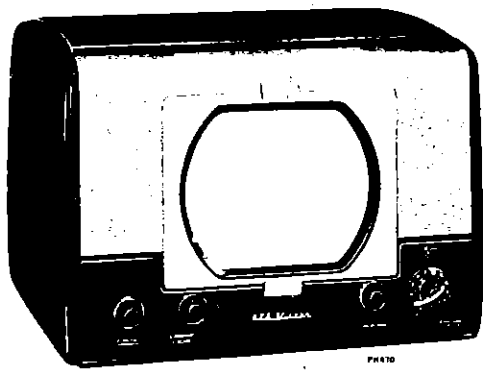
RCA VICTOR

TELEVISION RECEIVER
MODEL 9T256
Chassis No. KCS38C
—Mfr. No. 274—

SERVICE DATA
— 1949 No. 12 —

RADIO CORPORATION OF AMERICA
RCA VICTOR DIVISION
CAMDEN, N. J., U. S. A.



Model 9T256, Mahogany Finish Metal Cabinet

GENERAL DESCRIPTION

Model 9T256 is a 10-inch table type television receiver in a mahogany finish metal cabinet. The receiver employs twenty-one tubes plus three rectifiers and a 10-inch kinescope.

The receiver is provided with Electronic Magnifier deflection circuits by which the center portion of the picture may be enlarged to fill the screen. Choice of picture coverage is made by operation of a remote switch.

Features of the television unit are full twelve channel coverage; FM sound system; improved picture brilliance; picture A-G-C; A-F-C horizontal hold; stabilized vertical hold; two stages of video amplification; noise saturation circuits; improved sync separator and clipper; four mc. band width for picture channel and reduced hazard high voltage supply. An auxiliary audio input jack is provided to permit the use of an external record playing attachment.

ELECTRICAL AND MECHANICAL SPECIFICATIONS

PICTURE SIZE..... 61 square inches on a 10BP4 Kinescope

R-F FREQUENCY RANGES

Channel Number	Channel Freq. Mc.	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.	Receiver R-F Osc. Freq. Mc.
2	54-60	55.25	59.75	81
3	60-66	61.25	65.75	87
4	66-72	67.25	71.75	93
5	76-82	77.25	81.75	103
6	82-88	83.25	87.75	109
7	174-180	175.25	179.75	201
8	180-186	181.25	185.75	207
9	186-192	187.25	191.75	213
10	192-198	193.25	197.75	219
11	198-204	199.25	203.75	225
12	204-210	205.25	209.75	231
13	210-216	211.25	215.75	237

FINE TUNING RANGE

Plus and minus approximately 250 kc on channel 2 and plus and minus approximately 650 kc on channel 13.

POWER SUPPLY RATING

KCS38C..... 115 volts, 60 cycles, 300 watts

AUDIO POWER OUTPUT RATING..... 2.4 watts max.

LOUDSPEAKER

KCS38C..... 970773-1 5-inch x 7-inch EM Dynamic, 3.2 ohms

DIMENSION (inches)	Width	Height	Depth
Cabinet (outside).....	22	15⅝	21¼
Chassis (overall).....	19½	13	20½

RECEIVER ANTENNA INPUT IMPEDANCE

Choice: 300 ohms balanced or 72 ohms unbalanced.

WEIGHT

Chassis with Tubes in Cabinet..... 84 lbs.
Shipping Weight..... 99 lbs.

RCA TUBE COMPLEMENT

Tube Used	Function
(1) RCA 6AG5	R-F Amplifier
(2) RCA 6AG5	Converter
(3) RCA 6J6	R-F Oscillator
(4) RCA 6AU6	1st Sound I-F Amplifier
(5) RCA 6AU6	2nd Sound I-F Amplifier
(6) RCA 6AL5	Sound Discriminator
(7) RCA 6AV6	1st Audio Amplifier
(8) RCA 6K6GT	Audio Output
(9) RCA 6BA6	1st Picture I-F Amplifier
(10) RCA 6AG5	2nd Picture I-F Amplifier
(11) RCA 6BA6	3rd Picture I-F Amplifier
(12) RCA 6AG5	4th Picture I-F Amplifier
(13) RCA 6AL5	Picture 2nd Detector and Sync Limiter
(14) RCA 12AU7	1st and 2nd Video Amplifier
(15) RCA 6SN7GT	AGC Amplifier and Vertical Sweep Oscillator
(16) RCA 6SN7GT	AGC Rectifier and 1st Sync Separator
(17) RCA 6SN7GT	Sync Amplifier and 2nd Sync Separator
(18) RCA 6K6GT	Vertical Sweep Output
(19) RCA 6SN7GT	Horizontal Sweep Oscillator and Control
(20) RCA 6BG6G	Horizontal Sweep Output
(21) RCA 6W4GT	Damper
(22) RCA 1B3-GT/8016	High Voltage Rectifier
(23) RCA 5U4G	Power Supply Rectifier (two tubes)
(24) RCA 10BP4	Kinescope

Specifications continued on page 2

First Edition—First Printing
1-30-50

Printed in U. S. A.

ELECTRICAL AND MECHANICAL SPECIFICATIONS (Continued)

PICTURE INTERMEDIATE FREQUENCIES

Picture Carrier Frequency	25.75 Mc.
Adjacent Channel Sound Trap	27.25 Mc.
Accompanying Sound Traps	21.25 Mc.
Adjacent Channel Picture Carrier Trap	19.75 Mc.

SOUND INTERMEDIATE FREQUENCIES

Sound Carrier Frequency	21.25 Mc.
Sound Discriminator Band Width between peaks	350 kc

VIDEO RESPONSE	To 4 Mc.
FOCUS	Magnetic
SWEEP DEFLECTION	Magnetic
SCANNING	Interlaced, 525 line
HORIZONTAL SWEEP FREQUENCY	15,750 cps
VERTICAL SWEEP FREQENCY	60 cps
FRAME FREQUENCY (Picture Repetition Rate)	30 cps

OPERATING CONTROLS (front panel)

Channel Selector	Single Control Knob
Fine Tuning	Single Control Knob
Picture and Brightness	Dual Control Knobs
Picture Horizontal and Vertical Hold	Dual Control Knobs
Sound Volume and On-Off Switch	Single Control Knob

NON-OPERATING CONTROLS (excluding r-f and i-f adjustments)

Horizontal Centering	top chassis screwdriver adjustment
Vertical Centering	top chassis screwdriver adjustment
Shunt Width Coil	rear chassis screwdriver adjustment
Height	rear chassis adjustment
Horizontal Linearity	rear chassis screwdriver adjustment
Vertical Linearity	rear chassis adjustment
Horizontal Drive	rear chassis screwdriver adjustment
Horizontal Osc. Freq.	bottom chassis adjustment
Horizontal Osc. Waveform	side chassis adjustment
Horizontal Locking Range	rear chassis adjustment
Focus	rear chassis adjustment
Ion Trap Magnet	top chassis adjustment
Deflection Coil	top chassis wing nut adjustment
AGC Threshold Control	rear chassis adjustment
Series Width Coil	rear chassis screwdriver adjustment
Expanded Width Coil	rear chassis screwdriver adjustment
Width Selector Switch	rear chassis screwdriver adjustment

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 SHIELD REMOVED.

KINESCOPE HANDLING PRECAUTIONS

DO NOT REMOVE OR HANDLE THE KINESCOPE IN ANY MANNER UNLESS SHATTERPROOF GOGGLES AND HEAVY GLOVES ARE WORN. PEOPLE NOT SO EQUIPPED SHOULD BE KEPT AWAY WHILE HANDLING KINESCOPES. KEEP THE KINESCOPE AWAY FROM THE BODY WHILE HANDLING.

The kinescope bulb encloses a high vacuum and, due to its large surface area, is subjected to considerable air pressure. For this reason, kinescopes must be handled with more care than ordinary receiving tubes.

The large end of the kinescope bulb — particularly that part at the rim of the viewing surface — must not be struck, scratched or subjected to more than moderate pressure at any time. In installation, if the tube sticks or fails to slip smoothly into its socket, or deflecting yoke, investigate and remove the cause of the trouble. Do not force the tube. Refer to the Receiver Installation section for detailed instructions on kinescope installation. All RCA kinescopes are shipped in special cartons and should be left in the cartons until ready for installation in the receiver. Keep the carton for possible future use.

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

1. See that the TV-PH switch on the rear apron is in the "TV" position.

2. Turn the receiver "ON" and advance the SOUND VOLUME control to approximately mid-position.

3. Set the STATION SELECTOR to the desired channel.

4. Adjust the FINE TUNING control for best sound fidelity and the SOUND VOLUME control for suitable volume.

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

6. Adjust the VERTICAL hold control until the pattern stops vertical movement.

7. Adjust the HORIZONTAL hold control until a picture is obtained and centered.

8. Turn the BRIGHTNESS control counter-clockwise until the retrace lines just disappear.

9. Adjust the PICTURE control for suitable picture contrast.

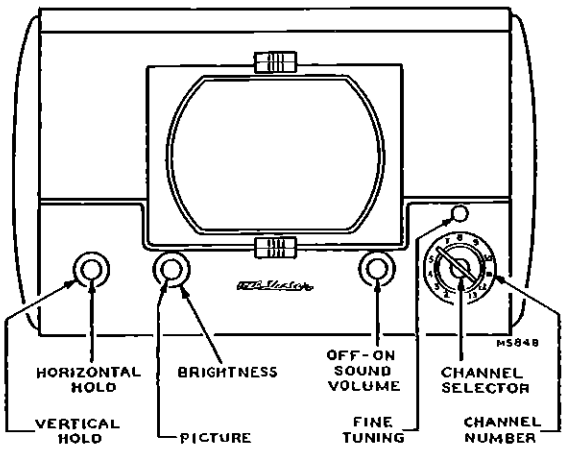


Figure 1—Receiver Operating Controls

10. After the receiver has been on for some time, it may be necessary to readjust the FINE TUNING control slightly for improved sound fidelity.

11. In switching from one station to another, it may be necessary to repeat steps 4, 8 and 9.

12. When the set is turned on again after an idle period, it should not be necessary to repeat the adjustments if the positions of the controls have not been changed. If any adjustment is necessary, step number 4 is generally sufficient.

13. If the positions of the controls have been changed, it may be necessary to repeat steps 2 through 9.

14. To operate the Electronic Magnifier push the button on the remote cable.

15. To use the instrument with a record player, plug the record-player output cable into the PHONO jack on the rear apron, and set the TV-PH switch on "PH." Set the TV-PH switch back to TV on completion of the record program.

INSTALLATION INSTRUCTIONS

Model 9T256 is shipped complete in cardboard cartons. The kinescope is shipped in place in the receiver.

UNPACKING. — To unpack the 9T256, tear open the carton flaps, pick up the receiver from under the bottom of the cabinet, and lift it out of the shipping carton.

The receiver may now be placed on a stand, table or other appropriate support. If a table or piece of furniture other than the regular stand is used for support, care must be taken to see receiver is sitting on the cabinet feet. If the bottom of the cabinet is permitted to touch a table top, the table could become badly scratched.

Take off the cabinet back.

The operating control knobs are packed in a paper bag which is tied on top of the chassis. Remove the bag and install the knobs on the proper control shafts.

Remove the cardboard shield from the 5U4G rectifier.

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

Check to see that the high voltage lead is attached to the kinescope second anode connector socket on the bell of the tube.

Connect the antenna transmission line to the receiver antenna terminals.

Plug the receiver power cord into a 115 volt a-c power source. Turn the receiver power switch to the "on" position, the brightness control three-fourths clockwise, and the picture control counter-clockwise.

ION TRAP MAGNET ADJUSTMENT. — Set the ion trap magnet approximately in the position shown in Figure 2, and with the part number on magnet towards the rear of the chassis. Starting from this position immediately adjust the magnet by moving it forward or backward at the same time rotating it slightly around the neck of the kinescope for the brightest raster on the screen. Reduce the brightness control setting until the raster is slightly above average brilliance. Adjust the focus control (R191 on the chassis rear apron) until the line structure of the raster is clearly visible. Readjust the ion trap magnet for maximum raster brilliance. The final touches on this adjustment should be made with the brightness control at the maximum position with which good line focus can be maintained.

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

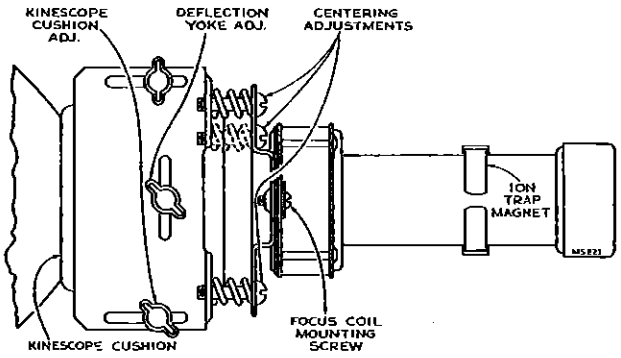


Figure 2—Yoke and Focus Coil Adjustments

PICTURE ADJUSTMENTS. — It will now be necessary to obtain a test pattern picture in order to make further adjustments. See steps 3 through 9 of the receiver operating instructions.

If the Horizontal Oscillator and AGC System are operating properly, it should be possible to sync the picture at this point. However, if the AGC threshold control is misadjusted, and the receiver is overloading, it may be impossible to sync the picture.

If the receiver is overloading turn R138 on the rear apron (see Figure 3) clockwise until the set operates normally and the picture can be synced.

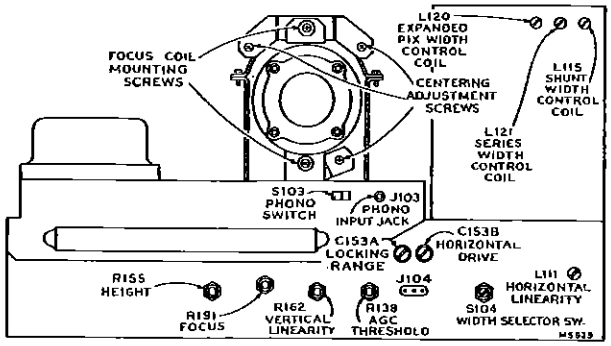


Figure 3—Rear Chassis Adjustments

CHECK OF HORIZONTAL OSCILLATOR ALIGNMENT. — Turn the horizontal hold control to the extreme counter-clockwise position. The picture should remain in horizontal sync. Momentarily remove the signal by switching off channel then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal black bars will be gradually reduced and when only 3 bars sloping downward to the left are obtained, the picture will pull into sync upon slight additional clockwise rotation of the control. Pull-in should occur when the control is approximately 90 degrees from the extreme counter-clockwise position. The picture should remain in sync for approximately 90 degrees of additional clockwise rotation of the control. At the extreme clockwise position, the picture should be out of sync and should show 1 vertical or diagonal black bar in the raster.

If the receiver passes the foregoing checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Centering Adjustment."

ALIGNMENT OF HORIZONTAL OSCILLATOR. — If in the above check the receiver failed to hold sync with the hold control at the extreme counter-clockwise position or failed to hold sync over 90 degrees of clockwise rotation of the control from the pull-in point, it will be necessary to make the following adjustments:

Horizontal Frequency Adjustment. — Turn the horizontal hold control to the extreme clockwise position. Tune in a television station and adjust the T109 horizontal frequency adjustment (under the chassis) until the picture is just out of sync and the horizontal blanking appears as a vertical or diagonal black bar in the raster.

Horizontal Lock in Range Adjustment. — Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C153A slightly clockwise. If less than 3 bars are present, adjust C153A slightly counter-clockwise. Turn the picture control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 3 bars are present.

Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the conditions specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

If it is impossible to sync the picture at this point 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 11. For field purposes paragraph "A" under Horizontal Oscillator Waveform Adjustment may be omitted.

CENTERING ADJUSTMENT. — No electrical centering controls are provided. Centering is obtained by mechanically orienting the focus coil with the three adjustment screws shown in Figure 2. Center the picture on the screen by adjustment of these screws. The focus coil should be concentric around the neck of the kinescope to prevent curvature of the raster.

FOCUS COIL ADJUSTMENTS. — If, after making the centering adjustments described in the above paragraph, a corner of the picture is shadowed, it will be necessary to loosen the focus coil mounting screws (shown in Figure 2) and change the position of the coil to eliminate the shadow. Recenter the picture by adjustment of the centering screws.

Recheck the position of the ion trap magnet to insure that maximum brilliance is obtained. It is important that the kinescope not be operated with the ion trap magnet adjusted for less than maximum brightness. To do so may cause injury to the tube.

PICTURE SIZE AND LINEARITY. — Connect the "Electronic Magnifier" switch to its socket on the rear apron of the chassis. Set the switch to the large (expanded) picture position. Set the Expanded Width Selector Switch S104 to the counter-clockwise position and adjust the Expanded Width Control L120 so that the test pattern outer circle normally tangent to the top of the picture is now tangent to the side of the picture. (If the width is not sufficient, set the Expanded Width Selector Switch to the center or the clockwise end position.) Adjust the Horizontal Drive and the Horizontal Linearity Control until the pattern is symmetrical from left to right. In general, the core of the Linearity Control Coil should be between one-half to all the way out of the coil.

Set the "Electronic Magnifier" switch to the normal size position. Observe to see if the picture width is correct. If it is not, adjust either the Series Width Control Coil L121, or the Shunt Width Control Coil L115 until the picture is the correct width. If the Series Width Coil core is out too far, the picture will "ring" on the left half. This ring will be shown as one or more faint light or dark vertical bars somewhere on the left half of the picture with resulting poor horizontal linearity.

When the proper width is obtained, switch to the expanded picture position, wait for a few seconds then switch back to the normal position. Observe if the top of the picture immediately assumes its final position or if it takes several seconds to come to a stop. If the picture requires more than a second to become still, adjust the core of L115 or L121 in and the other out while maintaining the proper width. Repeat the above test and observe if the picture immediately comes to rest when switched to the normal size position. Continue to adjust L115 and L121 until this condition is satisfied and the picture is the proper width. Observe the picture horizontal linearity and if necessary retouch Horizontal Drive, Linearity and Width Controls L115 and L121.

With the "Electronic Magnifier" switch in normal position, adjust the Height and Vertical Linearity controls as usual in order to obtain good vertical linearity. In addition, if difficulty is experienced in obtaining good vertical linearity at the top one-half inch of the picture, slightly adjust the Vertical Peaking Control L119.

Switch to the expanded picture position and note if the proper aspect ratio is obtained. If not, adjust L112 and/or S104.

Two hooks are provided in back of the cabinet to permit coiling up any excess cable to the "Electronic Magnifier" switch.

Adjustments of the horizontal drive control affect horizontal oscillator hold and locking range. If the drive control was adjusted, recheck the oscillator alignment.

FOCUS. — Adjust the focus control (R191 on chassis rear apron) for maximum definition in the test pattern vertical "wedge" and best focus in the white areas of the pattern.

CHECK TO SEE THAT THE CUSHION AND YOKE THUMBSCREWS AND THE FOCUS COIL MOUNTING SCREWS ARE TIGHT.

AGC THRESHOLD CONTROL. — The AGC threshold control R138 is adjusted at the factory and normally should not require readjustment in the field.

To check the adjustment of the AGC Threshold Control, tune in a strong signal, sync the picture and turn the picture control to the maximum clockwise position. Turn the brightness control counter-clockwise until the vertical retrace lines are just invisible. Momentarily remove the signal by switching off channel and then back. If the picture reappears immediately, the receiver is not overloading due to improper setting of R138. If the picture requires an appreciable portion of a second to reappear, R138 should be readjusted.

Set the picture control at the maximum clockwise position. Turn R138 fully clockwise. The top one-half inch of the picture may be bent slightly. This should be disregarded. Turn R138 counter-clockwise until there is a very, very slight bend or change of bend in the top one-half inch of the picture. Then turn R138 clockwise just sufficiently to remove this bend or change of bend.

If the signal is very weak, the above method may not work as it may be impossible to get the picture to bend. In this case, turn R138 counter-clockwise until the snow in the picture becomes more pronounced, then clockwise until the best signal to noise ratio is obtained.

The AGC control adjustment should be made on a strong signal if possible. If the control is set too far counter-clockwise on a weak signal, then the receiver may overload when a strong signal is received.

CHECK OF R-F OSCILLATOR ADJUSTMENTS. — Tune in all available stations to see if 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 page 10. The adjustments for channels 2 through 5 and 7 through 12 are available from the front of the cabinet by removing the station selector escutcheon as shown in Figure 4. Adjustment for channel 13 is on top of the chassis and channel 6 adjustment is in the kinescope well. See Figures 8 and 9 for their location.

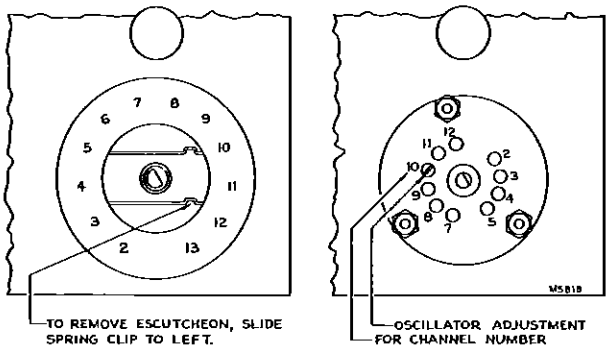


Figure 4—R-F Oscillator Adjustments

Replace the cabinet back and make sure that the screws are tight in order to prevent rattling at high volume.

WEAK SIGNAL AREA OPERATION. — Since the vast majority of receivers are sold in strong signal areas, the chassis are aligned to produce the cleanest pictures in those areas. However, if the receiver is to be operated in a weak signal area, better performance can be obtained by "peaking" the r-f unit.

To peak the r-f unit in these receivers, disconnect the 390 ohm resistor which is on top of the r-f unit chassis. Adjust L66 to obtain the best possible picture on the weakest low channel station received. By this action, the r-f gain is increased 50% at the expense of r-f bandwidth and an improvement in the weak signal picture results.

On early production receivers, R11 was 1,000 ohms and R14 was omitted. In order to "peak" these units it will be necessary to remove the unit from the receiver and change R11 to 10,000 ohms. Once the unit is removed from the chassis R11 is easily accessible on the unit rear wafer. When making this change, if the channel number 2 r-f coil L62 consists of 5¾ turns, the outside turn should be "knifed" one wire diameter away from the rest of the coil in order to provide peak response on channel 2. The unit should then be replaced and L66 peaked as described above.

If the peaked receiver is subsequently taken to a strong signal area, the resistor R14 should be connected in place and L66 adjusted for "flat" response on the low channels.

CHASSIS REMOVAL. — To remove the chassis from the cabinet for repair or installation of a new kinescope, remove the back and the knobs, unplug the speaker cable, and remove the chassis bolts under the cabinet. Withdraw the chassis from the back of the cabinet. The kinescope is held on the chassis by means of a special strap, so that the chassis and the kinescope can be handled together, as a unit.

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

To remove the kinescope, remove the kinescope socket, the ion trap magnet, and the second-anode connector. Loosen the cross-recessed head screw on the kinescope strap, as shown in Figure 5. Withdraw the kinescope toward the front of the chassis.

INSTALLATION OF KINESCOPE. — The kinescope second anode contact is a recessed metal well in the side of the bulb. The tube must be installed so that this contact is up but rotated approximately 30 degrees toward the high-voltage compartment.

Slide the kinescope cushion toward the rear of the chassis. Loosen the deflection yoke adjustment, slide the yoke toward the rear of the chassis and tighten.

Insert the neck of the kinescope through the deflection and focus coils until the bell of the tube rests against the yoke cushion. If the tube sticks, or fails to slip into place smoothly, investigate and remove the cause of the trouble. Do not force the tube.

Slip the ion trap magnet assembly over the neck of the kinescope.

Connect the kinescope socket to the tube base.

Connect the high voltage lead to the kinescope second anode socket.

Wipe the kinescope screen surface and front panel safety glass clean of all dust and finger marks.

To replace the chassis in the cabinet, first tighten the cross-recessed head screw on the kinescope strap. Slide the chassis into the cabinet, then insert and tighten the six chassis bolts. Loosen the kinescope strap from the rear of the cabinet, or from the bottom through a hole in the chassis shelf. The bottom end of the cross-recessed head screw is slotted to fit a screwdriver. Push the kinescope forward until the face of the tube is against the mask. Push the yoke cushion forward against the kinescope flare, then tighten the cushion adjusting screws. Push the yoke forward and tighten. Tighten the kinescope strap. Replace the knobs and proceed with the set-up adjustments.

ANTENNAS. — The finest television receiver built may be said to be only as good as the antenna design and installation. It is therefore important to select the proper antenna to suit the particular local conditions, to install it properly and orient it correctly.

CHASSIS TOP VIEW

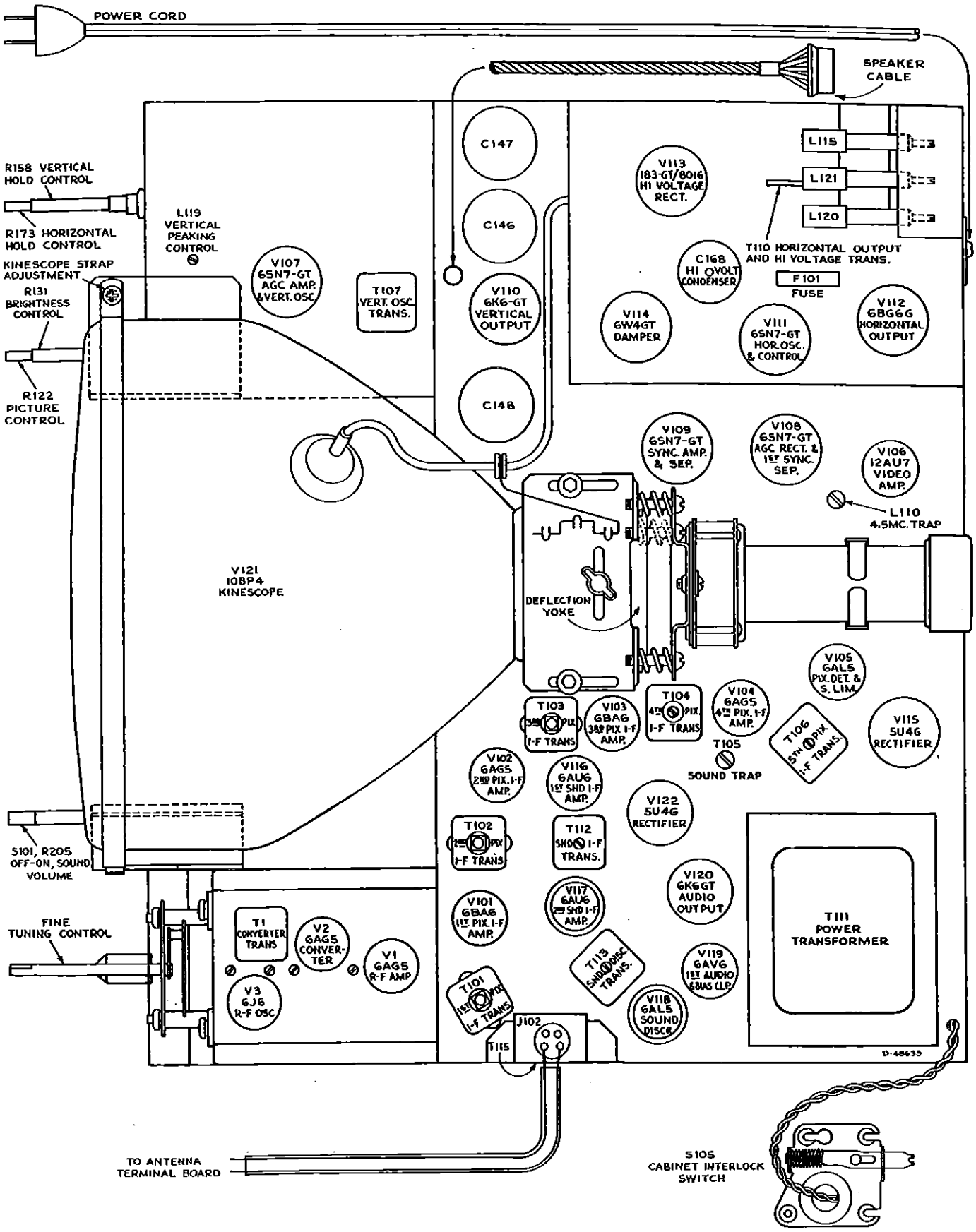


Figure 5—Chassis Top View

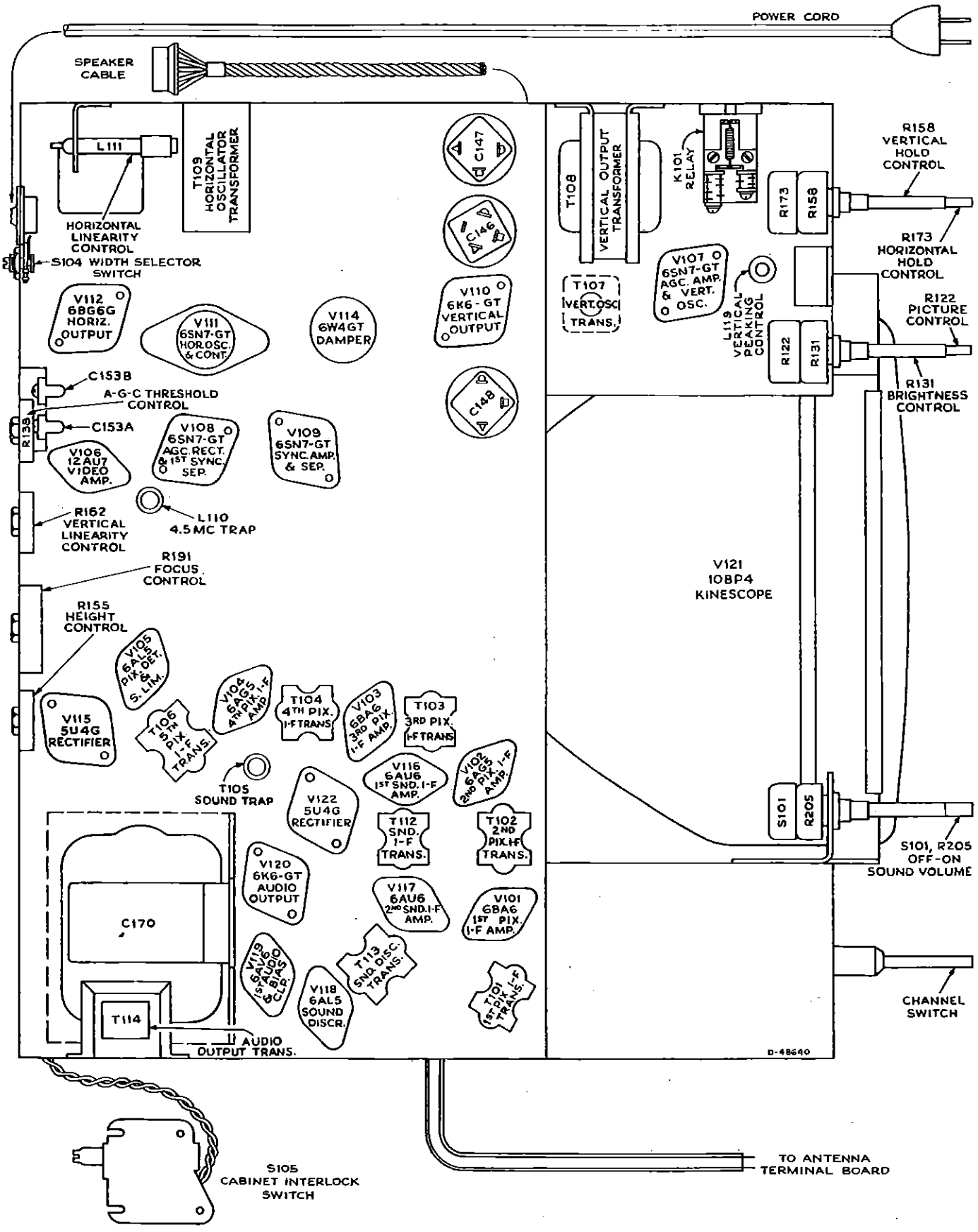


Figure 6—Chassis Bottom View

ALIGNMENT PROCEDURE

TEST EQUIPMENT. — To service properly the television chassis of this receiver, it is recommended that the following test equipment be available:

R-F Sweep Generator meeting the following requirements:

(a) Frequency Ranges
20 to 30 mc., 1 mc. and 10 mc. sweep width
50 to 90 mc., 10 mc. sweep width
170 to 225 mc., 10 mc. sweep width

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

(c) Output constant on all ranges.

(d) "Flat" output on all attenuator positions.

Cathode-Ray Oscilloscope. — For alignment purposes, the oscilloscope employed must have excellent low frequency and phase response, and should be capable of passing a 60-cycle square wave without appreciable distortion. While this requirement is not met by many commercial instruments, RCA Oscilloscopes, types WO-55A, WO-58A, WO-79A, and WO-60C fill the requirement and any of these may be employed.

For video and sync waveform observations, the oscilloscope must have excellent frequency and phase response from 10 cycles to at least two megacycles in all positions of the gain control. The RCA types WO-58A and WO-79A are ideally suited for this purpose.

Signal Generator to provide the following frequencies with crystal accuracy.

(a) Intermediate frequencies
19.75 mc. adjacent channel picture trap
21.25 mc. sound i-f and sound traps
22.05 and 24.75 mc. conv. and first pix i-f trans.
25.9 mc. second picture i-f transformer
24.6 mc. fourth picture i-f transformer
22.0 mc. third picture i-f transformer
22.5 mc. fifth picture i-f transformer
25.75 mc. picture carrier
27.25 mc. adjacent channel sound trap

(b) Radio frequencies

Channel Number	Picture Carrier Freq. Mc.	Sound Carrier Freq. Mc.
2	55.25	59.75
3	61.25	65.75
4	67.25	71.75
5	77.25	81.75
6	83.25	87.75
7	175.25	179.75
8	181.25	185.75
9	187.25	191.75
10	193.25	197.75
11	199.25	203.75
12	205.25	209.75
13	211.25	215.75

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

Heterodyne Frequency Meter with crystal calibrator if the signal generator is not crystal controlled.

Electronic Voltmeter of Junior "VoltOhmyst" type and a high voltage multiplier probe for use with this meter to permit measurements up to 10 kv.

Service Precautions. — If possible, the chassis should be serviced without the kinescope. However, if it is necessary to view the raster during servicing, make sure the kinescope retaining strap is secure, and the yoke cushion is up firmly against the flare of the tube.

CAUTION: Do not short the kinescope second-anode lead. Its short circuit current is approximately 3 ma. This represents approximately 9 watts dissipation and a considerable overload on the high voltage filter resistor R189.

Adjustments Required. — Normally, only the r-f oscillator line will require the attention of the service technician. All other circuits are either broad or very stable and hence will seldom require readjustment.

The oscillator line is relatively non-critical. When oscillator tubes are changed, in all probability it will be necessary to adjust only C6 in order to bring the entire line into adjustment.

ORDER OF ALIGNMENT. — When a complete receiver alignment is necessary, it can be most conveniently performed in the following order:

(1) Sound discriminator
(2) Sound i-f transformers
(3) Picture i-f traps
(4) Picture i-f transformers
(5) R-F and converter lines
(6) R-F oscillator line
(7) 4.5 mc. video trap
(8) Sensitivity check

SOUND DISCRIMINATOR ALIGNMENT. — Set the signal generator for approximately .1 volt output at 21.25 mc. and connect it to the second sound i-f grid.

Detune T113 secondary (bottom).

Set the "VoltOhmyst" on the 3-volt scale.

Connect the meter, in series with a 1-megohm resistor, to the junction of diode resistors R203 and R204.

Adjust the primary of T113 (top) for maximum output on the meter.

Connect the "VoltOhmyst" to the junction of C183 and R203. Adjust T113 secondary (bottom). It will be found that it is possible to produce a positive or negative voltage on the meter dependent upon this adjustment. Obviously to pass from a positive to a negative voltage, the voltage must go through zero. T113 (bottom) should be adjusted so that the meter indicates zero output as the voltage swings from positive to negative. This point will be called discriminator zero output.

Connect the sweep oscillator to the grid of the second sound i-f amplifier.

Adjust the sweep band width to approximately 1 mc. with the center frequency at approximately 21.25 mc. and with an output of approximately .1 volt.

Connect the oscilloscope to the junction of C183 and R203. The pattern obtained should be similar to that shown in Figure 12. If it is not, adjust T113 (top) until the waveform is symmetrical.

The peak-to-peak band width of the discriminator should be approximately 350 kc. and the trace should be linear from 21.175 mc. to 21.325 mc.

SOUND I-F ALIGNMENT. — Connect the sweep oscillator to the first sound i-f amplifier grid.

Connect the oscilloscope to the second sound i-f grid return (terminal A of T112) in series with a 33,000-ohm isolating resistor.

Insert a 21.25 mc. marker signal from the signal generator into the first sound i-f grid.

Adjust T112 (top and bottom) for maximum gain and symmetry about the 21.25 mc. marker. The pattern obtained should be similar to that shown in Figure 13.

The output level from the sweep should be set to produce approximately .3 volt peak-to-peak at the second sound i-f grid return when the final touches on the above adjustment are made. It is necessary that the sweep output voltage should not exceed the specified values otherwise the response curve will be broadened, permitting slight misadjustment to pass unnoticed and possibly causing distortion on weak signals.

The band width at 70% response from the first sound i-f grid to the second i-f grid should be approximately 200 kc.

PICTURE I-F TRAP ADJUSTMENT. — Connect the "VoltOhmyst" to the junction of R135 and C190.

Remove the 6SN7GT AGC Amplifier tube V107. Connect a 250,000-ohm potentiometer between pins 5 and 6 of the V107 socket. Adjust the potentiometer until the "VoltOhmyst" reads approximately −12 volts. Note: Use approximately −6.5 volts bias on sets in which the third pix i-f obtains bias at junction of R135 and C190.

Set the channel switch to the blank position between channels number 2 and 13.

Connect the "VoltOhmyst" across the picture detector load resistor R119. Under this condition, both leads of the meter are at approximately −120 volts. In making this connection, care should be taken not to touch the case of the meter or to permit the meter case to become grounded.

Connect the output of the signal generator to the grid of the converter tube V2. To do this, remove the tube from the socket and fashion a clip by twisting one end of a small piece of wire around pin number 1. Replace the tube in the socket leaving the end of the wire protruding from under the tube. Connect the signal generator to this wire through a 1,500 mmf capacitor keeping the leads as short as possible.

Set the generator to each of the following frequencies and with a thin fiber screwdriver tune the specified adjustment for minimum indication on the "VoltOhmyst." In each instance the generator should be checked against a crystal calibrator to insure that the generator is exactly on frequency.

(1) 21.25 mc.—T103 (top)
(2) 21.25 mc.—T105 (top)
(3) 27.25 mc.—T102 (top)
(4) 27.25 mc.—T104 (top)
(5) 19.75 mc.—T106 (top)
(6) 19.75 mc.—T101 (top)

In the above transformers using threaded cores, it is possible to run the cores completely through the coils and secure two peaks or nulls. The correct position is with the cores in the outside ends of the coils. If the cores are not in the correct position, the coupling will be incorrect and it will be impossible to secure the correct response.

PICTURE I-F TRANSFORMER ADJUSTMENTS. — Set the signal generator to each of the following frequencies and peak the specified adjustment for maximum indication on the "VoltOhmyst." During alignment, reduce the input signal if necessary to prevent overloading.

22.5 mc.—T106 (bottom)
24.6 mc.—T104 (bottom)
22.0 mc.—T103 (bottom)
25.9 mc.—T102 (bottom)

T1 and T101 are coupled by a link and in combination constitute an overcoupled transformer. The characteristics of such a transformer are such that it is impossible to adjust it to a single frequency.

To sweep align T1 and T101, connect a 330-ohm composition resistor across the primary coils of T102, T103, T104 and T106.

Connect the "VoltOhmyst" to the junction of R135 and C190. Adjust the 250,000-ohm variable resistor for −2.0 volts on the meter.

Connect the oscilloscope to the plate of the first video amplifier, pin 1 of V106.

Connect a sweep generator to the converter grid through a 1,500 mmf capacitor. Set the generator to sweep from 20.0 mc. to 30.0 mc. and adjust the output to provide a 4-volt peak-to-peak signal on the scope.

Connect the signal generator loosely to the converter grid and tune it to provide markers at 22.05 mc. and 24.75 mc.

Adjust T1 (top) and T101 (bottom) to obtain the response shown in Figure 14. The T1 core must penetrate to the terminal-board end of the coil in order to obtain the correct response.

Remove the 330-ohm resistors from across T102, T103, T104 and T106.

Adjust the 250,000-ohm potentiometer for a 15-volt peak-to-peak signal at the plate of the first video amplifier. The bias as measured by the "VoltOhmyst" should be −12 volts or −6.5 volts for earlier sets.

Observe and analyze the response curve obtained. The response will not be ideal and the i-f adjustments must be retouched in order to obtain the desired curve. See Figure 15.

On final adjustment the picture carrier marker must be at approximately 45% response. The curve must be approximately flat topped, with the 22.1 mc. marker at approximately 95% response and the 25.0 mc. marker below 90% response. A 26.5 mc. marker must fall between 5 and 10% response.

The most important consideration in making the i-f adjustments is to get the picture carrier at the 45% response point. If the picture carrier operates too low on the response curve, loss of low frequency video response, of picture brilliance, of blanking, and of sync may occur. If the picture carrier operates too high on the response curve, the picture becomes smeared. In making these adjustments, care should be taken to see that no two transformers are tuned to the same frequency as i-f oscillation may result.

Remove the converter tube and take off the clip to pin number 1. Replace the tube in the socket.

Picture I-F Oscillation. — If the receiver will operate without oscillating with the test equipment disconnected but breaks into oscillation or becomes unstable with the equipment connected, it may become necessary to establish a ground plane. Cover the test bench with a sheet of copper and set the chassis on the sheet. Set all the test equipment except the "VoltOhmyst" on the sheet and bond or bypass them to it. A Junior "VoltOhmyst" should not be bonded to the sheet since the negative test probe is not always connected to ground during alignment. If the receiver is badly misaligned and two or more of the i-f transformers are tuned to the same frequency, the receiver may fall into i-f oscillation. I-F oscillation shows up as a voltage across the picture detector load resistor that is unaffected by r-f signal input. If such a condition is encountered, it is sometimes possible to stop oscillation by adjusting the transformers approximately to frequency by setting the adjustment cores of T101, T102, T103, T104, T105 and T106 to be approximately equal to those of another receiver known to be in proper alignment. If this does not have the desired effect, it may now be possible to stop oscillation by increasing the grid bias. If so, it should then be possible to align the transformers by the usual method. Once aligned in this manner, the i-f amplifier should be stable with reduced bias.

If the oscillation cannot be stopped in the above manner, shunt the grids of the first three pix i-f amplifiers to ground with 1,000 mmf. capacitors. Connect the signal generator to the fourth pix i-f grid and align T106 to frequency. Progressively remove the shunt from each grid and align the plate coil of that stage to frequency.

If this does not stop the oscillation, the difficulty is not due to i-f misalignment as the i-f section is stable when properly aligned. Check all i-f by-pass condensers, transformer shunting resistors, tubes, socket voltages, etc.

ANTENNA, R-F AND CONVERTER LINE ADJUSTMENT. — In order to align the r-f tuner, it will first be necessary to set the channel-13 oscillator to frequency. The shield over the bottom of the r-f unit must be in place when making any adjustments.

The channel-13 oscillator may be aligned by adjusting it to beat with a crystal-calibrated heterodyne frequency meter, or by feeding a signal into the receiver at the r-f sound carrier frequency and adjusting the oscillator for zero output from the sound discriminator. In this latter case the sound discriminator must first have been aligned to exact frequency. Either method of adjustment will produce the same results. The method used will depend upon the type of test equipment available. Regardless of which method of oscillator alignment is used, the frequency standard must be crystal controlled or calibrated.

If the receiver oscillator is to be adjusted by the heterodyne frequency meter method, couple the meter probe loosely to the receiver oscillator.

If the receiver oscillator is adjusted by feeding in the r-f sound carrier signal, connect the signal generator to the receiver antenna terminals. Connect the "VoltOhmyst" to the sound discriminator output (junction of C183 and R203).

Set the receiver switch to 13.

Adjust the frequency standard to the correct frequency (237 mc. for heterodyne frequency meter or 215.75 mc. for the signal generator).

Set the fine tuning control to the middle of its range.

Adjust C6 for an audible beat on the heterodyne frequency meter or zero voltage from sound discriminator.

Now that the channel-13 oscillator is set to frequency, we may proceed with the r-f alignment.

Connect the "VoltOhmyst" to the junction of R135 and C197. Adjust the 250K pot. for −3.5 volts on the meter.

Remove the first pix i-f amplifier tube V101.

Connect the oscilloscope to the test connection at R13 in the r-f tuning unit.

Connect the r-f sweep oscillator to the receiver antenna terminals. The method of connection depends upon the output impedance of the sweep. The P102 connections for 300-ohm balanced or 72-ohm single-ended input are shown in the circuit diagrams in Figure 79. If the sweep oscillator has a 50-ohm single-ended output, 300-ohm balanced output can be obtained by connecting as shown in Figure 7.

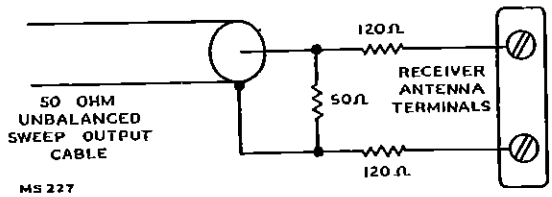


Figure 7—Unbalanced Sweep Cable Termination

Connect the signal generator loosely to the receiver antenna terminals.

Since channel 7 has the narrowest response of any of the high frequency channels, it should be adjusted first.

Set the receiver channel switch to channel 7.

Set the sweep oscillator to cover channel 7.

Insert markers of channel 7 picture carrier and sound carrier, 175.25 mc. and 179.75 mc.

Adjust C10 and C14 until the curve falls symmetrically between the sound and picture carrier markers. Adjust C11 to give the proper band width. Roughly peak L6 in conjunction with slight adjustments of C10 and C14 for a flat-topped response curve with the sound and picture carriers at 90% to 95% response points on this curve. See Figure 16, channel 7.

Switch to channel 12 and adjust L6 for maximum response and minimum top slope of the curve.

Check the response of channels 7 through 13 by switching the receiver channel switch, sweep oscillator and marker oscillator to each of these channels and observing the response obtained. See Figure 16 for typical response curves. It should be found that all these channels have the proper shaped response with the markers above 80% response. If the markers do not fall within this requirement on one or more high frequency channels, since there are no individual channel adjustments, it will be necessary to readjust L6, C10, C11 and C14, and possibly compromise some channel slightly in order to get the markers up on other channels. Normally, however, no difficulty of this type should be experienced since the higher frequency channels are comparatively broad and the markers easily fall within the required range.

Channel 6 is next aligned in the same manner.

Set the receiver to channel 6.

Set the sweep oscillator to cover channel 6.

Set the marker oscillator to channel 6 picture and sound carrier frequencies.

Adjust L9, L13, L66, and C12 for an approximately flat-topped response curve located symmetrically between the markers. L9, L13 and L66 are the center frequency adjustments. C12 is the band-width adjustment

Check channels 5 down through channel 2 by switching the receiver, sweep oscillator and marker oscillator to each channel and observing the response obtained. In all cases, the markers should be above the 80% response point. If this is not the case, L9, L13, L66 and C12 should be retouched. On final adjustment, all channels must be within the 80% specification.

Disconnect the 250K pot., and replace V107 and V101.

Following an r-f alignment, the oscillator alignment must be checked.

R-F OSCILLATOR LINE ADJUSTMENT. — The r-f oscillator line may be aligned by adjusting it to beat with a crystal-calibrated heterodyne frequency meter, or by feeding a signal into the receiver at the r-f sound carrier frequency and adjusting the oscillator for zero output from the sound discriminator. In this latter case the sound discriminator must first have been aligned to exact frequency. Either method of adjustment will produce the same results. The method used will depend upon the type of test equipment available.

Regardless of which method of oscillator alignment is used, the frequency standard must be crystal controlled or calibrated. If the receiver oscillator is to be adjusted by the heterodyne frequency meter method, the calibration frequency listed under R-F Osc. Freq. must be available.

If the receiver oscillator is adjusted by feeding in the r-f sound carrier frequency, the frequencies listed under Sound Carrier Freq. must be available.

Channel Number	Receiver R-F Osc. Freq. Mc.	R-F Sound Carrier Freq. Mc.	Channel Oscillator Adjustment
2	81	59.75	L24
3	87	65.75	L23
4	93	71.75	L22
5	103	81.75	L21
6	109	87.75	L31
7	201	179.75	L19
8	207	185.75	L18
9	213	191.75	L17
10	219	197.75	L16
11	225	203.75	L15
12	231	209.75	L14
13	237	215.75	C6

If the heterodyne frequency meter method is used, couple the meter probe loosely to the receiver oscillator.

If the r-f sound carrier method is used, connect the "Volt-Ohmyst" to the sound discriminator output (junction of C183 and R203) and connect the signal generator to the receiver antenna terminals. The order of alignment remains the same regardless of which method is used.

If the r-f unit is removed from the receiver for service and is aligned separately, the shield over the bottom of the r-f unit must be in place when making adjustments.

Since the lower frequencies are obtained by adding steps of inductance, it is necessary to align channel 13 first and continue in reverse numerical order.

Set the receiver channel switch to 13.

Adjust the frequency standard to the correct frequency (237 mc. for heterodyne frequency meter or 215.75 mc. for the signal generator).

Set the fine tuning control to the middle of its range while making the adjustment.

Adjust C6 for an audible beat on the heterodyne frequency meter or zero voltage from sound discriminator. Oscillator adjustments L1 and L2 shown on the schematic are factory control adjustments and should not be touched in the field.

Switch the receiver to channel 12.

Set the frequency standard to the proper frequency as listed in the alignment table.

Adjust L14 for indications as above.

Adjust the oscillator to frequency on all channels by switching the receiver and the frequency standard to each channel and adjusting the appropriate oscillator trimmer for the speci-

fied indication. It should be possible to adjust the oscillator to the correct frequency on all channels with the fine tuning control in the middle third of its range.

After the oscillator has been set on all channels, start back at channel 13 and recheck to make sure that all adjustments are correct.

AGC THRESHOLD ADJUSTMENT. — The AGC threshold adjustment can be made by the method outlined in the Installation Instructions. However, a more accurate adjustment can be obtained by the use of an oscilloscope.

Tune in a station and advance the picture control to the maximum clockwise position. Connect the low capacity probe from the oscilloscope to the plate of the first video amplifier, pin 1 of V106. Adjust the oscilloscope to observe the horizontal sync pulse.

Turn the AGC threshold control R138 fully clockwise, then slowly counter-clockwise. As the control is turned counter-clockwise, the receiver gain will increase slowly, increasing the size of the pattern on the oscilloscope. R138 should be turned counter-clockwise until the receiver begins to overload as indicated by clipping of the sync. The control should be left in the maximum gain position in which no clipping of sync is observed. See Figure 17 for proper waveforms.

HORIZONTAL OSCILLATOR ADJUSTMENT. — Normally the adjustment of the horizontal oscillator is not considered to be a part of the alignment procedure, but since the oscillator waveform adjustment requires the use of an oscilloscope, it can not be done conveniently in the field. The waveform adjustment is made at the factory and normally should not require readjustment in the field. However, the waveform adjustment should be checked whenever the receiver is aligned or whenever the horizontal oscillator operation is improper.

Horizontal Frequency Adjustment. — With a clip lead, short circuit the coil between terminals C and D of the horizontal oscillator transformer T109. Tune in a television station and sync the picture if possible.

A. — Turn the horizontal hold control R173 to the extreme clockwise position. Adjust the T109 Frequency Adjustment (under the chassis) so that the picture is just out of sync and the horizontal blanking appears in the picture as a vertical bar. The position of the bar is unimportant.

B. — Turn the hold control approximately one-quarter of a turn from the extreme clockwise position and examine the width and linearity of the picture. If picture width or linearity is incorrect, adjust the horizontal drive control C153B, the width control L115 and the linearity control L111 until the picture is correct. If C153B was adjusted, repeat step A above.

Horizontal Locking Range Adjustment. — Turn the horizontal hold control fully counter-clockwise. Momentarily remove the signal by switching off channel then back. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 9 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C153A slightly clockwise. If less than 7 bars are present, adjust C153A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat the procedure until 7 to 9 bars are present.

Horizontal Oscillator Waveform Adjustment. — Remove the shorting clip from terminals C and D of T109. Turn the horizontal hold control to the extreme clockwise position. With a thin fibre screwdriver, adjust the Oscillator Waveform Adjustment Core of T109 (on the outside of the chassis) until the horizontal blanking bar appears in the raster.

A. — Connect the low capacity probe of an oscilloscope to terminal C of T109. Turn the horizontal hold control one-quarter turn from the clockwise position so that the picture is in sync. The pattern on the oscilloscope should be as shown in Figure 18. Adjust the Oscillator Waveform Adjustment Core of T109 until the two peaks are at the same height. During this adjustment, the picture must be kept in sync by readjusting the hold control if necessary.

This adjustment is very important for correct operation of the circuit. If the broad peak of the wave on the oscilloscope is lower than the sharp peak, the noise immunity becomes poorer, the stabilizing effect of the tuned circuit is reduced and drift of the oscillator becomes more serious. On the other hand, if the broad peak is higher than the sharp peak, the oscillator is overstabilized, the pull-in range becomes inadequate and the broad peak can cause double triggering of the oscillator when the hold control approaches the clockwise position.

Remove the oscilloscope upon completion of this adjustment.

Check of Horizontal Oscillator Adjustments. — Set the horizontal hold control to the full counter-clockwise position. Momentarily remove the signal by switching off channel then back. Slowly turn the horizontal hold control clockwise and note the least number of diagonal bars obtained just before the picture pulls into sync.

If more than 3 bars are present just before the picture pulls into sync, adjust the horizontal locking range trimmer C153A slightly clockwise. If less than 3 bars are present, adjust C153A slightly counter-clockwise. Turn the horizontal hold control counter-clockwise, momentarily remove the signal and recheck the number of bars present at the pull-in point. Repeat this procedure until 3 bars are present.

Turn the horizontal hold control to the maximum clockwise position. The picture should be just out of sync to the extent that the horizontal blanking bar appears as a single vertical or diagonal bar in the picture. Adjust the T109 Frequency Adjustment until this condition is fulfilled.

4.5 MC. VIDEO TRAP. — With a strong input from a station, detune the receiver from the correct fine tuning point. With a very short clip lead, short the trap winding of T103. Observe the picture for the appearance of a 4.5 mc. beat. If the beat appears in the picture, adjust L110 until the beat is eliminated.

SENSITIVITY CHECK. — A comparative sensitivity check can be made by operating the receiver on a weak signal from a television station and comparing the picture and sound obtained to that obtained on other receivers under the same conditions.

This weak signal can be obtained by connecting the shop antenna to the receiver through a ladder type attenuator pad. The number of stages in the pad depends upon the signal strength available at the antenna. A sufficient number of stages should be inserted so that a somewhat less than normal contrast picture is obtained when the picture control is at the maximum clockwise position. Only carbon type resistors should be used to construct the pad.

RESPONSE CURVES. — The response curves shown on page 14 and referred to throughout the alignment procedure were taken from a production set. Although these curves are typical, variations can be expected.

The response curves are shown in the classical manner of presentation, that is with "response up" and low frequency to the left. The manner in which they will be seen in a given test set-up will depend upon the characteristics of the oscilloscope and the sweep generator. The curves may be seen inverted and/or switched from left to right depending on the deflection polarity of the oscilloscope and the phasing of the sweep generator.

ALIGNMENT TABLE. — Both methods of oscillator alignment are presented in the alignment table. The service technician may thereby choose the method to suit his test equipment.

ALIGNMENT TABLE

THE DETAILED ALIGNMENT PROCEDURE BEGINNING ON PAGE 8 SHOULD BE READ BEFORE ALIGNMENT BY USE OF THE TABLE IS ATTEMPTED.

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
DISCRIMINATOR AND SOUND I-F ALIGNMENT									
1	2nd sound i-f grid (pin 1, V117)	21.25 .1 volt output	Not used		Not used	In series with 1 meg. to junction of R203 & R204		Detune T113(bot.) Adjust T113 (top) for max. on meter	Fig. 8 Fig. 9 Fig. 10
2	"	"	"		"	Junct. of C183 & R203	Meter on 3 volt scale	T113 (bottom) for zero on meter	Fig. 9 Fig. 10
3	"	"	2nd sound i-f grid (pin 1, V117)	21.25 center 1 mc. wide .1 v. out	Junction of C183 & R203	Not used	Check for symmetrical response waveform (positive & negative). If not equal adjust T113 (top) until they are equal		Fig. 10 Fig. 12
4	1st sound i-f grid (pin 1, V116)	21.25 reduced output	1st sound i-f grid	21.25 reduced output	Terminal A, T112 in series with a 33,000 ohm resistor	"	Sweep output reduced to provide .3 volt p-to-p on scope	T112 (top & bot.) for max. gain and symmetry at 21.25 mc.	Fig. 8 Fig. 9 Fig. 10 Fig. 13
PICTURE I-F AND TRAP ADJUSTMENT									
5	Not used		Not used		Not used	Junction of R135 & C190	Remove V107. Connect potentiometer between pins 5 & 6 of V107 socket	Adjust pot. for meter reading of −12 volts or −6.5 volts on early sets	Fig. 10
6	Converter grid (pin 1, V2)	21.25	"		"	Across R119	Meter on 3 volt scale. Receiver between 2 and 13	T103 (top) for min. on meter	Fig. 8
7	"	21.25	"		"	"	"	T105 (top) for min.	"
8	"	27.25	"		"	"	"	T102 (top) for min.	"
9	"	27.25	"		"	"	"	T104 (top) for min.	"
10	"	19.75	"		"	"	"	T106 (top) for min.	"
11	"	19.75	"		"	"	"	T101 (top) for min.	"
12	"	22.5	"		"	"	"	T106 (bottom) for max. on meter	Fig. 9
13	"	24.6	"		"	"	"	T104 (bottom) for max.	"
14	"	22.0	"		"	"	"	T103 (bottom) for max.	"
15	"	25.9	"		"	"	"	T102 (bottom) for max.	"
16	"	22.05 24.75	Converter grid (pin 1, V2)	Sweeping 20 to 30 mc.	Pin 1, V106	Junction of R135 & C190	Shunt 330 ohms across pri. T102, T103, T104, T106. Set bias −2 V. Set swp. gen. for 4 V. P-P on scope.	Adjust T1 (top) and T101 (bottom) for proper response	Fig. 8 Fig. 9 Fig. 14
17	"		"	"	"	"	Remove shunt resistors. Set bias to give 15 volts P to P on scope.	Adjust T1 (top), T101, T102, T103, T104, T106 (bot.) for proper resp.	Fig. 8 Fig. 9 Fig. 15
ANTENNA, R-F AND CONVERTER LINE ALIGNMENT									
18	Antenna terminals	215.75	Not used		Not used	Junction of C183 & R203 for signal gen. method only	Fine tuning centered. Receiver on channel 13. Heterodyne meter coupled to oscillator if used.	C6 for zero on meter or beat on het. freq. meter	Fig. 8 Fig. 10
19						Junction of R135 & C197	Remove V101	Potentiometer for −3.5 volts on meter	Fig. 8 Fig. 10
20	Antenna terminal (loosely)	175.25 & 179.75	Antenna terminals (see text for precaution)	Sweeping channel 7	Test Connection R13	Not used	Receiver on channel 7	L6, C10, C11 & C14 for flat top response between markers. Markers above 90%.	Fig. 8 Fig. 9 Fig. 16 (7)
21	"	205.25 209.75	"	channel 12	"	"	Receiver on channel 12	L6 for max. response and min. slope of top of curve	Fig. 8 Fig. 16 (12)
22	"	175.25 179.75	"	channel 7	"	"	Receiver on channel 7	Check to see that response is as above	Fig. 16 (7)
23	"	181.25 185.75	"	channel 8	"	"	Receiver on channel 8	"	Fig. 16 (8)
24	"	187.25 191.75	"	channel 9	"	"	Receiver on channel 9	"	Fig. 16 (9)
25	"	193.25 197.75	"	channel 10	"	"	Receiver on channel 10	"	Fig. 16 (10)

ALIGNMENT PROCEDURE

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT SWEEP GENERATOR TO	SWEEP GEN. FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
	ANTENNA, R-F AND CONVERTER LINE ALIGNMENT (Continued)								
26	"	199.25 203.75	"	channel 11	"	"	Receiver on channel 11	"	Fig. 16 (11)
27	"	205.25 209.75	"	channel 12	"	"	Receiver on channel 12	"	Fig. 16 (12)
28	"	211.25 215.75	"	channel 13	"	"	Receiver on channel 13	"	Fig. 16 (13)
29	If the response on any channel (steps 22 through 28) is below 80% at either marker, switch to that channel and adjust L6, C10, C11 & C14 to pull response up on that channel. Then recheck steps 22 through 28.								
30	Antenna terminals (loosely)	83.25 87.75	Ant. terminals (see text for precaution)	Sweeping chan. 6	Test Connection R13	Not used	Receiver on channel 6	L9, L13, L66 & C12 for response as above	Fig. 16 (6)
31	"	77.25 81.75	"	channel 5	"	"	Receiver on channel 5	Check to see that response is as above	Fig. 16 (5)
32	"	67.25 71.75	"	channel 4	"	"	Receiver on channel 4	"	Fig. 16 (4)
33	"	61.25 65.75	"	channel 3	"	"	Receiver on channel 3	"	Fig. 16 (3)
34	"	55.25 59.75	"	channel 2	"	"	Receiver on channel 2	"	Fig. 16 (2)
35	If the response on any channel (steps 31 through 34) is below 80% at either marker, switch to that channel and adjust L9, L13, L66 & C12 to pull response up on that channel. Then recheck steps 30 through 34. Disconnect the bias pot. and replace V101 and V107.								

R-F OSCILLATOR ALIGNMENT

STEP No.	CONNECT SIGNAL GENERATOR TO	SIGNAL GEN. FREQ. MC.	CONNECT HETERODYNE FREQ. METER TO	HET. METER FREQ. MC.	CONNECT OSCILLOSCOPE TO	CONNECT "VOLTOHMYST" TO	MISCELLANEOUS CONNECTIONS AND INSTRUCTIONS	ADJUST	REFER TO
36	Antenna terminals	215.75	Loosely coupled to r-f osc.	237	Not used	Junction of C183 & R203 for sig. gen. method only	Fine tuning centered. Receiver on channel 13	C6 for zero on meter or beat on het. freq. meter	Fig. 8 Fig. 10
37	"	209.75	"	231	"	"	Rec. on chan. 12	L14 as above	Fig. 11
38	"	203.75	"	225	"	"	Rec. on chan. 11	L15 as above	"
39	"	197.75	"	219	"	"	Rec. on chan. 10	L16 as above	"
40	"	191.75	"	213	"	"	Rec. on chan. 9	L17 as above	"
41	"	185.75	"	207	"	"	Rec. on chan. 8	L18 as above	"
42	"	179.75	"	201	"	"	Rec. on chan. 7	L19 as above	"
43	"	87.75	"	109	"	"	Rec. on chan. 6	L31 as above	Fig. 9
44	"	81.75	"	103	"	"	Rec. on chan. 5	L21 as above	Fig. 11
45	"	71.75	"	93	"	"	Rec. on chan. 4	L22 as above	"
46	"	65.75	"	87	"	"	Rec. on chan. 3	L23 as above	"
47	"	59.75	"	81	"	"	Rec. on chan. 2	L24 as above	"
48	Repeat steps 36 through 47 as a check.								

AGC THRESHOLD ADJUSTMENT

49	Not used		Not used		Pin 1, V106	Not used	Tune in station, turn pix control clockwise. Adjust R138 for max. gain without clipping sync on scope		Fig. 10 Fig. 17

	HORIZONTAL OSCILLATOR ADJUSTMENT
50	Short circuit terminals C and D of T109. Tune in a station.
51	Turn hold control fully clockwise. Adjust T109 Frequency Adjustment until horizontal blanking bar appears in the picture.
52	Turn hold control ¼ turn from clockwise to sync picture. Adjust width (L115), linearity (L111) and drive (C153B) controls until picture is correct. Repeat step 51.
53	Turn hold control fully counter-clockwise. Momentarily remove signal. Turn hold control slowly clockwise. Note least number of bars before pull-in. Adjust Locking Range Control (C153A) for 7 to 9 bar pull-in.
54	Remove clip from terminals C and D of T109. Turn hold control fully clockwise. Adjust T109 Oscillator Waveform Adjustment until horizontal blanking bar appears in picture.
55	Connect low capacity probe of oscilloscope to terminal C of T109. Turn hold control ¼ turn from clockwise. Adjust T109 Oscillator Waveform Adjustment until broad and sharp peaks of wave on oscilloscope are same height. Keep picture in sync with hold control during adjustment. Remove oscilloscope.
56	Turn hold control fully counter-clockwise. Momentarily remove signal. Turn hold control slowly clockwise. Note least number of bars before pull-in. Adjust Locking Range Control (C153A) for 3 bar pull-in.
57	Turn hold control fully clockwise. Adjust T109 Freq. Adjustment until horizontal blanking appears as single vertical or diagonal bar in pix.
	4.5 MC VIDEO TRAP ADJUSTMENT
58	Tune in a strong station. Short T103 trap. If a 4.5 mc. beat appears in picture adjust 4.5 mc. trap (L110) until beat is eliminated.
	SENSITIVITY CHECK
59	Connect antenna to receiver through attenuator pad to provide weak signal. Compare the picture and sound obtained to that obtained on other receivers under the same conditions.

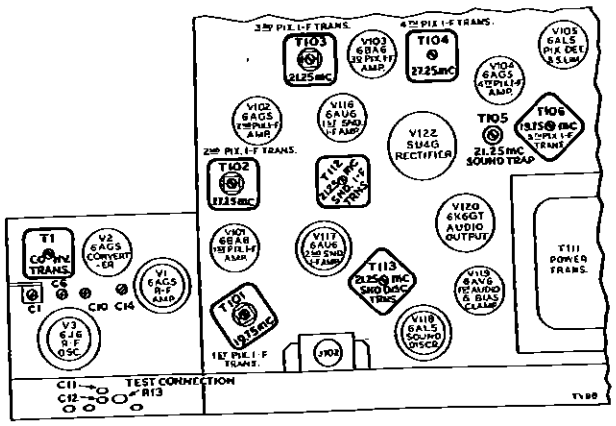


Figure 8—Top Chassis Adjustments

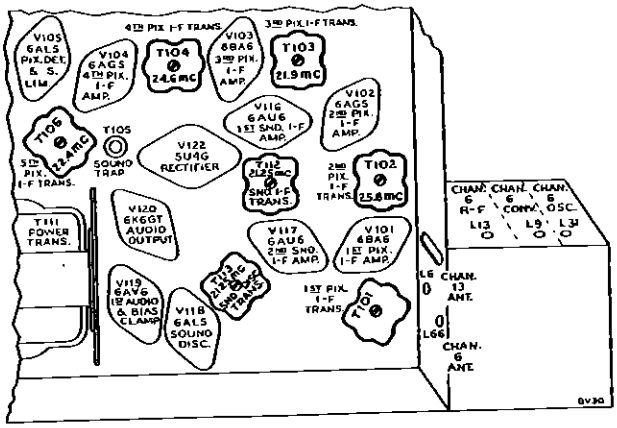


Figure 9—Bottom Chassis Adjustments

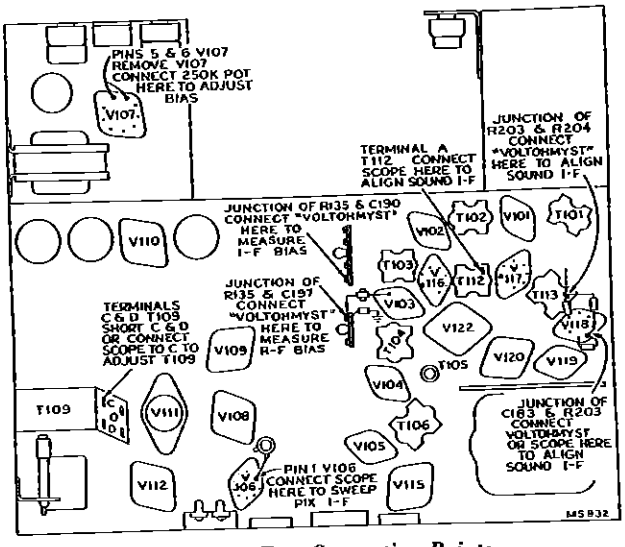


Figure 10—Test Connection Points

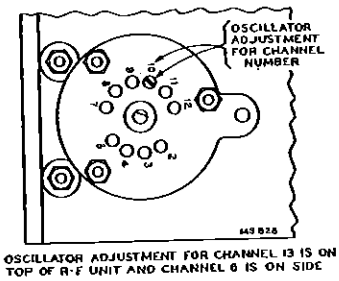


Figure 11—R-F Oscillator Adjustments

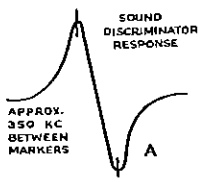


Figure 12 Discriminator Response

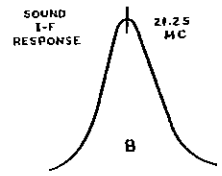


Figure 13 Sound I-F Response

Figure 14 T1 and T101 Response

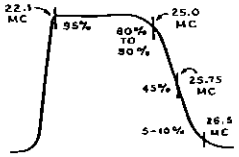


Figure 15 Overall I-F R-F Response

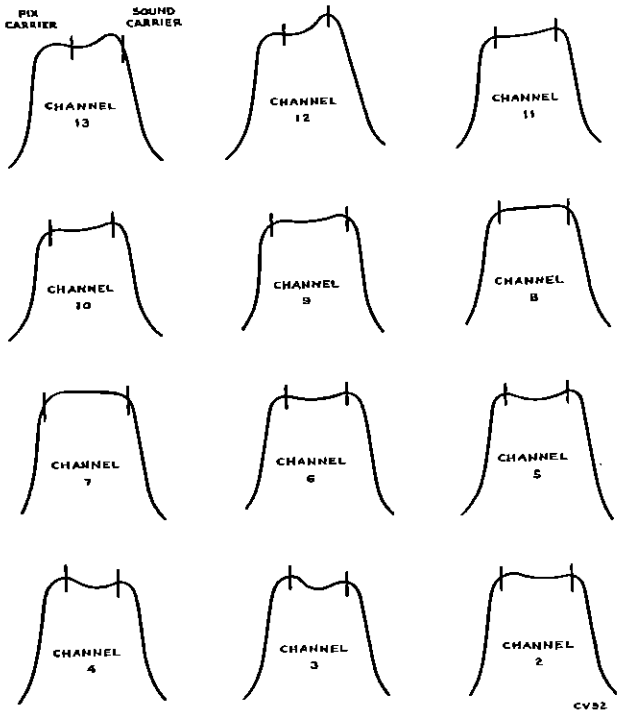


Figure 16—R-F Response

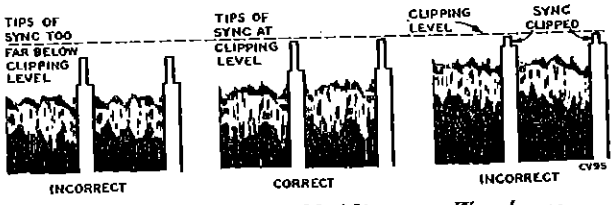


Figure 17—AGC Threshold Adjustment Waveforms

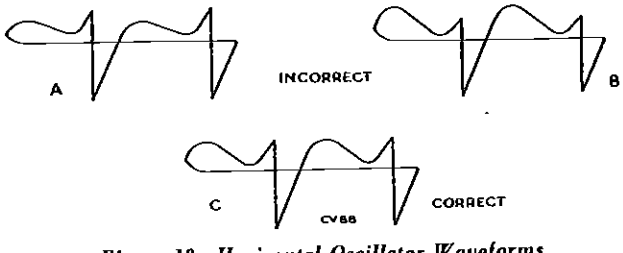


Figure 18—Horizontal Oscillator Waveforms

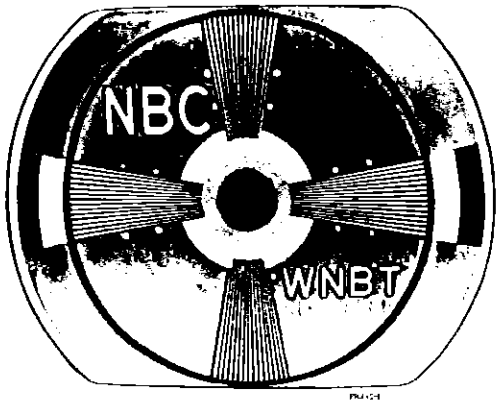


Figure 19—Normal Picture

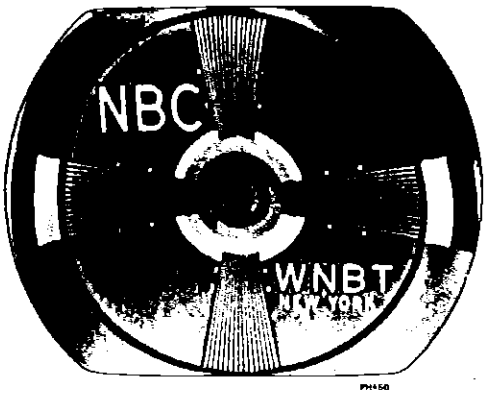


Figure 20—Focus Coil and Ion Trap Magnet Misadjusted

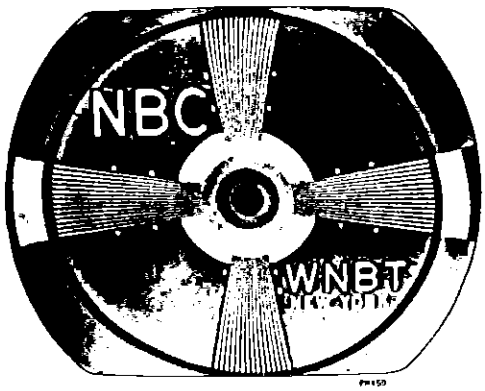


Figure 21—Horizontal Linearity Control Misadjusted (Picture Cramped in Middle)

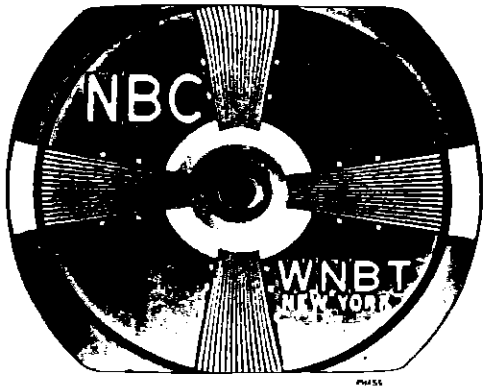


Figure 22—Width Control Misadjusted

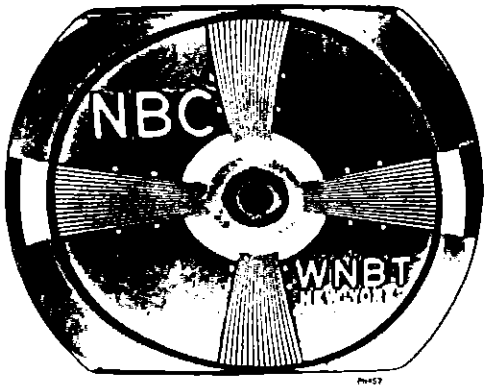


Figure 23—Horizontal Drive Control Misadjusted

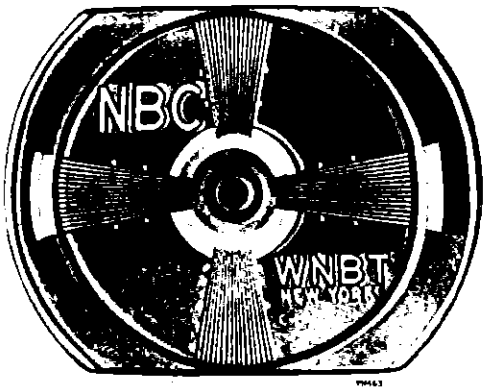


Figure 24—Transients

Figure 25—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is in a Counter-clockwise Position—Just Before Pulling Into Sync

Figure 26—Test Pattern Showing Out of Sync Condition When Horizontal Hold Control Is at the Maximum Clockwise Position

SERVICE SUGGESTIONS

Following is a list of symptoms of possible failures and an indication of some of the possible faults:

NO RASTER ON KINESCOPE:

(1) Incorrect adjustment of ion trap magnet. Magnets reversed either front to back or top to bottom; front magnet incorrectly oriented.

(2) V112 or V113 inoperative. Check waveforms on grids and plates.

(3) No high voltage — If horizontal deflection is operating as evidenced by the correct waveform on terminal 4 of horizontal output transformer, the trouble can be isolated to the 8016 circuit. Either the T110 high voltage winding is open, the 8016 tube is defective, its filament circuit is open, C168 is shorted, or R187 or R189 are open.

(4) V111 circuit inoperative — Refer to schematic and waveform chart.

(5) Damper tube (V114) inoperative.

(6) Defective kinescope.

(7) R131 open.

(8) No receiver plate voltage—filter capacitor shorted—bleeder or filter choke open.

NO VERTICAL DEFLECTION:

(1) V107B or V110 inoperative. Check voltage and waveforms on grids and plates.

(2) T107 or T108 open.

(3) Vertical deflection coils open.

SMALL RASTER:

(1) Low Plus B or low line voltage.

(2) V112 defective.

POOR VERTICAL LINEARITY:

(1) If adjustments cannot correct, change V110.

(2) Vertical output transformer defective.

(3) V107B defective — check voltage and waveforms on grid and plate.

(4) C150, R164, C147B or C148-C defective.

(5) Low bias or plate voltage — check rectifiers and capacitors in supply circuits.

POOR HORIZONTAL LINEARITY:

(1) If adjustments do not correct, change V112 or V114.

(2) T110 or L111 defective.

(3) C164 or C165 defective.

WRINKLES ON LEFT SIDE OF RASTER:

(1) R166, R167 or C169 defective.

(2) Defective yoke.

PICTURE OUT OF SYNC HORIZONTALLY:

(1) T109 incorrectly tuned.

(2) R172, R173 or R174 defective.

TRAPEZOIDAL OR NON-SYMMETRICAL RASTER:

(1) Improper adjustment of focus coil or ion trap magnet.

(2) Defective yoke.

RASTER AND SIGNAL ON KINESCOPE BUT NO SOUND:

(1) R-F oscillator off frequency.

(2) Sound i-f, discriminator or audio amplifier inoperative — check V116, V117, V118, V119, V120 and their socket voltages.

(3) T114 or C186 defective.

(4) Speaker defective.

SIGNAL AT KINESCOPE GRID BUT NO SYNC:

(1) AGC threshold control R138 misadjusted.

(2) V105B, V107A, V108 or V109 inoperative. Check voltage and waveforms at their grids and plates.

SIGNAL ON KINESCOPE GRID BUT NO VERTICAL SYNC:

(1) Check V107B and associated circuits—C145, T107, etc.

(2) Integrating network inoperative—Check.

(3) R154, R155, R157, R158 or R159 defective.

SIGNAL ON KINESCOPE GRID BUT NO HORIZONTAL SYNC:

(1) T109 misadjusted—readjust as instructed on page 11.

(2) V111 inoperative—check socket voltages and waveforms.

(3) T109 defective.

(4) C140, C153A, C154, C155, C156, C157 or C166 defective.

(5) If horizontal speed is completely off and cannot be adjusted check C158, C159, R172, R173, R174, R179 and R182.

SOUND AND RASTER BUT NO PICTURE OR SYNC:

(1) Picture i-f, detector or video amplifier inoperative — check V103, V104, V105 and V106 — check socket voltages.

(2) Bad contact to kinescope grid.

PICTURE STABLE BUT POOR RESOLUTION:

(1) V105A or V106 defective.

(2) Peaking coils defective — check for specified resistance.

(3) Make sure that the focus control operates on both sides of proper focus.

(4) R-F and I-F circuits misaligned.

PICTURE SMEAR:

(1) R-F or I-F circuits misaligned.

(2) Open peaking coil.

(3) This trouble can originate at the transmitter — check on another station.

PICTURE JITTER:

(1) AGC threshold control R138 misadjusted.

(2) If regular sections at the left picture are displaced change V112.

(3) Vertical instability may be due to loose connections or noise.

(4) Horizontal instability may be due to unstable transmitted sync.

RASTER BUT NO SOUND, PICTURE OR SYNC:

(1) Defective antenna or transmission line.

(2) R-F oscillator off frequency.

(3) R-F unit inoperative — check V1, V2, V3.

DARK VERTICAL LINE ON LEFT OF PICTURE:

(1) Reduce horizontal drive and readjust width and horizontal linearity.

(2) Replace V112.

LIGHT VERTICAL LINE ON LEFT OF PICTURE:

(1) C169 defective.

(2) V114 defective.

PICTURE I-F RESPONSE. — At times it may be desirable to observe the individual i-f stage response. This can be achieved by the following method:

Shunt all i-f transformers and coils with a 330-ohm carbon resistor except the one whose response is to be observed.

Connect a wide band sweep generator to the converter grid and adjust it to sweep from 18 mc. to 30 mc.

Connect the oscilloscope across the picture detector load resistor and observe the overall response. The response obtained will be essentially that of the unshunted stage. The effects of the various traps are also visible on the stage response.

Figures 27 through 31 show the responses of the various stages obtained in the above manner. The curves shown are typical although some variation between receivers can be expected. Relative stage gain is not shown.

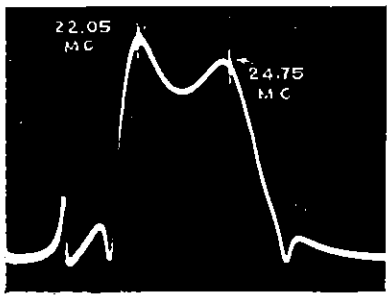


Figure 27—Response of Converter and First Pix I-F Transformer

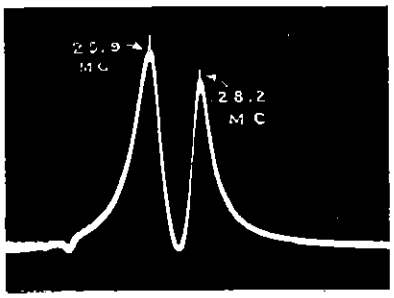


Figure 28—Response of Second Pix I-F Transformer

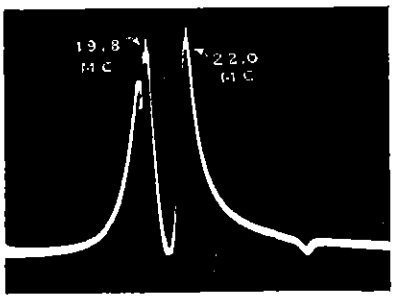


Figure 29—Response of Third Pix I-F Transformer

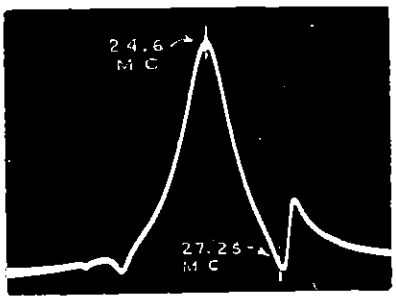


Figure 30—Response of Fourth Pix I-F Transformer

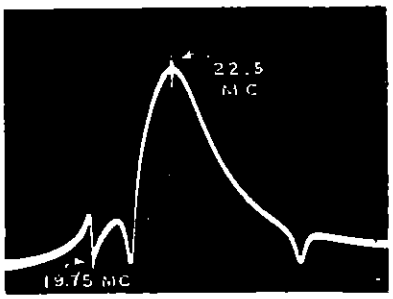


Figure 31—Response of Fifth Pix I-F Transformer

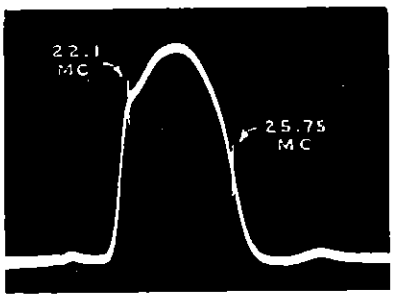


Figure 32—Response from First Pix I-F Grid to Pix Det.

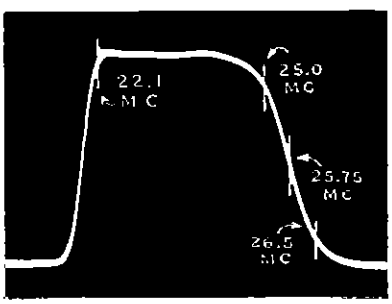


Figure 33—Overall Pix I-F Response

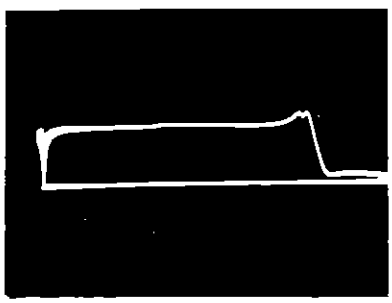


Figure 34—Video Response at Average Contrast

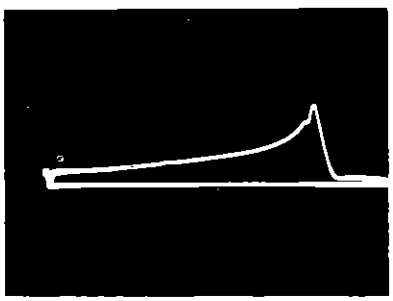


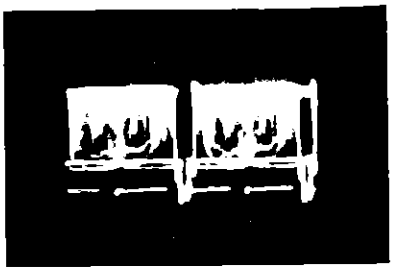
Figure 35—Video Response at Minimum Contrast

WAVEFORM PHOTOGRAPHS

Video Signal Input to 1st Video Amplifier (Pin 2 of V106) (12AU7)

Figure 36—Vertical (Oscilloscope Synced to ½ of Vertical Sweep Rate) (5.4 Volts PP)

Figure 37—Horizontal (Oscilloscope Synced to ½ of Horizontal Sweep Rate) (5.4 Volts PP)



Sync Feed (Junction of L104, R219 and C194)

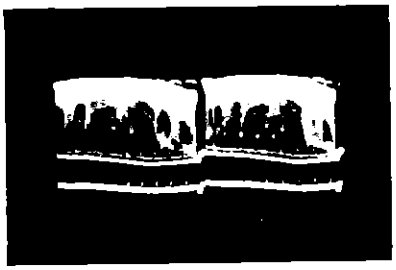
Figure 38—Vertical (28 Volts PP)

Figure 39—Horizontal (28 Volts PP)

Input to 2nd Video Amplifier (Pin 7 of V106) (12AU7)

Figure 40—Vertical (17 Volts PP)

Figure 41—Horizontal (17 Volts PP)



Output of 2nd Video Amplifier (Junction of L105 and R127) (Picture Max.)

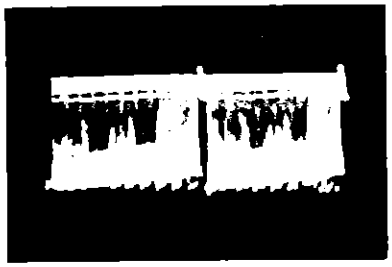
Figure 42—Vertical (96 Volts PP)

Figure 43—Horizontal (96 Volts PP)

Input to Kinescope (Junction of R127 and R128) (Picture Max.)

Figure 44—Vertical (65 Volts PP)

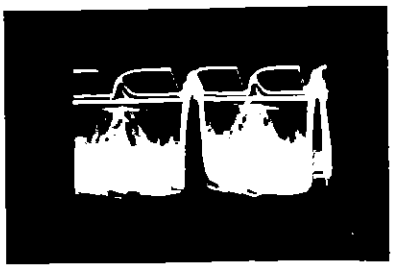
Figure 45—Horizontal (65 Volts PP)



Input to 1st Sync Separator (Pin 1 of V108) (6SN7GT)

Figure 46—Vertical (25 Volts PP)

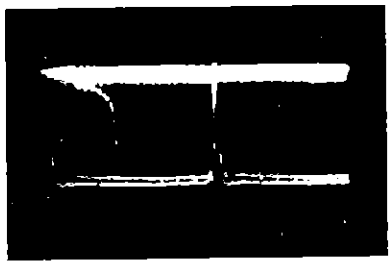
Figure 47—Horizontal (23 Volts PP)



AGC Rectifier Cathode (Pin 6 of V108) (6SN7GT)

Figure 48—Vertical (4.7 Volts PP)

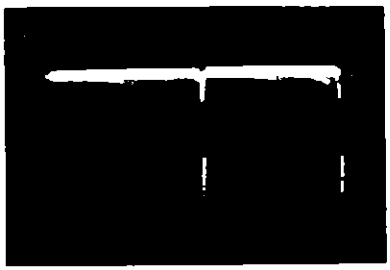
Figure 49—Horizontal (1.5 Volts PP)



Output of AGC Rectifier (Pin 5 of V108) (6SN7GT)

Figure 50—Vertical (24 Volts PP)

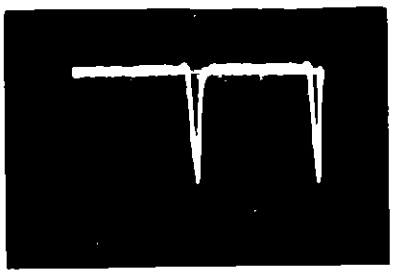
Figure 51—Horizontal (24 Volts PP)

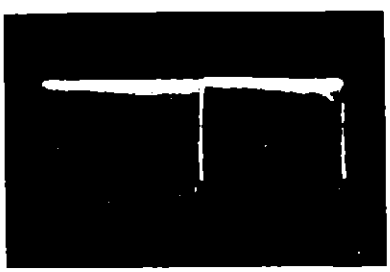


Output of 1st Sync Separator (Pin 2 of V108) (6SN7GT)

Figure 52—Vertical (26 Volts PP)

Figure 53—Horizontal (25.5 Volts PP)



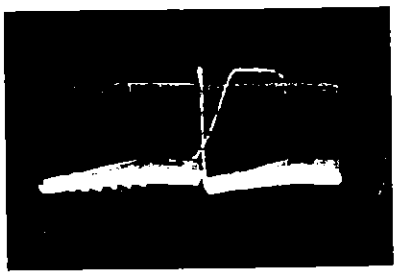


Input to Sync Amplifier (Junction of C137, C139 and R145)

Figure 54—Vertical (21 Volts PP)

Figure 55—Horizontal (21 Volts PP)

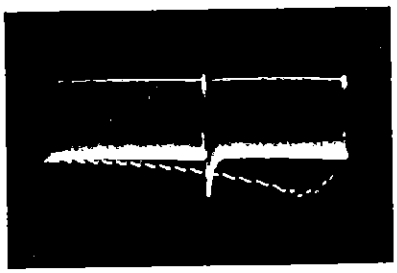
WAVEFORM PHOTOGRAPHS



Output of Sync Amplifier (Pin 2 of V109) (6SN7GT)

Figure 56—Vertical (115 Volts PP)

Figure 57—Horizontal (105 Volts PP)



Cathode of 2nd Sync Separator (Pin 6 of V109) (6SN7GT)

Figure 58—Vertical (17 Volts PP)

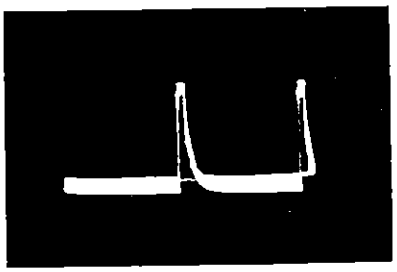


Figure 59—Horizontal (11 Volts PP)

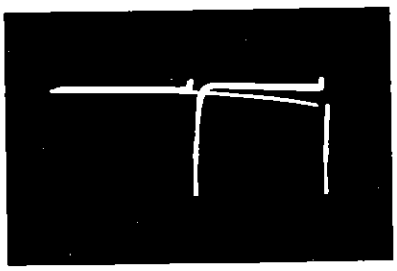


Figure 60—Output of Integrating Network (Junction of C144, C145 and R153) (45 Volts PP)

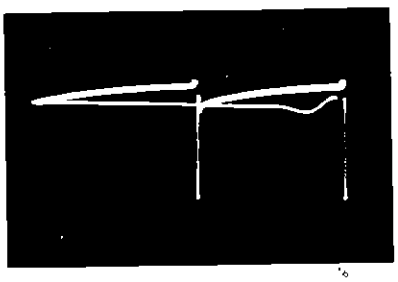


Figure 61—Grid of Vertical Oscillator (720 Volts PP) (Pin 1 of V107) (6SN7GT)

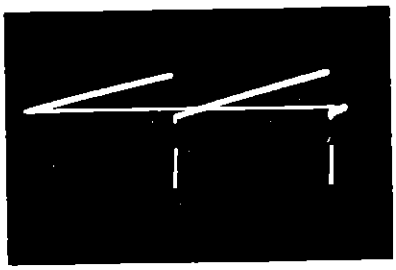


Figure 62—Grid of Vertical Output (160 Volts PP) (Pin 5 of V110) (6K6GT)

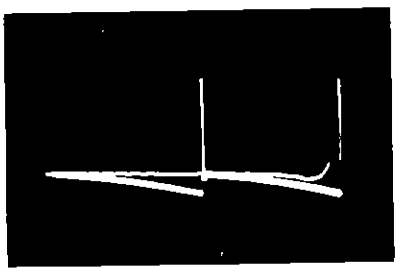


Figure 63—Plate of Vertical Output (750 Volts PP) (Pin 3 of V110) (6K6GT)

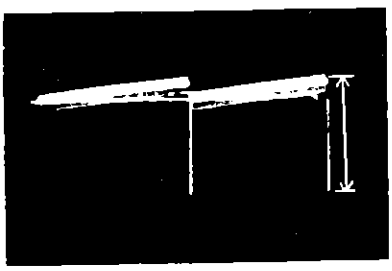


Figure 64—Input of Vertical Deflection Coils (75 Volts PP) (Junction of Green Lead of T108 and Green Lead of Yoke)

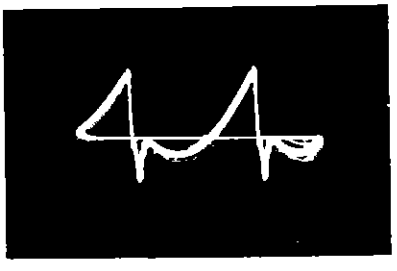


Figure 65—Input to Horizontal Oscillator (17.5 Volts PP) (Junction of C153A and C154)

Figure 66—Junction of R168, R176 and R178 (150 Volts PP)

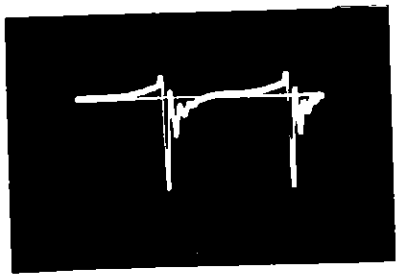


Figure 67—Grid of Horizontal Oscillator (480 Volts PP) (Pin 4 of V111) (6SN7GT)

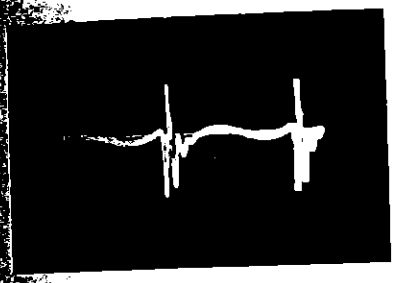


Figure 68—Plate of Horizontal Oscillator (270 Volts PP) (Pin 5 of V111) (6SN7GT)

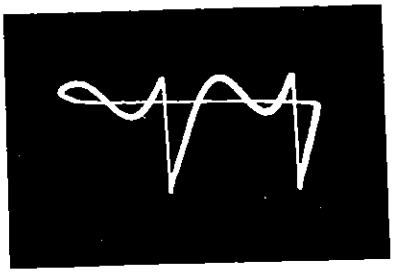


Figure 69—Terminal "C" of T109 (70 Volts PP)

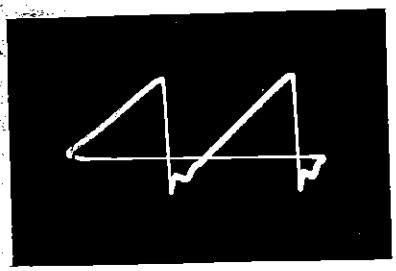


Figure 70—Input to Horizontal Output Tube (42 Volts PP) (Junction of C160, R183 and C153B)

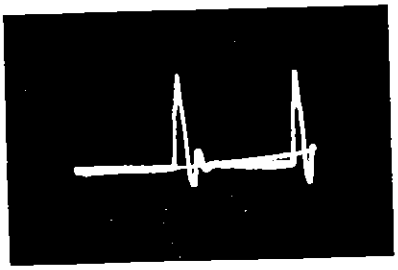


Figure 71—Plate of Horizontal Output (Approx. 5,200 Volts PP) (Measured Through a Capacity Voltage Divider Connected from Top Cap of V112 to Ground)

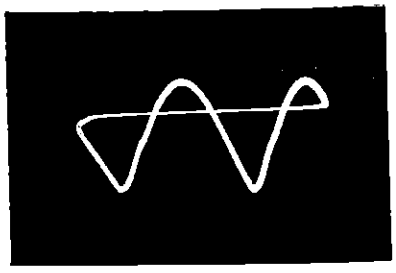


Figure 72—Junction of C164, L115 and Terminal 1 of T110 (165 Volts PP)

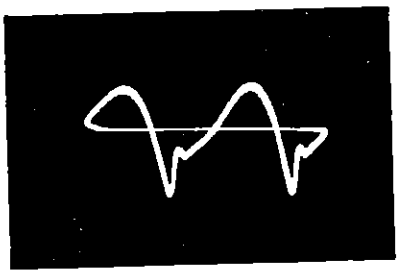


Figure 73—Plate of Damper (125 Volts PP) (Pin 5 of V114) (6W4GT)

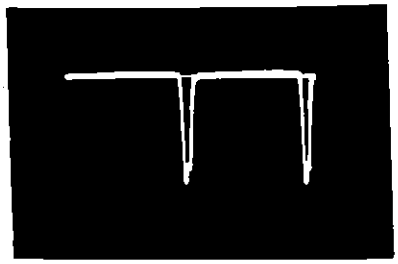


Figure 74—Input to Horizontal Deflection Coils (1,150 Volts PP)

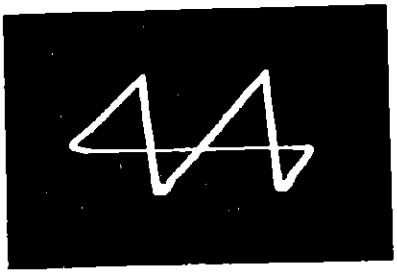


Figure 75—Horizontal Deflection Coil Current (0.6 Amp. PP) Measured by Inserting a 5-ohm Resistor in series with the yoke and observing the waveform across the resistor.

VOLTAGE CHART

The following measurements represent two sets of conditions. In the first condition a 2200 microvolt test pattern signal was fed into the receiver, the picture was synced and the AGC threshold control was properly adjusted. The second condition was obtained by removing the antenna leads and short-circuiting the receiver antenna terminals. Voltages shown are as read with "Jr. 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		I Plate (ma.)	I Screen (ma.)	Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts			
V1	6AG5	R-F Amplifier	2200 Mu. V. Signal	5	130	6	132	2 & 7	0	1	−2.2	5	2	
			No Signal	5	67	6	111	2 & 7	0	1	+.2	14.0	5.0	
V2	6AG5	Converter	2200 Mu. V. Signal	5	*130 to 140	6	*130 to 140	2 & 7	0	1	*−3.0 to −7.0	*7.1 to 7.7	*2.3 to 2.7	*Depending upon channel
			No Signal	5	*104 to 109	6	*104 to 109	2 & 7	0	1	*−2.0 to −6.0	*5.3 to 5.9	*.8 to 1.0	
V3	6J6	R-F Oscillator	2200 Mu. V. Signal	1 & 2	*88 to 95	—	—	7	.19	5 & 6	*−5.1 to −7.3	*1.9 to 2.7	—	*Depending upon channel
			No Signal	1 & 2	*68 to 81	—	—	7	.16	5 & 6	*−4.5 to −6.6	*1.8 to 2.1	—	
V101	6BA6	1st Pix. I-F Amplifier	2200 Mu. V. Signal	5	115	6	115	7	.4	1	−11.0	1.9	.8	
			No Signal	5	87	6	87	7	1.73	1	+.2	8.1	3.4	
V102	6AG5	2d Pix. I-F Amplifier	2200 Mu. V. Signal	5	109	6	109	2 & 7	.78	1	0	8.8	2.4	
			No Signal	5	91	6	91	2 & 7	.62	1	0	7.4	1.6	
V103	6BA6	3d Pix. I-F Amplifier	2200 Mu. V. Signal	5	81	6	119	7	.52	1	−2.2	11.1	.3	
			No Signal	5	55	6	96	7	.62	1	+.2	13.2	.3	
V104	6AG5	4th Pix. I-F Amplifier	2200 Mu. V. Signal	5	159	6	135	2 & 7	1.5	1	0	7.2	2.2	
			No Signal	5	165	6	118	2 & 7	1.35	1	0	6.8	2.4	
V105 A	6AL5	Picture 2d Det.	2200 Mu. V. Signal	7	−113	—	—	1	−112	—	—	.48	—	
			No Signal	7	−120	—	—	1	−120	—	—	—	—	
V105 B	6AL5	Sync Limiter	2200 Mu. V. Signal	2	−107	—	—	5	−56	—	—	—	—	
			No Signal	2	−80	—	—	5	−60	—	—	—	—	
V106	12AU7	1st Video Amplifier	2200 Mu. V. Signal	1	−30	—	—	3	−111	2	−113	4.38	—	
			No Signal	1	−28	—	—	3	−118	2	−120	3.82	—	
V106	12AU7	2d Video Amplifier	2200 Mu. V. Signal	6	*166	—	—	8	−6.5	7	*−12.2	6.2	—	*Variation 0 to −15 with contrast
			No Signal	6	*160	—	—	8	*−9	7	*−10.3	6.9	—	
V107 A	6SN7 GT	AGC Amplifier	2200 Mu. V. Signal	5	−11.0	—	—	6	−55.5	4	−56.5	.9	—	*Variation of AGC control gives −60 to −75
			No Signal	5	−.2	—	—	6	−60	4	*−64	.3	—	
V107 B	6SN7 GT	Vertical Oscillator	2200 Mu. V. Signal	2	*76	—	—	3	−111	1	−158	.2	—	*Variation of height gives −30 to +170
			No Signal	2	*62	—	—	3	−120	1	−169	.2	—	
V108	6SN7 GT	AGC Rectifier	2200 Mu. V. Signal	5	95	—	—	6	−3.4	4	−19.3	.3	—	
			No Signal	5	72	—	—	6	−22	4	−28	.28	—	
V108	6SN7 GT	1st Sync Separator	2200 Mu. V. Signal	2	95	—	—	3	−1.8	1	−19.5	.1	—	
			No Signal	2	73	—	—	3	−21	1	−28	.1	—	

VOLTAGE CHART

Tube No.	Tube Type	Function	Operating Condition	E. Plate		E. Screen		E. Cathode		E. Grid		I Plate (ma.)	I Screen (ma.)	Notes on Measurements
				Pin No.	Volts	Pin No.	Volts	Pin No.	Volts	Pin No.	Volts			
V109	6SN7 GT	Sync Amplifier	2200 Mu. V. Signal	2	150	—	—	3	0	1	−4.7	5.25	—	
			No Signal	2	145	—	—	3	0	1	−5.2	3.75	—	
V109	6SN7 GT	Sync Separator	2200 Mu. V. Signal	5	220	—	—	6	−51	4	−106	.4	—	
			No Signal	5	205	—	—	6	−59	4	−80	.35	—	
V110	6K6-GT	Vertical Output	2200 Mu. V. Signal	3	210	4	210	8	−70	5	−91	*7.85		*Screen connected to plate
			No Signal	3	190	4	190	8	−85	5	−101	*7.7		
V111	6SN7 GT	Horizontal Osc. Control	2200 Mu. V. Signal	2	*48	—	—	3	−110	1	−92	.2	—	*Variation of hold gives −80.9 to +140 volts on plate
			No Signal	2	*33	—	—	3	−120	1	−108	.2	—	
V111	6SN7 GT	Horizontal Oscillator	2200 Mu. V. Signal	5	70	—	—	6	−111	4	−185	2.4	—	
			No Signal	5	70	—	—	6	−120	4	−185	2.4	—	
V112	6BG6G	Horizontal Output	2200 Mu. V. Signal	Cap	Do Not Meas.	8	150	3	−115	5	−110	72	9.4	
			No Signal	Cap	Do Not Meas.	8	145	3	−115	5	−130	70	9.2	
V113	1B3GT /8016	H. V. Rectifier	Brightness Min.	Cap	Do Not Meas.	—	—	2 & 7	9500	—	—	0	—	
			Brightness Average	Cap	Do Not Meas.	—	—	2 & 7	9000	—	—	.1	—	
V114	6W4GT	Damper	2200 Mu. V. Signal	5	Do Not Meas.	—	—	3	350	—	—	66	—	
			No Signal	5	Do Not Meas.	—	—	3	340	—	—	65	—	
V115	5U4G	Rectifier	2200 Mu. V. Signal	4 & 6	*335			2 & 8	220	—	—	210	—	*A-C measured from plate to trans. center tap
			No Signal	4 & 6	*335			2 & 8	220	—	—	215	—	
V116	6AU6	1st Sound I-F Amplifier	2200 Mu. V. Signal	5	134	6	134	7	.9	1	0	8.2	3.3	
			No Signal	5	110	6	110	7	.7	1	0	5.7	2.6	
V117	6AU6	2nd Sound I-F Amplifier	2200 Mu. V. Signal	5	148	6	90	7	0	1	−9	1.6	.8	
			No Signal	5	115	6	60	7	0	1	−.65	3.35	1.15	
V118	6AL5	Sound Discrim.	2200 Mu. V. Signal	2	−8.4	—	—	5	5.8	—	—	—	—	
			No Signal	2	−2.0	—	—	5	.41	—	—	—	—	
			2200 Mu. V. Signal	7	−3.7	—	—	1	0	—	—	—	—	
			No Signal	7	−1.08	—	—	1	0	—	—	—	—	
V119	6AV6	1st Audio Amplifier	2200 Mu. V. Signal	7	85	—	—	2	0	1	.89	.49	—	
			No Signal	7	83	—	—	2	0	1	−.89	.4	—	
V120	6K6-GT	Audio Output	2200 Mu. V. Signal	3	102	4	113	8	−99	5	−108	19.3	3.3	
			No Signal	3	72	4	80	8	−111	5	−120	18	3	
V121	10BP4	Kinescope	2200 Mu. V. Signal	Cap	*9000	10	339	11	51	2	20	.1	—	*Average Brightness
			No Signal	Cap	—	10	322	11	42	2	14	—	—	Average Brightness
			2200 Mu. V. Signal	Cap	—	10	339	11		2		.4	—	Maximum Brightness
			2200 Mu. V. Signal	Cap	9200	10	339	11		2		0	—	Minimum Brightness

R-F UNIT WIRING DIAGRAM

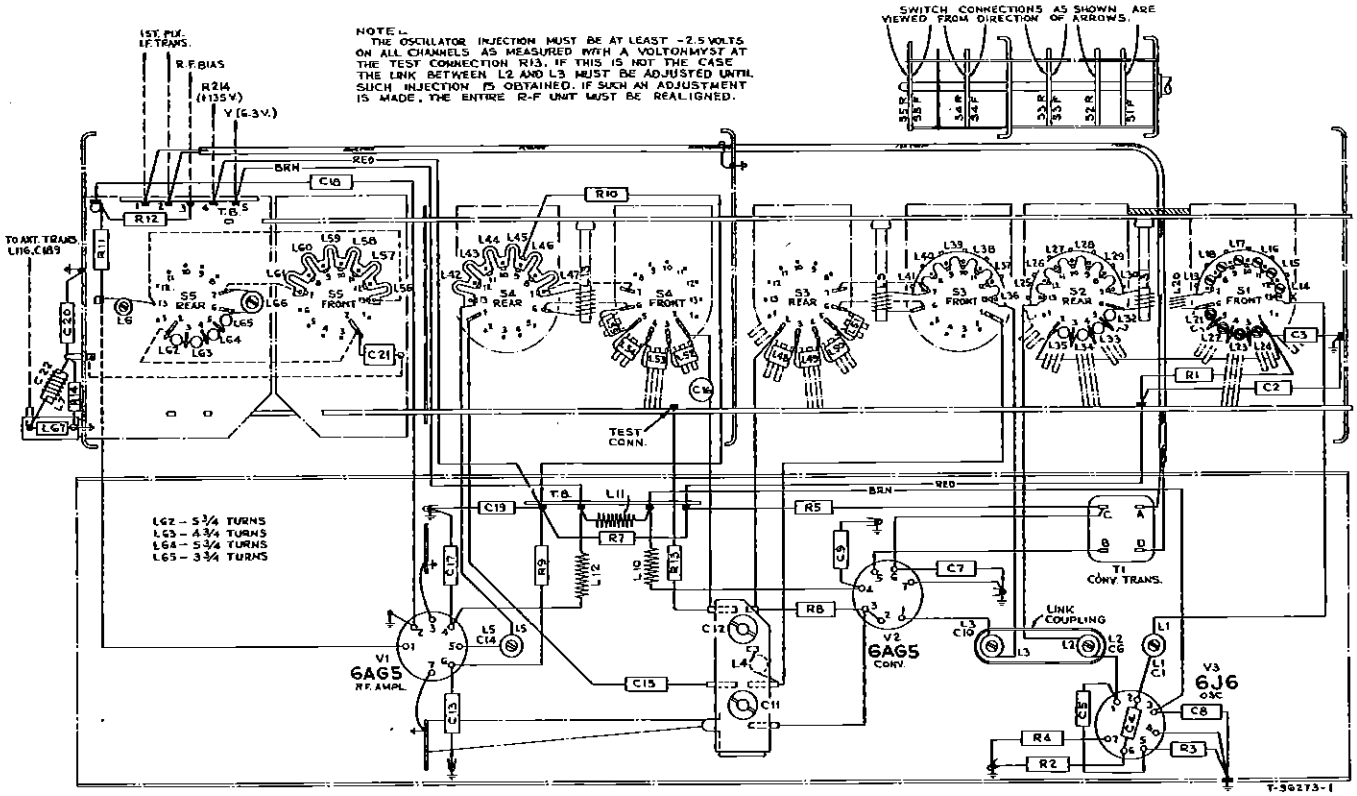


Figure 76—R-F Unit Wiring Diagram

CRITICAL LEAD DRESS:

1. The ground bus from pin 2 and the center shield of V117 socket should not be shortened or rerouted.
2. Do not change the dress of the filament leads or the bypass capacitors in the picture or sound i-f circuits. The filament leads between V117, V118 and V119 should be down against the chassis and away from grid or plate leads.
3. If it is necessary to replace any of the 1500 mmf capacitors in the picture i-f circuit, the lead length must be kept as short as possible.
4. Picture i-f coupling capacitors C106, C111, C115 and C121 should be up and away from the chassis and should be clear of the pix i-f transformer adjustments by at least ¼ inch. If the dress of any of these capacitors is changed, the i-f alignment should be rechecked.
5. Leads to L102 and L103 must be as short as possible.
6. Dress peaking coils L105, L106 and L107 up and away from the chassis.
7. Dress C183 across tube pins 5 and 6 with leads not exceeding ⅜ inch.
8. Dress C129 and C130 up and away from the chassis.
9. Dress the yellow lead from the picture control away from the chassis and away from the volume-control leads. Dress the yellow lead from pin 8 of V106 away from the chassis.
10. Dress the green lead from pin 2 of V106 away from the chassis.
11. Dress R168, R169, R170, R176 and R178 up and away from the chassis.
12. The leads to the volume control should be dressed down against the chassis and away from V117 and V118.
13. Contact between the r-f oscillator frequency adjustment screws and the oscillator coils or channel switch eyelets must be avoided.
14. Dress leads from L110 (width control coil) away from the transformer frame.
15. Dress T110 winding leads as shown in Figure 77.

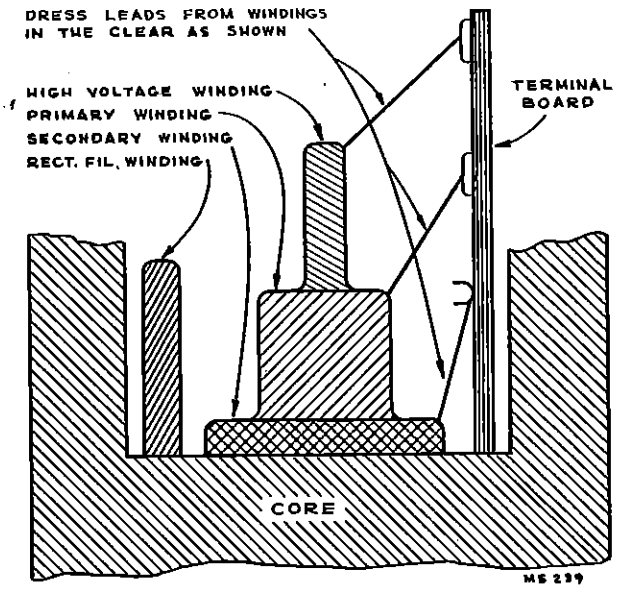
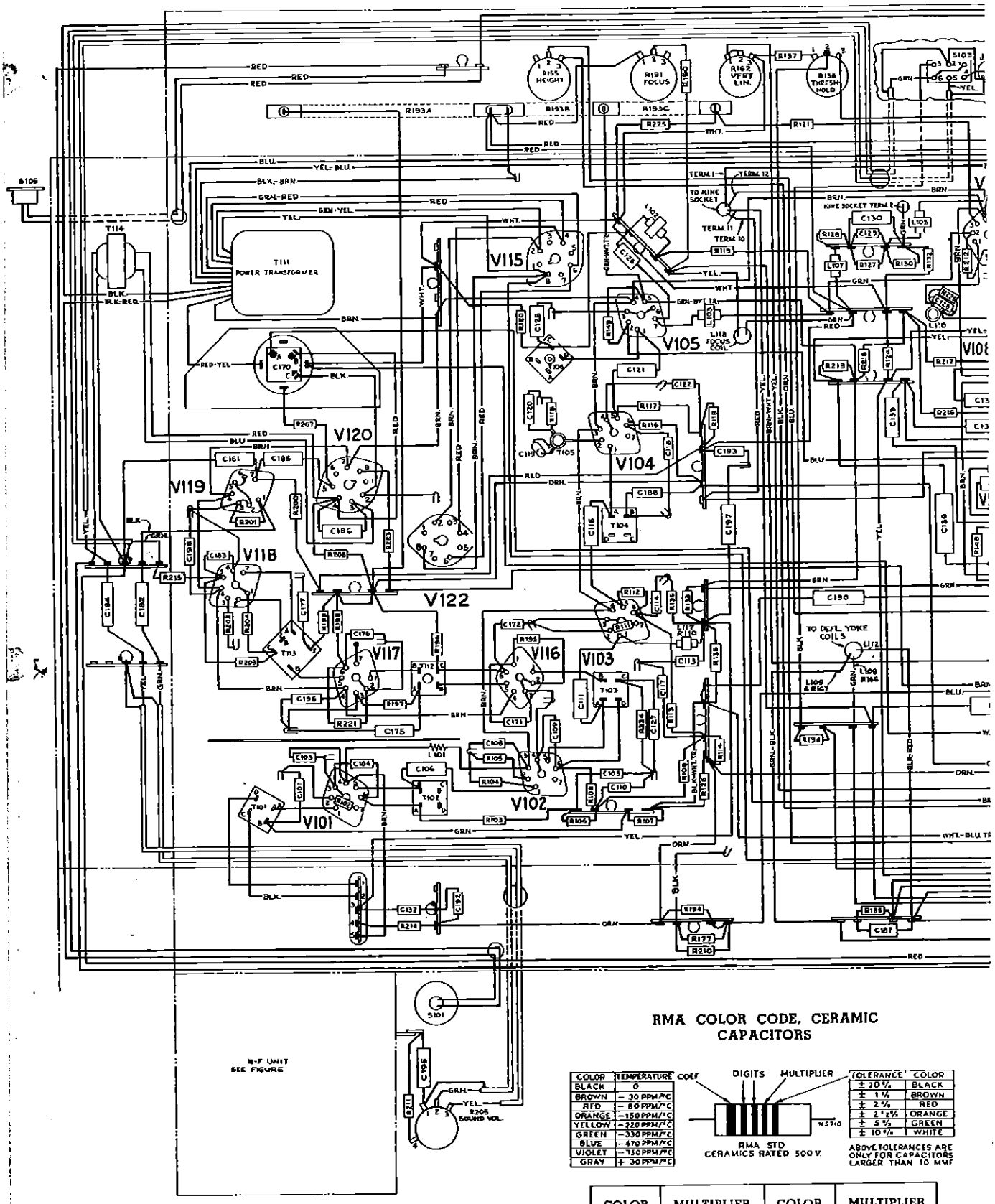


Figure 77—T110 Lead Dress



RMA COLOR CODE, CERAMIC CAPACITORS

COLOR	TEMPERATURE COEF.
BLACK	0
BROWN	− 30 PPM/°C
RED	− 80 PPM/°C
ORANGE	−150 PPM/°C
YELLOW	−220 PPM/°C
GREEN	−330 PPM/°C
BLUE	−470 PPM/°C
VIOLET	−750 PPM/°C
GRAY	+ 30 PPM/°C

RMA STD CERAMICS RATED 500 V.

TOLERANCE	COLOR
± 20 %	BLACK
± 1 %	BROWN
± 2 %	RED
± 2½ %	ORANGE
± 5 %	GREEN
± 10 %	WHITE

ABOVE TOLERANCES ARE ONLY FOR CAPACITORS LARGER THAN 10 MMF

COLOR	MULTIPLIER	COLOR	MULTIPLIER
GRAY	.01	BROWN	10
WHITE	.1	RED	100
BLACK	1.	ORANGE	1,000

For digits, use digit column, page 26.

CHASSIS WIRING DIAGRAM

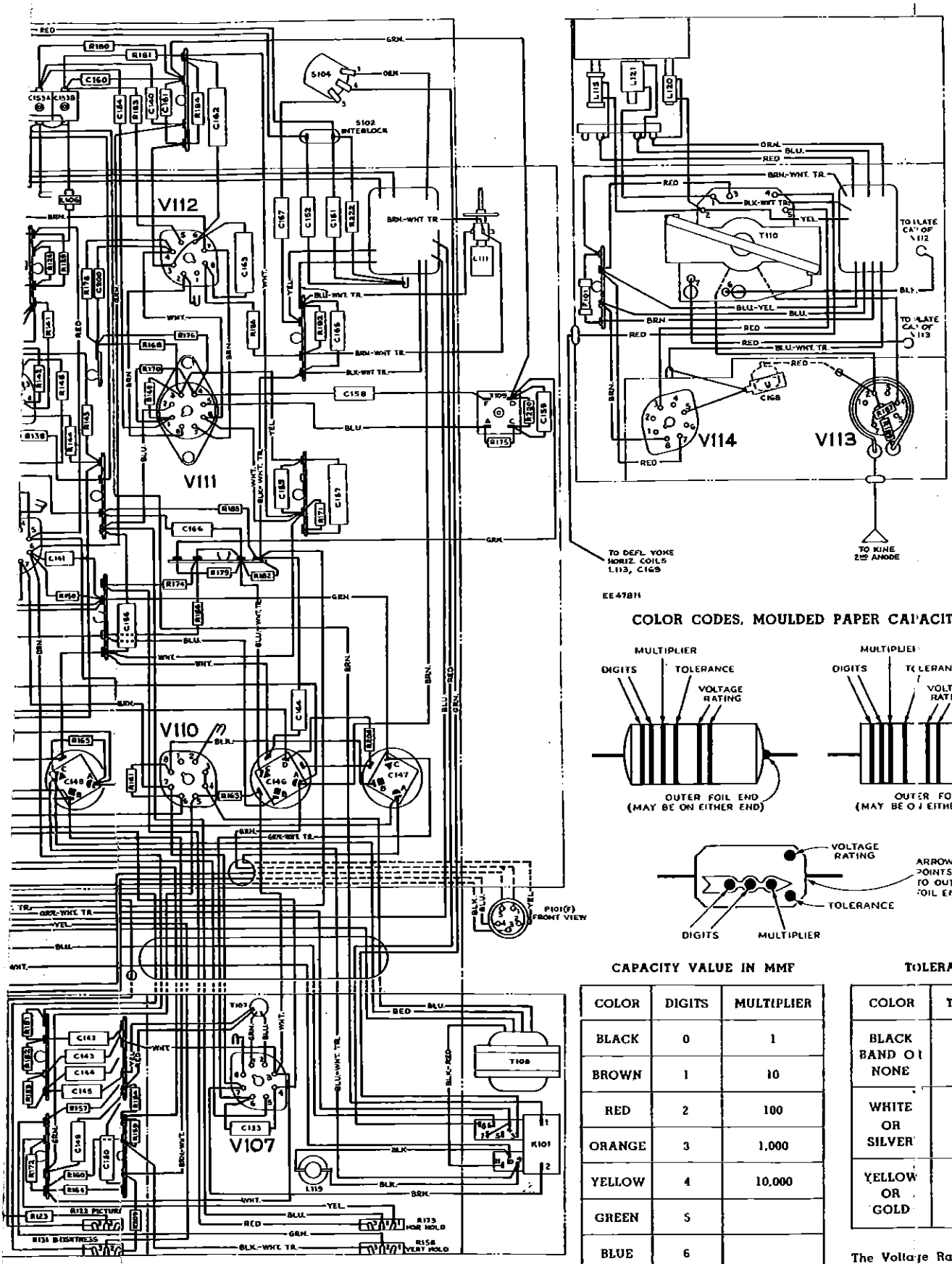


Figure 8 – Chassis Wiring Diagram

COLOR CODES, MOULDED PAPER CAPACITORS

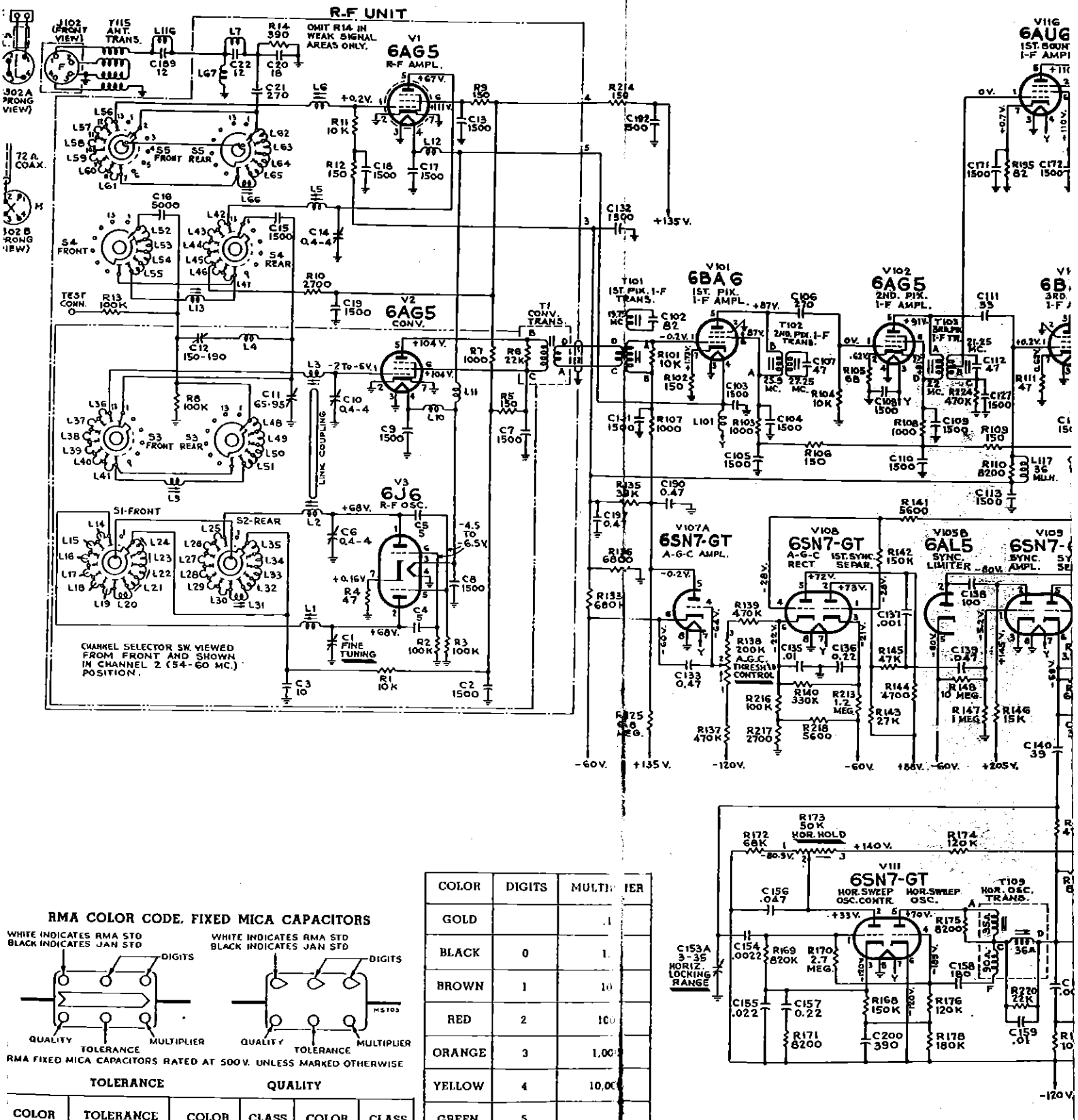
CAPACITY VALUE IN MMF

COLOR	DIGITS	MULTIPLIER
BLACK	0	1
BROWN	1	10
RED	2	100
ORANGE	3	1,000
YELLOW	4	10,000
GREEN	5	
BLUE	6	
VIOLET	7	
GRAY	8	
WHITE	9	

TOLERANCE

COLOR	TOLERAN
BLACK BAND O NONE	±20%
WHITE OR SILVER	±10%
YELLOW OR GOLD	±5%

The Voltage Rating is g
in hundreds of volts.
one band is employed
ratings under 1,000
Two bands are employe
ratings over 1,000 volts.
digit column to read vo
rating.



RMA COLOR CODE. FIXED MICA CAPACITORS

RMA FIXED MICA CAPACITORS RATED AT 500 V. UNLESS MARKED OTHERWISE

	TOLERANCE		QUALITY		
COLOR	TOLERANCE	COLOR	CLASS	COLOR	CLASS
RED	±2%	BLACK	A	YELLOW	D
GREEN	±5%	BROWN	B	GRAY	I
SILVER	±10%	RED	C	WHITE	J
BLACK	±20%	ORANGE	D		

COLOR	DIGITS	MULTIPLIER
GOLD		.1
BLACK	0	1
BROWN	1	10
RED	2	100
ORANGE	3	1,000
YELLOW	4	10,000
GREEN	5	
BLUE	6	
VIOLET	7	
GRAY	8	
WHITE	9	

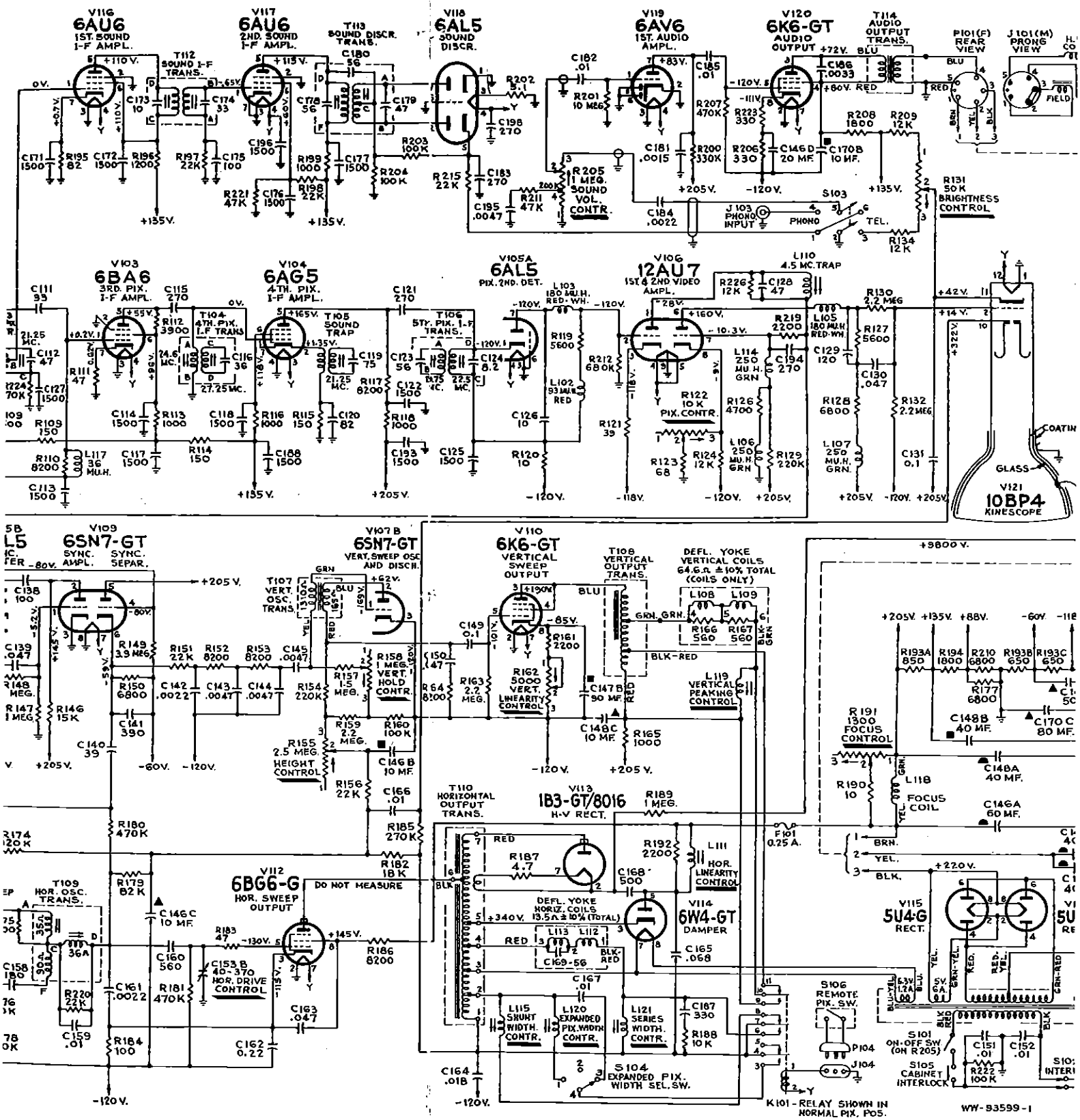
All resistance values in ohms. K = 1,000.

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

Coil resistance ohm are not show

Direction of arr cates clockwise ro

CIRCUIT SCHEMATIC DIAGRAM



Coil resistance values less than 1 ohm are not shown.

Direction of arrows at controls indicates clockwise rotation.

In some receivers, substitutions have caused changes in component lead color codes, in electrolytic capacitor values and their lug identification markings.

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

In some receivers, L117, C1 R110 are connected to the jun R135 and C190.

Figure 79—Circuit Schematic

STOCK No.	DESCRIPTION
	RF UNIT ASSEMBLIES KRK7
75069	Board—R-F unit power connection terminal board
75067	Bracket—Vertical bracket for holding r-f oscillator tube shield.
73478	Cable—I-F transmission cable (W1)
74035	Capacitor—Ceramic, 5 mmf. (C4, C5)
53511	Capacitor—Ceramic, 10 mmf. (C3)
54207	Capacitor—Ceramic, 18 mmf. (C20)
73449	Capacitor—Ceramic trimmer, 1 section of 150-190 mmf and 1 section of 65-95 mmf. (C11, C12)
73091	Capacitor—Ceramic, 270 mmf. (C21)
71501	Capacitor—Ceramic, 1,500 mmf. (C2, C7, C8, C9, C13, C15, C17, C18, C19)
73473	Capacitor—Ceramic, 5,000 mmf. (C16)
73460	Coil—R-F plate coil for channel 6 (L13)
73461	Coil—Rear section osc. plate coil for channel 6 (L20)
73462	Coil—Coupling inductance coil (L4)
73475	Coil—Antenna filter shunt coil (C67)
73476	Coil—I-F trap (L7, C22)
73477	Coil—Choke coil (L10, L11, L12)
73874	Coil—Front section osc. plate coil for channel 6 (L31)
74108	Coil—Fine tuning coil (1½ turns) with adjustable inductance core and capacitor stud (plunger adjustment) (L1, C1)
74109	Coil—Trimmer coil (1½ turns) with adjustable inductance core and capacitor stud (screw adjustment for oscillator section or convertor section) (L2, L3, C6, C10)
74110	Coil—Trimmer coil (3 turns) with adjustable inductance core and capacitor stud (screw adjustment) for r-f amplifier section (L5, C14)
73455	Core—Sliding core for fine tuning control trimmer
74187	Core—Adjustable core for coil L9
71493	Connector—Oscillator segment connector
73440	Detent—R-F unit detent mechanism and fibre shaft
71487	Form—Coil form for coil L31
73453	Form—Coil form assembly for L9, L13
73442	Link—Link assembly for fine tuning
71462	Loop—Oscillator to convertor trimmer loop connector
*74572	Plate—Front plate and bushing for KRK 7
	Resistor—Fixed, composition:
	47 ohms, ±20%, ½ watt (R4)
	150 ohms, ±20%, ½ watt (R5, R9, R12)
	390 ohms, ±10%, ½ watt (R14)
	1,000 ohms, ±20%, ½ watt (R7)
	2,700 ohms, ±10%, ½ watt (R10)
	10,000 ohms, ±20%, ½ watt (R1, R11)
	100,000 ohms, ±20%, ½ watt (R2, R3, R8, R13)

STOCK No.	DESCRIPTION
30340	Retainer—Retainer ring for fine tuning stud
70881	Screw—No. 4-40 x ¼" binder head screw for adjusting coils L14, L15, L16, L17, L18, L19
73640	Screw—No. 4-40 x ¾" adjusting screw for L6
71475	Screw—No. 4-40 x 10/32" adjusting screw for coils L21, L22, L23, L24
74575	Screw—No. 4-40 x 1 7/32" adjusting screw for L8
74573	Shaft—Channel selector shaft complete with pawl and stud
74574	Shaft—Fine tuning shaft and cam assembly
72951	Shield—Metal tube shield for V3
73632	Shield—Metal tube shield for V1
71494	Socket—Tube socket, moulded, 7 prong, saddle mounted
73450	Socket—Tube socket, ceramic, 7 prong, bottom mounted
74576	Spacer—Insulating spacer for front plate (4 required)
75068	Spring—Retaining spring for r-f oscillator tube shield
73457	Spring—Return spring for fine tuning control core
74188	Spring—Retaining spring for adjustable core RCA 74187
74578	Spring—Retaining spring for adjusting screws RCA 73640 and RCA 74575
73468	Stator—Front oscillator section stator complete with rotor, segment, coils and adjusting screws (S1, L14, L15, L16, L17, L18, L19, L21, L22, L23, L24)
73469	Stator—Rear oscillator section stator complete with rotor, segment, coils (S2, L25, L26, L27, L28, L29, L30, L32, L33, L34, L35)
73633	Stator—Antenna stator complete with rotor and coils (S5, L6, L56, L57, L58, L59, L60, L61, L62, L63, L64, L65, L66, C20)
73470	Stator—Convertor stator complete with rotor and coils (S3, L9, L36, L37, L38, L39, L40, L41, L48, L49, L50, L51)
73471	Stator—R-F amplifier stator complete with rotor and coils (S4, L13, L42, L43, L44, L45, L46, L47, L52, L53, L54, L55, C16, C18, R10)
73448	Transformer—Convertor transformer (T1, R6)
73466	Washer—Insulating washer for front shield (1 set)
74577	Washer—Spring washer for fine tuning shaft
2917	Washer—"C" washer for channel selector shaft or fine tuning shaft and cam
	CHASSIS ASSEMBLIES KRC 38C
74593	Capacitor—Mica, trimmer, 1 section of 3-35 mmf. and 1 section of 7-40 mmf. (C153A, C153B)
39604	Capacitor—Mica, 10 mmf. (C126)
74105	Capacitor—Mica, 33 mmf. (C111)

STOCK No.	DESCRIPTION
*74726	Capacitor—Mica, 39 mmf. (C140)
64062	Capacitor—Ceramic, 82 mmf. (C120)
39396	Capacitor—Ceramic, 100 mmf. (C175)
75060	Capacitor—Mica, 100 mmf., 1,000 volts (C138)
73921	Capacitor—Ceramic, 120 mmf. (C129)
73102	Capacitor—Mica, 180 mmf. (C158)
73922	Capacitor—Ceramic, 270 mmf. (C183, C194, C198)
73091	Capacitor—Mica, 270 mmf. (C106, C115, C121)
53113	Capacitor—Mica, 330 mmf. (C187)
39642	Capacitor—Mica, 390 mmf. (C141, C200)
74153	Capacitor—Hi-voltage, 500 mmf., 15,000 volts (C168)
74250	Capacitor—Mica, 560 mmf. (C160)
71501	Capacitor—Ceramic, 1,500 mmf. (C101, C103, C104, C105, C108, C109, C110, C113, C114, C117, C118, C122, C125, C127, C132, C171, C172, C176, C177, C188, C192, C193, C196)
71432	Capacitor—Electrolytic comprising 2 sections of 40 mfd., 450 volts and 1 section of 10 mfd., 450 volts (C148A, C148B, C148C)
73582	Capacitor—Electrolytic comprising 1 section of 40 mfd., 450 volts, 1 section of 10 mfd., 450 volts and 1 section of 80 mfd., 200 volts (C170A, C170B, C170C)
73583	Capacitor—Electrolytic comprising 1 section of 40 mfd., 450 volts, 1 section of 90 mfd., 150 volts and 1 section of 50 mfd., 150 volts (C147A, C147B, C147C)
73581	Capacitor—Electrolytic comprising 1 section of 60 mfd., 450 volts, 2 sections of 10 mfd., 450 volts and 1 section of 20 mfd., 150 volts (C146A, C146B, C146C, C146D)
73801	Capacitor—Tubular, paper, oil impregnated, .001 mfd., 600 volts (C137)
73802	Capacitor—Tubular, paper, oil impregnated, .0015 mfd., 600 volts (C181)
73803	Capacitor—Tubular, moulded paper, .0022 mfd., 600 volts (C154)
73595	Capacitor—Tubular, moulded paper, oil impregnated, .0022 mfd., 600 volts (C142, C161, C184)
73795	Capacitor—Tubular, paper, oil impregnated, .0033 mfd., 600 volts (C186)
73920	Capacitor—Tubular, moulded paper, oil impregnated, .0047 mfd., 600 volts (C143, C144, C145, C195)
73561	Capacitor—Tubular, paper, oil impregnated, .01 mfd., 400 volts (C135, C166, C167, C182)
73565	Capacitor—Tubular, moulded paper, .01 mfd., 1,000 volts (C151, C152, C185)
73594	Capacitor—Tubular, moulded paper, oil impregnated, .01 mfd., 600 volts (C159)
74727	Capacitor—Tubular, moulded paper, oil impregnated, .018 mfd., 1,000 volts (C164)
73562	Capacitor—Tubular, paper, oil impregnated, .022 mfd., 400 volts (C155)
73553	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 400 volts (C130, C139)
73592	Capacitor—Tubular, moulded paper, oil impregnated, .047 mfd., 600 volts (C150, C156)
73597	Capacitor—Tubular, paper, oil impregnated, .047 mfd., 1,000 volts (C163)
73815	Capacitor—Tubular, moulded paper, oil impregnated, .068 mfd., 1,000 volts (C165)
73551	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 400 volts (C149)
73557	Capacitor—Tubular, paper, oil impregnated, 0.1 mfd., 600 volts (C131)
73794	Capacitor—Tubular, paper, oil impregnated, 0.22 mfd., 400 volts (C136, C157, C162)
73787	Capacitor—Tubular, paper, oil impregnated, 0.47 mfd., 200 volts (C133, C190, C197)
74585	Coil—Focus coil (L118)
71449	Coil—Horizontal linearity control coil (L111)
71429	Coil—Width control coil (L115, L120)
*74877	Coil—Vertical peaking coil (L119)
*74878	Coil—Series width coil (L121)
71526	Coil—Peaking coil (250 mh) (L106, L107, L114)
73477	Coil—Filament choke coil (L101)
71527	Coil—Peaking coil (93 mh) (L102)
74214	Coil—Peaking coil (180 mh) (L103, L105)
74170	Coil—Peaking coil (36 mh) (L117, R110)
74594	Connector—2 contact male connector for power cable
*74879	Connector—2 contact (polarized) female connector for electronic magnifier cable (J104)
35787	Connector—Phono input connector (J103)
71789	Connector—Anode connector
12493	Connector—5 contact female connector for speaker cable (P101)
71521	Connector—Hi-voltage capacitor connector
72734	Control—Horizontal and vertical hold control (R158, R173)
74047	Control—Brightness and picture control (R122, R131)
38408	Control—Sound volume control and power switch (R205, S101)
71441	Control—Vertical linearity control (R162)
71440	Control—Height control (R155)
74597	Control—Focus control (R191)
74475	Control—AGC threshold control (R138)
71457	Cord—Power cord and plug
71437	Cover—Insulating cover for electrolytics Nos. 71432, 73581 and 73582
74418	Cushion—Rubber cushion for kinescope mounting

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
73590	Cushion—Rubber cushion for deflection yoke hook (2 required)
73600	Fuse—0.25 amp., 250 volts (F101)
71780	Grommet—Rubber grommet for yoke horizontal lead exit
67398	Grommet—Rubber grommet for mounting ceramic tube socket (2 required)
72283	Grommet—Rubber grommet for mounting relay (2 required)
73301	Magnet—Ion trap magnet (PM type)
73587	Nut—Speed nut to mount hi-voltage capacitor
18469	Plate—Bakelite mounting plate for electrolytics
74873	Relay—Electronic magnifier relay (K101)
72633	Resistor—Wire wound, 4.7 ohms, ⅓ watt (R187)
72067	Resistor—Wire wound, 5.1 ohms, ½ watt (R202)
18471	Resistor—Wire wound, 10 ohms, ½ watt (R190)
73588	Resistor—Voltage divided comprising 1 section of 850 ohms, 12 watts and 2 sections of 650 ohms, 6 watts (R193A, R193B, R193C)
	Resistor—Fixed, composition:
	10 ohms, ±20%, ½ watt (R120)
	18 ohms, ±10%, ½ watt (R225)
	39 ohms, ±10%, ½ watt (R121)
	47 ohms, ±5%, ½ watt (R111)
	47 ohms, ±20%, ½ watt (R183)
	68 ohms, ±10%, ½ watt (R105)
	68 ohms, ±20%, ½ watt (R123)
	82 ohms, ±10%, ½ watt (R195)
	100 ohms, ±10%, 2 watt (R184)
	150 ohms, ±5%, ½ watt (R102)
	150 ohms, ±10%, ½ watt (R115)
	150 ohms, ±20%, ½ watt (R106, R109, R114, R214)
	330 ohms, ±10%, ½ watt (R206, R223)
	1,000 ohms, ±20%, ½ watt (R103, R107, R108, R113, R116, R118, R165, R199)
	1,200 ohms, ±10%, ½ watt (R196)
	1,800 ohms, ±10%, 2 watt (R194, R208)
	2,200 ohms, ±10%, ½ watt (R219)
	2,200 ohms, ±10%, 1 watt (R192, R161)
	2,700 ohms, ±10%, ½ watt (R217)
	3,900 ohms, ±5%, ½ watt (R112)
	4,700 ohms, ±5%, ½ watt (R126)
	4,700 ohms, ±10%, ½ watt (R144)
	5,600 ohms, ±10%, ½ watt (R141, R218)
	5,600 ohms, ±10%, 1 watt (R127)
	6,800 ohms, ±5%, ½ watt (R136)
	6,800 ohms, ±10%, ½ watt (R150)
	6,800 ohms, ±5%, 1 watt (R128)
	6,800 ohms, ±10%, 2 watt (R177, R210)
	8,200 ohms, ±5%, ½ watt (R164, R175)
	8,200 ohms, ±10%, ½ watt (R152, R153, R171)
	8,200 ohms, ±5%, 1 watt (R117)
	8,200 ohms, ±10%, 2 watt (R186)
	10,000 ohms, ±5%, ½ watt (R104)
	10,000 ohms, ±10%, ½ watt (R188)
	12,000 ohms, ±10%, ½ watt (R134, R209, R226)
	12,000 ohms, ±10%, 2 watt (R124)
	15,000 ohms, ±10%, 1 watt (R146)
	18,000 ohms, ±10%, 1 watt (R182)
	22,000 ohms, ±10%, ½ watt (R151, R197, R220, R156)
	22,000 ohms, ±20%, ½ watt (R198, R215)
	27,000 ohms, ±10%, ½ watt (R143)
	39,000 ohms, ±5%, ½ watt (R135)
	47,000 ohms, ±10%, ½ watt (R145, R211)
	47,000 ohms, ±20%, ½ watt (R221)
	68,000 ohms, ±10%, ½ watt (R172)
	82,000 ohms, ±10%, 1 watt (R179)
	100,000 ohms, ±5%, ½ watt (R203, R204)
	100,000 ohms, ±10%, ½ watt (R160, R216)
	100,000 ohms, ±20%, 1 watt (R222)
	120,000 ohms, ±5%, 1 watt (R176)
	120,000 ohms, ±10%, 1 watt (R174)
	150,000 ohms, ±10%, ½ watt (R168)
	150,000 ohms, ±20%, ½ watt (R142)
	180,000 ohms, ±5%, 1 watt (R178)
	220,000 ohms, ±10%, ½ watt (R129, R154)
	270,000 ohms, ±10%, ½ watt (R185)
	330,000 ohms, ±10%, ½ watt (R140, R200)
	470,000 ohms, ±5%, ½ watt (R207)
	470,000 ohms, ±10%, ½ watt (R137, R139, R180, R224, R181)
	680,000 ohms, ±10%, ½ watt (R133, R212)
	820,000 ohms, ±5%, ½ watt (R169)
	1 megohm, ±10%, ½ watt (R147)
	1 megohm, ±20%, 1 watt (R189)
	1.2 megohm, ±5%, ½ watt (R213)
	1.5 megohm, ±5%, ½ watt (R157)
	2.2 megohm, ±10%, ½ watt (R130, R132, R159, R163)
	2.7 megohm, ±5%, 1 watt (R170)
	3.9 megohm, ±10%, ½ watt (R149)
	6.8 megohm, ±10%, ½ watt (R125)
	10 megohm, ±10%, ½ watt (R148)
	10 megohm, ±20%, ½ watt (R201)
74416	Screw—No. 10-32 x 1¾" cross-recessed round head screw for kinescope retaining strap
71456	Screw—No. 8-32 wing screw for deflection yoke
74601	Screw—No. 8-32 x ⅜" cross-recessed binder head screw for focus coil mounting (2 required)
74602	Screw—No. 10-32 x 1¼" cross-recessed round head screw for focus coil adjustment (3 required)
73584	Shield—Tube shield

REPLACEMENT PARTS (Continued)

STOCK No.	DESCRIPTION
74937	Sleeve—Rubber sleeve for focus coil
73117	Socket—Tube socket, 7 pin, miniature
72927	Socket—Tube socket, 9 pin, miniature
31251	Socket—Tube socket, octal, wafer
73249	Socket—Tube socket, octal, ceramic, plate mounted
71508	Socket—Tube socket for 8016
72741	Socket—Kinescope socket
74936	Spring—Suspension spring for kinescope socket leads
73586	Spring—Compression spring used under centering control screws (3 required)
74595	Spring—Anode lead spring
*74735	Strap—Kinescope retaining strap
74596	Support—Bakelite supports (1 set) for mounting hi-voltage rectifier tube mounting plate
*74872	Switch—Width selector switch (S104)
46760	Switch—"TV"—Phono switch (S103)
71457	Switch—Interlock switch (S105)
73569	Transformer—Vertical oscillator transformer (T107)
71419	Transformer—Sound output transformer (T114)
74589	Transformer—First pix i-f transformer (T101, C102, R101)
74590	Transformer—Second pix i-f transformer (T102, C107)
74591	Transformer—Third pix i-f transformer (T103, C112)
74592	Transformer—Fourth pix i-f transformer (T104, C116)
73575	Transformer—Fifth pix i-f transformer (T106, C123, C124)
71424	Transformer—Sound i-f transformer (T112, C173, C174)
71427	Transformer—Sound discriminator transformer (T113, C178, C179, C180)
73576	Transformer—Horizontal oscillator transformer (T109)
73578	Transformer—Antenna transformer complete with socket and bracket (T115, J102)
*74874	Transformer—Power transformer, 115 volts, 60 cycle (T111)
*74875	Transformer—Vertical output transformer (T108)
*74876	Transformer—Horizontal output and hi-voltage transformer (T110)
73577	Trap—4.5 mc trap (L110, C128)
71778	Trap—Sound trap (T105, C119)
73476	Trap—I-F trap (L116, C189)
71420	Yoke—Deflection yoke (L108, L109, L112, L113, C169, R166, R167)

STOCK No.	DESCRIPTION
	SPEAKER ASSEMBLIES 970773-1
71560	Connector—5 contact male connector for speaker (J101)
74599	Speaker—5" x 7" EM speaker complete with cone and voice coil
	Note: If stamping in instruments does not agree with above speaker number, order replacement parts by referring to model number of instrument, number stamped on speaker and full description of part required.
	MISCELLANEOUS
*74880	Back—Cabinet back
75039	Board—"Ant" terminal board
*74883	Case—Plastic case and bottom cover for electronic magnifier switch
X3037	Cloth—Grille cloth only
39153	Connector—4 contact male connector for antenna cable (P102)
*74882	Connector—3 contact male connector for electronic magnifier cable (P104)
74638	Cushion—Vinylite cushion for safety glass
74627	Decal—Control panel function decal
73180	Emblem—"RCA Victor" emblem
73642	Escutcheon—Channel marker escutcheon
74631	Foot—Rubber foot (4 required)
74632	Gasket—Cork gasket for safety glass
74629	Glass—Safety glass
74000	Knob—Horizontal hold control or picture control knob—inner
74635	Knob—Station selector knob
74636	Knob—Fine tuning control knob
73998	Knob—Vertical hold control or brightness control knob
74002	Knob—Sound volume control and power switch knob
74633	Nut—Speed nut for safety glass retainers
74630	Panel—Removable grille panel and cloth assembly
74162	Plate—Mounting plate for interlock switch
74628	Retainers—Safety glass retainers (1 set)
30330	Spring—Retaining spring for knob 74000
14270	Spring—Retaining spring for knobs 73998, 74002, 74635 and 74636
73643	Spring—Spring clip for channel marker escutcheon
*74881	Switch—Electronic magnifier switch (S106)

To obtain resistors for which no stock number is given, order by stating type, value of resistance, tolerance and wattage.

*This is the first time this Stock No. has appeared in Service Data.

APPLY TO YOUR RCA DISTRIBUTOR FOR PRICES OF REPLACEMENT PARTS