**GENERAL INFORMATION**

Models 3193TV and 3194TV are tube model receivers covering 915-1255 Mc. Both models have 6FU-7 picture tubes and an electron-magnetic type television picture tube. A 12V picture tube is used in the 3194TV while the 3193TV utilizes a 16V picture tube. Other than this, both models are identical.

**SPECIFICATIONS:**
- Models have been designed with complete sensitivity to the 3182 or 3193 TV terminals. In view of this, it is recommended that extreme care be made in the service notes covering the latter for a detailed discussion of the following:

**CIRCUIT DESCRIPTION:**
Block diagram with a description of the function of the various sections of the circuit.

**INSTALLATION INSTRUCTIONS:**
Instructions concerning installation of the receiver in the customer's home.

**SERVICE INSTRUCTIONS:**
- General service notes and specifications.
- Instructions for aligning, servicing, etc., Packard-Bell Television Receivers.

**ALIGNMENT PROCEDURE:**
Step by step alignment chart.

**SERVICE INFORMATION BASED ON PICTURE TUBE OBSERVATION:**
Photographic reproductions of television set patterns with various circuit deficiencies present.

**Troubleshooting:**
Instructions noted in picture tube observation.

**NOTES:**
- It is noted that the Service Instructions for the 3193TV and 3194TV are identical to those of the 3199 and 3199 TV receivers. In view of this, it is recommended that the reader consult the Service Information for those receivers. See 3199 service manual, 3199 TV receiver.

**SPECIFICATIONS:**
- Voltage and current ratings for various components.
- Technical information and specifications.

---

**TUBE COMPLEMENT:**

<table>
<thead>
<tr>
<th>Tube</th>
<th>No.</th>
<th>Function</th>
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</thead>
<tbody>
<tr>
<td>6AQ5</td>
<td>V-12</td>
<td>1st Video</td>
</tr>
<tr>
<td>6AQ7</td>
<td>V-16</td>
<td>1st Video</td>
</tr>
<tr>
<td>6AL5</td>
<td>V-17</td>
<td>D.C. Regulator</td>
</tr>
<tr>
<td>12968</td>
<td>V-18</td>
<td>Picture Tube (Grey)</td>
</tr>
<tr>
<td>12969</td>
<td>V-18</td>
<td>Picture Tube (Black)</td>
</tr>
<tr>
<td>10PPA</td>
<td>V-18</td>
<td>Picture Tube (Red)</td>
</tr>
<tr>
<td>10PPA</td>
<td>V-18</td>
<td>Picture Tube (Black)</td>
</tr>
<tr>
<td>6G8V</td>
<td>V-19</td>
<td>Sync. Transformer</td>
</tr>
<tr>
<td>6M7N</td>
<td>V-22</td>
<td>Sync. Separator</td>
</tr>
<tr>
<td>6G8V-G</td>
<td>V-23</td>
<td>Magnetic Amplifier &amp; Vertical Oscillator Discharge</td>
</tr>
<tr>
<td>6G8V-G</td>
<td>V-24</td>
<td>Horizontal Oscillator Discharge</td>
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<tr>
<td>6G8V-G</td>
<td>V-25</td>
<td>Vertical Oscillator Discharge</td>
</tr>
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<td>6G8V-G</td>
<td>V-26</td>
<td>Horizontal Oscillator Discharge</td>
</tr>
<tr>
<td>6G8V</td>
<td>V-29</td>
<td>Vertical Oscillator Discharge</td>
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<td>V-29</td>
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<td>V-29</td>
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</tr>
<tr>
<td>6G8V-G</td>
<td>V-29</td>
<td>Vertical Oscillator Discharge</td>
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</tbody>
</table>

**MAXIMUM DIAMETER 10VDC:**
- Maximum Diameter 10VDC: 6.5 mm
- Minimum Diameter 10VDC: 6.0 mm

---

**FIGURE 3 - TRIMMER LOCATION**

- S-9 - 2nd Pic Xf, 33.2 MC
- S-10 - Pic Xf feathers, 21.25 MC
- S-11 - 4th Pic Xf, 23.55 MC
- S-12 - Horizontal Phase Control
- S-13 - Horizontal Hold
- S-14 - Vertical

---

**FIGURE 6 - SOCKET VOLTAGES**

**CRITICAL LEAD DRESS:**
- 1 - Dress leads of Rotor Transformer, S-1 to V-1, approximately 2" above chassis.
- 2 - Dress video output leads up and away from chassis.
- 3 - Dress video output leads up and away from chassis.
- 4 - Contact between the B-F Oscillator Adjustment.

---

**FIGURE 7 - VERTICAL HOLD CONTROL**

- 1 - Dress leads of Rotor Transformer, S-1 to V-1, approximately 2" above chassis.
- 2 - Dress video output leads up and away from chassis.
- 3 - Dress video output leads up and away from chassis.
- 4 - Contact between the B-F Oscillator Adjustment.
We have had a few reports from the field that some 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 bells 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 shorted-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 our new type turreted tuner. This can be corrected by using the 4400 ceramic resonator indicated near the front of the crystal oscillator of a ceramic N 600, 1C MMFD temperature compensated type. This condenser is connected to contact #2 on the turret, 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 3021, where noise has developed in the volume control, the following engineering change is recommended. At present there is a large number of models which should be isolated from the volume control by inserting a .01 2000 condenser between the high side of the volume control and the 22K resistor in the out-of the 6A15 radio detector.

ADJACENT CHANNEL 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 RF coil, substituting a type which includes a parallel trap, one operating at 19.75 MC and the other operating at 27.25 MC. When lining up the traps in the shop, it is suggested your signal generator be adjusted to 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 experienced a few cases in the table models of horizontal oscillator feedback getting into the picture IF strip, causing a jagged black vertical line of varying widths 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 wire which runs from the left to the right side of the chassis connecting the B supply filter condensers together. This lead passes quite close to the first IF transformer coil. It should be dressed far away from the coil and near the chassis as possible.
**GENERAL DESCRIPTION**

The Model 3361 TV is a conventional television receiver, complete with television picture tube, and all associated circuits. The receiver was designed to meet the needs of the average consumer who desires a good quality television set at a reasonable price. The receiver is equipped with all the features that are found in more expensive models, such as automatic tuning, sound control, and various other convenience features.

**SPECIFICATIONS**

- **Overall Dimensions:**
  - Height: 36.4 in.
  - Shipping Weight: 144 lb.
  - Width: 23 in.
  - Depth: 21.5 in.

- **Electrical Ratings:**
  - Line Voltage: 110-120 volts, 60 cycle AC.
  - AC Power Consumption: 210 watts.

- **Tuning Frequency Range:**
  - Channel: All 16 channels.

- **Audio System:**
  - System: Stereo.

- **Sensitivity:**
  - tuner: 1.5 microvolts for 12 decibels signal-to-noise ratio.

- **Audio Power Output:**
  - Maximum: 3.5 watts.
  - Underload: 1.5 watts.

- **Tube Complement:**
  - 6B4: Picture tube (71 in.)
  - 6AS8: Picture tube (71 in.)
  - 6SN7: Picture tube (71 in.)
  - 6C5GT: Picture tube (71 in.)
  - 6G6GT: Picture tube (71 in.)
  - 6G6GT: Picture tube (71 in.)

- **Circuit Description:**

  The Model 3361 TV is designed with the following features:

  1. RF Amplifier, Driver, and Oscillator.
  2. Picture IF Amplifier, Detector, and Automatic Gain Control.
  3. Sound IF and Rotor Detector.
  5. Sync Amplifier and Separator.
  7. Horizontal Sweep.
  8. Picture Tube and Picture Tube.

- **After the picture signal has been amplified sufficiently, it is rectified, and the audio frequency component eliminated. The resulting signal contains picture information, blanking, and blanking.

**INTER-CHANNEL INTERFERENCE — TELEVISION MODELS**

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

5. Sync Amplifier and Separators:
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 removes the video and blanking pulses from the vertical and horizontal outputs. The Sync pulses are further amplified and separated by means of modulating and differentiating networks.

6. Vertical Sweep Circuits:
Vertical Scanning of the magnetically controlled picture tube requires a saw-tooth waveform of current through the vertical deflection coil. A voltage of the proper waveform and frequency is obtained in the vertical oscillograph and deflecting coil.

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 interconnected circuits:
- Horizontal Sync Discriminator
- Horizontal Oscillator
- Horizontal Oscillator Control
- Horizontal Deflection Output
- Horizontal Output
- Horizontal Sync.

8. Reaction Scanning:
The Horizontal Oscillator is a 6X5T connected in a very stable Hartley oscillator circuit. In order to maintain the proper frequency (13750 C.P.S.) and phase relations between this oscillator and the transmitted picture signal, a resistance divider (R.A.C.) is connected across the oscillator circuit and controlled by means of the Horizontal Sync Discriminator (H.A.S) which produces a C.C. voltage proportional to the phase displacement between the oscillator sine wave output and the horizontal sync pulses.

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

9. High Voltage:
The picture tube requires between eight and ten kilovolts at 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 (B46G-C) is connected through a transformer to both a high voltage rectifier and to the Reaction Scanning tube. The high voltage winding of the transformer steps up the voltage to the required value. The resultant voltage is then rectified by the selenium tube and applied to the 2nd anode of the picture tube. Because of the magnitude, and frequency, great care must be exercised in handling the high voltage circuitry to prevent any possibility of injury to personnel.

HIGH VOLTAGE WARNING
OPERATION OF THIS RECEIVER IS RISKY AND IS COVERED BY A SHOCK HAZARD.

NON-OPERATING CONTROLS:
- Alignment and trim circuit adjustments are not included in this list.
- Height (near, extreme left).
- Vertical Hold (near).
- Vertical Linearity (near).
- Horizontal Hold (near).
- Focus (near).
- Horizontal Drive (near).
- Vertical Centering (near).
- Horizontal Centering (near).
- Horizontal Phase (near, extreme right).
- Horizontal Linearity (near, extreme right).
- Width (high voltage coil).
- Focus Coil (mark of picture tube, weakly adjusted).
- Deflection Coil (mark of picture tube, weakly adjusted).

ANTENNA:
To ensure 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.

TELEVISION INSTALLATION
The Model 3391 TV is delivered with the picture tube ready for operation. For any reason, it becomes necessary to remove this tube, the following procedure is recommended:
- Remove chassis from cabinet and place on a bench or table so that the face of the tube and the control gear is off the chassis overlapping the table edge by about three inches.
- 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—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/TV Switch—Turning this control tunes the FM section. Pushing the control as to cause a "click" to engage, permits switching from TV to FM position. Pushing this control again, releases the switch and operation returns to TV position.

Channel Selector—For selecting desired Television station.

Fine Tuning Control—For obtaining the best sound and picture quality.
HIGH VOLTAGE MEASUREMENT

The potential applied to the 2nd anode of the picture tube should be in the order of 10 kilovolts. This is well outside the range of any voltmeter used by the average radio technician. The range of a Polytector or similar type meter can readily be extended. Voltsimeters are commercially available for this purpose. In measuring this voltage, all the precautions of high voltage handling should be observed.

PRODUCTION MODIFICATIONS

Several modifications have been made since the first unit was produced. The schematic diagram incorporates all of these changes. In order that the service technician may reconcile any variations between the block he is servicing and the schematic diagram, a list of these modifications is included with these notes. It is not advised that these changes be made unless there is an apparent justification for so doing.

1. An 8000 ohm resistor was added across L-89, the 4th Pin 1F transformers.
2. R-48, the 4th Pin 1F cathode resistor was reduced from 82 ohms and changed to 180 ohms.
3. Early versions of this model incorporated no delay in the Automatic Gain Control circuit. Because of the poor sensitivity resulting in weak signal output, it was deemed advisable to add delay so that the AGC would not be active unless a certain minimum signal was received. The ability of the Control switch which went to ground has been connected to a positive voltage source as indicated in the schematic diagram.
4. The 4th Pin 1F cathode bypass condenser which was originally, 1500 uMf, has been changed to 5000 uMf.
5. A certain number of receivers were built with the polarity of the secondary of the 1st Sound 1F reversed. Terminal "A", instead of being connected to the grid, is connected to AVC. For these receivers, this method of connections is correct.
6. A 1500 uMf condenser was added to the 135 volt bus to the Sound 1F.
7. The limiting resistor in series with the Horizontal Drive Control may be varied from several thousand, 10,000 ohms, 6000 ohms, or 8200 ohms.

ALIGNMENT PROCEDURE

For convenience, the alignment procedure is given in the form of a chart. In the alignment of the Picture 1F Amplifier, care must be taken not to prevent the input circuit of one tube becoming tuned to the same frequency as its output circuit. Violent oscillations will occur which manifest themselves in an abnormally high bias voltage. This voltage will drive subsequent amplifier tubes to cutoff and an signal will appear on the oscilloscope screen. The technician should observe both oscilloscope and voltmeter, determining each 1st tube until a signal appears on the oscilloscope screen and (for the bias voltage becomes lower value for read point P1). The alignment procedure outlined in (3) and (2) can then be followed.

The alignment procedure recommends, in several instances, that the Signal or Sweep Generator be loosely coupled to either the Converter of R/F tube. This is accomplished most readily by wrapping several turns of highly heavy insulated wire (#14 or #16 gauge) around the clamp attachment of the tube and connecting the conductor to one end and the other side to the amplifier.
### ALIGNMENT CHART

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Contact Signal Generator To</th>
<th>Signal Generator Frequency</th>
<th>Contact Switch VA Frequency</th>
<th>Contact Oscillators To</th>
<th>Contact Voltmeter To</th>
<th>Miscellaneous Connections and Instructions</th>
<th>Adjust</th>
<th>Refer To</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>Antenna terminals/point D</td>
<td>67.25</td>
<td>Channel 4</td>
<td>Channel 4</td>
<td>Channel 4</td>
<td>Check for same response as above</td>
<td>Fig 1</td>
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<td>Channel 2</td>
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(5) R.F OSCILLATOR ALIGNMENT TUNER No. 10830

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<tr>
<th>Step No.</th>
<th>Antenna terminals</th>
<th>215.75</th>
<th>Intro R14 &amp; R24, Point D</th>
<th>Real tuning control for all antenna or on Chan. 13</th>
<th>530, 31 for same frequency as volt. meter</th>
<th>S-1-1st Sound IF Primary</th>
<th>S-2-1st Sound IF Secondary</th>
<th>S-3-2nd Sound IF Primary</th>
<th>S-4-2nd Sound IF Secondary</th>
<th>S-5-Trap Detector sound Primary</th>
<th>S-6-Trap Detector sound Secondary</th>
<th>S-7-1st Picture IF</th>
<th>S-8-2nd Picture IF</th>
<th>S-9-3rd Picture IF</th>
<th>S-10-Sound Trimpot may be either of two shown, S-11-4th Picture IF</th>
<th>S-12-Horizontal Disc Coll, Phase Control</th>
<th>S-13-Horizontal Disc Coll, Hold Control (frequency)</th>
<th>S-14-Width Control</th>
<th>S-15-Horizontal Linearity Control</th>
<th>S-16-T.V. Tuner-R.F Adjustment</th>
<th>S-17-T.V. Tuner-R.F Adjustment</th>
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<tbody>
<tr>
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<td>*</td>
<td>208.75</td>
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</table>

(6) R.F OSCILLATOR ALIGNMENT TUNER No. 10823

**NOTICE**: The oscillator alignment for Tuner 10823 should not be attempted if all stations fall within range of the Fine Tuning Control. There are no oscillator adjustments for each channel, hence the adjustment is a compromise. The foregoing procedure is only recommended when one station or stations fall outside the range of the Fine Tuning Control.

### FM TRAP ADJUSTMENT

<table>
<thead>
<tr>
<th>Step No.</th>
<th>Between same terminal and grounded (150 ohms)</th>
<th>The one being FM freq.</th>
<th>Intro R26 and C37, Point E</th>
<th>S20 or 21 if necessary, whichever is the more effective</th>
<th>Fig 1</th>
<th>Fig 5</th>
<th>Fig 10</th>
</tr>
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**SERVICE SUGGESTIONS BASED ON PICTURE TUBE OBSERVATION**

No Raster on Picture Tube:
2. No high voltage. If horizontal deflection is operating, the trouble can be isolated to the 8016 circuit. Check:
   a) The 8016 tube (V-30).
   b) C150 for short circuit.
   c) R119 and R137 for open circuit.
3. V-27 or V-27 circuits inoperative. Check:
   a) For sine wave on terminal 5 (grid of V-8755-G, Horizon. Osc.)
   b) For pulse on terminal 5 (grid of V-8755-G, Horizon. Osc.)
4. Check oscillator control open (886).
5. No receiver plate voltage. Check filter condenser for short circuit.

No Vertical Deflection:
1. V-23 or V-24 inoperative. Check:
   a) Voltages and waveforms on grids (terminals 4, 6557-GT, and 6557-GT) and plates (terminals 5 and 3 of tubes V-238 and V-239.)
   b) Vertical Output Transformer (T-11) open.
2. Vertical Deflection Colls (L-97 and L-98) open.

No Horizontal Deflection:
1. Horizontal Deflection Colls (L-103) open. Any other failure in the Horizontal Oscillator circuits will cause loss of high voltage. Check voltages at output terminals for short circuit.
2. Sound and Signal on Picture Tube, But No Sound:
   a) 6557-GT output frequency.
   b) Vertical Oscillator circuits open.
   c) Sound and Image circuits open (886).
   d) Speaker defective.

Sound and Raster, But No Picture or Sync:
1. Picture 1F, Detector, or Video Amplifier inoperative. Check voltages on all tubes in these circuits.
2. Sound contact to picture tube grid.

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**FM ALIGNMENT PROCEDURE**

When the Model 3961TV is operating as an FM receiver, the TV sound channel is being used as the IF Amplifier and Detector. The adjustment of this portion of the receiver is covered in the TV alignment instruction.

**FM ALIGNMENT CHART**

<table>
<thead>
<tr>
<th>Step</th>
<th>Contact</th>
<th>Test Out.</th>
<th>Pointer</th>
<th>Adjust</th>
<th>For Max. Output*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Antenna</td>
<td>21.25</td>
<td>21.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>108 MC.</td>
<td>108 MC.</td>
<td>C66 &amp; C66</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>88 MC.</td>
<td>88 MC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>80 MC.</td>
<td>80 MC.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Antenna</td>
<td>96 MC.</td>
<td>96 MC.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Connect a "Volturny" or equivalent to point "C" on schematic.

**SERVICE INSTRUCTIONS—FM**

The Model 3961TV may be used for the reception of FM stations on the FM band which extends from 88 to 108 MC. A block diagram shows how this is accomplished.

This unit consists of an R.F. Amplifier (8854) and a Converter (8856) which changes the FM signal from its original frequency 88 to 108 MC to the IF frequency 525 MC. The IF frequency is the same as used for the Picture circuit and the same IF channel is used in both cases. A two-gang variable capacitor serves to tune the R.F. Amplifier and Oscillator across the band. The converter circuit is not tuned. The antenna coil is resonated at the middle of the band and is designed to perform across the entire band with uniform gain.

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