arrangements are now possible which, with conventional wiring methods, were formerly impossible. Simplification of equipment design, lighter construction, no lead-dress problems, compactness, reduction of the number of components and thus the simplification of servicing are features made possible by the use of printed circuitry.

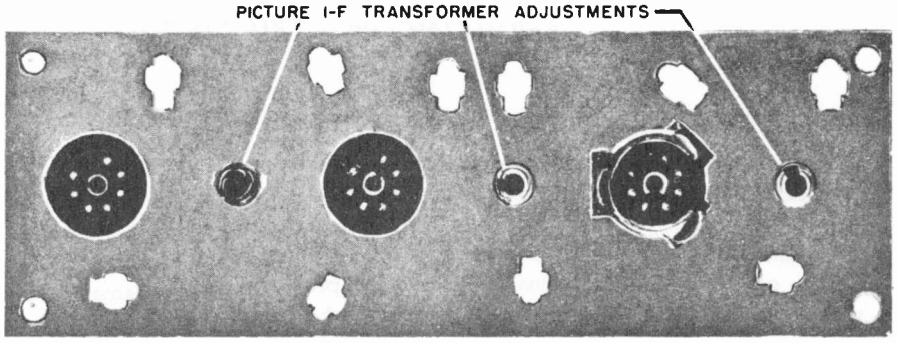
Tuning of the transformers is accomplished by means of flat, circular metal plates which are in a plane parallel with, and adjacent to, each transformer inductance. These are shown in figure 2. A screw-type shaft has its threads extending through the printed circuit board at the center of each transformer. The shaft is attached to the center of the circular metal plate. Rotating the shaft varies the distance between the inductance and the metal plate. In so doing, the effective inductance of the transformer is increased or decreased, thus raising or lowering the frequency to which the circuit is tuned.

In many of the printed circuit boards employed in television receiver circuitry the copper etching process is used only to construct the wiring portion of the circuit. Picture I-F circuits employ copper etched transformers and filament choke inductances, and, therefore, have been used to advantage in the preceding text to expose all circuitry that may be involved in what is commonly referred to as the printed circuit board.

Top and bottom view of electrically equivalent picture I-F strips are shown in figure 3, page 157. An examination of these will reveal the physical differences between the already familiar, conventional type I-F strip and the printed circuit type I-F strip employed in many current line television receivers.

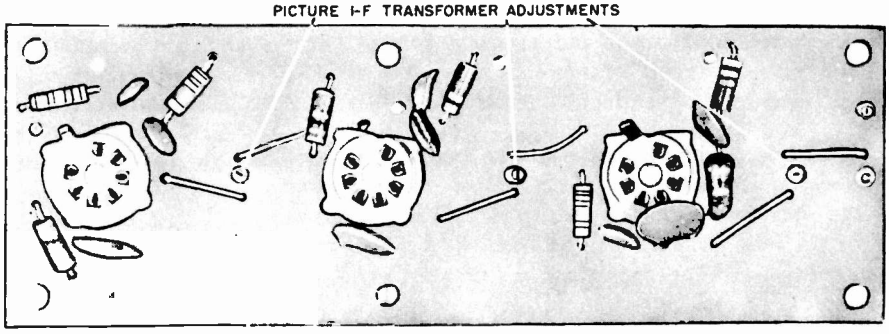
RCA Victor Printed Circuit Board Service Data (Continued)

Top View of Conventionally Wired I-F Strip →



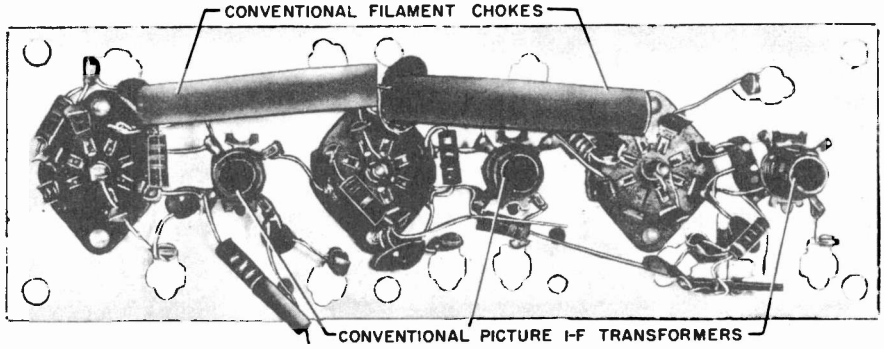
NOTE: COMPONENTS ARE MOUNTED BENEATH STRIP CONNECTED WITH CONVENTIONAL WIRING

Top View of Printed Circuit Type I-F Strip →



NOTE: COMPONENTS ARE MOUNTED ABOVE BOARD CONNECTED BY PRINTED WIRING BENEATH BOARD

Bottom View of Conventionally Wired I-F Strip →



Bottom View of Printed Circuit Type I-F Strip →

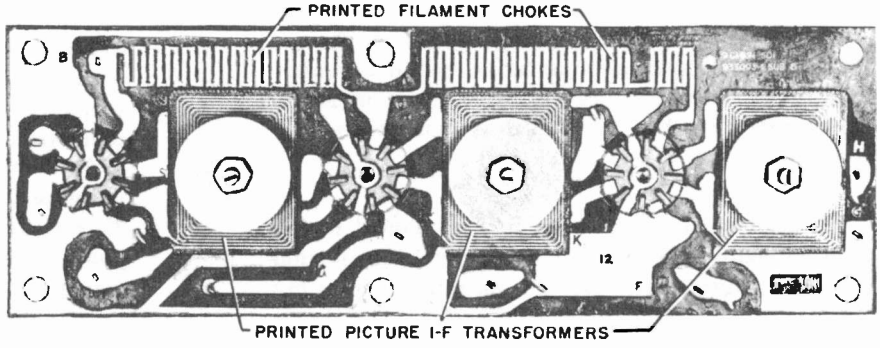


Figure 3. Comparison of Printed I-F Circuit Board with Equivalent Circuit in Conventional Form

RCA Victor Printed Circuit Board Service Data (Continued)

SERVICING PRINTED CIRCUIT BOARDS

General Considerations

The printed circuit board may be analyzed for component failure in the conventional manner by using the wiring layout drawings of the printed circuit assemblies in conjunction with the schematic diagram of the respective chassis. These are provided in the related Service Data. However, to further facilitate servicing the printed circuit boards, specific service data is presented in this publication covering recommendations, precautions, suggestions and additional information that will help the technician service printed circuit boards effectively. When this information is absorbed and properly applied, servicing printed circuit boards should be less difficult than servicing conventional circuitry.

Normally, printed circuits can be analyzed without removing the board from the chassis. In most cases tube socket voltages are readily accessible. If this is not the case, voltages may be checked at points common to tube socket connections or a tube socket voltage test adapter may be employed. If an adapter is used, it should be of the longer type, preferably 1¼" in length since some of the sockets are recessed as much as ⅞" in depth.

An important advantage of printed circuit boards, in regard to servicing a television receiver, is that they sectionalize a receiver physically and thereby facilitate the localization and isolation of defective components.

Standard components are used on printed circuit boards and can be removed and replaced easily. Replacements should be made with duplicate parts for convenience of mounting. Resistance or continuity measurements of coils, resistors, and some capacitors, can be made from the component side of the board. Voltage measurements can be made on either side of the board.

However, since the sockets on some boards are mounted upright on the wiring side of the board, the tube pin connections must be counted in a counterclockwise direction. The clockwise direction is the usual practice when the socket is mounted on the component side of the board.

A small break in the continuity of printed wiring can normally be found easily by a visual examination of the circuitry. The use of a magnifying glass can be of help in locating small "hairline" breaks in printed wiring.

There are no special tools required when servicing printed circuit boards. The complement of tools normally employed by the television service technician are all that are necessary. However, the soldering iron used when working on the printed circuit board should not exceed 100 watts, since excessive heat can readily damage the board.

Replacement of Components on Printed Circuit Boards

The individual components mounted on printed circuit boards may be easily replaced when the proper technique is used. Only extensive damage to the printed connecting strips or breakage of the board should necessitate replacement of the complete board. When removing and replacing components every possible precaution should be taken to prevent damage to the connecting strips bonded to the phenolic laminate board and to the board itself.

Soldering should be made with care to prevent excessive heat from damaging the board and excess solder from causing shorts.

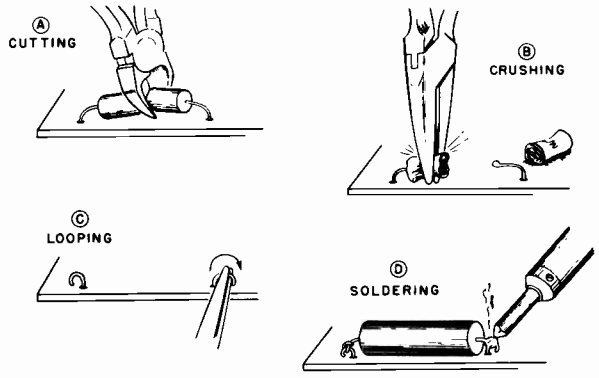


Figure 4. Component Replacement Procedure

To replace capacitors or resistors on printed circuit boards without removing the boards from the chassis proceed as follows:

Refer to figure 4.

1. Cut the component in half with a pair of diagonal cutting pliers.
2. Remove the body of the component from the connecting wires leaving as much wire as possible for connecting purposes.
3. Prepare connecting points for the replacement component by cutting the wire leaving ¼" to 5/16" and form a connecting loop as shown in figure C.
4. Thread the leads of the replacement component through the loops of wire, bend component leads to form a good connection and then solder. Cut off excess wire from component leads.

RCA Victor Printed Circuit Board Service Data (Continued)

If the printed circuit board has been removed from the receiver chassis for reasons other than component replacement, the parts may be removed simply by applying heat to the point on the connecting strip where the leads come through the board, bending the leads upright with a soldering aid, and lifting the part from the board. In the process of removing the solder, caution must be taken to prevent excessive heating. Use a small wire brush if necessary to quickly brush away the excessive solder from the connection. Do not leave the soldering iron on the connection when brushing away the solder. Melt the solder, remove the iron and quickly brush away the solder. It may require more than one heating and brushing process to completely remove the solder. The new part can then be mounted in place of the part that has been removed and secured in the original manner.

Removal of Printed Circuit Board From Chassis

Refer to figure 5.

When removing a printed circuit board proceed with caution. *Do not attempt to force the board from each of its mounting lances since excessive flexing of the board can cause damage. Disconnect the wires where necessary from the printed circuit board.* (Cut and leave 1/8" of the color-coded wire covering to provide references facilitating the reconnection of the wires. These are wire-wrap connections, and once the wire wrap connection is disconnected it should be reconnected by soldering. No attempts should be made to wrap the wire on the terminal once it has been removed.)

To remove the board, apply heat to the point where the board eyelet is soldered to the lance and at the same time apply pressure to the back of the board through the hole in the chassis. When the solder melts push the board out so that the lance is flush with the eyelet in the board and let cool. Do not attempt to clear lance from eyelet at this point. Continue around the perimeter of the board systematically doing the same at each lance. After each lance has been made flush with the eyelet, use the same technique to remove each lance completely from its eyelet freeing the board from the chassis.

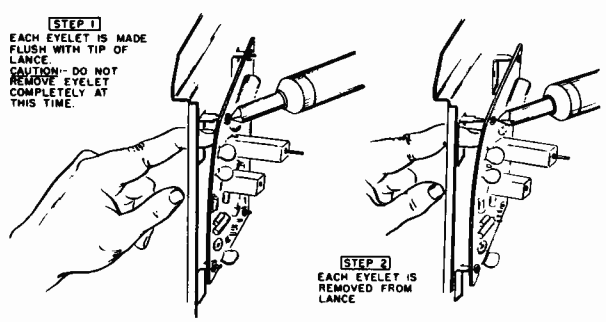


Figure 5. Removal of Printed Circuit Board from Receiver Chassis

Replacement of Sound I-F Transformers

Refer to figure 6.

To remove sound I-F transformers apply just enough heat to the terminals and can supports to melt the solder so that the terminal may be pushed away from the connecting strips.

When working on the boards it is advisable to place them in a secure stationary position such as between two blocks of wood as illustrated in figure.

When installing the transformer can, the terminals and can supports should be positioned to contact the connecting strips, and then soldered at these points.

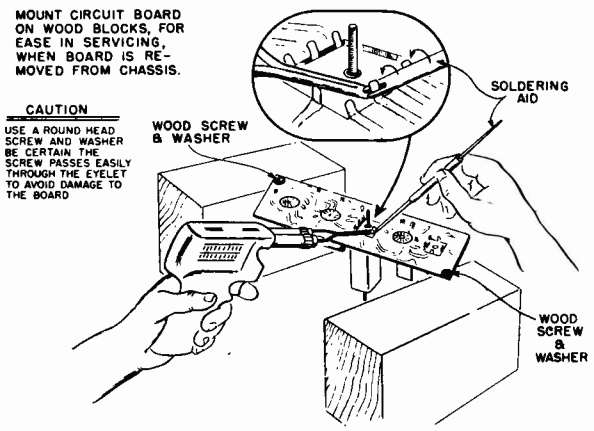


Figure 6. Sound I-F Transformer Replacement

If it is necessary to check the operation of the printed circuit board after it has been removed from the chassis, the wires previously removed may be temporarily reconnected.

When replacing the printed circuit board make certain that all the eyelets on the perimeter of the board are clear and all excess solder is removed from the mounting lances. Place the board in the approximate mounting position and reconnect all wires previously removed. Position the board so that all the lances protrude through the eyelets and solder in place.

Repair of Printed Wiring Connections

If one of the connecting copper strips on the printed circuit board is cracked or broken it may be repaired easily. A short length of tinned copper wire should be placed across the break. The joint is then soldered by flowing solder over the break and the length of wire. Care should be taken to prevent solder from shorting one connecting strip to another. When the printed wiring on the board is not exposed an open section may be repaired by jumping this section with an ordinary piece of hook-up wire on the component side of the board. Connect the hook-up wire between two components that the open section of printed wiring would normally connect.

RCA Victor Printed Circuit Board Service Data (Continued)

Replacement of Tube Sockets

Refer to figure 7.

In order to replace a tube socket it is necessary to remove the printed circuit board from the chassis in the majority of cases. Apply heat to the socket terminals, melt and shake off all excess solder, or use a small brush to clean off the excess solder at the socket contacts using the technique described previously under Replacement of Components on Printed Circuit Boards. Wedge a flat blade, such as pen knife blade, under the socket contact and pry it up from the connecting strips. Also unsolder and pry up the center pin ground connection.

When replacing a socket, use the proper replacement for the particular board and insert it in position as indexed by the key. Solder the pins and center pin ground connection to the connecting strips. On some boards the contacts must be first bent back so they may be soldered on the tube side of the board.

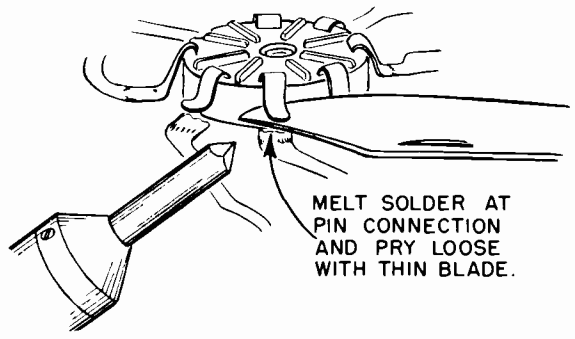


Figure 7. Removal of Tube Socket from Printed Circuit Board

Replacement of Printed Filament Choke Coil

If it is necessary to replace the printed choke coil on the picture I-F board PC102, a conventional filament choke coil may be used for replacement. The damaged printed coil is removed from the circuit and the replacement coil, part number 73477, is soldered to the filament connections.

Checking Intermittent Circuitry

The technique employed in the construction of printed circuits minimizes the possibility of intermittent circuit conditions. If an intermittent condition does exist it may be localized by a slight flexing of the board and probing of the component leads. Caution should be exercised in excessive flexing of the board, although the board is sturdy in construction it may crack or break if proper care is not taken when servicing.

When an intermittent point or area is localized it usually can be corrected by simply heating the leads of the components, at that point or area, with a soldering iron. This will fuse the intermittent point forming a secure connection.

Replacement of Picture I-F Transformers

Refer to figure 8.

The printed coils of the picture I-F transformers on PC102 may be replaced with a conventional bi-filar transformer, stock number 76433.

This is done as follows:

1. Remove alignment screw and plate. See figure 2.
2. Break the four connections to the printed coils (two on top of the board and two on the bottom).
3. Enlarge the screw hole in the board to accommodate a bi-filar transformer.
4. Remove the clip fastener from the end of the bi-filar transformer.
5. Cement the transformer in place so that the coils and four terminals are underneath the board and positioned to facilitate wiring. See figure 8.
6. Connect the coils as indicated in the drawing shown in figure 8. Loading resistors must be installed across the primary winding of the replacement transformer in certain instances as indicated in the note next to the drawing.
7. Align the picture I-F transformers as described in the Service Data for the respective receiver.

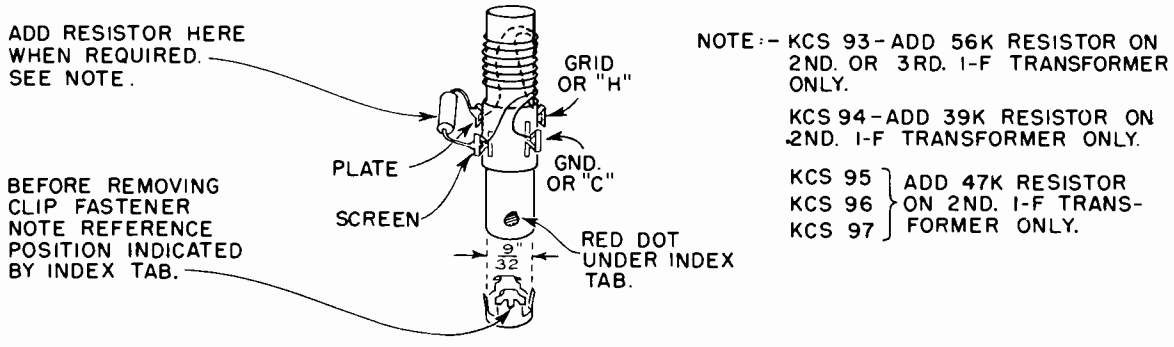


Figure 8. Replacement of I-F Transformer

RAYTHEON MANUFACTURING COMPANY

21T32 CHASSIS

Models UM-2186, UM-2187, UM-2188, UM-2189

HORIZONTAL HOLD (R606-L600-L601)

The top control (R606), must be capable of producing an out-of-sync condition (equal number of sloping bars) at either stop position. If not, follow alignment procedure below.

1. Set top H. Hold control (R606) to center of mechanical range.
2. Short out H. Stabilizer coil (L600) with a clip lead.
3. Adjust H. Blocking transformer (L601) until picture is in sync.
4. Remove clip lead from L600 and connect a scope with a low capacity probe at the junction of L600, L601, C606 and R609. Wave form illustrated on schematic must be obtained.
5. Adjust H. Stabilizer coil (L600) until peaks of wave form are equal in amplitude.

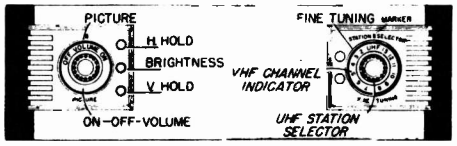


Figure 1. Top Controls

TROUBLE-SHOOTING

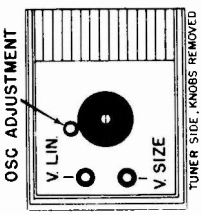
Trouble	Probable Location
No Raster No Sound	1. Defective tubes V10-12-13. 2. Defective selenium rectifiers. 3. Defective resistors R502,R504, thru R506. 4. Defective capacitors C504-505-219-506. 5. Defective transformer T500 or choke L500. 6. Defective safety interlock or on-off switch. 7. Defective L505 (circuit breaker).
No Raster Sound Normal	1. Insufficient or no high voltage, (refer to "No High Voltage" section). 2. Defective picture tube. 3. Second anode lead disconnected. 4. Ion trap magnet misadjusted. 5. Defective C.R.T. socket.
No High Voltage	1. Defective tubes V12-13-14-15. 2. Defective transformer T600, yoke T203. or coil L600-601-602. 3. Defective capacitors C604-605-607-609-610-611-613. 4. Defective resistors R604-606-607-610-612-613-615-616-617.
No Picture No Sound Raster Normal	1. Defective antenna or lead-in. 2. Defective tubes V1-2-3-4-5-6. 2a. Defective tube 15 (UHF) 3. Improper voltages or resistances at sockets of tubes V1-2-3-4-5-6 or 15. 4. Improper alignment.
No Sound Picture Normal	1. Defective tubes V7-9-10. 2. Improper voltages or resistances at socket of tubes V7-9-10. 3. Defective speaker or leads broken or not in place. 4. Defective transformer T100-101 or coil L100. 5. Improper sound alignment.
No Sync	1. Defective tubes V6-7. 2. Defective capacitors 302. 3. Defective resistors R300, R303 thru R307. 4. Defective C300 (couplate).
Insufficient or no Vertical Sweep	1. Defective tube V8. 2. Defective transformer T400 or yoke T203. 3. Defective capacitors C401-402-403-404-405-219-224. 4. Defective resistors R401-404-405-406-407-408-409-410.
Picture cannot be Centered	1. Defective picture tube. 2. Defective centering control. 3. Defective ion trap magnet.
Poor Focus	1. Improper adjustment on ion trap. 2. Defective picture tube.
Poor Horizontal Linearity	1. Defective tubes V12-13. 2. Defective capacitors C228-620-611-613-614. 3. Defective transformer T203-600 or coil L602.
Snow or Poor Picture	1. Insufficient signal input. 2. Defective antenna or lead-in. 3. Weak tubes V1-2-3-4-5-6 or 15. 4. Improper video IF alignment.
Lack of Contrast	1. Defective tubes V4-5-6. 2. Defective resistors R203-206-209-210. 3. Defective capacitors C217-226-221. 4. Defective coil L202-205.
Washed Out or Picture Smear	1. Gassy tubes V1-2-3-4-5-6. 2. Defective resistors R210-216-212-211-214. 3. Defective capacitors C214-217-226. 4. Defective coils L202-203-205 and transformer T204. 5. Improper Video IF alignment.

(Service material continued on the next three pages)

RAYTHEON

SERVICE ADJUSTMENTS

Three serviceman's controls are provided on the top of the cabinet located under the right hand knobs and cinch buttons (figure 2). When adjustment is determined necessary, simply remove the station selector and fine tuning knobs and cinch buttons.



VIDEO TRAP COIL (L-211) ADJUSTMENT

1. Tune in a TV station.
2. Adjust fine tuning until sound bars just appear.
3. Turn L-211 slug all the way out (counter-clockwise)
4. Turn slug in (clockwise) until horizontal scanning lines are smooth and continuous.

NOTE: VOLTAGE READINGS TAKEN WITH A V.T.V.M. BETWEEN POINTS INDICATED AND CHASSIS WITH LINE VOLTAGE AT 115V AC AND THE ANTENNA SHORTED TO CHASSIS.

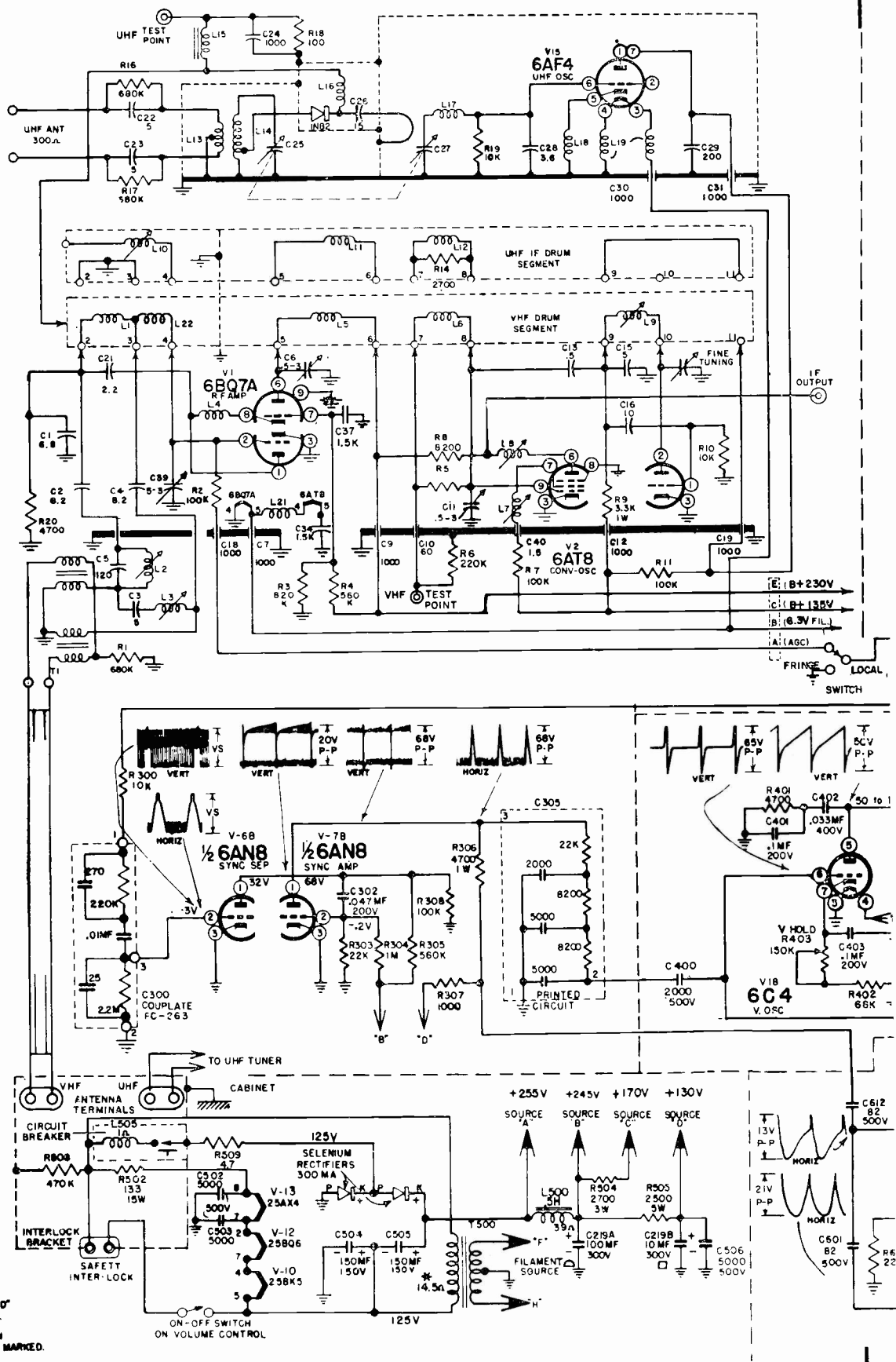
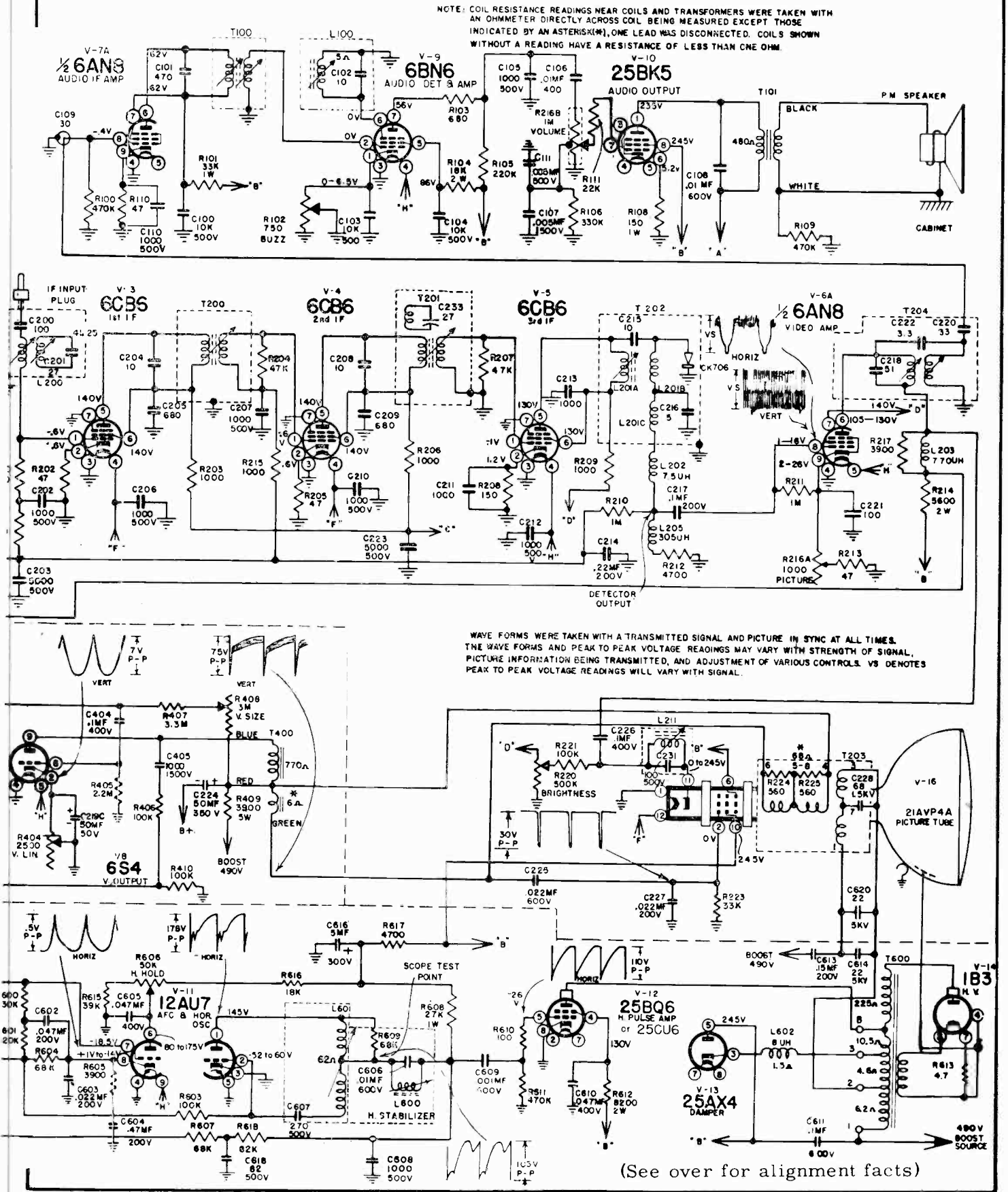


Figure 2. Service Controls

NOTE.
CAPACITOR VALUES IN "MMF" UNLESS OTHERWISE MARKED.

RESISTOR WATTAGE SHOWN IN 1/2 WATT UNLESS OTHERWISE MARKED.

RAYTHEON Chassis 21T32



(See over for alignment facts)

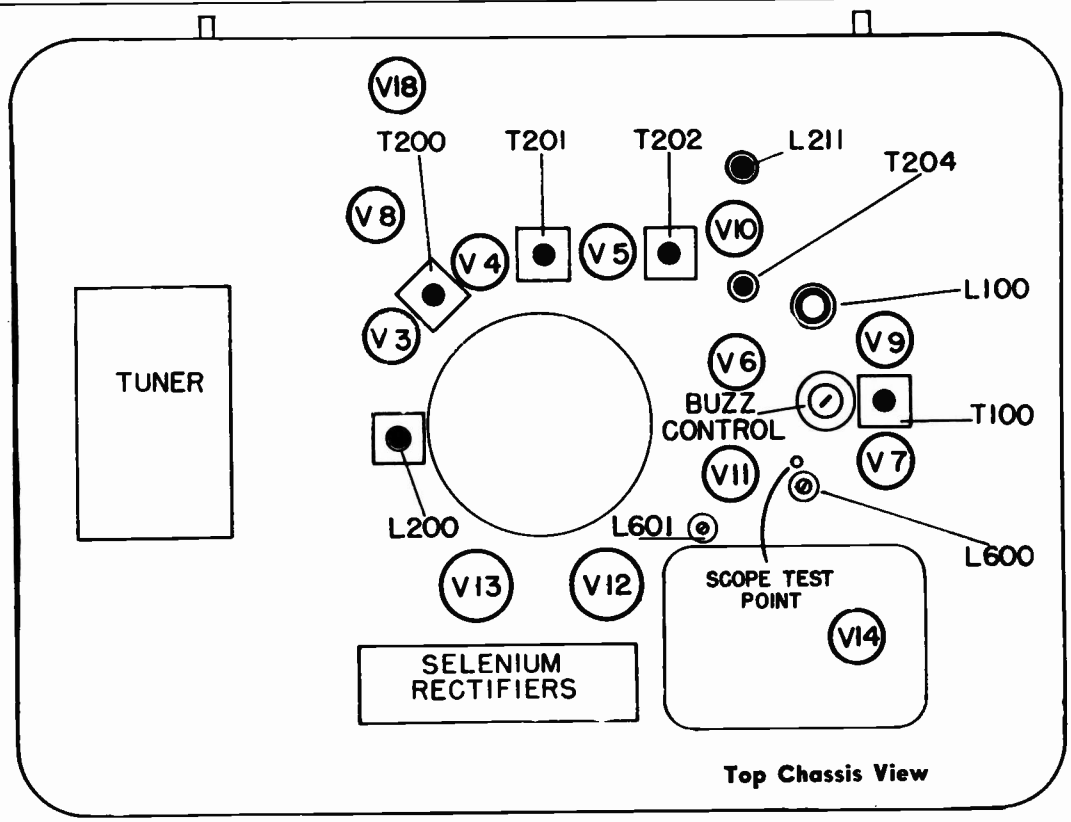
RAYTHEON
21T32 Chassis
(Continued)

PRE-ALIGNMENT

Connect a 1000 mmf capacitor across scope terminals and a 10K ohm resistor in series with hot lead as close to test point as possible.

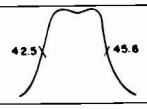
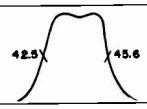
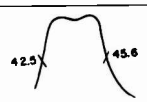
Connect signal generator through a 1000 mmf capacitor.

When aligning the IF Amplifier be sure tuner is set to channel 10.



Top Chassis View

VIDEO IF ALIGNMENT

Step No.	Signal Generator Freq. (mc.)	Sweep Generator Freq. (mc.)	Signal Input Point	Output Point	Remarks	Adjust	Response
1	44.3	———	Pin 1 of V3	VTVM at junction of L205-R212	Adjust generator for output of not to exceed 2 volts on VTVM	T202	Maximum Reading
2	47.25	———	Pin 1 of V3	VTVM at junction of L205-R212	Adjust generator for output of approx. 2 volts on VTVM	T201 (top core)	Minimum Reading
3	45.4	———	Pin 1 of V3	VTVM at junction of L205-R212	Adjust generator for output of approx. 2 volts on VTVM	T201 (bottom core)	Maximum Reading
4	47.25	———	Pin 1 of V3	VTVM at junction of L205-R212	Adjust generator for output of approx. 2 volts on VTVM	T201 (top core)	Minimum Reading
5	43.0	———	Pin 1 of V3	VTVM at junction of L205-R212	Adjust generator for output of approx. 2 volts on VTVM	T200	Maximum Reading
6		43	Pin 1 of V3	Scope at junction of L205-R212	Keep generator output as low as possible Adjust for flat response	T202	
7	42.5 45.6	43	Pin 1 of V3	Scope at junction of L205-R212	Markers should be 60% down and response curve should be as shown. If not, repeat steps 1 thru 4	Check point only	
8	41.25	———	Converter grid	VTVM at junction of L205-R212	Keep generator output as low as possible to obtain required response.	L200 (top core)	Minimum Reading
9	42.5 45.6	43	Converter grid	Scope at junction of L205-R212	Markers should be 50% down and response curve should be as shown. If not repeat alignment.	L200 (bottom core) Tuner Conv. Coil (L8 or L9)	

L200 (bottom core) has a band width control effect and should be adjusted for marker positioning.

SYLVANIA ELECTRIC PRODUCTS INC.

SYLVANIA TELEVISION

CHASSIS: 1-532-5,-6,-7
MODELS: 21T207, 21T208, 21C508, 21C509, 24T201 SERIES

This service material is on pages 165 through 170.

SPECIAL SERVICE INSTRUCTIONS

RANGE (AGC/NOISE GATE) ADJUSTMENT

If picture stability and/or normal contrast range cannot be obtained by means of the conventional controls, adjust RANGE control (R307) as described below.

A. When picture contrast is insufficient with Contrast control set to maximum, tune in strongest channel in area and rotate RANGE control clockwise until picture "jumps sideways and downward" or is unsteady. Then rotate RANGE control slightly in the opposite direction until picture becomes steady and normal. Readjust Contrast and Brightness controls for most pleasing picture.

B. When picture is unstable in areas of high electrical interference, tune in strongest channel in area and adjust Horizontal and Vertical Hold controls for best picture stability possible. Rotate RANGE control clockwise until best picture stability is obtained. (In some areas, it may be necessary to compromise the RANGE control setting for both strong and weak channel reception.)

HORIZONTAL AFC CIRCUIT ADJUSTMENT

BEFORE PERFORMING THE FOLLOWING PROCEDURE, CHECK RANGE CONTROL ADJUSTMENT AS DESCRIBED IN "RANGE (AGC/NOISE GATE) CONTROL ADJUSTMENT".

If picture cannot be synced horizontally with the Horizontal Hold control, adjust the Horizontal Automatic Frequency Control circuit as described below.

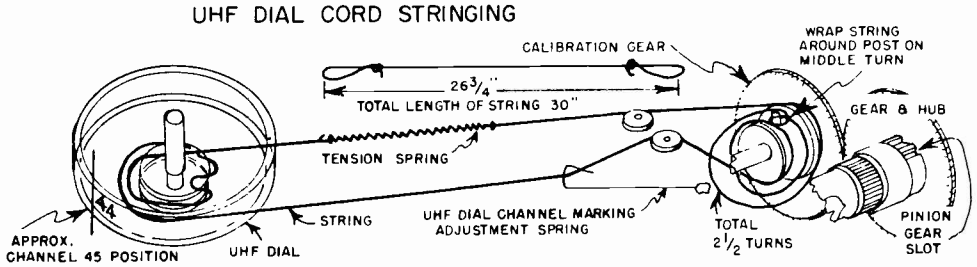
1. Connect antenna to receiver; tune in a strong station and adjust Contrast and Brightness controls to approximately normal positions. Adjust WIDTH control (L404) for approximately normal picture width.
2. Short pin 5 of 3CS6 (V11) to chassis ground; connect a "clip-lead" jumper across terminals of HORIZONTAL STABILIZING coil (L400); set HORIZONTAL HOLD control (R415) to mid-range.
3. Adjust HORIZONTAL RANGE control (R413) until picture moves back and forth across the screen with the blanking bar vertical.
4. Remove shorting jumper for HORIZONTAL STABILIZING coil (L400) terminals; adjust HORIZONTAL STABILIZING coil core until picture moves back and forth across the screen with the blanking bar vertical.
5. Remove short from pin 5 of 3CS6 (V11).
6. Rotate Channel Selector to a position on which no signal is received; then return to the original station. The picture should immediately fall into sync. If not, slightly readjust HORIZONTAL HOLD control (R415) and repeat this step.

FOCUS, ION TRAP & CENTERING ADJUSTMENT

1. Position deflection yoke as far forward as possible on the neck (against the flare) of the picture tube.
2. Adjust Contrast control one-quarter back from maximum and adjust Brightness control to maximum. (Caution: Do not operate receiver longer than necessary with Brightness control set to maximum.) Rotate and shift Ion Trap Magnet until the highest possible brightness level is obtained in picture. Reduce Brightness control setting and again adjust Ion Trap Magnet to obtain highest possible brightness level.
3. Center picture by concurrently rotating the Centering Magnet and turning the small adjustment screw on Centering Magnet. Turn Brightness control to a low level and check that no corner cutting exists in the picture.
4. Turn Contrast and Brightness controls to obtain a normal picture (preferably a test pattern.) Then, "fine-adjust" the Ion Trap Magnet to obtain the best possible focus consistent with the highest possible brightness level. This adjustment is extremely critical; a slight maladjustment may give good brightness, but the sharp edges desirable on large black areas may contain a "halo" effect.

UHF DIAL CORD STRINGING

NOTE: BEFORE STRINGING, ROTATE UHF SHAFT TO POSITION POST OF CALIBRATION GEAR STRAIGHT UP AND TO POSITION SLOT OF PINION GEAR AS SHOWN. POSITION UHF DIAL WITH CHANNEL 45 MARKING CENTERED IN DIAL WINDOW BEFORE PLACING STRING AROUND UHF DIAL.



SYLVANIA Chassis 1-532-5, -6, -7, Service Instructions, Continued

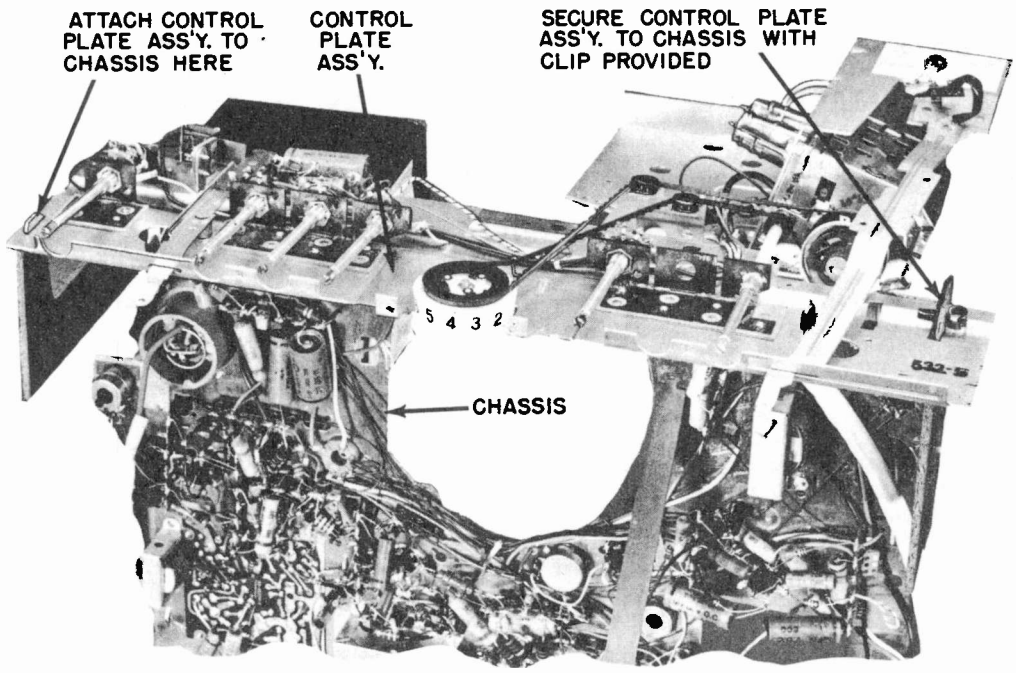


FIGURE A – CONTROL PLATE ASSEMBLY & CHASSIS ATTACHMENT FOR TEST PURPOSES

CHASSIS REMOVAL

1. Disconnect AC power cord and antenna connections; remove rear interlock cover.
2. Disconnect speaker leads, HaloLight plug (from control plate assembly), picture tube high voltage lead, yoke plug and picture tube socket. Slip picture tube socket leads out of slots in fiber yoke guard.
3. Remove On/Off and VHF Channel Selector knobs by removing screw located on underside of each knob. Remove escutcheon and window assembly by removing two screws located directly above On/Off and VHF Channel Selector levers. Remove remaining front control knobs (pull down and out from shafts).
4. Remove three screws holding control plate assembly to light shield. Remove under-chassis mounting bolts, side brace mounting screws and control plate mounting bracket screw at top of cabinet.
5. Slide chassis part way out of cabinet, bring control plate assembly back along top of picture tube and engage chassis and control plate assembly as shown in Figure A on sheet 1. Slide the two attached units from cabinet.
6. To replace chassis, reverse the preceding steps. CAUTION: control shafts must line up with and project through proper holes in light shield. (Controls are spring-mounted to aid in the placement of shafts through proper holes.)

PICTURE TUBE REMOVAL

1. Remove Chassis and control plate assembly from cabinet as outlined under "Chassis Removal".
2. LAY CABINET ON FRONT SIDE on a surface that will not scratch or damage front trim molding.
3. Remove ion trap (beam bender) magnet, centering magnet, yoke retaining clamp (loosen screw and spread retaining clamp) and yoke from neck of picture tube.
4. Remove the one top holddown strap screw. Unhook one of the lower holddown strap brackets from slot in light shield and slip strap away from picture tube. See Figure C.
5. USING GOGGLES AND GLOVES, reach under face of tube with fingers and lift tube from cabinet. On 24" models, TWO PERSONS should reach down along opposite sides of picture tube and lift tube from cabinet. DO NOT GRASP NECK OF PICTURE TUBE AT ANY TIME.
6. To install picture tube, reverse the preceding steps. On models using the contact filter over picture tube face, exercise care not to scratch filter surface. Use a very soft cloth during any cleaning process.

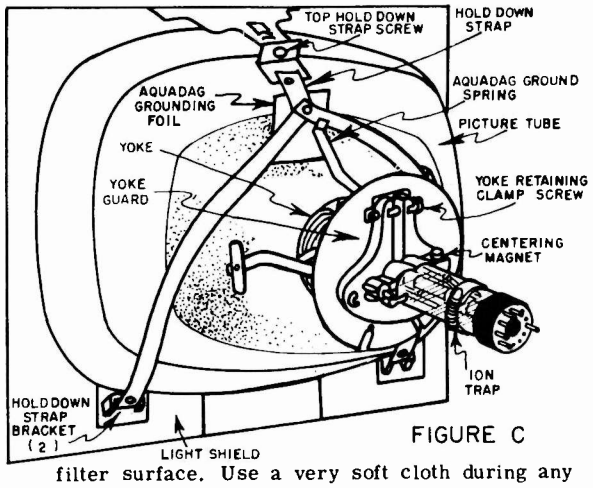
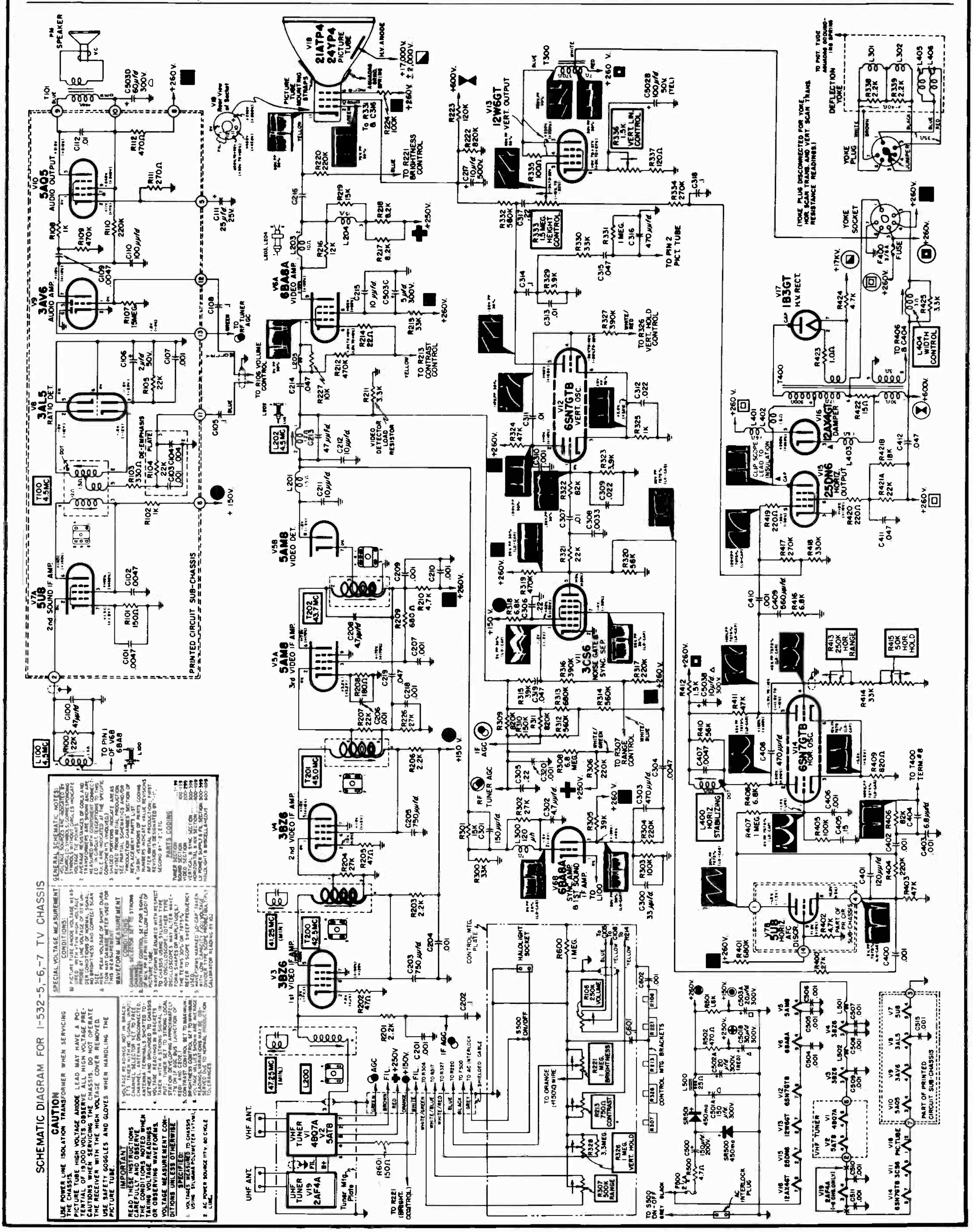


FIGURE C


SCHEMATIC DIAGRAM FOR 1-532-5,-6,-7 TV CHASSIS
CAUTION
IMPORTANT
GENERAL SCHEMATIC NOTES:
SPECIAL VOLTAGE MEASUREMENT CONDITIONS:
WAVEFORM MEASUREMENT CONDITIONS:
PARTS CODING
V18 21ATP4 24YP4 PICTURE TUBE
V10 5AQ5 AUDIO OUTPUT
V9 3AV6 AUDIO AMP.
V8 3AL5 RATIO DET.
V7A 5U8 2nd SOUND IF AMP.
V6A 6BA8A VIDEO AMP.
V5B 5AM8 VIDEO DET.
V5A 5AM8 3rd VIDEO IF AMP.
V4 3BZ6 2nd VIDEO IF AMP.
V3 3BZ6 1st VIDEO IF AMP.
V13 12W6GT VERT. OUTPUT
V12 6SN7GTB VERT. OSC.
V11 3CS6 NOISE GATE & SYNC SEP.
V6B 6BA8A SYNC AMP. & 1st SOUND IF AMP.
V17 1B3GT H.V. RECT.
V16 12AX4GT DAMPER
V15 25DN6 HORIZ. OUTPUT
V14 6SN7GTB HOR. OSC.
V7B 5U8 HORIZ. AFC DISCR.
VHF TUNER V1 4BQ7A V2 5AT8
UHF TUNER V19 2AF4A
PRINTED CIRCUIT SUB-CHASSIS
DEFLECTION YOKE
YOKE PLUG
YOKE SOCKET
PM SPEAKER
CONTROL MTG. BRACKETS
VHF ANT.
UHF ANT.

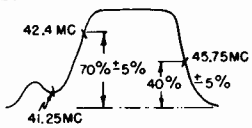
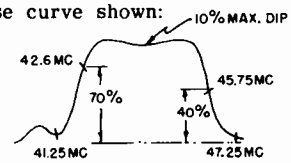
SYLVANIA Chassis 1-532-5, -6, -7, Alignment Instructions, Continued

VIDEO IF, SOUND IF & 4.5MC TRAP ALIGNMENT PROCEDURES

PRELIMINARY INSTRUCTIONS

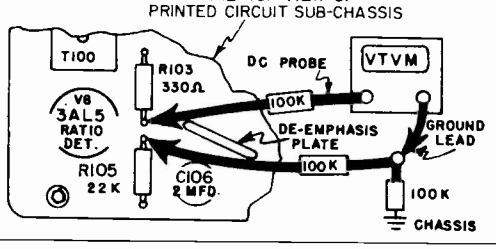
1. CONNECT AN ISOLATION TRANSFORMER BETWEEN CHASSIS AND POWER LINE.
2. Attach control plate assembly to main chassis as illustrated in Figure A on sheet No. 1.
3. Use high scope gain and keep sweep generator output at lowest usable value; check, at intervals, for possible sweep generator overloading by temporarily varying signal input level and noting any change (excluding amplitude) in response curve shape.
4. Keep marker generator coupling to a minimum to avoid distortion of response curve.
5. For optimum receiver alignment, power line voltage should be maintained at 117 volts.
6. 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.	Connect 3.5V. DC source (-) term. to junction of R 201 (2.2K) and C202 (.1 mfd.) and connect (+) terminal to chassis. Set VHF tuner BETWEEN any two channels.	SIGNAL GENERATOR - through 10K isolation resistor to VHF Mixer grid through hole in top of VHF tuner. VTVM - DC Probe across R211 (3.3K) Video Detector load resistor.	For MINIMUM reading: L200 (top core) at 47.25 MC. T200 (top core) at 41.25 MC. Use maximum generator output, initially; reduce generator output as required to keep VTVM reading between 1 and 2 volts.
2.	Same as step 1.	Same as step 1.	For MAXIMUM reading: T202 at 43.7 MC. T201 at 45.0 MC. T200 (bottom core) at 42.5 MC. Reduce generator output as required to keep VTVM reading between 1 and 2 volts.
3.	Same as step 1.	SWEEP GENERATOR - through .01 mfd. blocking capacitor to pin 1 of V3 (3BZ6). Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - loosely couple as a marker to sweep generator lead. OSCILLOSCOPE - across R211 (3.3K) Video Detector load resistor through 33K isolation resistor.	a. ADJUST SWEEP GENERATOR OUTPUT TO PRODUCE RESPONSE CURVE OF 3V. PEAK-TO-PEAK. b. Recheck trap settings by observing markers. c. Adjust T201 to place 45.75 MC marker at 40%. d. Adjust T202 to remove tilt. e. Adjust T200 to place 42.4 MC marker at 70%. f. Adjust T202 to remove tilt. g. Repeat steps c to f until 45.75 MC marker is at 40% and 42.4 MC marker is at 70%. h. Recheck traps. 
4.	Leave 3.5V. AGC voltage connected as in step 1. Set VHF tuner BETWEEN any two channels.	SWEEP GENERATOR - through 10K isolation resistor to VHF Mixer grid through hole in top of VHF tuner. Set generator to 43.5 MC with 10 MC sweep. SIGNAL GENERATOR - loosely couple as a marker to sweep generator lead. OSCILLOSCOPE - across R211 (3.3K) Video Detector load resistor through 33K isolation resistor.	L20 (VHF tuner) and L200 (bottom core) for response curve shown:  ADJUST SWEEP GENERATOR OUTPUT TO PRODUCE RESPONSE CURVE OF 3V. PEAK-TO-PEAK. If impossible to obtain response curve by L20 (VHF tuner) and L200 (bottom core) adjustments, make SLIGHT readjustments of T202, T201 and T200 (bottom core).
5.	For optimum receiver alignment repeat steps 1, 2 and 4 in order; upon completion, remove all test equipment, resistors, etc.		

SYLVANIA Chassis 1-532-5, -6, -7, Alignment Instructions, Continued

SOUND IF ALIGNMENT

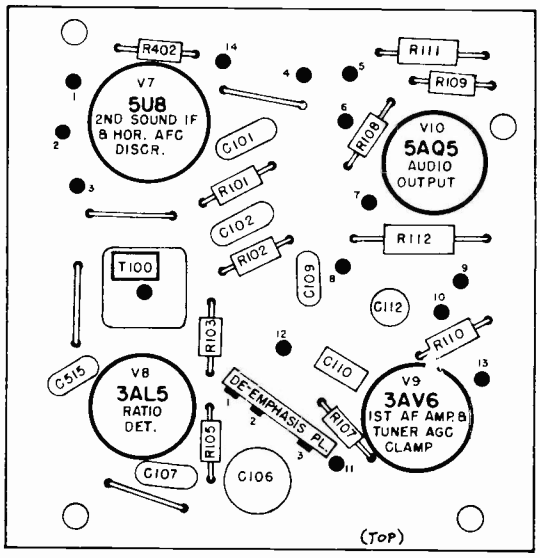
STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST
1.	Short pin 1 of V4 (3BZ6) 2nd Video IF Amp. tube to chassis. Set Contrast control to minimum. Connect RF signal generator to junction of L201 and L202. Set signal generator to 4.5 MC (preferably crystal calibrated or controlled) OR Connect a good antenna to receiver and properly tune in a strong station. (In this case, do NOT short pin 1 of V4 to chassis.)	VTVM - Ground or "Common" lead to junction of two matched 100K resistors connected in series across R105 (22K). DC Probe through 100K resistor to junction of De-emphasis Plate terminal 1 and R103 (330 ohm). ISOLATE VTVM FROM GROUND. PARTIAL TOP VIEW OF PRINTED CIRCUIT SUB-CHASSIS  	For MAXIMUM reading: T100 (both cores) L100* *Start at chassis end of coil and turn core until resonance is reached. Then, for ZERO reading: T100 (top core) Set VTVM to zero center using lowest meter scale. At the correct setting for T100 top core, a slight turn of core will give a reading either up or down the scale.
2.	Remove test equipment, resistors and short at pin 1 of V4 (3BZ6); then, tune in a WEAK STATION and adjust top core of T100 for optimum signal-to-noise ratio.		

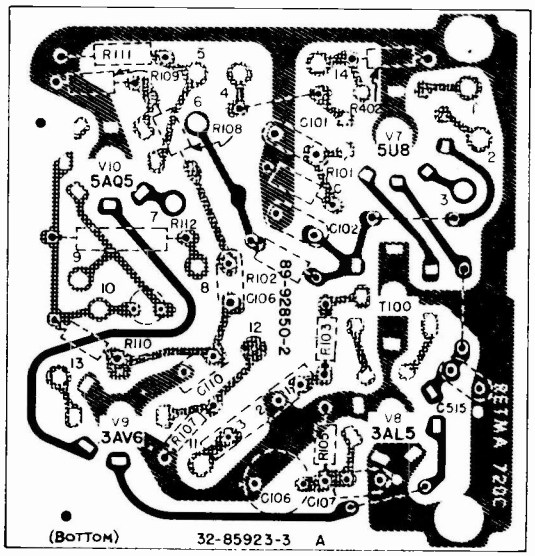
4.5 MC TRAP ALIGNMENT

STEP	ALIGNMENT SETUP NOTES	TEST EQUIPMENT HOOKUP	ADJUST
1.	PERFORM "SOUND ALIGNMENT" PROCEDURE BEFORE PERFORMING THE FOLLOWING PROCEDURE.		
2.	Short Pin 1 of V4 (3BZ6) 2nd Video IF Amp. tube to chassis.	SIGNAL GENERATOR - through 2.7K isolation resistor to junction of L201 and L202. Set signal generator to 4.5 MC (preferably crystal calibrated or controlled). VTVM - RF Probe to pin 11 (yellow lead) of picture tube.	L202 for MINIMUM reading.
3.	Remove test equipment, isolation resistor and short at pin 1 of V4 (3BZ6)		

ALTERNATE 4.5 MC ALIGNMENT:

Connect antenna to receiver and properly tune in strong station. Adjust L202 for minimum 4.5 MC interference in picture. This interference takes the form of a "grainy" appearance or fine line pattern through picture.

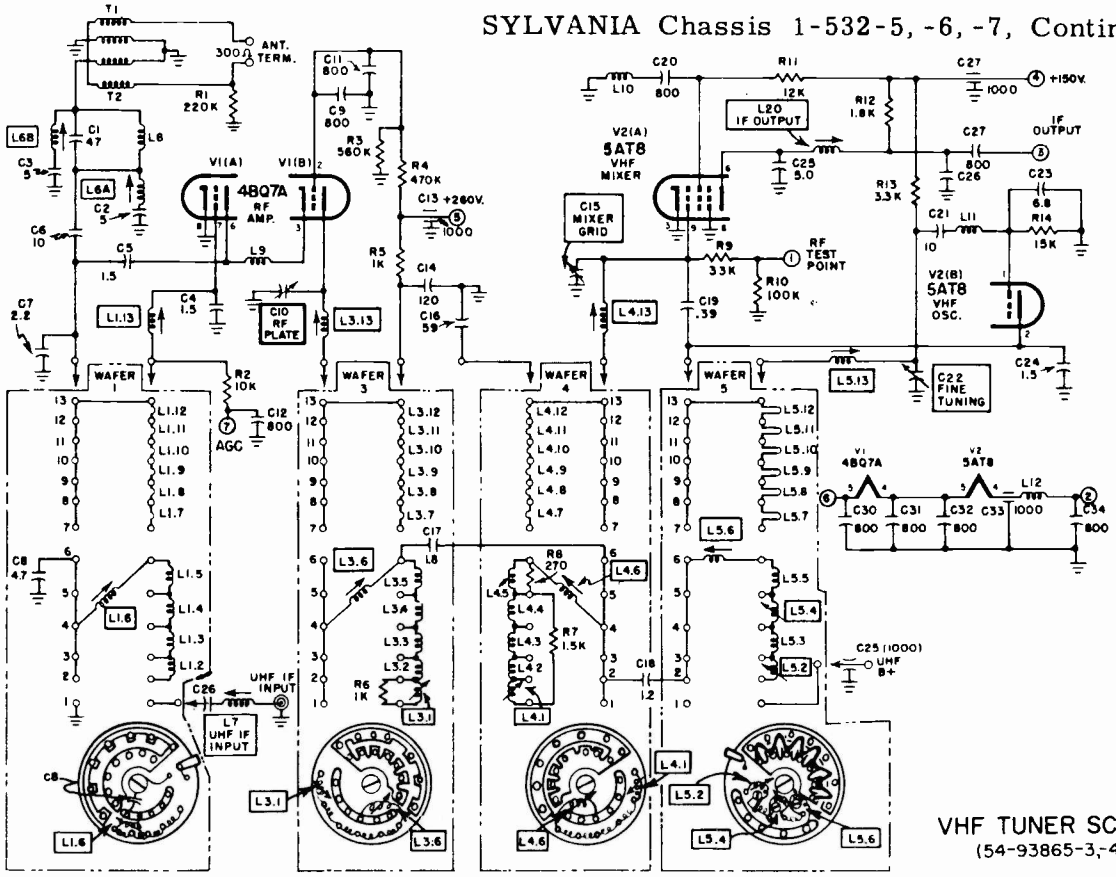




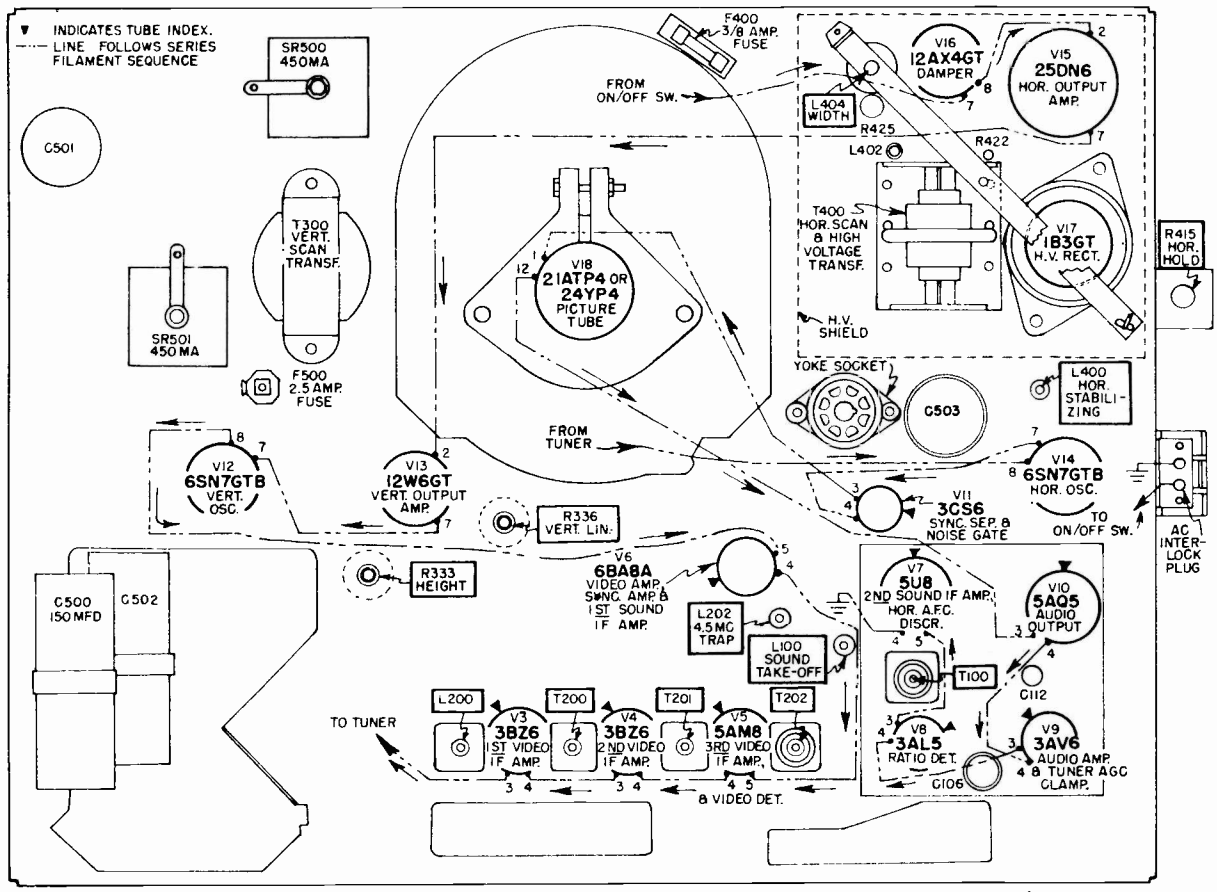
PRINTED CIRCUIT SUB-CHASSIS PARTS LAYOUT

FILAMENT
+260 V. B+ VOLTAGE
+150 V. B+ VOLTAGE
B- GROUND
MISCELLANEOUS

SYLVANIA Chassis 1-532-5, -6, -7, Continued



VHF TUNER SCHEMATIC
(54-93865-3,-4 TUNERS)



CHASSIS TOP PARTS LAYOUT

Westinghouse

CHASSIS V-2344, V-2354, and V-2345, V-2355

MODEL INFORMATION

The V2344 television chassis will be found in the following 21" models:

H21T101	H21T108
H21T104	H21K111
H21T105	H21K112
H21T106	H21K113
H21T107	H21K114

The V2345 television chassis will be found in the following 24" models:

H24T117	H24T122
H24T118	H24K125
H24T119	H24K126
H24T120	H24K127
H24T121	H24K128

The V2354 television chassis will be found in the following 21" factory equipped UHF models:

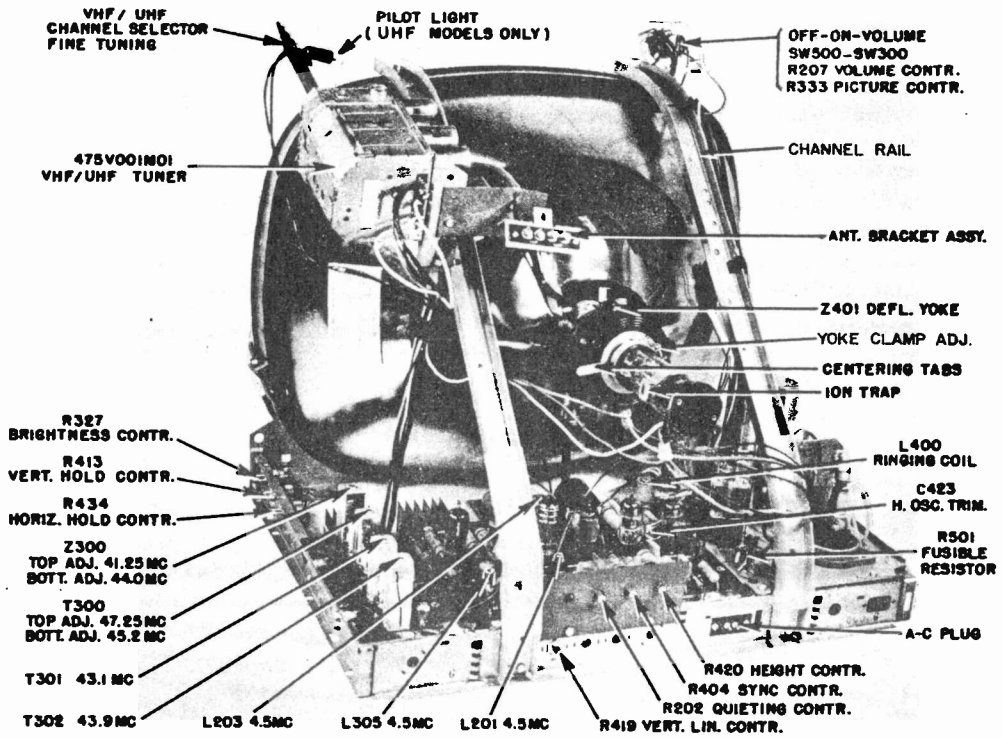
H21TU101	H21TU108
H21TU104	H21KU111
H21TU105	H21KU112
H21TU106	H21KU113
H21TU107	H21KU114

The V2355 television chassis will be found in the following 24" factory equipped UHF models:

H24TU117	H24TU122
H24TU118	H24KU125
H24TU119	H24KU126
H24TU120	H24KU127
H24TU121	H24KU128

CHASSIS REMOVAL

1. Remove the knobs from the two top front controls and the three located on the bottom right side of the cabinet.
2. Remove the back cover.
3. Remove the chassis bottom bolts.
4. Remove the two bottom and the top left-hand gussets (corner braces).
5. Remove the speaker and speaker leads.
6. Remove the bracket securing the off-on-volume and picture control to the back portion of the die cast zinc mask located inside the cabinet.
7. Loosen the nuts on the spade bolts and lift out the brackets from their slots located on the top of the chassis channels.
8. Loosen the nuts securing the tuner to the tuner bracket and push the tuner forward.



Rear View of Chassis

600 MA. SERIES TYPE TUBES

The new type 600 ma. tubes used in these chassis are controlled heater type tubes. The value of the heater resistance varies from a low value to a higher value while the tube approaches its normal operating temperature. For example, the 3CB6 heater resistance when cold is approximately .75 ohms and increases to about 5.25 ohms when hot.

(Continued on pages 172 through 174)

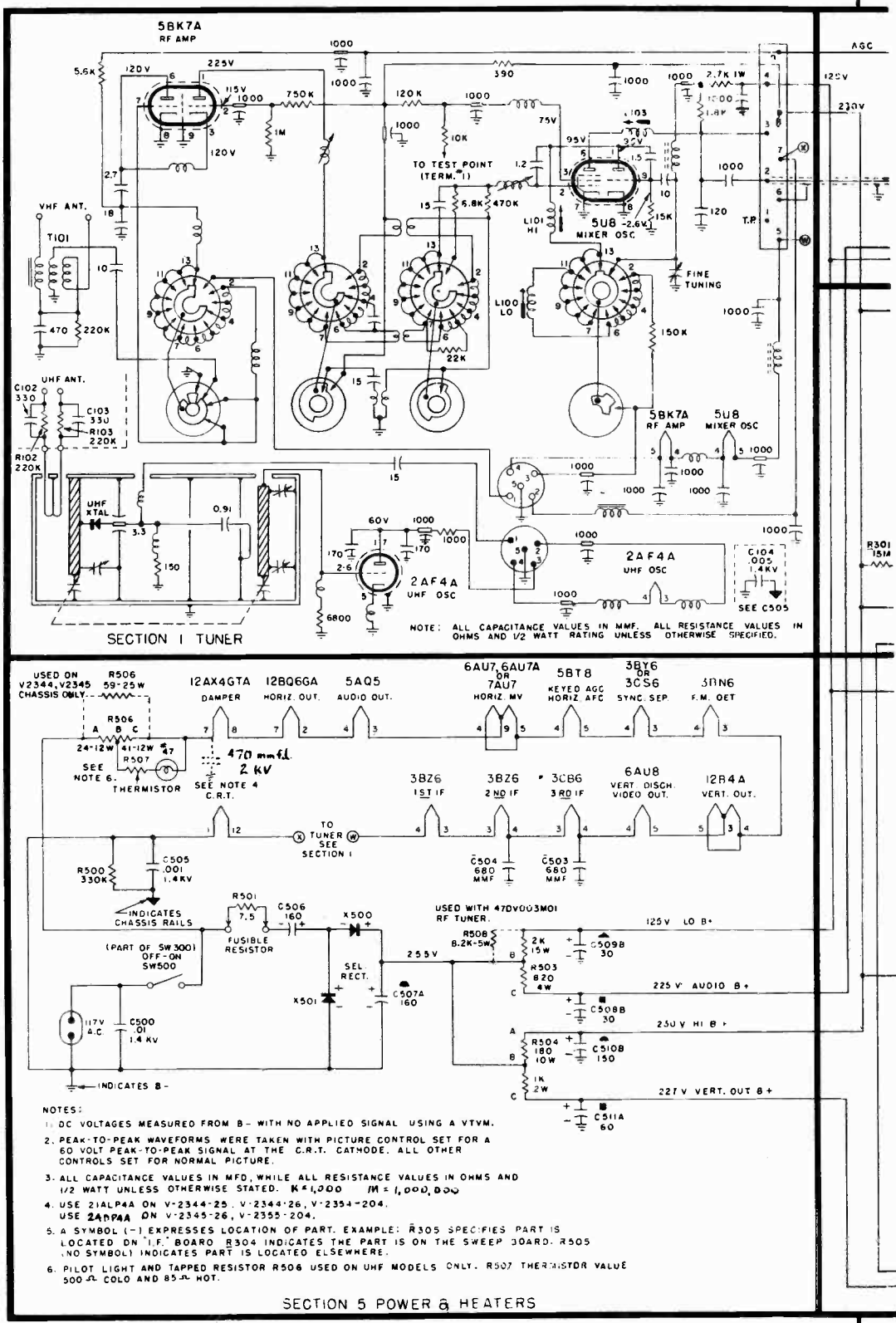
Westinghouse Chassis V-2344, V-2345, V-2354, V-2355

CRT REPLACEMENT

The following steps are used as a guide in removing the Cathode Ray tube:

1. Remove the television chassis from the cabinet.
2. Remove the CRT socket.
3. Remove the **ion** trap.
4. Loosen and remove the aluminum clamp ring securing the yoke cover.
5. Slip the yoke assembly from the CRT neck.
6. Loosen and remove from each channel stabilizing bar one 3/8" nut and lock washer allowing each stabilizing bar to be free from the CRT mounting strap assembly.
7. Remove the six (three on each side) 1/4" self tapping screws from the chassis side rails securing the CRT cradle.

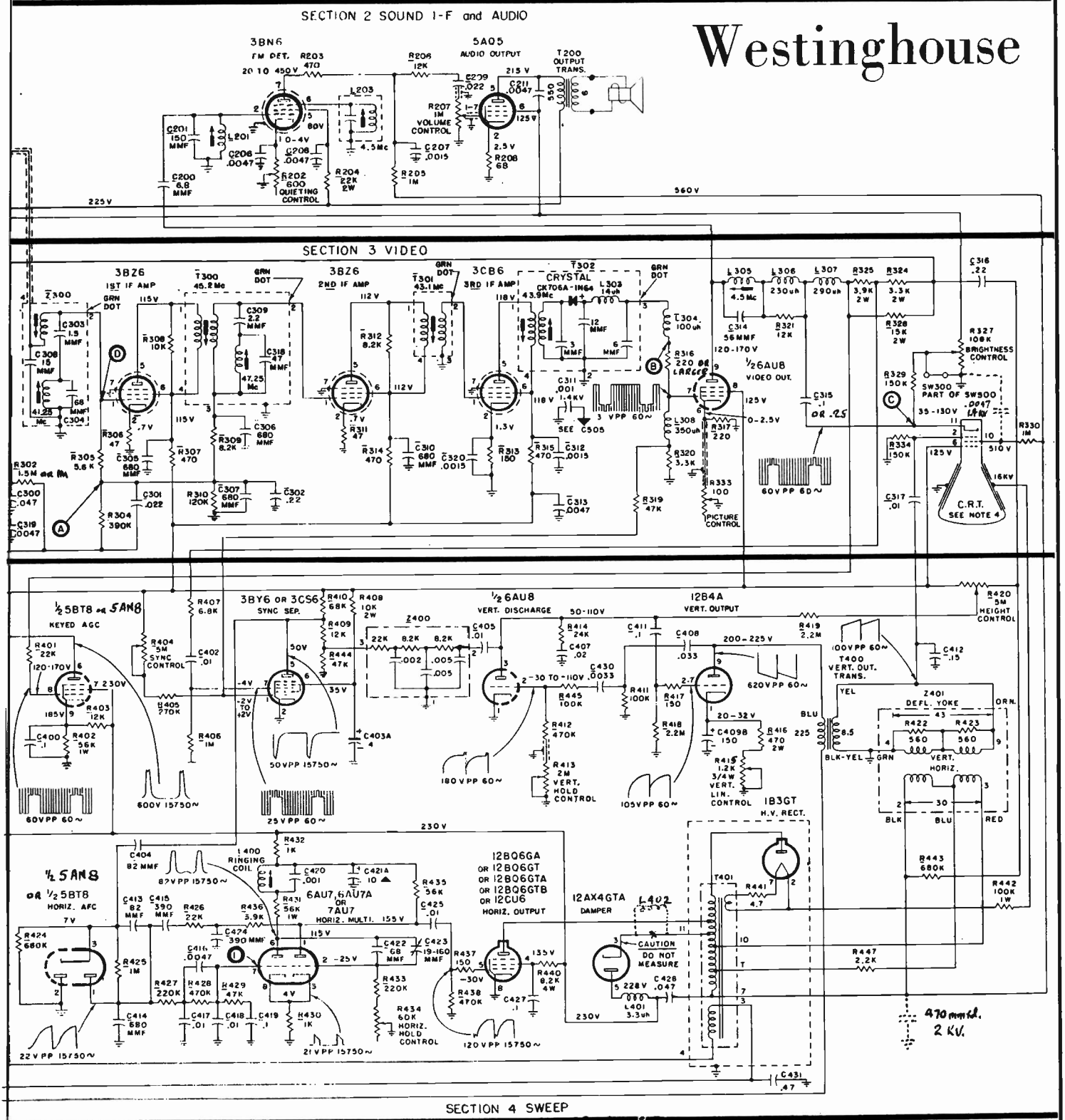
NOTE: Upon replacement of new CRT, do not tighten the yoke clamp too tight but make sure the yoke is up well against the CRT flare.



CHASSIS ASSEMBLIES V-2354 and V-2355

Chassis assemblies V-2354 and V-2355 are the same as chassis assemblies V-2344 and V-2345 except that they contain a factory installed VHF-UHF all-channel tuner.

Figure 14 – V-2344-25-26, V-2354-204, V-2345-26, V-2355-204 Schematic Diagram



PRINTED CIRCUITS

Two printed circuit assemblies are used in these chassis, they are namely the IF printed board and the sweep printed board. The IF assembly includes the IF amplifiers and the crystal detector circuits. The sweep assembly includes the video amplifier, sound detector, sync separator, vertical discharge and keyed AGC, vertical output and horizontal multivibrator circuits.

WESTINGHOUSE Chassis V-2344, V-2345, V-2354, V-2355

Information on Printed Boards Used

Component Replacement on Printed Boards

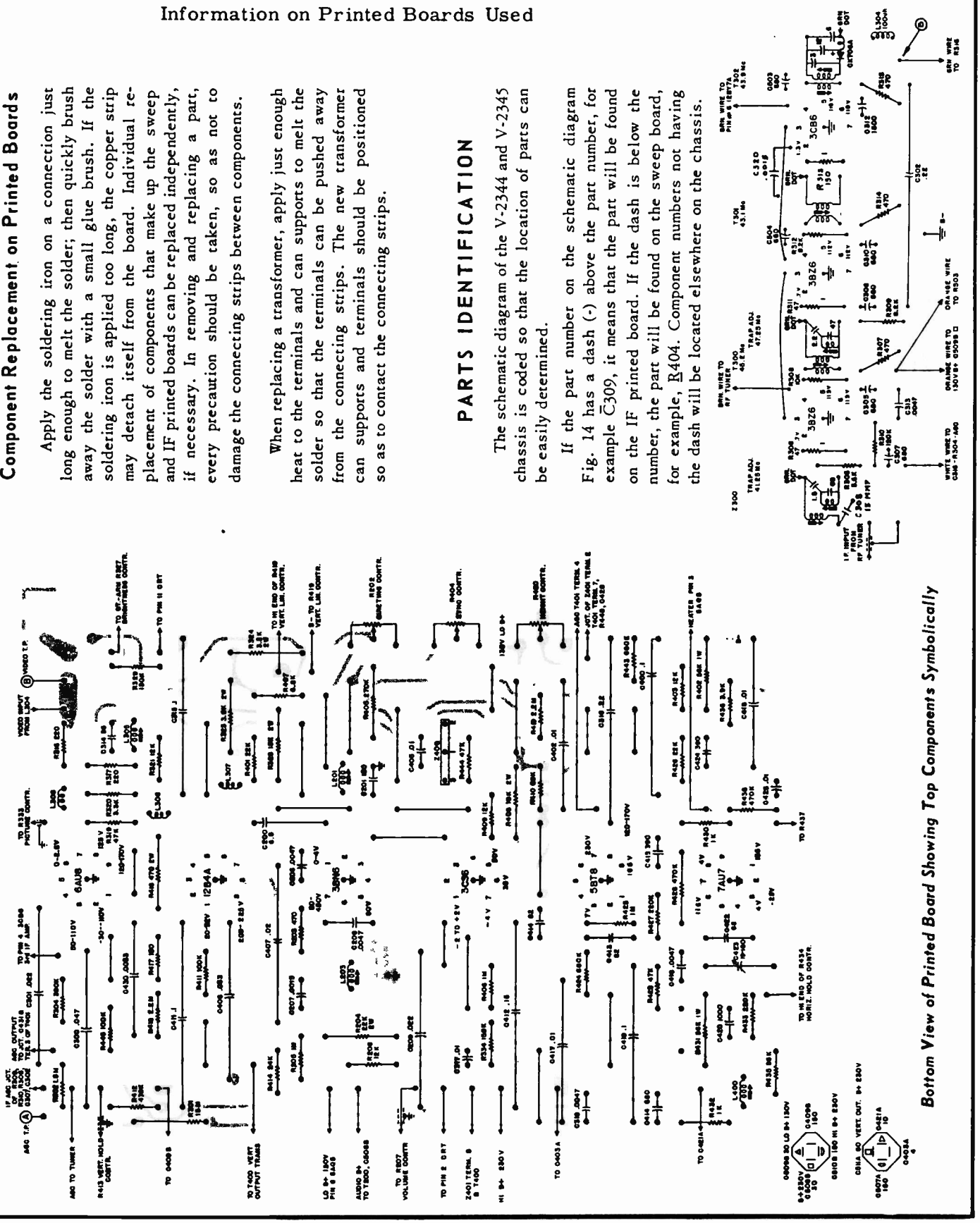
Apply the soldering iron on a connection just long enough to melt the solder; then quickly brush away the solder with a small glue brush. If the soldering iron is applied too long, the copper strip may detach itself from the board. Individual replacement of components that make up the sweep and IF printed boards can be replaced independently, if necessary. In removing and replacing a part, every precaution should be taken, so as not to damage the connecting strips between components.

When replacing a transformer, apply just enough heat to the terminals and can supports to melt the solder so that the terminals can be pushed away from the connecting strips. The new transformer can supports and terminals should be positioned so as to contact the connecting strips.

PARTS IDENTIFICATION

The schematic diagram of the V-2344 and V-2345 chassis is coded so that the location of parts can be easily determined.

If the part number on the schematic diagram Fig. 14 has a dash (-) above the part number, for example C309, it means that the part will be found on the IF printed board. If the dash is below the number, the part will be found on the sweep board, for example, R404. Component numbers not having the dash will be located elsewhere on the chassis.



Bottom View of Printed Board Showing Top Components Symbolically

ZENITH RADIO CORPORATION

1957 TELEVISION RECEIVERS

CHASSIS 16Z20-16Z21-17Z20-17Z21-17Z22-17Z23-19Z22-22Z20

Chassis:	Used in Models:
16Z20	Z1814R, Y
16Z21	Z1816C, E, R, Z1818C, E, R
17Z20	Z2220R, Y
17Z21	Z2222C, E, R, Y
17Z22	Z2247E, H, R, Z2258E, H, R
17Z22Q	Z3000E, R, Z3004E, R, Z3006E, R, Z3008E, R
17Z23	Z2637E, R, Y, Z2672E, R
17Z23Q	Z4000E, R
19Z22	Z2229R, Z2230E, R, Z2255E, R, Z2257E, M, R
19Z22Q	Z3010E, H, R, Y
22Z20	Z2359, R, Z2360R
22Z20Q	Z3012H, R, Z3014H, R

With the exception of tuners used, the 16Z20, 16Z21, 17Z20, 17Z21, 17Z22, 17Z23, vertical chassis models are similar in design and adjustments. The 16Z20 and 17Z20 chassis utilize a bandswitch tuner and the 16Z21, 17Z21, 17Z22, and 17Z23 chassis are equipped with the Target turret tuner. Two tuner diagrams are printed on page 190. Suffix "Q" following the chassis number indicates that the receiver is equipped with Zenith Space Command remote control. Suffix "U" indicates that the set is equipped with UHF continuous tuner. Ajustment and alignment procedures for the I. F. amplifier and sound circuits of the chassis listed in this paragraph are identical.

For circuit diagram applicable to 16Z20 and 16Z21 see pages 176-177; for circuit on 17Z series sets see page 183.

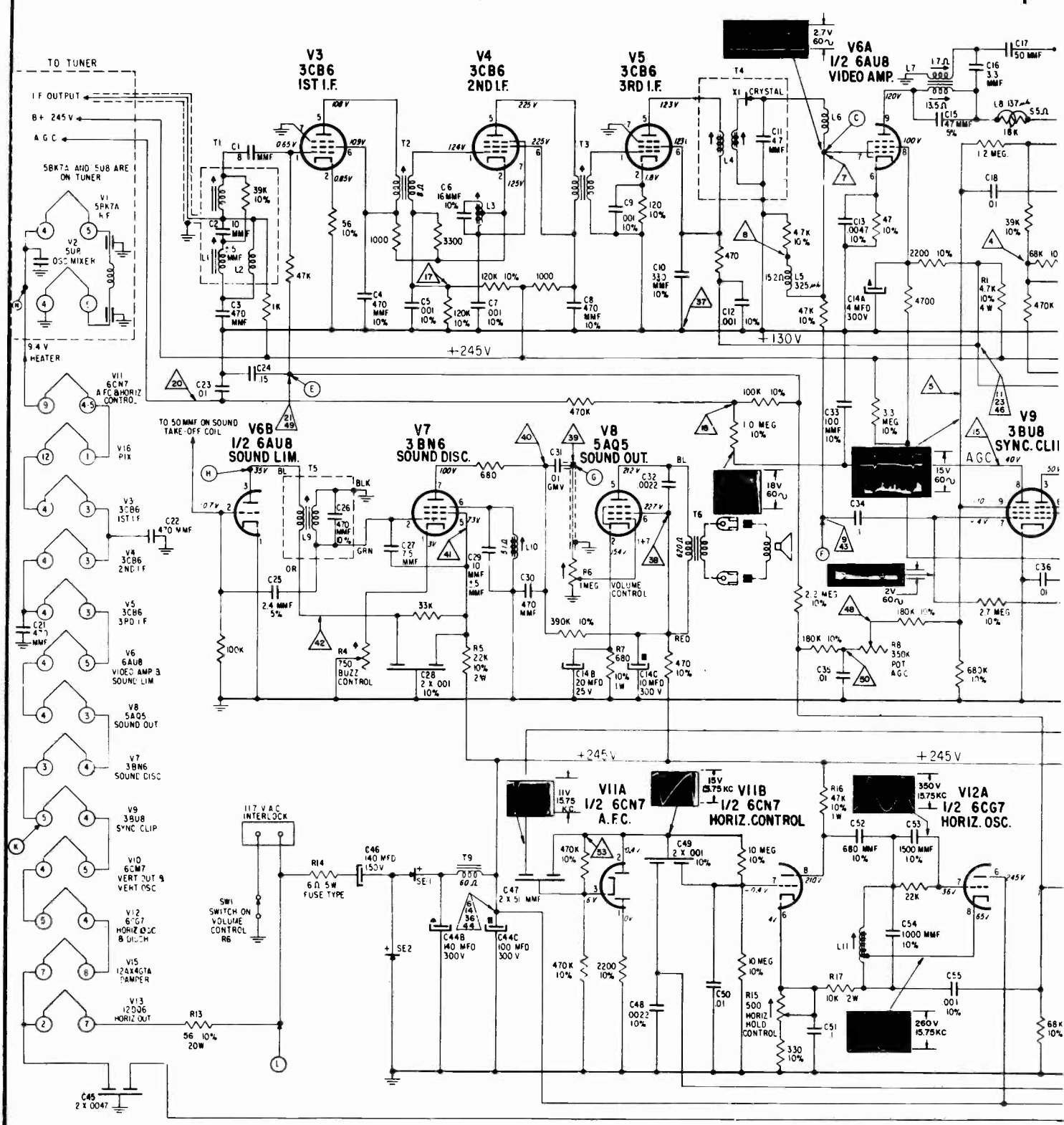
The 19Z22 and 22Z20 horizontal chassis are equipped with the Bulls-Eye tuner and are similar in design and adjustment to similar sets of a prior period. Suffix "Q" and "U" has the same reference as stated above. Circuit diagram of 19Z22 is on page 187, and for 22Z20 on page 189.

POWER SUPPLY
110 Volts - 60 Cycles A C

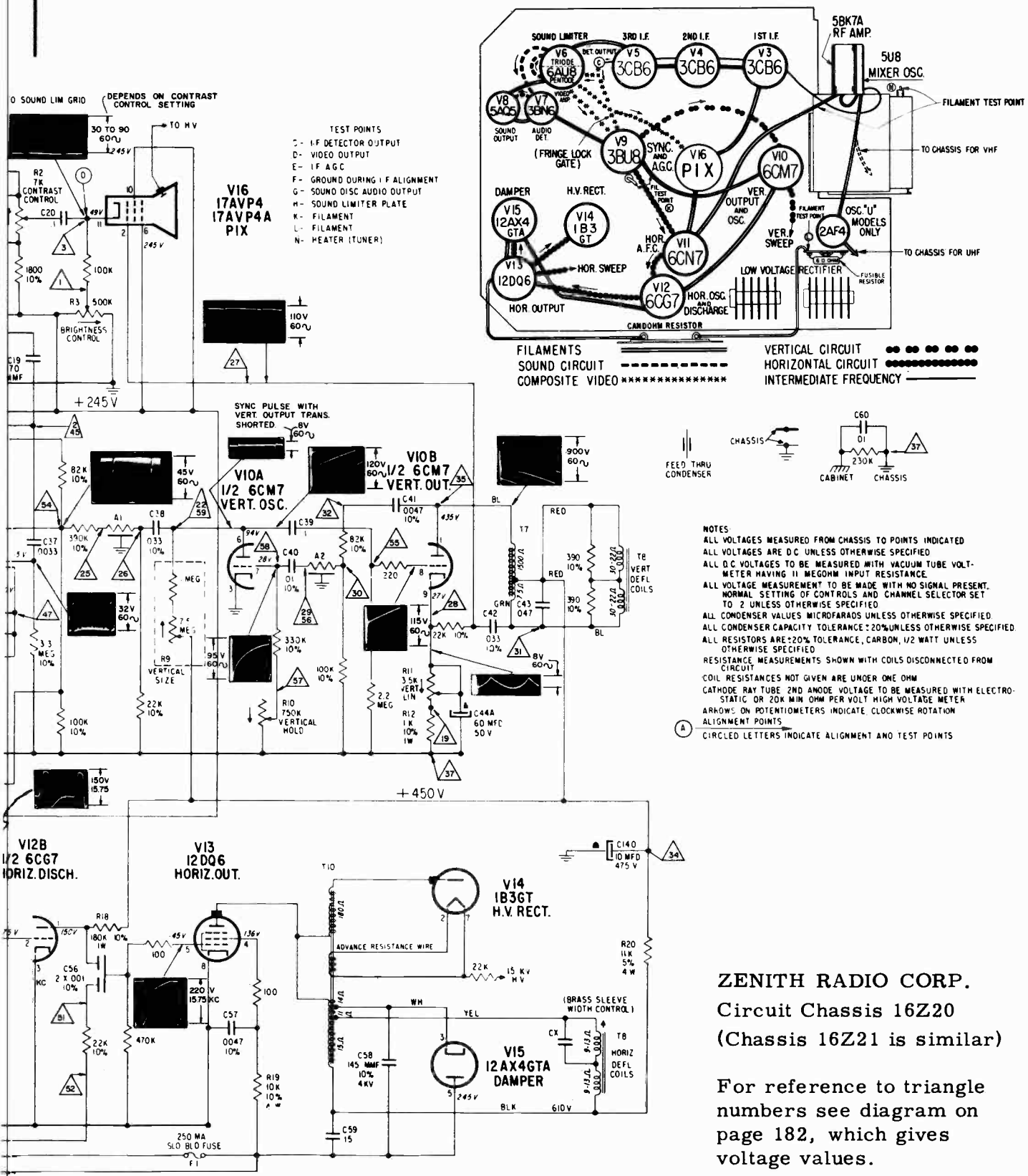
16Z20 & U Chassis	-	160 Watts
16Z21 & U Chassis	-	160 Watts
17Z20 & U Chassis	-	180 Watts
17Z21 & U Chassis	-	180 Watts
17Z22 & U Chassis	-	180 Watts
17Z22Q Chassis	-	*290 Watts
17Z23 & U Chassis	-	215 Watts
17Z23Q Chassis	-	*325 Watts
19Z22 Chassis	-	190 Watts
19Z22Q Chassis	-	*300 Watts
22Z20 Chassis	-	265 Watts
22Z20Q Chassis	-	*375 Watts

* Includes power required to operate Space Command chassis. (50 Watts when idling and 110 Watts with motor operating.)

ZENITH RADIO CORP. Circuit Diagram Chassis 16Z20 (Chassis 16Z21 is similar)



ZENITH Circuit Diagram Chassis 16Z20 (Chassis 16Z21 is similar)



NOTES
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
ALL D.C. VOLTAGES TO BE MEASURED WITH VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENT TO BE MADE WITH NO SIGNAL PRESENT, NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO 2 UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER CAPACITY TOLERANCE ±20% UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±20% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM
CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN OHM PER VOLT HIGH VOLTAGE METER
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION
(A) ALIGNMENT POINTS
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS

ZENITH RADIO CORP.
Circuit Chassis 16Z20
(Chassis 16Z21 is similar)

For reference to triangle numbers see diagram on page 182, which gives voltage values.

CIRCUIT DESCRIPTION OF THE 6BU8 AGC AMPLIFIER AND SYNC CLIPPER

The physical construction of the Zenith developed 6BU8 tube used in the 17Z chassis (3BU8 in the 16Z chassis) is similar to a pentode in which the plate and grid #3 are split in half forming two individual plates (pins 3 and 8, Fig. 1) and two second control grids (pins 6 and 9). The cathode, control grid #1 and screen grid elements are common to both halves of the tube.

To the second control grid (pin 9) is applied a positive going composite video signal obtained from the plate of the 6AU8 video amplifier. This voltage is directly proportional to the strength of the received TV signal i.e., the stronger the TV signal impressed on the grid, the greater will be the plate current and less positive voltage will appear at "E". The opposite is true if the signal level drops.

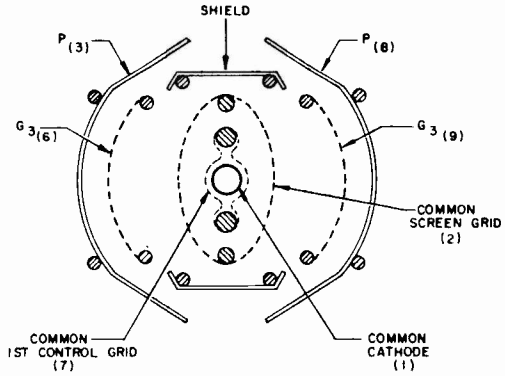


Fig. 1 Cut-Away View Of The 3/6BU8 Tube

When a TV signal is received, the positive going composite signal at the second control grid causes an increase in plate current and a greater voltage drop through the 3.3 meg. plate load resistor.

Noise gating of the AGC and sync clipper is a single function. It is accomplished by applying a negative going composite signal (from the video detector) to the 1st control grid (pin 7). The 2.7 megohm resistor connected to the grid regulates the bias so that any noise burst greater than the composite video signal will cut the tube off.

The second section of the 6BU8 is the sync clipper. In this circuit the output of the video amplifier is coupled to the second control grid (pin 6). The negative bias, developed as the result of grid current flow through the 3.3 megohm resistor, is held to a level so that only the sync tips appear in the output. The 2.7 megohm grid resistor regulates the bias at grid #1 (pin 7) so that any noise burst greater than the composite video signal will cut the tube off.

ADJUSTMENTS

CENTERING ADJUSTMENT

In the 16Z, 17Z and 19Z series receivers, 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.

In the 22Z series receivers, a single centering lever is used for both vertical and horizontal centering. The up-down movement of this lever moves the picture horizontally while a left-right movement moves the picture vertically. The lever is locked in position after adjustment by use of a small lift locking lever or in some models by a locking screw. A screwdriver adjustment is provided for focusing.

AFC ADJUSTMENT 17Z, 19Z & 22Z CHASSIS

The AFC is adjusted by setting the horizontal hold control L9 (L11 in 17Z chassis) to a position where it is virtually impossible to "throw" the receiver out of horizontal sync when switching from channel to channel.

TUNER OSCILLATOR ADJUSTMENTS 16Z20 & 17Z20 CHASSIS

To adjust the receiver oscillator adjustment screws set the fine tuning control to a position where the index hole in the drive cam is directly over the small hole just below the channel 13 adjustment screw (see Fig. 2). Without further adjustment of the fine tuning control, insert a 68-24 alignment tool into the tuner and adjust each operating channel to resonance starting with the highest channel and following each lower channel in sequence. Be certain not to move the fine tuning shaft when switching channels. It will be noted that tuning to one side of resonance results in a faded, washed-out picture with the spacing between the wedge lines fogged and tuning in the opposite direction causes the spaces between the lines to clear up. However, going beyond this point causes the picture to take on a "wormy" appearance from sound getting into the picture. Correct adjustment is obtained by tuning to the "wormy" picture and then backing the control off slightly until the picture clears up.

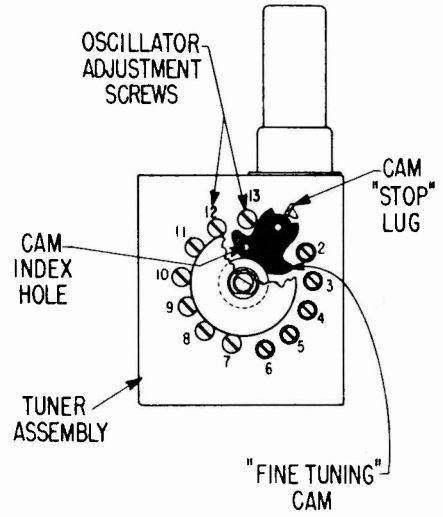


Fig. 2. Bandswitch Tuner Oscillator Adjustments

BULLS EYE TUNER ADJUSTMENTS 19Z & 22Z CHASSIS

To adjust the receiver for bulls-eye tuning, set the fine tuning control to its approximate center position. Without further adjustment of the control insert an 68-21 alignment wrench through the hole provided at the rear of the tuner and adjust each operating channel to resonance. It will be noted that tuning to one side of resonance results in a faded, washed-out picture with the spacings between the wedge lines fogged and tuning in the opposite direction causes the spaces between the lines to clear up. However, going beyond this point causes the picture to take on a "wormy" appearance from sound getting into the picture. Correct adjustment is obtained by tuning to the "wormy" picture and then backing the adjustment screw slightly until the picture clears up.

AGC ADJUSTMENT

The AGC is adjusted at the factory (using a 100% modulated video signal) to obtain 100 volts (75 V 16Z & 17Z chassis) peak video amplifier output as measured at the cathode of the picture tube.

Satisfactory adjustment can also be made by observing the picture and slowly turning the AGC 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.

CAUTION: Misadjustment of the AGC delay control can result in a washed-out picture, distorted picture, buzz in sound OR COMPLETE LOSS OF PICTURE AND SOUND.

FRINGE LOCK ADJUSTMENT 19Z & 22Z CHASSIS

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 counter-clockwise position of the control.

3. In fringe and noisy areas, the best adjustment will be found at or near the maximum clockwise position of the control; however, do not automatically turn the fringe lock fully clockwise in fringe areas as has been done on previous models. Follow the procedure outlined. In areas where both local and fringe signals are received, a compromise setting should be made for best overall performance.

CORRECTOR MAGNET ADJUSTMENT 19Z & 22Z SERIES

Two corrector magnets are used to obtain straight, sharply focused sweep lines across the face of the picture tube. In the 22Z21 chassis, the corrector magnets are mounted top and bottom. 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: Mis-adjustment of the corrector magnets may cause pincushioning, barreling, keystoning, poor linearity, etc.

ALIGNMENT

A suitable VHF and UHF sweep generator in conjunction with an accurate marker must be used for alignment work. It is very important to properly terminate the sweep generator output cable and to check whether or not the attenuator is reactive. If the attenuator is reactive or if the output cable is improperly terminated, correct alignment cannot be made since the degree of attenuation then may change the shape as well as the amplitude of the response curve. The position of the attenuator should only vary the amplitude and not the shape of the response curve.

SOUND ALIGNMENT

Proper alignment of the 4.5 Mc intercarrier sound channel can only be made if the signal to the receiver antenna terminals is reduced to a level below the limiting point of the 6BN6 Gated Beam Detector. This level can be easily identified by the "hiss" which then accompanies the sound.

Various methods may be used to reduce the signal level; however, it is recommended that a step attenuator similar to the S-17203 unit be used 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 "hiss" is heard with the sound.

3. Adjust the sound take-off coil (top and bottom slugs), 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.

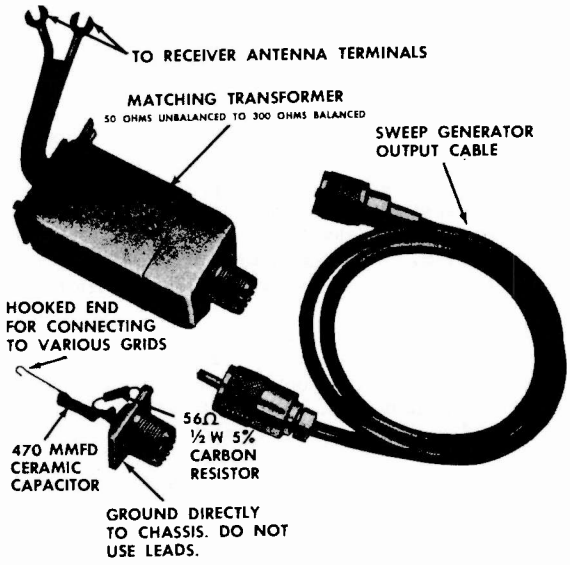


Fig. 3 IF-RF Alignment Fixtures

VIDEO IF ALIGNMENT 16Z & 17Z SERIES RECEIVERS

The video IF amplifier is stagger tuned, using one double tuned and four single tuned circuits. The converter plate coil tunes to 45.4 Mc, the first IF to 43.6 Mc, the second IF to 42.75 Mc, the third IF to 45 Mc, and the fourth IF (both cores) to 43.6 Mc. The 47.25 Mc trap is part of the first IF transformer assembly. The 40.50 Mc second IF cathode trap boosts the sound carrier under extremely weak signal conditions. Attenuation of the 41.25 Mc associated sound carrier is controlled by adjusting the band width. With the exception of the traps, a slight deviation from the above mentioned frequencies is permissible to obtain proper band pass; however, the order must be maintained. To align the IF, proceed as follows:

1. To prevent an erroneous IF response, disable the local oscillator during alignment. To do this, wrap a short bare wire around the oscillator grid and connect wire to chassis. In "U" models it is only necessary to switch the channel selector to the UHF position. Connect terminal "F" (Fig.27) to chassis.

2. Connect the negative lead of a 6 volt battery or a low impedance bias supply to terminal "E" and the positive lead to chassis.

3. Connect a calibrated oscilloscope through a 10K isolation resistor between terminal "C" and chassis.

4. Connect the sweep generator through a terminating network similar to that shown in Fig. 3 to the grid (pin 1) of the third IF amplifier.

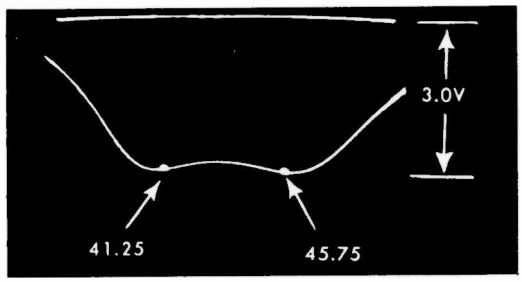


Fig. 4 4th IF Response

5. Adjust the sweep generator to obtain a pattern similar to Fig. 4 with a detector output of 3 volts peak to peak. Do not exceed this output during alignment.

6. Adjust the top and bottom cores of the fourth IF transformer to obtain a response similar to Fig. 4. The 41.25 and 45.75 Mc markers should be adjusted for symmetry and should fall as close to the response curve humps as possible. If the correct response curve cannot be obtained, check the position of the two cores to see that they are not butted but are entering their respective windings from the opposite ends of the coils.

7. Connect the sweep generator to test point "A" (Fig. 19 or 20 depending on tuner used) and adjust attenuator to obtain 3 volts peak to peak output at the detector.

8. Adjust the first IF bottom core (44.Mc), second IF (42.75 Mc), third IF (45 Mc), and converter plate coil to obtain a response similar to Fig. 5.

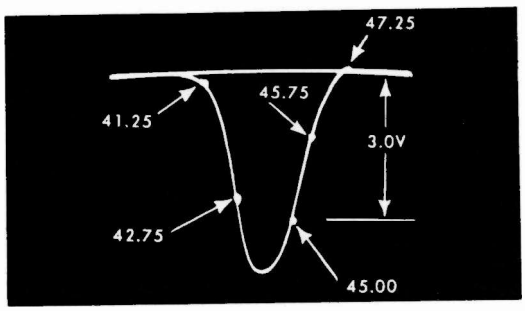


Fig. 5 Overall IF Response

9. Switch the oscilloscope to 10X gain used in the above steps to blow up the trap slots. Adjust the 47.25 Mc trap for maximum attenuation of 47.25 Mc

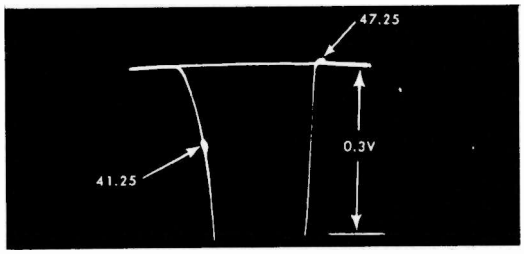


Fig. 6 Expanded View Of Traps

marker (top core lst IF transformer). The 41.25 Mc marker should be in the approximate position shown in Fig. 6. On some receivers more oscilloscope gain, more signal input, or lower bias may be necessary to adjust the 47.25 Mc trap. (If the 41.25 Mc marker does not fall at the approximate position shown or nearer the base line, it may be necessary to make a slight re-adjustment of the 2nd IF. If this is done, check the overall response after adjustment.)

10. Switch oscilloscope to position used in Step 8. Remove the bias battery and ground the AGC. Adjust signal generator to obtain a 3 volt peak to peak response similar to Fig. 7. Adjust the 2nd IF cathode trap for maximum displacement of the 40.50 Mc marker but not to exceed the displacement of the 41.25 Mc marker.

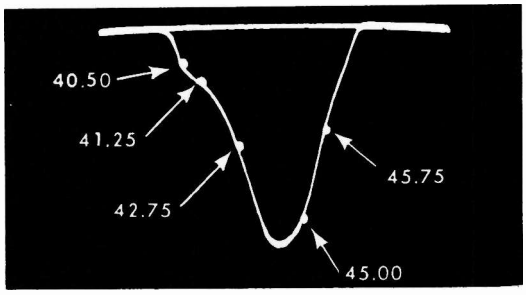


Fig. 7 Overall Response With Zero Bias For Adjusting The 40.5 Mc Trap

VIDEO IF ALIGNMENT 19Z & 22Z CHASSIS

1. Slowly turn the channel selector until the turret is made to rest between two channels. Connect the negative lead of a battery bias supply to terminal "H" ——— and the positive lead to chassis. The bias supply should be adjustable so that it can be varied from negative 3 volts to positive 3 volts. Keep the supply leads short.

2. Connect a calibrated oscilloscope through a 10,000 ohm isolation resistor between terminal "E" and chassis. Adjust bias to -2 volts. The sweep generator input to the receiver should be adjusted for 3 volts peak to peak detector output. Do not exceed this output level during any of the adjustments.

3. Feed the output from the sweep generator through the special termination unit shown in Fig. 3 to point "D" (pin 1 of 6CB6, 3rd IF). Adjust the generator until a pattern similar to Fig. 8 is obtained.

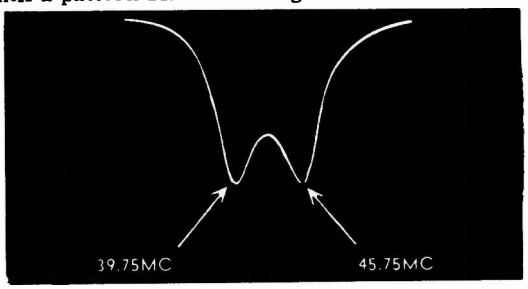


Fig. 8 4th IF Response

4. Set the Marker Generator to 45.75 Mc and alternately adjust the top and bottom cores of the 4th IF transformer for maximum gain and symmetry with the 45.75 Mc markers positioned as shown in Fig. 8. The 39.75 Mc marker can fall within ± 0.5 Mc of the specified frequency. If the correct response curve cannot be obtained in this step, check the position of the two cores to see that they are entering their respective windings from the opposite ends of the coil form.

5. Connect the sweep generator cable to terminal "A" (Mixer Grid, see Fig.42). In this step it may be necessary to temporarily reduce the bias to zero or even go slightly positive in order to observe the highly attenuated trap slots. Use maximum vertical gain on the oscilloscope.

6. Adjust the 47.25 Mc, 39.75 Mc and 41.25 Mc (Top slug of 1st IF transformer) traps for minimum marker amplitude, see Fig. 9. It can be seen that maximum oscilloscope gain has been used and the response curve has been "run off" the oscilloscope screen in order to see a "blow up" of the trap slots.

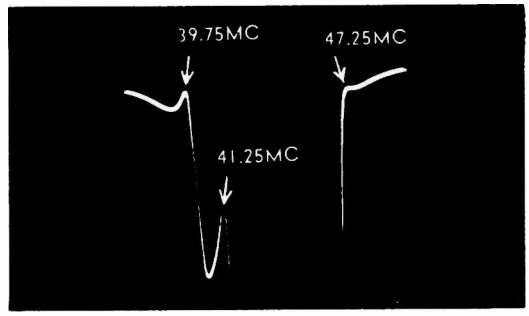


Fig. 9 Expanded View Of Traps

7. Readjust the bias to -2 volts and set the oscilloscope vertical gain to the calibrated position. Adjust the sweep generator for 3 volts peak to peak output at the video detector.

8. With the test equipment set up as in Step 7, alternately adjust the 2nd IF, 3rd IF, 1st IF and the converter plate coil until an overall response curve similar to Fig. 10 is obtained. Do not adjust the 4th IF in this step. 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 curve.

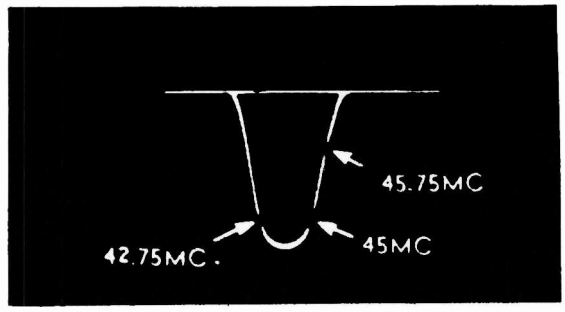
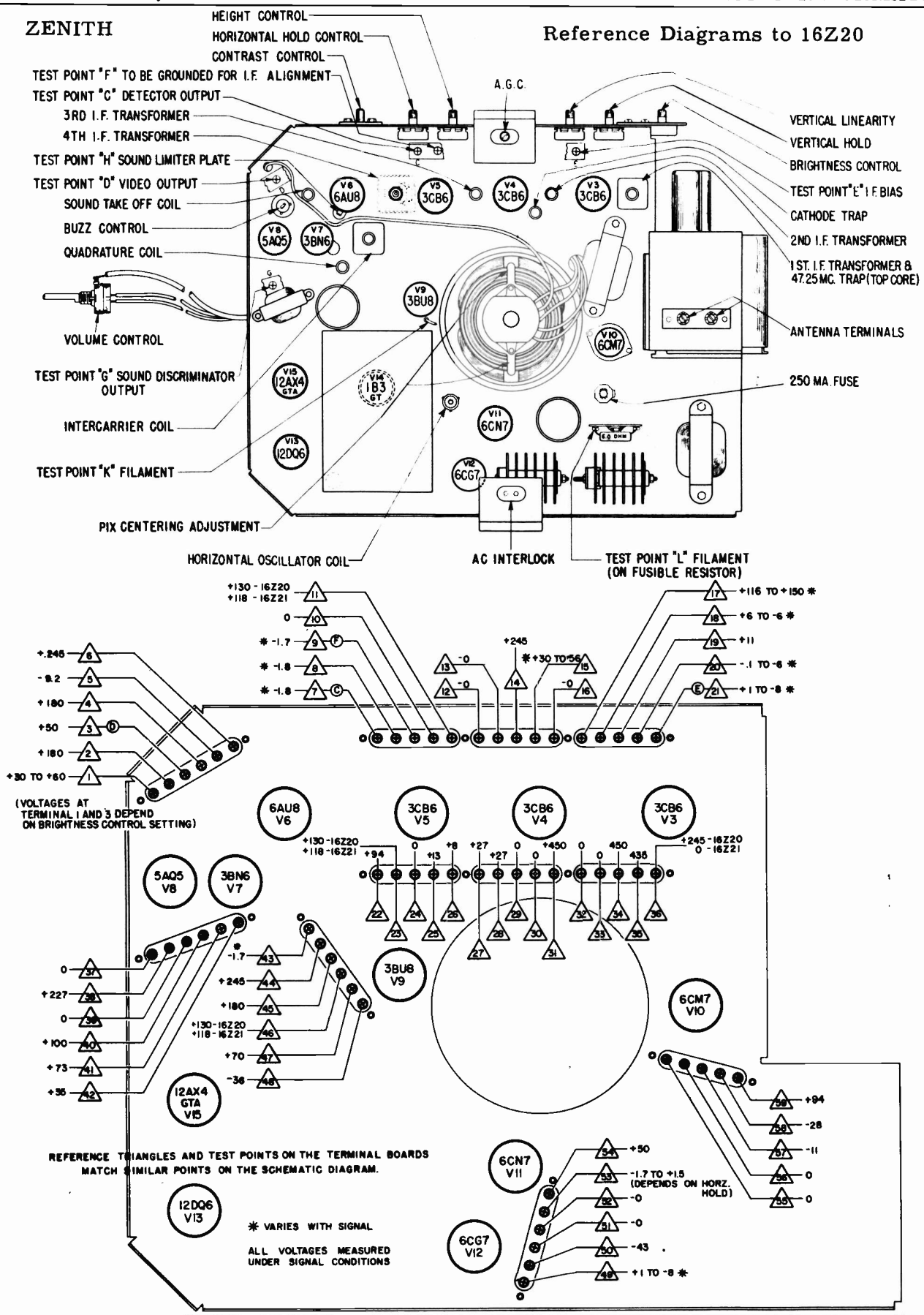


Fig. 10 Overall IF Response

ZENITH

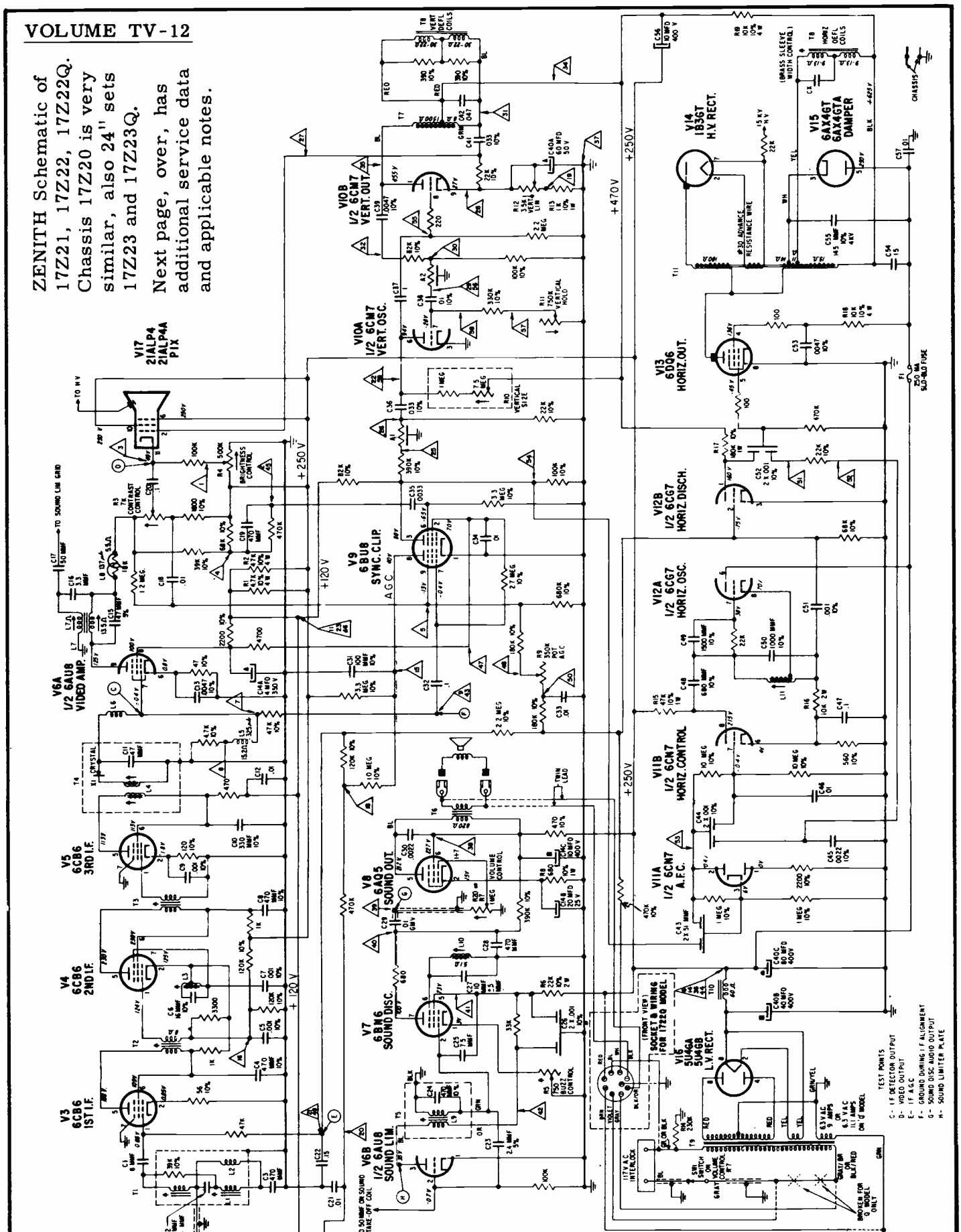
Reference Diagrams to 16Z20



VOLUME TV-12

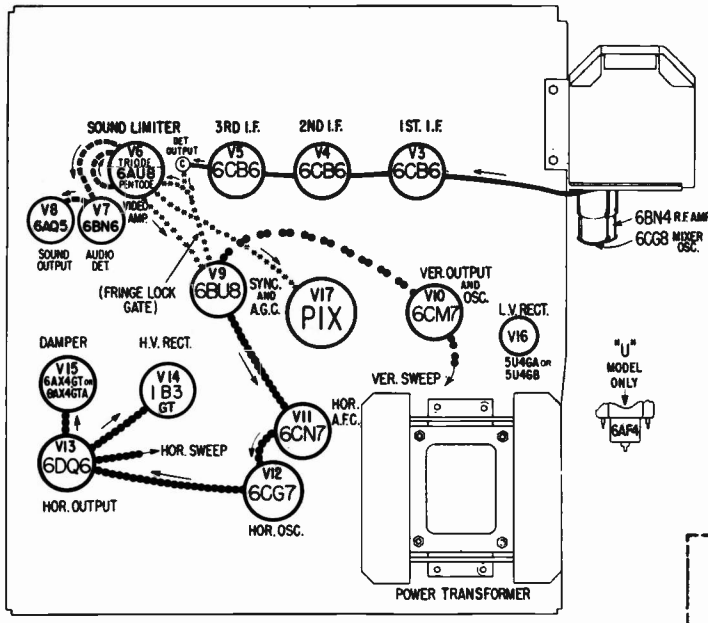
ZENITH Schematic of 17Z21, 17Z22, 17Z22Q. Chassis 17Z20 is very similar, also 24" sets 17Z23 and 17Z23Q.

Next page, over, has additional service data and applicable notes.

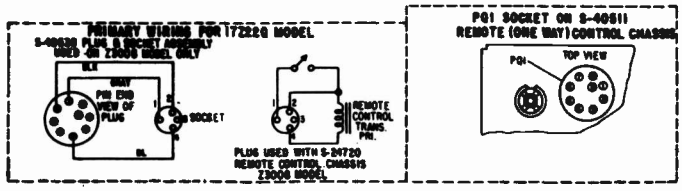


ZENITH Chassis 17Z21, 17Z22, 17Z22Q

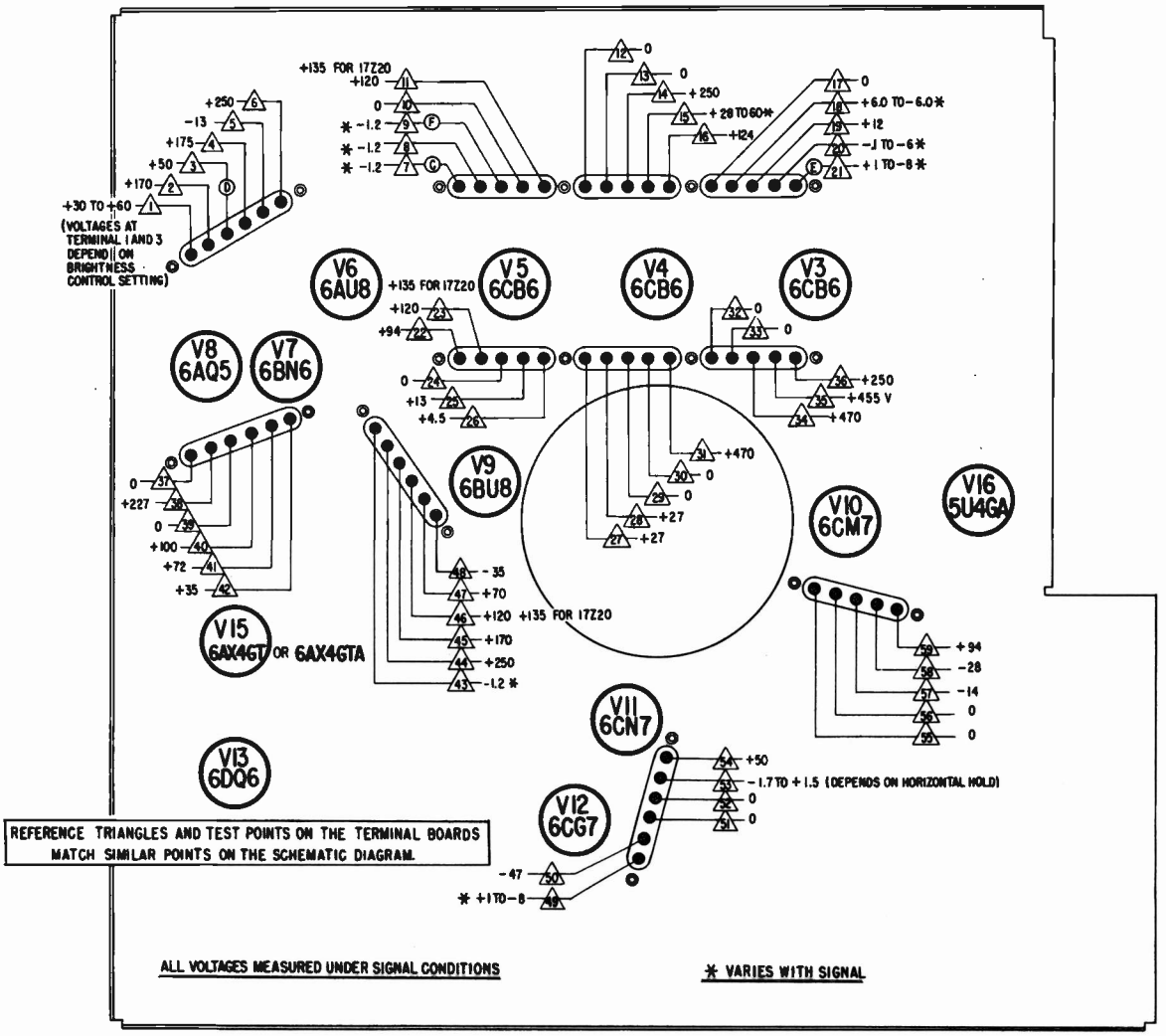
Additional data and notes concerning the schematic diagram (see page 183) and other service material.



NOTES.
ALL VOLTAGES MEASURED FROM CHASSIS TO POINTS INDICATED.
ALL VOLTAGES ARE D.C. UNLESS OTHERWISE SPECIFIED
ALL D.C. VOLTAGES TO BE MEASURED WITH VACUUM TUBE VOLTMETER HAVING 11 MEGOHM INPUT RESISTANCE.
ALL VOLTAGE MEASUREMENT TO BE MADE WITH NO SIGNAL PRESENT NORMAL SETTING OF CONTROLS AND CHANNEL SELECTOR SET TO 2 UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER VALUES MICROFARADS UNLESS OTHERWISE SPECIFIED.
ALL CONDENSER CAPACITY TOLERANCE ±20% UNLESS OTHERWISE SPECIFIED.
ALL RESISTORS ARE ±20% TOLERANCE, CARBON, 1/2 WATT UNLESS OTHERWISE SPECIFIED
RESISTANCE MEASUREMENTS SHOWN WITH COILS DISCONNECTED FROM CIRCUIT
COIL RESISTANCES NOT GIVEN ARE UNDER ONE OHM
CATHODE RAY TUBE 2ND ANODE VOLTAGE TO BE MEASURED WITH ELECTROSTATIC OR 20K MIN OHM PER VOLT HIGH VOLTAGE METER.
ARROWS ON POTENTIOMETERS INDICATE CLOCKWISE ROTATION
(A) ALIGNMENT POINTS
CIRCLED LETTERS INDICATE ALIGNMENT AND TEST POINTS



SOUND CIRCUIT
COMPOSITE VIDEO
INTERMEDIATE FREQUENCY
VERTICAL CIRCUIT
HORIZONTAL CIRCUIT

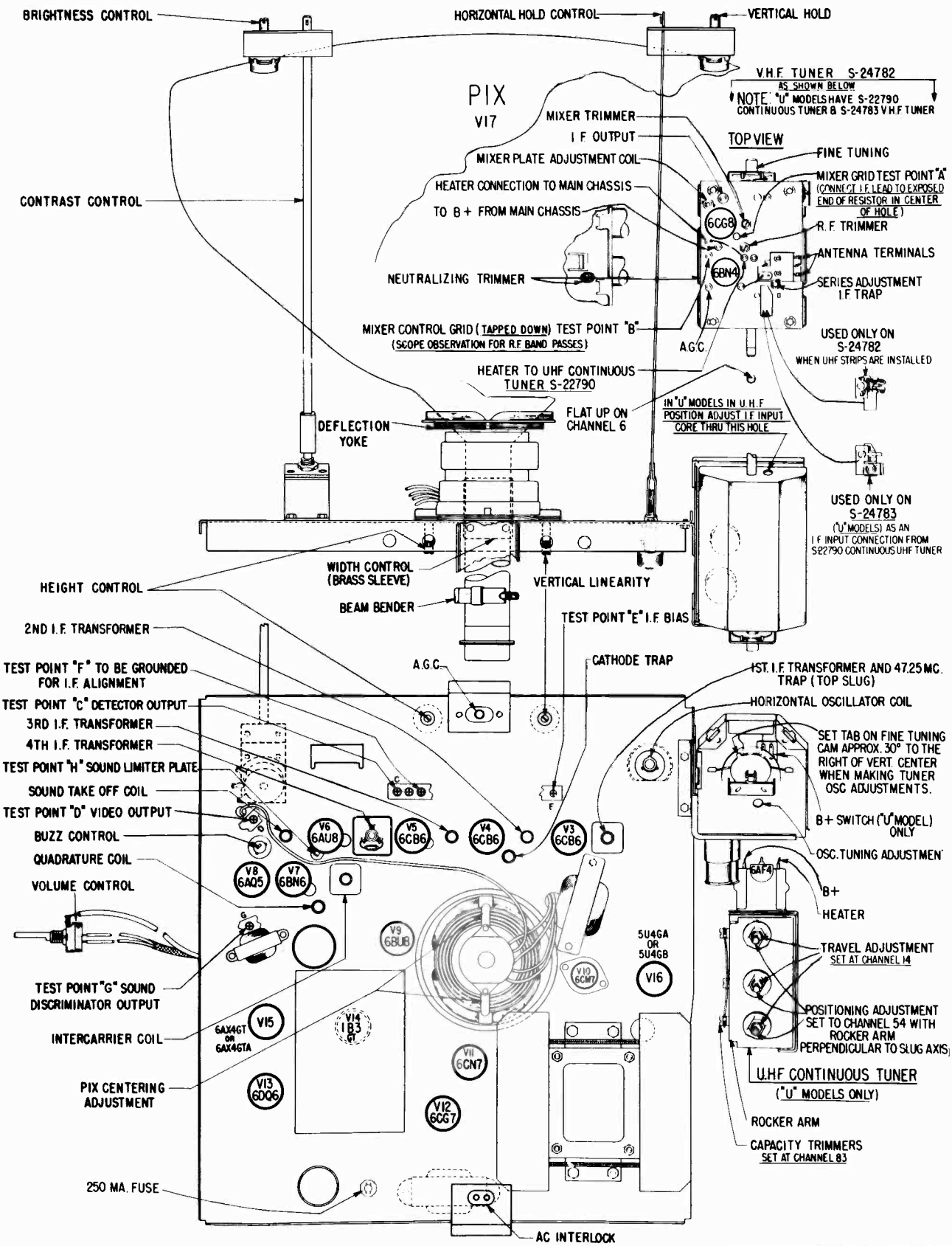


REFERENCE TRIANGLES AND TEST POINTS ON THE TERMINAL BOARDS MATCH SIMILAR POINTS ON THE SCHEMATIC DIAGRAM.

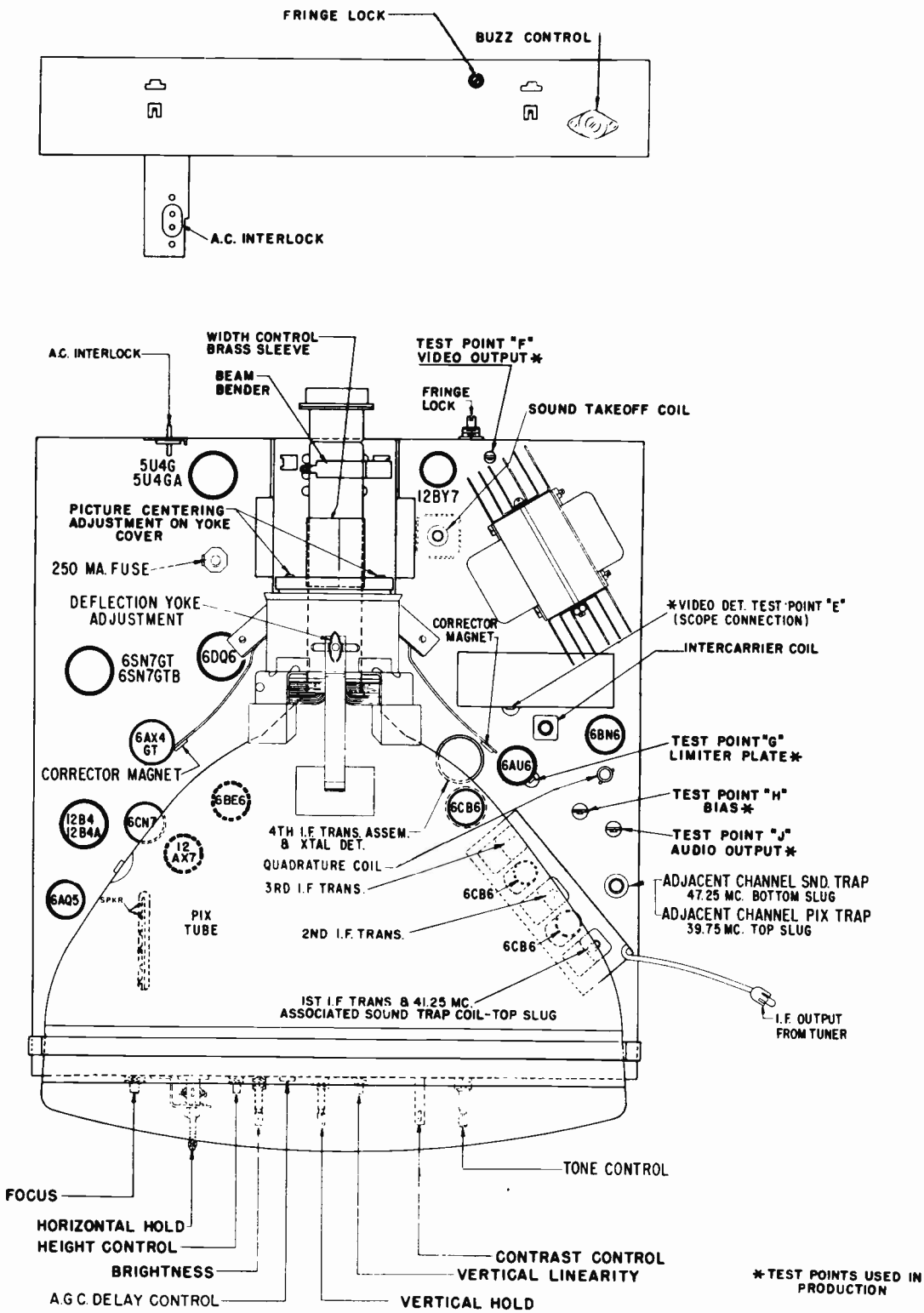
ALL VOLTAGES MEASURED UNDER SIGNAL CONDITIONS

* VARIES WITH SIGNAL

ZENITH Tube and Trimmer Layout Chassis 17Z21, 17Z22, and 17Z22Q

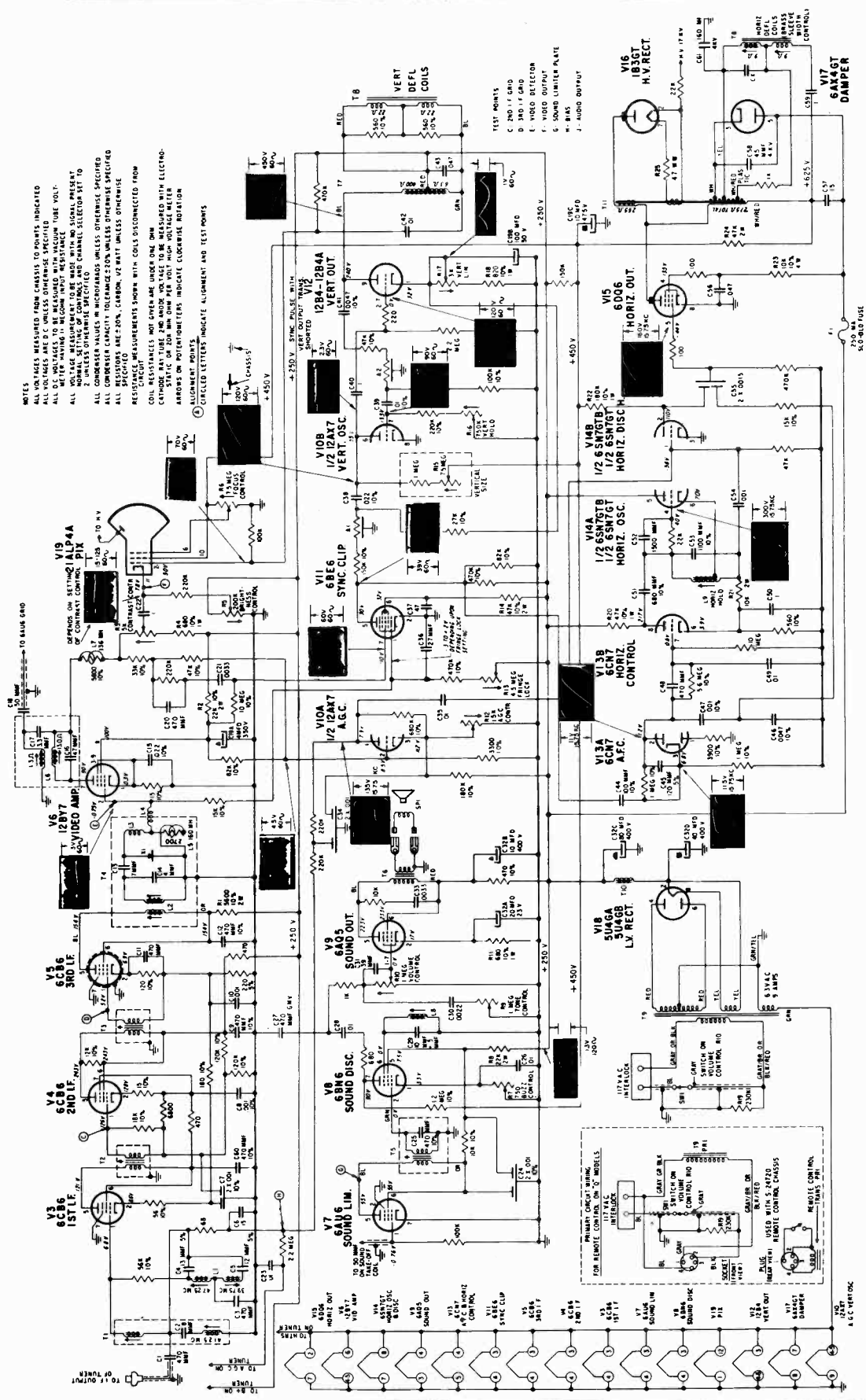


ZENITH Tube and Trimmer Layout Chassis 19Z22 and 19Z22Q

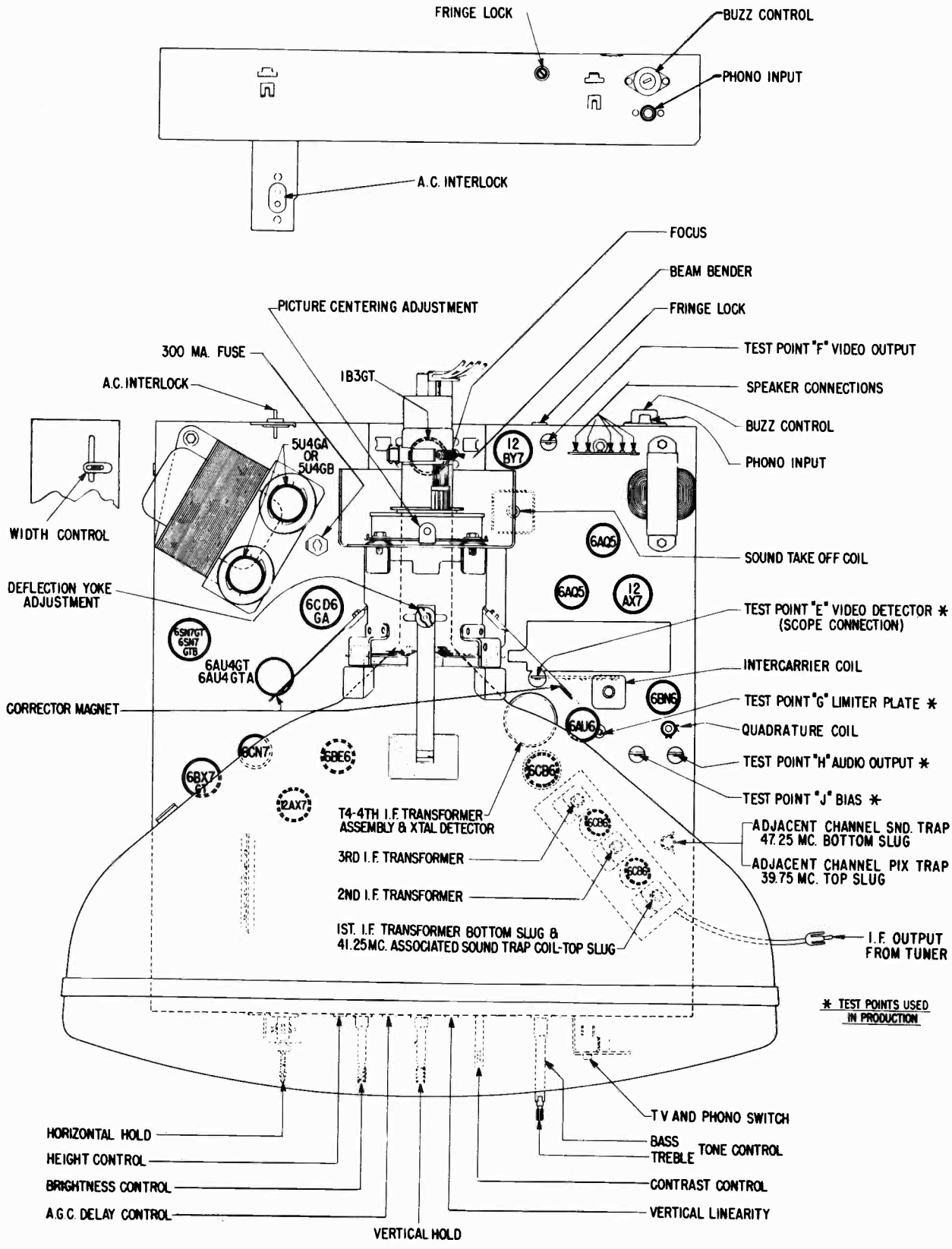


Tube and Trimmer Layout 19Z22 & 19Z22Q Chassis

ZENITH Circuit Diagram of Chassis 19Z22 and 19Z22Q

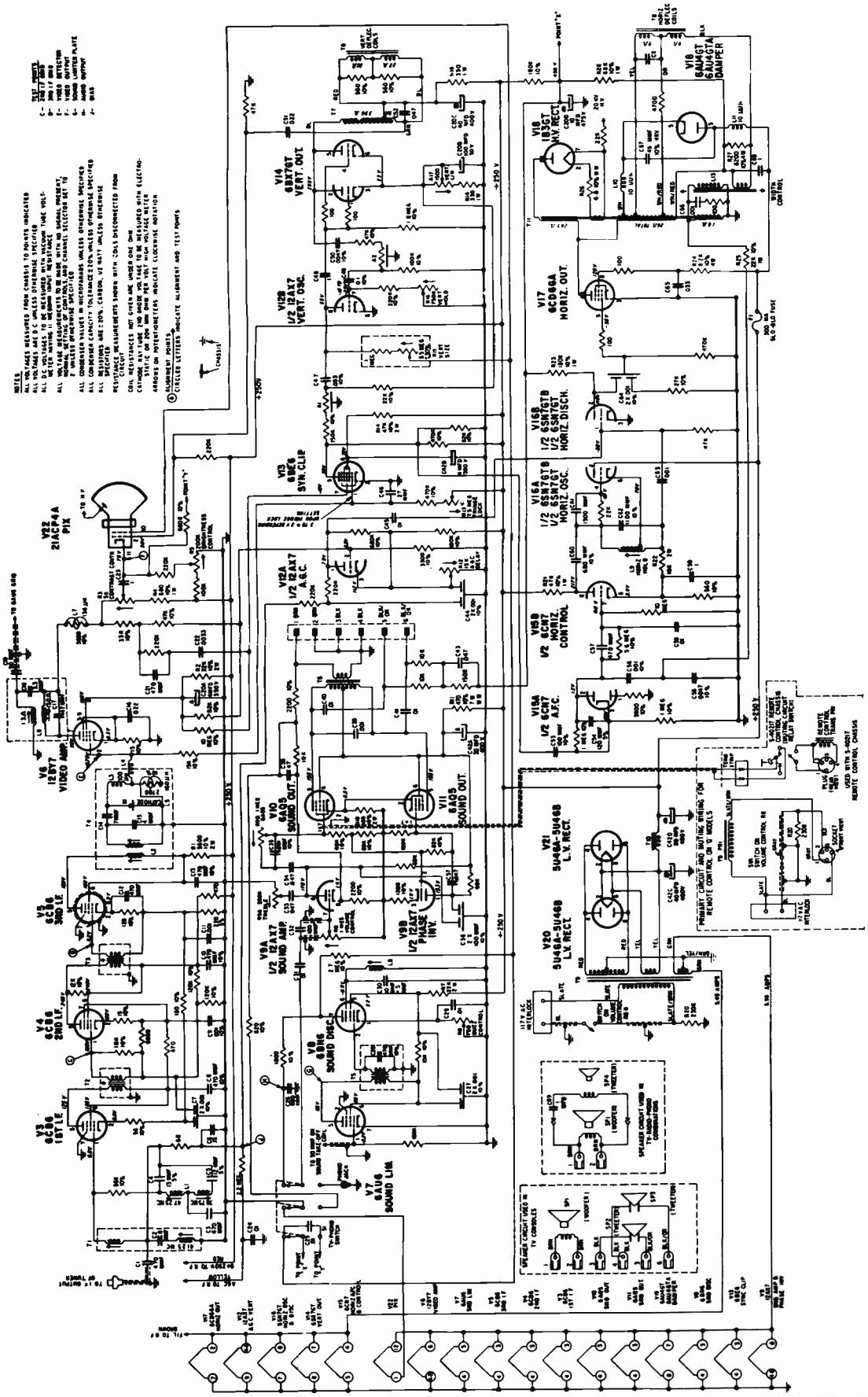


ZENITH Tube and Trimmer Layout Chassis 22Z20 and 22Z20Q

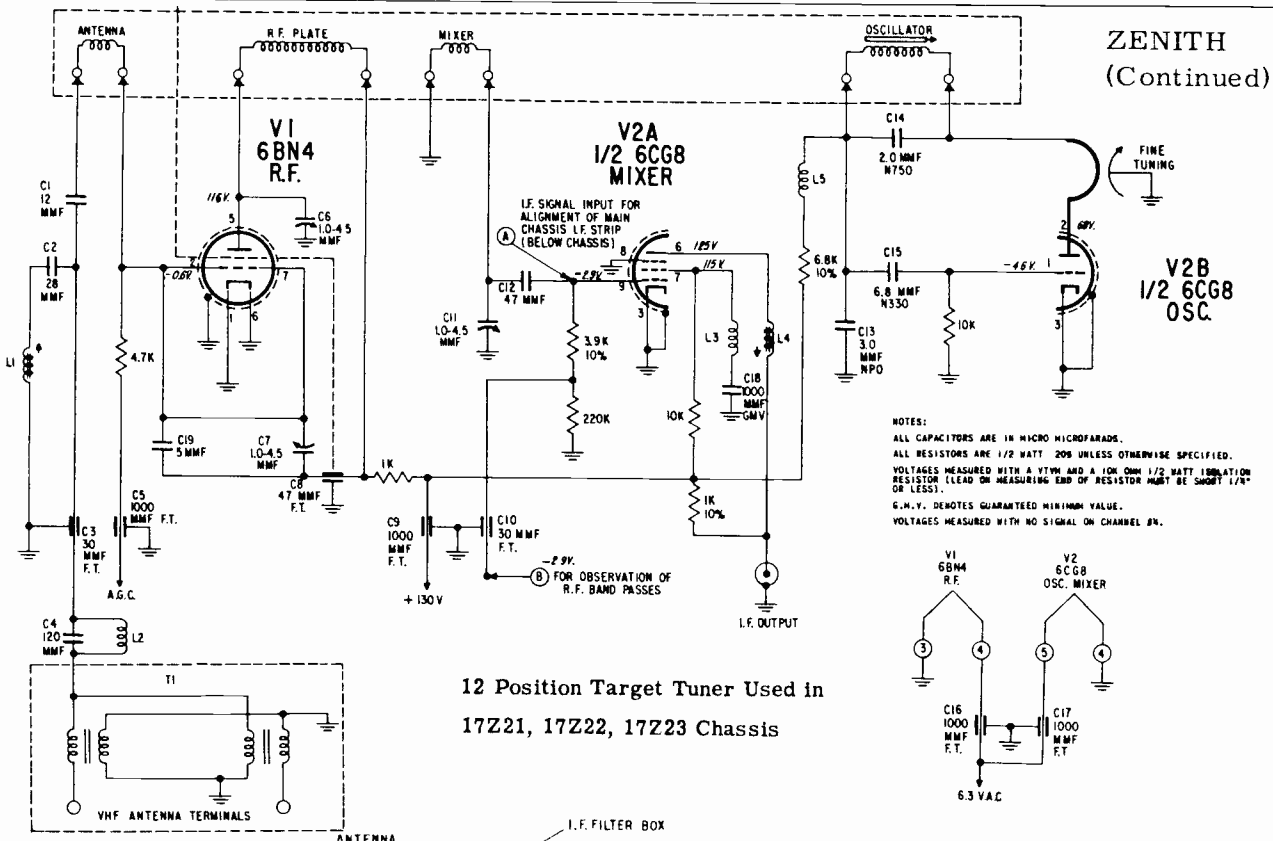


Tube and Trimmer Layout 22Z20 & 22Z20Q Chassis

ZENITH Circuit Diagram of Chassis 22Z20 and 22Z20Q



ZENITH (Continued)



12 Position Target Tuner Used in 17Z21, 17Z22, 17Z23 Chassis

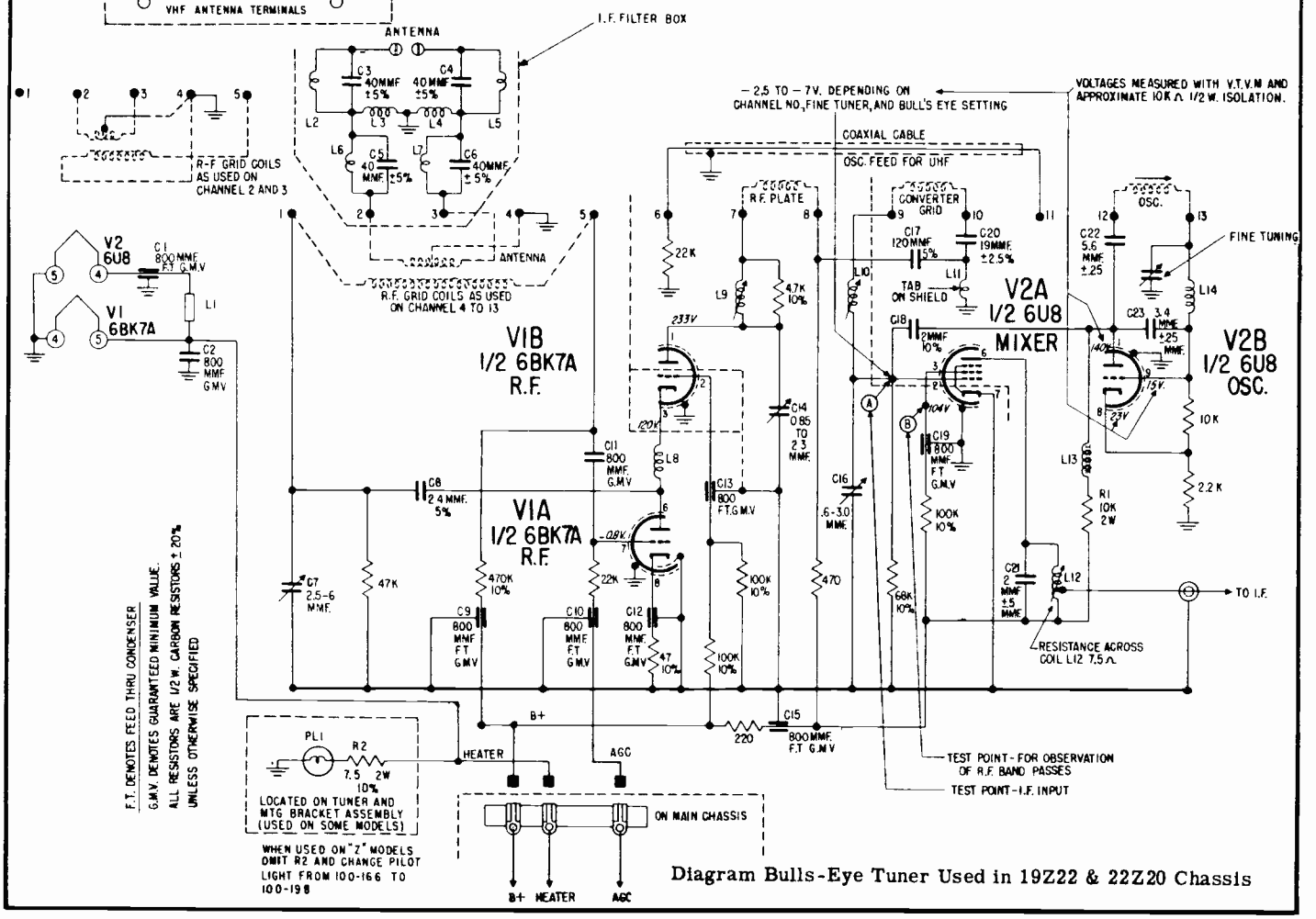


Diagram Bulls-Eye Tuner Used in 19Z22 & 22Z20 Chassis

INDEX

Under each manufacturer's name, at left there are listed that make chassis and models in numerical order. The corresponding page number at right of each listing refers to the first page of the section dealing with such material.

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Another

Supreme Publications

Service Manual