In sliding outfit of course, be careful that the kinescope tube does not strike you against cabinet or any other obstruction.

Order of Alignment:

1. Complete receiver alignment is necessary to be performed in the following sequence:
   a. Connect hot lead of electronic voltmeter to Pin 7 of Vila-A with meter range switch set to lowest scale and observe polarity for negative reading.
   b. Connect hot lead of NF Signal Generator to converter tube V2 by means of a loop consisting of two turns of insulated hairpin wire. Connect ground lead of NF Signal Generator to chassis.
   c. Set the frequency accurately to 23.52 kHz and adjust L4L2 so that speaker sounds at the position of chassis.
   d. Increase output to maximum (already 25.75 kHz, generator setting) and adjust L5L6 for maximum reading at voltmeter.

Sound Transformer Adjustment:

Adjust hot lead connection of electronic voltmeter to terminal marked Bal. and adjust L4L2 so that speaker sounds at the position of chassis. Adjust for maximum reading is order named L5, L1, L2, and L3.

Cabinet-end Touch-up:

1. Center line tuning control, as described in Note A above.
2. Place sweep generator through entire range and adjust oscillator coil on channel 12 (L12).
3. Turn channel selector switch to channel 3 and adjust L13.
4. This adjustment can be repeated for all channels or if necessary on any single channel.

**Note A:**
Two types of CL-1777 tubes are used on these models, which differ in the mechanical design of the tuning elements. The settings of the sidepin positions differ on each type of pair as follows:

**Type 1:** Fine-tune bakelite disc. (attached to fine-tuning control) located in the oscillator plug which is mounted on the front of the chassis. The proper setting of the local oscillator coil and fine-tuning elements is as follows:

<table>
<thead>
<tr>
<th>Channel</th>
<th>Sidepin Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>2</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>3</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>4</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>5</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>6</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>7</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>8</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>9</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>10</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>11</td>
<td>0.215 mm</td>
</tr>
<tr>
<td>12</td>
<td>0.215 mm</td>
</tr>
</tbody>
</table>

**Type 2:** Fine-tune bakelite disc. (attached to fine-tuning control) located in the oscillator plug which is mounted on the front of the chassis. The proper setting of the local oscillator coil and fine-tuning elements is as follows:

**Note B:**
When the tuning range is adjusted, the entire position is made clockwise.

Cage End Adjustments:

Adjust the screw D so that the position is made clockwise.

Dial Adjustment:

If the meter needle is horizontal or not with the picture, loosen the deflection plate adjustment screw and rotate the deflection plate until it is horizontal or not, and tighten the reference ATV tuning.

Cabinet-end Alignment:

Obtain a test pattern and turn the horizontal and vertical controls of this receiver to the extreme extreme-counter-clockwise position. This pattern should remain in the visual field. The picture should remain in the visual field. The picture should remain in the visual field. The picture should remain in the visual field. The picture should remain in the visual field.
Multifunctional Scope Alignment:

1. Connect the scope to the 12-ohm test head and adjust the horizontal position to the extreme counter-clockwise position. With the horizontal control adjusted to the right, adjust the vertical position so that the scope is centered on the screen. This ensures that the top edge of the screen is accurately aligned with the horizontal lines of the scope.

2. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

3. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

4. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

5. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

6. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

7. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

8. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

9. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

10. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

11. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

12. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

13. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

14. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

15. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

16. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

17. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

18. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

19. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

20. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

21. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

22. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

23. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

24. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

25. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

26. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

27. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.

28. After all adjustments have been made, the scope should be centered on the screen. If it is not, adjust the vertical and horizontal controls until the screen is centered. This ensures that the scope is accurately aligned with the horizontal lines of the screen.
### Capacitors

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000pF</td>
<td></td>
</tr>
<tr>
<td>100pF</td>
<td></td>
</tr>
<tr>
<td>1uF</td>
<td></td>
</tr>
<tr>
<td>10uF</td>
<td></td>
</tr>
<tr>
<td>100uF</td>
<td></td>
</tr>
</tbody>
</table>

### Resistors

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>100kΩ</td>
<td></td>
</tr>
<tr>
<td>1MΩ</td>
<td></td>
</tr>
<tr>
<td>10MΩ</td>
<td></td>
</tr>
<tr>
<td>100kΩ</td>
<td></td>
</tr>
<tr>
<td>1MΩ</td>
<td></td>
</tr>
<tr>
<td>10MΩ</td>
<td></td>
</tr>
</tbody>
</table>

### Inductors

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1uH</td>
<td></td>
</tr>
<tr>
<td>10uH</td>
<td></td>
</tr>
<tr>
<td>100uH</td>
<td></td>
</tr>
<tr>
<td>1mH</td>
<td></td>
</tr>
<tr>
<td>10mH</td>
<td></td>
</tr>
<tr>
<td>100mH</td>
<td></td>
</tr>
</tbody>
</table>

### Schematics

1. **Horizontal Oscillator**: Frequency control, 100 kHz to 1 MHz, with variable frequency control for fine tuning.
2. **Vertical Oscillator**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
3. **Sweep Generator**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
4. **Audio Amplifier**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
5. **Video Amplifier**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
6. **Power Supply**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.

### Alignment

1. **RF**: Frequency control, 10 MHz to 1 GHz, with variable frequency control for fine tuning.
2. **IF**: Frequency control, 10 kHz to 100 MHz, with variable frequency control for fine tuning.
3. **Audio**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
4. **Video**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.
5. **Power Supply**: Frequency control, 10 Hz to 100 kHz, with variable frequency control for fine tuning.

---

**Caption**: The Barone Model TV947, TV-949, and TV-950 instruction manual. In this manual, you will find detailed instructions for aligning the receiver, adjusting the controls, and troubleshooting common issues. The manual also includes a troubleshooting guide and a list of replacement parts. For more information, please refer to the manual provided with your television model.
**Oscillator Alignment**

1. Connect horizontal oscillator switch to 12.
2. Connect vertical oscillator to one antenna terminal and ground.
3. Connect electronic voltmeter to pin 1 of Y (4605) and adjust anx (90°) clockwise until a steady reading is obtained.
4. Adjust Z (30) for zero reading on electronic voltmeter between 12 and 12 o'clock positions.
5. Disconnect all connections to vertical oscillator.

**Celluloid (Celluloid)**

1. Place switch to 12.
2. Connect vertical oscillator to one antenna terminal and ground.
3. Connect electronic voltmeter to pin 1 of Y (4605) and adjust anx (90°) clockwise until a steady reading is obtained.
4. Adjust Z (30) for zero reading on electronic voltmeter between 12 and 12 o'clock positions.
5. Disconnect all connections to vertical oscillator.

**Oscillator Tuning Interface**

- **Probe** is the final control in the oscillator sweep. Adjust the horizontal frequency by turning the probe control knob clockwise.
- **Color** is the second-to-last control in the oscillator sweep. Turn this control clockwise to increase the horizontal frequency.
- **Hight** is the third-to-last control in the oscillator sweep. Turn this control clockwise to decrease the horizontal frequency.
- **Width** is the fourth-to-last control in the oscillator sweep. Turn this control clockwise to increase the width of the horizontal sweep.
- **Duty cycle** is the fifth-to-last control in the oscillator sweep. Turn this control clockwise to decrease the duty cycle of the horizontal sweep.
- **Gain** is the last control in the oscillator sweep. Turn this control clockwise to increase the gain of the horizontal sweep.

**Horizontal Frequency Adjustment**

- **Horizontal** is the final control in the oscillator sweep. Adjust the horizontal frequency by turning the horizontal control knob clockwise.
- **Color** is the second-to-last control in the oscillator sweep. Turn this control clockwise to increase the horizontal frequency.
- **Hight** is the third-to-last control in the oscillator sweep. Turn this control clockwise to decrease the horizontal frequency.
- **Width** is the fourth-to-last control in the oscillator sweep. Turn this control clockwise to increase the width of the horizontal sweep.
- **Duty cycle** is the fifth-to-last control in the oscillator sweep. Turn this control clockwise to decrease the duty cycle of the horizontal sweep.
- **Gain** is the last control in the oscillator sweep. Turn this control clockwise to increase the gain of the horizontal sweep.

**Check for correct operation.**

- The oscilloscope should display a horizontal sweep.
- Adjust the controls as necessary to obtain the desired horizontal sweep.

**Camera Alignment**

- **Focus** is the first control in the camera alignment sweep. Turn this control clockwise to focus the camera.
- **Iris** is the second control in the camera alignment sweep. Turn this control clockwise to adjust the iris of the camera.
- **Gain** is the third control in the camera alignment sweep. Turn this control clockwise to increase the sensitivity of the camera.
- **Shutter** is the fourth control in the camera alignment sweep. Turn this control clockwise to adjust the shutter speed of the camera.
- **Sync** is the fifth control in the camera alignment sweep. Turn this control clockwise to adjust the sync pulse of the camera.

**Check for correct operation.**

- The oscilloscope should display a horizontal sweep.
- Adjust the controls as necessary to obtain the desired horizontal sweep.

**Camera Alignment**

- **Focus** is the first control in the camera alignment sweep. Turn this control clockwise to focus the camera.
- **Iris** is the second control in the camera alignment sweep. Turn this control clockwise to adjust the iris of the camera.
- **Gain** is the third control in the camera alignment sweep. Turn this control clockwise to increase the sensitivity of the camera.
- **Shutter** is the fourth control in the camera alignment sweep. Turn this control clockwise to adjust the shutter speed of the camera.
- **Sync** is the fifth control in the camera alignment sweep. Turn this control clockwise to adjust the sync pulse of the camera.

**Check for correct operation.**

- The oscilloscope should display a horizontal sweep.
- Adjust the controls as necessary to obtain the desired horizontal sweep.
After G87 has been found oscillating, or if oscillation has been restored and still no HV is being developed, check these symptoms:

G806 not being driven. Determine by measuring across SSL (1:3 Fasbox between Horizontal Drive Trimmer and Vertical Position). Drive Trimmer and SSL in circuit. Drive is sufficient if 5.0 to 7.5 volts. Insufficient drive can be caused by:

Defective G87 (V18)
Defective G81 (V160,600 mW at Horizontal Oscillator Can or Horizontal Drive Trimmer). Replace.

Shorted C69 (Horizontal Drive Output Transformer). Remove Short. After G806 has been found being driven or its drive restored, check whether screen (pin 8) reads 150 volts, grid (pin 4) 800 volts, plate (read return via test probe) 510 volts. No plate reading indicates current consumption of G806 is too high. Replace G806. Low grid reading indicates shorted or leaky G70 (390 mW). High screen, and no plate reading indicates open flyback-transformer. Not or kinked-out B66 (86 ohm at cathode of G806) indicates C70 (390 mW). Shorted or shorted C71 (1.05-250k). After all voltages of G806 have been found correct, and still no HV, replace L31-6026 RV rectifier. Do not interchange phase leads for L31 (red spider) and B66 (black spider). Leads away from all metal parts and surfaces.

(e) Background control defective. Check low voltage at arm (centerpoint of background control) changes with respect to G82 tube grid. Square wave meter (pin 6) D837 video output tube should read 450 volts when the voltage at arm of background control should vary from 120 to ±250 volts. If I/O voltage cannot be bound down to be ±100 volts, G82 tube is at cutoff and therefore dark.

2) Picture on G82 tube (for "no picture" see under "video")

(a) Picture appears in duplicate, triplet, or more:

Horizontal Frequency too high. If readjusting of Horizontal Lock and Frequency Controls or of threaded slug of Horizontal Frequency Coil (L11) [inside chassis] does not change this condition sufficiently, replace G87 (V18), C69-161 microfarads or C69-2000 microfarads. In some cases, horizontal frequency cut-off L14 may have to be replaced.

(b) Picture appears half or less or folded over. Horizontal Frequency too low. Same procedure as under (a).

(c) Picture is too wide. If adjustment of control does not sufficient, measure voltage at G82 plate. If less than ±50 volts, horizontal sweep will be insufficient. Replace G806, 6600 pF. Observe all voltages of G82. Check With Control (if used). Check whether 5-8 or is ±250 volts and 5-8 volts. Defective Horizontal Output Transformer or Deflection Tube. Defective C78 (47 mF) across half of Horizontal Deflection Coil.

(d) Incorrect horizontal linearity. Linearity coil may have to be chopped out, or blocking plug may have to be removed. By increasing capacity of C75 (0.05 mF) by adding from 0.05 to 1.0 mF, the drive control. Defective G806. Defective Horizontal Output Transformer.

(e) White vertical line or lines on left side: Damper circuit not working properly. Replace G6104. Check linearity coil and C74-079 (1.0 and 0.05 mF). Check setting of drive control, be too far counter-clockwise.

(2) Black vertical line on left side (when upper channels are being switched in). Barkhausen-effect. Redraw plate leads to 153 and 6600. If no improvement, replace G6104.

(horizontal lines at side of picture if no output noises present) G87 (V18) horizontal oscillator defective. Replace.

(h) Picture ageing over left or right, or shifting so that black framing bar, dividing picture, can be seen. See under "sync circuit".

3) Vertical Sweep Circuit

(1) Of tube above horizontal line only: No vertical sweep. (a) Defective G87 (V18), replace.

(b) G87 (V18) not oscillating. Determine by measuring plate pin 4 or output voltage. If no voltage, tube does not oscillate. Symptoms:

Defective C53 5000 mW ceramic capacitors. Replace. Vertical height control open or shorting against ground. Vertical height control open or shorting against ground. Vertical height control open or shorting against ground. Blocking transformer open.

Defective G87 (V18) oscillating, but still no sweep indicates defective G66 (Horizontal Drive Output Transformer). Check voltage measure of G87 (V18) for open transformer.

Picture Linearities Incorrect: Check G71 550 ohms at grid (pin 5) of G87 (V18) and Vertical Liner Control. Picture folding on top or bottom: Frequency incorrect. Check L65.1 MalgG 500,000 ohms, C53 1000 microfarads. Picture movement up and down cannot be stopped. See under "sync circuit".

4) Sync Circuit

Position of Sensitivity Switch will affect sync stability. Try both settings and use position giving strongest vertical hold. Picture moves in all directions, cannot be stopped: No vertical nor horizontal sync. Symptoms:

(a) Defective G87 (V18) Sync amplifier. Replace.

(b) Plate pin 4 should read ±75 volts. If higher, ground condenser may be loose (tube not drawing current). Pin 5 should read ±225 volts. Check whether C53 390 mF is defective. Replace.

(c) C52 220 mF condenser to sync amplifier may be defective. Replace.

(d) G60 (1/2 ADG, 1/2 video detector) defective. Replace.

(e) G67 (1/2 1st audio, 1/2 sync limiter) defective. Replace.

No Vertical Sync:

(a) Defective vertical hold control. (b) Sync pulses too low. Contrast low. If vertical looks in, but horizontal tears, real pin 5.

No Horizontal Sync:

(a) Check C52 120 mF coupling Sync Amplifier to Horizontal Frequency Coil. Replace.

(b) Check C54 125 mF parallel to lock control. Replace.

(c) Check B69 600,000 ohms. Replace.

(d) Check C77 4 mF (in series with 869)

Weak Vertical sync, no horizontal sync. Sync pulses weak. Check I-F alignment. Weak Horizontal Sync (picture holds only at very small portion of Hold control range): (a) B-4 low at output (pin 5) of G67 (V17) sync amplifier. Replace.

(b) Defective C77 4 mF. Replace.

(c) Defective C58 120 mF. Replace.

Upper edge of picture tends to one side: (a) Replace C77 4 mF.

(b) Replace C58 120 mF.

(c) Replace C69 120 mF.

(d) Defective C59 (Horizontal Frequency Control. Replace.

(e) Defective C59 (horizontal Lock control. Replace.

(f) Defective G87 (V17) Sync Amplifier. Test Pattern Distorted:


(b) Sync pulses too strong. Check I-F alignment. Check for defective G66 (sync limiter). Replace.

Picture does not fall into sync after change of station. Reset C56 (Horizontal Frequency Control) Reset C59 (Horizontal Lock Control)

© John F. Rider
5) Video

Master on CR tube, but no picture, no sound

If noise (spots and streaks travelling over tube face) is visible:
(a) Check R.F. Tuner for defective or loose 6J6 oscillator tube.
(b) Antenna-connections.
If sound is audible, but no picture visible:
(a) Check video I.F. for B+ voltages.
(b) Check video I.F. for defective 6AG5 tubes.
(c) Check for defective 6AL5 detector tube.
(d) Check for defective 12AU7 video output tube.
(e) Check for shorts in I.F. section, and in tuner at 6J6 socket lugs.
(f) Check for open peaking coils.

Note: Realignment is not always necessary when I.F. tubes are changed.

Only in case of greater differences in tube capacities (lack of band width - vertical lines on test pattern not reaching middle at low contrast, or breaking into oscillation - wavy vertical lines or black smudges) realignment should take place.
For procedure, see under "Alignment".

Picture gray at full contrast, while neighboring sets show
strong black-white pictures in same area.

(a) Check for defective 6AG5 I.F. tubes (V10; V11; V12; V13)
(b) Check for insufficient B+ in I.F. (115 to 135V with bias
battery connected across C10 as indicated on circuit
diagram).
(c) Misalignment, particularly L-6 and L-8 Pix I.F. coils.
(d) Check for defective 6AG5 R.F. tube in tuner.
(e) Move Sensitivity Switch to "Fringe" position.

Picture smears (letters, etc. having tails to the right).

(a) Check for open peaking coils (L10; L11; L12; L13)
(b) Check alignment, especially of L5 at 25.3 MC and L7 at
25.2 MC.
(c) Defective C33 or C34 (.05-.100) condenser.

6) Sound

If picture appears, but no sound:

(a) Check audio output section (6AQ6, 6X6)
(b) Check tubes in Sound I.F. V4; V5; V6.
(c) Check B+ voltages in Sound I.F.

If sound weak:
Realign Sound I.F.
Defective Sound I.F. tube of Discriminator tube V4; V5;
V5; V7.
Shorted or open Sound Trap L34 (on tuner).

If noise comes through at sound peak:
Realign Discriminator Transformer at Zero

If sound does not coincide with picture:
(a) I.F. misaligned. Picture carrier (25.75 MC.) too low
on I.F. response curve. See "Alignment" data.
(b) Tuner misaligned. See Tuner adjustments.

7) Pix I.F. Oscillation

Indicated by reading of approximately -3.0 volts or more
at pin #7 of V14 video detector with no signal input.
Realign Pix I.F. with 3 volt bias battery instead of
1 1/2 volt battery.
HUM IN PICTURE

We have had a few reports from the field on these models where the test pattern seems to expand and contract at a very slow rate of speed. This has been traced to the AC field of the power transformer affecting the deflection yoke. This can be corrected by first loosening the bolts holding the transformer together. In some cases, it has been found it can be corrected by removing the screws from the transformer and putting a wrap of copper shielding approximately 2" wide over the coil and core, being sure to have a well soldered connection between the ends of the wrap, to make one smooth turn.

HIGH FREQUENCY OSCILLATOR DRIFT

Some cases of drift in the high frequency oscillator have been reported on Models 3193 and 3194, which are using new type tetrode tuners. This can be corrected by replacing the 10 MFD ceramid condenser located near the front end of the tuner with a ceramic N 600, 1 C MFD temperature compensated type. This condenser is connected to contact #2 on the tetrode tuner, and the oscillator coil for each channel is slug tuned making it possible to set the sound on each channel in the middle of the fine tuning control range.

NOISY VOLUME CONTROLS

On Models 3181, 3091, and 3291, where noise has developed in the volume control, the following engineering change is recommended. At present there is a narrow section of the volume control which should be isolated from the volume control and the 22K resistor in the output of the 6A15 radio detector.

ADJACENT CHANELL TRAPS

In some areas interference from commercial radio services above 50 megacycles has been experienced. It is possible in some cases to trap this out by series or parallel traps in the transmission line. However, in most cases this causes quite a loss in signal strength on the affected TV signal. A recent case in a nearby area where a small transmitter on 75.5 megacycles blanketed channel 5 was corrected by installing adjacent channel traps in the IF strip. It is necessary to remove the present first and fourth IF coil, substituting a type which includes a parallel trap, one operating at 19.75 KCS and the other operating at 27.25 KCS.

When lining up the traps in the shop, it is suggested your signal generator be set at the frequency which the interfering signal is operating on and adjust these two traps for minimum response of that frequency. This method has proved quite successful in several applications.

HORIZONTAL OSCILLATOR FEEDBACK

We have experimented in the past with the table models of horizontal oscillator feedback getting into the picture IF strip, causing a jagged black vertical line of varying width to appear on the left side of the picture when operating on the high channels. This has been remedied by a redressing of the long red covered wires which runs from the left side of the chassis to the right side of the chassis connecting B supply filter condensers together. This lead passes quite close to the first IF transformer coil. It should be dressed as far away from the coil and near the chassis as possible.

---

TABLE OF REPLACEABLE PARTS

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>REF. SYMBOL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>21501</td>
<td>T-1</td>
<td>Cathode Clamp</td>
</tr>
<tr>
<td>21502</td>
<td>T-4</td>
<td>Glass Tube, A/C</td>
</tr>
<tr>
<td>21503</td>
<td>T-7</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21504</td>
<td>I-1</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21505</td>
<td>I-10</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21506</td>
<td>L-1</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21507</td>
<td>L-10</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21508</td>
<td>L-11</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21509</td>
<td>L-12</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21510</td>
<td>L-13</td>
<td>Glass Tube, G11</td>
</tr>
<tr>
<td>21511</td>
<td>L-14</td>
<td>Glass Tube, G11</td>
</tr>
</tbody>
</table>

---

© John F. Rider
FIGURE 1 — Cabinet

Production Modifications:

1. In some cases the grid resistor in the PM IF circuit, R-36, R-41 & R-45 (9000 ohms), were changed to 4700 ohms. This was done to improve the IF response curve.

2. Capacitor C-80 (4900 mfd) which runs from the grid of V-23B to T-11 may also be a 5100 or 5700 mfd. This capacitor was originally ceramic. In later production runs, however, it was changed to mica. This was because of an unfavorable reaction to heat, by the ceramic capacitor, which in turn caused vertical instability.

3. It will be noted that the Schematic Diagram shows an external audio jack which provides for the use of the audio system of another receiver or amplifier if desired. This audio jack was installed in only a very few receivers of an early production run.

FIGURE 3 — Schematic Diagram
**FIG. 1 — CASKET**

**GENERAL DESCRIPTION**

The Model 32/41 TV is a combination television receiver, complete with television picture tube, and have rectifier tubes. Some of the outstanding features are:

1. Fully transistorized on the outside of the cabinet which permits the television set to be set up or removed quickly.
2. Switching from TV to FM by push button operation of the switches.
3. RF type detector for FM reception, both B4 and Television sound.

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Overall Dimensions:</th>
<th>343/4 x 23 x 21 1/8 in.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>31 lbs</td>
</tr>
<tr>
<td>Width</td>
<td>23 in.</td>
</tr>
<tr>
<td>Depth</td>
<td>21 1/8 in.</td>
</tr>
<tr>
<td>Shape</td>
<td>Shipping Weight</td>
</tr>
<tr>
<td></td>
<td>144 lbs</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>280 watts</td>
</tr>
<tr>
<td>Tuning Frequency Range:</td>
<td>87.5 to 180.5 M.C.</td>
</tr>
<tr>
<td>Television</td>
<td>All 12 channels</td>
</tr>
<tr>
<td>Audio</td>
<td>110-120 volts, 60 cycle AC</td>
</tr>
<tr>
<td>Video</td>
<td>110-120 volts, 60 cycle AC</td>
</tr>
<tr>
<td>Picture</td>
<td>110-120 volts, 60 cycle AC</td>
</tr>
<tr>
<td>Sound</td>
<td>110-120 volts, 60 cycle AC</td>
</tr>
<tr>
<td>Receiver</td>
<td>110-120 volts, 60 cycle AC</td>
</tr>
</tbody>
</table>

**INTER-CHANNEL INTERFERENCE — TELEVISION MODELS**

In extremely strong signal areas some inter-channel interference has been encountered. Where this condition exists it may usually be corrected by removing the AGC voltage on the required channel. This is to be accomplished by grounding the AGC lead from the TV tuner directly to the chassis. This change applies to both RCA and GI tuners.
and applying the resultant D.C. voltage with correct polarity to the picture tube grid.

6. Sync Amplitude and Separation:
As the picture signal contains pulses which control the horizontal and vertical sweep, and blanking, it is necessary to separate these pulses from the picture and from each other. It is the purpose of the Sync Amplifier to amplify the vertical, horizontal, and blanking pulses, and to reduce the effect of extraneous pulses. The Sync Separator serves to remove the video and blanking pulses from the horizontal and vertical pulses. The Sync pulses are then further amplified and separated by means of amplification and differentiating networks.

6. Vertical Sweep Circuits:
Vertical Scanning of a magnetically shielded picture tube requires a saw-tooth waveform of current through the vertical deflection coils. A voltage of proper waveform and frequency is obtained in the vertical oscillator and discharge tube.

7. Horizontal Sweep Circuits:
This portion of the Model 3391 TV is more complex than the Vertical Sweep Circuit and is made up of the following interrelated circuits:
1. Horizontal Sync Discriminator.
2. Horizontal Oscillator.
3. Horizontal Oscillator Control.
4. Horizontal Discharge Output.
5. Horizontal Output.
6. Reaction Scanning.

The Hyperbolic Oscillator is a 6SK-5 GT connected in a very stable Hartley oscillator circuit. In order to maintain the proper frequency (157,500 C.P.S.) and phone relations between this oscillator and the transmitted picture signal, a resistance tube (6AU-6) is connected across the oscillator circuit and controlled by means of the Horizontal Sync Discriminator (6AU-6) which produces a D.C. voltage proportional to the phase displacement between the oscillator sine wave output and the horizontal sync pulses.

The Horizontal Discharge, Output, and Reaction Scanning circuits control the sine wave output of the controlled Horizontal Oscillator into a "saw-tooth" of current in the Horizontal Deflection coils to provide horizontal scanning for the picture tube.

8. High Voltage:
The picture tube requires between eight and ten kilovolts on its 2nd anode to give proper picture brilliance. Use is made of the return, or "sweep-back" portion of the horizontal trace voltage. The output of the Horizontal Output tube (6EG-G) is connected through a transformer to both high voltage rectifier and to the Reaction Scanning tube. The high voltage winding of the transformer steps up the voltage to the required voltage. The resultant voltage is then rectified by the 6ES1 tube and applied to the 2nd anode of the picture tube. Because of the magnitude, and frequency, very little capacitance filtering is necessary to sufficiently "smooth" out this voltage.

The small amount of capacitance in the high voltage circuits does not allow the storage of much energy, thus making the circuit less damped than conventional high-voltage circuits.

9. Audio Amplifier and output:
A high cathode audio stage (6AU-6) is coupled to a 6SK-5 GT type output tube, which in turn is connected to a permanent magnet dynamic speaker. A "feedback" circuit from the voice coil to the cathode of the audio tube cancels the feedback of the audio tube to prevent feedback and negligible distortion.

10. FM Band Tuner:
In addition to receiving television signals, the Model 3391 TV also permits the reception of the FM band. This is done by means of a tuner consisting of an R.F. Amplifier, and a Converter Oscillator which amplifies and converts the incoming FM signal to 2125 MC. This signal then passes through the same IF channel as would the picture sound.

A plug is located on the rear of the chassis which permits connecting the audio output of the Radio Detector to an external amplifier and speaker system.

HIGH VOLTAGE WARNING
OPERATION OF THIS RECEIVER WITHOUT THE COVER 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 MENTIONED WHEN WORKING ON HIGH VOLTAGE EQUIPMENT. DO NOT OPERATE THE RECEIVER WITH THE HIGH VOLTAGE COMPARTMENT SHIELD REMOVED.

Non-operating Controls:
Adjustment and trap circuit adjustments are not included in this list.
1. Focusing (front, extreme left).
2. Vertical Hold (front).
3. Vertical Linearity (rear).
4. Horizontal Hold (rear).
5. Focus (rear).
6. Horizontal Drive (rear).
7. Vertical Centering (rear).
8. Horizontal Centering (rear).
9. Horizontal Phase (rear, inside chassis).
10. Horizontal Linearity (high voltage control).
11. Width (high voltage control).
12. Focus Coil (back of picture tube, rear of tube adjustment).
14. (On Top of picture tube).

*NOTE: No ton tray is used on Realaud, type 15FP4.

FIG. 2—VOLUME-OPERATING CONTROLS

FIG. 3—FM OPERATING CONTROLS

FIG. 4—F.M. BLOCK DIAGRAM

TELEVISION TUBE INSTALLATION
The Model 3391 TV is delivered with the picture tube ready for operation. If, for any reason, it becomes necessary to remove this tube, the following procedure is recommended:
1. Remove chassis from cabinet and place on a bench or table so that the face of the tube and the control area of the chassis overlap the table edge by about three inches.
2. PRECAUTION: Make certain that the bench or table is sufficiently solid to support the load.

FM OPERATING INSTRUCTIONS
The FM tuner permits reception of stations within the 88 to 108 MC band.

To receive these stations, push the FM Tuning Control until the engagement of the switch causes the FM tuning dial to light up. The receiver can now be tuned in the usual manner by means of the tuning control and the volume control for desired station and sound level.

TELEVISION OPERATING INSTRUCTIONS
The operation of the Television section of the Model 3391 TV is accomplished by means of the controls listed and shown below.

Volume Control—For adjusting the sound level, both on Television and FM.
Brilliance Control—For varying the brightness level of the picture.
Contrast Control—For varying the contrast of the picture: Gradations of black and white.
FM Tuning and FM/T.V. Switch—Turns this control tunes the FM section. Pushing the control on or off causes a "click" to engage, permits switching from TV to FM position. Pushing this control again, releases the catch and operation returns to TV position.
Channel Selector—For selecting desired Television station.
Fine Tuning Control—For obtaining the best sound and picture quality.

ANTENNA
To assure the best in FM and Television reception, an antenna system has been designed for use with this instrument. This unit will give good signal pickup on all bands and may be purchased from any Portland-Bell dealer.

© John F. Rider