10" AND 12 1/2" TWENTY TUBE DIRECT VIEW TELEVISION TABLE AND CONSOLE RECEIVERS

<table>
<thead>
<tr>
<th>Catalog No.</th>
<th>Chassis No.</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9123</td>
<td>110-499</td>
<td>10&quot; Table Model Television Receiver</td>
</tr>
<tr>
<td>9124</td>
<td>110-499-1</td>
<td>12 1/2&quot; Table Model Television Receiver</td>
</tr>
<tr>
<td>9126</td>
<td>110-499-2</td>
<td>12 1/2&quot; Console Model Television Receiver</td>
</tr>
</tbody>
</table>

TABLE MODEL

GENERAL DESCRIPTION

The above television receivers are of the Inter-carrier Sound type of Television receiver using 20 tubes including rectifiers and Kinescope tube. This receiver has complete coverage of the television band, channel 2 thru channel 13. Features of this receiver are clear, bright pictures, good picture-stability, and noise free F.M. sound. The receiver is operated by means of seven controls located on the front of the cabinet. One additional control is provided on the Console Model to switch from built-in antenna to the outdoor antenna.

SPECIFICATIONS

R.F. FREQUENCY RANGE

<table>
<thead>
<tr>
<th>CHANNEL NUMBER</th>
<th>CHANNEL FREQ.</th>
<th>PICTURE CARRIER</th>
<th>SOUND CARRIER</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>54 - 60MC.</td>
<td>55.25MC.</td>
<td>59.75MC.</td>
</tr>
<tr>
<td>3</td>
<td>66 - 72</td>
<td>61.25</td>
<td>65.75</td>
</tr>
<tr>
<td>4</td>
<td>66 - 72</td>
<td>67.25</td>
<td>71.75</td>
</tr>
<tr>
<td>5</td>
<td>76 - 82</td>
<td>77.25</td>
<td>81.75</td>
</tr>
<tr>
<td>6</td>
<td>82 - 88</td>
<td>82.25</td>
<td>87.75</td>
</tr>
<tr>
<td>7</td>
<td>174 - 180</td>
<td>175.25</td>
<td>179.75</td>
</tr>
<tr>
<td>8</td>
<td>180 - 186</td>
<td>181.25</td>
<td>185.75</td>
</tr>
<tr>
<td>9</td>
<td>186 - 192</td>
<td>187.25</td>
<td>191.75</td>
</tr>
<tr>
<td>10</td>
<td>192 - 198</td>
<td>193.25</td>
<td>197.75</td>
</tr>
<tr>
<td>11</td>
<td>198 - 204</td>
<td>199.25</td>
<td>203.75</td>
</tr>
<tr>
<td>12</td>
<td>204 - 210</td>
<td>205.25</td>
<td>209.75</td>
</tr>
<tr>
<td>13</td>
<td>210 - 216</td>
<td>211.25</td>
<td>215.75</td>
</tr>
</tbody>
</table>

TUBE COMPLEMENT (EXCLUSIVE OF R.F. TUNER, SEE SECTION ON TUNERS)

<table>
<thead>
<tr>
<th>TUBE NO.</th>
<th>TUBE TYPE</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V4</td>
<td>6A06</td>
<td>1st I.F. Amplifier</td>
</tr>
<tr>
<td>V5</td>
<td>6A06</td>
<td>2nd I.F. Amplifier</td>
</tr>
<tr>
<td>V6</td>
<td>6A06</td>
<td>3rd I.F. Amplifier</td>
</tr>
<tr>
<td>V7</td>
<td>6A06</td>
<td>Video detector and automatic gain control</td>
</tr>
<tr>
<td>V8</td>
<td>6A06</td>
<td>Video amplifier</td>
</tr>
<tr>
<td>V9</td>
<td>6A06</td>
<td>Ratio detector driver</td>
</tr>
<tr>
<td>V10</td>
<td>6T8</td>
<td>Ratio detector and first audio</td>
</tr>
<tr>
<td>V11</td>
<td>6V9GT</td>
<td>Audio output</td>
</tr>
<tr>
<td>V12</td>
<td>10BP4</td>
<td>Kinescope 10&quot;</td>
</tr>
<tr>
<td>V13</td>
<td>12LP4</td>
<td>Kinescope 12 1/2&quot;</td>
</tr>
<tr>
<td>V14</td>
<td>6SN7</td>
<td>D.C. rectifier, Sync clipper, Sync amplifier and phase splitter</td>
</tr>
<tr>
<td>V15</td>
<td>6A06</td>
<td>Vertical sweep oscillator and Vertical sweep amplifier</td>
</tr>
<tr>
<td>V16</td>
<td>12AU7</td>
<td>Horizontal phase detector</td>
</tr>
<tr>
<td>V17</td>
<td>6BG9G</td>
<td>Horizontal sweep oscillator</td>
</tr>
<tr>
<td>V18</td>
<td>1B3-8016</td>
<td>Horizontal sweep output</td>
</tr>
<tr>
<td>V19</td>
<td>6W4</td>
<td>High Voltage rectifier</td>
</tr>
<tr>
<td>V21</td>
<td>6X50T</td>
<td>Horizontal dimmer</td>
</tr>
<tr>
<td>V21</td>
<td>6W4</td>
<td>Medium voltage rectifier</td>
</tr>
<tr>
<td>V21</td>
<td>6X50T</td>
<td>Low voltage rectifier</td>
</tr>
</tbody>
</table>

POWER SUPPLY RATING

All models 117 volts AC 60 cycle operation unless otherwise specified. Power consumption 180 watts.

AUDIO POWER OUTPUT

5.5 Watts.

FIGURE 1. BLOCK DIAGRAM

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CIRCUIT DESCRIPTION

In the mixer stage, of an intercarrier sound system of a television receiver, both the picture and sound carriers are heterodyned by the local oscillator. Both i.f. carriers thus created and their respective side bands are then amplified by the i.f. amplifiers and are demodulated by the video detector. The output of the video detector is then further amplified by the video amplifier.

In the plate circuit of the video amplifier the frequency modulated intercarrier signal is separated from the video signal. The video signal is fed directly to the Kinescope grid. The sound signal is further amplified and fed to the ratio detector. The output of the ratio detector is then amplified and fed to the loud speaker.

The sound output is nearly independent of the setting of the contrast control because in most settings of the contrast control the 4.5 MC sound i.f. amplifier is operating in an overload condition.

For ease in understanding the basic operation of this receiver a 16 unit block diagram of its operation is shown in FIGURE 1. The circuit description will follow the numerical order of these blocks in order to logically follow a signal through the receiver.

R.F. TUNER (Block #1)

A description of the R.F. tuner and its operation will be found in a separate section of this manual.

VIDEO AND SOUND I.F. AMPLIFIERS (Block #2)

The video and sound i.f. amplifier consist of three stages using 6AL6 tubes. It is very simple to align because it uses only four tuning circuits and they are resonated at only two frequencies.

The bandpass characteristic of this amplifier is shown in FIGURE 23. It is important to note that the two peaks of this bandpass curve do not correspond to the alignment frequency. It is also recommended that no attempt should be made to observe this bandpass by means of a sweep generator. The i.f.'s should be adjusted to their alignment frequencies and left alone. The bandpass of these i.f.'s at about fifty per cent voltage response is approximately 3 MC.

PICTURE DETECTOR (Block #3)

The picture detector is one half of a 6AL5 tube connected as a conventional half wave rectifier. It produces video signal of the proper polarity with a frequency modulated sound beat.

VIDEO AMPLIFIER (Block #4)

The video amplifier uses a 6AC7 tube that is direct coupled to the video detector and capacitive coupled to the Kinescope grid. The circuit is so designed so as to give good noise clipping due to the fact the peaks of the synchronizing signals are at the knee of the plate voltage to plate current characteristics of the tube.

In the plate circuit of the video amplifier we find the sound take-off that is tuned to 4.5 MC. In addition to this there are two peaking coils and two plate load resistors. These resistors are effectively in parallel but are connected to different voltage sources so as to provide an effective voltage of around 315 volts on the video amplifier plate.

The contrast control in addition to varying the automatic gain control delay voltage also varies the video amplifier bias and the amount of A.C. degeneration. This results in the clipping level and maximum output remaining relatively constant from the weakest to the strongest signal.

It has been found that a crisper picture results when the response of the video amplifier is peaked towards the high frequency end of the curve. However, it must be noted that increasing the high frequencies will increase the apparent noise in the picture. This receiver is therefore so designed that the amount of A.C. degeneration will vary with the setting of the contrast control resulting in little or no peaking of the high frequencies when the contrast control is advanced as used for the reception of weak signals.

SOUND I.F., RATIO DETECTOR AND FIRST AUDIO (Block #5)

The frequency modulated sound beat is taken from the video amplifier plate by means of a sound take-off coil. The signal is then amplified by a 6AL6 tube functioning as a ratio detector driver and demodulated by two diodes in a 6T8 tube operating as a ratio detector. The triode section of the 6T8 tube is functioning as the first audio amplifier. The audio volume is adjusted by means of a volume control connected to the grid coupling condenser of this tube.

AUDIO OUTPUT AMPLIFIER (Block #6)

The audio output tube is a 6V6 capable of about five watts of audio power. This is fed to a 5 inch permanent magnet speaker on the tables models and to a 10 inch permanent speaker on the console models.

D.C. RESTORER AND SYNC CLIPPER (Block #7)

The D.C., restorer and sync clipper is one half of a 12AT7 tube. The grid and cathode form a diode that clips the sync signal from the composite signal. The voltage developed across the resistor connected between cathode and grid is a function of the average applied signal and thus provides the required D.C. restoration. A small positive voltage is applied to the plate of this tube. During the tube conduction electrons are first drawn to the plate because it is positive with respect to the grid until its voltage drops to approximately that of the grid. At this point the excess electrons go to the grid thus holding the plate to approximately zero potential. This clips the sync on the other side and prevents noise pulses from exceeding the peak amplitude of the sync signal.

SYNC AMPLIFIER AND HORIZONTAL PHASE SplitTER (Block #8)

The second half of the 12AU7 tube is used to amplify and reverse the phase of the vertical sync pulses that are taken from the plate in positive form and fed thru an intergrating network to the vertical sweep oscillator.

The horizontal pulses are also taken from the plate and cathode in both positive and negative form of equal amplitude and fed to the horizontal phase detector.

VERTICAL SWEEP OSCILLATOR AND OUTPUT (Block #9)

One triode of a 6SN7 tube is used as a conventional vertical sweep blocking oscillator while the other triode is used as the vertical output tube. The blocking oscillator is tripped by the incoming sync signal. The oscillator is brought into sync by adjusting the grid resistor. The height is controlled by adjusting the charge rate of C47. The vertical linearity is controlled by adjusting the bias on the vertical sweep output tube.

The plate of the output tube is connected to a transformer which in turn is connected to the vertical coils in the yoke and provides them with a saw tooth current.

KINESCOPE (Block #10)

The Kinescope is a 10 or 12 1/2" tube employing a screen material which provides considerable picture brilliance. The tube employs magnetic deflection and magnetic focus. An ion trap is employed to prevent the ion beam from producing a brown spot on the picture screen. The inside and outside of the flaring portion of the bulb are given a metallic coating. The inner coating, which is the second anode, is connected to the high voltage supply. The outer coating is grounded by means of two small springs on the deflection yoke support. The capacity between the two coatings is approximately 500 mmfd. and is used as a high voltage filter condenser.

HORIZONTAL PHASE DETECTOR (Block #11)

A 6AL5 tube is used as a phase detector to compare the phase of the horizontal sync pulses with the phase of the saw tooth voltage derived from the pulses across the secondary of the horizontal output transformer. The D.C. voltage developed by the difference in phase of the above two pulses is used to control the frequency of the horizontal oscillator.

HORIZONTAL OSCILLATOR AND OUTPUT (Block #12)

A type 12AU7 tube is used as a Horizontal oscillator and discharge tube. The output of the oscillator which is a saw tooth with a peaking component is fed into the grid of a 6SG6 Horizontal output tube. The output of this tube is fed into the Horizontal yoke and it is also used to develop the high voltage for the kinescope tube.

HIGH VOLTAGE RECTIFIER AND DAMPER TUBE (Block #13)

The high voltage supply is a conventional type of Horizontal fly-back supply with its associated damper tube. The high voltage rectifier is a 1B5 or 1B6 type of tube while the damper tube is a 6W4.
AUTOMATIC GAIN CONTROL (Block #14)

One half of the 6A1.5 video detector is used to supply automatic gain control voltage to control the bias on the R.F. and I.F. stages of this receiver. 2.5 volts of delay is supplied to this circuit which is controlled by the contrast control. The delay is at maximum with maximum contrast and at zero with minimum contrast. This increases the range of the contrast control and also increases the sensitivity of the receiver.

LOW AND MEDIUM VOLTAGE RECTIFIERS (Block #15 & 16)

A 5U4G is used as a 360 volt full wave rectifier while a 6X5GT is used as a 150 volt full wave rectifier.

FRONT PANEL CONTROLS

(1) CONTRAST CONTROL (PICTURE)

The contrast control operates by varying the delay voltage on the AGC diode and the bias on the video amplifier. Due to the use of AGC in this receiver the picture control should not require re-adjustment when channels are switched except where the signal received from different stations varies greatly.

(2) BRIGHTNESS CONTROL

The brightness control operates by varying the D.C. voltage on the cathode of the Cathode Ray tube, thereby controlling the light on the face of the tube.

(3) HORIZONTAL CONTROL

The horizontal control on the front panel is a fine frequency regulator for the horizontal sweep oscillator. Its setting is not critical and is used to restore sync when necessary.

(4) VERTICAL CONTROL

The vertical control regulates the frequency of the vertical oscillator. Misadjustment of this control will cause the picture to "roll" up or down. The setting is not normally critical.

(5) OFF - ON SOUND CONTROL

The OFF - ON switch is located on the rear of this control and is operated by rotating the control until a click is heard. This switch turns the television receiver on or off. This control is also used to control the volume of the sound from the receiver.

(6) STATION SELECTOR

This control selects the channel desired for viewing.

(7) FINE TUNING CONTROL

This control varies the local R.F. Oscillator Frequency. Correct adjustment will result in a picture with maximum definition. This is not a control for tuning the sound.

(8) ANTENNA CONTROL

This control is found on console models only. It is used to switch from the built-in antenna to the outside antenna. The built-in antenna will operate satisfactorily in most locations and sometimes it will be found to operate better than an outdoor antenna.

CHASSIS CONTROLS

These controls have been properly adjusted at the factory. If it becomes necessary to readjust these controls, the correct method of adjustment will be found under "PICTURE ADJUSTMENTS".

(1) HEIGHT CONTROL

The height control varies the input to the vertical sweep amplifier. Since changes in height will affect picture linearity this control should be used in conjunction with the Vertical Linearity Control.
DO NOT OPEN THE KINESCOPE SHIPPER CARTON, INSTALL, OR MOVE THE KINESCOPE IN ANY MANNER UNLESS EYE PROTECTION GOGGLES AND HEASY GLOVES ARE WORN. PERSONS NOT SO EQUIPPED SHOULD BE KEEP AWAY WHILE HANDLING KINESCOPES. THE LARGE END OF THE KINESCOPE BULB, PARTICULARLY THAT PART AT THE OPENING OF THE VIEWING SURFACE, MUST NOT BE STRUCK, SCRATCHED, OR SUBJECTED TO MORE THAN MODERATE PRESSURE AT ANY TIME. IN INSTALLATION OR REMOVING, IF THE TUBE IS NOT PLACED SMOOTHLY INTO ITS SOCKET, OR DEFLECTING YOKE INVESTIGATE AND REMOVE THE CAUSE OF THE TROUBLE. DO NOT FORCE THE TUBE.

To remove the kinescope from the chassis proceed as follows:

1. Remove the nut from the base of the tube by sliding the socket straight back.
2. Loosen the screws holding the pin trap magnet in place and slide the magnet straight back off the tube. The screws are held in place by springs instead of nuts.
3. Remove the centering rings by sliding straight back. (There may be either one or two centering rings.)
4. If there is a centering ring located between the yoke and the focus coil the screws mounting the focus coil in the brackets must be removed and the focus coil slid back and off the neck of the tube. This will allow you to slide the centering ring off the neck of the tube. If there is no centering ring at this point it will not be necessary to remove the focus coil.
5. Remove the thumb screws holding the strap around the face of the kinescope tube.
6. Lift the kinescope slightly so as to clear the front brackets and slide the tube straight forward.
7. Replace the kinescope tube reverse the above operations. Be sure that the face of the tube is in contact with the two front support brackets and the yoke support is slid forward so that the end of the tube is supported in the rubber collar.

PARTS REMOVAL

TO REMOVE THE CHASSIS FROM THE CABINET

1. Remove the screws holding the back to the cabinet.
2. On the chassis remove, the screws holding the rear panel to the cabinet. On the chassis models receive, remove the antenna connector plug connecting the antenna terminal strip and the back to the chassis.
3. Remove the screw from the rear and remove the plug from the speaker socket.
4. Remove all the knobs from the face of the cabinet by pulling them straight out.
5. Remove the four mounting screws from the base of the chassis. These screws will be found under the cabinet in the table models and under the chassis mounting board in the console models.
6. Slide the chassis straight out of the back of the cabinet.
7. To replace the chassis into the cabinet reverse the operations listed above.

TO REMOVE THE KINESCOPE FROM THE CHASSIS

CAUTION

THE KINESCOPE BULB ENCLOSES A HIGH VACUUM AND DUE TO ITS LARGE AREA IS SUBJECT TO CONSIDERABLE AIR PRESURE. FOR THESE REASONS, KINESCOPE TUBES MUST BE HANDLED WITH EXTREME CARE.

ADJUSTMENTS

ADJUSTMENTS OF KINESCOPE CONTROLS

If it should become necessary to readjust the Kinescope controls proceed as follows:

ION TRAP MAGNET ADJUSTMENT

1. Turn the On-Off switch to the ON or clockwise position.
2. Turn the picture control fully counterclockwise.
3. Turn the BRIGHTNESS control fully clockwise.
4. The rear pin trap magnet should be approximately one of the pin trap flags as shown in Figure 7. Starting from this position adjust the pin trap magnet by sliding it forward or backward, at the same time rotating it slightly around the neck of the tube for the best picture on the screen.
5. Tighten the pin trap magnet adjustment screws sufficiently to hold it in this position but still be free to permit further adjustment.
6. Reduce the brightness control until the picture is visible.
7. Adjust the focus control from the picture is clearly visible.
8. Retighten the pin trap magnet for maximum visibility. The final touch at this point is to check the brightness control at the maximum position of which great care can be maintained. THIS ADJUSTMENT SHOULD BE MADE ONLY AFTER THE PICTURE IS PROPERLY ADJUSTED AS DESCRIBED IN THE FOLLOWING PARAGRAPH. ADJUSTMENT OF THE CENTERING RINGS AND THE FOCUS COIL WILL CAUSE A CHANGE IN THE ADJUSTMENT OF THE ION TRAP MAGNET.
9. Tighten the pin trap magnet adjustment thumb screws, these pin trap magnets are held by springs and have no adjustment screws.

FIGURE 7 - ION TRAP FLAGS

FOCUS COIL AND CENTERING RINGS

1. Turn the centering rings around the neck of the tube keeping the rear centering ring in place with the focus coil as far forward as possible, until the picture is centered and there are no shadows appearing on the screen. If necessary, the focus control may be readjusted.
2. Center the focus coil is Figure 6 on the rear of chassis until the lines are in sharp focus. It may be necessary to reposition the pin trap magnet as indicated in step 4 above.

DEFLECTING YOKE ADJUSTMENT

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

PICTURE ADJUSTMENTS

In order to proceed with the adjustments it will be necessary to obtain a test pattern. To accomplish this follow the operating instructions in the operating instructions manual.
ALIGNMENT PROCEDURE

TEST EQUIPMENT REQUIRED

To service this receiver according to the alignment procedure given below, the following test equipment will be required:

1. Signal Generator with an output variable between 100 and 10,000 micro-volts and crystal controlled or crystal calibrated at the following frequencies.
   (a) 4.5 megacycles
   (b) 22.8 megacycles
   (c) 25.2 megacycles
2. R.F. Sweep Generator with a frequency range from 40 to 220 megacycles with a sweep width of 10 megacycles and an adjustable output of at least 0.1 volts.
3. Crystal controlled or crystal calibrated markers for the sound carrier of each Television channel. Picture carrier markers are desirable but not necessary.
4. Cathode Ray Oscilloscope
5. Vacuum Tube Voltmeter (V.T.V.M.)

CAUTION

THE SECOND ANODE LEAD TO THE PICTURE TUBE HAS A POTENTIAL OF APPROXIMATELY 10,000 VOLTS. DURING ALIGNMENT IT IS ADVISABLE TO REMOVE THE Bd566 TUBE FROM ITS SOCKET TO ELIMINATE THIS 10,000 VOLT HAZARD.

I.F. ALIGNMENT

(1) Adjust the PICTURE control for 1 volt measured from pin “a” to chassis. (V8=6AC7)
(2) Connect the V.T.V.M. across the 8200 ohm resistor R17 in the cathode of the 6AL5 video detector, V7A.
(3) Connect the signal generator to the test loop located on top of tuner #1.
(4) Adjust the signal generator to 22.8 megacycles with sufficient output to develop approximately 2.5 volts on the meter.
(5) Adjust L1 and L4 for maximum reading.
(6) Adjust the signal generator for 25.2 megacycles.
(7) Adjust L3 and L6 for maximum reading.
(8) Re-check operations 4, 5, 6 and 7. This completes the alignment of the I.F. Amplifier.

ALIGNMENT OF RADIO DETECTOR DRIVER AND RATIO DETECTOR

(1) Connect the V.T.V.M. across the 47,000 ohm resistor R31 in the diode of the radio detector tube 6T8, V10. The negative side of the meter goes to the diode plate.
(2) Connect the signal generator in series with a .001 microfarad condenser to the gridpin #4 of the Video amplifier 6AC7, V8. The ground side of the signal generator is connected to chassis.
(3) Set the signal generator to 4.5 megacycles with sufficient output to give a reading of about 10 volts on the meter.
(4) Adjust the primary and secondary of T1 and the primary of the radio detector transformer T2 for maximum reading.
(5) Connect two 100,000 ohm resistors in series across the 17,000 ohm resistor R31 in the diode of the radio detector tube 6T8, V10.
(6) Connect one side of the V.T.V.M. to the center tap of these two resistors. The return lead of the meter is connected to the triode winding lug “E” of the radio detector transformer.
(7) The secondary of the radio detector transformer T2 is adjusted for zero voltage in such a manner that slight movement of the core in either direction will cause a positive or negative voltage on the meter depending upon which direction the core was moved.
(8) Re-check adjustments 4 and 7 above. This completes the alignment of the ratio detector.

HORIZONTAL AFC ADJUSTMENT

(1) Set the HORIZONTAL hold control (Front Panel) to the center of its range.
(2) Adjust the AFC control in either direction until the picture locks into horizontal sync.
(3) Slowly rotate the horizontal hold control and readjust the AFC control until the picture will hold thru at least 3/4 of the horizontal hold control range.

HEIGHT AND VERTICAL LINEARITY

(1) Adjust the height control #60 (on rear of chassis) (See Figure 4) until the picture fills the mask vertically.
(2) Adjust the Vertical Linearity control #63 (on rear of chassis) until the test pattern is symmetrical from top to bottom.

NOTE: Adjustment of either control will require readjustment of the other control.

WIDTH AND HORIZONTAL DRIVE

(1) Turn the horizontal drive condenser C56 (on rear of chassis) (See Figure 4) as far counterclockwise (loosen) as possible without crowding one side of the picture or causing the picture to tear. This will provide the maximum high voltage.
(2) Adjust tie width control L14 (on rear of high voltage shield) (See Figure 4) until the picture fills the mask horizontally.

NOTE: AN ADJUSTMENT OF THE HORIZONTAL DRIVE WILL AFFECT THE ADJUSTMENT OF THE HORIZONTAL AFC CONTROL.

TUBE VOLTAGES

(Exclusive of R.F. TUNER. SEE SECTION ON TUNERS)

All voltages are measured with a D.C. Vacuum Tube Voltmeter and with the PICTURE and BRIGHTNESS Control in the minimum position, unless otherwise specified. No incoming signals are being received at the time the measurements are being made. The following voltages were taken on a production receiver with 117 volts 60 cycle AC input. A variation of 10% in the voltages should be considered normal.

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NO RASTER ON KINESCOPE

(1) Incorrect adjustment of ion trap magnet.
(2) V16 or V17 inoperative - Check voltages and wave form.
(3) No high voltage - If horizontal deflection is operating as evidenced by the correct wave-form on terminal 5 of the horizontal damper tube V19, the trouble can be isolated to the 6061 circuit. Either the T6 high voltage winding is open, (points 2 to 3), the 806 tube is defective, its filament circuit is open, C63 is shorted, R82 or R84 is open.

NO VERTICAL DEFLECTION

(1) V14 inoperative.
(2) T4 or T5 open.
(3) Vertical deflection coils open.

NO HORIZONTAL DEFLECTION

(1) Horizontal deflection coil open.

TRAPEZOIDAL OR NON-SYMMETRICAL RASTER

(1) Improper adjustment of focus coil, centering rings or ion trap magnet.
(2) Defective yoke.

RASTER & SIGNAL ON KINESCOPE BUT NO SOUND

(1) Sound I.F. or Audio amplifier inoperative - check V9, V10, and V11.
(2) T1 or T2 defective.
(3) Speaker defective.

SMALL RASTER

(1) Low plus B or low line voltage.

POOR VERTICAL LINEARITY

(1) If adjustments are correct change V14.
(2) Vertical output transformer defective.

WRINKLES ON LEFT SIDE OF RASTER

(1) R85, R86 or C64 defective.
(2) Defective yoke.
SIGNAL AT KINESCOPE GRID BUT NO SYNC

(1) V13 inoperative - check voltages and wave-forms.

SIGNAL ON KINESCOPE GRID BUT NO VERTICAL SYNC

(1) Integrating network inoperative - check C42, C43, C44, R51, R52, and R53.

SIGNAL ON KINESCOPE GRID BUT NO HORIZONTAL SYNC

(1) L13 misadjusted.
(2) V15 inoperative - check voltages and wave-forms.
(3) C40, C41, C48, or C49 defective.

SOUND & RASTER BUT NO PICTURE OR SYNC

(1) R21 shorted.
(2) Bad contact to Kinescope grid.

PICTURE STABLE BUT POOR RESOLUTION

(1) Peaking coils defective.
(2) Make sure that the focus control operates on both sides of proper focus. Check V11.
(3) Make sure that the yoke, focus coil and centering ring are as far forward as possible.
(4) Be sure that the centering ring is as close to the focus coil as possible.
(5) R.F. and I.F. circuits misaligned.

RASTER BUT NO SOUND PICTURE OR SYNC

(1) Defective antenna or transmission line.
(2) R.F. unit inoperative - Check V1, V2 and their socket voltages.
(3) I.F. or Video amplifier inoperative - check V4, V5, V6, V7, and V8 and their socket voltages.

DARK VERTICAL LINE ON LEFT OF PICTURE

(1) Reduce horizontal drive and readjust width.
(2) Replace V17.

WAVEFORM DIAGRAMS