RCC TELEVISION Service Manual

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1964 Supplement No. 56

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23CC153U See chassis X-1.
23CC163U See chassis X-1.
23CC173U See chassis X-1.
23CC233A See chassis X-1.
23CC643U See chassis X-1.
23CC653U See chassis X-1.
23CC693A See chassis X-1.
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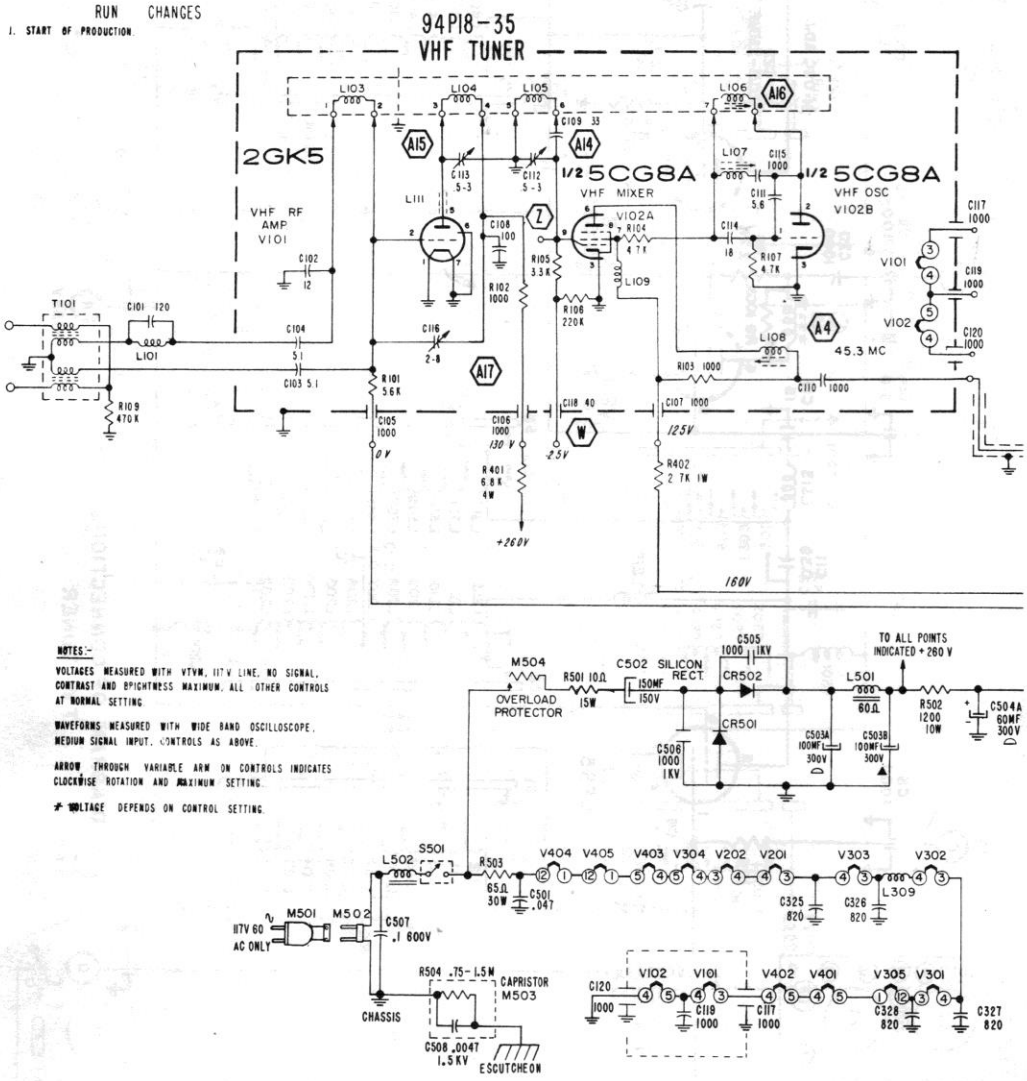
RUN CHANGES

1. START OF PRODUCTION.



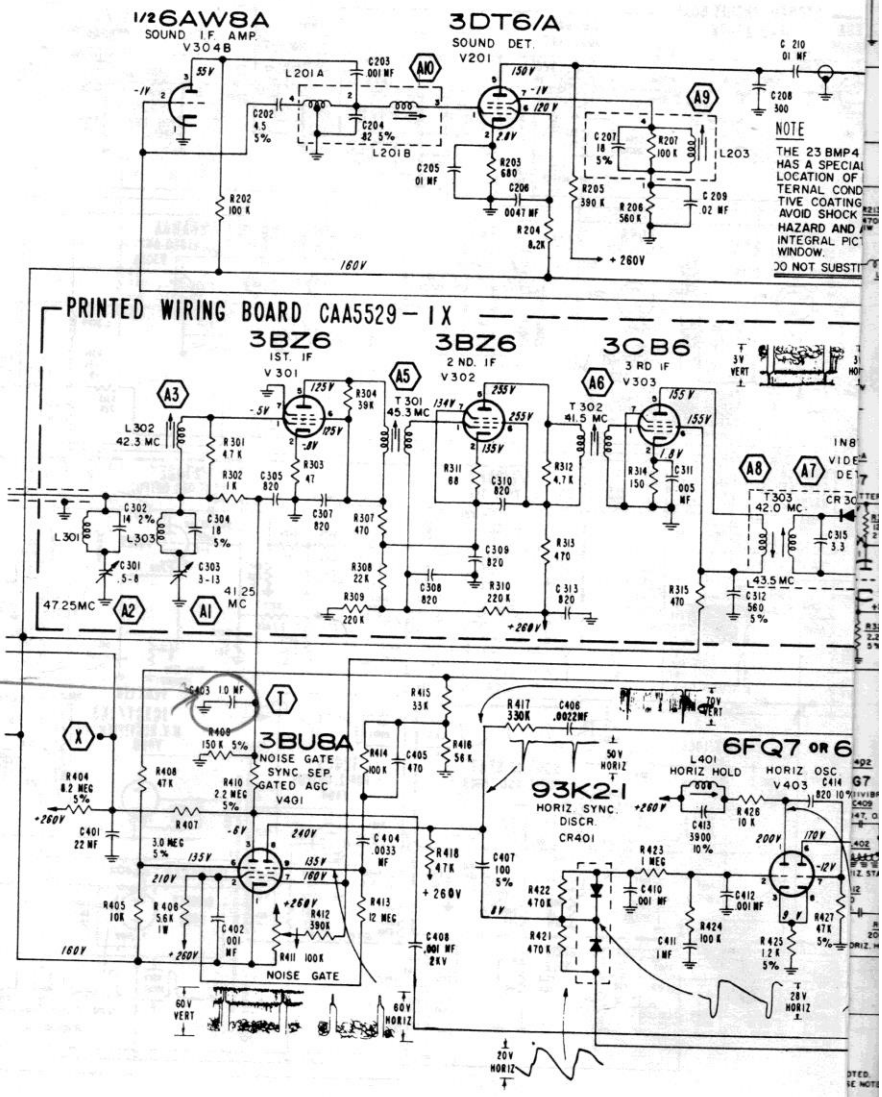
NOTES:-

VOLTAGES MEASURED WITH VTVM, 117 V LINE, NO SIGNAL, CONTRAST AND BRIGHTNESS MAXIMUM, ALL OTHER CONTROLS AT NORMAL SETTING.

WAVEFORMS MEASURED WITH WIDE BAND OSCILLOSCOPE, MEDIUM SIGNAL INPUT, CONTROLS AS ABOVE.

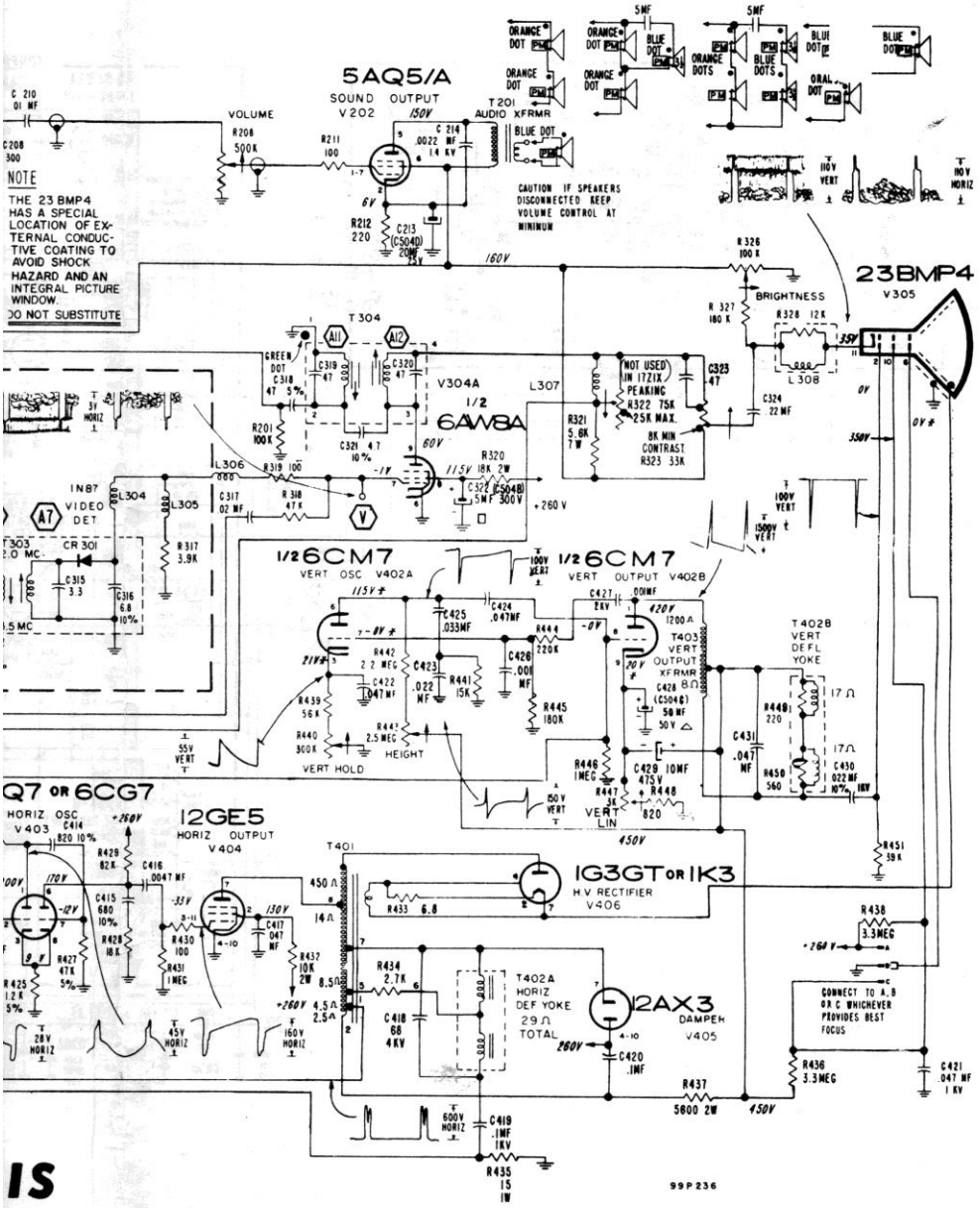
ARROW THROUGH VARIABLE ARM ON CONTROLS INDICATES CLOCKWISE ROTATION AND MAXIMUM SETTING.

* VOLTAGE DEPENDS ON CONTROL SETTING.



Vertical int locking

17Y1X-Z1X - CHASSIS


5AQ5/A
SOUND OUTPUT
V202
T201
AUDIO XFRMR
VOLUME
R208 500K
C 210 01 MF
C208 500
R211 100
C 214 .0022 MF 14 KV
R212 220
C213 (C504J) 20MF 25V
6V
160V
CAUTION IF SPEAKERS DISCONNECTED KEEP VOLUME CONTROL AT MINIMUM
NOTE
THE 23 BMP4 HAS A SPECIAL LOCATION OF EXTERNAL CONDUCTIVE COATING TO AVOID SHOCK HAZARD AND AN INTEGRAL PICTURE WINDOW.
DO NOT SUBSTITUTE
ORANGE DOT
BLUE DOT
5MF
ORANGE DOTS
BLUE DOTS
110V VERT
110V HORIZ
R326 100 K
BRIGHTNESS
R 327 180 K
R328 12K
L308
23BMP4
V305
T304
A11
A12
GREEN DOT
C318 47 5%
C319 47
C320 47
V304A
1/2 6AW8A
L307
(NOT USED IN 17Y1X) PEAKING R322 75K 25K MAX.
8K MIN CONTRAST R323 33K
C323 .47
C324 .22 MF
R321 5.6K 7W
R201 100K
C321 4.7 10%
R319 100
R320 18K 2W
C322 (C504B) 5MF 300V
+260 V
L306
L304
L305
IN87 VIDEO DET
A7
R317 3.9K
C317 02 MF
R318 47K
V
CR301
C315 3.3
C316 6.8 10%
1/2 6CM7
VERT OSC V402A
1/2 6CM7
VERT OUTPUT V402B
C425 .033MF
C424 .047MF
C427 .001MF
R444 220K
R442 2.2 MEG
C423 .022 MF
R441 15K
C426 .001 MF
R445 180K
C422 .047 MF
R439 56K
R440 300K
VERT HOLD
R447 2.5 MEG
HEIGHT
T403 VERT OUTPUT XFRMR
T402B VERT DEFL YOKE
C428 8Ω (C504B) 50 MF 50 V
C431 .047 MF
R449 220
R450 560
C430 .022 MF 10%
17Ω
R446 1MEG
C429 10MF 475V
R447 3K VERT LIN
R448 820
R451 59K
6Q7 OR 6CG7
HORIZ OSC V403
12GE5
HORIZ OUTPUT V404
T401
1G3GT OR 1K3
H.V RECTIFIER V406
R433 6.8
R438 3.3MEG
R434 2.7K
C418 68 4KV
T402A HORIZ DEF YOKE 29Ω TOTAL
12AX3
DAMPER V405
C420 .1MF
R437 5800 2W
R436 3.3MEG
C421 .047 MF 1 KV
C419 .1MF 1KV
R435 15 1W
CONNECT TO A, B OR C WHICHEVER PROVIDES BEST FOCUS
99P236

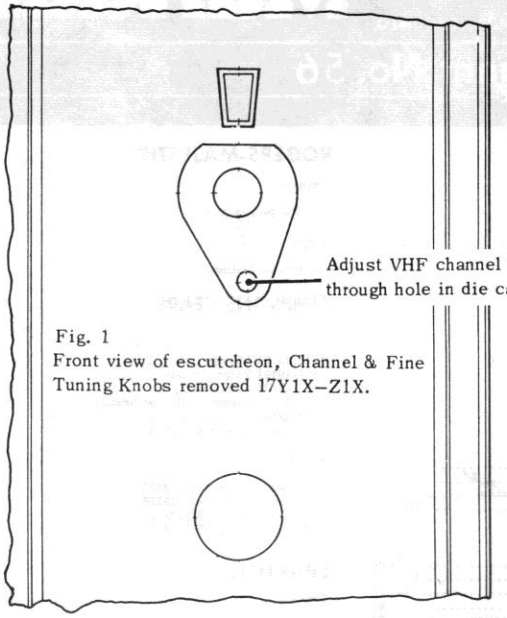


Fig. 1
Front view of escutcheon, Channel & Fine Tuning Knobs removed 17Y1X–Z1X.

COILS

L201	Coil Ass'y (4.5 MC Interstage)	72L3-2
	or	72L3-1
L203	Coil Ass'y (4.5 MC Quadrature)	72L4-2
	or	72L4-1
L302	1st I.F. Grid Input Coil	72C132-31
L304	Resonant Choke (43.5MC)	73B24-7
L305	Peaking Coil Video Det.	73D5-20
L306	R.F. Trap	73B31-3
L307	Video Peaking Coil (Shunt)	73C5-44
L308	Video Peaking Coil (Series)	73C5-40
L401	Horizontal Osc. Coil	94M15-3
L501	Filter Choke	74C18-10
L502	R. F. Choke	73B31-1
Filament Choke		73X37-2
41.25 MC and 47.25 MC Trap Coil (Orange)		73X37-3

TRANSFORMERS

T201	Audio Output Transformer	79M9-25
T301	1st I.F. Transformer	72C132-38
T302	2nd I.F. Transformer	72C132-39
T303	3rd I.F. Transformer	72D191-3
T304	Trans. Ass'y. (4.5 MC Sound Take Off & Trap)	72L2-3
	or	72L2-2
T401	Horizontal Output Transformer	79N7-5
T402	Deflection Yoke	94N5-8
T403	Vert. Output Transformer	79M4-2

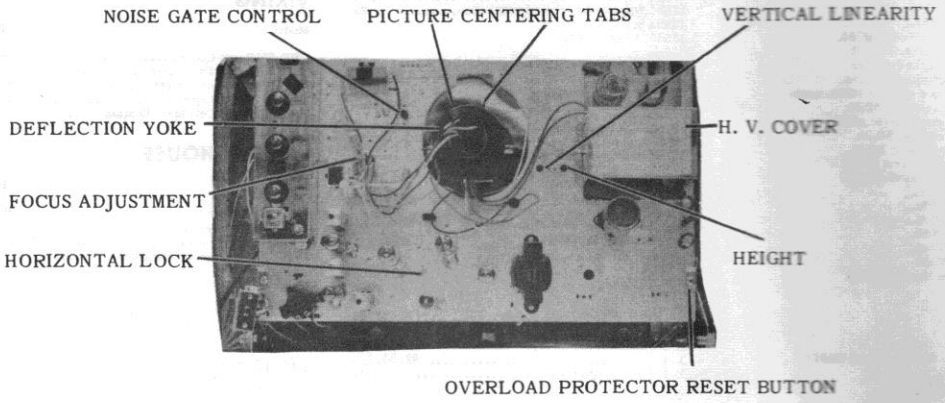


Fig. 2
Rear view of 17Y1X–Z1X chassis showing adjustment locations.

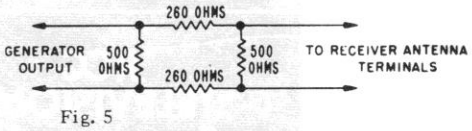


Fig. 5
Circuit of 12 D B Attenuation Pad for viewing I F Response Curve.

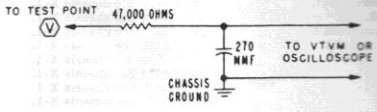


Fig. 6
Decoupling Filter

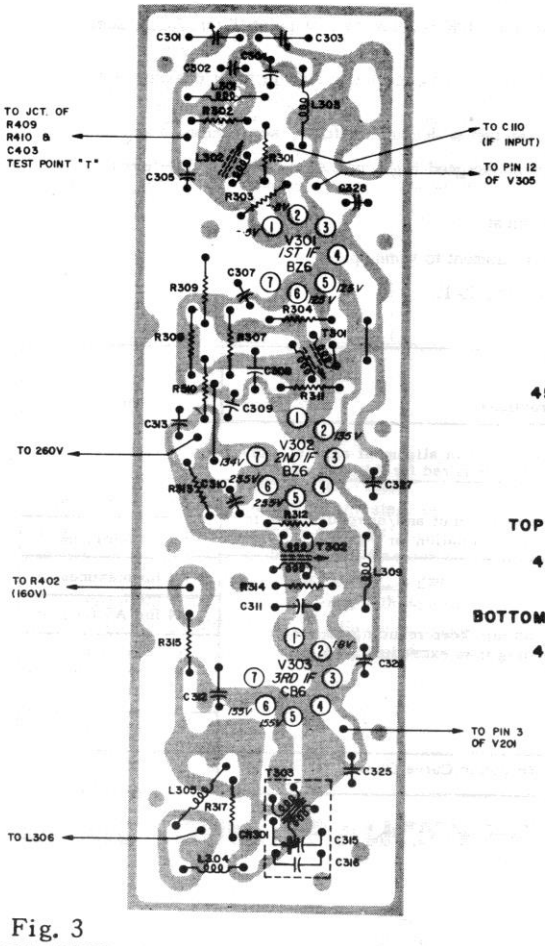


Fig. 3
CAA5529–1X Printed Circuit Assembly

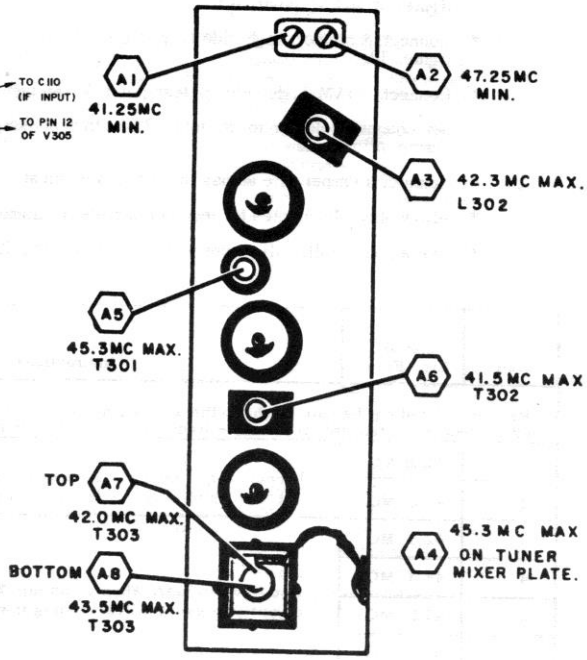


Fig. 4
I. F. Slug Adjustments

GENERAL

Complete alignment consists of the following individual procedure and should be performed in this sequence:

a. IF Amplifier Alignment.
b. 4.5 MC Sound IF Alignment.
c. R. F. Alignment.
d. Over-all and IF Response Curve Check.
e. Oscillator Adjustment.

IF AMPLIFIER ALIGNMENT

* Connect negative of 5.0 volt bias supply through 10K resistor to test point T (IF AGC), see figures 3 and 4, positive to chassis.
* Connect generator, high side to test point W on tuner. Connect low side to tuner chassis. See figure 10.
* Connect VTVM high side to test point V through a decoupling filter, see figures 3 and 6.
* Set channel selector to channel 12 or other unassigned high channel, to prevent interference during alignment.
* Connect a jumper wire across the antenna terminals
* Allow about 15 minutes for receiver and test equipment to warm up.
* Use a non-metallic alignment tool, part number 98A30-12.

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

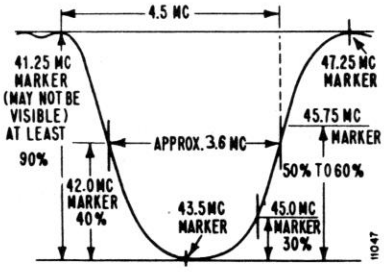


Fig. 7
Ideal IF Response Curve

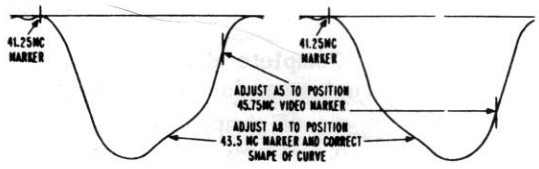


Fig. 8
IF Response Curve, incorrect shape.

IF RESPONSE CURVE CHECK (USING SWEEP GENERATOR & OSCILLOSCOPE)				
Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on Channel 12 or any unassigned high channel. Connect negative of 5 volt bias supply to test point "T" (IF AGC) positive to chassis.	Connect high side to test point W on tuner. Connect low side to tuner chassis. Set Sweep Frequency to 43 MC and sweep width approximately 7 MC	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" thru a decoupling filter, see figs. 3 & 6.	Check curve obtained against ideal response curve in fig. 7. Note tolerances on curve. Keep marker and sweep outputs at very minimum to prevent overloading. A reduction in sweep output should reduce response curve amplitude without altering the shape of the response curve. If the curve is not within tolerance or the markers are not in the proper location on the curve, touch-up with IF slugs as instructed below.

ALIGNMENT OF 4.5 MC TRAP

As the Fine Tuning Control is adjusted for the best picture, there may appear a 4.5 MC Beat Interference in the picture in the form of fine vertical or diagonal lines, close together having a gauze-like appearance the pattern varying with speech.

To align the 4.5 MC trap (slug adjustment A12), tune in a television station with beat interference pattern in picture.

While closely observing the picture, adjust slug A12 for minimum interference pattern.

Important: A hexagonal non-metallic alignment tool (part number 98A30-12) is required for making adjustment. Note that adjustment A12 is top slug (nearest top of shield can); use caution so as not to disturb bottom slug (nearest bottom of shield can) as sound IF alignment will be affected.

4.5 MC SOUND IF ALIGNMENT USING TELEVISION SIGNAL

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

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

Make alignment adjustments as follows:

1. Remove cabinet back. Turn set on and allow 15 minutes for warm up.
2. Select the strongest TV station received. Adjust controls for normal operation. Turn Noise Gate Control fully to the left (counterclockwise). See figure 2 for adjustment locations.
3. Using a non-metallic alignment tool (for hexagonal core IF slugs, Part No. 98A30-12) very slowly turn slug "A9" several turns counterclockwise until a buzz is heard in the sound. Then turn it clockwise until the loudest and clearest sound is obtained. NOTE: There may be two points (approximately 1/2 turn apart) at which sound is loudest. The slug should be set at the centre range of the second point of loudest sound noted as the slug is turned in (toward printed circuit board).
4. Set Contrast control fully to the left (counterclockwise). Reduce the signal to the antenna terminals until there is a considerable amount of hiss in the sound. For best results, it is recommended that a step attenuator be connected between the antenna and the antenna terminals. The signal can also be reduced by disconnecting the antenna and placing it in close proximity of the antenna terminals or tuner antenna lead-in.

5. Carefully adjust slug "A10" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A10".
6. Carefully adjust slug "A11" for loudest and clearest sound with minimum hiss level. If hiss disappears during alignment, reduce signal input to maintain hiss level; readjust "A11". Caution: Adjustment "A11" is slug nearest bottom of shield can; use care so as not to disturb slug nearest top of shield can.
7. If the above steps are correctly made, no further adjustment should be required. However, if sound remains distorted at normal volume level when receiver is tuned for best picture repeat entire procedure.

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

ALIGNMENT FOR VHF TUNER

The VHF tuners used in these sets are a 13 position drum type tuner utilizing replaceable channel snap-in coils.

VHF amplifier and Mixer alignment consists of checking the VHF response curve with a sweep generator and oscilloscope. If response curve is not within limits shown in figure 9, alternately adjust RF plate and mixer grid trimmers A15 and A14 for obtaining satisfactory curve. Adjustment of neutralizing trimmer A17 may be required if unable to obtain proper response curve. Repeat adjustment of trimmers A14 and A15 each time after adjusting neutralizing trimmer A17.

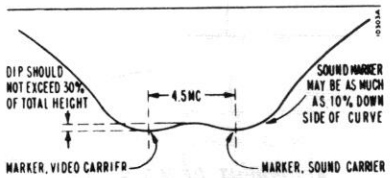


Fig. 9
Ideal VHF Response Curve.

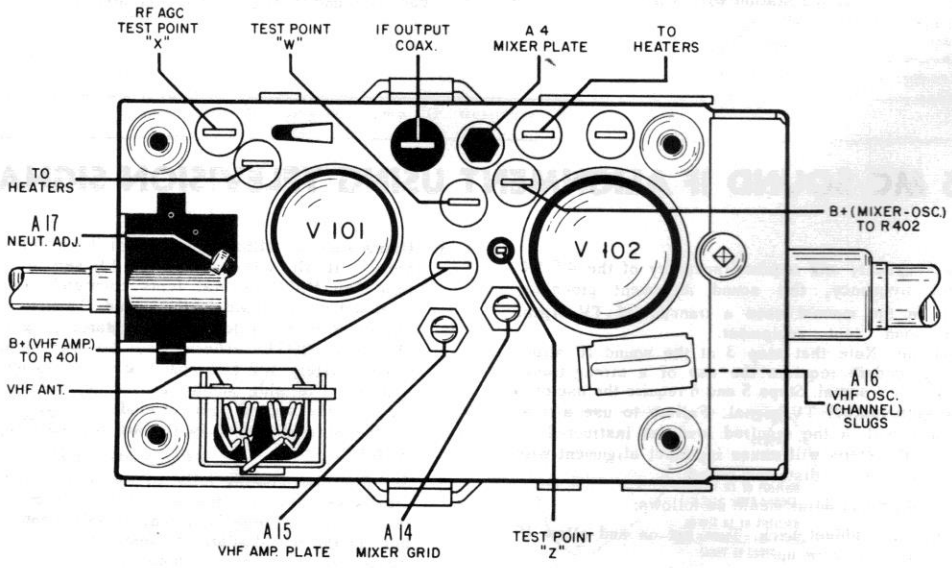


Fig. 10 TOP VIEW OF VHF TUNER

RF AMPLIFIER AND MIXER ALIGNMENT FOR VHF TUNER

* Connect negative of 2.5 volt bias supply to test point "X" (RF AGC), positive to chassis. See schematic.
* Set Contrast control fully to the right (clockwise).
* Set Noise Gate control fully to the left (counter-clockwise).
* Connect sweep generator 300 ohm output to antenna terminals. If sweep generator does not have a built-in marker generator, loosely couple a marker generator to the antenna terminals. To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.
* Connect oscilloscope through a 15,000 ohm resistor to test point "W" on tuner. Keep scope leads away from chassis.
* Allow about 15 minutes for receiver and test equipment to warm up.
* Do not remove bottom shield during alignment.
* See figure 10 for adjustment locations and identification.

Step	Marker Gen. Freq. (MC)	Sweep Gen. Frequency	Instructions.
1	193.25 MC (Video Carrier) 197.75 MC (Sound Carrier)	Sweeping Channel 10. See "Frequency Table	Set Channel Selector to channel 10. Use 2.5 volts bias. Check response obtained with VHF response curve shown in figure 9. Alternately adjust A14 and A15 (figures 9 and 10) as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location.
2	83.25 MC (Video Carrier) 87.75 MC (Sound Carrier)	Sweeping Channel 6. See "Frequency Table"	Set Channel Selector to channel 6. Use 2.5 volts bias. Check response obtained with VHF response curve shown in figure 9. If curve is not within limits, compromise adjustment is required. Alternately adjust A14 and A15 as required to obtain curve having maximum amplitude, symmetry and flat top appearance consistent with proper bandwidth and correct marker location. After completing adjustment, recheck adjustment of step 1. If satisfactory response curves are obtained. proceed with step 4 (skip step 3). If proper response curves are not obtained with adjustment of A14 and A15 proceed with step 3
3 Neutralizing Adjustment	193.25 MC (Video Carrier) 197.75 MC (Sound Carrier)	Sweeping Channel 10. See "Frequency Table"	Set Channel Selector to channel 10. Use 15 volts bias. Increase sweep generator output to maximum and increase oscilloscope gain as required for obtaining usable response curve.* Adjust A17 for minimum response (amplitude). After adjusting A17, conclude by repeating steps 1, 2 and 4.
4	Set the sweep generator to sweep the channel to be checked. Set marker generator for the corresponding video carrier frequency and sound carrier frequency.		Use 2.5 volts bias. Check each channel operating in the service area for curve shown in figure 9. In general, the adjustment performed in step 1 and 2 are sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on an operating channel, repeat steps 1 and 2 as a compromise adjustment to favor the particular channel. If a compromise adjustment is made, other channels operating in the service area should be checked to make certain that they have not been appreciably affected.

*If usable Response Curve is not obtained. Connect Oscilloscope to test point "V" through decoupling filter. Note: I.F. Amplifier must be in normal alignment. Adjust A17 for equal peak amplitudes with dip at centre of curve.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Receiver Controls and Bias Supply	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Contrast control fully to the right (clockwise). Set Noise Gate control fully to the left (counterclockwise). Channel Selector on channel 12 or other unassigned high channel. Connect negative of 3V bias to test point "T" (IF AGC) and test point "X" (RF AGC), positive to chassis. See figures 3 & 4.	Connect to antenna terminals. Keep generator output as low as possible to prevent overloading.	If an external marker generato is used, loosely couple high side to generator lead. Marker frequencies are shown in frequency table.	Connect to point "V" through a decoupling filter. See figure 6.	Compare the response curve obtained against the ideal curve shown in figure 11. If the curve is not within tolerance, touch up the IF slugs as instructed below. It should never be necessary to turn slugs more than one turn in either direction. If the curve is satisfactory on the channel checked, all other channels should also be satisfactory. IMPORTANT: When sweep output is reduced, response curve amplitude on scope should also decrease, but curve should remain the same. If curve shape changes, reduce sweep output and/or the scope gain until the shape does not change.
		Note that video marker on the "Over-all VHF-IF Response Curve" will appear on the opposit side of the curve as compared to the "Ideal IF Response Curve", figure 7. This is due to action of the mixer tube.		

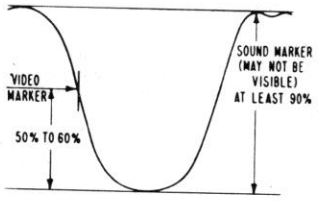


Fig. 11
Ideal over-all VHF and IF Response Curve.

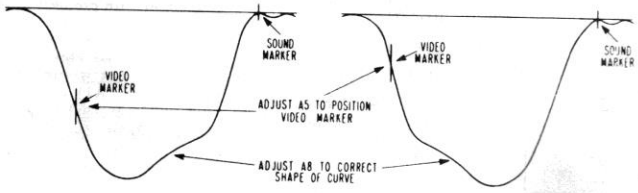


Fig. 12
Over-all VHF and IF Response Curves, incorrect shape.

VHF OSCILLATOR ADJUSTMENT USING A TRANSMITTED TELEVISION SIGNAL

It is always advisable to make VHF oscillator (channel) adjustments using a transmitted Television Signal as instructed under, VHF Channel Adjustment. If a television signal is not available, VHF oscillator (channel) adjustment can be made while observing the Over-all VHF and IF Response Curve. Align oscillator adjustments to position the video carrier marker 50 to 60 percent down from the peak of the over-all response curve, see figure 11.

WARNING: It is important on the completion of service of this receiver to perform a breakdown test between both sides of the AC line terminals and all exposed metal parts (including control shafts) exposed to the consumer. The isolation should withstand 1200 volts AC for one second.