MODEL 180 UHF TUNER
(ALSO USED IN MODEL 212)

ALIGNMENT PROCEDURE

PRELIMINARY NOTES:

VHF tuner and TV I-F strip must be in proper alignment before attempting alignment of UHF tuner.

Connect oscilloscope or VTVM across the 4,7K ohms video detector load, R-12, TV schematic.

EQUIPMENT REQUIRED—AM VHF signal generator with 12 kc sweep, oscilloscope or VTVM, insulated screwdriver.

250 OHMS

TO CRYSTAL

50 OHMS

TO SIGNAL

ANTENNA TERMINALS

OF CONVERTER

TO UHF

GENERATOR

50 OHMS

TO SIGNAL

GENERATOR

125 OHMS

Fig. 1

SIG. GEN. CONNECTION

SIG. GEN. FREQ.

ADJUST

REMARKS

I-F ALIGNMENT

1—To crystal at junction of items 21, 29, 45, 51, UHF schematic, thru matching net, Fig. 1.

2—Same as 1.

OCCILLATOR ALIGNMENT

3—UHF antenna terminals thru matching net. See Fig. 2.

4—Same as 3.

5—Repeat steps 3 and 4 until no further improvement in signal is apparent. 465 Mc and 900 Mc are approximations and may not fall precisely at extreme left and right dial positions. However, oscillator alignment must be made so that both frequencies may be tuned within dial limits.

6—Same as 3.

7—Same as 3.

8—Repeat steps 6 and 7 until no further improvement in signal is apparent.

9—Same as 3.

10—Repeat steps 6 and 7 until no further improvement in signal is apparent.

11—Repeat steps 6 and 7 until no further improvement in signal is apparent.

12—Repeat steps 6 and 7 until no further improvement in signal is apparent.

VOLTAGE MEASUREMENTS

Notes: VTVM used. Measurements taken between terminals and chassis. Measurements within 20% of specified values are satisfactory. Values in DC volts unless otherwise noted. Switch in UHF position.

<table>
<thead>
<tr>
<th>TUBE TYPE</th>
<th>FUNCTION</th>
<th>PIN 1</th>
<th>PIN 2</th>
<th>PIN 3</th>
<th>PIN 4</th>
<th>PIN 5</th>
<th>PIN 6</th>
<th>PIN 7</th>
<th>PIN 8</th>
<th>PIN 9</th>
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<tbody>
<tr>
<td>6X4</td>
<td>Rect.</td>
<td>170 AC</td>
<td>NC</td>
<td>0</td>
<td>6.3 AC</td>
<td>NC</td>
<td>170 AC</td>
<td>190</td>
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<tr>
<td>6BK7/6RO7</td>
<td>L.F. Amp.</td>
<td>120</td>
<td>.85</td>
<td>6.3 AC</td>
<td>0</td>
<td>125</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>Osc.</td>
<td>85</td>
<td>5.7</td>
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<td>5.7</td>
<td>85</td>
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*Use 15K ohms isolating resistor in series with voltmeter probe.

RESISTANCE MEASUREMENTS

Notes: VTVM used. Measurements taken between terminals and chassis. Measurements within 20% of specified values are satisfactory. Switch in UHF position. AC cord disconnected.

<table>
<thead>
<tr>
<th>TUBE TYPE</th>
<th>FUNCTION</th>
<th>PIN 1</th>
<th>PIN 2</th>
<th>PIN 3</th>
<th>PIN 4</th>
<th>PIN 5</th>
<th>PIN 6</th>
<th>PIN 7</th>
<th>PIN 8</th>
<th>PIN 9</th>
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<td>50K</td>
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<td>12K</td>
<td>50K</td>
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</table>

*Or more.

CIRCUIT DIAGRAM

REPAIR PARTS LIST

PMA-6501-11 1  Inductor, UHF
PMA-6501-4  4  Transformer, Power
PMA-6501-5  5  Transformer, L.F. Input
PMA-6501-6  6  Transformer, L.F. Output
PMA-6501-9  9  Switch AC & Antenna Changerover
PMA-6501-24 24  Choke, Neutralizing
PMA-6501-25 25  Capacitor, Ceramic Tubular, 10 UUF
PMA-6501-27 27  Choke, L.F. Plate
PMA-6501-29 29  Capacitor, Ceramic Tubular, .68 UUF
PMA-6501-35 35  Capacitor, Electrolytic Filter, 20-20, 20-200, 175-150 UUF
PMA-6501-36 36  Resistor, Carbon, 56 Ohms, ± 10%
PMA-6501-38 38  Resistor, Carbon, 470 Ohms
PMA-6501-39 39  Resistor, Carbon, 880 Ohms

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CHASSIS VARIATIONS

<table>
<thead>
<tr>
<th>NUMBER</th>
<th>PICTURE TUBE</th>
<th>TUNERS</th>
<th>VHF</th>
<th>UHF</th>
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<tbody>
<tr>
<td>200-1</td>
<td>17HP4</td>
<td>PMC-57006</td>
<td>PMC-57007</td>
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<td>200-2</td>
<td>17HP4</td>
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<td>17HP4</td>
<td>PMC-57006</td>
<td>PMC-57009</td>
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<td>200-5</td>
<td>17HP4</td>
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<td>21MP4</td>
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<tr>
<td>200-15</td>
<td>21MP4</td>
<td>PMC-57011</td>
<td>None</td>
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</tr>
</tbody>
</table>

GENERAL SPECIFICATIONS

- Built-in with Provisions for External 300 Ohms Antenna
- 4.5 Megacycles
- 45.75 Megacycles
- 41.25 Megacycles
- 110-120 Volts, 60 Cycle, AC.
- 215 Watts
- PM Type 3.2 Ohms Voice Coil

ADJUSTMENTS

WARNING — OPERATION OF THE RECEIVER CHASSIS OUTSIDE OF THE CABINET INVOLVES THE DANGER OF WORKING WITH HIGH VOLTAGES. EXTREME CAUTION SHOULD BE EXERCISED AT ALL TIMES.

Occasional minor adjustments will be needed if any circuit work or tube replacement is required. A test pattern, generated locally or from a broadcast station, is recommended for best results. The operating and auxiliary controls, located on the front panel and rear apron, should be set for as good a pattern as possible before making the following adjustments:

CENTERING

Rotate each of the Centering Rings separately until the picture is properly centered.

HEIGHT AND WIDTH

Adjust the Height and Width Controls so that the picture fills the dimensions of the screen. A slight re-adjustment of the centering control may be necessary.

HORIZONTAL DRIVE CONTROL

The Horizontal Drive Control (CS18) is adjusted by backing off the control until a vertical white bar appears in the middle of the picture, and then going in one full turn from this point. This adjustment may be reached from the underside of the chassis mounting board. See below for detailed description of Horizontal Oscillator Sync Adjustment.

VERTICAL LINEARITY CONTROL

Set the Vertical Linearity Adjustments for a symmetrical pattern. A slight re-adjustment of the Height and Width Controls may then be necessary.

NOISE BALANCE CONTROL

Turn the Channel Selector to the strongest station signal on the air. Slowly turn the Noise Balance Control from full clockwise position counterclockwise until the picture just starts to show a distorted shape. Then turn the control slightly in the opposite direction so that the picture shape is normal. Check all channels, if the picture shape is distorted on any channel, advance the control slightly clockwise to restore normal shape. (NOTE: WHENEVER THE PICTURE IS DISTORTED, OR SLANTING BARS ARE ENCOUNTERED WHICH CANNOT BE ADJUSTED CORRECTLY WITH THE HORIZONTAL LOCK OR FINE TUNING CONTROLS, ALWAYS SET THE NOISE BALANCE CONTROL FULLY COUNTERCLOCKWISE BEFORE MAKING ANY OTHER ADJUSTMENT.)

PICTURE TUBE ADJUSTMENTS

WARNING: THE PICTURE TUBE ENVELOPE ENCLOSES A HIGH VACUUM. ANY ACCIDENTAL BLOW OR ROUGH HANDLING MAY CAUSE THE TUBE TO IMPLODE WITH DANGEROUS AND DESTRUCTIVE FORCE. THE WEARING OF HEAVY GLOVES AND SHATTER-PROOF GOGGLES IS ADVISED WHEN HANDLING THE PICTURE TUBE.

1. Turn the Brightness Control to maximum (clockwise) and the Picture Control to minimum (Counterclockwise).
2. Rotate the Ion Trap Magnet and at the same time move it backward and forward to obtain the brightest raster.
3. Reduce the Brightness Control so that the raster is slightly over normal brilliance and re-adjust the Ion Trap Magnet for maximum brightness.
4. Loosen the Deflection Yoke adjusting screws and rotate the Deflection Yoke so that the top and bottom edges of the raster are parallel to the top of the chassis. When this adjustment is made, tighten screws.
5. Adjust the Centering Control until the entire raster is visible, centered within the opening of the mask, with no shadowed corners.
6. Move the Ion Trap Magnet as in step 2 for final adjustment.

HORIZONTAL OSCILLATOR SYNC ADJUSTMENT

- Remove the screw and swing plate clear.
- Set the V/I (125 x 100) 1 x Microammeter.
- 3.8125 A. FUSE.
- Hor. Drive Control (CS8) 1 x Microammeter.
- Hor. Drive Control (CS8) 1 x Microammeter.

1. Set the Noise Balance control to maximum clockwise.
2. Connect an oscilloscope to terminal "C" on the Synchroguide transformer (T-8) through a small capacitor, from 10 to 50 UF.
3. Connect a DC VTM from the grid of the type 6AU6 Horizontal Output tube (VT15) to the chassis. Use a high impedance probe.
4. Set the trimming capacitor adjustment screws in tight for the Horizontal Locking Range (CS1a) and the Horizontal Drive (CS1b).
5. Back off the trimmer for the Horizontal Locking Range 1/2 turn.
6. Back of the trimmer for the Horizontal Drive until the VTM registers .9 volts (approximately one full turn).
7. Adjust front screw of Synchroguide to lock-in picture horizontally.
8. Adjust inside core of Synchroguide to give correct wave form. Re-adjust front screw simultaneously to keep in sync. Use non-metallic screw driver on inside core.

9. Trim front screw to get approximately three bars break-out when switching channels, with Horizontal Lock control in maximum clockwise position.

THE HORIZONTAL LOCK CONTROL SHOULD PRODUCE THE FOLLOWING CONDITIONS:
A. Sync should hold with control in maximum counterclockwise position.
B. Sync should pull in when switching channels over at least half of the rotation range of the control.
C. Picture should not jitter at any position of the control.
   a. If sync does not hold in maximum counterclockwise position, back off front screw of Synchroguide. Retain correct wave form by adjustment of inside core.
   b. If sync does not pull in when switching channels over half of rotation range, back off C-51a, 1/4 turn at a time, until correct lock-in range is established.
   c. If the picture jitter at any position of the Horizontal Lock control, advance the control in a clockwise direction to the position that produces the greatest amount of jitter and adjust the front screw of the Synchroguide in a clockwise direction until the jitter stops. If jitter is not eliminated, advance C-51a trimmer adjustment. If jitter persists, shunt a 100 uF LiF capacitor across C-51a, Re-check break-out on clockwise end when switching channels. Back off C-51a if sync does not pull in at least half of rotation range of Horizontal Lock control.

ALIGNMENT
NOTE: ALWAYS SET NOISE BALANCE CONTROL FULLY CLOCKWISE BEFORE MAKING ANY ALIGNMENT TESTS OR ADJUSTMENTS.

I-F ALIGNMENT

Lift the top section of the shield on the R.F. oscillator mixer tube so that it does not make electrical contact with its base. Connect one side of the output of an A.M. signal generator to the shield, the other side to the chassis. Connect a VYTM across the 4.7K video detector load. Use the lowest scale reading on the meter. Always attenuate the signal generator output for a reading below the limits of the meter, approximately —1 to —1.5 volts.
Set the Volume and Contrast controls to minimum. Set the Channel Selector to channel 7 or 13, depending on local conditions or interference.

PROCEDURE

<table>
<thead>
<tr>
<th>SIZE, GEN FREQUENCY</th>
<th>ADJUST</th>
<th>METER READING</th>
<th>REMARKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>4550 Mc T-11</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>44 Mc I-F Adjustment</td>
<td>on Tuner</td>
<td>Maximum</td>
<td>Connect a 1K resistor from grid of V-1 to AGC line for this step only.</td>
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<tr>
<td>44.0 Mc Bottom of T-1</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.50 Mc Bottom of T-2</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45.35 Mc Bottom of T-10</td>
<td>Maximum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.25 Mc Top of T-1</td>
<td>Minimum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>41.25 Mc Top of T-2</td>
<td>Minimum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>47.35 Mc Top of T-2</td>
<td>Minimum</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat steps 3, 4, and 5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeat step 2.</td>
<td></td>
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</tr>
</tbody>
</table>

The I-F passband may be observed by substituting a sweep generator for the A.M. signal generator and substituting an oscilloscope for the VYTM. Connect a 3 volt battery so that its positive terminal is connected to the chassis and the negative terminal is connected to the AGC lead. The sweep generator should be set to approximately 44 Mc and then adjusted to center the wave form on the scope face. To avoid overload and to assure a true view of the wave shape, the output of the sweep generator should be attenuated until further attenuation has a minimum effect on the wave shape. If necessary, a slight adjustment of the I-F transformers may be made to obtain a close approximation to the ideal curve. Adjustment of T-2 or T-10 affects the band width. Adjustment of T-1 or T-11 affects the slope of the top. However, T-1 should be preferred for slope adjustment.

SOUND ALIGNMENT

1. Connect an A.M. signal generator tuned to 4.5 Mc between the grid of V5 and ground. Connect the alignment test circuit shown below and tune LB for a minimum reading on a VTVM.
2. Disconnect the alignment test circuit and connect the VTVM to ground and Pin 5 of V7. Adjust L9 and primary of T3 (Bottom) for maximum indication.
3. Remove the VTVM and re-connect it to ground and junction of R27 and R28. Adjust secondary of T3 (Top) for zero. (Note: When tuning through the proper setting, the meter should swing negative on one side and positive on the other side.)

USE IN-8 CRYSTAL SOUND ALIGNMENT TEST CIRCUIT

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CHASSIS 200-1, 2-3-4-5, 11-12-13-14-15
<table>
<thead>
<tr>
<th>PART NO.</th>
<th>SCHEMATIC LOCATION</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>SCHEMATIC LOCATION</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>SCHEMATIC LOCATION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>P8A-4515-49</td>
<td>R40</td>
<td>4.7 MEGOHMS</td>
<td>1/2 WATT</td>
<td>P8A-4515-73</td>
<td>R29</td>
<td>10 MEGOHMS</td>
<td>1/2 WATT</td>
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<td>P8A-4700-7</td>
<td>R76</td>
<td>220 OHMS</td>
<td>4 WATT</td>
<td>P8A-4700-7</td>
<td>R55</td>
<td>60 OHMS</td>
<td>6 WATT</td>
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<tr>
<td>P8A-4700-7</td>
<td>R76</td>
<td>220 OHMS</td>
<td>4 WATT</td>
<td>P8A-4700-7</td>
<td>R55</td>
<td>60 OHMS</td>
<td>6 WATT</td>
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<td>P8A-4700-7-1</td>
<td>R17, R38</td>
<td>1K OHMS</td>
<td>2.5 WATT</td>
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<td>P8A-4801-5</td>
<td>R58</td>
<td>5K Ohms, Vertical Linearity Control</td>
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<td>R47</td>
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<td>P8A-4801-5</td>
<td>R17a, R17b, S1</td>
<td>.5 MEGOHM &amp; 780 Ohms, Volume &amp; Contrast Control and On-Off Switch</td>
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<td>1.5 MEGOHM, Vertical Hold Control</td>
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<td>P8A-50207</td>
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<td>4.5 MC Ratio Detector</td>
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<td>P8A-50503</td>
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<td>P8A-50605</td>
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<td>P8A-50604</td>
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<td>P8A-50219</td>
<td>T8</td>
<td>Synchrobridge</td>
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</tr>
</tbody>
</table>

**ALL CAPACITOR TOLERANCES ± 20%, EXCEPT:**
- C: ± 5% T = ± 10%
- ALL RESISTORS ± 10%

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Television Receiver Chassis

No. 200-1  No. 200-11
No. 200-2  No. 200-12
No. 200-3  No. 200-13
No. 200-4  No. 200-14
No. 200-5  No. 200-15

NOTES:

1. Last C-78; Last R-88. All capacitors in UUF, all resistors 1/2 watt, unless otherwise noted.

2. Pin voltages taken with VTVM, antenna shorted, TV-Phono switch in TV position. Contrast control minimum contrast. Noise control maximum clockwise. Other controls at normal operating position. All voltages positive DC unless otherwise noted. All readings to ground except pin 3 to pin 4 on V-11.

3. Wave form peak to peak voltages taken with video output of 45 volts peak to peak.

†C-19 connected from terminals 7 to 3 of T-9 when using 21MP4 picture tube.
CHASSIS 150-4, -5, -7, -9, -10, -12, -16, -31, -51, -61

CHASSIS 150-4, 150-5, 150-7, 150-9, 150-10, 150-12, 150-16, 150-31, 150-51, and 150-61

CABINET MODELS AND CORRESPONDING CHASSIS NUMBERS

<table>
<thead>
<tr>
<th>CABINET MODEL NO.</th>
<th>CHASSIS MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>20B1</td>
<td>Console Comb.</td>
</tr>
<tr>
<td>21B1</td>
<td>Console Comb.</td>
</tr>
<tr>
<td>21B4</td>
<td>Console Comb.</td>
</tr>
<tr>
<td>21B2</td>
<td>Console Comb.</td>
</tr>
<tr>
<td>21B3</td>
<td>Console Comb.</td>
</tr>
<tr>
<td>21B4</td>
<td>Console Comb.</td>
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<tr>
<td>2401</td>
<td>Console</td>
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<tr>
<td>4317</td>
<td>Table Model</td>
</tr>
<tr>
<td>47B1</td>
<td>Table Model Comb.</td>
</tr>
<tr>
<td>5517</td>
<td>Table Model</td>
</tr>
</tbody>
</table>

Power consumption of combination sets is 240 watts.

DESCRIPTION

Combination Receivers Using Chassis 155 & 155-1 A-M Radio Tuner TV CHASSIS 150-4, 150-5, 150-7, & 150-9

Chassis model 155 is a two tube A-M radio tuner with a built-in loop antenna, a type 6B66 converter tube, a type 6B6, 455 Kc, I-F amplifier, tube, and a crystal diode detector, type 1N62. This A-M radio tuner has a control panel separate from the television receiver. The audio amplifying and output circuits of the television receiver provide these functions for radio reception. A three position function switch on the radio control panel (S1, S2, S3) radio schematic permits changing the source of the audio signal voltage across the volume control potentiometer (R-13) TV schematic) from TV to radio or phonograph, as desired. The 155 A-M radio tuner is connected to the television circuitry through an adapter socket on the back of the TV chassis. The phone feed is also plugged into the back of the TV chassis, but the phone pick-up lead is plugged into the A-M radio tuner. Chassis 155-1 is the same as 155 except for length of control shafts.

Combination Receivers Using Chassis 160 AM Radio Tuner TV CHASSIS 150-10

Chassis model 160 is also a two tube A-M radio tuner with the same type of converter, I-F amplifier, and detector as chassis 155. The function of the two tubes is the same. However, a single set of controls is used to provide both television and radio reception on receivers with the 160 chassis. The radio dial is attached to the TV Fine Tuning control, which gives control a dual capacity, depending on the position of the TV-RADIO-PHONO function switch. The 160 chassis is mounted on the underside of the TV chassis directly behind the front panel auxiliaries controls. Its tuning gang is driven off the fine tune shaft with a pulley and stringing arrangement. The function switch (S1, S2, S3 radio schematic) permits changing the source of the audio signal voltage across the volume control potentiometer (R-13, TV schematic) from TV to radio or phonograph, as desired. The 155 A-M radio tuner is connected to the television circuitry through an adapter socket on the back of the TV chassis. The phone feed is also plugged into the back of the TV chassis, but the phone pick-up lead is plugged into the A-M radio tuner. Chassis 155-1 is the same as 155 except for length of control shafts.

Record Changers

There are three types of record changers used in Pacific Mercury combination receivers. Pacific Mercury model 90023 is a V-M, model 950, record changer. Pacific Mercury model 90025 is a Webster-Chicago, model 114 record changer. Pacific Mercury model 90026 is a General Instrument & Appliance Corp., model 7004-33-45, record changer. All three record changers operate on 110 volts AC, 60 cycle power.

Chassis 150-9 & 150-16

Chassis 150-9 and 150-16 use a 17HP4 type picture tube. The 17HP4 has electrostatic focus with 450 volts on Pin No. 6, and 290 volts on Pin No. 10. See installation and adjustment instructions of electrostatic focus picture tubes.

Chassis 150-7 & 150-12

Chassis 150-7 and 150-12 also use a type 17HP4 picture tube. These two models are 20 tube chassis, similar to the basic chassis 150-series except for the omission of the Noise Balance circuit.

The second half of V-4 (Type 12AX7), which formerly functioned as the Noise Balance Control, is used as the audio amplifier in these models, and V-3, the type 6AV6 tube, which was formerly used for audio amplification, is omitted.

There is no coupling between the two halves of the twin triodes V-4, in the twenty tube receivers even though they are in the same envelope. The output from the first half, the video detector, is coupled to the video amplifier.
The chassis listed in this supplement require the same type of adjustments as described in the 150-Series Service Manual.

INSTALLING AND ADJUSTING PICTURE TUBES

17HP4
Rotate each of the Centering Rings separately until the picture is properly centered.

24AP4
The 24 inch picture tube is mounted on a triangular wooden platform, and this platform is bolted to the cabinet at each of its three corners. The chassis is mounted separately on a flat wooden base which in turn is fastened to the side of the cabinet with four wood screws.

REMOVING THE PICTURE TUBE
To remove the picture tube, it is first necessary, to remove the chassis.

WARNING: OBSERVE ALL HIGH VOLTAGE AND PICTURE TUBE HANDLING PRECAUTIONS
1. Remove the push-on type control knobs from the front panel and remove the back of the cabinet.
2. Remove the upright support [Hold in place by wire or two wood screws] located in the rear of the cabinet to the left of the neck of the picture tube.
3. Disconnect:
   a. Speaker plug.
   b. Antenna.
   c. Anode lead of picture tube.
   d. Picture tube socket.
   e. Ion trap.
   f. Deflection yoke (Some models have plug-in yoke leads).
   g. Focus assembly.
   h. Wire or spring that is used to ground the deflection yoke support and tube mounting strap to the chassis.

INSTALLING THE PICTURE TUBE
1. Set the picture tube on its supporting platform, with its rim resting in the cradle, and attach the mounting strap. Position the tube so that the key-way for the tube socket will be forward the chassis. Place the rubber collar and deflection yoke support as far forward on the neck of the tube as possible.
2. Slide the supporting platform inside the cabinet and bolt it in the proper position. The supporting platform has elongated holes for the three bolts that anchor it to the cabinet. This allows adjustment of the platform's position so that the face of the tube can be made to fit properly against the mask, regardless of variations in dimensions or shapes of new tubes.
3. Replace the wooden block that acts as a wedge support for the top of the rim of the picture tube.
4. Slide the chassis, mounted on its base, into the grooved track on the side of the cabinet and fasten it in place with the four wood screws. The holes through which the chassis is bolted to its base are large enough to shift the chassis to the position that will allow the control shafts to fit properly.
5. Connect:
   a. Focusing assembly.
   b. Deflection yoke (or plug).
   c. Ion trap.
   d. Picture tube socket.
6. Replace the upright support.
7. Replace the back of the cabinet and the push-on control knobs.

ALIGNMENT

NOTE: ALWAYS SET NOISE BALEANCE CONTROL FULLY CLOCKWISE BEFORE MAKING ANY ALIGNMENT TESTS OR ADJUSTMENTS.

I-F SWEEP PATTERNS AND ALIGNMENT CHART

5. Peak the fourth I-F transformer (T2) to 24.35 Mc keeping the VTVM reading at —1 to —1.5 volts by adjustment of the attenuator on the signal generator.
6. Connect a 1,000 ohm resistor from the grid of V1 to the junction of R2 and R4. Adjust the first I-F coil located on the tuner for a maximum reading on the VTVM of between —1 and —1.5 volts (L9, Fig. 10). Remove the 1,000 ohm resistor.
7. Place the tuner turret so that it is between any two channels and adjust L1 for maximum indication on the VTVM. [Note: on sets below serial number 10925, L1 is fixed and step 7 should be disregarded.]
8. Peak the third I-F coil (L3) to 23.2 Mc keeping the VTVM reading at —1 to —1.5 volts.

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9. Tune the signal generator to 25.2 Mc and adjust the second I-F transformer (T1) for maximum keeping the VTVM reading at —1 to —1.5 volts.

10. Adjust the signal generator to 21.6 Mc and tune the trap L2 for a minimum reading.

11. The I-F passband may be observed by connecting a sweep generator across the terminals of the A-M signal generator and substituting an oscilloscope for the VTVM. Please use a 3 volt battery so that its positive terminal is connected to the chassis and its negative terminal is connected to the junction of R2 and R6. The sweep generator should be set to approximately 24.35 Mc and then adjusted to center the waveform on the scope face. To avoid overload and to assure a true view of the waveform, the output of the sweep generator should be attenuated until further attenuation has a minimum effect on the waveform. If necessary, a slight adjustment of the I-F transformers may be made to obtain a close approximation to the ideal curve. Adjustment of L3 or T1 affects the bandwidth. Adjustment of T2 affects the slope of the top.

SOUND ALIGNMENT

1. Connect an A-M signal generator tuned to 4.5 Mc between the grid of V5 and ground. Connect the alignment test circuit shown below and tune L8 for a maximum reading on the VTVM.

2. Disconnect the alignment test circuit and connect the VTVM to ground and Pin 5 of V7. Adjust L9 and primary of T3 (Bottom) for maximum indication.

3. Remove the VTVM and re-connect it to ground and junction of R27 and R28. Adjust secondary of T3 (Top) for zero. (Note: When tuning through the proper setting, the meter should swing negative on one side and positive on the other side.)

4. Align channel 13 R.F. plate (Adjustment B) and R.F. grid (Adjustment A) and inductances. Align channel 13 mixer grid and inductances by spreading or pushing together the turn. The band pass should include both carriers, have steep sides, and maximum gain.

5. Align the incremental loops of the R.F. plate, R.F. grid, and mixer grid from 5 to 12.7 in that order. Pushing the loops inward increases the frequency.

6. Align incremental coils of R.F. plate, R.F. grid, and mixer grid to obtain a flat response on maximum gain. Spreading the coils increases the frequency. A tuning wind may be used to determine what change is necessary.

ALIGNMENT OF THE ROTARY SWITCH TUNER PMB-57003

Note: This tuner has been carefully checked and aligned at the factory to give the best possible performance. Alignment should not be necessary in the field unless tubes or other components are replaced.

OSCILLATOR ADJUSTMENT

1. Turn stenon selector to channel 13.

2. Connect signal generator, adjusted to correct channel 13 oscillator frequency, to the antenna.

3. Connect oscilloscope to test point through 10,000 ohms.

4. Set fine tuning in center of range. Connect channel 13 and 6 for zero beat on scope.

If it is necessary to make adjustments to the oscillator, the following steps should be followed:

A. Align high channels for correct frequency with channel 13 oscillator screw (See illustration, Adjustment G). A non-metallic screwdriver is advisable.

B. Align low channels for correct frequency with channel 6 oscillator screw (Adjustment G).

C. Adjustment of channel 13 and channel 6 oscillator brings all other channels in adjustment. Do not back up the screws more than 8 turns from tight. At that point the electrical effect has ceased. Further backing up will cause the screw to drop out.

Notes: Cover and tube shields to be on. Have rated supply voltages fed to tuner. Allow at least 3 minutes warm up. When replacing oscillator tube, select one which requires minimum touch-up. Clockwise rotation of screws increases frequency.

BAND PASS ALIGNMENT

1. Use R.F. sweep to antenna and oscilloscope to the test point through 10,000 ohms.

2. The oscillator must be operating for each channel at nearly the correct frequency.
ALIGNMENT OF THE A-M RADIO TUNER, CHASSIS 160

The alignment procedure for this tuner is basically the same as for chassis 155, except for dial setting. The radio dial is fastened to the TV Fine Tuning dial in such a manner that the low end mark on the dial is opposite the radio index with the gang fully closed. The radio index is either to the right, or above the dial. When ordering dial replacement give position of Index. Before removing the chassis from the cabinet, mark the TV Channel Selector Knob with a grease pencil or bit of plastic tape opposite the radio index. Remove and replace the knobs when removing the chassis, without changing the position of the TV Channel Selector or Fine Tuning controls. This will provide a reference point for the radio dial settings under the alignment procedure. Dial settings will correspond to signal generator frequencies except for 455 Kc. For this frequency open tuning gang fully.

It is necessary to retain the connections between the radio tuner and the radio built-in antenna fastened to the cabinet, during alignment.

ALIGNMENT OF AM RADIO—CHASSIS 113

Set RADIO-PHONO-TV function switch to RADIO position.
Set Volume control at full clockwise position.
Connect output meter across voice coil.

NOTES:
Use an insulated alignment screwdriver.
Use signal generator having 30% modulation at 40 cycles.
Attenuate signal generator to keep output meter reading below 1.25 volts.

<table>
<thead>
<tr>
<th>Antenna</th>
<th>Coupling</th>
<th>Frequency</th>
<th>Dial Setting</th>
<th>Adjust</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>Source</td>
<td>Bandwidth</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>455 Kc</td>
<td>Top T2 &amp; T1</td>
<td>Adjust for max.</td>
<td></td>
</tr>
<tr>
<td>Source</td>
<td>Bandwidth</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>159 Kc</td>
<td>Tuning gang</td>
<td>for max.</td>
<td></td>
</tr>
</tbody>
</table>

When the chassis is replaced in the cabinet, adjust the pointer to make the dial settings conform with known frequencies.

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NOTES:

1. Last C-74; last R-90. All capacitors in U/F, all resistors 1/2 watt, unless otherwise noted.
2. Pin voltages taken with VTVM. Antenna shorted. TV-PHONO switch in TV position. Contrast control minimum contrast. Noise Balance control maximum clockwise. Other controls at normal operating position. All voltages positive DC unless otherwise noted. All readings to ground except Pin 3 to Pin 4 on V-11.
3. Wave form peak to peak voltages taken with video output 45 volts peak to peak.
4. PRODUCTION CHANGES:
   a. Previous serial No. 39,828, Terminal 1, N2 connected directly to 290 B.
   b. Previous serial No. 65,122, Linearity coil was used connected from Pin 3, V-16 to Terminal B, T9, with tap to Terminal 7, T9. Also Terminal 7 & 8, T9 connected through .04 mfd. capacitor (C-63).
   c. Previous serial No. 46,889, each side of primary, T5 by-passed to ground through .01 mfd. capacitor (C-70 & C-71).
   d. Previous serial No. 47,810, C-74 not used. Also C-25 connected Pin 6 to Pin 7, V-5.

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NOTES
1. Resistors are carbon composition unless otherwise noted. Wirewound resistors are not shown.
2. Pin voltages taken with VTM. Antenna shorted. Contrast control minimum, brightness control maximum clockwise. Other controls at normal operating position. All voltages positive DC unless otherwise noted. All readings to ground except Pin 3 to Pin 4 on V11.
3. Wave form peak to peak voltage taken with video output 45 volts peak to peak.

PRODUCTION CHANGES:
- Previous serial No. 39,828, Terminal 1, N2 connected directly to 290 B-1.
- Previous serial No. 46,264, Linearity coil was used connected from Pin 3, V16 to Terminal 6, T9, with tap to Terminal 7, T9. Also Terminal 7 & 8, T9 connected through .04 mfd capacitor (C-83).
- Previous serial No. 46,889, each side of primary, T5 by-passed to ground through .01 mfd capacitor (C-70 & C-71).
- Previous serial No. 47,610, C-25 connected Pin 6 to Pin 7, V6.