"The Kingsport" Models
21-CD-8725 & U—Mah. Grain
21-CD-8727 & U—Oak Grain

"The Sanford" Models
21-CD-8775 & U—Mah. Grain
21-CD-8776 & U—Wal. Grain
21-CD-8777 & U—Oak Grain

"The Anderson" Models
21-CD-8865 & U—Mahogany
21-CD-8866 & U—Walnut
21-CD-8867 & U—Oak

"The Westmont" Models
21-CD-8885 & U—Mahogany
21-CD-8886 & U—Walnut
21-CD-8888 & U—Blend

"The Townsend" Models
21-CD-8906 & U—Walnut
21-CD-8907 & U—Oak

"The Alexander" Models
21-CD-8925 & U—Walnut
21-CD-8927 & U—Oak

"The Woodbridge" Models
21-CD-8949 & U—Cherry

## GENERAL DESCRIPTION

All models listed above are Deluxe color television receivers which automatically provide high-quality black and white picture reception when color programs are not scheduled in the reception area. This compatibility feature also provides reception of black and white pictures only, if desired.

Models bearing a "U" designation following the model number are full coverage UHF/VHF receivers. VHF channel tuning in these models is with a 13 position switch-type tuner. The 13th position automatically switches to a continuously variable tuning system which covers all 70 UHF channels. UHF models cover black and white and color reception on any channel within the normal reception area.

Models without the "U" designation cover all 12 VHF channels.

# RCA VICTOR

# COLOR TELEVISION RECEIVERS

## MODELS

**21-CD-8725 & U, 21-CD-8727 & U**
**21-CD-8775 & U, 21-CD-8776 & U**
**21-CD-8777 & U, 21-CD-8865 & U**
**21-CD-8866 & U, 21-CD-8867 & U**
**21-CD-8885 & U, 21-CD-8886 & U**
**21-CD-8888 & U, 21-CD-8906 & U**
**21-CD-8907 & U, 21-CD-8926 & U**
**21-CD-8927 & U, 21-CD-8949 & U**

**Chassis No. CTC7A, B, C, or D**
**—Mfr. No. 274—**

# SERVICE DATA

**—1957 No. T9—**

PREPARED BY COMMERCIAL SERVICE
RCA SERVICE CO., INC.
CAMDEN 8, N. J.
FOR
**RADIO CORPORATION OF AMERICA**
**RCA VICTOR TELEVISION DIVISION**

SUPPLEMENTARY INFORMATION

| Issue | Subject |
|---|---|
| | |
| | |
| | |
| | |
| | |
| | |

List related Supplements and Service Tips above.

First Edition—First Printing—8-21-57



Printed in U. S. A.

All of these receivers use the 21CYP22 glass-envelope tri-color kinescope. The kinescope, employing three separate electron-guns and an internal shadow-mask, provides in either color or black and white a high brightness picture, with a viewing area of approximately 261 square inches.

Color coded "TINT" and "COLOR" controls are easily tuned from the side of the cabinet. These controls, show on the escutcheon, the direction of rotation for proper tuning to achieve the desired color effects on the viewing screen of the kinescope and are an aid when making adjustments both by the customer and the service technician.

Other features of the Deluxe color television receivers include: intercarrier FM sound system; quadrature grid FM detector; separate picture and sound detectors to minimize 920 kc. beat interference; 4.5 mc sound trap and sound rejection control in the input to the video amplifier stages to further minimize interference; AGC control of the RF amplifier and the first and second picture IF amplifier stages; an automatic noise cancellation circuit; automatic frequency/phase control in the chrominance circuits; crystal-controlled 3.58 mc. color subcarrier reference oscillator; stabilized synchroguide horizontal oscillator and control; an automatic color "killer" circuit; and a continuously regulated high voltage supply to the ultor of the kinescope.

A feature of particular interest to the service technician is the new simplified convergence system. The convergence circuits and the controls necessary to perform convergence adjustments are mounted on a printed circuit board which is detachable from the cabinet. When removed from its normal mounting position it may be inverted and secured to two mounting screws provided on the upper rear of the cabinet.

In addition to convenience for adjustment, the convergence circuits in these receivers provide for adjustment of convergence at either side of the screen without affecting convergence at the opposite edge of the screen.

Convergence at the center of the screen is controlled by adjustable permanent magnets adjacent to the horizontal and vertical dynamic convergence coils. These are mounted over the convergence pole pieces in the kinescope.

For further ease in adjustment, the vertical amplitude and tilt controls and the horizontal dynamic convergence adjustments affecting the left side of the screen, are potentiometer controls.

## ELECTRICAL AND MECHANICAL SPECIFICATIONS

### CHASSIS DESIGNATIONS

| CHASSIS | TUNER | MODELS | LOUD-SPEAKERS |
|---|---|---|---|
| CTC7A | KRK48A | 21-CD-8725<br>21-CD-8727 | 1—8 inch |
| | | 21-CD-8775<br>21-CD-8776<br>21-CD-8777 | 1—3½ x 14 inch |
| CTC7B | KRK49A | 21-CD-8725U<br>21-CD-8727U | 1—8 inch |
| | KRK56D | 21-CD-8775U<br>21-CD-8776U<br>21-CD-8777U | 1—3½ x 14 inch |
| CTC7C | KRK48B | 21-CD-8865<br>21-CD-8866<br>21-CD-8867 | 2—3½ inch<br>1—6 x 9 inch |
| | | 21-CD-8885<br>21-CD-8886<br>21-CD-8888<br>21-CD-8906<br>21-CD-8907 | 2—3½ inch<br>1—8 inch |
| CTC7D | KRK49B<br>KRK56D | 21-CD-8865U<br>21-CD-8866U<br>21-CD-8867U | 2—3½ inch<br>1—6 x 9 inch |
| | | 21-CD-8885U<br>21-CD-8886U<br>21-CD-8888U<br>21-CD-8906U<br>21-CD-8907U | 2—3½ inch<br>1—8 inch |
| CTC7E | KRK48B | 21-CD-8926<br>21-CD-8927<br>21-CD-8949 | 2—3½ inch<br>1—6 x 9 inch |
| CTC7F | KRK49B<br>KRK56E | 21-CD-8926U<br>21-CD-8927U<br>21-CD-8949U | 2—3½ inch<br>1—6 x 9 inch |

**PICTURE SIZE**.....Approx. 261 sq. ins. on a 21CYP22 Kinescope

**POWER RATING**.....117 V.A.C., 60 Cy., 380 watts

**ANTENNA INPUT IMPEDANCE**.....300 ohms balanced

**SWEEP DEFLECTION**.....Magnetic

**FOCUS**.....Electrostatic

**CONVERGENCE**.....Magnetic

### RCA TUBE COMPLEMENT

| | Tube Used | Function |
|---|---|---|
| | *Models with VHF only* | |
| (1) | RCA 6BC8 | R-F Amplifier |
| (2) | RCA 6CQ8 | R-F Oscillator and Mixer |
| | *UHF/VHF Models* | |
| (1) | RCA 6AF4A | UHF Oscillator |
| (2) | RCA 6BC8 | VHF R-F Amplifier |
| (3) | RCA 6CQ8 | VHF R-F Oscillator & Mixer<br>UHF I-F Amplifier |
| | *All Models* | |
| (1) | RCA 6BZ6 | 1st Picture I-F Amp. |
| (2) | RCA 6BZ6 | 2nd Picture I-F Amp. |
| (3) | RCA 6AW8A | 3rd Pix. I-F Amp. & Sync. Sep. A crystal diode is used for the picture 2nd Detector. |
| (4) | RCA 6AW8A | 1st Video Amp. & AGC Amp. |
| (5) | RCA 12BY7A | 2nd Video Amplifier |
| (6) | RCA 6U8A | Sound I-F Amp. & Noise Invert. |
| (7) | RCA 6DT6 | Sound Demodulator |
| (8) | RCA 6AQ5A | Audio Output |
| (9) | RCA 6CG7 | Vertical Osc. & Sync. Output |
| (10) | RCA 6AQ5A | Vertical Output |
| (11) | RCA 6CG7 | Horiz. Osc. & Control |
| (12) | RCA 6DQ5 | Horiz. Output |
| (13) | RCA 6AU4GTA | Damper |
| (14) | RCA 1V2 | Focus Rectifier |
| (15) | RCA 3A3 | High Voltage Rectifier |
| (16) | RCA 6BK4 | Shunt Regulator |
| (17) | RCA 6U8A | Killer & 1st Band Pass Amplifier |
| (18) | RCA 6AW8A | 2nd Band Pass Amp. & Burst Amp. |
| (19) | RCA 12AZ7 | "X" & "Z" Demodulators |
| (20) | RCA 12BH7A | "R-Y" & "B-Y" Amplifiers |
| (21) | RCA 12BH7A | "G-Y" Amp. & Blanker |
| (22) | RCA 6U8A | 3.58 MC Osc. & React. Control |
| (23) | RCA 6BN8 | Phase & Killer Detectors |
| (24) | RCA 5U4GB (2 Tubes) | Rectifiers |
| (25) | RCA 21CYP22 | Kinescope |

## INDEX



## HIGH VOLTAGE WARNING

OPERATION OF THIS RECEIVER OUTSIDE THE CABINET OR WITH THE COVERS REMOVED, INVOLVES A SHOCK HAZARD FROM THE RECEIVER POWER SUPPLIES. WORK ON THE RECEIVER SHOULD NOT BE ATTEMPTED BY ANYONE WHO IS NOT THOROUGHLY FAMILIAR WITH THE PRECAUTIONS NECESSARY WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT COVER OPENED. BEFORE TURNING THE RECEIVER ON, INSURE THAT THE GROUND STRAP, FROM THE FRONT KINESCOPE MOUNTING BRACKET TO THE FRONT CHASSIS MOUNTING BRACKET, IS SECURELY FASTENED AND MAKING CONTACT.

## OPERATING INSTRUCTIONS

The following adjustments are necessary when turning the receiver on for the first time.

### BLACK and WHITE RECEPTION

1. Turn the receiver "ON". Advance the SOUND VOLUME control to approximately mid-position.

2. Set the VHF CHANNEL SELECTOR to the desired VHF channel, or to UHF position (UHF Models only), whichever applies. UHF channel selection is made by setting the UHF TUNING control to the desired UHF channel with the VHF CHANNEL switch at UHF position.

3. Turn the BRIGHTNESS control fully counter-clockwise then clockwise until a light pattern appears on the screen.

4. Advance the CONTRAST control until a picture is obtained.

5. Adjust the VERTICAL HOLD control, if necessary, until the picture stops vertical movement.

6. Adjust the HORIZONTAL HOLD control, if necessary, until a picture is obtained and centered.

7. Turn FINE TUNING (clockwise) or UHF TUNING (counter-clockwise) until interference appears and picture begins to disappear, then slowly in opposite direction until interference just disappears and a clear, sharp picture is obtained.

8. Turn the BRIGHTNESS control for normal screen brightness.

9. Adjust the CONTRAST control for suitable picture contrast. Adjust sound for proper volume.

10. In switching from one channel to another, it may be necessary to repeat steps numbers 7 and 9.

11. When the receiver is turned on again after an idle period, it should not be necessary to repeat the adjustments. If any adjustment is necessary, steps 7 and 9 are generally sufficient.

### COLOR RECEPTION

1. Set the CHANNEL SELECTOR to the desired channel broadcasting a color program. Turn the COLOR control fully counter-clockwise.

2. Adjust the receiver for a black and white picture as outlined above, with the fine tuning control advanced to its most clockwise position where most detailed picture is obtained without interference.

3. Turn the COLOR control clockwise until the desired intensity of color is obtained.

4. Adjust the TINT control to obtain the proper natural flesh tones in the picture.

5. If slight interference is present, recheck VHF FINE TUNING or UHF TUNING as outlined under step 7 for black and white reception.

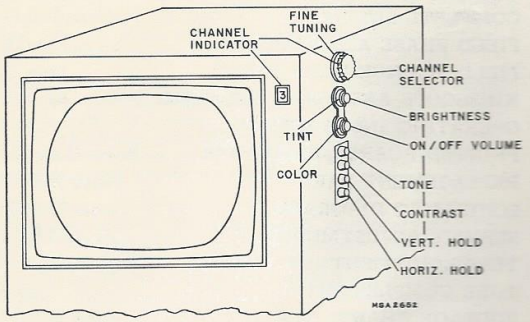



*Figure 1—Operating Controls VHF Models 21-CD-8725 to 21-CD-8907*

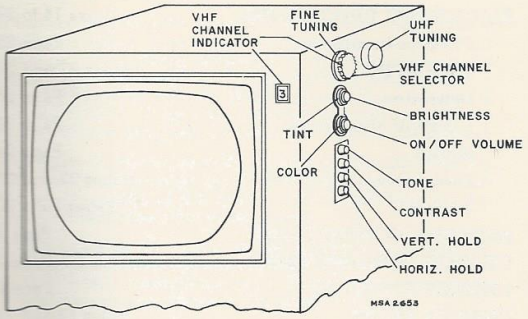



*Figure 2—Operating Controls UHF/VHF Models 21-CD-8725U to 21-CD-8907U*

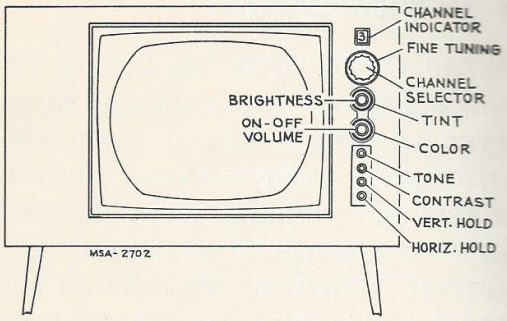



*Figure 3—Operating Controls VHF Models 21-CD-8926, 21-CD-8927 & 21-CD-8949 Only*

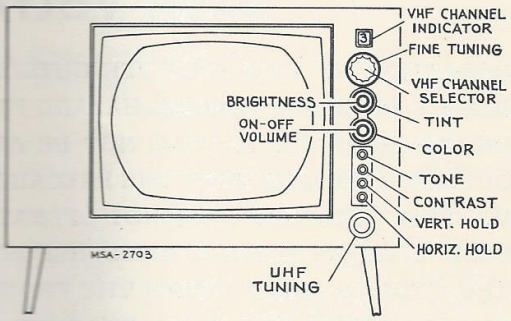



*Figure 4—Operating Controls UHF/VHF Models 21-CD-8926U, 21-CD-8927U & 21-CD-8949U Only*

## INSTALLATION INSTRUCTIONS

**UNPACKING.**—These receivers are shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

Take the receiver out of the carton and remove all packing material.

Make sure that all tubes are in place and are firmly seated in their sockets.

Check to see that the kinescope high voltage connector is in place.

Plug the power cord into the 117 volt a-c power source and turn the receiver power switch to the "ON" position.

Connect the antenna transmission line to the receiver as outlined under "ANTENNA CONNECTIONS" on next page.

Adjust the receiver, as outlined in the "OPERATING INSTRUCTIONS," for a black and white picture.

The receiver should operate normally and produce proper black and white or color pictures. However, although the receiver has been correctly adjusted at the factory, several minor adjustments may be required dependent upon the particular location in which the receiver is operated.

Observe the picture for good black and white reproduction over all areas of the screen. No objectionable color shading should be evident, unless the instrument has come under the influence of a strong magnetic field during shipment. Color shading refers to a color cast in a portion or portions of the screen. If shading is evident the instrument must be demagnetized.

Using the demagnetizing coil specified on page 14, slowly move the coil around the front faceplate of the kinescope, the sides and front of the receiver and very slowly withdraw the coil to a distance of about six feet before disconnecting the coil from the AC source. This procedure should correct any color shading that is evident.

A few cases may still show color shading in areas near the edge of the screen. If so, adjustment of the "Z" purity control should be made. Refer to Figure 5 for the location of this control on the receiver chassis rear apron. Remove the guard over the rear controls.

Adjustment should be made starting with this control in the center or zero position. To determine zero position, rotate the control back and forth over its range. A distinct detenting of the control will be felt about center range, this point is zero position of the control.

Advance the control slightly either right or left from the zero position and push in on the control shaft. Observe the picture for correction of shading at the edges. If the shading improved, but further correction is required, advance the control still further in the same direction and again push in on the shaft. Continue until best edge purity is obtained.

If the shading increased when the initial check was made, turn the control to the other side of the zero position and repeat the above procedure for best edge purity.

Too much correction may be noticed if the control is advanced past the point of best edge purity. If this is done, move the control slightly past zero position in the opposite direction, push the button in and recheck. After best edge purity is obtained return the control to the zero position.

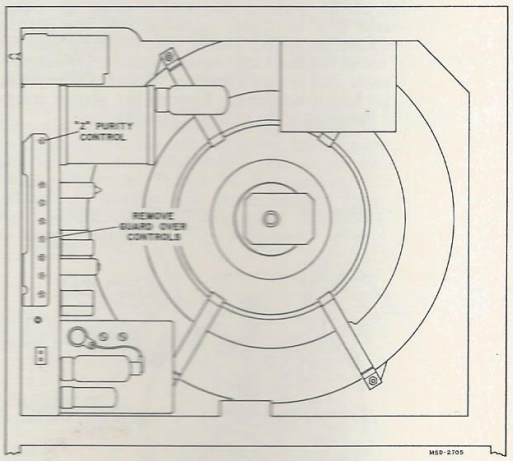



*Figure 5—"Z" Purity Adjustment*

The above adjustments should be all that are required in those few cases where the conditions mentioned exist at time of set-up of the receiver. However, if these adjustments do not correct the condition, reference to "COLOR PURITY ADJUSTMENTS" under COMPLETE SET-UP PROCEDURE should be made.

Also check the horizontal oscillator adjustment and the conventional adjustments of focus, height, vertical linearity, width and electrical centering. The checks for these adjustments are listed following ANTENNA CONNECTIONS below. Normally, no readjustment should be necessary.

## ANTENNA CONNECTIONS

VHF Models—The KRK48A or B tuner is designed for VHF reception only with a 300 ohm antenna input provided.

UHF/VHF Models—The KRK49A or B/56D-E tuners are designed for UHF/VHF reception with individual 300 ohm inputs provided for UHF and VHF use. When using a UHF or VHF antenna only, or both, connect the transmission line(s) to the proper antenna terminals at the rear of the receiver.

When a combination UHF/VHF antenna is to be used, having a single transmission line, connect as shown in Figure 6 to crossover network fastened to cabinet rear.

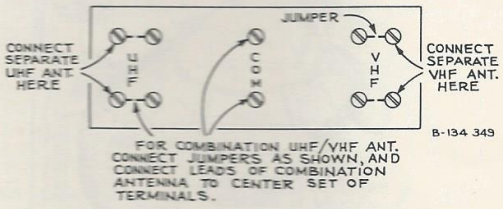



*Figure 6—Combination UHF/VHF Antenna Matching*

## CHECK OF HORIZONTAL OSCILLATOR

Turn the horizontal hold control to the extreme counter-clockwise position. The picture should be out of sync with multiple bars slanting to the right.

Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 1 to 3 bars sloping downward to the right are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. The picture should remain in sync for a minimum of five-eighths (5/8) additional rotation of the control. At the extreme clockwise position, the picture should be out of sync, with multiple bars slanting to the left.

Rotate the control counter-clockwise to the pull-in point. Continue counter-clockwise rotation for one-quarter turn from pull-in. This will be the proper setting of the control.

When the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned.

## ADJUSTMENT OF HORIZONTAL OSCILLATOR

If in the preceding check the receiver failed to hold sync for a minimum of 5/8 of a full turn and the AGC system is in proper adjustment it will be necessary to adjust the Horizontal Oscillator by the method outlined in the alignment procedure on page 26.

## CENTERING ADJUSTMENT

Centering is accomplished by adjustment of the two electrical centering controls located on the rear of the chassis as shown in Figure 7.

Adjust the vertical centering control and the horizontal centering control to center the picture within the mask of the kinescope. If the picture does not fully cover the masked area of the kinescope, adjust the positioning for equal distribution of blank area at top and bottom and at each side.

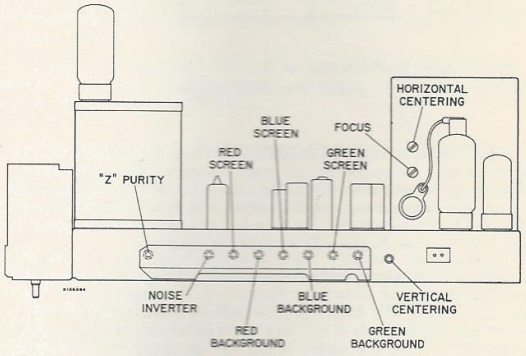



*Figure 7—Rear Chassis Adjustments*

## WIDTH, HORIZONTAL DRIVE & EFFICIENCY ADJUSTMENTS

Adjustment of the horizontal drive and efficiency controls affects the operation of the HV section of the receiver and should only be made following the procedure outlined under HORIZONTAL DEFLECTION ALIGNMENT on page 26 of the "ALIGNMENT PROCEDURE."

If the picture does not fill the mask horizontally, move the blue/white yoke lead from the "D" position to the "BLU 2" position on the rear of the yoke.

## HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS

Adjust the Height Control R101B and the Vertical Linearity Control R144B (inner controls under TONE and VERTICAL HOLD Knobs—which must be removed—inside control case at side or front of cabinet—see Figure 22), until the picture or test pattern is symmetrical from top to bottom. Make the final adjustment to overscan the mask by one inch at both top and bottom. Recheck the horizontal and vertical centering for correct positioning of the picture with respect to the mask.

### FOCUS

Adjust the focus control on the rear of the HV compartment for maximum overall definition of fine picture detail. Refer to Figure 7.

### CHECK OF VHF R-F OSCILLATOR ADJUSTMENTS

Tune in all available stations to see that the receiver r-f oscillator is adjusted to the proper frequency on all channels. If adjustments are required, these should be made by the method outlined in the alignment procedure on pages 17 and 18.

The adjustments are accomplished by removing the fine tuning and channel selector knobs. The oscillator for the UHF tuner section of UHF/VHF tuners should be adjusted only by the method outlined on page 19 under Alignment Procedure.

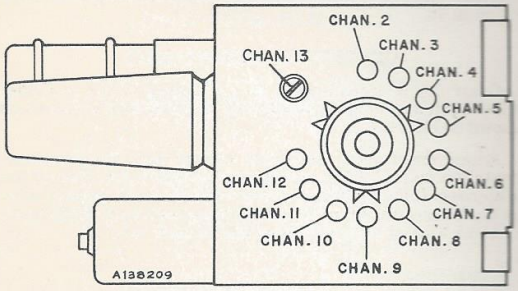



*Figure 8—KRK48A or B & KRK49A or B VHF Oscillator Adjustments*

**FM TRAP ADJUSTMENT.**—In some instances interference may be encountered from a strong FM station signal. A trap is provided to eliminate this type of interference. To adjust the trap tune in the station on which the interference is observed and adjust the FM trap for minimum interference in the picture. See Figures 31 and 32 for location.

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

Replace the cabinet rear panel. Make sure that the screws holding it are up tight, otherwise it may vibrate when the receiver is operated at high volume.

## KINESCOPE REPLACEMENT

**KINESCOPE HANDLING PRECAUTION.**—Do not open the kinescope carton, install, remove, or handle the kinescope in any manner, unless shatterproof goggles are worn. People not so equipped should be kept away while handling the kinescope.

**REMOVAL OF KINESCOPE.**—Take off the front or side control knobs by pulling the knobs outward. Take off the rear of the receiver. Disconnect the H.V. ultor anode connector inside the H.V. compartment. Unplug the yoke wires and unplug the speaker. Remove the plug from the convergence yoke and board assembly and disconnect the kinescope socket. Disconnect the antenna leads at the tuner. Unplug the "Z" purity coil.

The main chassis must be out of the cabinet for removal or installation of the kinescope. Take out the bolts holding the chassis and slide the chassis out from the rear. The kinescope should be installed with the cabinet resting on its face. Lay the cabinet on its face with a heavy pad used to protect the cabinet front. See Figure 10.

Remove the lateral beam magnet, the purifying magnet assembly and the convergence yoke by sliding them off the kinescope neck.

Loosen the screw on the yoke clamp and slide the yoke off the kinescope neck. Remove the four nuts holding the kinescope mounting brackets to the front mask assembly. Refer to Figure 9. Lift off the pull-up ring and bracket assembly. Remove the shield (not on metal cabinets) and the plastic anode lead insulator. Grasp the bell of the kinescope and lift directly up and out of the front brackets. Disconnect the anode lead and the resistor and spring assembly. Observe how these are connected for future reference. Remove the plastic wrap-around shield at the front edge of the kinescope.

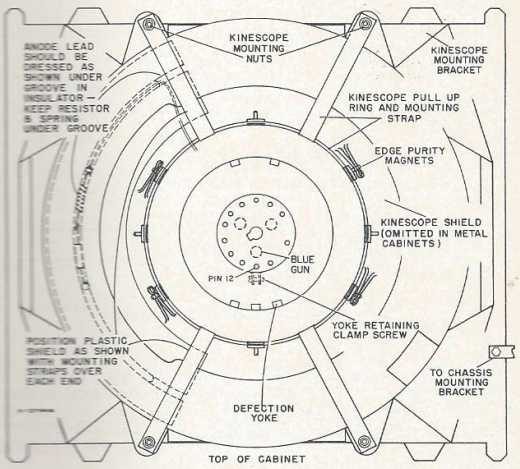



*Figure 9—Kinescope Assembly*

**INSTALLATION OF KINESCOPE.**—Take the new kinescope from its carton, observing the precautions in handling as noted previously. Connect the anode lead and the resistor and spring exactly as noted previously. This is shown

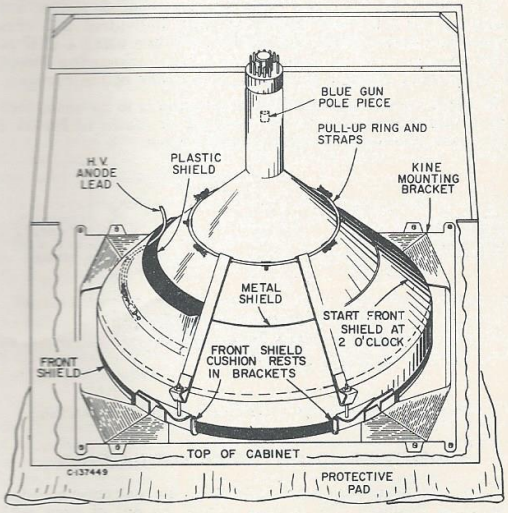



*Figure 10—Kinescope Installation*

in Figure 9. Turn the kinescope with the blue gun facing you. (See Figure 9 for location of blue gun.) There are three glass bumps on the front edge of the kinescope. Place the end of the plastic front wrap-around shield against the edge of the glass bump at the two o'clock position and wrap clockwise around the front bell, overlapping at the end, and secure with the tape provided.

Place the kinescope into the front brackets with the blue gun facing the cabinet top. The cushions on the front edge of the wrap-around shield should rest in the mounting brackets at top and bottom of the kinescope.

Place the plastic anode lead shield over the kinescope bell. Position so that the resistor, spring and anode lead fall under the ridge in the insulator with the lead emerging at the left side. Replace the metal shield (except in metal cabinets) in position shown in Figure 10. Put pull-up ring and bracket assembly in position and fasten loosely. Position the plastic shield so the both ends are under the brackets and tighten the four bracket nuts.

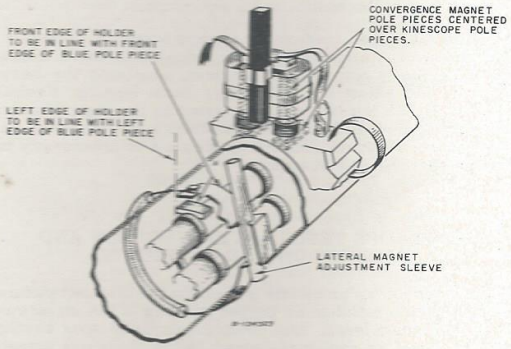



*Figure 11—Location of Convergence and Lateral Beam Magnets*

The receiver may now be returned to an upright position. Replace the yoke, with the clamp toward the cabinet top and tighten the clamp screw.

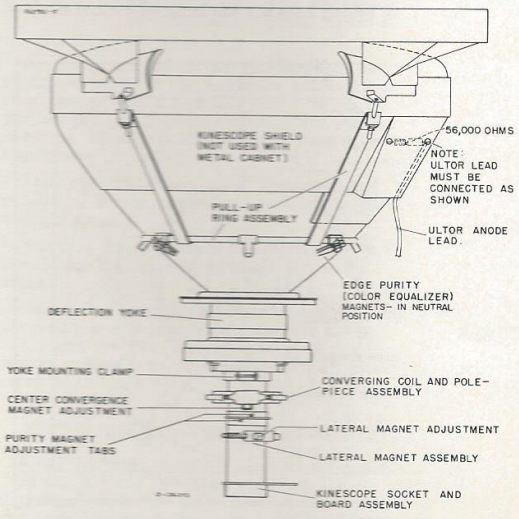



*Figure 12—Kinescope Adjustments and Components*

Slide the convergence coil and board assembly forward over the kinescope neck with the leads toward the kinescope bell. Center the convergence pole pieces over the pole pieces at the front end of the kinescope guns. The opening between the two magnets should be over the opening between the pole pieces. Refer to Figure 11. The blue coil must be positioned over the blue gun. The proper coil may be identified by the color of the wires fastened to the rear of each coil. Improper positioning will result in inability to properly converge the kinescope beams. Place the purifying magnet over the kinescope neck with the small tabs toward the bell of the kinescope as shown in Figure 12. Position the assembly approximately ¼ inch behind the converging coil and magnet assembly. Place the blue beam positioning magnet on the kinescope neck exactly in the position shown in Figure 11.

Replace the chassis in the cabinet and bolt in position. Connect the ultor anode lead, the speaker leads, the yoke wires, making sure that the proper wire is in the proper cup at the rear of the yoke. The cups have the color code of the wires printed below each in the rear cover of the yoke. The solid blue wire goes to "BLU-1" and the blue with white tracer to "D", the other leads are easily identified as to their proper positions.

Plug in the convergence yoke plug, the "Z" purity coil plug and replace the kinescope socket assembly. Replace the control knobs.

## COMPLETE SET-UP PROCEDURE

### INITIAL ADJUSTMENTS

Adjust the receiver, as outlined in the "OPERATING INSTRUCTIONS," for a black and white picture. The receiver should be placed in the location and position at which it will be operated.

At this point it is necessary to check the horizontal oscillator and the conventional adjustments of height, vertical linearity, focus, and electrical centering.

### PRELIMINARY CONVERGENCE ADJUSTMENT

The dot signal generator should be connected to the receiver to provide a dot pattern on the kinescope for making convergence adjustments.

To do this, clip the "horizontal lead" from the dot generator to the insulation of the red lead of the deflection yoke.

Clip the "vertical lead" from the dot generator to terminal "D" of PW800, on the convergence board assembly, or to the yellow lead to the kinescope socket assembly, whichever gives best vertical stability.

For generators with internal vertical sync omit this connection.

Connect the "ground lead" to the receiver chassis and the "Video Output" to the WG-306A adapter plugged into the 2nd Video amplifier V402 socket.

Set the receiver to obtain a signal from some channel. This will provide sync pulses to the dot generator.

NOTE.—Dot generators which provide an RF output may be connected to the antenna terminals of the receiver.

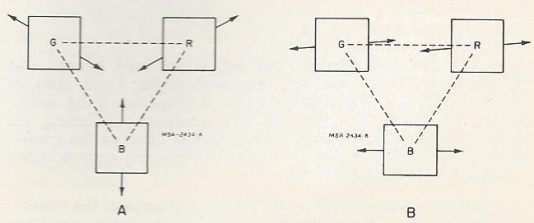



*Figure 13—Dot Movement Pattern*

Preset all red, green and blue horizontal and vertical convergence controls and coils to mid-range. Refer to Figures 11 and 14.

Adjust the red, green and blue magnets shown in Figure 14, and the lateral magnet to produce white dots in the center of the screen. The direction of movement of the dots, using the magnets, is shown in Figure 13A. Lateral movement of the dots is accomplished by adjustment of the lateral magnet, see Figures 11 and 12. Red and green movement is opposite to blue, with the dots moving as shown in Figure 13B.

Keep the receiver in focus when making the above adjustments.

Set the generator to "stand by" position.

## COLOR PURITY ADJUSTMENTS

The kinescope and associated components should be subjected to a strong magnetic field at this point if not previously done. Using the demagnetizing coil, slowly move the coil around the kinescope, the sides and front of the receiver and very slowly withdraw to about six feet before disconnecting the coil. (Minimum contamination should result from the demagnetizing procedure.)

Set the red tabs on the purity magnet together. Refer to Figure 12. Set the edge purity magnets to neutral position as shown in Figure 14. This is with the two magnets in the same position one above the other.

Loosen the screw on the yoke clamp and slide the yoke as far to the rear as possible. See Figure 12.

Shunt the blue and green kinescope grids to ground through individual 100,000 ohm resistors. (See Figure 40 top section for locations.)

Rotate the purity magnet around the neck of the kinescope and at the same time adjust the tabs on the magnet to produce a uniform red screen area, at the center of the kinescope.

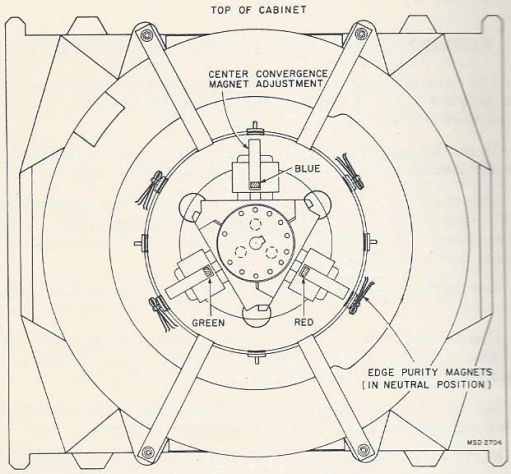



*Figure 14—Edge Purity and Center Convergence Magnets*

Move the yoke forward and adjust for best overall red screen, without neck shadow, and with center beam landing on the phosphor dots. Observe beam landing using the microscope, and check all three screens, alternately shunting out two grids through 100,000 ohm resistors to observe the screen color being checked. Adjust so any purity error occurs at the extreme edges of the screen.

Color shading, evident in areas near the edge of the screen, is corrected by adjustment of the "Z" purity control and the edge purity magnets. Refer to Figure 5 for the location of the "Z" purity control on the receiver chassis rear apron.

Adjustment should be made starting with this control in the center or zero position. To determine zero position, rotate the control back and forth over its range. A distinct detenting of the control will be felt about center range, this point is zero position of the control.

Advance the control slightly either right or left from the zero position and push in on the control shaft. Observe the picture for correction of shading at the edges. If the shading improved, but further correction is required, advance the control still further in the same direction and again push in on the shaft. Continue until best edge purity is obtained.

If the shading increased when the initial check was made, turn the control to the other side of the zero position and repeat the above procedure for best edge purity. Observation with the microscope will show the beam landing. Adjust for best overall center beam landing at the edges of the screen.

Too much correction may be noticed if the control is advanced past the point of best edge purity. If this is done, move the control slightly past zero position in the opposite direction, push the button in and recheck. After best edge purity is obtained return the control to the zero position.

Adjust the screen controls for a white screen, if necessary, and observe any areas still showing edge purity error. Rotate the edge purity magnets in that area, observing the beam landing, and adjust for best center beam landing. Neutral position is with the two magnets laying in the same position one above the other. Maximum correction is obtained with the open ends 180° apart. Rotate both magnets simultaneously to achieve the desired correction.

## KINESCOPE TEMPERATURE, SCREEN AND BACKGROUND ADJUSTMENTS

The object of this procedure is to obtain the brightest picture possible, while maintaining proper tracking of the kinescope at all brightness levels. This condition depends upon having one (or more, as explained below) of the kinescope screen controls set to their maximum positions. This results in the brightest picture that is possible to obtain.

Set the screen controls maximum clockwise and the background controls maximum counter-clockwise. Turn the brightness and contrast controls fully counter-clockwise after tuning in a signal. Use a program which displays the full range of contrast conditions from highlights to lowlights.

Advance the brightness control to obtain a picture just slightly below normal brightness level, the control will usually fall approximately two-thirds clockwise. Be careful not to advance brightness too close to overload. If the picture appears too dim at above setting advance the contrast control slightly.

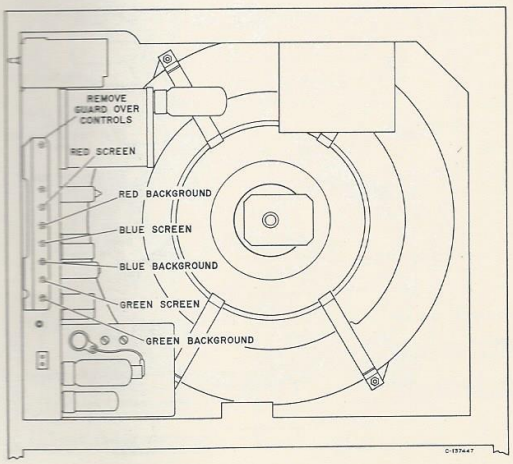



*Figure 15—Screen and Background Controls*

Adjust the red, green and blue background controls to produce white in the highlight area of the picture. (Color temperature of 8200° Kelvin).

The screen control (or controls) which should remain at maximum control setting is determined as follows.

Reduce the brightness to produce a low brightness level picture and observe the lowlight areas (dark objects) of the picture. Some color will prevail in the lowlight areas. Depending upon which color is evident proceed as outlined below to determine which screen will be set at its maximum position:

1. YELLOW IN LOWLIGHT AREAS—This condition indicates that the blue screen should remain at maximum setting.
2. CYAN IN LOWLIGHT AREAS—This condition indicates that the red screen should remain at maximum setting.
3. MAGENTA IN LOWLIGHT AREAS—This condition indicates that the green screen should remain at maximum.
4. RED, GREEN OR BLUE IN LOWLIGHT AREAS—This condition indicates that the screen, of whichever of these colors appears, is set too high and must be reduced from maximum. Turn this screen control down *slowly*. One of the following conditions will occur.

   A. The picture will become gray in the lowlight areas. If this occurs the remaining two screen controls should remain at maximum setting and the corresponding background control for the screen that was turned down should be adjusted, with the brightness advanced to normal brightness, to produce white in the highlight areas. The kinescope should now track at all brightness levels. Recheck at low level and if necessary retouch slightly the screen control that was previously turned down to obtain gray in the lowlights.

   No further adjustments are required and the balance of this procedure will not apply.

   B. The picture will become yellow in the lowlight areas. This condition corresponds to 1. above and indicates the blue screen should remain at maximum.

   C. The picture will become cyan in the lowlight areas. This condition corresponds to 2. above and indicates the red screen should remain at maximum.

   D. The picture will become magenta in the lowlight areas. This condition corresponds to 3. above and indicates the green screen should remain at maximum.

At this point either the kinescope is already tracked as explained in A. or the maximum position screen control has been determined. *From this point on do not adjust either the screen or background control for the color which remains at maximum screen control setting. This is important.*

Turn the brightness to a low level and adjust the two remaining screen controls to produce a gray picture in the lowlight areas.

Advance the brightness to normal level and adjust the two remaining background controls for white in the highlight areas.

Check at all brightness levels for proper tracking. It may be necessary to retouch slightly the two screen controls at lowlights and the two backgrounds at highlights, remembering *not to adjust* either the screen or background of the color set to maximum screen.

## CENTER CONVERGENCE ADJUSTMENTS

A dot pattern should be used to set center convergence. Turn the dot/bar generator back on. Center convergence is performed with the three magnet adjustments on the convergence coil assembly around the kinescope neck and with the lateral magnet also on the kinescope neck. Refer to Figures 11 and 14.

Recheck the dot pattern for white dots in the center of the screen. If necessary, readjust to produce this condition, following the procedure under "PRELIMINARY CONVERGENCE ADJUSTMENT" on page 7. At this point the dot pattern should appear as shown in Figure 16.

Recheck the screen purity. If adjustment is required refer to "COLOR PURITY ADJUSTMENTS" on page 8. After correcting for purity error, recheck the center convergence.

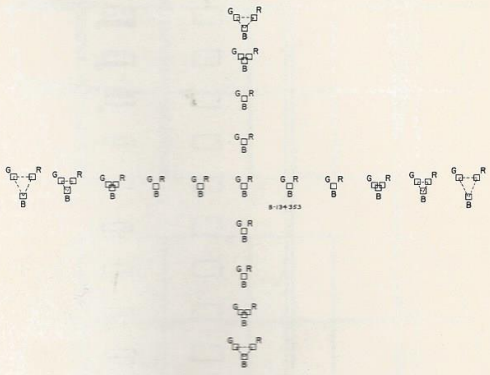


*Figure 16—Center Convergence Pattern*

## VERTICAL CONVERGENCE ADJUSTMENTS

Vertical convergence should be performed before attempting horizontal convergence.

The convergence board assembly is designed to permit adjustments to be made from the front of the receiver. Loosen the two screws holding the board and slide the bracket to the left and remove. Fasten the bracket to the two screws provided on the top rear rail of the cabinet with the controls facing the front. Slots are provided in the bottom of the bracket for mounting in this position.

Referring to the vertical bar at the center of the screen adjust the red and green tilt controls to produce equal displacement of the red and green bars at the top and bottom of the center line. Refer to Figures 17 and 18.

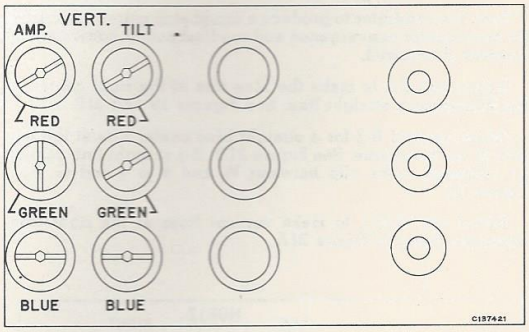



*Figure 17—Vertical Convergence Controls*

Adjust the red and green amplitudes to produce straight lines along the center line. Gradually reduce the amplitudes to converge red, green and blue along the center line, retouching the red and green vertical tilt controls to keep the lines parallel. The center line should converge to produce a white line from top to bottom, or should show slight displacement of red at one side and green at the other with all lines parallel from top to bottom. Readjust the center convergence magnets to superimpose the parallel lines making a white line from top to bottom.

Turn the generator to horizontal bars. Using the extreme top and bottom bars for reference adjust the blue vertical tilt and amplitude controls to produce equal downward displacement of the blue bar from the extreme top and bottom lines at the

top center and bottom center of the kinescope. Reduce the blue vertical amplitude to converge all lines at the center, retouching the blue vertical tilt slightly, if necessary, making all white lines from top to bottom at the center of the tube.

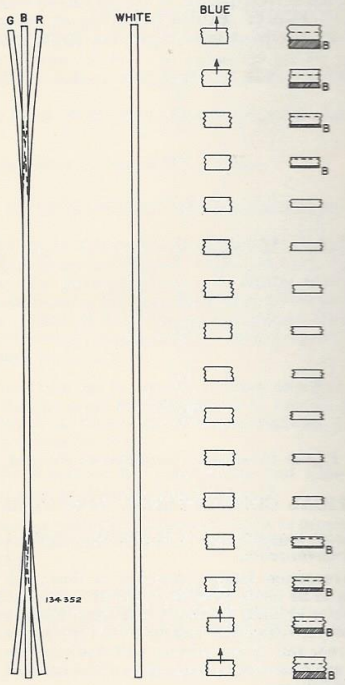



*Figure 18—Vertical Convergence Patterns*

## HORIZONTAL CONVERGENCE ADJUSTMENTS

Turn the generator to produce a crosshatch pattern. Recheck for good center convergence and readjust center convergence magnets if required.

Adjust coil B-1 to make the blue line at the right center of the kinescope a straight line. See Figures 19 and 21B.

Adjust control B-2 for a straight blue center line at the left side of the kinescope. See Figure 21D. If a straight line cannot be obtained, move clip between W and 4 to 4 and G. See Figure 19.

Adjust coil R-G-1 to make vertical lines at the right side converge. Refer to Figure 21A.

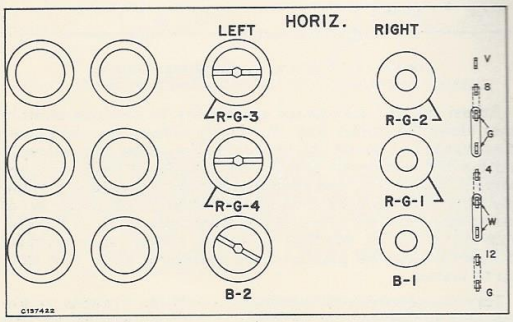



*Figure 19—Horizontal Convergence Controls*

Adjust coil R-G-2 to make horizontal red and green lines a the right side converge. Refer to Figure 21B. Readjust coil B-1 to make the blue line at the right center fall on the converged red and green lines. Retouch R-G-1 for convergence of vertical lines at the right side.

Adjust control R-G-3 to make vertical lines at the left side converge. Refer to Figure 21C.

Adjust control R-G-4 to make the red and green horizontal lines at the left side of the screen converge. Refer to Figure 21D.

If it was impossible to achieve convergence at the left side with either R-G-3 or R-G-4, move the clips on the rear of the convergence board as follows:—Move the clip between terminals 8 and G to 8 and V. Move the clip between 12 and G to 12 and W. Now repeat adjustment of R-G-3 and R-G-4 and sufficient range will be obtained to converge in each case.

After adjusting R-G-4 repeat adjustment of R-G-3 to compensate for any interaction. Readjust control B-2 to make the blue line at the left center fall on the converged red and green lines.

The pattern should now show proper convergence on all areas of the screen.

## KINESCOPE AND SAFETY GLASS CLEANING

All models have a "U" shaped channel in front of the top edge of the safety glass and also at the bottom edge. Pry off the top and bottom channels starting at the extreme ends.

Insert the blade of a small screwdriver in one of the vertical slots in the middle of a retainer at the top of the safety glass. Slide the bar to the right to release the retainer. Refer to Figure 20.

The bottom retainers are removed in a similar manner except the slide bar is moved to the left.

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

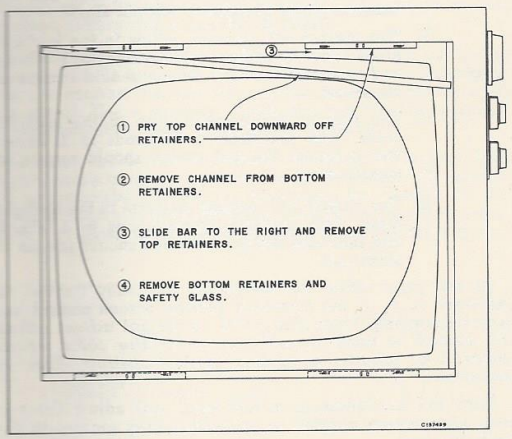



*Figure 20—Safety Glass Removal*

**RECEIVER LOCATION.**—The owner should be advised of the importance of placing the receiver in the proper location in the room.

The location should be chosen—

Away from bright windows and so that no bright light will fall directly on the screen. (Some illumination in the room is desirable, however).

—To allow adequate ventilation.

—Away from any large metal objects such as radiators.

Movement of the receiver after set-up adjustments have been made will be required for cleaning. It should be brought to the customer's attention that the receiver should be returned to its original position after the cleaning has been completed.

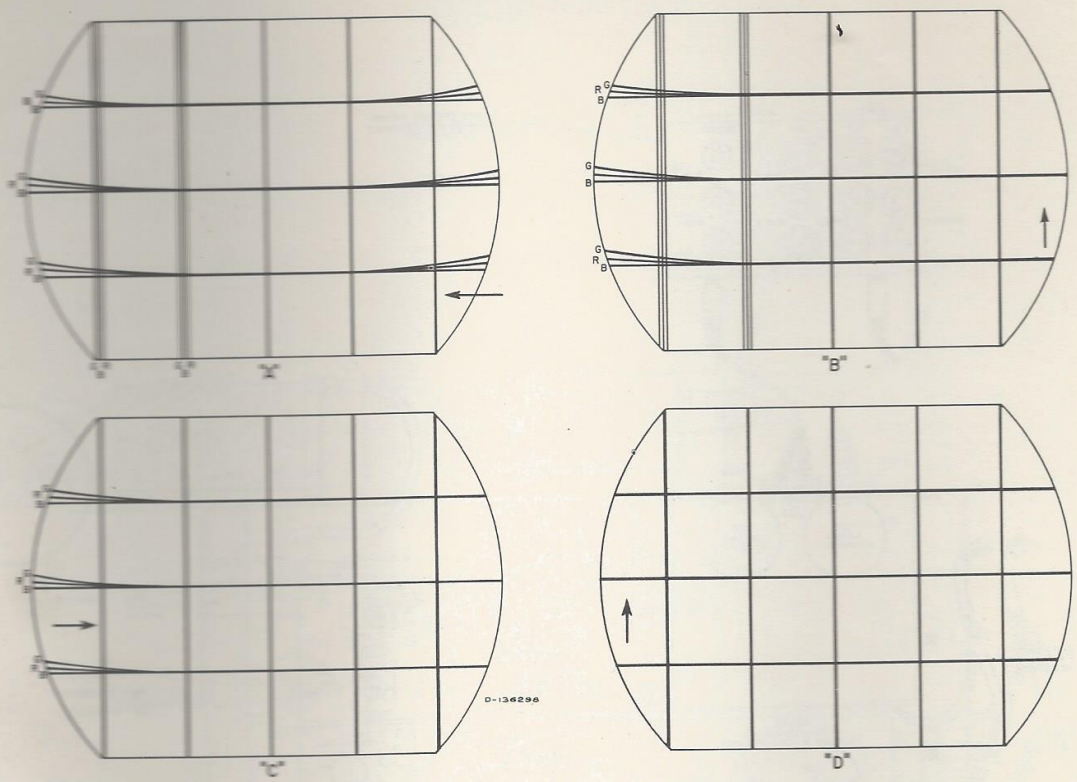



*Figure 21—Horizontal Convergence Patterns*

21-CD-8725 to 21-CD-8949 Incl.
21-CD-8725U to 21-CD-8949U Incl.

## CHASSIS TOP VIEW

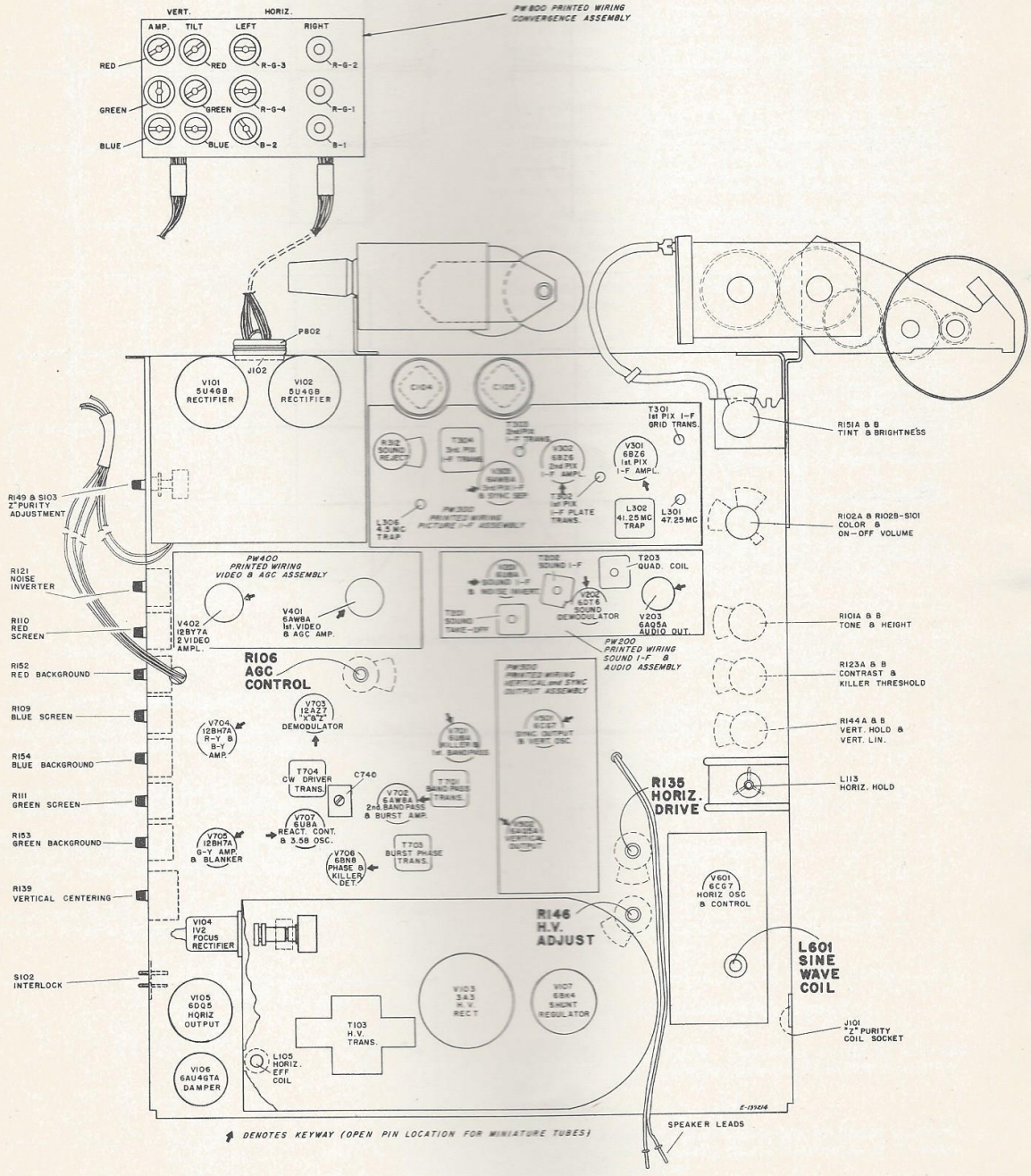



*Figure 22—Top Chassis View*

## CHASSIS BOTTOM VIEW 21-CD-8725 to 21-CD-8949 Incl.
## 21-CD-8725U to 21-CD-8949U Incl.

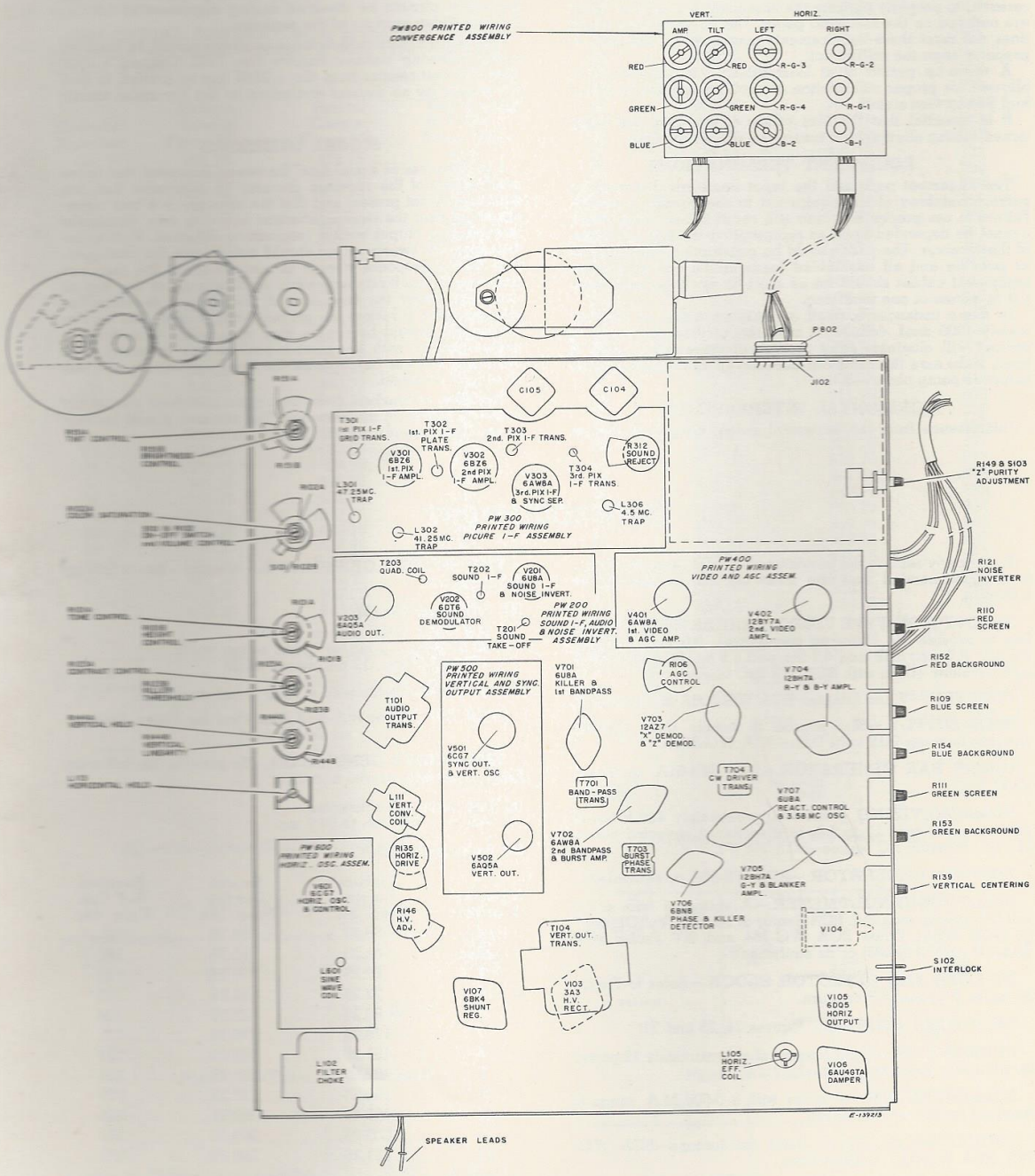



*Figure 23—Bottom Chassis View*

# GENERAL INSTRUCTIONS

## EQUIPMENT

The test equipment specified below, or its equivalent, is essential to properly perform the alignment procedures which are outlined on the following pages. Use of equipment which does not meet these requirements may result in inability to properly align the instrument.

A warm-up period of at least fifteen minutes should be allowed for proper stabilization of such equipment as Signal and Sweep Generators.

It is essential that the bias values as specified are maintained during alignment to insure the proper results.

## EQUIPMENT TERMINATIONS

The alignment pads and the input head are designed for correct matching of the equipment to the circuits involved. Failure to use proper matching will result in responses which cannot be depended upon as representing the true operation of the receiver. The pads should be constructed as compactly as possible and all unshielded leads at the end of the test equipment cables should be as short as possible, preferably not in excess of one inch long.

In many instances a small ceramic capacitor of approximately 1000 mmf. connected from the oscilloscope probe to ground will eliminate stray pick-up of unwanted signals. If used, make sure the capacitor does not affect the shape of the response being observed.

## HORIZONTAL INTERFERENCE

Interference from the horizontal sweep circuits of the receiver may appear on the responses making it difficult to observe a clearly defined trace. It is important that the horizontal circuits be disabled during alignment of the I-F, R-F and Video sections of the receiver.

The horizontal circuits in these receivers should be disabled in the following manner. Remove fuse F103. Connect a 1500 ohm 100 watt resistor from the +385V bus to ground, to load the supply by an amount equivalent to the horizontal circuit load.

## SIGNAL OVERLOAD

Use of excessive signal from the sweep generator can cause overloading of the receiver circuits. To determine that this condition is not present and that the response is a true representation, turn the sweep generator output to zero. Gradually increase the output until a response is obtained. Further increase of the sweep output should not change the configuration of the response except in amplitude. If the response changes in configuration, such as flattening at the top or dropping below the base line at the bottom, decrease the sweep output to restore the proper configuration. The oscilloscope gain should be run as high as possible to maintain a usable pattern with the peak-to-peak values specified, thus requiring a lower output from the sweep generator and less chance of overload.

Insertion of markers from the signal generator should not cause distortion of the response. The markers should be kept as small as possible and still remain visible.

# TEST EQUIPMENT

To properly service the television chassis of these receivers, it is recommended that the following test equipment be available.

**ABSORPTION TYPE VIDEO MARKER BOX.**—Marker Box to provide the following frequencies: 0.5 mc.; 1.5 mc.; 2.5 mc.; 3.0 mc.; 3.58 mc.; 4.1 mc. and 4.5 mc. RCA WG-295B or equivalent. (Used with RCA WR-59C Generator)

**ADAPTER.**—Video Adapter, RCA WG-306A or equivalent.

**BIAS SUPPLY.**—Bias source to supply three outputs variable between 0-15 volts D.C.—RCA WG-307A.

**COLOR BAR GENERATOR.**—RCA WR-61A, or equivalent.

**DEMAGNETIZING COIL.**—Approximately 425 turns of #20 enameled wire 12 inches in diameter. Connected across 117 volt 60 cycle AC source—RCA-205W1.

**DOT-BAR GENERATOR.**—RCA WR-36A or equivalent.

**ELECTRONIC VOLTMETER.**—A voltmeter with a 1.5 volt DC scale is required. RCA Senior or Master "VoltOhmyst" ® (with Diode Probe RCA WG-264 and HV Probe RCA WG-289 with WG-206) or its equivalent.

**I-F LOAD AND DETECTOR BLOCK.**—Refer to Figure 26 under Alignment Procedure.

**MATCHING PADS.**—See Figures 24, 25 and 27.

**MICROSCOPE.**—A microscope of approximately 12 power for phosphor dot observation.

**MILLIAMMETER.**—A meter with a 0-500 M.A. range is required for HV measurement.

**OSCILLOSCOPE.**—Wide band oscilloscope—RCA WO-78A, RCA WO-91A or equivalent.

**R-F MODULATOR.**—RCA WG-304A or equivalent.

**SOUND DETECTOR.**—Diode detector shown in Figure 29.

**TELEVISION PICTURE CARRIER SIGNAL GENERATOR** (with provision for Wide Band Modulation).—i.e. RCA WR-39C Crystal Calibrator modulated by RCA WR-59C Sweep Generator. Used with WG-304A R-F Modulator.

**VHF SWEEP GENERATOR.**—Meeting the following requirements:

(a) Frequency Ranges
0 to 5 mc. Video Sweep
35 to 90 mc., 1 mc. to 12 mc. sweep width
170 to 225 mc., 12 mc. sweep width

(b) Output adjustable with at least .1 volt maximum.

*(RCA WR-59C or WR-58B Modified for Video Sweep or Equivalent)*

**VHF SIGNAL GENERATOR.**—To provide the following frequencies with crystal accuracy:

(a) Intermediate frequencies
4.5 mc., 40.0 mc. to 60.0 mc.

(b) Radio frequencies

| Channel Number | Picture Carrier Freq. Mc. | Sound Carrier Freq. Mc. | Receiver R-F Osc. Freq. Mc. |
|---|---|---|---|
| 2 | 55.25 | 59.75 | 101 |
| 3 | 61.25 | 65.75 | 107 |
| 4 | 67.25 | 71.75 | 113 |
| 5 | 77.25 | 81.75 | 123 |
| 6 | 83.25 | 87.75 | 129 |
| 7 | 175.25 | 179.75 | 221 |
| 8 | 181.25 | 185.75 | 227 |
| 9 | 187.25 | 191.75 | 233 |
| 10 | 193.25 | 197.75 | 239 |
| 11 | 199.25 | 203.75 | 245 |
| 12 | 205.25 | 209.75 | 251 |
| 13 | 211.25 | 215.75 | 257 |

(c) Output of these ranges should be adjustable and at least .1 volt maximum.

*(RCA WR-39C or WR-89A Crystal Calibrator or Equivalent)*

**VHF HETERODYNE FREQUENCY METER** with crystal calibrator if the signal generator is not crystal controlled.

**VIDEO SWEEP GENERATOR.**—Sweep Generator with a range of 0 to 5 mc. with markers—RCA WR-59C and Marker Box.

**UHF SWEEP GENERATOR** with a frequency range of 470 mc. to 890 mc. RCA Types WR-40A, WR-41A or WR-86A or their equivalent.

**UHF SIGNAL GENERATOR** to provide the following frequencies with crystal accuracy if RCA Type WR-41A or WR-86A is used.

| Channel Number | Picture Carrier Freq. Mc. | Sound Carrier Freq. Mc. | Receiver R-F Osc. Freq. Mc. |
|---|---|---|---|
| 14 | 471.25 | 475.75 | 517 |
| 15 | 477.25 | 481.75 | 523 |
| 16 | 483.25 | 487.75 | 529 |
| 17 | 489.25 | 493.75 | 535 |
| 18 | 495.25 | 499.75 | 541 |
| 19 | 501.25 | 505.75 | 547 |
| 20 | 507.25 | 511.75 | 553 |
| 21 | 513.25 | 517.75 | 559 |
| 22 | 519.25 | 523.75 | 565 |
| 23 | 525.25 | 529.75 | 571 |
| 24 | 531.25 | 535.75 | 577 |
| 25 | 537.25 | 541.75 | 583 |
| 26 | 543.25 | 547.75 | 589 |
| 27 | 549.25 | 553.75 | 595 |
| 28 | 555.25 | 559.75 | 601 |
| 29 | 561.25 | 565.75 | 607 |
| 30 | 567.25 | 571.75 | 613 |
| 31 | 573.25 | 577.75 | 619 |
| 32 | 579.25 | 583.75 | 625 |
| 33 | 585.25 | 589.75 | 631 |
| 34 | 591.25 | 595.75 | 637 |
| 35 | 597.25 | 601.75 | 643 |
| 36 | 603.25 | 607.75 | 649 |
| 37 | 609.25 | 613.75 | 655 |
| 38 | 615.25 | 619.75 | 661 |
| 39 | 621.25 | 625.75 | 667 |
| 40 | 627.25 | 631.75 | 673 |
| 41 | 633.25 | 637.75 | 679 |
| 42 | 639.25 | 643.75 | 685 |

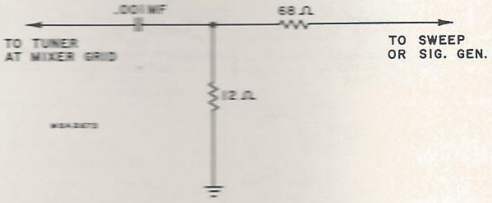



*Figure 24—Mixer Grid Matching Pad*

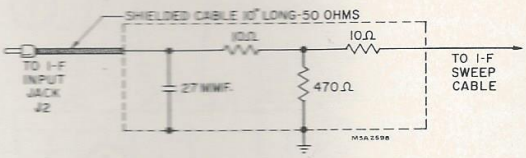



*Figure 25—Tuner I-F Input Head*

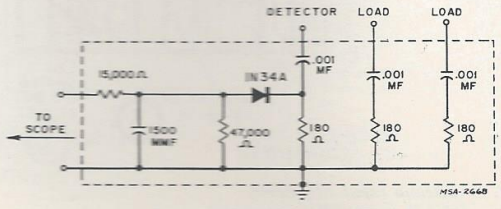



*Figure 26—I-F Test Block*

| Channel Number | Picture Carrier Freq. Mc. | Sound Carrier Freq. Mc. | Receiver R-F Osc. Freq. Mc. |
|---|---|---|---|
| 43 | 645.25 | 649.75 | 691 |
| 44 | 651.25 | 655.75 | 697 |
| 45 | 657.25 | 661.75 | 703 |
| 46 | 663.25 | 667.75 | 709 |
| 47 | 669.25 | 673.75 | 715 |
| 48 | 675.25 | 679.75 | 721 |
| 49 | 681.25 | 685.75 | 727 |
| 50 | 687.25 | 691.75 | 733 |
| 51 | 693.25 | 697.75 | 739 |
| 52 | 699.25 | 703.75 | 745 |
| 53 | 705.25 | 709.75 | 751 |
| 54 | 711.25 | 715.75 | 757 |
| 55 | 717.25 | 721.75 | 763 |
| 56 | 723.25 | 727.75 | 769 |
| 57 | 729.25 | 733.75 | 775 |
| 58 | 735.25 | 739.75 | 781 |
| 59 | 741.25 | 745.75 | 787 |
| 60 | 747.25 | 751.75 | 793 |
| 61 | 753.25 | 757.75 | 799 |
| 62 | 759.25 | 763.75 | 805 |
| 63 | 765.25 | 769.75 | 811 |
| 64 | 771.25 | 775.75 | 817 |
| 65 | 777.25 | 781.75 | 823 |
| 66 | 783.25 | 787.75 | 829 |
| 67 | 789.25 | 793.75 | 835 |
| 68 | 795.25 | 799.75 | 841 |
| 69 | 801.25 | 805.75 | 847 |
| 70 | 807.25 | 811.75 | 853 |
| 71 | 813.25 | 817.75 | 859 |
| 72 | 819.25 | 823.75 | 865 |
| 73 | 825.25 | 829.75 | 871 |
| 74 | 831.25 | 835.75 | 877 |
| 75 | 837.25 | 841.75 | 883 |
| 76 | 843.25 | 847.75 | 889 |
| 77 | 849.25 | 853.75 | 895 |
| 78 | 855.25 | 859.75 | 901 |
| 79 | 861.25 | 865.75 | 907 |
| 80 | 867.25 | 871.75 | 913 |
| 81 | 873.25 | 877.75 | 919 |
| 82 | 879.25 | 883.75 | 925 |
| 83 | 885.25 | 889.75 | 931 |

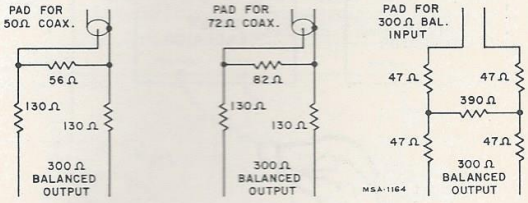



*Figure 27—Sweep Attenuator Pads*

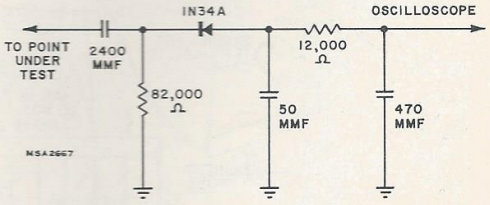



*Figure 28—Video Sweep Detector*

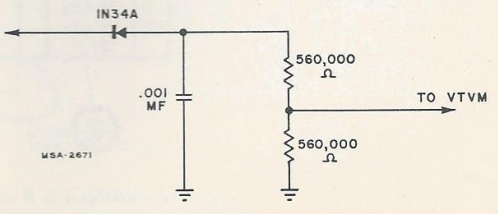



*Figure 29—Sound Detector*

# KRK48A & B or KRK49A & B ANTENNA INPUT ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

**BIAS SUPPLY**.....Align with 0.0 V. bias. Ground the AGC terminal to the tuner case with a short jumper.
**OSCILLOSCOPE**.....Connect to C5 using direct probe. Set scope to maximum gain.
**SWEEP GENERATOR**.....Connect to antenna terminals through pad shown in Figure 27.
**SIGNAL GENERATOR**.....Couple R-F output cable loosely to sweep cable to provide markers.
**MISCELLANEOUS**.....Disconnect the B+ supply to the tuner at the B+ terminal as shown in the diagram below. Disable the horizontal sweep section of the receiver (see page 14).

| STEP | | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| 1 | Adjust Chan. 13 & Chan. 12 Ant. Input | Chan. 12 | 205.25 mc. 209.75 mc. | L6 (Chan. Select. on Chan. 12) | Adjust L6, with tuner on Chan. 12, for response shown below. Do not adjust Chan. 12 coil L32. (See note below.) |
| 2 | Adjust Ant. coils on Chans. 11 to 7 | Chans. 11-10-9-8 and 7 in that order | Pix. & Snd. carrier markers (See page 14) | L31, L30, L29, L28 & L27 | Knife appropriate Antenna coil for correct response. Knife from Chan. 11 down to Chan. 7. |
| 3 | Adjust Chan. 6 & Chan. 5 Ant. Input | Chan. 5 | 77.25 mc. 81.75 mc. | L26 (Chan. Select. on Chan. 5) | Adjust L26, with tuner on Chan. 5, for response shown below. Do not adjust Chan. 5 coil L24. (See note below.) |
| 4 | Adjust Antenna coils on Chans. 4 to 2 | Chans. 4-3 and 2 in that order | Pix. & Snd. carrier markers (See page 14) | L23, L22 & L21 | Knife appropriate Antenna coil for correct response. Knife from Chan. 4 down to Chan. 2. |

NOTE:—Best results for Channels 13 and 12 are obtained by adjusting the Chan. 13 coil with the tuner on Chan. 12. Also best results for Channels 6 and 5 are obtained by adjusting the Chan. 6 coil with the tuner on Chan. 5. All adjustments should be made to obtain maximum gain at the center of the band with the picture and sound carrier markers symmetrically located on the response as shown in curve below.

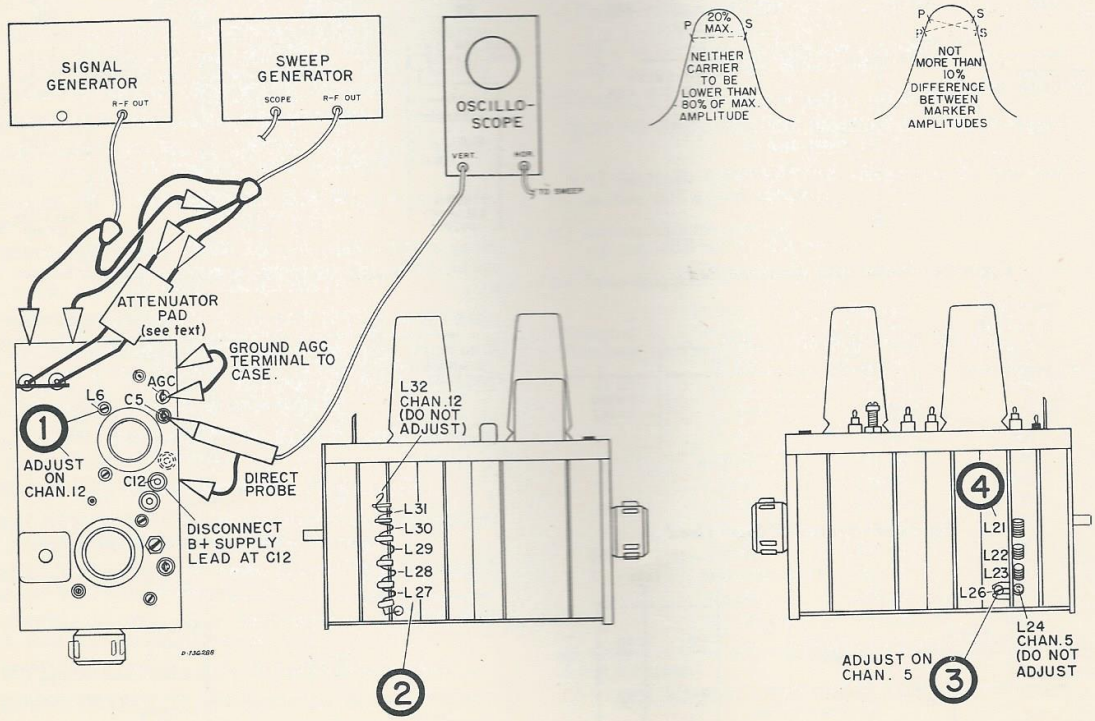



*Figure 30—KRK48A & B or KRK49A & B Antenna Input Alignment*

# KRK48A & B VHF TUNER R-F ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

**BIAS SUPPLY**.....Align with 0.0 V. bias. Ground the AGC terminal to the tuner case with a short jumper.
**OSCILLOSCOPE**.....Connect to test TP1 using direct probe. Set scope to maximum gain.
**SWEEP GENERATOR**.....Connect to antenna terminals through pad shown in Figure 27.
**SIGNAL GENERATOR**.....Couple R-F output cable loosely to sweep cable to provide markers. Insert insulated wire into top of Osc./Mixer tube shield. Connect other end to "R-F IN" terminals.
**VAGUUM TUBE VOLTMETER**..Connect to test point TP1 (See below).
**MISCELLANEOUS**.....Disconnect link cable from I-F output jack J1. Connect a 1000 mmf. capacitor and a 39 ohm resistor in series across J1 (see below). Set fine tuning at mechanical center of range. Disable the horizontal sweep section of the receiver (see page 14).

| | STEP | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| NOTE:—Antenna input section must be aligned, see page 16, before proceeding with this section. | | | | | |
| Channel selector to be set at channel being aligned in each step outlined below. | | | | | |
| 1 | Adjust osc. Chan. 13 | —— | 257 mc. | L11 | Adjust for beat with Sig. Gen. |
| 2 | Adjust osc. Chan. 12 downward to Chan. 2 | —— | Osc. Freq. for Chan. involved (See page 14) | L65 to L55 | Adjust for beat with Sig. Gen. from Chan. 12 down to Chan. 2 |
| 3 | Adjust R-F Plate, Mixer Grid and Bandwidth on Chan. 8 | Chan. 8 | 181.25 mc.<br>185.75 mc. | C8, C14 & C16 | Adjust C8 (Freq.) and C16 (Tilt) for response below. Adjust C14 for bandwidth. |
| 4 | Adjust Chan. 13 coils and bandwidth | Chan. 13 | 211.25 mc.<br>215.75 mc. | L8, L10 & C14 | Adjust L8 (Freq.) and L10 (Tilt) for proper response. Retouch C14 for bandwidth. |
| Repeat Chan. 8 and 13 adjustments for proper tracking and response on all channels from 13 to 7. Repeat step 1. Turn off generators and check osc. injection voltage (—2.5 to —5.5) on meter. Replace V2 if outside limits and repeat steps 1 and 4. | | | | | |
| 5 | Adjust R-F Plate & Mixer Grid coils on Chan. 6 | Chan. 6 | 83.25 mc.<br>87.75 mc. | L33 and L54 | Adjust L33 (Freq.) and L54 (Tilt) for response below. |
| *6 | Adjust R-F Plate & Mixer Grid coils on Chans. 5 to 2 | Chans. 5-4-3 and 2 in that order | Pix. & Snd. carrier markers (See page 14) | L43-L40 (R-F)<br>L53-L50 (Mixer) | Knife appropriate R-F Plate and Mixer Grid coils for correct response. Knife from to Chan. 5 down to Chan. 2. |
| *(Perform only if response is incorrect.) Recheck oscillator on all channels. | | | | | |

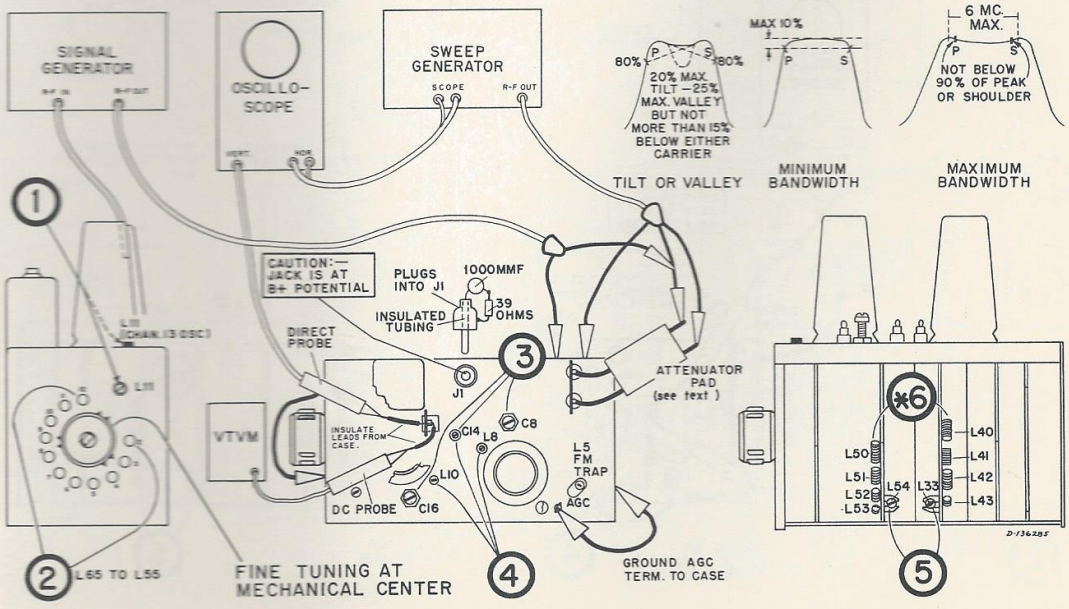



*Figure 31—KRK48A & B VHF Tuner R-F Alignment (Except antenna input)*

# KRK49A & B VHF TUNER R-F ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY.....Align with 0.0 v. bias. Ground the AGC terminal to the tuner case with a short jumper.
OSCILLOSCOPE.....Connect to test point TP1 using direct probe. Set scope to maximum gain.
SWEEP GENERATOR.....Connect to antenna terminals through pad shown in Figure 27.
SIGNAL GENERATOR.....Couple R-F output cable loosely to sweep cable to provide markers. Insert insulated wire into top of Osc./Mixer tube shield. Connect other end to "R-F IN" terminals.
VACUUM TUBE VOLTMETER..Connect to test point TP1 (See below).
MISCELLANEOUS.....Disconnect link cable from I-F output jack J1. Connect a 1000 mmf. capacitor and a 39 ohm resistor in series across J1 (see below). Set fine tuning at mechanical center of range. Plug UHF tuner into I-F input jack J2. Disable the horizontal sweep section of the receiver. (See page 14.)

| STEP | | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| NOTE:—Antenna input section must be aligned, see page 16, before proceeding with this section. | | | | | |
| Channel selector to be set at channel being aligned in each step outlined below. | | | | | |
| 1 | Adjust osc. Chan. 13 | —— | 257 mc. | L11 | Adjust for beat with Sig. Gen. |
| 2 | Adjust osc. Chan. 12 downward to Chan. 2 | —— | Osc. Freq. for Chan. involved (See page 14) | L65 to L55 | Adjust for beat with Sig. Gen. from Chan. 12 down to Chan. 2. |
| 3 | Adjust R-F Plate-Mixer Grid and Bandwidth on Chan. 8 | Chan. 8 | 181.25 mc. 185.75 mc. | C8, C14 & C16 | Adjust C8 (Freq.) and C16 (Tilt) for response below. Adjust C14 for bandwidth. |
| 4 | Adjust Chan. 13 coils and bandwidth | Chan. 13 | 211.25 mc. 215.75 mc. | L8, L10 & C14 | Adjust L8 (Freq.) and L10 (Tilt) for proper response. C14 for bandwidth. |
| Repeat Chan. 8 and 13 adjustments for proper response on channels 13 to 7. Repeat step 1. Turn off generators. Check osc. injection voltage (—1.5 to —5.0) on meter. Replace V2 if outside limits and repeat steps 1 to 4. | | | | | |
| 5 | Adjust R-F Plate & Mixer Grid coils on Chan. 6 | Chan. 6 | 83.25 mc. 87.75 mc. | L33 and L66 | Adjust L33 (Freq.) and L66 (Tilt) for response below. |
| *6 | Adjust R-F Plate & Mixer Grid coils on Chans. 5 to 2 | Chans. 5-4-3 and 2 in that order | Pix. & Snd. carrier markers (See page 14) | L43-L40 (R-F) L53-L50 (Mixer) | Knife appropriate R-F Plate and Mixer Grid coils for correct response from Chan. 5 down to Chan. 2. |
| *(Perform only if response is incorrect). Recheck oscillator on all channels.—Refer to page 20 for Tuner I-F Alignment. | | | | | |

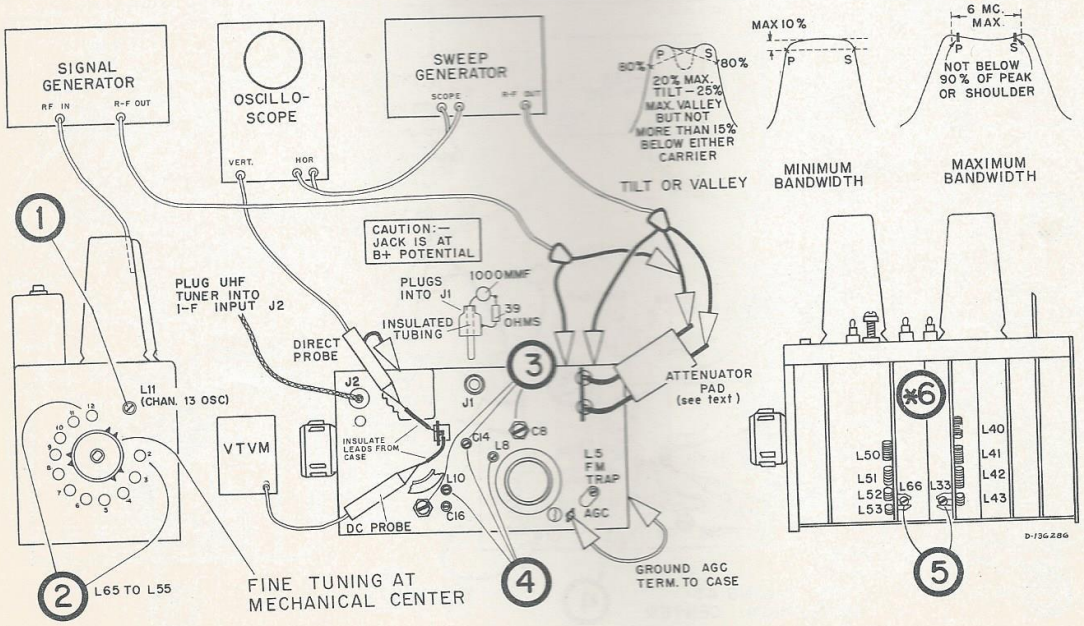



*Figure 32—KRK49A & B VHF Tuner R-F Alignment (Except antenna input)*

# KRK56D & E UHF TUNER R-F ALIGNMENT—UHF/VHF CHASSIS

## TEST EQUIPMENT CONNECTIONS:

MILLIAMMETER..... Disconnect B+ lead and insert 0-15 ma. meter in series with B+ lead.
OSCILLOSCOPE..... Connect using preamplifier to center conductor of J901 at 100 ohm resistor (see below).
VACUUM TUBE VOLTMETER..Connect to center conductor of J901.
VHF SIGNAL GENERATOR.....Connect in series with 1000 ohms to center conductor of J901.
UHF SWEEP GENERATOR.....Connect to antenna terminals using 300 ohm pad. Set for full sweep width.
UHF SIGNAL GENERATOR.....Couple loosely to sweep cable if sweep does not have internal markers.
MISCELLANEOUS..... Connect 100 ohm resistor from center conductor of J901 to ground (see below). Fashion a test dial to fit over split gear on tuner gang. Mark 0°, 5° and 164° on test dial. Establish 0° with tuner gang shaft fully clockwise.

| STEP | | UHF SWEEP & SIGNAL GENERATORS | VHF SIGNAL GENERATOR | ADJUST |
|---|---|---|---|---|
| 1 | Adjust R-F tabs at high freq. end | 887.5 mc. center freq. Chan. 83 | 41.25 mc. 43.5 mc. 45.75 mc. | Gang at 164° point. Knife C901 and C903 for response "A" centered at 887.5 mc. |
| 2 | Adjust osc. trimmer at high freq. end | 887.5 mc. center freq. Chan. 83 | 43.5 mc. | Adjust C909 so 43.5 mc. marker and 887.5 mc. marker coincide. See response "A". |
| 3 | Adjust osc. trimmer at low freq. end | 473.5 mc. center freq. Chan. 14 | 43.5 mc. | Gang at 5° point. Adjust C910 so 43.5 mc. marker and 473.5 mc. marker coincide. See response "B". |
| Repeat steps 1, 2 and 3 for proper response. Tune entire range from high freq. to low freq. end checking response to be within limits. Mistracking to the extent that carriers fall no lower than 70% down the sides of response is permissible. If tracking is outside limits proceed with step 4. | | | | |
| 4 | Knife R-F plates from high to low end | Downward from high to low end for Chan. being observed | 41.25 mc. 43.5 mc. 45.75 mc. | Knife segments of C902 and C904 from high to low end. Knife equally on each side at point closest to mesh with stator. Do not reknife preceding section. Always knife going lower in freq. |
| 5 | Tune entire range and observe reading on VTVM. A reading between .05 and .4 volts should be obtained with 130 volts at B+ terminal. Reposition osc. flag L906 to bring within proper range. If unobtainable replace crystal CR901 or V901, and repeat entire procedure for new tube or crystal. Observe current reading on milliammeter. Should read between 8 and 10.5 ma. If not, replace V901 and realign with new tube. | | | |

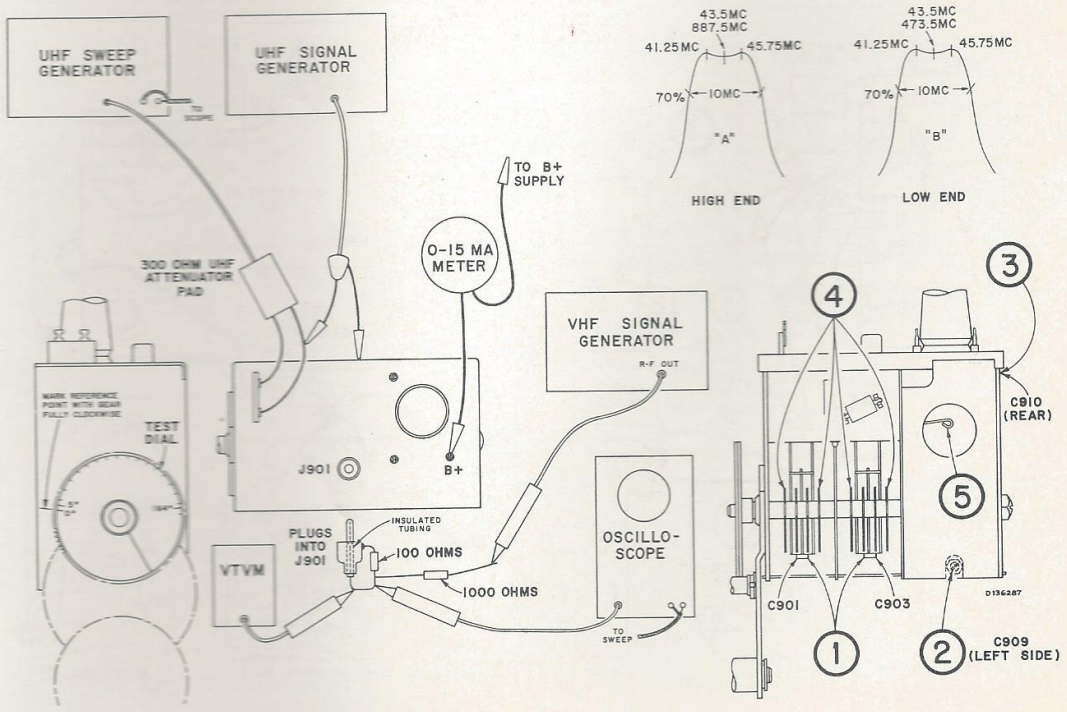



*Figure 33—KRK56D & E UHF Tuner R-F Alignment*

# KRK49A & B TUNER I-F ALIGNMENT—UHF/VHF CHASSIS ONLY

## TEST EQUIPMENT CONNECTIONS:

**BIAS SUPPLY**.....Align with 0.0 v. bias. Ground the AGC terminal to the tuner case with a short jumper.
**OSCILLOSCOPE**.....Connect a 330 mmf. capacitor and a 180 ohm resistor in series from pin 6 of V2 to ground. Connect the capacitor to pin 6 and the resistor to ground. Connect the oscilloscope to the junction of the resistor and capacitor using the diode probe. (See below.)
**SWEEP GENERATOR**.....Connect to I-F input jack J2 using the input head shown in Figure 25.
**SIGNAL GENERATOR**.....Couple loosely to the sweep output cable to provide markers.
**MISCELLANEOUS**.....Disable the horizontal sweep section of the receiver (see page 14).

| | STEP | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| Set channel selector to UHF position between channels 2 and 13. | | | | | |
| 1 | Adjust I-F input coil | 40-50 mc. (I-F) | 41.25 mc. 45.75 mc. | L12 | L12 for max. gain and response "A". Generator set for 0.5 v. p-p or less on scope. |
| 2 | Adjust I-F interstage coils | 40-50 mc. (I-F) | 41.25 mc. 45.75 mc. | L67 | Adjust L67 for response "A" in conjunction with L12 in step 1 above. |
| Connect UHF sweep generator to UHF terminals. Couple VHF signal generator to grid of 1st picture I-F amplifier as shown below. Remove input head from J2 and reconnect the cable from the UHF tuner to J2. Connect the oscilloscope to the 2nd detector output at terminal "E" of PW400 using the direct probe. Use 3 volts p-p on oscilloscope. | | | | | |
| 3 | Retouch I-F input and interstage coils for overall response | Tune entire UHF range | 41.65 mc., 42.17 mc. 42.75 mc., 45.00 mc. & 45.75 mc. | L12 & L67 | Retouch L12 & L67 for response "B". |
| **NOTE:**—Adjustment of L12 affects the setting of the VHF oscillators. The oscillator adjustments will require resetting after L12 is adjusted. Do not retouch any other I-F adjustments when checking overall response at UHF. | | | | | |

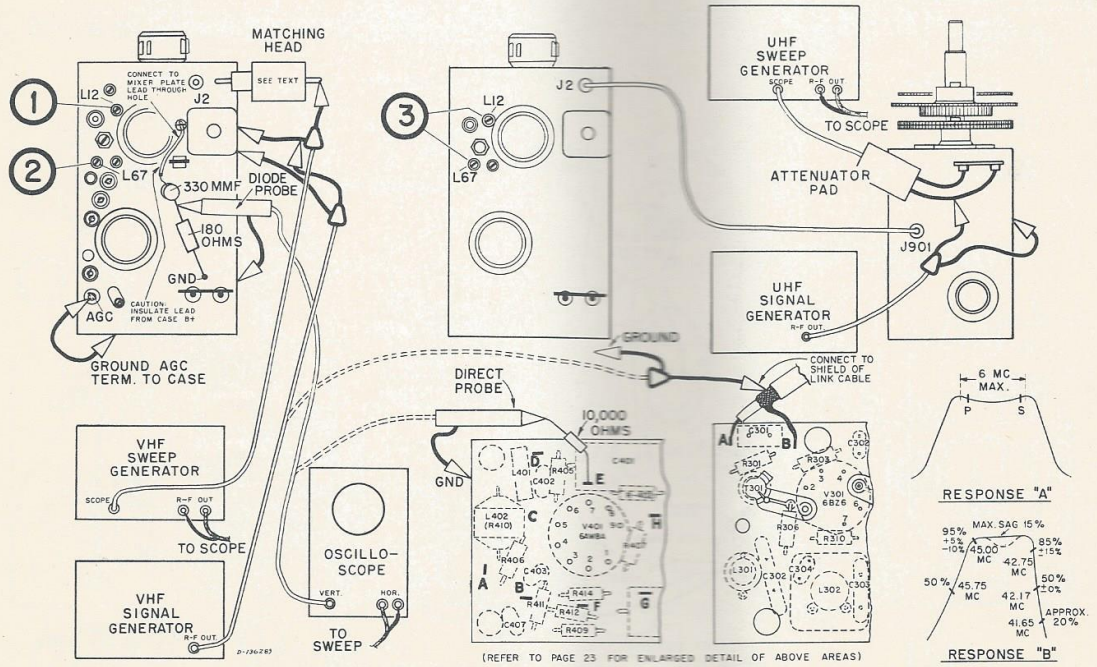



*Figure 34—KRK49A & B Tuner I-F Alignment (UHF/VHF Chassis Only)*

# PICTURE I-F TRANSFORMER AND TRAP ADJUSTMENTS

## TEST EQUIPMENT CONNECTIONS:

**BIAS SUPPLY**..... Apply −6 volts to I-F AGC bus at terminal "C" of PW300. Apply −15 volts R-F AGC bias at terminal "G" of PW400. Apply −7 volts to terminal "A" of PW600 and also −7 volts to pin 2 of V705 Blanker.

**SIGNAL GENERATOR**..... Connect in series with matching pad, shown in Figure 24 to mixer grid.

**VACUUM TUBE VOLTMETER**.... Connect in series with 10,000 ohms to 2nd Detector output at terminal "E" of PW400. Use DC probe.

**MISCELLANEOUS**..... Ground terminal "D" of PW400 with a short jumper. Preset R312 at 75% clockwise position. Set channel selector to channel 4. Picture I-F. Shield must be in place. Disable the horizontal sweep section of the receiver (see page 14).

| | STEP | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|
| 1 | Peak 3rd pix. I-F transformer | 43.8 mc. | T304 (bottom) | Peak T304 (bottom), T303 and T302 on frequency for maximum on meter. Set generator output for −1.5 volts on meter when finally peaked. Peak with cores at coil end nearest printed board. |
| 2 | Peak 2nd pix. I-F transformer | 42.5 mc | T303 | |
| 3 | Peak 1st pix. I-F plate transformer | 45.75 mc. | T302 | |
| 4 | Peak 1st pix. I-F grid transformer | 44.0 mc. | T301 | Peak T301 and T2 at 44.0 mc. Use −1.5 v. on meter when peaked. Peak T301 with core at board end of coil. Peak T2 with core at top of coil. |
| 5 | Peak mixer plate coil | 44.0 mc. | T2 | |
| 6 | Adjust 3rd pix. I-F sound trap | 41.25 mc. | T304 (top) | Adjust T304 (top) and R312 simultaneously for minimum on meter. Reduce I-F bias as necessary for sufficient indication. Adjust L301 for minimum. Keep cores of T304 and L301 at coil end away from board. |
| 7 | Adjust sound rejection control | 41.25 mc. | R312 | |
| 8 | Adjust 47.25 mc. trap | 47.25 mc. | L301 | |
| | Move the VTVM to terminal "F" on PW200. Increase the I-F bias to −6 volts. | | | |
| 9 | Adjust 41.25 mc. I-F input trap | 41.25 mc. | L302 | Adjust for minimum, with core at coil end away from board. |

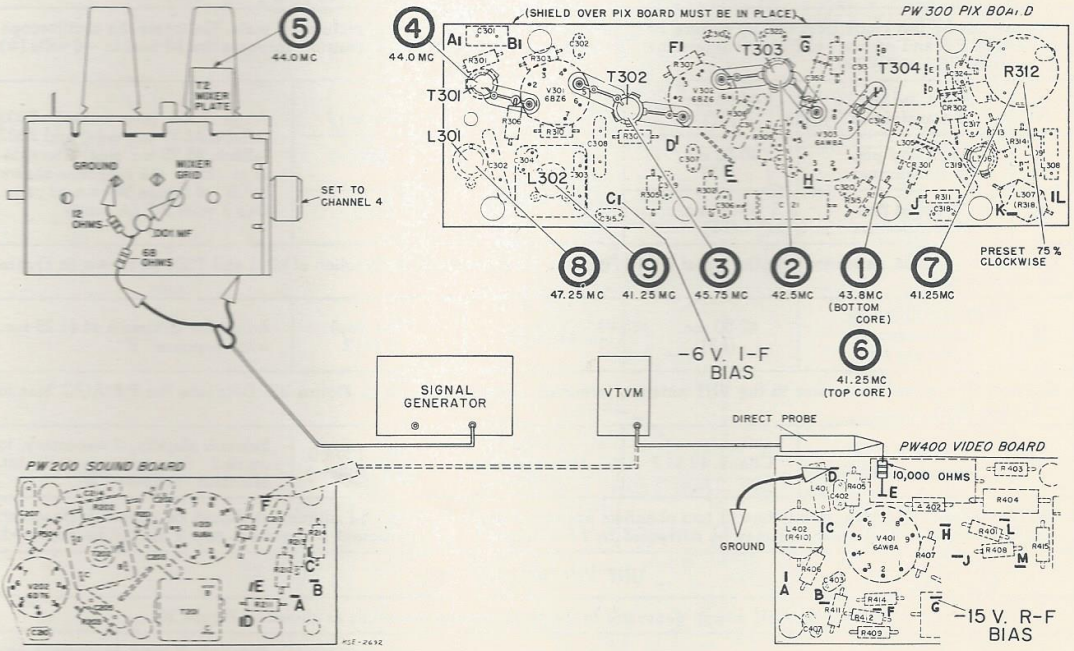



*Figure 35—Picture I-F Transformer and Trap Adjustments*

# SWEEP ALIGNMENT OF PICTURE I-F

## TEST EQUIPMENT CONNECTIONS:

**BIAS SUPPLY**..... Apply −4 volts to I-F AGC bus at terminal "C" of PW300, and −15 volts to the tuner AGC terminal. Apply −7 volts to terminal "A" of PW600 and also −7 volts to pin 2 of V705 Blanker.

**OSCILLOSCOPE**..... Connect to pin 5 of V301 using I-F Test Block shown in Figure 26. Load the plate of the 2nd picture I-F, pin 5 of V302, see below.

**SWEEP GENERATOR**..... Connect in series with matching pad, shown in Figure 24, to strap on S1B at mixer grid. Use shortest leads possible.

**SIGNAL GENERATOR**..... Couple loosely to sweep output cable to provide markers.

**VACUUM TUBE VOLTMETER**.. Connect to AGC terminal on the tuner.

**MISCELLANEOUS**..... The shield over PW300, printed wiring picture I-F board, must be in place during alignment. Disable the horizontal sweep section of the receiver (see page 19).

| | STEP | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| | Set channel selector to channel 4 | | | | |
| 1 | Adjust mixer plate trans. | 40-50 mc. (I-F) | 42.17 mc. 45.75 mc. | T2 | Sweep output set for 0.1 v. P-P on scope. Adjust for max. gain and response "A" in Figure 36 on next page. |
| 2 | Adjust 1st pix I-F grid transformer | 40-50 mc. (I-F) | 42.17 mc. 45.75 mc. | T301 | |
| 3 | Check 41.25 mc. I-F input trap | 40-50 mc. (I-F) | 41.25 mc. (I-F) | L302 | Adjust for minimum response at 41.25 mc. |
| 4 | Check 47.25 mc. I-F input trap | 40-50 mc. (I-F) | 47.25 mc. | L301 | Adjust for minimum response at 47.25 mc. |
| 5 | Recheck adjustment of T2 and T301 for correct response as shown in "A" of Figure 36. Repeat steps 1 and 2 if necessary. | | | | |
| | Remove the I-F test block from the 1st picture I-F plate and the load from the 2nd picture I-F plate. Calibrate the oscilloscope for 3 volts P-P and connect to PW 400 at terminal "E" in series with a 10,000 ohm resistor. Increase the I-F bias to −6 volts (*) at terminal "C" of PW300. | | | | |
| 6 | Align 3rd pix. I-F transformer | 40-50 mc. (I-F) | 41.65 mc. 42.17 mc. 42.75 mc. 45.00 mc. 45.75 mc. | T304 (bottom) | Align T304 (tilts curve), T303 (affects 42.17 mc. side) and T302 (affects 45.75 mc. side) alternately to obtain the response shown in "B" of Figure 36 on next page. Use 3 volts P-P on scope. |
| 7 | Align 2nd pix. I-F transformer | 40-50 mc. (I-F) | | T303 | |
| 8 | Align 1st pix. I-F transformer | 40-50 mc. (I-F) | | T302 | |
| | Connect a .001 mfd. capacitor from the top of L301 to ground. This point is at the junction of L301 and T301 as shown in Figure 36 on next page. | | | | |
| 9 | Check 41.25 mc. attenuation at 3rd pix I-F | 40-50 mc. (I-F) | 41.25 mc. | T304 (top) & R312 | Adjust for minimum at 41.25 mc. with response "B". |
| | Connect VHF sweep generator to the VHF antenna terminals using pad shown in Figure 27. Decrease the R-F AGC bias to −3 volts. (**). | | | | |
| 10 | Check R-F/I-F overall on VHF | Chans. 13 to 2 | Various (See response "B") | T302, T303 & T304 (bottom) | Retouch slightly, if necessary, to correct for any overall tilt. Maintain response "B". |
| | NOTE:—In step 10 above, if only one or two channels are out of limits the tuner R-F alignment should be checked. However, any tilt consistent to all channels may be corrected by I-F retouch. If any adjustment is required, step 9 should be repeated. | | | | |
| | UHF/VHF MODELS ONLY | | | | |
| | Connect the UHF sweep generator to the UHF antenna terminals as shown in Figure 36. | | | | |
| 11 | Check R-F/I-F overall on UHF | Tune entire UHF range | Various (See response "B") | L12 & L67 on tuner | Retouch slightly to correct any overall tilt. Do not retouch I-F adjustments on UHF check of overall. |

# SWEEP ALIGNMENT OF PICTURE I-F

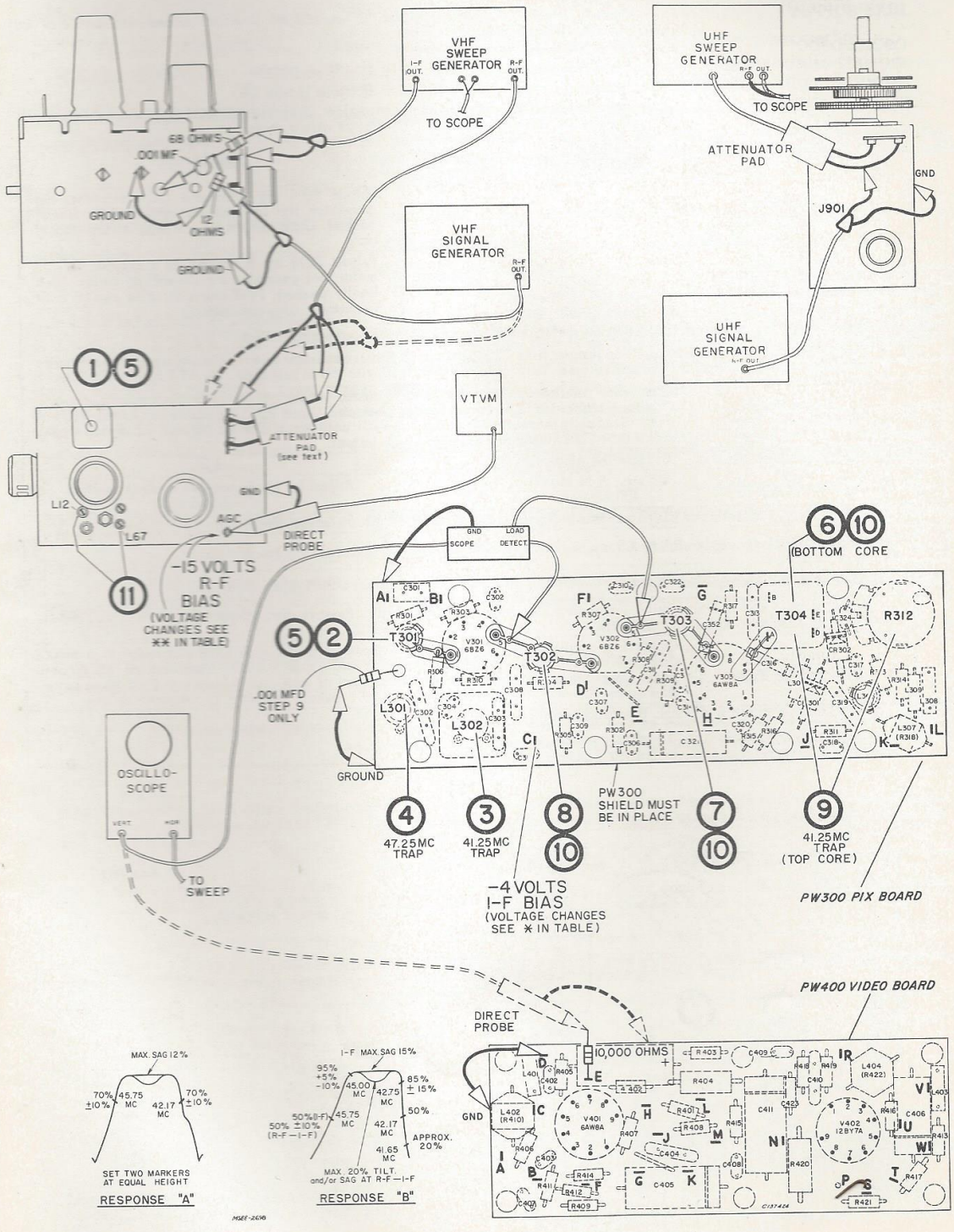



*Figure 36—Sweep Alignment of Picture I-F*

# SOUND I-F, SOUND DEMODULATOR AND 4.5 MC TRAP ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

BIAS SUPPLY..... Apply −10 volts I-F bias at terminal "C" on PW300. Connect second bias source to pin 2 of V201. Set supply for 0 volts.

OSCILLOSCOPE..... Connect across speaker voice coil.

SIGNAL GENERATOR..... Connect to junction of CR301, C316 & L305 on PW300.

VACUUM TUBE VOLTMETER.. Connect to output of diode detector shown in Figure 29.

MISCELLANEOUS..... Connect test diode detector as shown below. Disable horizontal deflection as explained on Page 14. Ground terminal "D" of T203 with a short jumper.

| | STEP | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|
| 1 | Adjust Sound Take-Off Trans. | 4.5 mc. | T201 | Adjust T201 for maximum DC on meter. Set generator for 1.0 volt on meter when finally peaked. Core should be on peak at top end of coil. |
| 2 | Adjust Driver Transformer Primary and Secondary | 4.5 mc. | T202 (top & bottom) | Adjust T202 top & bottom for maximum DC on meter. Set generator for 1.0 volt on meter when finally peaked. Peak cores at open end of coils (maximum core separation). |
| Repeat steps 1 and 2 for maximum indication on meter, maintaining 1 volt with generator output. | | | | |
| 3 | Disconnect the diode test detector and jumper from T203-D. Turn off signal generator and tune in strongest signal in area adjusting volume control for normal volume. Turn core of T203 flush with top of coil form. Turn I-F bias to 0 volts. | | | |
| 4 | Adjust Sound Demodulator Trans. | Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to a second louder peak and adjust T203 for maximum on this second peak. Gradually increase bias at pin 2 of V201 until signal distorts. Maintain distorted signal and adjust T202 (top) for maximum audio output. | | |
| Move the oscilloscope to pin 6 of V701. Use the diode probe. | | | | |
| 5 | Adjust 4.5 mc. trap | 4.5 mc., A-M Mod., 400 Cycles | L306 | Adjust for minimum 400 cycle indication on oscilloscope. |
| Alternate Method Using Generators With F-M Modulation Provided. | | | | |
| 1 | Same as step 1 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation. | | | |
| 2 | Same as step 2 above. Modulate 4.5 mc. signal with F-M 400 cycle signal with 7½ kc. deviation. | | | |
| 3 | Repeat steps 1 and 2, maintaining 1 volt on meter with generator output. Remove diode detector and short on T203-D. Increase generator output to maximum. | | | |
| 4 | Adjust Sound Demodulator Trans. | Observing oscilloscope and listening to audio output adjust T203 clockwise to a peak. Continue clockwise to a second louder peak and adjust T203 for maximum on this second peak. Decrease signal until detector breaks out of lock, indicated by jagged portions on sine wave. Adjust T202 (top) for symmetrical breakout as shown in response below. | | |
| Move the oscilloscope to pin 6 of V701. Use diode probe. | | | | |
| 5 | Same as step 5 above. Adjust L306 for minimum indication on oscilloscope. | | | |

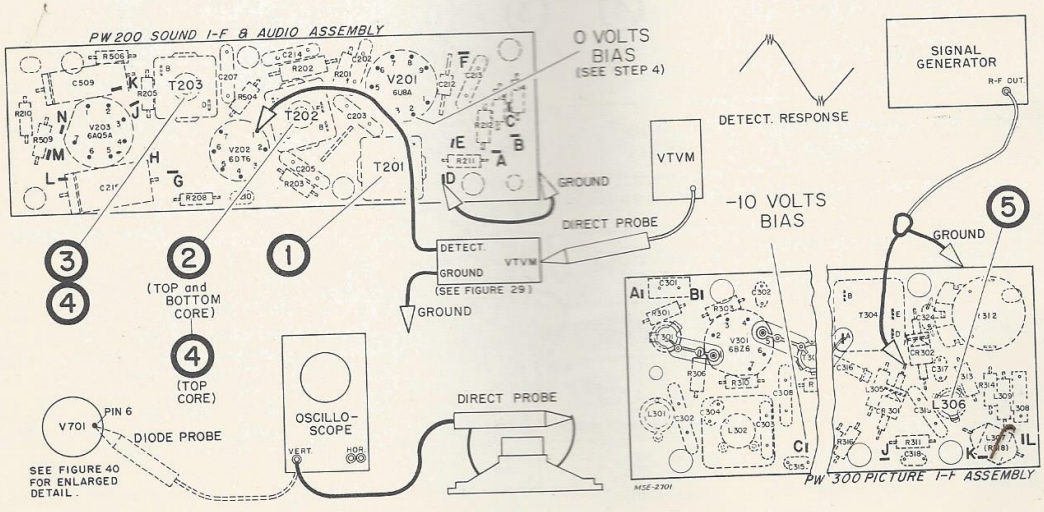



*Figure 37—Sound I-F, Sound Demodulator and 4.5 mc. Trap Alignment*

# CHROMA BANDPASS ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

| | |
|---|---|
| BIAS SUPPLY | Apply −7 volts bias to #3 terminal of terminal board TB10. This point is at the junction of L702, C712, R717, etc. See below. |
| OSCILLOSCOPE | Connect to Demodulator grids using Video Sweep Detector. |
| R-F MODULATOR | Connect as shown below for steps 2 and 3. |
| SIGNAL GENERATOR | Connect as shown below for steps 2 and 3. |
| SWEEP GENERATOR | Connect in series with Absorption Marker Box and .1 mfd. capacitor to pin 2 of V701. Set generator for video sweep. |
| VACUUM TUBE VOLTMETER | Connect to terminal "E" of PW400, ground lead to terminal "D". |
| VIDEO SWEEP DETECTOR | Connect detector shown in Figure 28 to the Demodulator grids, pins 2 & 7 of V703. |
| MISCELLANEOUS | Ground terminal "D" of PW400 with a short jumper. Turn the Color control R102A fully clockwise. |

| STEP | | SWEEP GENERATOR | SIGNAL GENERATOR | ADJUST | REMARKS |
|---|---|---|---|---|---|
| 1 | Align chroma 1st bandpass trans. | 3-5 mc. sweep width at 3.58 mc. center freq. | —— | T701 (top & bottom cores) | Adjust T701 (top & bottom cores) for response "A" shown below. Maintain equal marker height. |
| Turn brightness, contrast and noise threshold controls fully counter-clockwise. Connect a 330 ohm resistor and a 4 mfd capacitor in series from the plate of 1st Bandpass Amplifier to ground, pin 6 of V701 (see below). Connect the Video Sweep Detector to pin 6 of V701. Connect the sweep, signal generator, marker box and R-F modulator to the mixer grid, using input pad shown in Figure 24, referring to drawing below for proper connection. Adjust sweep output for 1.5 volts DC at picture 2nd detector, terminal "E" of PW400. Remove jumper at terminal "D" of PW400. | | | | | |
| 2 | Align peaker | 40-50 mc (I-F) | 45.75 mc | L702 | Adjust L702 for response shown in "B" below. (Adjust with core at chassis end of coil). |
| Remove the 330 ohm load and the 4 mfd. capacitor at pin 6 of V701. Move the Video Sweep Detector and oscilloscope back to the Demodulator grids, pins 2 & 7 of V703. | | | | | |
| 3 | Check overall chroma response | 40-50 mc (I-F) | 45.75 mc | T701 (top core) | Check for response "C" below. Retouch T701 (top) for flat response if necessary. |

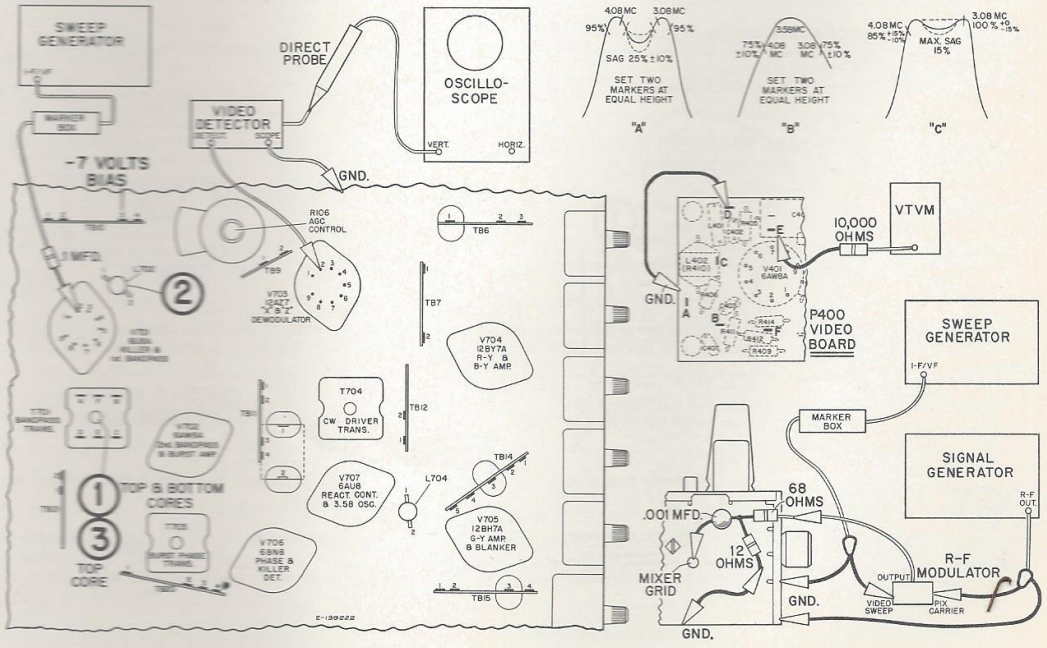



*Figure 38—Chroma Bandpass Alignment*

# HORIZONTAL DEFLECTION ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

**MILLIAMMETER**.....Connect 0-500 ma. meter between pin 3 of V105, Horizontal Output, and ground. Open the jumper between pin 3 and ground. Connect a .47 mfd. capacitor from pin 3 to ground.

**MICROAMMETER**.....Connect 0-1000 μa. meter in series with cathode lead of V107 Shunt Regulator by opening jumper between terminals 2 & 3 on terminal board TB23 as shown below.

**OSCILLOSCOPE**.....Connect to terminal "E" of PW600 using low capacity probe.

**VACUUM TUBE VOLTMETER**..Connect to HV rectifier cup as shown below.

**MISCELLANEOUS**.....Set focus control fully counter-clockwise. Set horizontal drive control at center of its range. Set H.V adjustment control at ⅔ clockwise position. Tune receiver to signal and synchronize the picture.

| STEP | | ADJUST | REMARKS |
|---|---|---|---|
| 1 | Adjust horiz. sine wave | L601 | Adjust L601 for correct wave shape shown below, keeping picture in sync with hold control L113. |
| 2 | Set horiz. output current | L105 | Adjust for minimum current on milliammeter. |
| 3 | Adjust horiz. drive | R135 | Adjust for maximum current without drive line but not in excess of 210 ma. |
| 4 | Adjust high voltage | R146 | Adjust for 22.5 KV with R146. Check current on microammeter, must be not less than 800 μa. (18 watts). |

## AGC ADJUSTMENT

Connect the oscilloscope calibrated for 10 volts peak-to-peak to terminal "D" of PW400 (see Figure 36 for location). Adjust the AGC control for 10 volts peak-to-peak response on the oscilloscope.

## NOISE INVERTER ADJUSTMENT

Connect the oscilloscope to terminal "E" on PW200 (see Figure 37 for location). Starting from the counter-clockwise position advance the Noise Inverter control R121 clockwise until the tips of sync appear clipped, then counter-clockwise to the unclipped position.

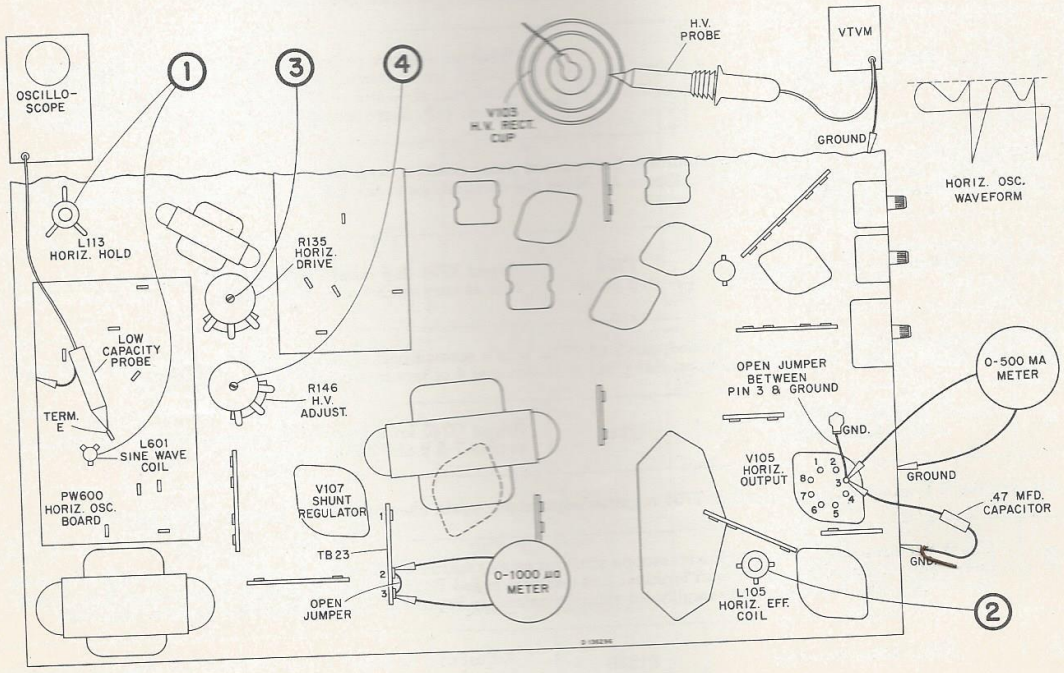



*Figure 39—Horizontal Deflection Alignment*

# COLOR AFPC ALIGNMENT

## TEST EQUIPMENT CONNECTIONS:

COLOR BAR GENERATOR.....Connect to receiver antenna terminals. Adjust receiver for color reception.

OSCILLOSCOPE.....Connect to junction of L701 and C710 at terminal 1 of terminal board TB7 as shown in Figure 40.

VACUUM TUBE VOLTMETER..Connect in series with a 470,000 ohm resistor to pins 7/8 of Killer Detector V706.

MISCELLANEOUS.....Set tint control to the center of its range. Set C740 one-half (½) turn from tight. Turn killer control R123B fully counter-clockwise. Short terminal "D" of T701, 1st Bandpass Transformer, to ground with a short jumper.

| | STEP | ADJUST | REMARKS |
|---|---|---|---|
| 1 | Peak primary and secondary of C.W. drive transformer | T704 (top & bottom) | Adjust T704 (top and bottom cores) for maximum DC reading on the "VoltOhmyst". If the 3.58 mc. oscillator is not running no reading will be obtained. Adjust the reactance tube plate coil L704 to start the oscillator, and adjust to a peak reading. |
| | Move the VTVM to the junction of C712, R716, R750 etc. at terminal 3 of the terminal board TB10. | | |
| 2 | Peak the phase detector transformer | T703 | Adjust T703 for maximum DC reading on the "VoltOhmyst". Make sure the 3.58 mc oscillator is running and locked in as in step 1 above. |
| | Ground the reactance tube input with a short jumper from the junction of C726, R743, R744 etc., terminal 3 of terminal board TB20. | | |
| 3 | Adjust the reactance tube plate coil for zero beat of the 3.58 mc. oscillator | L704 | Observe the kinescope and adjust L704 for zero beat (Color bars stand still on screen or drift slowly). |
| | Remove the jumper grounding the reactance tube input at terminal 3 of terminal board TB20. | | |
| 4 | Adjust phase detector transformer | T703 | Observe the bar pattern on the oscilloscope. Check that tint control when rotated from one extreme to the other gives a minimum of + and − 30 degrees from nominal phase. Refer to Figure 41A. If not adjust T703 to achieve this condition. |
| | After completion of step 4 return the tint control to the nominal phase position, with the 6th and 7th bars equally spaced above and below the zero line as shown in "A" of Figure 41. Move the oscilloscope to the B-Y output at the blue kinescope grid, terminal 3 of terminal board TB14. | | |
| 5 | Adjust secondary of C.W. drive transformer for correct B-Y waveform | T704 (top core) | Adjust T704 (top core) for correct B-Y waveform, 3rd and 9th bars at zero as shown in Figure 42A. |
| | Short the grid of the burst amplifier to ground, pin 7 of V702, with a screwdriver or short jumper. Short the grid of the killer, pin 9 of V701, to ground with a short jumper, this point is at terminal 4 of terminal board TB20. | | |
| 6 | Adjust C.W. drive trimmer for 0 volts at killer detector | C740 | Adjust C740 for 0 volts DC at crossover on the "VoltOhmyst" at pins 7 & 8 of V706 killer detector. |
| | Recheck the B-Y waveform as in step 5, if T704 requires adjustment, again check the C.W. trimmer C740 as in step 6. | | |
| 7 | Check the three color outputs at the kinescope grids for proper matrixing. Check R-Y waveform at terminal 1 of terminal board TB6. Check G-Y waveform at terminal 3 of terminal board TB15. Check B-Y waveform at terminal 3 of terminal board TB14. The waveforms and amplitudes should conform to Figure 42. Remove jumper at terminal 4 of TB20. | | |
| 8 | Adjust killer threshold | R123B | Adjust with no signal. Adjust R123B so that color just disappears from the noise pattern on kinescope. |

# COLOR AFPC ALIGNMENT

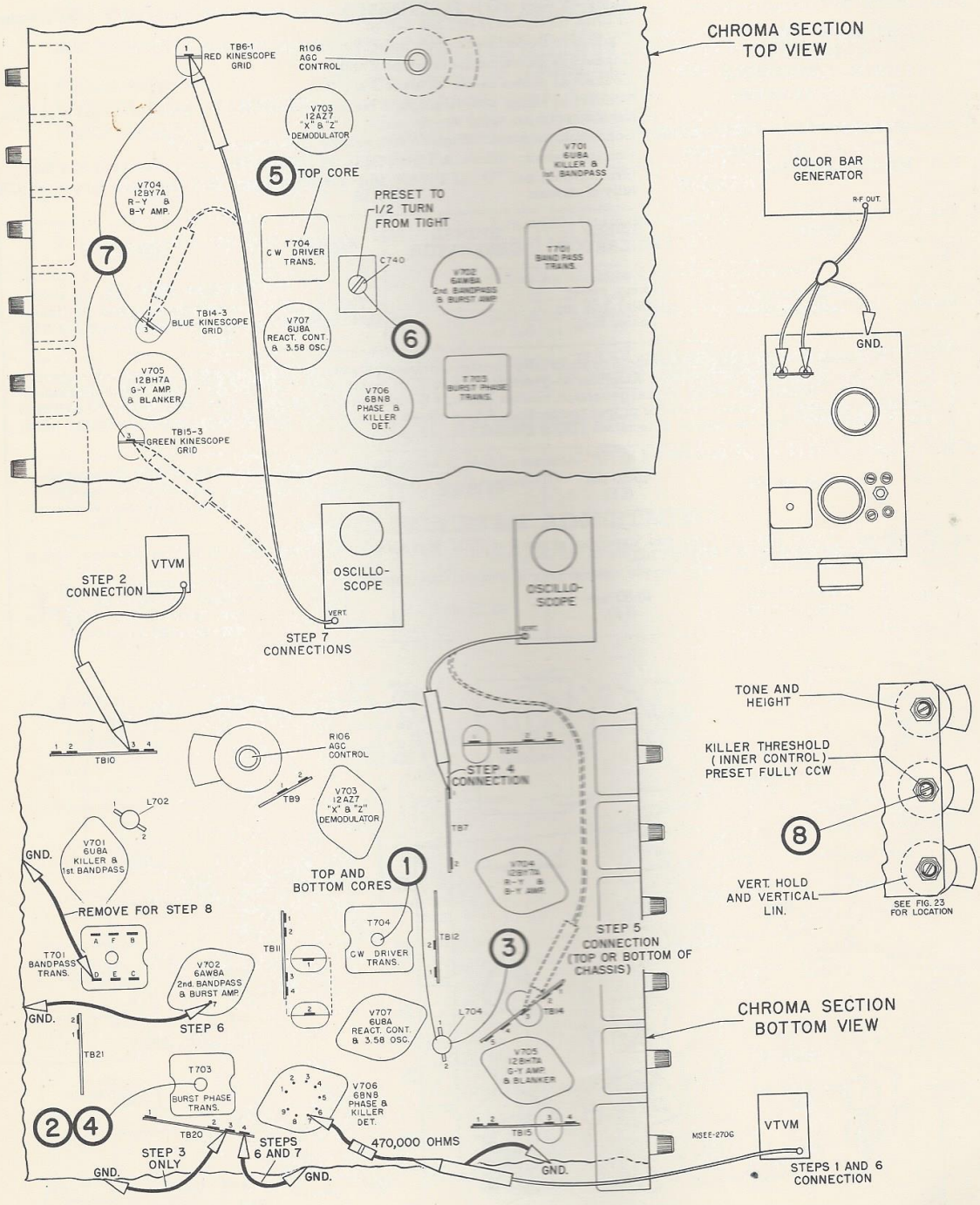



*Figure 40—Color AFPC Alignment*

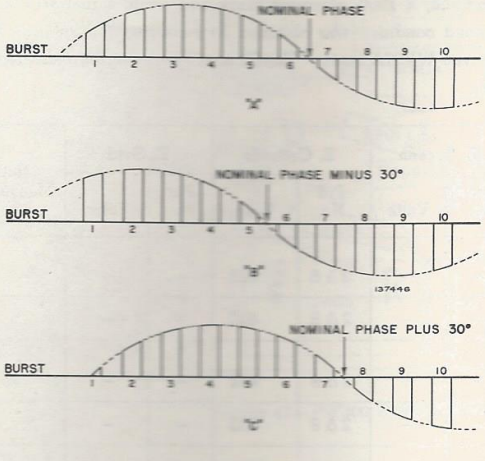



*Figure 41—Waveforms at "X" Demodulator Output*

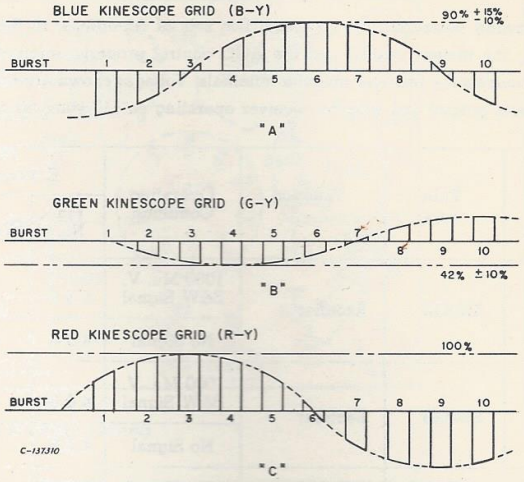



*Figure 42—Waveforms at Kinescope Grids*

## FIELD DEMODULATOR PHASE ADJUSTMENT

### TEST EQUIPMENT CONNECTIONS:

**COLOR BAR GENERATOR**....Connect to antenna terminals. Adjust receiver for color reception. Refer to Figure 40.

**MISCELLANEOUS**.....Set tint control to center of its range. Turn killer control fully counter-clockwise. Insert a nine (9) pin adapter—which has connection to pin 1 opened, thereby disconnecting pin 1—into the Demodulator V703 tube socket. This disables the "Z" Demodulator while the "X" Demodulator remains operative. Insert the tube into the adapter. Shunt the green and blue kinescope grids to ground through 100,000 ohm resistors at TB14-3 and TB15-3, refer to Figure 40 for tube and TB locations.

| | STEP | ADJUST | REMARKS |
|---|---|---|---|
| 1 | Adjust phase detector transformer | T703 (See Figure 40 for location) | Observe the bar pattern on the kinescope. With the tint control at the center of its range, adjust T703 so that the sixth bar is brighter than the background with the seventh bar proportionately darker than the background.<br>Rotate the tint control from one extreme to the other. At one extreme the sixth bar should go darker than the background with the fifth bar proportionately brighter. At the other extreme the seventh bar should be brighter than the background with the eighth bar proportionately darker than the background.<br>Repeat the adjustment of T703 until the above conditions are obtained at or near the extremes of the tint control range. After adjustment return the tint control to the mid-position where the sixth bar is brighter than the background and the seventh bar is proportionately darker than the background. Do not change this setting until after step 2 is completed.<br>(NOTE:—This adjustment is identical to step 4 on page 27, however, the kinescope bar pattern is used instead of using the oscilloscope bar pattern.) |
| | Remove the adapter and replace the demodulator tube in its socket. Move the 100,000 ohm shunt on the blue kinescope grid to the red kinescope grid at TB6-1, see Figure 40. | | |
| 2 | Adjust C.W. drive transformer secondary for B-Y waveform | T704 (Top core—see Figure 40 for location) | Observing the bar pattern on the kinescope, adjust T704 (top core) for correct B-Y output, third and ninth bars at same brightness level as the background. |
| | Move the shunt on the green kinescope grid to the blue kinescope grid at TB14-3 and check for correct G-Y output. The first and seventh bars should be the same brightness level as the background. Move the shunt on the red kinescope grid to the green kinescope grid at TB15-3 and check for correct R-Y output. The sixth bar should be at the same brightness level as the background. Reset the killer control, using no signal, so that color just disappears from the noise pattern on the kinescope. | | |

## 21-CD-8725 to 21-CD-8949 Incl.
## 21-CD-8725U to 21-CD-8949U Incl.

# VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition, a 1000 microvolt black and white signal was fed into the receiver, the picture synced and the AGC control properly adjusted. The second condition was obtained by removing the antenna leads and short circuiting the receiver antenna terminals. Voltages shown are read with a type WV97A senior "VoltOhmyst" between the indicated terminal and chassis ground and with the receiver operating on 117 volts, 60 cycles, a-c.

| Tube No. | Tube Type | Function | Operating Condition | E. Plate | | E. Screen | | E. Cathode | | E. Grid | | Notes on Measurements |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | |
| V101 | 5U4GB | Rectifier | 1000 Mu. V. B&W Signal | 4 & 6 | — | — | — | 2 & 8 | 402 | — | — | — |
| | | | No Signal | 4 & 6 | — | — | — | 2 & 8 | 402 | — | — | — |
| V102 | 5U4GB | Rectifier | 1000 Mu. V. B&W Signal | 4 & 6 | — | — | — | 2 & 8 | 402 | — | — | — |
| | | | No Signal | 4 & 6 | — | — | — | 2 & 8 | 402 | — | — | — |
| V103 | 3A3 | H.V. Rectifier | 1000 Mu. V. B&W Signal | Cap | * | — | — | 7 | 22,500 | — | — | *H.V. Pulse present |
| | | | No Signal | Cap | * | — | — | 7 | 22,500 | — | — | |
| V104 | 1V2 | Focus Rectifier | 1000 Mu. V. B&W Signal | 9 | * | — | — | 4 & 5 | *4730 | — | — | *H.V. Pulse present |
| | | | No Signal | 9 | * | — | — | 4 & 5 | *4730 | — | — | |
| V105 | 6DQ5 | Horizontal Output | 1000 Mu. V. B&W Signal | Cap | * | 4-8 | 146 | 3-6 | 0 | 1-5 | −63 | *H.V. Pulse present |
| | | | No Signal | Cap | * | 4-8 | 145 | 3-6 | 0 | 1-5 | −64 | |
| V106 | 6AU4GTA | Damper | 1000 Mu. V. B&W Signal | 5 | 375 | — | — | 3 | * | — | — | *H.V. Pulse present |
| | | | No Signal | 5 | 380 | — | — | 3 | * | — | — | |
| V107 | 6BK4 | Shunt Regulator | 1000 Mu. V. B&W Signal | Cap | 22,500 | — | — | 1 | 380 | 5 | * | *H.V. Pulse present |
| | | | No Signal | Cap | 22,500 | — | — | 1 | 380 | 5 | * | |
| V108 | 21CYP22 | Kine-scope Red | No Signal | Ultor Anode | 22,500 | 3 | 740 | 4 | 325 | 2 | 220 | At average raster brightness |
| | | Kine-scope Green | | | | 7 | 740 | 5 | 335 | 6 | 220 | |
| | | Kine-scope Blue | | | | 11 | 700 | 13 | 345 | 12 | 235 | |
| V201A | 6U8A | Sound I-F Amp. | 1000 Mu. V. B&W Signal | 6 | *110 | 3 | 110 | 7 | 1.2 | 2 | 0 | *Measured with 1 Megohm, ½ watt resistor in series with probe |
| | | | No Signal | 6 | *100 | 3 | 100 | 7 | 1.0 | 2 | 0 | |
| V201B | 6U8A | Noise Inverter | 1000 Mu. V. B&W Signal | 1 | 185 | — | — | 8 | 20 | 9 | −3 | At normal volume |
| | | | No Signal | 1 | 136 | — | — | 8 | 21 | 9 | 2.0 | — |
| V202 | 6DT6 | Sound Demodulator | 1000 Mu. V. B&W Signal | 5 | 222 | 6 | 140 | 2 | 3.5 | 1 | 0 | At normal volume |
| | | | No Signal | 5 | 204 | 6 | 127 | 2 | 2.5 | 1 | 0 | — |
| V203 | 6AQ5A | Audio Output | 1000 Mu. V. B&W Signal | 5 | 390 | 6 | 306 | 2 | 157 | 1-7 | 139 | At normal volume |
| | | | No Signal | 5 | 374 | 6 | 270 | 2 | 136 | 1-7 | 119 | — |

## VOLTAGE CHART

21-CD-8725 to 21-CD-8949 Incl.
21-CD-8725U to 21-CD-8949U Incl.

| Tube No. | Tube Type | Function | Operating Condition | E. Plate | | E. Screen | | E. Cathode | | E. Grid | | Notes on Measurements |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | |
| V301 | 6BZ6 | 1st Pix I-F Amplifier | 1000 Mu. V. B&W Signal | 5 | *259 | 6 | 259 | 2 | 0.28 | 1 | −5.7 | *Measured with 1 Megohm, ½ watt resistor in series with probe |
| | | | No Signal | 5 | *110 | 6 | 110 | 2 | 0.9 | 1 | 0.3 | |
| V302 | 6BZ6 | 2nd Pix I-F Amplifier | 1000 Mu. V. B&W Signal | 5 | *260 | 6 | 260 | 2 | 0.3 | 1 | −5.7 | |
| | | | No Signal | 5 | *112 | 6 | 112 | 2 | 1.2 | 1 | 0.3 | |
| V303A | 6AW8A | 3rd Pix I-F Amplifier | 1000 Mu. V. B&W Signal | 9 | *175 | 8 | 175 | 6 | 3.7 | 7 | 0 | |
| | | | No Signal | 9 | *150 | 8 | 150 | 6 | 3.0 | 7 | 0 | |
| V303B | 6AW8A | Sync Separator | 1000 Mu. V. B&W Signal | 3 | 42.5 | — | — | 1 | 0 | 2 | −22 | — |
| | | | No Signal | 3 | 42 | — | — | 1 | 0 | 2 | −4.3 | — |
| V401A | 6AW8A | 1st Video Amplifier | 1000 Mu. V. B&W Signal | 9 | 177 | 8 | 181 | 6 | 20 | 7 | 17.3 | — |
| | | | No Signal | 9 | 118 | 8 | 132 | 6 | 23 | 7 | 21 | — |
| V401B | 6AW8A | AGC Amplifier | 1000 Mu. V. B&W Signal | 3 | −46 | — | — | 1 | 157 | 2 | 117 | — |
| | | | No Signal | 3 | 5.5 | — | — | 1 | 135 | 2 | 80 | — |
| V402 | 12BY7A | 2nd Video Amplifier | 1000 Mu. V. B&W Signal | 7 | 315 | 8 | 215 | 1 | 7 | 2 | 0.6 | — |
| | | | No Signal | 7 | 330 | 8 | 225 | 1 | 13.5 | 2 | 7.5 | — |
| V501A | 6CG7 | Sync Output | 1000 Mu. V. B&W Signal | 1 | 72 | — | — | 3 | 0 | 2 | −1.3 | — |
| | | | No Signal | 1 | 66 | — | — | 3 | 0 | 2 | −0.35 | — |
| V501B | 6CG7 | Vertical Oscillator | 1000 Mu. V. B&W Signal | 6 | 175 | — | — | 8 | 0 | 7 | −24 | — |
| | | | No Signal | 6 | 180 | — | — | 8 | 0 | 7 | −24 | — |
| V502 | 6AQ5A | Vertical Output | 1000 Mu. V. B&W Signal | 5 | 260 | 6 | 275 | 2 | 0.7 | 1-7 | −17 | — |
| | | | No Signal | 5 | 255 | 6 | 270 | 2 | 0.75 | 1-7 | −19 | — |
| V601 | 6CG7 | Horizontal Oscillator | 1000 Mu. V. B&W Signal | 6 | 240 | — | — | 8 | 0 | 7 | −98 | — |
| | | | No Signal | 6 | 285 | — | — | 8 | 0 | 7 | −120 | — |
| | 6GC7 | Horizontal Osc. Control | 1000 Mu. V. B&W Signal | 1 | 390 | — | — | 3 | 63 | 2 | 0 | — |
| | | | No Signal | 1 | 382 | — | — | 3 | 66 | 2 | 0 | — |
| V701A | 6U8A | Killer | 1000 Mu. V. B&W Signal | 1 | −24 | — | — | 8 | 0 | 9 | −0.66 | — |
| | | | No Signal | 1 | −21 | — | — | 8 | 0 | 9 | −0.8 | — |
| V701B | 6U8A | 1st Band Pass Amplifier | 1000 Mu. V. B&W Signal | 6 | 210 | 3 | 210 | 7 | 0 | 2 | −4.0 | — |
| | | | No Signal | 6 | 210 | 3 | 210 | 7 | 0 | 2 | −7.0 | — |

## VOLTAGE CHART

21-CD-8725 to 21-CD-8949 Incl.
21-CD-8725U to 21-CD-8949U Incl.

| Tube No. | Tube Type | Function | Operating Condition | E. Plate | | E. Screen | | E. Cathode | | E. Grid | | Notes on Measurements |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | Pin No. | Volts | |
| V702A | 6AW8A | 2nd Band Pass Amplifier | 1000 Mu. V. B&W Signal | 3 | 298 | — | — | 1 | 1.6 | 2 | −17 | — |
| | | | No Signal | 3 | 270 | — | — | 1 | 2.5 | 2 | −13 | — |
| V702B | 6AW8A | Burst Amplifier | 1000 Mu. V. B&W Signal | 9 | 292 | 8 | 292 | 6 | 54 | 7 | 0 | — |
| | | | No Signal | 9 | 260 | 8 | 260 | 6 | 57 | 7 | 0 | — |
| V703A | 12AZ7 | "X" Demodulator | 1000 Mu. V. B&W Signal | 6 | 288 | — | — | 8 | 7.2 | 7 | 0 | — |
| | | | No Signal | 6 | 255 | — | — | 8 | 7.0 | 7 | 0 | — |
| V703B | 12AZ7 | "Z" Demodulator | 1000 Mu. V. B&W Signal | 1 | 285 | — | — | 3 | 7.2 | 2 | 0 | — |
| | | | No Signal | 1 | 255 | — | — | 3 | 7.0 | 2 | 0 | — |
| V704A | 12BH7A | "R-Y" Amplifier | 1000 Mu. V. B&W Signal | 1 | 212 | — | — | 3 | 17.5 | 2 | 9.3 | — |
| | | | No Signal | 1 | 210 | — | — | 3 | 17.0 | 2 | 9.0 | — |
| V704B | 12BH7A | "B-Y" Amplifier | 1000 Mu. V. B&W Signal | 6 | 210 | — | — | 8 | 17.5 | 7 | 9.3 | — |
| | | | No Signal | 6 | 205 | — | — | 8 | 17.0 | 7 | 9.0 | — |
| V705A | 12BH7A | "G-Y" Amplifier | 1000 Mu. V. B&W Signal | 6 | 215 | — | — | 8 | 17.5 | 7 | 9.3 | — |
| | | | No Signal | 6 | 212 | — | — | 8 | 17.0 | 7 | 9.0 | — |
| V705B | 12BH7A | Blanker | 1000 Mu. V. B&W Signal | 1 | 158 | — | — | 3 | 1.8 | 2 | −23.5 | — |
| | | | No Signal | 1 | 158 | — | — | 3 | 1.8 | 2 | −24 | — |
| V706A | 6BN8 | Phase Detector | 1000 Mu. V. B&W Signal | 1 | −11.6 | — | — | 2 | 0 | — | — | — |
| | | | No Signal | 1 | −13 | — | — | 2 | 0 | — | — | — |
| V706B | 6BN8 | Phase Detector | 1000 Mu. V. B&W Signal | 6 | 0 | — | — | 3 | 12 | — | — | — |
| | | | No Signal | 6 | 0 | — | — | 3 | 13 | — | — | — |
| V706C | 6BN8 | Killer Detector | 1000 Mu. V. B&W Signal | 7 | −0.7 | — | — | 9 | 12 | 8 | −0.7 | — |
| | | | No Signal | 7 | −0.5 | — | — | 9 | 13 | 8 | −0.5 | — |
| V707A | 6U8A | Reactance Control | 1000 Mu. V. B&W Signal | 1 | 180 | — | — | 8 | 5.3 | 9 | −0.2 | — |
| | | | No Signal | 1 | 160 | — | — | 8 | 5.0 | 9 | 0.2 | — |
| V707B | 6U8A | 3.58 MC Oscillator | 1000 Mu. V. B&W Signal | 6 | 278 | 3 | 135 | 7 | 0 | 2 | −5.0 | — |
| | | | No Signal | 6 | 265 | 3 | 130 | 7 | 0 | 2 | −6.0 | — |

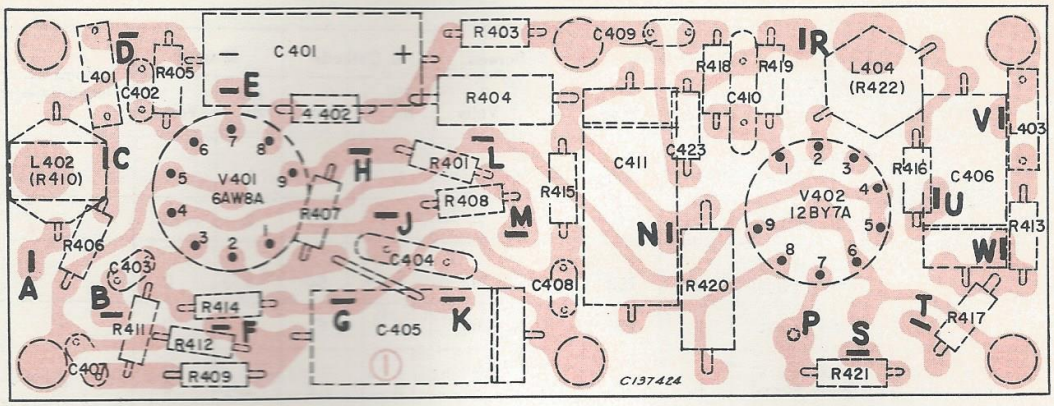



*Figure 43—PW400 Printed Wiring Video & AGC Assembly*

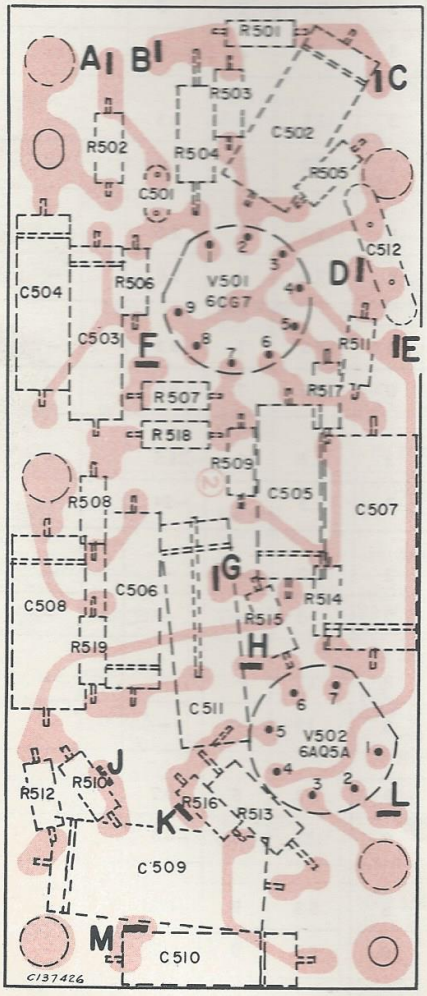




*Figure 45—PW500 Printed Wiring Vertical & Sync Assembly*

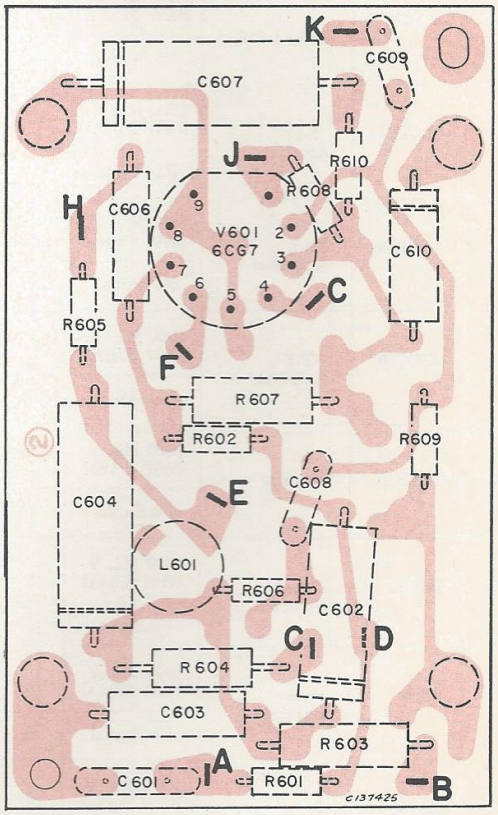



*Figure 46—PW600 Printed Wiring Horizontal Oscillator Assembly*

The assemblies represented above are viewed from the printed wiring sid of the boards and are oriented as they will usually be viewed on the chassi

The components are shown by dotted lines to indicate they are on the rever side of the board. This will enable circuit tracing without referring to bot sides of the board.

Component replacement, when necessary, should be made following th techniques outlined in Printed Circuit Board Service Data 1955 No. T dated 11/15/55.

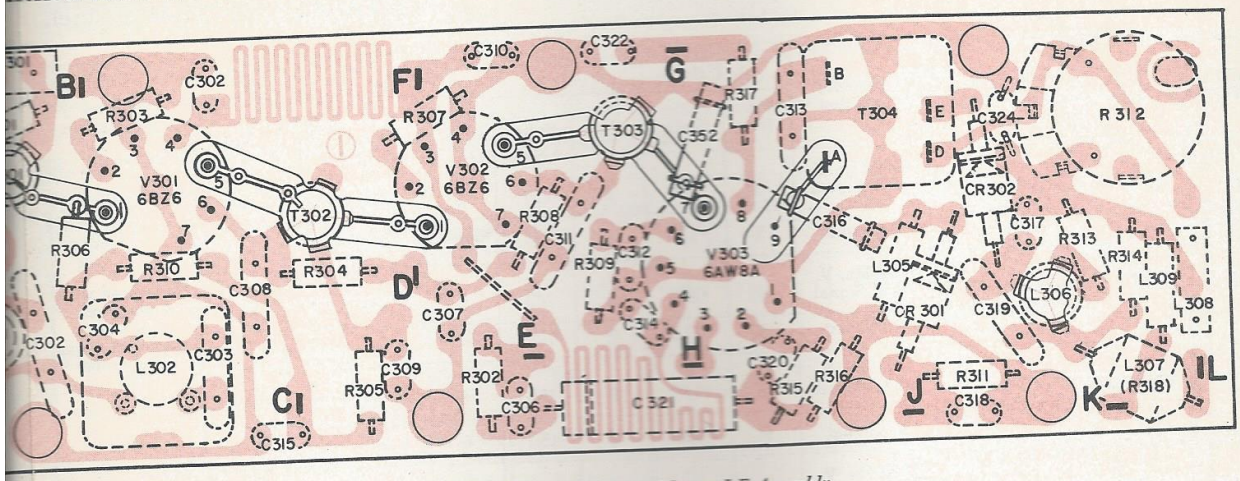



*Figure 44—PW300 Printed Wiring Picture I-F Assembly*

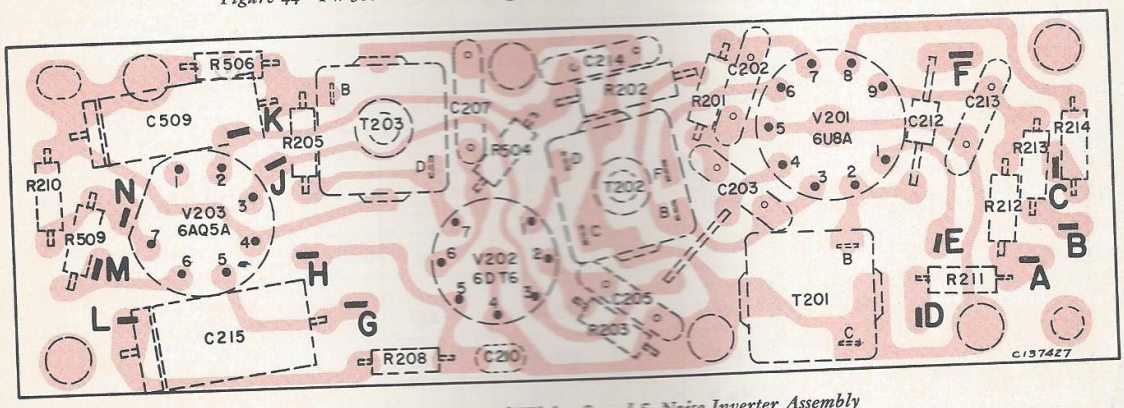



*Figure 47—PW200 Printed Wiring Sound & Noise Inverter Assembly*

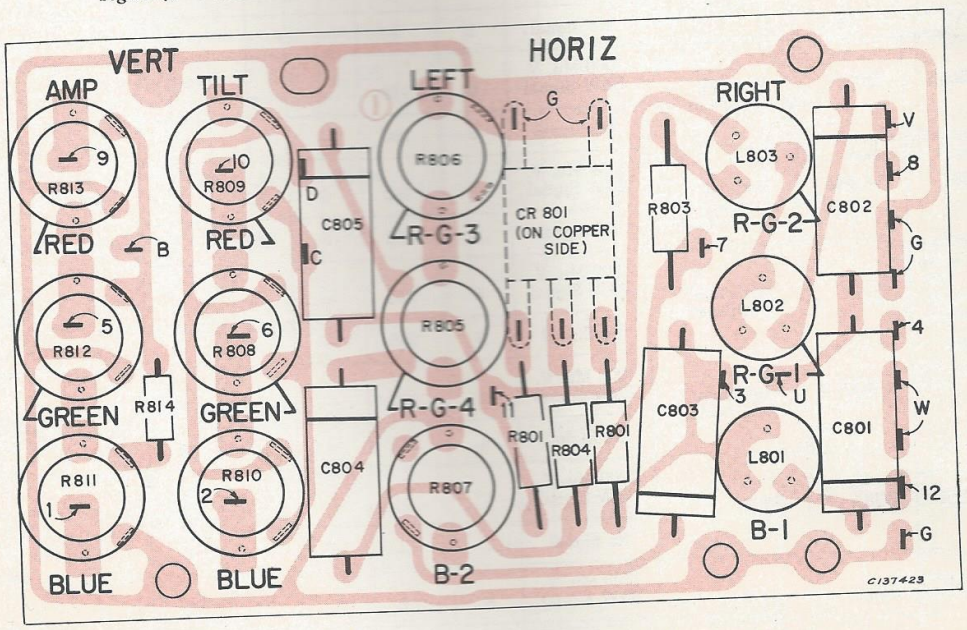
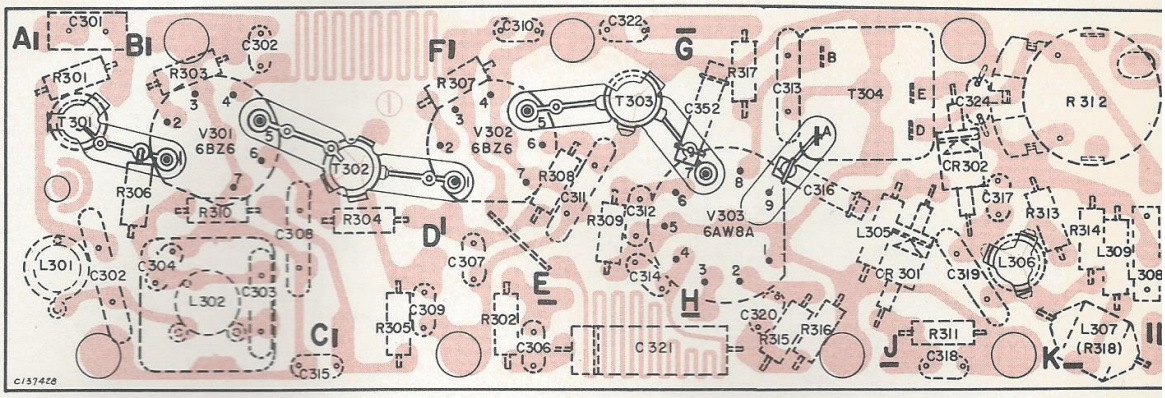
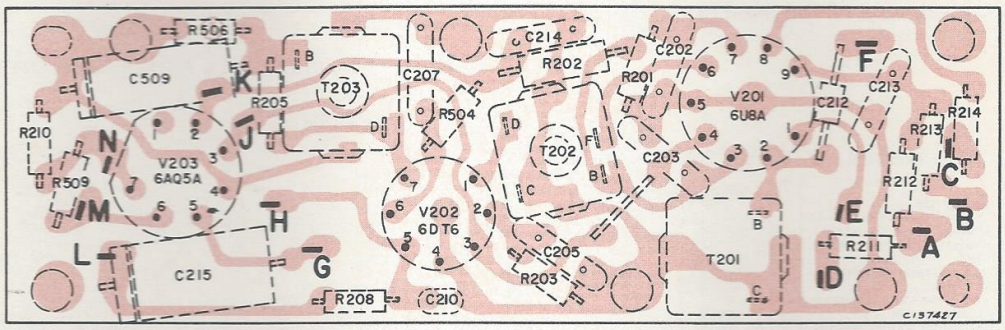


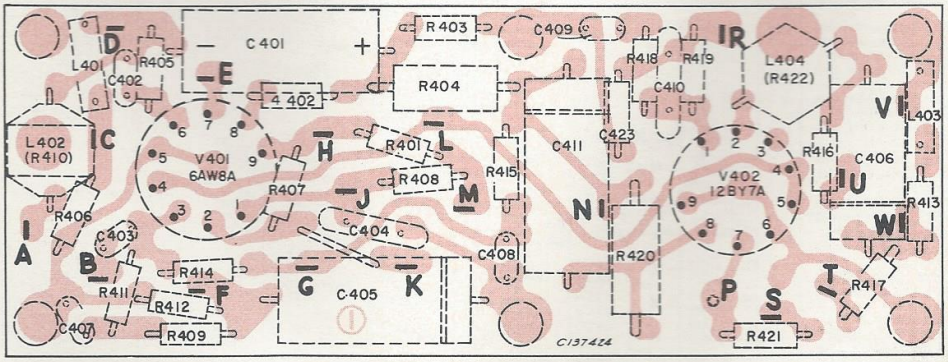

*Figure 48—PW800 Printed Wiring Convergence Assembly*




*PW300—PICTURE I-F UNIT LAYOUT*




*PW200—SOUND & NOISE INVERTER UNIT LAYOUT*




*PW400—VIDEO & AGC UNIT LAYOUT*

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

The components are shown by dotted lines to indicate they are on the reverse side of the board. This will enable circuit tracing without referring to both sides of the board.

Component replacement, when necessary, should be made following the techniques outlined in Printed Circuit Board Service Data 1955 No. T13 dated 11/15/55.

CUT ALONG THIS LINE