ELECTRICAL SPECIFICATIONS

Power Supply .................. 110-125 Volts AC
60 Cycles Only
Power Consumption .............. 220 Watts
Power Output .................. 2.4 Watts Maximum
1.8 Watts Distorted
Antenna Input Impedance ........ 300 Ohms Balanced
Picture Area .................. 55 Square Inch
Tuning Range .................. 12 Channel
Intermediate Frequencies ..... Picture-25.75 Mc
Sound-71.25 Mc
 Loud Speaker .................. 12” PIW Dynamic
Voice Coil Impedance ........ 3.2 Ohms 400 Cycles
Video Response ................ 3.5 Mc
Focus .......................... Magnetic
Sweep Deflection ................. Magnetic
Scanning ....................... Interlaced, 525 Line
Horizontal Scanning Frequency ... 15.75 Cycles
Vertical Scanning Frequency .... 60 CFS
Frame Frequency ............... 30 CPS

TUBE COMPLEMENT

Symbol | Type | Position
--- | --- | ---
V1 | 1-5866 | R.F. Amplifier
V2 | 1-6AG5 | Converter
V3 | 1-6CA | R.F. Oscillator
V4 | 1-6BA6 | 1st Sound I-F Amp.
V5 | 1-6AU6 | 2nd Sound I-F Amp.
V6 | 1-6AL5 | Sound Discriminator
V7 | 1-6MGT | Audio Output
V8 | 1-6AT6 | 1st Audio and Bias Clamp
V9 | 1-6AG5 | 1st Picture I-F Amp.
V10 | 1-6AG5 | 2nd Picture I-F Amp.
V11 | 1-6AG5 | 3rd Picture I-F Amp.
V12A, 12B, 1-6AL5 | Picture 2nd Det and Sync Limiter
V13 | 1-12AU7 | 1st and 2nd Video Amp.
V14 | 1-6SN7-GT | Sync Amplifier and Separator
V15 | 1-6SN7-GT | Vertical Sweep Oscillator, Discharge and Output
V16 | 1-6SN7-GT | Horizontal Sweep Oscillator and Sync Guide
V17 | 1-48G6-G | Horizontal Sweep Output
V18 | 1-183-GT, 8016 | High Voltage Rectifier
V19 | 1-5V6-G | Horizontal Dampener
V20 | 1-5U4-G | Power Supply Rectifier
V21 | 1-10BF4 | Kinescope (Picture Tube)

MODEL D1991

RADIO FREQUENCY RANGES

<table>
<thead>
<tr>
<th>Channel Number</th>
<th>Channel Frequency Mc</th>
<th>Picture Carrier Frequency Mc</th>
<th>Sound Carrier Frequency Mc</th>
<th>Receiver I.F. Osc. Frequency Mc</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>54-60</td>
<td>55.25</td>
<td>59.75</td>
<td>81</td>
</tr>
<tr>
<td>3</td>
<td>60-70</td>
<td>61.75</td>
<td>65.75</td>
<td>87</td>
</tr>
<tr>
<td>4</td>
<td>66-72</td>
<td>67.25</td>
<td>71.75</td>
<td>87</td>
</tr>
<tr>
<td>5</td>
<td>74-78</td>
<td>77.25</td>
<td>81.75</td>
<td>103</td>
</tr>
<tr>
<td>6</td>
<td>82-88</td>
<td>83.25</td>
<td>87.25</td>
<td>109</td>
</tr>
<tr>
<td>7</td>
<td>174-180</td>
<td>175.25</td>
<td>179.75</td>
<td>201</td>
</tr>
<tr>
<td>8</td>
<td>180-186</td>
<td>181.25</td>
<td>185.75</td>
<td>207</td>
</tr>
<tr>
<td>9</td>
<td>186-192</td>
<td>187.25</td>
<td>191.75</td>
<td>213</td>
</tr>
<tr>
<td>10</td>
<td>192-198</td>
<td>193.25</td>
<td>197.75</td>
<td>219</td>
</tr>
<tr>
<td>11</td>
<td>198-204</td>
<td>199.25</td>
<td>203.75</td>
<td>225</td>
</tr>
<tr>
<td>12</td>
<td>204-210</td>
<td>205.25</td>
<td>209.75</td>
<td>231</td>
</tr>
<tr>
<td>13</td>
<td>210-216</td>
<td>211.25</td>
<td>215.75</td>
<td>237</td>
</tr>
</tbody>
</table>

RECEIVER LOCATION—Advise the owner as to the proper location for the television receiver. The following may be used as a guide:
1. Choose an area in the home where sunlight or light from lamps do not strike the face of the picture tube and cause glare.
2. Remember the necessity of an electrical outlet and the location of the point at which the antenna leads enter the room.
3. The receiver should be placed a short distance from the wall to allow adequate ventilation.
4. The receiver should be placed to permit easy access for operation and comfortable viewing from all angles.

ANTENNA—This receiver has been designed to use an antenna with a 300 ohm balanced transmission line. This line must be as short as possible because the longer the line the greater the chances are for picking up electrical disturbances. Stand-off insulation should be used to keep the line away from the mast, metal or walls. Twist this line about one turn per foot throughout the line to cancel out direct signal and/or noise pickup from the transmission line. It should also be securely anchored in place so that a change in weather will not affect its position.

HIGH VOLTAGE WARNING

This television receiver contains high voltages which are dangerous to life. Never operate or service the receiver outside of the cabinet or with the covers removed until all the safety precautions necessary for working with high vahage equipment have been observed.

KINESCOPE (Picture Tube)

HANDLING PRECAUTION

Shatterproof goggles and heavy gloves must be worn by individuals while handling the kinescope or installing the kinescope into the receiver.

The kinescope contains a high vacuum and due to the large surface area, it is subjected to excessive air pressure. Therefore, care should be taken not to bump or scratch the picture tube accidentally as it may cause the tube to implode resulting in damage to property or injury to an individual.

© John F. Rider
**TUNING PROCEDURE**

1. To turn the television receiver on, turn the OFF-ON SOUND CONTROL clockwise until a click is heard. Allow approximately 30 seconds for the tubes to warm up.

2. Turn the STATION SELECTOR CONTROL to the desired channel. This control may be turned in either direction.

3. Turn the CONTRAST CONTROL fully counterclockwise.

4. Turn the BRIGHTNESS CONTROL fully counterclockwise and then very slowly clockwise until light is readily visible on the screen.

5. Turn the CONTRAST CONTROL clockwise until activity or define form is noted on the screen.

6. Adjust the FINE TUNING CONTROL for best tonal quality and the SOUND CONTROL for desired volume.

7. Turn the VERTICAL CONTROL until the picture stops moving up or down.

8. Adjust the HORIZONTAL CONTROL until the picture is obtained and centered.

9. Adjust the CONTRAST CONTROL until the picture is obtained and if necessary make a slight readjustment of the BRIGHTNESS CONTROL.

10. After the receiver has been on for a while it may be necessary to readjust the FINE TUNING CONTROL for best sound quality.

11. When switching from one channel to another, it may be necessary to repeat steps number 6 and 9.

12. To turn off the receiver, turn only the OFF-ON SOUND CONTROL counterclockwise until a click is heard.

13. When the receiver is turned on again and the positions of the controls have not been changed, no further adjustments will be necessary except for the FINE TUNING CONTROL and SOUND CONTROL for the desired volume.

14. If the positions have been disturbed since the last time the receiver has been used it may be necessary to follow steps 1 to 10.

---

**KINESCOPE WINDOW**

Clean the kinescope window with a dampened cloth or a soft lint-free cloth if dust or finger marks are present.

---

**NON-OPERATING CONTROLS**

(Reel Of Chassis)

<table>
<thead>
<tr>
<th>Control</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horizontal Centering</td>
<td>R-106</td>
</tr>
<tr>
<td>Vertical Centering</td>
<td>R-105</td>
</tr>
<tr>
<td>Width</td>
<td>R-115</td>
</tr>
<tr>
<td>Height</td>
<td>R-86</td>
</tr>
<tr>
<td>Horizontal Linearity</td>
<td>L-16</td>
</tr>
<tr>
<td>Vertical Linearity</td>
<td>R-93</td>
</tr>
<tr>
<td>Horizontal Drive</td>
<td>C-55C</td>
</tr>
<tr>
<td>Horizontal Oscillator Frequency (Front)</td>
<td>C-358</td>
</tr>
<tr>
<td>Horizontal Locking Range</td>
<td>C-55A</td>
</tr>
<tr>
<td>Focus</td>
<td>R-104</td>
</tr>
<tr>
<td>Focus Coil</td>
<td>Wing Screw Adjustment</td>
</tr>
<tr>
<td>Ion Trap Magnet</td>
<td>Top Chassis Adjustment</td>
</tr>
<tr>
<td>Deflection Coil</td>
<td>Wing Nut Adjustment</td>
</tr>
</tbody>
</table>

---

**REMOVAL PROCEDURE**

1. After the receiver has been unpacked and the cradle removed, take off the cabinet back and make sure all the tubes are properly mounted in their respective sockets.

2. Remove the rear panel of the kinescope socket base and the corrugated cardboard back holding the focus coil in place.

3. Connect on antenna to the antenna terminals at the rear of the cabinet and insert the line cord plug into a convenient outlet.

4. Turn on the receiver and wait about 60 seconds for the receiver to warm up. Turn the channel selector to a station that is transmitting and check the picture. If the picture is not centered on the screen, or visible at all, make the adjustments on the deflection yoke, focus coil and ion trap magnet assemblies as outlined on page 5.

**KINESCOPE REPLACEMENT**

Should the kinescope have to be replaced, remove the defective kinescope in the following manner:

1. Remove the front panel control knobs by pulling them straight from their shafts.

2. Remove two ornamental screws holding the front panel to the cabinet (see figure 5) and lift out panel.

3. Remove the cabinet back.

4. Disconnect the kinescope socket connector at the base of the tube and the high voltage anode lead from the front of the kinescope.

5. Remove the ion trap magnet, sliding it from the neck of the kinescope past the socket.

6. Loosen the wing nuts and wing screws on the deflection yoke and focus coil.

7. Loosen the strap holding the front of kinescope in place and withdraw the kinescope towards the front of the chassis.

8. To install a new kinescope, reverse the above procedure making sure that the kinescope is fitted closely against the kinescope cushion and that the high voltage well connector is at the top of the kinescope. If the kinescope sticks or fails to slip into place smoothly, investigate and remove the source of the trouble. Never force the tube.
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 and then back. Normally the picture will be out of sync. Turn the control clockwise slowly. The number of diagonal bars will be gradually reduced and when only 3-1/2 to 4-1/2 bars are present, the picture will pull into sync upon slight additional clockwise rotation of the control. The 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 from 3-1/2 to 4-1/2 bars sloping downward to the right. If the receiver passes the above checks and the picture is normal and stable, the horizontal oscillator is properly aligned. Skip "Alignment of Horizontal Oscillator" and proceed with "Focus" 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, turn back to hold sync for at least 60 degrees of clockwise rotation of the control from the pull-in point. It may 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 rear apron horizontal frequency trimmer C-55B (see Figure 6) until the picture is out of sync and shows 3-1/2 to 4-1/2 bars sloping downward to the right. If the trimmer has insufficient range, set the trimmer to mid-position (1 turn out from maximum capacity) and adjust the L-14 horizontal frequency adjustment until this condition is obtained. See Figure 9 for the location of L-14.

HORIZONTAL LOCKING RANGE ADJUSTMENT — Set the horizontal hold control to the extreme counter-clockwise position. Momentarily remove the signal by switching off channel and 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 4-1/2 bars are present, adjust the horizontal locking range trimmer C-55A (see Figure 6) slightly clockwise. If less than 3-1/2 bars are present, adjust trimmer C-55A 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 3-1/2 to 4-1/2 bars are present. Repeat the adjustments under "Horizontal Frequency Adjustment" and "Horizontal Locking Range Adjustment" until the condition specified under each are fulfilled. When the horizontal hold operates as outlined under "Check of Horizontal Oscillator Alignment" the oscillator is properly adjusted.

HEIGHT AND VERTICAL LINEARITY ADJUSTMENTS — Adjust the height control R-86 (see Figure 6) until the picture fills the mask vertically. Adjust the vertical linearity control R-93 (see Figure 6) until the picture is symmetrical from top to bottom. Adjustment of either control will require a realignment of the other. Adjust vertical centering control R-105 (see Figure 6) to align the picture with the mask.

WIDTH, DRIVE AND HORIZONTAL LINEARITY ADJUSTMENTS — Turn the width control L-15 (at top of power supply cover) to the maximum clockwise position. Vary the horizontal drive trimmer C-55C (see Figure 5) to yield the best compromise between brightness and linearity. Adjust the horizontal linearity control L-16 (see Figure 6) for best linearity of the right half of the picture. Readjust the width control L-15, until the picture fills the mask. Adjust horizontal centering control R-106 (see Figure 6) to align the picture with the mask.

FOCUS — Adjust the focus control R-104 (see Figure 6) for maximum definition of the vertical wedge of the picture. Check to see that all cushion, yoke and focus coil thumbscrews are tight. Replace the cabinet back making sure that the back is on tight, otherwise it may rattle at high volume.

CHECK OF R-F OSCILLATOR ADJUSTMENTS — With a crystal calibrated test oscillator or heterodyne frequency meter, check to see if the receiver R-F oscillator is adjusted to the proper frequency on all channels. The adjustments for all channels are available from the front of the cabinet by removing the front panel as shown in Figure 5. Tune in all available television stations.
SERVICE SUGGESTIONS

NO RASTER ON KINESCOPE — If raster cannot be obtained check below for the possible causes.

1. Ion trap magnet adjustment is incorrect.

2. No high voltage, check V-17 (6G8-G) and V-18 (135-GT/6016) tubes and circuits. If the horizontal deflection circuits are operating, as evidenced by the correct wave form measured on terminal 4 of horizontal output transformer (T-8), the trouble can be isolated to the high voltage rectifier (V-18) circuit. Either the high voltage winding (points 2 to 3 on T-8) is open, tube V-18 is defective, its filament circuit is open, or the high voltage filter capacitor (C-76) is shorted.

3. Damper tube V-19 (5V4-G) defective. Plate voltage supply for V-17 (6G8-G) horizontal output tube is obtained through the damper tube. Check tube and heater winding with power transformer (T-9). If the tube is alright, check the horizontal linearity cell (L-16) for continuity and check capacitors C-69 and C-75 for short circuit.


5. No plate voltage. Electrolytic capacitor shorted. Open speaker field coil. All +B measurements are accessible for measurement by removing cover from bleeder box.

6. Horizontal oscillator and control tube V-16 (6SN7-GT) defective. Check for proper linearity output tube V-17 (6G8-G). If not present, check voltages and components in the V-16 (6SN7-GT) circuits.

HORIZONTAL DEFLECTION ONLY — If only horizontal deflection is obtained as evidenced by a straight line across the face of the kinescope, it can be caused by the following:


2. Vertical output transformer (T-7) open.

3. Yoke vertical coils open.

POOR VERTICAL LINEARITY — If adjustment of the vertical, height and linearity controls will not correct this condition, any of the following may be the cause:

1. Vertical output transformer (T-7) defective.

2. Capacitors C-80A or C-78A defective.


4. Excess leakage or incorrect value in capacitor C-82.

5. Low plate and bias voltages. Check rectifier tube and capacitors in +B supply circuits.

6. Capacitor C-81 defective.

POOR HORIZONTAL LINEARITY — If adjustment of controls does not correct this condition, check the following:

1. Check or replace horizontal output tube V-17 (6G8-G).

2. Check or replace damper tube V-19 (5V4-G).

3. Check linearity cell L-16 for short circuit.

4. Check capacitors C-69 and C-75 for defects.

TRAPEZOIDAL OR NONSYMMETRICAL RASTER —

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

2. Defective yoke.

WRINKLES ON LEFT SIDE OF RASTER — This condition can be caused by:

Defective yoke due to R-97, R-98 or C-86 (internal in yoke assembly) being wrong value or open. These components are mounted in rear of yoke assembly.

HORIZONTAL DEFLECTION ONLY — If only horizontal deflection is obtained as evidenced by a straight line across the face of the kinescope, it can be caused by the following:


2. Vertical output transformer (T-7) open.

3. Yoke vertical coils open.

R-F SWEEP GENERATOR— This condition can be caused by:

1. Low +B or line voltage.

2. Insufficient output from horizontal output tube V-17 (6G8-G). Replace tube.


SERVICE SUGGESTIONS (Continued)

RATER; NO IMAGE, BUT ACCOMPANYING SOUND—This condition can be caused by:

1. No signal on kinescope grid. Check picture I-F amplifier tubes V-9, 10 and 11 (6AG5/S), second detector V-12 (6AL5) and video amplifier V-13 (12AU7).

2. Bad contact to kinescope grid (lead to socket broken).

3. Leakage in V-13 (12AU7) grid capacitor C-42. If the above components are not found to be defective, check the following:

1. Check all potentials in video circuits.

2. Check kinescope grid circuit for poor or dirty contact.

3. Check adjustment of focus control R-104. It should be effective on either side of proper focus.

4. Check and realign, if necessary, the picture I-F and R-F circuits.

PICTURE SQUEEZE:

1. Normally, squeezer can be attributed to phase shift of the low frequency end of the video characteristic. This can be caused by improper values of resistors and capacitors in the video circuits. Check for grid current on video amplifier tube V-13 (12AU7).

2. This trouble can also originate at the transmitter. Check reception from another station.

PICTURE STABLE BUT WITH POOR RESOLUTION — If the picture resolution is not up to standard, it may be caused by:

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

2. Defective yoke.

3. Insufficient output from horizontal output tube V-17 (6G8-G). Replace tube.

4. Open video peaking coil. Check all peaking coils L-8, L-9, L-10, L-11 for continuity. Note that L-9 and L-11 have shunting resistors.

ALIGNMENT PROCEDURE

TEST EQUIPMENT — To service this receiver properly, it is CATHODE-RAY OSCILLOSCOPE preferably one with a wide recommended that the following test equipment be available, both vertical deflection and an input calibrating source, signal generator to provide the following frequencies:

(a) Frequency ranges:

1. 18 to 30 mc, 1 mc sweep width
2. 40 to 90 mc, 10 mc sweep width
3. 170 to 225 mc, 10 mc sweep width
4. Output adjustable with at least 1 volt maximum.
5. Output constant on all ranges.
6. Flat output in all attenuator positions.

(b) Intermediate frequencies:

1. 21.25 mc sound I-F and sound traps
2. 22.8 mc converter transformer
3. 23.9 mc first picture I-F call
4. 24.5 mc third picture I-F call
5. 26.0 mc second picture I-F call

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

© John F. Rider
ALIGNMENT PROCEDURE (Continued)

(b) Radio frequencies:

<table>
<thead>
<tr>
<th>Channel Number</th>
<th>Picture Carrier Freq. Mc</th>
<th>Sound Carrier Freq. Mc</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>55.25</td>
<td>59.75</td>
</tr>
<tr>
<td>3</td>
<td>61.25</td>
<td>65.75</td>
</tr>
<tr>
<td>4</td>
<td>67.25</td>
<td>71.75</td>
</tr>
<tr>
<td>5</td>
<td>73.25</td>
<td>78.75</td>
</tr>
<tr>
<td>6</td>
<td>81.25</td>
<td>87.75</td>
</tr>
<tr>
<td>7</td>
<td>110.25</td>
<td>119.75</td>
</tr>
<tr>
<td>8</td>
<td>130.25</td>
<td>138.75</td>
</tr>
<tr>
<td>9</td>
<td>140.25</td>
<td>149.75</td>
</tr>
<tr>
<td>10</td>
<td>160.25</td>
<td>169.75</td>
</tr>
<tr>
<td>11</td>
<td>179.25</td>
<td>190.75</td>
</tr>
<tr>
<td>12</td>
<td>199.25</td>
<td>209.75</td>
</tr>
<tr>
<td>13</td>
<td>211.25</td>
<td>212.75</td>
</tr>
</tbody>
</table>

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

ELECTRONIC VOLTMMETER and a high voltage probe for use with this meter to permit measurements up to 10 kilovolts.

SERVICE PRECAUTIONS—To service the receiver remove the chassis from the cabinet. To do so, remove the knobs, the front panel, the cabinet back and then the 5 chassis mounting bolts. The chassis normally should be serviced without the kinescope. However, if it is necessary to view the raster during servicing, the kinescope should be inserted only after the chassis is turned on end. The kinescope should never be allowed to support its weight by resting in the deflection yoke. A bracket should be used to support the tube at its viewing screen. By turning the chassis on end with the power transformer up, all adjustments will be conveniently available. Since this is the only safe position in which the chassis will rest and still leave adjustment accessible, the trimmer location drawings are oriented similarly for ease of use.

CAUTION: Do not permit the kinescope second-knoodle lead to become shorted to the chassis. To do so will cause a considerable overload on the high-voltage filter resistor R-62.

RETOUCHING OF PICTURE I-F ADJUSTMENTS — The picture I-F response curve varies somewhat with change of bias and for this reason it should be aligned with approximately the same signal input as it will receive in operation.

If the receiver is located at the edge of the service area, it should be aligned with approximately 0.3 volt i-f grid bias. However, for normal conditions, (signals of 1000 microvolts or greater), it is recommended that the picture I-F be aligned with a grid bias of -3 volts. Set the picture control for -3 volts at the junction of R-41 and R-43.

Connect the i-f sweep generator to the receiver antenna terminals.

Connect the signal generator to the antenna terminals and feed in the 35.75 megacycles i-f picture carrier marker and a 25 megacycles marker.

Connect the oscilloscope across the picture detector load resistor R-51.

Set the channel switch to channel (between 1 and 6) found to have the best response.

Set the sweep output to approximately 0.3 volt peak to peak across the picture detector load resistor.

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. In making these adjustments, care should be taken that no two transformers are tuned to the same frequency as i-f oscillation may result.

On final adjustment the picture carrier marker must be at approximately 45% response. The curve must be approximately flat topped and with the 23 mc marker at 90% 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 brightness, of blanking, and of sync may occur. If the picture carrier operates too high on the response curve, the picture is distorted with a loss of high frequency video response.

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 an attenuator pad of the type shown in Figure 17. 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 attenuator pad. Since many of the low valued resistors generally available are of wire wound construction, it is advisable to break and examine one of each type of resistor used in order to determine its construction.

RESPONSE CURVES — The response curves shown in Figure 18 were taken from a production set. Although these curves are typical, some variations can be expected.

CRITICAL LEAD DRESS —

1. Do not strain any leads to be placed on the leads of R-68, R-59, R-63, R-62, R-58, R-61, R-67 and R-64. Do not permit these resistors to be exposed to the heat of a soldering iron any more than is absolutely necessary.

2. Dress the temperature compensating resistor R-64 approximately one quarter inch from the power transformer and the chassis.

3. Dress all video coupling capacitors and peaking coils up and away from the chassis.

4. Contact between the RF oscillator frequency adjustment screws and the oscillator coils on channel switch outlets must be avoided.

5. Dress T-8 winding leads as shown in Figure 16.

© John F. Rider
ALIGNMENT TABLE

**DISCRIMINATOR AND SOUND I-F ALIGNMENT**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2nd sound I-F grid (pin 1, V-5)</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>In series with</td>
<td>Meter on 10 volt scale</td>
<td>Detune T-3 (bottom) Adjust T-3 (top) for max. on meter.</td>
<td>Fig. 11</td>
<td>12</td>
</tr>
<tr>
<td>2</td>
<td>2nd sound I-F grid (pin 1, V-5)</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Discriminator output (pin 1 of V-5)</td>
<td>Meter on 3 volt scale</td>
<td>T-3 (bottom) for zero on meter.</td>
<td>Fig. 12</td>
<td>11</td>
</tr>
<tr>
<td>3</td>
<td>2nd sound I-F grid (pin 1, V-5)</td>
<td>21.25</td>
<td>2nd sound I-F grid (pin 1, V-5)</td>
<td>21.25 center 1 mc .1 volt output</td>
<td>Discriminator output (pin 1 of V-5)</td>
<td>Not used</td>
<td>Check for symmetrical response waveform (positive and negative). If not equal adjust T-3 (top) until they are equal. See Note 1.</td>
<td>Fig. 11</td>
<td>12</td>
</tr>
<tr>
<td>4</td>
<td>Trap winding or T-1 (top of chassis)</td>
<td>21.25 reduced output</td>
<td>Trap winding or T-1</td>
<td>21.25 reduced output</td>
<td>Terminal A, T-2 in series with 33,000 ohms. See Note 2.</td>
<td>Not used</td>
<td>Sweep output reduced to provide 3 volt p-p top on scope. See Note 3.</td>
<td>T-2 (top and bottom) for max. gain and symmetry at 21.25 mc.</td>
<td>Fig. 11</td>
</tr>
</tbody>
</table>

**NOTE:**
1. The peak to peak bandwidth of the discriminator should be approximately 400 kc and should be linear from 21.175 mc to 21.225 mc.
2. If a 60 cycle sweep rate is used, it will be necessary to reduce the time constant in the 2nd sound I-F grid circuit in order to reproduce the desired response curve. To do this, short R-10 (Terminal "A" of T-2 to chassis) with 5000 ohms.
3. The sweep generator output should be set to produce approximately 0.3 volt peak-to-peak at the second sound I-F grid output (Terminal "A" of T-2) for final touch-up on this adjustment. Signal voltage in excess of 0.3 volt will tend to broaden the response curve--permitting misalignment to pass unnoticed.

---

**PICTURE I-F AND TRAP ADJUSTMENT**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Not used</td>
<td>Not used</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction R-41 and R-43</td>
<td>Set &quot;Station Selector&quot; switch to channel 13</td>
<td>Adjust &quot;Picture&quot; control for 3 volts reading on Voltmeter</td>
<td>T-1 (top) for min. on meter</td>
<td>Fig. 15</td>
</tr>
<tr>
<td>6</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Meter on 3 volt scale</td>
<td>T-5 for min.</td>
<td>Fig. 14</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Meter on 3 volt scale</td>
<td>T-10 (bottom) for min.</td>
<td>Fig. 9</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Meter on 3 volt scale</td>
<td>T-10 (bottom) for max.</td>
<td>Fig. 15</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Not used</td>
<td>L-3 (top chassis) for max.</td>
<td>Fig. 14</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Not used</td>
<td>L-7 (top chassis) for max.</td>
<td>Fig. 14</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Not used</td>
<td>L-7 (top chassis) for max.</td>
<td>Fig. 14</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Junction C-31 and R-23</td>
<td>21.25</td>
<td>Not used</td>
<td>Not used</td>
<td>Junction of L-8 and R-51</td>
<td>Not used</td>
<td>L-7 (top chassis) for max.</td>
<td>Fig. 14</td>
<td></td>
</tr>
</tbody>
</table>

**NOTE:** Oscillation may occur if the I-F section is badly out of alignment. This will be evidenced by a meter reading in excess of 3 volts and is caused by the "staggered" I-F stages being tuned to approximately the same frequency. If this condition is encountered, adjust the core studs of T-1 (bottom) .5, T-10 and L-7 until oscillation ceases. Oscillation may not be encountered until proceeding with steps 9, 10, or 11.
The difference between series "A" and "B" receivers is in the tuner assembly. For issue "B" receivers the tube complement of the tuner assembly is as follows:

**SYMBOL** | **TYPE** | **FUNCTION**
--- | --- | ---
V1 | 5AG5 | RF Amplifier
V2 | 5AG5 | Converter
V3 | 6C4 | RF Oscillator

A parts list of the new S-25A3 Tuner Assembly and a schematic diagram are included in this manual to aid in the servicing of the issue "B" receivers.