REQUIRED EQUIPMENT

The following test equipment is required to align and to service the Receiver:

- Line Voltage Autotransformer or Voltage Regulator
- AC DC Multimeter
- Accurately Calibrated AC Voltmeter
- Oscilloscope (Flat to 100kHz Minimum)
- Low-Distortion Audio Sine-Wave Generator
- Harmonic Distortion Analyzer
- Two 12: Load Resistors, 8-Ohms, 50 Watts (Minimum Rating)
- Low-Distortion AM-FM Signal Generator
- 10.7 kHz Sweep-Generator
- Multiplex Generator
- 455kHz Sweep Generator

CAUTION: This precision high-fidelity instrument should be serviced only by qualified personnel, trained in the repair of transistorized equipment and printed circuitry.

FM-TUNER ALIGNMENT

SELECTOR to FM, VOLUME MINIMUM, AFC to OFF

Maintain generator output as low as possible for suitable indication.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>GENERATOR</th>
<th>DIAL SETTING</th>
<th>INDICATOR</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. IF ALIGNMENT</td>
<td>Connect to 10.7 MHz sweep generator to TP1. Connect ground lead to chassis. Markers are not required.</td>
<td>Position of non-interference.</td>
<td>Scope vertical input to TP2 through 100k resistor and 100pF capacitor as shown. Connect ground lead to chassis.</td>
<td>Detune T109 by turning core up (ccw). Adjust in the following order: T108, T107, T108, T105 and T104 for maximum gain and symmetrical shape of curve as shown in FIGURE 1.</td>
</tr>
<tr>
<td>2. PRELIMINARY DETECTOR ALIGNMENT</td>
<td>As above</td>
<td>As above</td>
<td>As above</td>
<td>Adjust T109 for maximum gain symmetry. See FIGURE 2.</td>
</tr>
</tbody>
</table>

Note: 120-ohm composition resistors in series with each lead from the RF generator match the 50-ohm output to the 300-ohm input impedance. Generator output voltage is reduced to one-half at antenna terminals. Signal voltages specified in this table are generator output levels, not antenna voltages.

| 3. FRONT END ALIGNMENT | Tuning knob fully CCW. | Center of 90 MHz calibration mark on dial. | Scope vertical input and AC-VTVM to 11B. | Adjust T103, T102 and T101 for maximum gain. Repeat this step as required. |

| 4. | Connect FM RF generator through two 120-ohm resistors to FM ANT screw terminals. Set generator to 90 MHz, modulate with 400 Hz to provide ± 75 kHz deviation. Set generator output attenuator as low as possible. | | | |
### AM-TUNER ALIGNMENT

**SELECTOR to AM, VOLUME MINIMUM.**

Maintain generator output as low as possible for suitable indication.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>GENERATOR</th>
<th>DIAL SETTING</th>
<th>INDICATOR</th>
<th>PROCEDURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. AM IF</td>
<td>Connect 445 kHz sweep generator to AM EXT ANT terminals. Note: After each adjustment reduce generator output as required.</td>
<td>Position of non-interference.</td>
<td>Scope vertical input to TP4. See FIGURE 3.</td>
<td>Adjust T113, T112 and T111 for maximum gain and symmetry.</td>
</tr>
<tr>
<td>2. AM FRONT END ALIGNMENT</td>
<td>AM generator to EXT AM ANT and GND terminals. Set to 600 kHz. Modulate with 30%, 1kkHz.</td>
<td>Center of 600 kHz calibration mark on dial.</td>
<td>Scope and VTVM to TP4.</td>
<td>Adjust T110 (osc.) and L801 (Loop Ant.) for maximum.</td>
</tr>
<tr>
<td>3. AM FRONT END ALIGNMENT</td>
<td>Change frequency to 1400 kHz.</td>
<td>Center of 1400 kHz calibration mark on dial.</td>
<td>As above</td>
<td>Adjust TC105 (osc.) TC104 (Ant.) for maximum. Repeat steps 2 and 3 until optimum alignment is reached.</td>
</tr>
</tbody>
</table>
TAPE DECK AZIMUTH AND HEAD HEIGHT ALIGNMENT

1. Preset Bass, Treble and Balance controls to their mechanical center position, Volume Control to 4.
2. Selector to Tape.
3. Connect Oscilloscope or AC-VTVM to the Main Left Speaker Output.
4. Insert prerecorded test tape, (RCA No. 378 or equivalent), into tape player.
5. Select Tape Program Number 2.
6. Adjust Head Height Crosstalk Adjustment screw for minimum output as indicated on VTVM or Oscilloscope.
7. Connect Oscilloscope or AC-VTVM to the Main Right Speaker Output.
8. Adjust Azimuth Adjustment Screw for maximum output as indicated on VTVM or Oscilloscope.
9. Repeat Head Height and Azimuth adjustment procedure until no further improvement is obtained.

(Refer to page 47)

(Ref. No.) (Part No.) (Description)
1  Not Available Bracket, Hold Down
2  Not Available Screw Tap Type (M3x8)
3  Not Available Label Model No.
4  Not Available Label Date Code
5  TP4174-5 Assy., Tape Guide & Switch
6  Not Available Spacer Sleeve
7  Not Available Chassis, Tape Player
8  TP4174-8 Assy., Flywheel & Shaft
9  TP4174-9 Assy., Housing & Bearings
10 TP4174-10 Washer, Flat
11 TP4174-11 Roller, Drive Cam
12 TP4174-12 Set Screw
13 TP4174-13 Belt Drive, P.C.
14 TP4174-14 Arm, Radius
15 TP4174-15 Spring Keeper
16 TP4174-16 Block Head
17 TP4174-17 Head Playback Stereo
18 TP4174-18 Machine Screw (M2.6x7)
19 TP4174-19 Spring, Head Tension
20 Not Available Bracket Head Assy., Mtg.
21 TP4174-21 Screw Machine (M3x2.8)
22 TP4174-22 Bracket, Azimuth
23 Not Available Rivet, Shoulder
24 Not Available UL & CSA Tube
25 Not Available Lug, Wrap Around
26 TP4172-26 Screw, Tap Type (M3x8)
27 TP4172-27 Arm, Radius
28 TP4172-28 Spring Azimuth
29 Not Available C. W. Shield
30 TP4172-30 D. C. Motor Assy.
31 TP4172-31 Shaft Cam
32 TP4172-32 Washer C Type
33 TP4172-33 Spring, Cam
34 TP4172-34 Cam, Ratchet
35 TP4172-35 Clip, Slide
36 Not Available Rivet (1.22x3/16)
37 TP4172-37 Panel Etched Indicator
38 Not Available Rivet (1.22x5/32)
39 Not Available Spring Stopper
40 Not Available Bracket, Cam
41 TP4174-41 Nut (M4x0.5)
42 TP4174-42 Spacer, Capstan
43 TP4174-43 Stop Solenoid
44 TP4174-44 Last Switch
45 TP4174-45 Rectifier, Silicon (10D2)
46 Not Available Machine Screw (M2.3x10)
47 TP4174-47 Spring Slide
48 Not Available Rivet, Shoulder
49 Not Available Bracket, Solenoid
50 Not Available Bracket, Delatch
51 TP4174-51 Solenoid Coil Assy.
52 TP4174-52 Spring Solenoid
53 TP4174-53 Plunger Solenoid
54 Not Available Spring, Push
55 TP4174-55 Guide, Plunger
56 Not Available Bracket Slide
57 Not Available Rivet, Shoulder
58 TP4174-58 Spring Delatch
59 TP4174-59 Roller, Carriage
60 Not Available Assy, Strip Term
61 Not Available Spring P.C. Board Mtd.
62 Not Available Rivet
63 TP4172-70 Leaf Switch