Information on this page applies ONLY to chassis with a 21 MC IF system.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Receiver Controls and Bias Supply	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Contrast control fully to the left. **Channel Selector** on channel 12 or other unassigned high channel. Connect negative of 3 volt bias supply to test point "T" and "X", positive to chassis.	Connect to antenna terminals. Set generator to sweep channel selected. See frequency table. Keep generator output as low as possible to prevent overloading.	If an external marker generator is used, loosely couple high side to sweep generator lead. Marker frequencies are shown in frequency table.	Connect to point "V" through a decoupling filter. See figures 11 through 14.	Compare the response curve obtained against the ideal curve shown in figure 20. 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 shape should remain the same. If curve shape changes, reduce sweep output and/or the scope gain until the shape does not change.

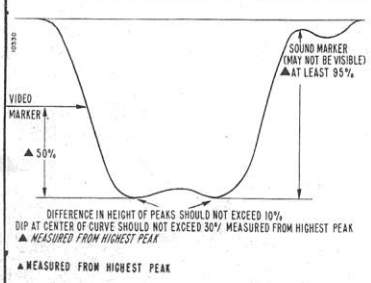


Figure 20. Ideal Over-all VHF and IF Response Curve.

Note that video marker on the "Overall VHF-IF Response Curve" will appear on the opposite side of the curve as compared to the "Ideal IF Repsonse Curve", figure 15. This is due to action of the mixer tube.

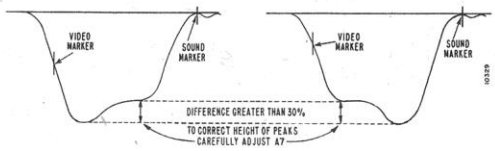


Figure 21. Over-all VHF and IF Response Curves, Incorrect Shape.

VHF OSCILLATOR ADJUSTMENT USING A SIGNAL GENERATOR

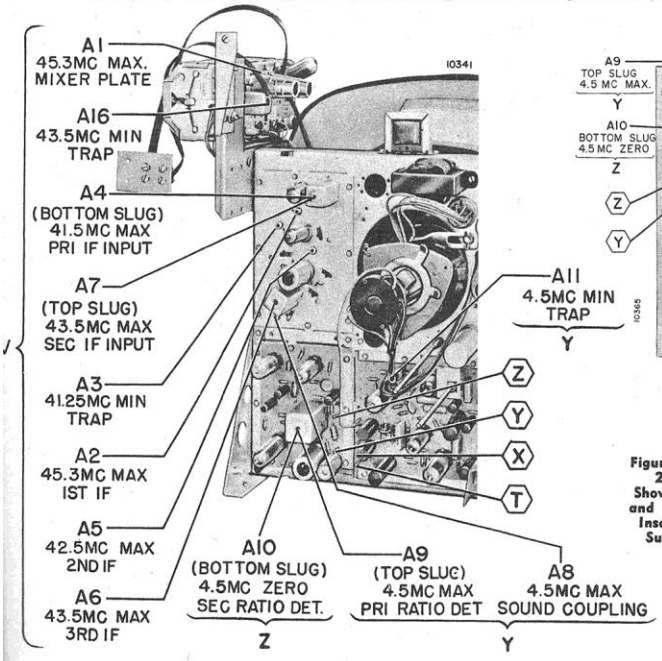
It is always advisable to make VHF oscillator adjustments using a Television Signal. If a Television Signal is not available, VHF oscillator adjustment can be made using a crystal calibrated signal generator. Make adjustments as follows:

Receiver Control Settings	Signal Generator	Instructions
Set Channel Selector for each channel to be adjusted. Set "Fine Tuning" control at half rotation. Turn Volume control fully to the right (clockwise).	Connect to antenna terminals. Set generator to exact frequency of VHF oscillator. See frequency table. **Set generator for maximum output.**	Connect a wire jumper from test point "W" on the tuner to test point "Z". Remove the ratio detector tube V202 (6AL5). Carefully adjust the oscillator slug A15 on each channel until a whistle (beat) is heard in the speaker of the receiver.

Information on this page applies ONLY to chassis with a 41 MC IF system.

SIMPLIFIED ALIGNMENT

After becoming familiar with alignment procedure, some servicemen simplify subsequent alignment of sets by merely using the essential alignment data given in figures 22, 23, 24, 28 and 29.



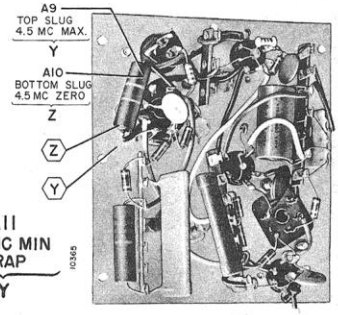
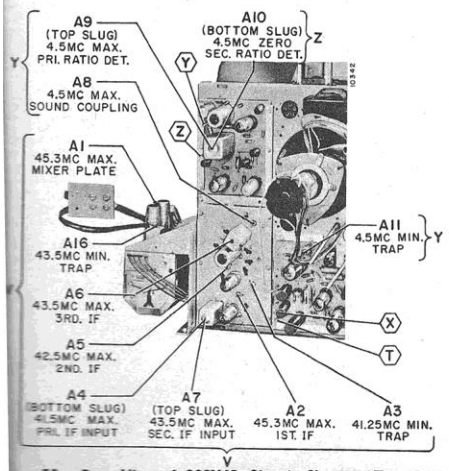


Figure 22. Rear View of 20SY4E, 20SY4F, 20SY4L, 20SY4H Showing Test Point Connections and IF Alignment Data. NOTE: Inset shows underside of Sound Sub-Chassis used in 20SY4H Chassis.



ure 23. Rear View of 20SY4B Chassis Showing Test Point Connections and IF Alignment Data.

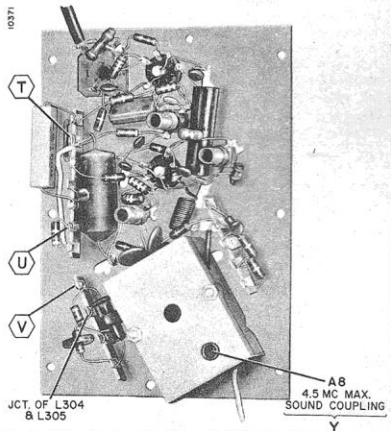


Figure 24. Underside View of 41 MC IF Sub-Chassis Showing Test Point Locations.

Information on this page applies ONLY to chassis with a 41 MC IF system.

41 MC IF AMPLIFIER AND TRAP ALIGNMENT

See 21 MC IF Amplifier and Trap Alignment

- Connect negative of bias supply to test point "T", see figures 22 or 23, positive to chassis. 4 volt supply required for steps 1, 2, 4, 5, 6, 7 and 8. -1½ volt supply may be required for steps 3 and 13.
- Disconnect antenna. Connect a jumper wire across antenna terminals.
- Set Channel Selector to Channel 12 or other unassigned high VHF channel to prevent interference during alignment.
- Set Contrast control fully counterclockwise, and Noise Gate fully clockwise.
- Allow about 15 minutes for receiver and test equipment to warm up.
- Connect generator high side to top of insulated tube shield for 6U8 (V903); connect low side to chassis near tube shield. See figure 9.
- Connect VTVM high side to test point "V" through a decoupling filter, common to chassis. See figures 11 and 24. Use lowest DC scale on VTVM.

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	45.3 MC	Use -4 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 3 volts.	A1 for maximum.
2	45.3 MC		A2 for maximum.
3	41.25 MC	If necessary, increase generator output and/or reduce bias to -1½ volts to obtain a definite indication on VTVM.	A3 for minimum.
4	41.5 MC		A4 for maximum.
5	42.5 MC	Use -4 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 3 volts.	A5 for maximum!
6	43.5 MC		A6 for maximum.
7	43.5 MC		A7 for maximum.
8	45.3 MC	Repeat steps 1 and 2.	Readjust A1 and A2 for maximum.
9	43.5 MC	Repeat steps 6 and 7.	Readjust A6 and A7 for maximum.
10	42.5 MC	Repeat step 5.	Readjust A5 for maximum.
11	41.5 MC	Repeat step 4. NOTE: If more than $\frac{1}{4}$ turn of rotation is needed to peak A4 in this step, then it will be necessary to repeat steps 2 and 6.	Readjust A4 for maximum.
12	45.3 MC 41.5 MC 43.5 MC	Repeat steps 2, 4 and 6. If A2, A4 and A6 were far off frequency in these steps, repeat steps 2, 4 and 6 once more.	A2 for maximum. A4 for maximum. A6 for maximum.
13	43.5 MC	Disconnect antenna terminals jumper, connect generator high side to antenna terminals. Set Channel Selector to 2 or other low channel. If necessary, increase generator output and/or reduce bias to -1½ volts to obtain a definite indication on VTVM.	A16 for minimum.
14	To insure correct IF alignment, make "IF Response Curve Check".		

Information on this page applies ONLY to chassis with a 41 MC IF system.

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 12 or an unassigned high channel. Contrast control fully to the left. Connect negative of 4½ volt bias supply to test point "T"; positive to chassis.	Connect high side to 6U8 mixer-osc. insulated tube shield, see figure 9. Connect low side to chassis near tube shield. Set sweep frequency to 44.5 MC, and sweep width approximately 7MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" through a decoupling filter, see figs. 11 and 24.	Check curve obtained against ideal response curve in fig. 25. 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. **Important:** If curve changes shape with hand capacity, see section 1 of "Important Alignment Hints."

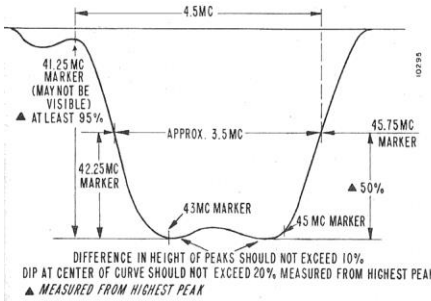


Figure 25. Ideal IF Response Curve.

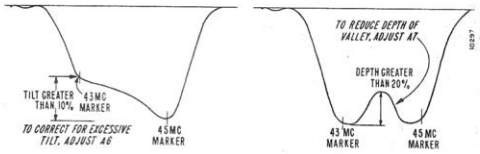


Figure 26. IF Response Curves, Incorrect Shape.

If it is necessary to adjust for incorrect response curve tilt or for excessive peak to valley ratio, carefully adjust alignment slugs as instructed under the above figures.

If the curve cannot be made to resemble the response curve shown at left, repeat all steps under "IF Amplifier and Trap Alignment" making sure that generator frequencies are accurate and adjustments are carefully made. Note: When aligning A1, A4 and A7, interaction between these tuned circuits is present. Repeat adjustment of these three tuned circuits several times at the correct frequency until a minimum of touch up is required for each stage.

If a satisfactory curve cannot be obtained after repeating these steps, it may be necessary to change IF amplifier tubes or check for a defective circuit component to be sure that each stage is operating properly.

Information on this page applies to chassis with EITHER 21 MC IF or 41 MC IF systems.

4.5 MC SOUND IF AND TRAP ALIGNMENT

Instructions for touch-up of ratio detector secondary A10 and alignment of trap A11 using television signal without test equipment are given below.

It is preferable to use a TV signal rather than a signal generator for this alignment. However, if a TV signal is not available, a signal generator which has been checked against a crystal calibrator or other frequency standard may be used. Accuracy required is within one kilocycle.

- If a television signal is to be used, connect antenna, set Channel Selector to the strongest TV signal available and tune in a picture.
- If a signal generator is to be used, disconnect antenna and short terminals together. Connect high side of generator to junction of L304 and L305 through a .01 mf, capacitor.
- Allow about 15 minutes for receiver and test equipment to warm up.
- Set Contrast control fully to the left (counterclockwise).
- See figures 12 through 14 (21 MC sets) or figures 22 through 24 (41 MC sets), for alignment and test point locations.
- Use a ***non-metallic*** alignment tool. Ratio Detector Transformer (T201) has hollow core slugs. Adjustments A9 and A10 can be made from the top of transformer if you use alignment tool, part number 98A30-12 obtainable from Admiral distributor.

Step	Signal Gen. Freq. (MC)	VTVM Connections	Instructions	Adjust
1	Tune in TV Signal or Set Signal Generator to exactly 4.5 MC	High side to test point "Y"; common to chassis.	Use lowest DC scale on VTVM.	A8 and A9 for maximum (keep reducing generator output to keep VTVM at approx. 1 volt).
2		High side to test point "Z"; common to chassis.	Use zero center scale on VTVM, if available.	A10 for zero on VTVM (the correct zero point is located between a positive and a negative maximum). If A10 was far off, repeat step 1.
3		High side to test point "Y"; common to chassis.	Connect a wire jumper across L305. Use lowest DC scale possible on VTVM.	A11 for minimum.

TOUCH-UP OF RATIO DETECTOR SECONDARY (A10) USING TELEVISION SIGNAL

Adjustment need be made on one channel only.

Proceed as follows:

a. Turn set on and allow about 15 minutes for warm up.

b. Tune set for normal picture and sound.

c. Carefully adjust the secondary slug (A10) of the Ratio Detector Transformer using a non-metallic alignment tool with a hexagonal end (part number 98A30-12). Both slugs (A9 and A10) have hollow cores. Either slug may be adjusted from the top or bottom of the chassis by passing the alignment tool through the core of the first slug encountered. A10 is the slug closest to the chassis.

Adjust A10 for best sound with minimum buzz level. Do this carefully as only slight rotation in either direction will generally be required. Correct adjustment point is located between the two maximum buzz peaks that will be noticed when turning the slug back and forth about ¼ to ½ turn.

d. If necessary, repeat individual channel slug adjustment and conclude with retouching the ratio detector secondary. Note: If oscillator adjustment is required for other channels, it will ***not*** be necessary to repeat the ratio detector secondary adjustment after ***once*** correctly adjusting it.

ALIGNMENT OF 4.5 MC TRAP A11, USING A TELEVISION SIGNAL

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

The trap can be tuned by watching the picture and adjusting the slug A11 for minimum 4.5 MC interference. If greater accuracy is required, the trap should be adjusted as instructed in step 3 under "4.5 MC Sound IF and Trap Alignment".

Information on this page applies ONLY to chassis with a 41 MC IF system.

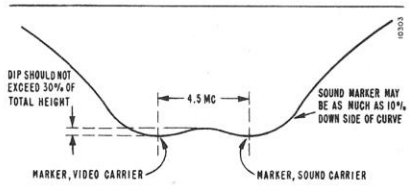
VHF AMPLIFIER AND MIXER ALIGNMENT

See VHF Amplifier and Mixer Alignment for 21 MC Chassis.

- Connect negative of 3 volt bias supply to AGC buss (test point "X"), positive to chassis.
- Connect sweep generator 300 ohm output to VHF 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 to test point "W" on tuner (fig 28). Keep scope leads away from chassis.
- Connect a jumper wire from test point "U" to chassis.
- Allow about 15 minutes for receiver and test equipment to warm up.

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".	Check for VHF response curve below. Alternately adjust A12 and A13 (figure 28) as required to obtain equal peak amplitudes and symmetry 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".	Check for VHF response curve below. Adjust A14 as required to obtain curve having maximum amplitude and flat top appearance consistent with proper bandwidth and correct marker location. After completing adjustment, recheck adjustment of step 1.
3	Set the sweep generator to sweep the channel to be checked. Set the marker generator for the corresponding video carrier frequency and sound carrier frequency.		Check each channel operating in the service area for curve shown below. In general, the adjustment performed in steps 1 and 2 are sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on a particular channel, (a) check to see that coils have not been intermixed, or (b) try replacing the pair of coils for that particular channel, or (c) repeat step 1 for a weak high channel as a compromise adjustment to favor the particular channel. Repeat step 2 for the weak low channel to favor the particular channel. If a compromise adjustment is made, other channels operating in the service area should be checked to make certain that they have not been appreciably affected.

Figure 27. Ideal VHF Response Curve. Note: Full skirt of curve will not be visible unless generator sweep width extends beyond 10 MC.



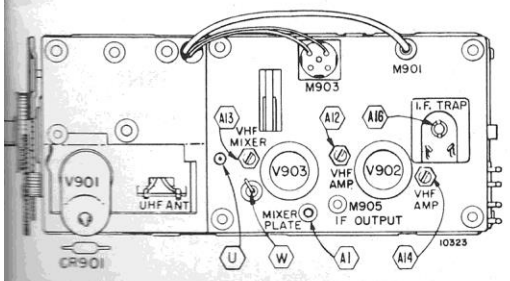


Figure 28. Top of VHF-UHF TUNER, Showing Adjustment Locations.

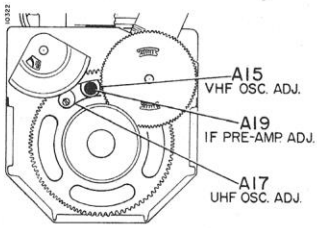


Figure 29. Front View of Tuner.

Information on this page applies ONLY to chassis with a 41 MC IF system.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Receiver Controls and Bias Supply	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Contrast control fully to the left. **Channel Selector** on channel 12 or other unassigned high channel. Connect negative of 3 volt bias supply to test point "T", and "X", positive to chassis.	Connect to antenna terminals. Set generator to sweep channel selected. See frequency table Keep generator output as low as possible to prevent overloading.	If an external marker generator is used, loosely couple high side to sweep generator lead: Marker frequencies are shown in frequency table	Connect to point "V" through a decoupling filter; see figures 11 and 22 through 24.	Compare the response curve obtained against the ideal curve shown in figure 30. 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 shape should remain the same. If curve shape changes, reduce sweep output and/or the scope gain until the shape does not change.

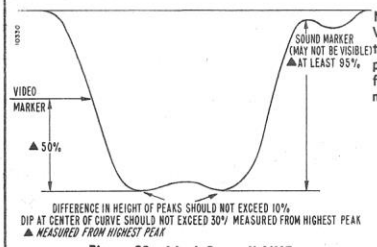


Figure 30. Ideal Over-all VHF and IF Response Curve.

Note that video marker on the "Overall VHF-IF Response Curve" will appear on the opposite side of the curve as compared to the "Ideal IF Response Curve", figure 25. This is due to action of the mixer tube.

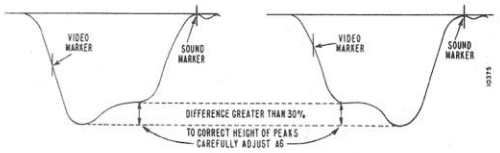


Figure 31. Over-all VHF and IF Response Curves, Incorrect Shape.

VHF OSCILLATOR ADJUSTMENT USING A SIGNAL GENERATOR

It is always advisable to make VHF oscillator adjustments using a Television Signal. If a Television Signal is not available, VHF oscillator adjustment can be made using a crystal calibrated signal generator. Make adjustments as follows:

Receiver Control Settings	Signal Generator	Instructions
Set Channel Selector for each channel to be adjusted. Set "Fine Tuning" control at half rotation. Turn Volume control fully to the right (clockwise).	Connect to antenna terminals. Set generator to exact frequency of VHF oscillator. See frequency table **Set generator for maximum output.**	Connect a wire jumper from test point "W" on the tuner to test point "Z". See figures 28 and 22. Remove the ratio detector tube V202 (6AL5). Carefully adjust the oscillator slug A15 on each channel until a whistle (beat) is heard in the speaker of the receiver.

Information on this page applies ONLY to chassis with a 41 MC IF system.

IF PRE-AMPLIFIER RESPONSE CURVE CHECK AND ALIGNMENT

Important: This alignment is seldom required. It should be made only if UHF reception is poor and after usual causes of poor reception have been checked. This alignment should be made after completing the preceding alignments.

- Set VHF Channel Selector to UHF position, which is when opening in knob (between channels 2 and 13) is at top.
- Connect negative of 3 volt bias supply to tuner AGC buss (test point "X"), positive to chassis.
- Remove IF input cable (M301) from tuner IF output socket (M905). Insert IF input cable for step 2.
- Remove CR901 (mixer crystal) from holder. Connect sweep generator high side through 100 ohm resistor to negative clip of mixer crystal socket, see figure 28. If sweep generator does not have a built-in marker generator, loosely couple a marker generator to the high side of sweep generator. To avoid distortion of the response curve, keep sweep generator output at a minimum, marker pips just barely visible.
- Connect oscilloscope to test point "W" on VHF section of tuner (figure 28). Keep scope leads away from chassis.
- **Connect a wire jumper from test point "U" to chassis.**
- Allow about 15 minutes for receiver and test equipment to warm up.
- Use a non-metallic alignment tool, part number 98A30-19.

Step	Marker Gen. Freq. (MC)	Sweep Gen. Frequency	Instructions
1	45.75 MC (Video Carrier) 41.25 MC (Sound Carrier)	Set sweep at 43.5 MC, sweep width 12 MC	Connect oscilloscope through a 10,000 ohm resistor to test point "W" on tuner (figure 28). Keep scope leads away from chassis. Compare the response curve obtained against the ideal curve shown in figure 32. If the curve is not within tolerance, adjust A19 to obtain maximum amplitude (at center of curve) consistent with flat top appearance, proper bandwidth and correct marker location; see figure 32.
2	Same as Above	Same as Above	Connect oscilloscope to test point "V" through a decoupling filter, see figure 11. Keep scope leads away from chassis. Increase bias voltage to −6 volts. Check response curve. If curve does not resemble figure 30, repeat step 1, making a compromise adjustment. If curve cannot be made to resemble response curve, figure 30, check to be sure all instructions have been followed. Check tubes V901 and V902 and repeat alignment. Important: After replacing tubes, it may be necessary to check "VHF and Mixer Alignment".

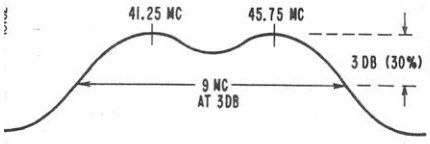


Figure 32. IF Pre-amplifier Response Curve.

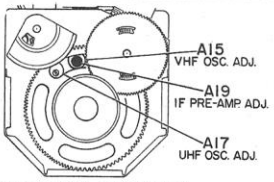


Figure 33. Front View of Tuner Showing IF Pre-amplifier Adjustment A19.

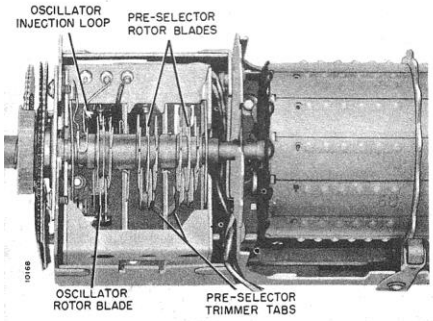


Figure 34. View of VHF-UHF Tuner Showing Adjustment Locations.

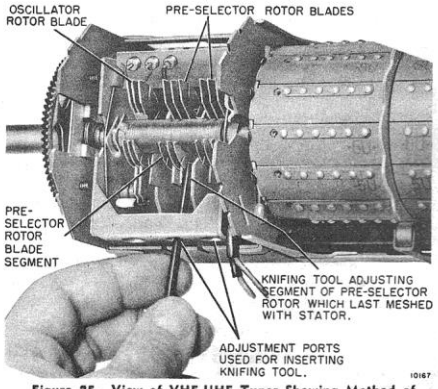


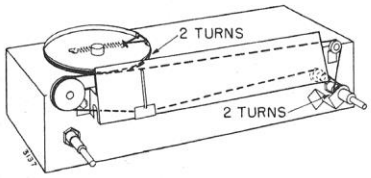
Figure 35. View of VHF-UHF Tuner Showing Method of Aligning (Knifing) Rotor Blades in UHF Section.

SERVICING 3D1B, 3D1C RADIO CHASSIS

The 3D1B or 3D1C Radio is used with the 20Y4H and 20SY4H Chassis only.

DRIVE CORD STRINGING

Drive cord stringing for the **Tuning** capacitor is shown elow.



gure 37. 3D1B, 3D1C Radio Chassis With Escutheon Removed.

ALIGNMENT OF 3D1B, 3D1C RADIO CHASSIS

The 3D1B and 3D1C radio chassis should be aligned instructed below.

Radio alignment adjustments are accessible without disembly of the radio from the housing. Remove the radio cutcheon for adjustments D and F. Adjustments D d F are accessible through holes in chassis housing. cation of alignment adjustments is shown in figure 38.

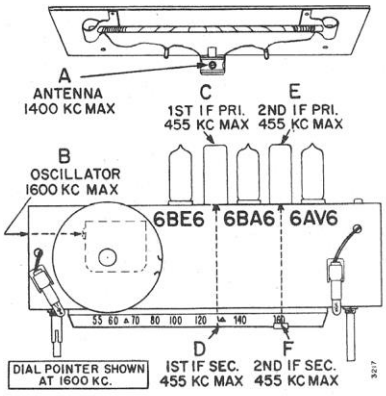


Figure 38. Trimmer Locations for 3D1B, 3D1C Radio.

3D1B, 3D1C RADIO ALIGNMENT PROCEDURE

- Connect output meter across speaker voice coil.
- Turn receiver **Volume** and **Tone** controls fully clockwise.
- **TV-Rad-Pho** switch in "Rad" position.
- Antenna must be connected and placed in the same relative position to the chassis as when in the cabinet.
- Use lowest output setting of signal generator that gives a satisfactory reading on meter.
- Use a non-metallic alignment tool.
- Repeat adjustments to insure good results.

Step	Connect Signal Generator	Dummy Antenna Between Radio and Signal Generator	Signal Generator Frequency	Receiver Dial Setting	Adj. Trimmers in Following Order to Max.
1	Tuning Capacitor antenna stator	.1 mf	455 KC	Tuning Capacitor wide open	* F, E, *D, C
2	"	"	1620 KC	"	B
3	Place generator lead close to loop of set to obtain adequate signal. No actual connection.		1400 KC	At 1400 on dial scale	§ A

djustments F and D made from underside of chassis.

ntenna trimmer adjustment A in step 3 should be repeated after set and antenna have been installed in cabinet. **Important:** Antenna rimmer may not peak if antenna leads are not properly routed or separated.

Information on this page applies ONLY to chassis with a 41 MC IF system.

UHF ALIGNMENT

Alignment of the UHF section of the tuner should seldom be required. The UHF oscillator tube V901 (6AF4) and the mixer crystal CR901 (1N82A) may generally be replaced without the need for alignment. Tube selection is recommended for best reception and to avoid the need for realignment.

Do not attempt alignment of the UHF section of the tuner unless the required specialized test equipment is available. See test equipment note

- Connect UHF Sweep Generator to UHF antenna terminals; set sweep width at 12 MC. If sweep generator does not have a built-in marker generator, loosely couple a UHF Marker Generator to the transmission line between antenna terminals and UHF tuner.
- Connect VHF Marker Generator high side to 6BC8 (V902) insulated tube shield. Connect low side to chassis near the tube shield. Set marker generator frequency to 43.5 MC for all steps below.
- Connect oscilloscope to test point "W" on VHF section of tuner (figure 28).
- Connect negative terminal of 1½ volt bias supply to test point "X", positive to chassis.
- Connect a wire jumper from test point "U" to chassis.
- Allow about 15 minutes for receiver and test equipment to warm up.

To obtain the accuracy required for this alignment, two marker generators should be used. A UHF Marker Generator is coupled to the antenna circuit of the UHF tuner and serves as a calibration check for the UHF Sweep Generator. A VHF Marker Generator is coupled to a special tube shield over V902 and is used to be certain that the proper band of frequencies is being selected by the UHF tuner and UHF IF pre-amplifier.

Step	UHF Sweep Gen. Center Frequency	UHF Marker Gen. Frequency	Instructions
1	887 MC	887.5 MC	Tune UHF tuner to channel 83, or until response curve is observed on oscilloscope. Adjust A17 (figure 33) until marker is located in the center of the response curve. *See note 1 below.
2	473 MC	473.5 MC	Tune UHF tuner to channel 14, or until response curve is observed on oscilloscope. Note the location of marker. If it is not centered on the response curve, knife the segment of the oscillator rotor blade adjacent to the stator as shown in figure 35, until the marker becomes centered on the response curve. *See note 2 below.
3	Set the sweep generator to sweep the channel to be checked. Set the marker generator to the mid-frequency of the channel to be checked. (The channel's mid-frequency is determined by adding 2.25 MC to the lower frequency limit of the channel.) See frequency table.		Check response curve for each channel operating in the service area. Marker location should be as shown in figure 36. In general, the adjustments performed in steps 1 and 2 are sufficient to provide satisfactory curves and correct marker location for all channels. However, if reasonable alignment is not obtained on a particular channel, see instructions given in steps 4 and 5 below.
4	887 MC	887.5 MC	Tune UHF tuner to channel 83. Carefully adjust both UHF preselector trimmer tabs (figure 34, by moving them back and forth, in order to obtain maximum amplitude and proper shape of response curve at test point "W". Adjustment of the trimmer tabs is made from the bottom of the UHF section of the tuner by means of a tool with a thin knife blade. Use care when moving the tabs, since only slight movement of the tabs should be required to obtain the proper response curve.
5	Successively sweep channels 83 to 14, inserting the appropriate mid-channel frequency marker (determined as instructed in step 3). See frequency table.		Track both UHF preselector sections to each other and to the oscillator section from channel 83 to channel 14, by bending or knifing the preselector rotor blade segments (figure 35), to obtain the desired response curve, see figure 36. To avoid affecting the tracking above the point of knifing, always knife the plates while tuning lower in frequency. Check which section requires knifing by bringing a finger close to either of the lines. If added capacity introduced by the finger improves the RF response, more capacity must be added between the rotor and stator by bending the rotor plates closer to the stator. Conversely, if added capacity makes the response worse, capacity must be reduced by bending the rotor plates away from the stator line. Generally, one preselector section or the other must be adjusted to remove tilt from the RF response curve. When correcting for a tilted condition, always adjust the preselector section that removes the tilt and at the same time improves the position of the marker. In some cases, it will be necessary to adjust both preselector sections to remove tilt and obtain correct marker location. Plates should always be adjusted evenly on both sides of the same preselector section and only on that portion which last meshed with the stator. Use caution when knifing the preselector blades so as not to disturb the position of the stator line.

Figure 36. Over-all VHF-UHF Response Curve Viewed from Test Point "W".

* NOTE 1: If UHF tuner is far out of alignment, the response curve may be too low in amplitude to be readily observed, or it may be very distorted in shape. In this case, it will be necessary to roughly align the preselector before completing final oscillator adjustment. This is done by knifing the preselector rotor blade segments (figure 35) adjacent to the stator at dial setting for the affected channel.
* NOTE 2: If the dial calibration reads within 3 channels of the frequency to which the UHF Sweep Generator is tuned, the oscillator rotor blades do not require adjustment. If the dial calibration is more than 3 channels off in frequency, carefully knife the segmented portion of the oscillator rotor blade that last meshed with the stator until the dial calibration accuracy is within ±3 channels.

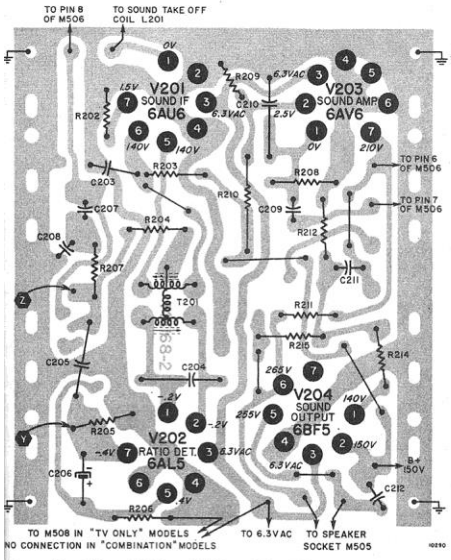


Figure 42. View of Printed Wiring Side of Sound Board used in all (VHF and VHF-UHF) "TV only" models with "Top Tuning". Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

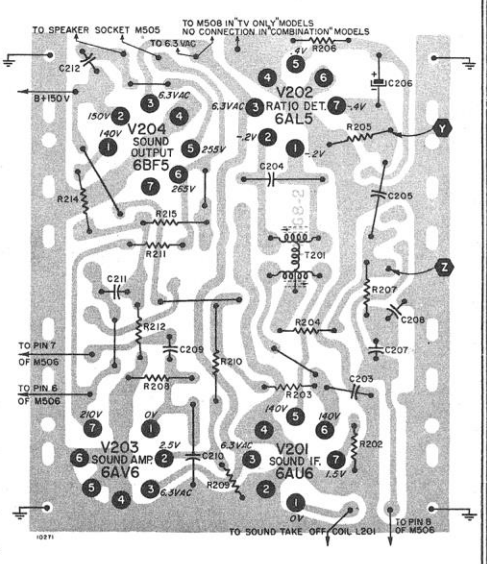


Figure 43. View of Printed Wiring Side of Sound Board used in models with "Bottom Tuning". Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

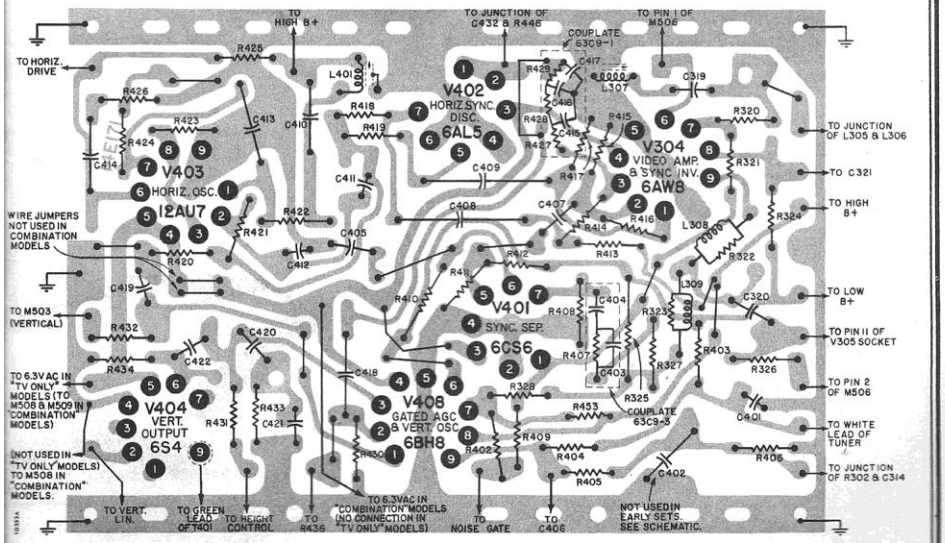


Figure 44. View of Printed Wiring Side of Sync Board used in all models having a 21" or 24" Picture Tube. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

SERVICING PRINTED WIRING

A major portion of the circuit wiring of these receivers is contained in two or three printed wiring assemblies.

Trouble shooting of printed wiring is similar to that of conventionally wired circuits. Complete instructions on the service and repair of printed wiring is given in Service Manual No. S559, available at no charge from Admiral distributors.

To simplify circuit tracing, identifying tube socket connections, locating component connection points, and making voltage and waveform measurements on the printed wiring assembly, figures 40 through 47 have been included in this manual.

All views are of the wiring side of the printed wiring assemblies. Figures 40 through 45 show the exact location and connection points of each component and voltages on the IF and Sound Boards. Except that the components are shown schematically instead of pictorially, this figure illustrates what would be seen if it were possible to look "through" the printed wiring board and actually see the various components on the board.

Figures 46 and 47 are views of the wiring side of the sync boards showing all the necessary voltages and waveforms taken from the wiring side of the printed wiring assemblies. The control settings and other conditions for measuring voltages and waveforms are given on schematic pages.

As an added convenience and time saver for servicing Admiral printed wiring, a printed wiring repair kit (part number 98A79) is available from Admiral distributors. This kit contains the specialized tools, special solder, lacquer and lacquer solvents required for making a perfect repair job. A manual on the Service and Repair of Printed Wiring, Form No. S559 is also included with the kit.

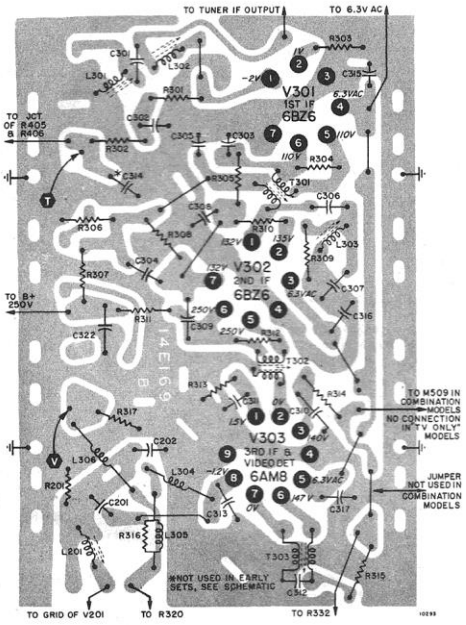


Figure 40. View of Printed Wiring Side of IF Board used in VHF models with "Top Tuning". Gray area represents printed wiring; Black symbols and lines represent components and connections on opposite side.

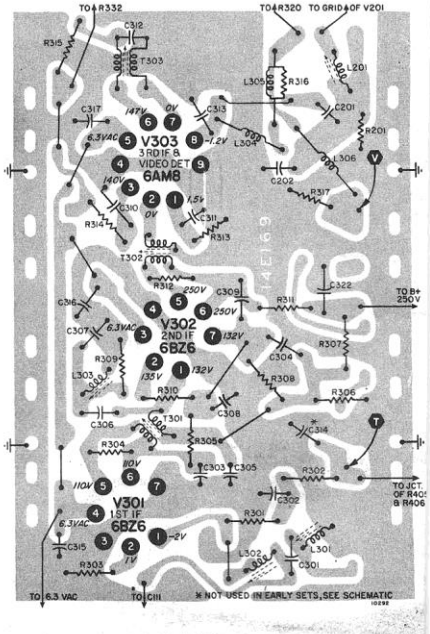
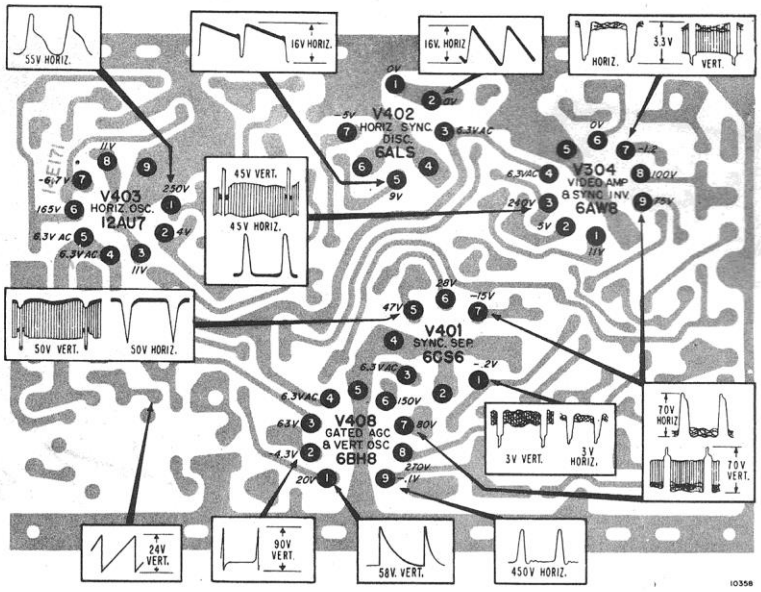


Figure 41. View of Printed Wiring Side of IF Board used in models with "Bottom Tuning". Gray area represents printed wiring; Black symbols and lines represent components and connections on opposite side.



gure 47. View of Printed Wiring Side of Sync Board used in models having a 27" Picture Tube Showing Voltages and Waveforms. Conditions for measurements given on schematic pages.

B+ DISTRIBUTION

'o illustrate the basic difference in circuit ing, B+ distribution diagrams are given in ires 48 through 52.

'hen servicing, it is important to note that chassis with a 21 MC IF system, B+ voltage he 1st and 2nd IF amplifiers V301 and V302 ffectively in series; see B+ distribution rams, figures 48, 49 and 51.

'he power supply provides approximately 270 s of DC voltage for application to the re- er circuits. The distribution of this volt- to the various stages is a series-parallel ngement. The horizontal and vertical deflec- circuits, sound amplifier, sync inverter, d AGC tube screen grid, 1st and 2nd IF am- iers (in UHF models only) and VHF amplifier ires approximately 270 volts and thus are ected directly across the 270 volt line. of the other circuits require approximately half of this voltage and obtain it from the ode of the sound output tube V204 which func- tions as a series voltage regulator. All the current drawn by these circuits passes through V204, hence the B+ voltage (270 volts) is divided nearly equally between V204 and the stages connected to its cathode. To prevent abnormal current flow through V204, some low voltage stages are connected to 270 volts B+ through a voltage dropping resistor.

The control grid of V204 is connected to a voltage dividing network consisting of R212 and R215, resulting in a fixed potential of approximately 140 volts being applied to the control grid. A change in the cathode voltage of V204 due to AGC fluctuations, tube current variations, etc., will cause a change in the grid to cathode voltage of V204. The resulting change in cathode current tends to maintain the 150 volt supply nearly constant. High value capacitors (C214 and C215A) are necessary in the cathode circuit of V204 to reduce any fluctuations in current due to the audio current components flowing in this stage.

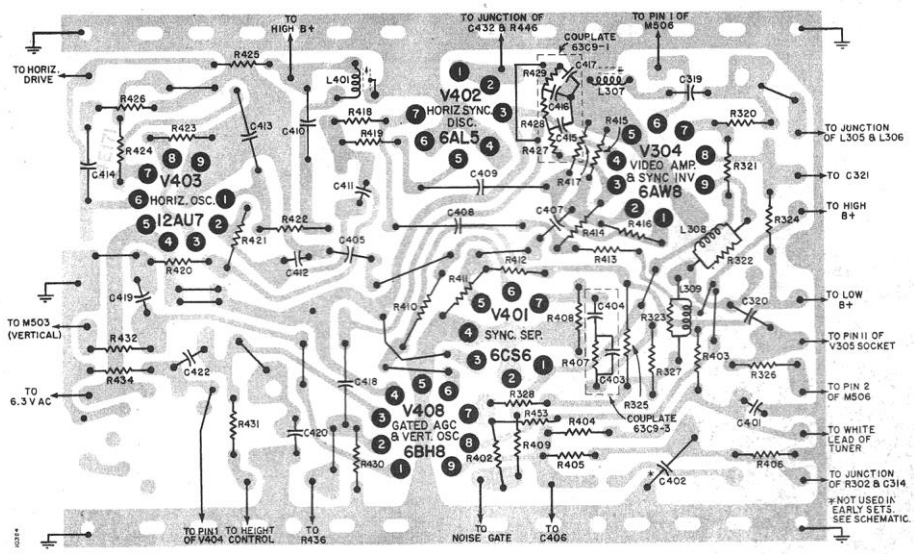


Figure 45. View of Printed Wiring Side of Sync Board used in models having a 27" Picture Tube. Gray area represents printed wiring; black symbols and lines represent components and connections on opposite side.

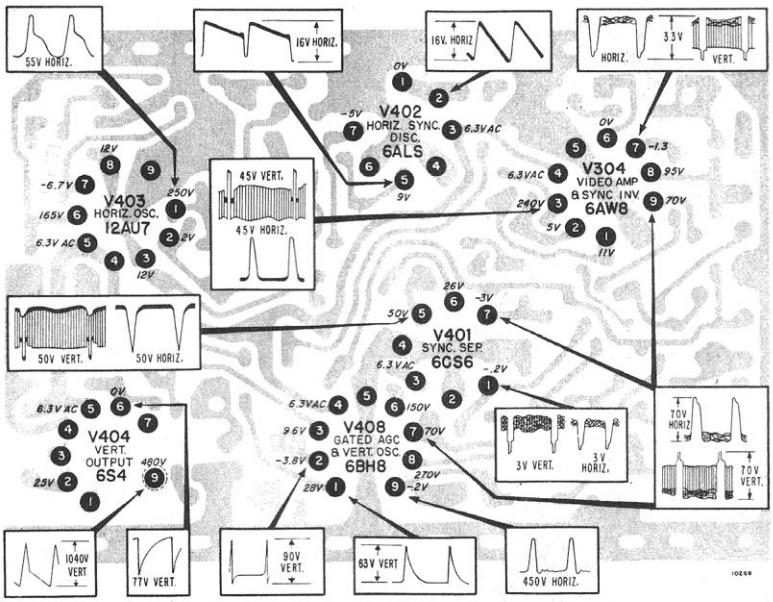


Figure 46. View of Printed Wiring Side of Sync Board used in models having a 21" or 24" Picture Tube Showing Voltages and Waveforms. Conditions for measurements given on schematic pages.

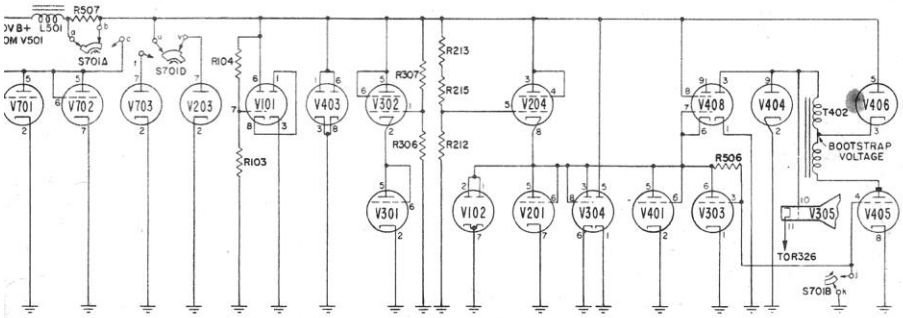


Figure 51. Simplified B+ Distribution Diagram for VHF TV-Radio-Phono Combination models.

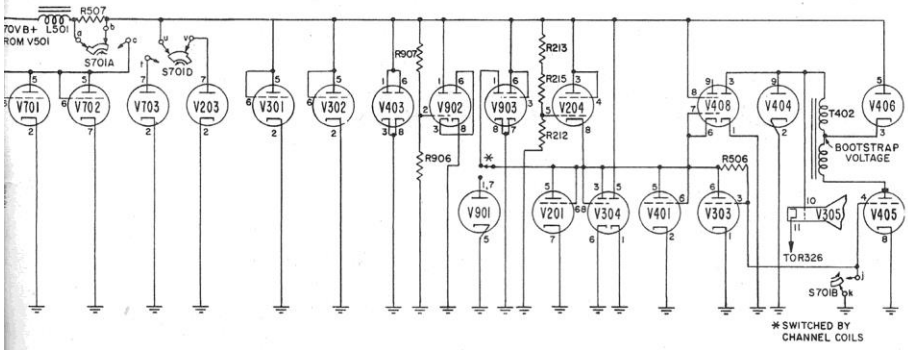


Figure 52. Simplified B+ Distribution Diagram for VHF-UHF TV-Radio-Phono Combination models

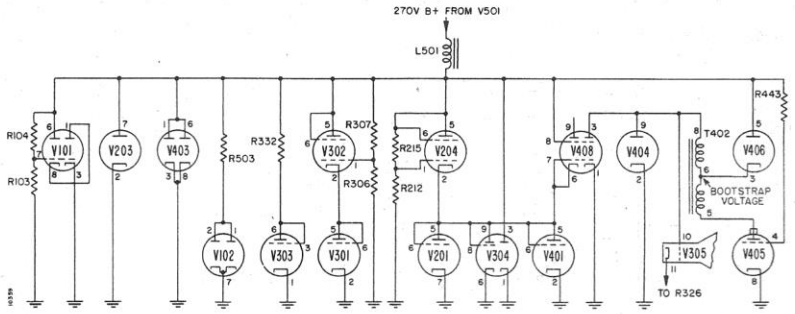


Figure 48. Simplified B+ Distribution Diagram for all VHF "TV-only" models having a 21" or 24" Picture Tube.

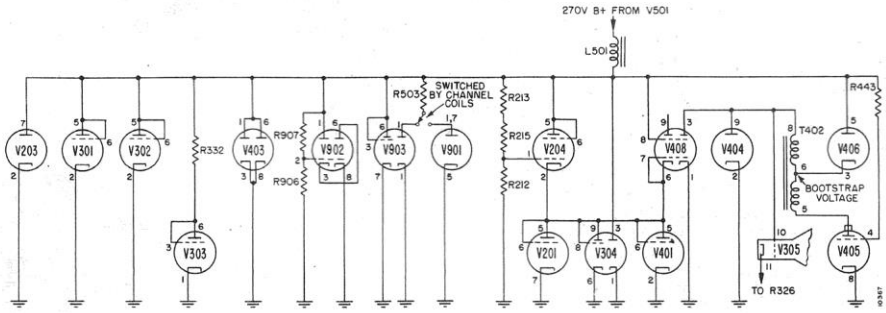


Figure 49. Simplifield B+ Distribution Diagram for all VHF-UHF "TV-only" models having a 21" or 24" Picture Tube.

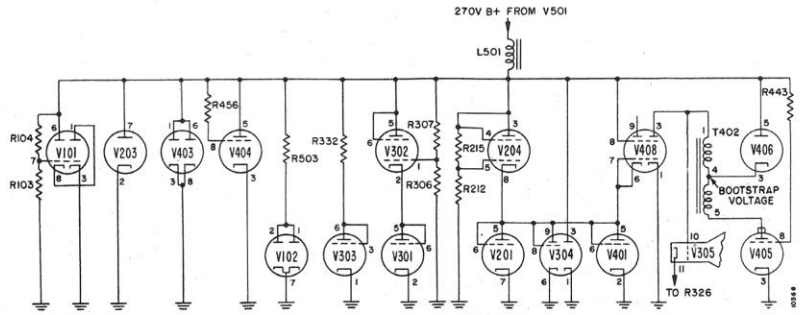
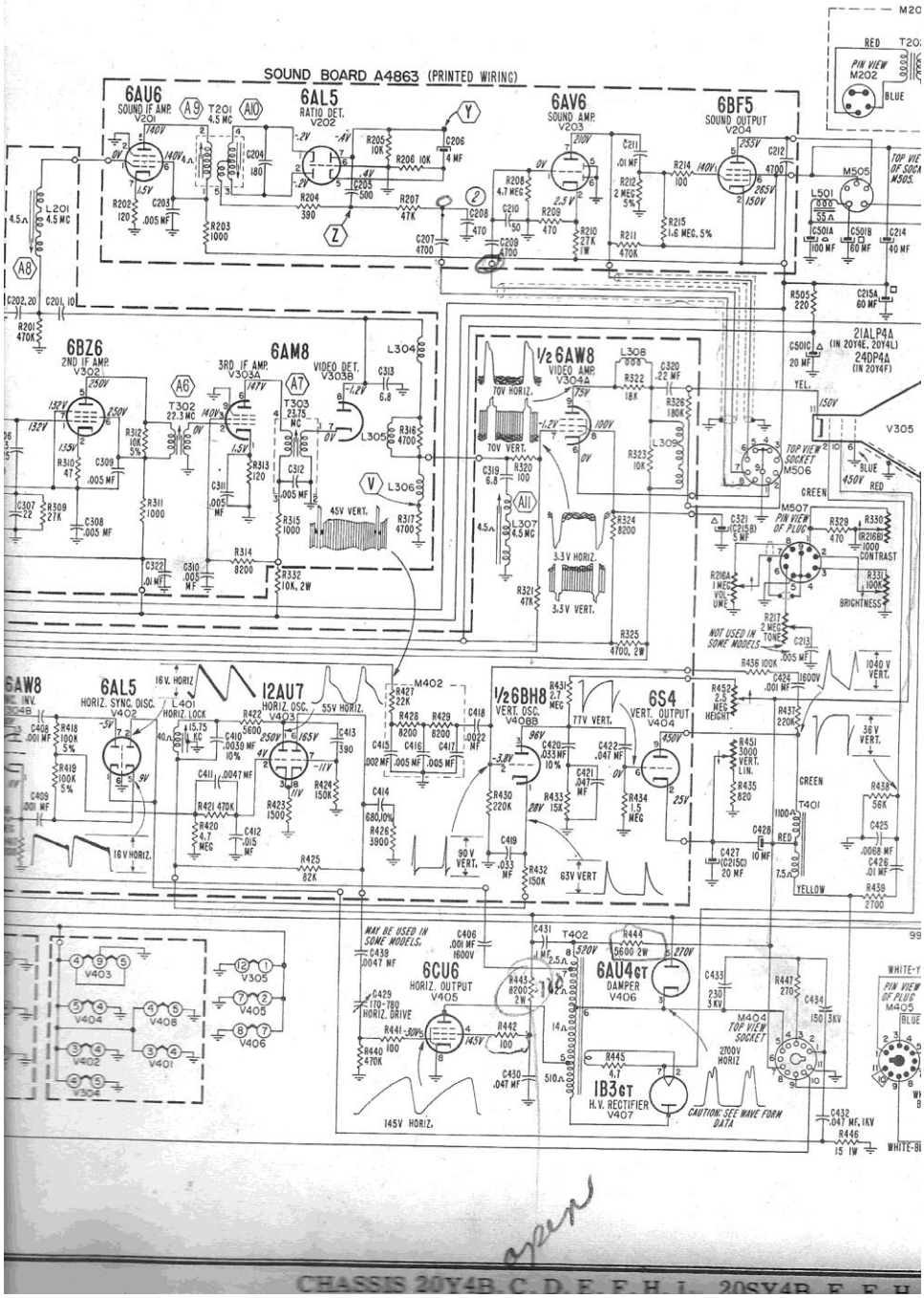
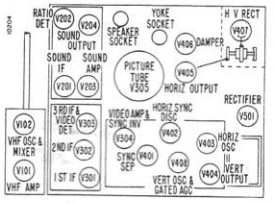


Figure 50. Simplified B+ Distribution Diagrams for models having a 27" Picture Tube.

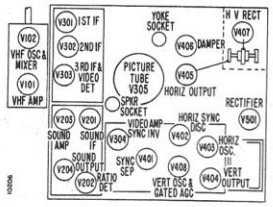
Schematic for 20Y4B, 20Y4E, 20Y4F, 20Y4L Television Chassis

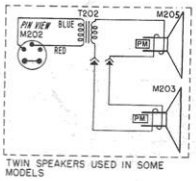


Rear View 20Y4B Chassis.



Rear View 20Y4E, 20Y4F, 20Y4L Chassis.





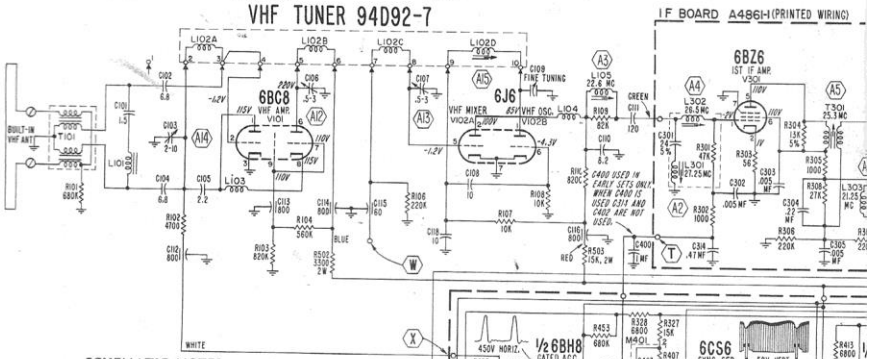
TWIN SPEAKERS USED IN SOME MODELS

V101—6BC8
V102—6J6
V201—6AU6
V202—6AL5
V203—6AV6
V204—6BF5
V301—6BZ6
V302—6BZ6
V303—6AM8

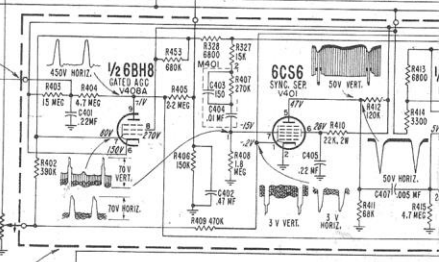
V305 V304—6AW8 | 21ALP4A (20Y4B, 20Y4E, 20Y4L) | 24DP4A (20Y4F)

V401—6CS6
V402—6AL5
V403—12AU7
V404—6S4
V405—6CU6
V406—6AU4GT
V407—1B3GT
V408—6BH8
V501—5U4GA or 5U4GB

VHF TUNER 94D92-7



IF BOARD A4861-1 (PRINTED WIRING)



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

SCHEMATIC NOTES

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

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

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

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

CONDITIONS FOR MEASURING VOLTAGES

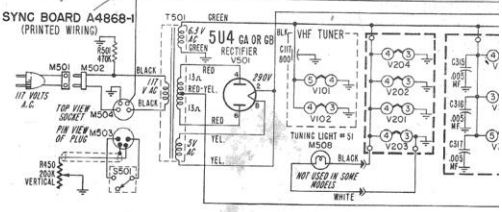
Warning: Pulsed high voltages are present at the caps of V405 and V407, and at pin 3 of V406. **Do not** attempt to measure voltages at these points without suitable test equipment. A VTVM with a high voltage probe should be used when measuring picture tube 2nd anode voltage.

- Set the **Channel Selector** on an unused channel. **Contrast** control fully clockwise. All other controls fully counterclockwise. Do not disturb **Horiz. Lock** and **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.

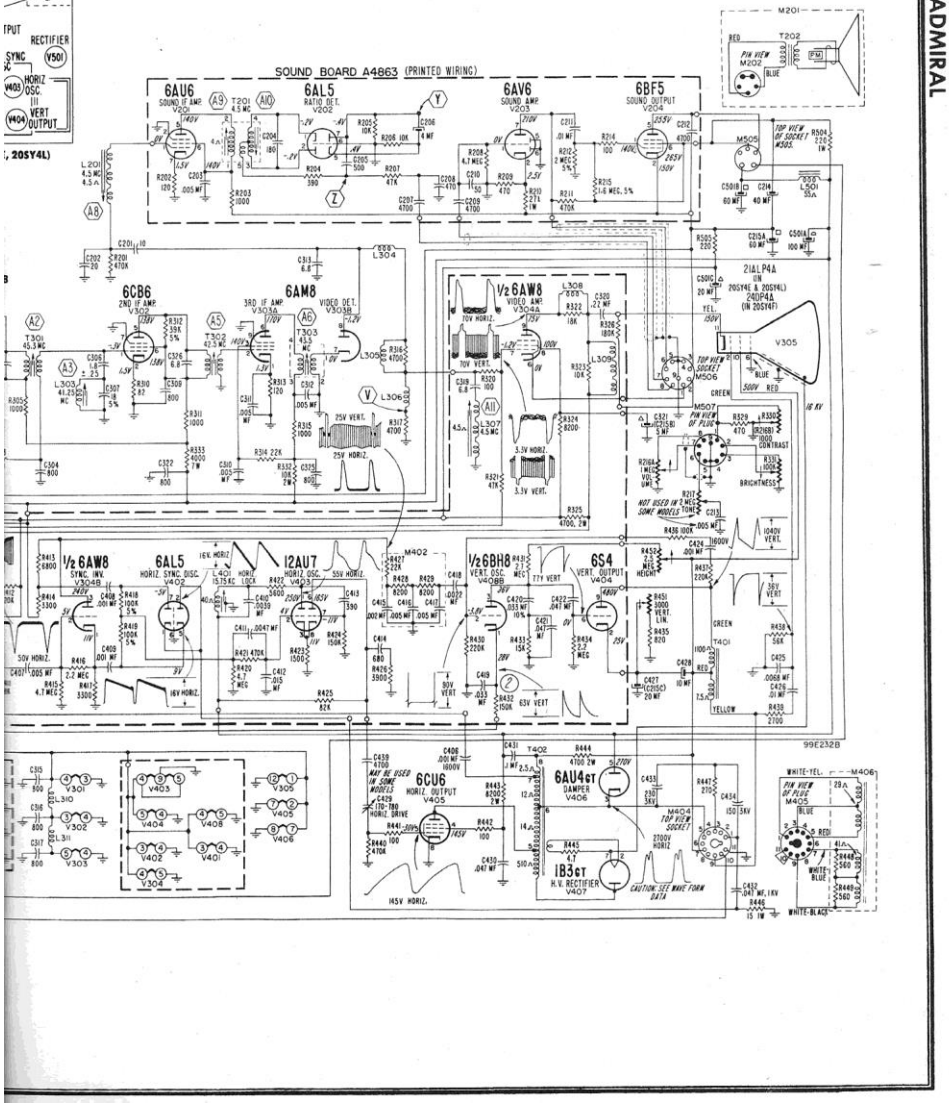
CONDITIONS FOR OBSERVING WAVEFORMS

See waveform information

SYNC BOARD A4868-1 (PRINTED WIRING)



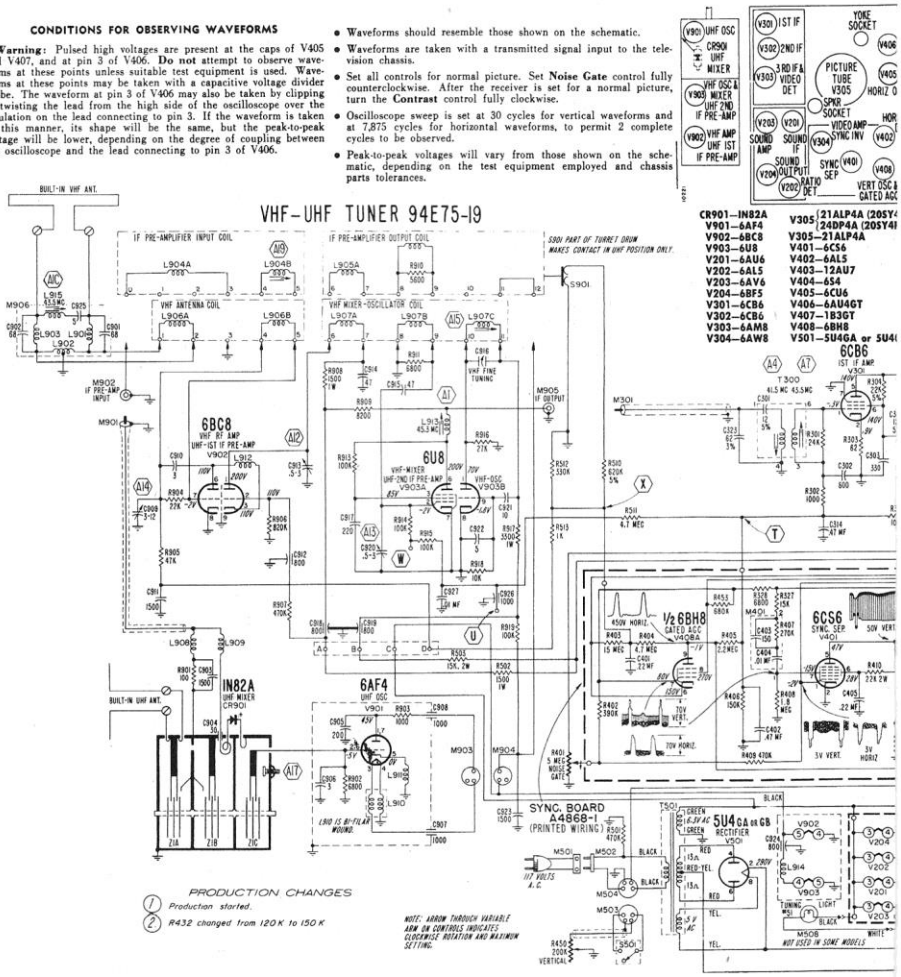
Schematic for 20SY4E, 20SY4F, 20SY4L Television Chassis.



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. Set **Noise Gate** control fully counterclockwise. 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.



MODEL IDENTIFICATION CHART

MODEL NO.	MODEL NAME	TV CHASSIS	TV TUNER	RADIO-PHONO UNIT	PICTURE TUBE	MAIN CONTROL LOCATION	AUXILIARY CONTROL LOCATION	TONE CONTROL
T23B1	Newport	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	SIDE	NO
TS23B1	Newport	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	SIDE	NO
T23B2	Claremont	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	SIDE	NO
TS23B2	Claremont	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	SIDE	NO
T23B6	Burlingame	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	SIDE	YES
TS23B6	Burlingame	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	SIDE	YES
T23B7	Boulevard	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	SIDE	YES
TS23B7	Boulevard	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	SIDE	YES
T23B16	Cuba	20Y4B	94D92-7 VHF	------	21ALP4A	BOTTOM	FRONT	YES
TS23B16	Cuba	20SY4B	94E75-19 VHF-UHF	------	21ALP4A	BOTTOM	FRONT	YES
T23B17	Caracas	20Y4B	94D92-7 VHF	------	21ALP4A	BOTTOM	FRONT	YES
TS23B17	Caracas	20SY4B	94E75-19 VHF-UHF	------	21ALP4A	BOTTOM	FRONT	YES
T23B18	Colonial	20Y4B	94D92-7 VHF	------	21ALP4A	BOTTOM	FRONT	YES
TS23B18	Colonial	20SY4B	94E75-19 VHF-UHF	------	21ALP4A	BOTTOM	FRONT	YES
T23B26	Berkeley	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
TS23B26	Berkeley	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
T23B27	Belvedere	20Y4L	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
TS23B27	Belvedere	20SY4L	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
T25B26	Delray	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
TS25B26	Delray	20SY4F	94E75-19 VHF-UHF	------	24DP4A	TOP	FRONT	YES
T25B27	Denmark	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
TS25B27	Denmark	20SY4F	94E75-19 VHF-UHF	------	24DP4A	TOP	FRONT	YES
C23B1	Malabar	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	NO
CS23B1	Malabar	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	NO
C23B2	Montreal	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	NO
CS23B2	Montreal	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	NO
C23B3	Madeira	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	NO
CS23B3	Madeira	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	NO
C23B16	Montego	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
CS23B16	Montego	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
C23B17	Miami	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
CS23B17	Miami	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
C23B18	Montevideo	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
C23B26	Morocco	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
CS23B26	Morocco	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
C23B27	Mediterranean	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
CS23B27	Mediterranean	20SY4E	94E75-19 VHF-UHF	------	21ALP4A	TOP	FRONT	YES
C25B6	Neptune	20Y4F	94D92-7 VHF.	------	24DP4A	TOP	FRONT	YES
CS25B6	Neptune	20SY4F	94E75-19 VHF-UHF	------	24DP4A	TOP	FRONT	YES
C25B7	Orlando	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
CS25B7	Orlando	20SY4F	94E75-19 VHF-UHF	------	24DP4A	TOP	FRONT	YES
C25B8	Plymouth	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
C28B6	Suburban	20Y4D	94D92-7 VHF	------	27RP4	TOP	FRONT	YES
C28B7	Sierra	20Y4D	94D92-7 VHF	------	27RP4	TOP	FRONT	YES
F23B6	Naples	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
F23B7	Norway	20Y4E	94D92-7 VHF	------	21ALP4A	TOP	FRONT	YES
F25B6	Saratoga	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
F25B7	Sweden	20Y4F	94D92-7 VHF	------	24DP4A	TOP	FRONT	YES
L23B6	Venice	20Y4H	94D92-7 VHF	3D1B-RC654 3D1C-RC654	21ALP4A	TOP	FRONT	YES
LS23B6	Venice	20SY4H	94E75-19 VHF-UHF	3D1B-RC654 3D1C-RC654	21ALP4A	TOP	FRONT	YES
L23B7	Vancouver	20Y4H	94D92-7 VHF	3D1B-RC654 3D1C-RC654	21ALP4A	TOP	FRONT	YES
LS23B7	Vancouver	20SY4H	94E75-19 VHF-UHF	3D1B-RC654 3D1C-RC654	21ALP4A	TOP	FRONT	YES

FEATURES

The Admiral 20Y4 series of television receiver is completely different electrically and mechanically from any previous Admiral sets. In designing these new models ease of service was a most important factor. As a result of Admiral's engineering skill, this line of receivers is much easier to service than many competitive sets.

These chassis have been electrically designed to provide superior performance under all signal conditions. Up to 75 per cent of the wiring is included in three printed wiring boards (in many models) which eliminate chances for human error and assure absolute uniform quality and dependability.

A few of the electrical and mechanical design features which provide better performance and make simpler servicing possible are listed below.

VERTICAL CHASSIS

All 20Y4 series chassis are mounted vertically with the neck of the picture tube protruding through a hole in the center of the chassis. Mounting the chassis in a vertical plane permits more compact, simplified design and makes tubes and most components more readily accessible for service or replacement. Although the chassis is mounted vertically, the chassis have been designed so that main operating controls are at the front of the set for customer convenience, and do not inconveniently extend from the side or the top of the cabinet.

CHASSIS AND PICTURE TUBE SEPARATELY REMOVABLE

An entirely new method is used for mounting the chassis and picture tube in these receivers. The picture tube can be removed without having to loosen or remove the chassis; likewise, the chassis can be removed without loosening or removing the picture tube.

The picture tube is rigidly mounted to brackets in four front corners of the cabinet. It is accessible for replacement by merely removing the screws holding the picture window retaining strip at the top of the window and then removing the glass and mask. Detailed picture tube replacement instructions are included in the Installation and Service Notes which are packed with each receiver and are also included in this manual.

The chassis is easily removed from the back of the set. Detailed instructions for removing the chassis are fastened to the inside wall of the cabinet for ready reference.

"EASY TO TRANSPORT" CHASSIS

On those occasions when it is necessary to remove the chassis from the cabinet for shop service, the lightweight, compact design of these chassis will be appreciated. The brackets used to mount the chassis in the cabinet and to mount the tuner have been specially designed so that the chassis may be transported in either a vertical or horizontal position.

PLUG AND SOCKET CONNECTIONS

These chassis have been designed with enough plug and socket connections to simplify testing and carrying since there is no need for parts dangling from the chassis. The deflection yoke, speaker, Volume and Contrast controls, Auxiliary controls, pilot light (if used), dynamagic radio (in combination models), are all connected to the chassis by plug and socket arrangement. Note: When removing the chassis for shop service, the control cable assembly (Off-On-Volume, Contrast, Brightness, Vertical, and Tone controls) and deflection yoke should be removed from the cabinet and also taken to the shop. It should not be necessary to remove the picture tube since the universal type 5AXP4 or the proper type will be available in the shop.

FILTER CHOKE MOUNTED ON CHASSIS

The power supply filter choke is mounted on the chassis instead of on the speaker as has been done previously. This should eliminate the necessity of removing the speaker from the cabinet when shop repairs are required, since most shops have a universal type speaker with output transformer.

UNIVERSAL TUNERS USED

All VHF 20Y4 series chassis use the same VHF tuner, part number 94D92-7. All VHF-UHF 20Y4 series chassis use the same VHF-UHF tuner, part number 94E75-19. The chassis have been designed so that it is not necessary to use tuners with different shaft lengths for various cabinet designs. This lessens stock problems and makes replacement parts more readily available.

REMOVABLE COVER ON HIGH VOLTAGE COMPARTMENT

All 20-series chassis have been provided with a removable cover on the high voltage compartment. The cover can be removed with a coin or

screwdriver for easy replacement of the high voltage rectifier and inspecting or testing the horizontal output transformer. To prevent loss, misplacement, or failure to replace it, the cover is securely fastened (with braided wire) to the compartment.

ALL ALIGNMENT TEST POINTS ACCESSIBLE WITH CHASSIS IN CABINET (most models)

To make alignment of these chassis easier, whether it is done with the chassis in the cabinet or on the service bench, all the alignment test points are available on the rear side (with tubes).

6BC8 VARIABLE-MU CASCODE AMPLIFIER

Admiral engineers, cooperating with receiving tube manufacturers, have developed a new cascode amplifier tube, the 6BC8.

This twin-triode is a variable-mu type having a semi-remote cut-off characteristic. Since it has a greater range of linear amplification, it can handle greater variations in incoming signal strengths (and the resulting changes in AGC bias voltage) without introducing cross modulation.

Cross modulation is the modulation of the desired carrier by an undesired signal which shows up as interference in the picture. It occurs when the bias applied to a stage is high enough to operate it very near to plate current cut-off. When operated under such conditions, the positive portion of a modulation envelope which is passing through this stage, is amplified much more than the negative portion. This non-linearity in amplification is equivalent to detection, which is actually taking place. The detected signal can then modulate another undesired signal which may also be present in this stage.

Although the 6BZ7 is directly interchangeable and can be used as a replacement, it is recommended that the 6BC8 be used unless it is impossible to obtain in your locality.

6BZ6 VARIABLE-MU HIGH GAIN IF AMPLIFIER

An improved pentode IF amplifier is used in the 1st and 2nd IF stage of all chassis using the printed wiring IF board.

The semi-remote cut-off characteristics of this tube enables Admiral receivers to handle stronger incoming signals without overloading. Distortion such as "cross modulation" or "non-linearity in amplification", due to high signal levels, is minimized or completely eliminated. See paragraph 3 under "6BC8 Variable-Mu Cascode Amplifier".

These advantages are obtained without any sacrifice in IF amplification in weak signal areas.

SPECIFICATIONS

Picture Tube: Direct view Electromagnetic deflection. Electrostatic Focus in 21-inch and 24-inch models. PM Focus in 27-inch models.

Operating Voltage: 110-120 volts. 60 cycles, AC.

Wattage:

- 205 watts for all straight television VHF models.
- 210 watts for all combination TV, Radio, Phono VHF models.
- 215 watts for all straight television VHF-UHF models.
- 220 watts for all combination TV, Radio, Phono VHF-UHF models.

Input Impedance and Transmission Line: 300 ohm balanced (between antenna terminals) for either VHF or UHF inputs.

Antenna: All models are equipped with built-in antennas.

Intermediate Frequencies:

- Video 25.75 MC Sound 21.25 MC in 20Y4B, 20Y4D, 20Y4E, 20Y4F, 20Y4H and 20Y4L chassis.
- Video 45.75 MC Sound 41.25 MC in 20SY4B, 20SY4E, 20SY4F, 20SY4H and 20SY4L chassis.
- Intercarrier Sound 4.5 MC (all chassis).

HIGH VOLTAGE WARNING

High voltages are present throughout the horizontal output, damper and second anode supply circuits. No attempt should be made to make measurements from high voltage points in these circuits with ordinary test equipment.

Caution: Operation of the set outside of the cabinet or with cabinet back removed involves shock hazard. Exercise normal high voltage precautions.

TUBE COMPLEMENT FOR 20Y4B, 20Y4D, 20Y4E, 20Y4F, 20Y4G, 20Y4H and 20Y4L CHASSIS

V101	6BC8	VHF Amplifier
V102	6J6	VHF Oscillator and Mixer
V201	6AU6	Sound IF Amplifier
V202	6AL5	Ratio Detector
V203	6AV6	Sound Amplifier
V204	6BF5	Sound Output in "TV Only" models
	6DG6GT	Sound Output in "Combination" models
V301	6BZ6	1st IF Amplifier
V302	6BZ6	2nd IF Amplifier
V303	6AM8	3rd IF Amplifier, Video Detector
V304	6AW8	Video Amplifier, Sync Inverter
V305	21ALP4A	Picture tube in all 21" models
	24DP4A	Picture tube in all 24" models
	27RP4	Picture tube in all 27" models
V401	6CS6	Sync Separator
V402	6AL5	Horiz. Sync Discriminator
V403	12AU7	Horiz. Oscillator
V404	6S4	Vertical Output in 21" and 24" models
	6AV5GT	Vertical Output in 27" models
V405	6CU6	Horiz. Output in 21" and 24" models
	6CD6G	Horiz. Output in 27" models
V406	6AU4GT	Horiz. Damper
V407	1B3GT	High Voltage Rectifier
V408	6BH8	Gated AGC Detector, Vertical Oscillator
V501	5U4GA or 5U4GB	Rectifier

TUBE COMPLEMENT FOR 20SY4B, 20SY4E, 20SY4F, 20SY4H and 20SY4L CHASSIS

CR901	1N82A	UHF Mixer
V901	6AF4	UHF Oscillator
V902	6BC8	VHF RF Amplifier, UHF 1st IF Pre-amplifier
V903	6U8	VHF Oscillator and Mixer, UHF 2nd IF Pre-amplifier
V201	6AU6	Sound IF Amplifier
V202	6AL5	Ratio Detector
V203	6AV6	Sound Amplifier
V204	6BF5	Sound Output in "TV Only" models
	6DG6G	Sound Output in "Combination" models
V301	6CB6	1st IF Amplifier
V302	6CB6	2nd IF Amplifier
V303	6AM8	3rd IF Amplifier, Video Detector
V304	6AW8	Video Amplifier, Sync Inverter
V305	21ALP4A	Picture tube in all 21" models
	24DP4A	Picture tube in all 24" models
V401	6CS6	Sync Separator
V402	6AL5	Horiz. Sync Discriminator
V403	12AU7	Horiz. Oscillator
V404	6S4	Vertical Output
V405	6CU6	Horiz. Output
V406	6AU4GT	Horiz. Damper
V407	1B3GT	High Voltage Rectifier
V408	6BH8	Gated AGC Detector, Vertical Oscillator
V501	5U4GA or 5U4GB	Rectifier

TUBES IN 3D1B OR 3D1C "AM ONLY" RADIO CHASSIS

V701	6BE6	Converter
V702	6BA6	IF Amplifier
V703	6AV6	Det., AVC and A.F. Amplifier

DIFFERENCES BETWEEN CHASSIS

The 20Y4 series chassis covered in this manual employ the same basic circuitry with differences which are described in the following paragraphs.

The 20Y4B chassis is a 20 tube VHF receiver having a 21 MC IF system and a 21-inch electrostatically focused picture tube. The chassis has three printed wiring boards; the IF Board, Sound Board and Sync Board. The IF Board is mounted at the bottom of the chassis, adjacent to the tuner and the Sound Board is mounted at the top of the chassis. The chassis is mounted vertically with the neck of the picture tube protruding through a hole in the center of the chassis. The tuner is mounted to the side of the chassis at the bottom.

The 20Y4E chassis and 20Y4L chassis are similar to the 20Y4B chassis except that the tuner is mounted to the side of the chassis at the top. Since the tuner output-IF input lead must be as short as possible, the positions of the IF Board and Sound Board are interchanged and both boards are inverted end for end.

The 20Y4F chassis is similar to the 20Y4E chassis except that a 24-inch electrostatically focused picture tube is used.

The 20Y4D chassis is similar to the 20Y4E chassis with the following differences. Due to dimensional differences of the 27-inch tube, this chassis is mounted on end (rotated 90°) as compared to all other 20Y4 series chassis. This chassis uses a 27-inch picture tube with a PM focus assembly. Width and Horizontal Linearity adjustments are also used. A different printed wiring Sync Board is used because a different Vertical output tube V404 (6AV5GT) is required. This tube is mounted on a metal extension located in the lower corner of the chassis.

The 20Y4H chassis is used in combination models. A 3D1 Dynamagic radio is used in conjunction with the television chassis. The 20Y4H

chassis is similar to the 20Y4E chassis with the following differences. Two printed wiring boards are used instead of three. The IF Board and Sync Board are similar to those used in the 20Y4E chassis. The sound stages are conventionally wired on a metal sub-chassis which is mounted to the main chassis.

The 20SY4B chassis is a 21 tube VHF-UHF receiver having a 41 MC IF system. It is very similar to the 20Y4B chassis except that a 3 tube VHF-UHF tuner is used and the IF system is not on a printed wiring board, but is conventionally wired on a metal sub-chassis.

The 20SY4E chassis and 20SY4L chassis are similar to the 20Y4E chassis and 20Y4L chassis with exception of the IF system and VHF-UHF tuner.

The 20SY4F chassis is similar to the 20Y4F chassis with exception of the IF system and VHF-UHF tuner.

The 20SY4H chassis is similar to the 20Y4H chassis with exception of the IF system and VHF-UHF tuner.

INSTALLATION ADJUSTMENTS

Make all checks or adjustments given here to insure best performance and ease in tuning. It is especially important that the Channel Slugs and Ion Trap be adjusted upon installation and at every service call. Removal of cabinet back disconnects interlock. Use a separate line cord (part number 89A22-1) when servicing.

ADJUST VHF CHANNEL SLUGS

VHF channel slug adjustment can be made without removing chassis from the cabinet.

Check individual channel slug adjustment for each VHF station received. If this adjustment is properly made, it is possible to tune from one station to another by turning the VHF Channel Selector only.

Adjust as follows:

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

b. Set the VHF Channel Selector for VHF Channel to be adjusted; set the UHF Channel Selector (VHF-UHF sets only) between channels 50 and 80. Set other controls for normal picture and sound.

c. Remove the VHF Channel Selector knob.

d. Set the Fine Tuning control (UHF Channel Selector in VHF-UHF sets) to the center of its VHF tuning range.

To do this for VHF models, rotate the knob approximately half-way between its stops. Then remove knob.

To do this for VHF-UHF models, rotate the UHF Channel Selector knob two or more full turns in either direction. Then rotate the knob between 1/2 and 3/4 of a turn in the opposite direction. Remove the knob. If the VHF channel slug hole is not exposed, repeat the above procedure.

e. Insert a 1/8" blade, 16" long, flexible non-metallic alignment tool in the hole adjacent to the channel tuning shaft (see figures 1, 2, and 3). WARNING: In VHF-UHF models, insert tool very carefully, since it may strike the UHF rotor or stator plates and cause tuner misalignment. Be sure to engage the VHF channel slug and NOT the UHF oscillator adjustment.

For each VHF channel in operation, carefully adjust the channel slug for best picture. (Note that this may not be the point at which the sound is loudest.) IMPORTANT: Always turn slug out (counterclockwise) first; then turn in. Only slight rotation of the slug will be required; turning the slug in too far will cause it to fall into the coil.

Figure 1. Channel Slug Location for Top Tuning VHF Models. View through hole in glass and mask with Channel Selector and Fine Tuning Knobs Removed.

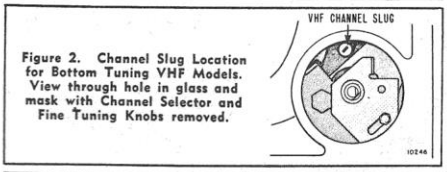


Figure 2. Channel Slug Location for Bottom Tuning VHF Models. View through hole in glass and mask with Channel Selector and Fine Tuning Knobs removed.

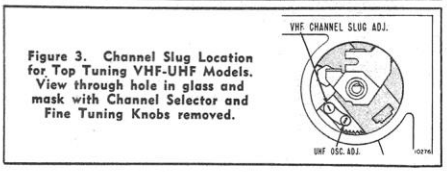


Figure 3. Channel Slug Location for Top Tuning VHF-UHF Models. View through hole in glass and mask with Channel Selector and Fine Tuning Knobs removed.

NOISE GATE ADJUSTMENT

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.

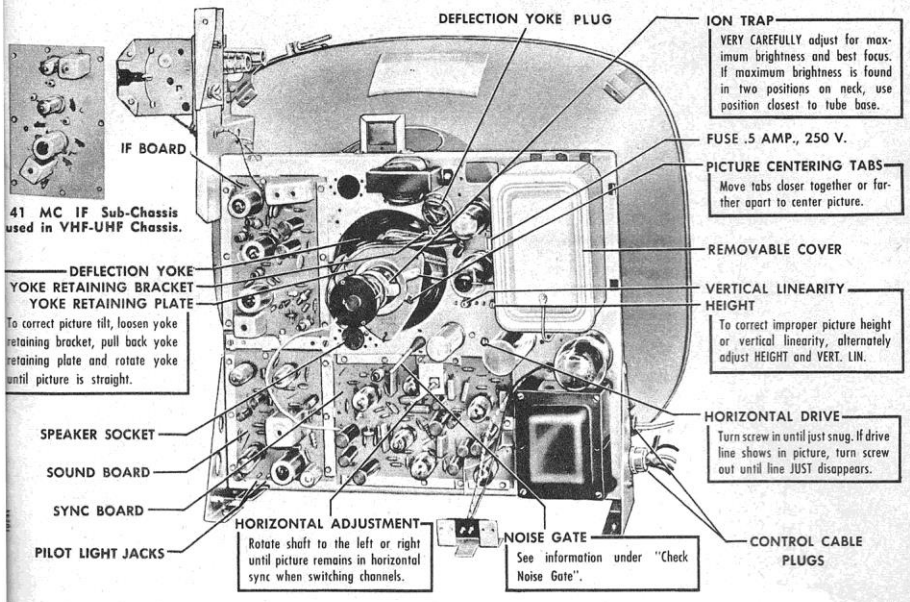


Figure 5. Rear View of 20Y4E, 20SY4E, 20Y4F, 20SY4F, 20Y4L, 20SY4L Chassis Showing Adjustment Locations.

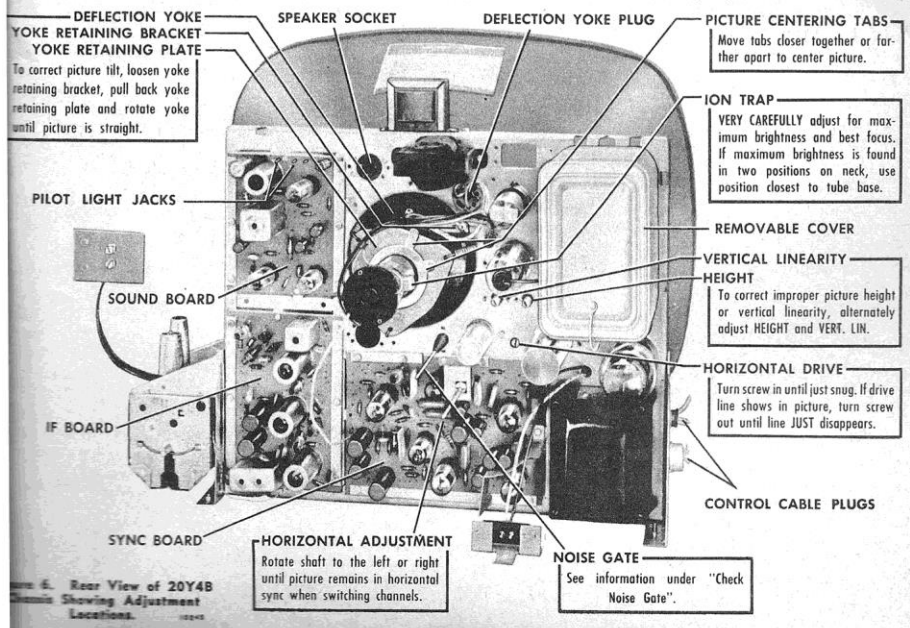


Figure 6. Rear View of 20Y4B Chassis Showing Adjustment Locations.

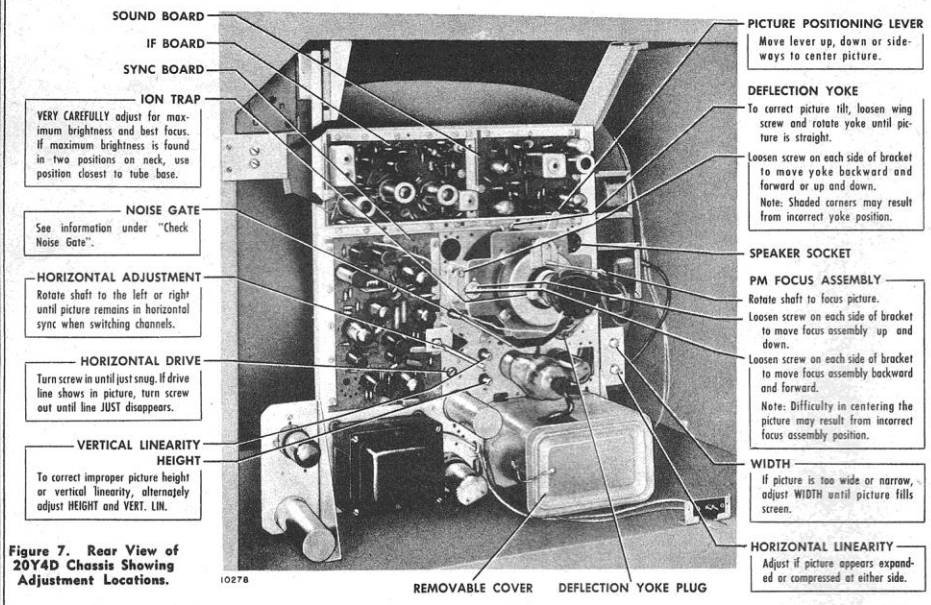


Figure 7. Rear View of 20Y4D Chassis Showing Adjustment Locations.

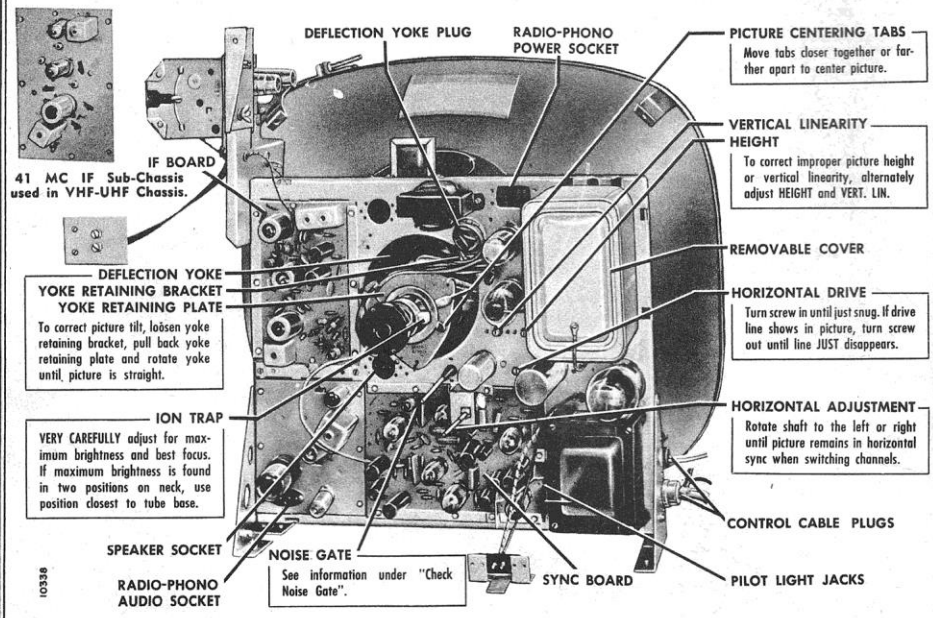


Figure 8. Rear View of 20Y4H, 20SY4H Chassis Showing Adjustment Locations.

TELEVISION ALIGNMENT

The following alignment pages are marked at the top to indicate whether the information applies to both 21 MC and 41 MC sets or applies to only one. BE SURE YOU ARE FOLLOWING THE CORRECT PROCEDURE FOR THE CHASSIS BEING ALIGNED.

GENERAL

mplete alignment consists of the following individual dures and should be performed in this sequence:

F Amplifier and Trap Alignment.
F Response Curve Check.
.5 MC Sound IF and Trap Alignment.
HF and Mixer Alignment.
ver-all VHF and IF Response Curve Check.
HF Oscillator Adjustment.
F Pre-amplifier Response Curve Check and Alignment.
HF Tuner Alignment.

TEST EQUIPMENT

properly service this receiver, it is recommended that llowing test equipment be available.

PORTANT: Many service instruments do not meet equirements given below. A list of recommended ment is available from Admiral distributors.

ep Generator

eep generator must provide sweep frequencies from

to 90 MC range: } with at least
to 225 MC range: } 10 MC sweep width
to 890 MC range: }

tput: adjustable; at least .4 volt maximum output.

tput impedance: 300 ohms balanced to ground.

sweep generator not having constant output voltage inear sweep over the swept range, will produce curves t are widely different from the ideal curves shown on llowing pages. If repeated difficulty is encountered in ining these curves, the sweep generator should be ked. A simple check is to observe the response curve set that is in alignment.

ore suspecting the generator, be sure the alignment ctions in this manual have been followed carefully.

Signal (Marker) Generator

4.5 MC frequency.
18 to 90 MC frequency range.
170 to 225 MC frequency range.
†470 to 890 MC frequency range.

Must have a built-in calibration crystal for checking dial accuracy.

Oscilloscope

Standard oscilloscope, preferably one with a wide band vertical deflection, vertical sensitivity at least .5 volt (RMS) per inch.

Vacuum-Tube Voltmeter

Preferably with low range (3 volt) DC zero center scale and a high voltage probe (30,000 volt range).

Bias Supply

0 to 4½ volts (battery or electronic).

ALIGNMENT TOOLS

The following alignment tools are required. They can be obtained from the Admiral distributor under the part numbers listed below:

Metal alignment screwdriver part number 98A30-9.

Non-metallic (fiber) alignment screwdriver (16 " long, ⅛" diameter) part number 98A30-19.

Non-metallic alignment wrench (9" long, for hexagonal core IF slugs) part number 98A30-12.

Non-metallic alignment wrench (9" long, for small hexagonal core IF slugs) part number 98A30-14.

Non-metallic alignment wrench (12" long, for hexagonal core UHF IF Pre-amplifier slugs), part number 98A30-18.

IMPORTANT ALIGNMENT HINTS

(For all 20Y4—series chassis.)

e following suggestions should be performed if diffi- is experienced during the alignment procedure.

F CIRCUIT INSTABILITY: When spot frequency ing the IF amplifiers, the VTVM pointer may swing the hand is placed too near the IF transformers. viewing the IF response curve on an oscilloscope, the may change shape with hand capacity, especially when ing 3rd IF transformer T303. To correct either of conditions, the following alignment hints should be

) Check the generator output leads to be certain that the unshielded portion (especially the grounded lead) is as short as practicable.

(b) Be sure that a decoupling network is used at the video detector output and that the leads on the network are kept as short as possible; see figure 11.

(c) The use of a nine inch hexagonal alignment tool will permit adjustment without encountering "hand capacity" effects. See "Alignment Tools" above.

2. RECEIVER OVERLOADING WHEN CHECKING THE OVER-ALL RESPONSE CURVE: Due to the inherent high sensitivity of these receivers, it is very easy to cause over-

Note: These steps are not performed on VHF only receivers. Required for UHF alignment only.

loading of the third IF amplifier stage. In some cases, generator leakage alone is enough to produce a response curve on the oscilloscope. To prevent overloading, the following things should be done:

(a) Be certain that the generator output attenuators are set for a minimum output.

(b) Some generators have a built-in pad in the output cable. Be sure that the pad in the cable is properly connected in the circuit. Refer to the generator instruction manual for details.

(c) If a pad is not built in, the 12 db pad shown below in figure 10 can be constructed and connected between the generator and the antenna terminals.

3. SPECIAL TUBE SHIELD: For injecting 21MC or 41MC IF Signals, use an insulated tube shield over the VHF Oscillator-Mixer tube. Insulate bottom of tube shield with masking tape, see figure 9.

4. CONNECT SPEAKER AND DEFLECTION YOKE: Speaker and deflection yoke must be connected to chassis during alignment.

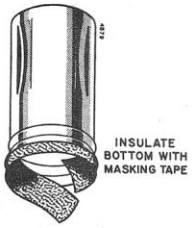


Figure 9. Special Tube Shield for IF Alignment and IF Response Curve Check.

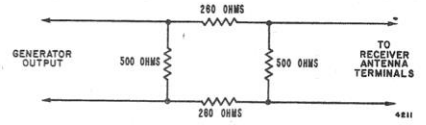


Figure 10. Illustration of 12 db Attenuation Pad for Viewing Over-all RF-IF Response Curve.

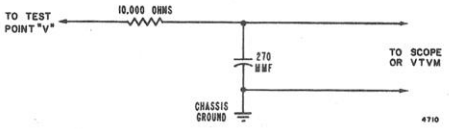


Figure 11. Decoupling Filter.

FREQUENCY TABLE FOR CHASSIS WITH 41 MC IF SYSTEM

FOR CHASSIS WITH 21 MC IF SYSTEM, SEE FOOTNOTE †

Channel No.	Freq. Range MC	Picture Carrier MC	Sound Carrier MC	Osc. Freq. MC	Sweep Gen. Center Freq. MC
2	54-60	55.25	59.75	*101	57.5
3	60-66	61.25	65.75	*107	63.5
4	66-72	67.25	71.75	*113	69.5
5	76-82	77.25	81.75	*123	79.5
6	82-88	83.25	87.75	*129	85.5
7	174-180	175.25	179.75	*221	177.5
8	180-186	181.25	185.75	*227	183.5
9	186-192	187.25	191.75	*233	189.5
10	192-198	193.25	197.75	*239	195.5
11	198-204	199.25	203.75	*245	201.5
12	204-210	205.25	209.75	*251	207.5
13	210-216	211.25	215.75	*257	213.5
14	470-476	471.25	475.75	517	473.5
15	476-482	477.25	481.75	523	479.5
16	482-488	483.25	487.75	529	485.5
17	488-494	489.25	493.75	535	491.5
18	494-500	495.25	499.75	541	497.5
19	500-506	501.25	505.75	547	503.5
20	506-512	507.25	511.75	553	509.5
21	512-518	513.25	517.75	559	515.5
22	518-524	519.25	523.75	565	521.5
23	524-530	525.25	529.75	571	527.5
24	530-536	531.25	535.75	577	533.5
25	536-542	537.25	541.75	583	539.5
26	542-548	543.25	547.75	589	545.5
27	548-554	549.25	553.75	595	551.5
28	554-560	555.25	559.75	601	557.5
29	560-566	561.25	565.75	607	563.5
30	566-572	567.25	571.75	613	569.5
31	572-578	573.25	577.75	619	575.5
32	578-584	579.25	583.75	625	581.5
33	584-590	585.25	589.75	631	587.5
34	590-596	591.25	595.75	637	593.5
35	596-602	597.25	601.75	643	599.5
36	602-608	603.25	607.75	649	605.5
37	608-614	609.25	613.75	655	611.5
38	614-620	615.25	619.75	661	617.5
39	620-626	621.25	625.75	667	623.5
40	626-632	627.25	631.75	673	629.5
41	632-638	633.25	637.75	679	635.5
42	638-644	639.25	643.75	685	641.5
43	644-650	645.25	649.75	691	647.5
44	650-656	651.25	655.75	697	653.5
45	656-662	657.25	661.75	703	659.5
46	662-668	663.25	667.75	709	665.5
47	668-674	669.25	673.75	715	671.5
48	674-680	675.25	679.75	721	677.5
49	680-686	681.25	685.75	727	683.5
50	686-692	687.25	691.75	733	689.5
51	692-698	693.25	697.75	739	695.5
52	698-704	699.25	703.75	745	701.5
53	704-710	705.25	709.75	751	707.5
54	710-716	711.25	715.75	757	713.5
55	716-722	717.25	721.75	763	719.5
56	722-728	723.25	727.75	769	725.5
57	728-734	729.25	733.75	775	731.5
58	734-740	735.25	739.75	781	737.5
59	740-746	741.25	745.75	787	743.5
60	746-752	747.25	751.75	793	749.5
61	752-758	753.25	757.75	799	755.5
62	758-764	759.25	763.75	805	761.5
63	764-770	765.25	769.75	811	767.5
64	770-776	771.25	775.75	817	773.5
65	776-782	777.25	781.75	823	779.5
66	782-788	783.25	787.75	829	785.5
67	788-794	789.25	793.75	835	791.5
68	794-800	795.25	799.75	841	797.5
69	800-806	801.25	805.75	847	803.5
70	806-812	807.25	811.75	853	809.5
71	812-818	813.25	817.75	859	815.5
72	818-824	819.25	823.75	865	821.5
73	824-830	825.25	829.75	871	827.5
74	830-836	831.25	835.75	877	833.5
75	836-842	837.25	841.75	883	839.5
76	842-848	843.25	847.75	889	845.5
77	848-854	849.25	853.75	895	851.5
78	854-860	855.25	859.75	901	857.5
79	860-866	861.25	865.75	907	863.5
80	866-872	867.25	871.75	913	869.5
81	872-878	873.25	877.75	919	875.5
82	878-884	879.25	883.75	925	881.5
83	884-890	885.25	889.75	931	887.5

* For oscillator frequencies from channels 2 to 13, frequency indicated is that of VHF oscillator. For oscillator frequencies higher than channel 13, frequency indicated is that of UHF oscillator with VHF oscillator inoperative.

† For channels 2 through 13, subtract 20 MC from Oscillator Frequency for chassis with a 21 MC IF system.

Information on this page applies ONLY to chassis with a 21 MC IF system.

SIMPLIFIED ALIGNMENT

After becoming familiar with alignment procedure, some servicemen simplify subsequent alignment of sets by merely using the essential alignment data given in figures 12, 13, 14, 18 and 19.

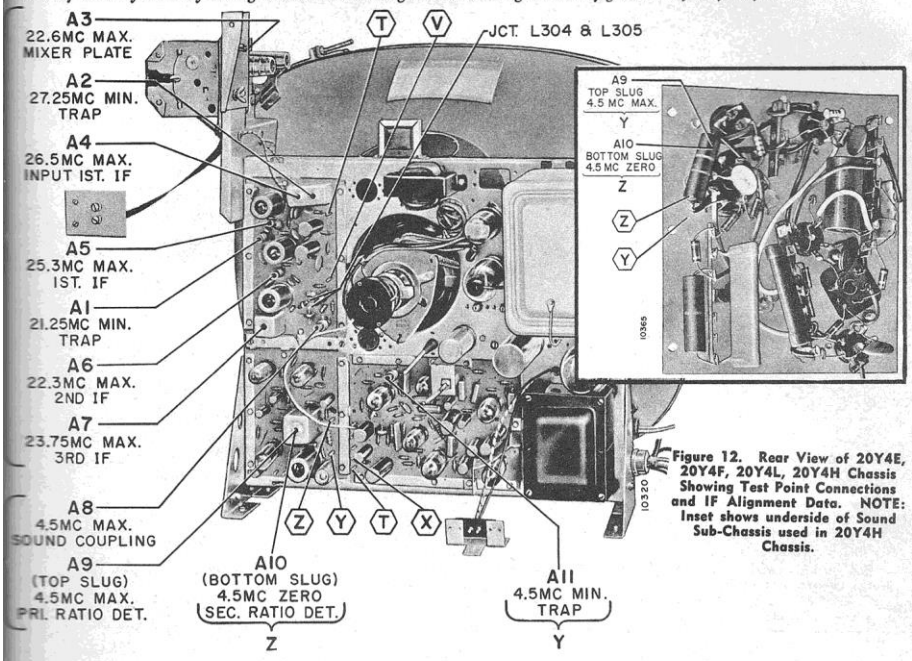


Figure 12. Rear View of 20Y4E, 20Y4F, 20Y4L, 20Y4H Chassis Showing Test Point Connections and IF Alignment Data. NOTE: Inset shows underside of Sound Sub-Chassis used in 20Y4H Chassis.

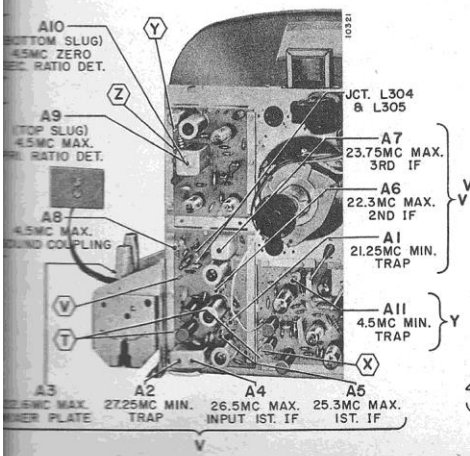


Figure 13. Rear View of 20Y4B Chassis Showing Test Point Connections and IF Alignment Data.

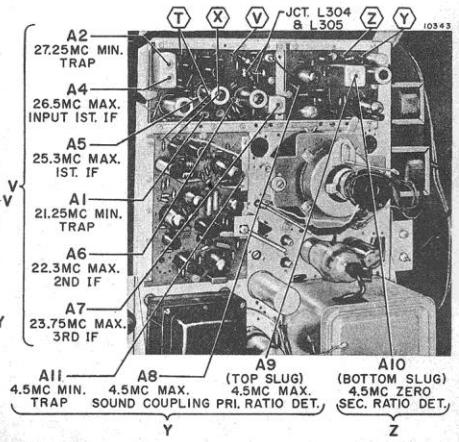


Figure 14. Rear View of 20Y4D Chassis Showing Test Point Connections and IF Alignment Data.

Information on this page applies ONLY to chassis with a 21 MC IF system.

21 MC IF AMPLIFIER AND TRAP ALIGNMENT

See 41 MC IF Amplifier and Trap Alignment.

- Connect negative of bias supply to test point "T", see figures 12 through 14, positive to chassis. -3 volt supply required for steps 3, 4, 5, 6, 7 and 8. -1½ volt supply may be required for steps 1 and 2.
- Disconnect antenna. Connect a jumper wire across antenna terminals.
- Set Channel Selector to Channel 3 or other unassigned low channel to prevent interference during alignment.
- Set Contrast control fully counterclockwise.
- Connect generator high side to insulated tube shield for 6J6 (V102); connect low side to chassis near tube shield. See figure 9.
- Connect VTVM high side to test point "V" through a decoupling filter, common to chassis. See figures 11 through 14. Use lowest DC scale on VTVM.
- Allow about 15 minutes for receiver and test equipment to warm up.

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	21.25 MC	If necessary, increase generator output and/or reduce bias to -1½ volts to obtain a definite indication on VTVM.	A1 for minimum.
2	27.25 MC		A2 for minimum.
3	22.6 MC	Use -3 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 2 volts.	A3 for maximum.
4	26.5 MC		A4 for maximum.
5	25.3 MC		A5 for maximum.
6	22.3 MC		A6 for maximum.
7	23.75 MC		A7 for maximum.
8	To insure correct IF alignment, make "IF Response Curve Check".		

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 3 or an unassigned low channel. Contrast control fully to the left. Connect negative of 3 volt bias supply to test point "T"; positive to chassis.	Connect high side to 6J6 mixer-osc. insulated tube shield, see fig. 9. Connect low side to chassis near tube shield. Set sweep frequency to 23MC, and sweep width approximately 7MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" through a decoupling filter, see figs. 11 through 14.	Check curve obtained against ideal response curve in fig. 15. 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. **Important:** If curve changes shape with hand capacity, see section 1 of "Important Alignment Hints."

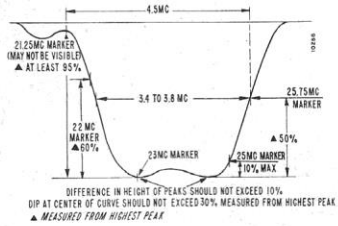


Figure 15. Ideal IF Response Curve.

Figure 16. IF Response Curves, Incorrect Shape.

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

If the curve cannot be made to resemble the response curve shown at left, repeat all steps under "IF Amplifier and Trap Alignment" making sure that generator frequencies are accurate and adjustments are carefully made. If a satisfactory curve cannot be obtained after repeating these steps, it may be necessary to change IF amplifier tubes or check for a defective circuit component to be sure that each stage is operating properly.

Information on this page applies ONLY to chassis with a 21 MC IF system.

4.5 MC SOUND IF AND TRAP ALIGNMENT

This procedure is identical for 21 MC and 41 MC IF Chassis.

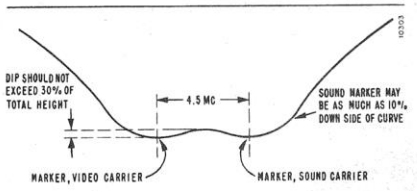
VHF AMPLIFIER AND MIXER ALIGNMENT

See page 18 for VHF Amplifier and Mixer Alignment for 41 MC Chassis.

- Connect negative of 3 volt bias supply to test point "X", positive to chassis.
- 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 (figure 18). Keep scope leads away from chassis.
- Allow about 15 minutes for receiver and test equipment to warm up.

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. Check response obtained with VHF response curve shown in figure 17. Alternately adjust A12 and A13 (figure 18) as required to obtain equal peak amplitudes and symmetry 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. Check response obtained with VHF response curve shown in figure 17. Adjust A14 as required to obtain curve having maximum amplitude and flat top appearance consistent with proper bandwidth and correct marker location. After completing adjustment, recheck adjustment of step 1.
3	Set the sweep generator to sweep the channel to be checked. Set the marker generator for the corresponding video carrier frequency and sound carrier frequency.		Check each channel operating in the service area for curve shown below. In general, the adjustment performed in steps 1 and 2 are sufficient to give satisfactory response curves on all channels. However, if reasonable alignment is not obtained on a parcticular channel, (a) check to see that coils have not been intermixed, or (b) try replacing the coil for that particular channel, or (c) repeat step 1 for a weak high channel as a compromise adjustment to favor the particular channel. Repeat step 2 for the weak low channel to favor the particular channel. If a compromise adjustment is made, other channels operating in the service area should be checked to make certain that they have not been appreciably affected.

Figure 17. Ideal VHF Response Curve. Note: Full skirt of curve will not be visible unless generator sweep width extends beyond 10 MC.



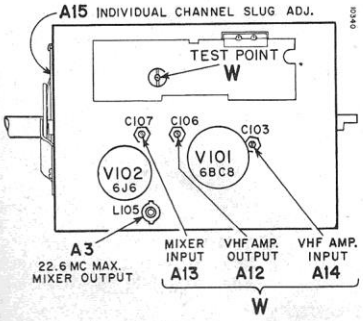


Figure 18. Top of VHF Tuner 94D92-7. Showing Adjustment Locations.

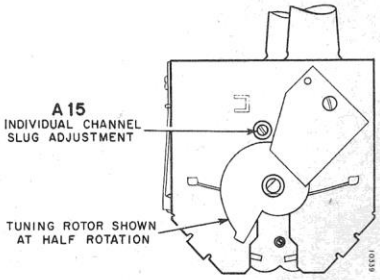


Figure 19. Front View of VHF Tuner 94D92-7. Bottom Cover Removed.

Information on this page applies ONLY to chassis with a 21 MC IF system.

OVER-ALL VHF AND IF RESPONSE CURVE CHECK

Receiver Controls and Bias Supply	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Contrast control fully to the left. **Channel Selector** on channel 12 or other unassigned high channel. Connect negative of 3 volt bias supply to test point "T" and "X", positive to chassis.	Connect to antenna terminals. Set generator to sweep channel selected. See frequency table. Keep generator output as low as possible to prevent overloading.	If an external marker generator is used, loosely couple high side to sweep generator lead. Marker frequencies are shown in frequency table.	Connect to point "V" through a decoupling filter. See figures 11 through 14.	Compare the response curve obtained against the ideal curve shown in figure 20. 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 shape should remain the same. If curve shape changes, reduce sweep output and/or the scope gain until the shape does not change.

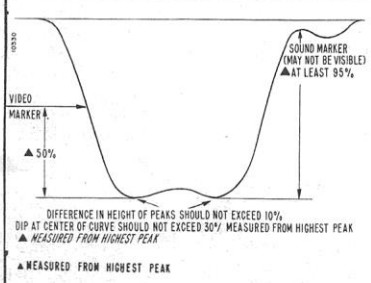


Figure 20. Ideal Over-all VHF and IF Response Curve.

Note that video marker on the "Overall VHF-IF Response Curve" will appear on the opposite side of the curve as compared to the "Ideal IF Repsonse Curve", figure 15. This is due to action of the mixer tube.

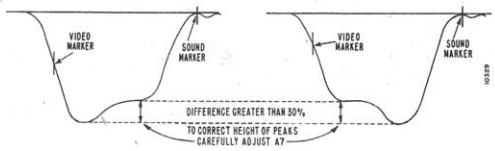


Figure 21. Over-all VHF and IF Response Curves, Incorrect Shape.

VHF OSCILLATOR ADJUSTMENT USING A SIGNAL GENERATOR

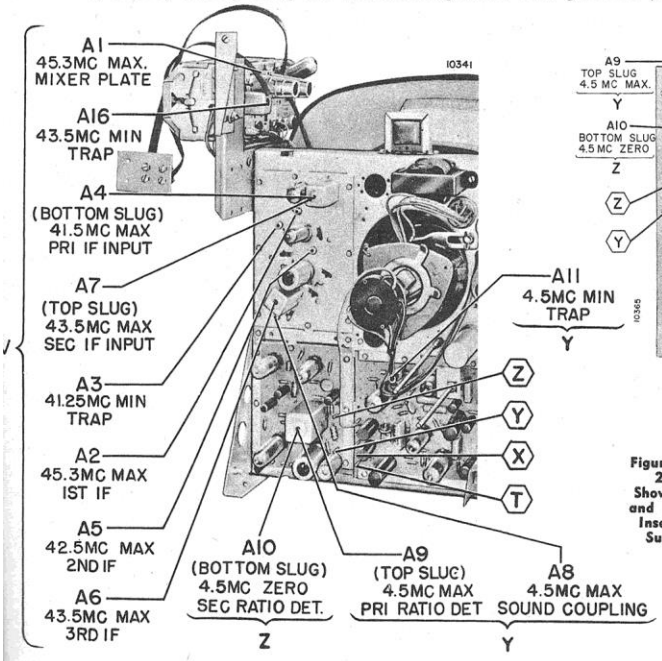
It is always advisable to make VHF oscillator adjustments using a Television Signal. If a Television Signal is not available, VHF oscillator adjustment can be made using a crystal calibrated signal generator. Make adjustments as follows:

Receiver Control Settings	Signal Generator	Instructions
Set Channel Selector for each channel to be adjusted. Set "Fine Tuning" control at half rotation. Turn Volume control fully to the right (clockwise).	Connect to antenna terminals. Set generator to exact frequency of VHF oscillator. See frequency table. **Set generator for maximum output.**	Connect a wire jumper from test point "W" on the tuner to test point "Z". Remove the ratio detector tube V202 (6AL5). Carefully adjust the oscillator slug A15 on each channel until a whistle (beat) is heard in the speaker of the receiver.

Information on this page applies ONLY to chassis with a 41 MC IF system.

SIMPLIFIED ALIGNMENT

After becoming familiar with alignment procedure, some servicemen simplify subsequent alignment of sets by merely using the essential alignment data given in figures 22, 23, 24, 28 and 29.



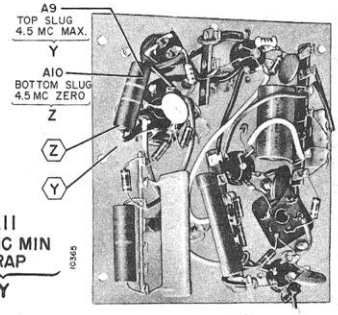
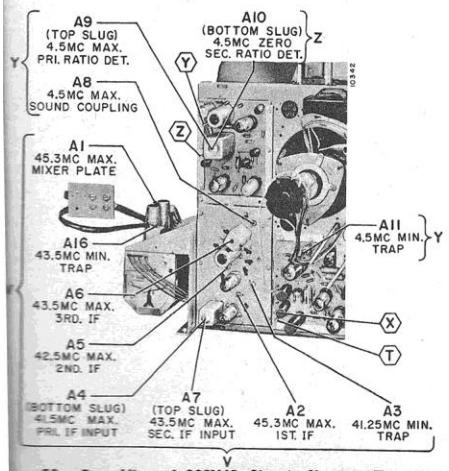


Figure 22. Rear View of 20SY4E, 20SY4F, 20SY4L, 20SY4H Showing Test Point Connections and IF Alignment Data. NOTE: Inset shows underside of Sound Sub-Chassis used in 20SY4H Chassis.



ure 23. Rear View of 20SY4B Chassis Showing Test Point Connections and IF Alignment Data.

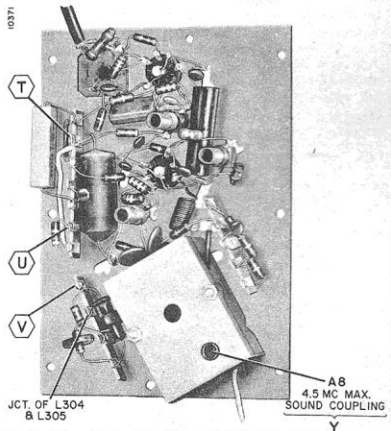


Figure 24. Underside View of 41 MC IF Sub-Chassis Showing Test Point Locations.

Information on this page applies ONLY to chassis with a 41 MC IF system.

41 MC IF AMPLIFIER AND TRAP ALIGNMENT

See 21 MC IF Amplifier and Trap Alignment

- Connect negative of bias supply to test point "T", see figures 22 or 23, positive to chassis. 4 volt supply required for steps 1, 2, 4, 5, 6, 7 and 8. -1½ volt supply may be required for steps 3 and 13.
- Disconnect antenna. Connect a jumper wire across antenna terminals.
- Set Channel Selector to Channel 12 or other unassigned high VHF channel to prevent interference during alignment.
- Set Contrast control fully counterclockwise, and Noise Gate fully clockwise.
- Allow about 15 minutes for receiver and test equipment to warm up.
- Connect generator high side to top of insulated tube shield for 6U8 (V903); connect low side to chassis near tube shield. See figure 9.
- Connect VTVM high side to test point "V" through a decoupling filter, common to chassis. See figures 11 and 24. Use lowest DC scale on VTVM.

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	45.3 MC	Use -4 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 3 volts.	A1 for maximum.
2	45.3 MC		A2 for maximum.
3	41.25 MC	If necessary, increase generator output and/or reduce bias to -1½ volts to obtain a definite indication on VTVM.	A3 for minimum.
4	41.5 MC		A4 for maximum.
5	42.5 MC	Use -4 volts bias. When adjusting, keep reducing generator output to prevent VTVM reading from exceeding 3 volts.	A5 for maximum!
6	43.5 MC		A6 for maximum.
7	43.5 MC		A7 for maximum.
8	45.3 MC	Repeat steps 1 and 2.	Readjust A1 and A2 for maximum.
9	43.5 MC	Repeat steps 6 and 7.	Readjust A6 and A7 for maximum.
10	42.5 MC	Repeat step 5.	Readjust A5 for maximum.
11	41.5 MC	Repeat step 4. NOTE: If more than $\frac{1}{4}$ turn of rotation is needed to peak A4 in this step, then it will be necessary to repeat steps 2 and 6.	Readjust A4 for maximum.
12	45.3 MC 41.5 MC 43.5 MC	Repeat steps 2, 4 and 6. If A2, A4 and A6 were far off frequency in these steps, repeat steps 2, 4 and 6 once more.	A2 for maximum. A4 for maximum. A6 for maximum.
13	43.5 MC	Disconnect antenna terminals jumper, connect generator high side to antenna terminals. Set Channel Selector to 2 or other low channel. If necessary, increase generator output and/or reduce bias to -1½ volts to obtain a definite indication on VTVM.	A16 for minimum.
14	To insure correct IF alignment, make "IF Response Curve Check".		

Information on this page applies ONLY to chassis with a 41 MC IF system.

IF RESPONSE CURVE CHECK (Using sweep generator and oscilloscope)

Receiver Controls and Bias Battery	Sweep Generator	Marker Generator	Oscilloscope	Instructions
Set Channel Selector on channel 12 or an unassigned high channel. Contrast control fully to the left. Connect negative of 4½ volt bias supply to test point "T"; positive to chassis.	Connect high side to 6U8 mixer-osc. insulated tube shield, see figure 9. Connect low side to chassis near tube shield. Set sweep frequency to 44.5 MC, and sweep width approximately 7MC.	If an external marker generator is used, loosely couple high side to sweep generator lead on tube shield, low side to chassis. Marker frequencies indicated on IF Response Curve.	Connect high side to test point "V" through a decoupling filter, see figs. 11 and 24.	Check curve obtained against ideal response curve in fig. 25. 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. **Important:** If curve changes shape with hand capacity, see section 1 of "Important Alignment Hints."

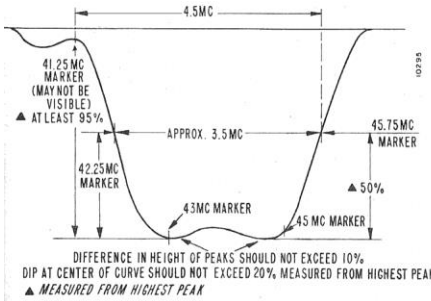


Figure 25. Ideal IF Response Curve.

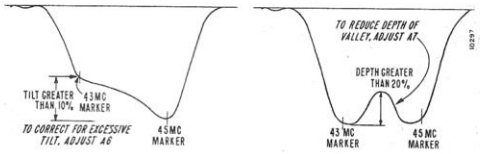


Figure 26. IF Response Curves, Incorrect Shape.

If it is necessary to adjust for incorrect response curve tilt or for excessive peak to valley ratio, carefully adjust alignment slugs as instructed under the above figures.

If the curve cannot be made to resemble the response curve shown at left, repeat all steps under "IF Amplifier and Trap Alignment" making sure that generator frequencies are accurate and adjustments are carefully made. Note: When aligning A1, A4 and A7, interaction between these tuned circuits is present. Repeat adjustment of these three tuned circuits several times at the correct frequency until a minimum of touch up is required for each stage.

If a satisfactory curve cannot be obtained after repeating these steps, it may be necessary to change IF amplifier tubes or check for a defective circuit component to be sure that each stage is operating properly.