<table>
<thead>
<tr>
<th>CONTENTS and SERVICE TIPS</th>
<th>PAGE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>REQUIRED TEST EQUIPMENT</td>
<td>3</td>
<td>TUNER</td>
</tr>
<tr>
<td>MECHANICAL DISASSEMBLY</td>
<td>3</td>
<td>MULTIPLEX</td>
</tr>
<tr>
<td>DIAL STRINGING</td>
<td>3</td>
<td>TUNER ALIGNMENT</td>
</tr>
<tr>
<td>HARMONIC DISTORTION TEST</td>
<td>3</td>
<td>PREAMP, AUDIO INPUT</td>
</tr>
<tr>
<td>CHASSIS LAYOUT</td>
<td>4</td>
<td>CONTROL AMP</td>
</tr>
<tr>
<td>SIGNAL FLOW</td>
<td>5</td>
<td>AUDIO FILTER</td>
</tr>
<tr>
<td>POWER SUPPLY</td>
<td>6-7</td>
<td>VOLUME</td>
</tr>
<tr>
<td>AUTOSCAN</td>
<td>8-9</td>
<td>POWER AMP, PRE-DRIVER</td>
</tr>
</tbody>
</table>

**CAUTION:**

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

Many of these items are included only as a reminder – they are normal procedures for experienced technicians. Shortcuts may be taken, but these often cause additional damage to transistors, circuit components, or printed circuit boards.

**SOLDERING:** A well-tinned, hot, clean soldering iron tip will make soldering easier, without causing damage to the printed circuit board or the components mounted on it. Regular use of a sponge cleaner will maintain a clean soldering surface. The heat available at the tip, (not the wetting angle of the iron) is important. Some 50-watt irons reach temperature of 1,000°F, while others will hardly melt solder. Small-diameter tips should be used for single solder connections, pyramidal and chisel tips for large areas.

Always disconnect the AC power cord from the line when soldering. Turning the power switch off is not sufficient. Power-line leakage paths, through the heating elements of the iron, may destroy transistors.

**PARTS REMOVAL:** If a part is not being returned for warranty factory replacement, it may be cut out in half with diagonal cutting pliers to make removal easier. Multiple terminal parts, such as IF transformers, or electrolytic capacitors, should be removed using special de-soldering tips made especially for this purpose. Removing solder from terminals reduces the possibility of breaking the printed circuit board when the part is removed.

**ACCIDENTAL SHORTS:** A clean working area, free of metal particles, screws, etc., is an important preventive in avoiding servicing problems. Screws, removed from the chassis during servicing, should be stored in a box until needed. While a set is operating, it takes only an instant for a base-to-collector short to destroy a transistor and others direct-coupled to it. (in the time it takes for a dropped screw, washer, or screwdriver, to contact a pair of terminals or terminal and chassis), a transistor can be ruined.

**SOLID-STATE DEVICES:** Integrated Circuits contain the equivalent of many circuit parts, including transistors, diodes, resistors, and capacitors. The preferred troubleshooting procedure requires isolating the trouble to one stage using AC signal tracing methods. Once the suspected stage is located the DC voltages at the input and output leads are measured to give an accurate indication of the operating conditions of the IC. DO NOT use an ohmmeter, to check continuity with the IC mounted on the printed circuit board. Forward biasing the internal junctions within the IC may burn out the transistors. Do not replace a defective IC until all external resistors, capacitors, and transformers are checked first, to prevent the replacement IC from failing immediately due to a defect in the connecting components. Solar and unlabelled leads separate using a pliers or other heat sink on the lead to prevent damage from excessive heat. Check that the leads are connected to the correct locations on the printed circuit board before turning the set on.

Whenever possible, a transistor tester should be used to determine the condition of a transistor or diode. Ohmmeter checks do not provide conclusive data, and many even destroy the junction(s) within the device.

Never attempt to repair a transistor power amplifier module until the power supply filter capacitors are fully discharged.

If an output or driver transistor becomes defective (open or short), always check ALL direct-coupled transistors and diodes in that channel. In addition, check the base and other parts in the bias network, before installing replacement transistors. All output and driver transistors in one channel may be destroyed if the bias network is defective. After parts replacement, check bias for specified idling current.

In some applications, replacement of transistors must be made from the same beta group as the original type. The beta group is indicated by a colored marking on the transistor. Include this information when ordering replacements.

When mounting a replacement power transistor, be sure the bottom of the flange, mica insulator, and the surface of the heat sink, are free of foreign matter. Dust and grit will prevent flat contact, reducing heat transfer to the heat sink. Metallic particles can puncture the insulator, cause a short, and destroy the transistor.

Silicone grease must be used between the transistor and the mica insulator and between the mica and the heat sink for best heat transfer. Use Dow-Corning DC-3, or an equivalent compound made for power transistor heat conduction.

Use care when making connections to speakers and output terminals. To reduce the possibility of shorts, lugs should be used on the exposed ends, or stranded wire should be tied to prevent frayed wire ends. Current in the speakers and output circuitry is quite high – poor contacts, or small wires, can cause significant power losses. For wire lengths greater than 30 feet, 16 AWG, or heavier, should be used.

**VOLTAGE MEASUREMENTS:** All voltages are measured with the line voltage adjusted to 120 volts. All measured voltages are ± 20%. DC voltages are measured to chassis with a VTVM, with no signal input unless otherwise noted. AC signal voltages are measured under the conditions specified on the schematic.

**ALIGNMENT PROCEDURES:** DO NOT attempt realignment unless the required test equipment is available, and the alignment procedure is thoroughly understood.

© COPYRIGHT 1971 FISHER RADIO ALL RIGHTS RESERVED PRINTED IN U.S.A.
REMOVING DRESS PANEL
(1) Remove screws securing top cover to chassis. Remove cover.
(2) Disconnect TPE MONITOR, SELECTOR, MODE, BASS, TREBLE, BALANCE, SPEAKERS, TUNING, and VOLUME knobs from their control shafts. Remove two nuts from shafts.
(3) Un螺丝 the four screws (1) at top and right of dial bracket. Remove dress panel.
(4) Replace procedure for assembly.

REPLACING DIAL GLASS
(1) Remove dress panel.
(2) Remove left and right dial glass retainers and remove dial glass.
(3) Replace new dial glass by reversing procedure.

REPLACING DIAL LAMPS
(1) Remove the screws securing top cover to chassis. Remove cover.
(2) Remove lamp assembly leads from pins 50 and 51.
(3) Replace the new lamp assembly and connect leads.
(4) Replace new glass lamp assembly and connect leads.

REPLACING DIAL POINTER LAMP
(1) Remove the screws securing top cover to chassis. Remove cover.
(2) Replace new lamp assembly leads from pins 50 and 51.
(3) Replace the new lamp assembly and connect leads.
(4) Replace new lamp assembly and connect leads.

REPLACING STEREO BEACON, 2-CH, 4-CH, AND MONO LAMPS
Note: The indicator assembly above the motor contains all four lamps and must be replaced as a unit.
(1) Remove the screws securing top cover to chassis. Remove cover.
(2) Disconnect three lamp assemblies leads from pins 36, 37, and 38 on connector plate. Insert new lamp assembly and connect leads.
(3) Replace new lamp assembly and connect leads.
(4) Replace new lamp assembly and connect leads.

CAUTION:
(1) Test all components at a time.
(2) Do not use a load with a minimum power rating of 100 watts.
(3) Unplug AC power cord. Release all pushbuttons. Slide FRONT and REAR VOLUME switches to 0. Set BASS, TREBLE, and BALANCE to their center positions. Set TPE MONITOR to OFF, SELECTOR to AUX 1, MODE to 4-OHM STEREO, and SPEAKERS to MAIN.
(4) Connect an accurate non-nulling millivoltmeter generator to the AUX 1 IN/FRONT L jack. Set generator frequency to 60 Hz and vary output to a minimum.
(5) Connect an 8 ft. 22 gauge wire from MAIN SPEAKERS/Front L and COM/Front L terminals. Connect a harmonic distortion analyzer and an AC VTM across the load.
(6) Connect AC power cord and slide FRONT VOLUME to the frontmost position.
(7) Increase generator output for 50 watts RMS (220V with 8 ft. 22 gauge wire). Monitor should indicate 1% or less.
(8) Repeat preceding steps for FRONT R, REAR L, and REAR R channels.

DIAL STRIGHTENING
(1) Remove the screws securing top cover to chassis. Remove cover.
(2) Rotate trim capacitor fully CCW. Loosen screw in center of dial and remove old dial card.
(5) Rotate dial fully CW, allowing cord to wind onto drum. (6) Guide card over drum into groove F, through rim slit, and under washer. See illustration. Head spring through rim slit, and “Fat” spring. (7) Rotate drum CCW and GW to distribute tensioning. (8) Repeat (7) and (8) until spring is tensioned. (9) Place cord over tab on pointer. Rotate turning shaft CCW. Slide pointer to 9 ohm holding turning shaft fully to CCW. (10) Check dial calibration. Refer to TUNER ALIGNMENT.

PARTS LIST

**Note:** The indicator assembly above the motor contains all four lamps and must be replaced as a unit. 

**ATTENTION:** CAUTION: Do not use a load with a minimum power rating of 100 watts.

**HARMONIC DISTORTION TEST**
(1) Remove the screws securing top cover to chassis. Remove cover.
(2) Rotate trim capacitor fully CCW. Loosen screw in center of dial and remove old dial card.
(5) Rotate dial fully CW, allowing cord to wind onto drum. (6) Guide card over drum into groove F, through rim slit, and under washer. See illustration. Head spring through rim slit, and “Fat” spring. (7) Rotate drum CCW and GW to distribute tensioning. (8) Repeat (7) and (8) until spring is tensioned. (9) Place cord over tab on pointer. Rotate turning shaft CCW. Slide pointer to 9 ohm holding turning shaft fully to CCW. (10) Check dial calibration. Refer to TUNER ALIGNMENT.

**DESCRIPTION**

**PART NO.**

**DESCRIPTION**

**PART NO.**

**DESCRIPTION**

**PART NO.**

**DESCRIPTION**

**PART NO.**
FM ALIGNMENT

Except as noted, maintain generator output level as low as possible during alignment.

Set SELECTOR to FM and release AUTOSCAN MODE switch for manual tuning. Set MODE switch to 60K and depress MUTING OFF switch. Release all other pushbuttons. Set dial pointer to position of non-interference near 88 MHz. Slide FRONT and REAR VOLUME controls to zero.

(1) Connect vertical input of scope to pin 90, scope ground to pin 5X, use a direct probe.
(2) Connect 10 MHz sweep generator to pin 63, generator ground to pin 5Y.
(3) Adjust top and bottom cores of 2402 and 2432 and trimmer C486 for maximum gain and symmetry. See FM IF illustration.
(4) Increase generator level to full output. If necessary, re-adjust top and bottom cores of 2462 for maximum gain and symmetry. See FM IF-LIMITED illustration.
(5) Reduce generator output and re-adjust top and bottom cores of 2402 for maximum gain and symmetry. See FM IF illustration.

DETECTOR

(6) Connect DC VTVM and vertical input of scope to detector output pin 5B, meter and scope grounds to pin 5W.
(7) Keep generator output as low as possible and adjust top and bottom cores of 2483 for maximum gain and symmetry. See FM DETECTOR illustration.
(8) Release sweep to zero. 10.7 MHz output only. Set DC VTVM to most sensitive scale. Readjust top core of C453 for zero VDC at pin 5B.

AFC

(9) Connect DC VTVM to pin 59, meter ground to pin 5X, set SELECTOR 4750 for zero VDC at pin 59. Disconnect VTVM.

METER

(10) Set generator output as low as possible and sweep to zero (10.7 MHz only).
(11) Connect VTVM to pin 57, ground to pin 5W. Adjust L701 for maximum gain. Disconnect VTVM.

NOTE: If no signal is present at pin 57, verify that MUTING THRESHOLD ADJUST R703 is not turned fully counterto-
clockwise.

DIAL CALIBRATION

(12) Turn MANUAL TUNING knob fully CCW. If pointer is not centered on 0, repetition it and cement pointer.
(13) Connect DC VTVM to pin 21 (top of R409). Set dial pointer to center of 100 MHz calibration bar (underneath number 100). Adjust PA423 FM DIAL CAL OHM for exactly 24.5 VDC.
(14) Set dial pointer to center of 88 MHz calibration bar. Adjust R403A FM DIAL CAL-W for exactly 4.4 VDC.
(15) Repeat steps (13) and (14) until correct voltages are obtained.

FRONT END

NOTE: This procedure uses 120-ohm composition resistors if series with each lead from the RF generator to metal 50-ohm output to 300-ohm input impedance. These matching resistors reduce generator voltage to one-half at the antenna terminals. RF signal voltages specified in this procedure indicate generator output levels, not antenna terminal voltages.

(16) Connect FM signal generator to FM ANTenna terminals through 120-ohm composition resistors. Modulator generator with 400Hz, 22.5 kHz (or 125 kHz) deviation. Connect AC VTVM to R702 OUT FRONT L jack. (17) Set generator frequency and dial pointer accurately to 90 kHz. Adjust generator output for a front panel meter indication between 2 and 3. Adjust cores of L405, L404, L403, and C401 for maximum indication on AC VTVM. Reduce generator output as necessary to keep panel meter reading between 2 and 3.
(18) Set generator frequency and dial pointer accurately to 100 kHz. Adjust trimpots C141, C146, C141, and C402 for maximum indication on AC VTVM. Reduce generator output to maintain panel meter indication between 2 and 3. (19) Repeat steps (17) and (18) until accurate dial calibration and maximum as signal is obtained.

METER FULL SCALE

(20) Set generator output to 100 mV and reduce sweep to zero. Set FULL SCALE METER DEFLECTION ADJUST R502 for a panel meter indication of 4.5.

MUTING

(21) Set generator frequency and dial pointer to position of non-interference near 88 MHz. Modulator generator with 400Hz, 22.5 kHz for ±25 kHz deviation. Reduce generator output until noise is visible on sine wave. Adjust generator frequency to center noise (interference) positives and negative half-cycles. See SYMMETRICAL TUNING illustration.
(22) Release MUTING OFF switch. Generator output output to 20 mV. Turn R703 MUTING THRESHOLD ADJUST counterclockwise until audio vanishes on scope trace, then turn R703 clockwise slowly until audio reappears. Check adjustment by reducing generator output to 18 uV. Audio should disappear. Disconnect VTVM and depress MUTING OFF pushbutton.

AFC FILL IN

(23) Set generator to 88 MHz and reduce sweep to zero. Tune receiver to generator and adjust generator output for a peak meter indication of 4.5.

(24) With AFC pushbutton released, desenseture receiver above 59 kHz for any indication on 2 and 3 on panel meter.

19K PILOT

(26) Connect DC VTVM to pin 72, meter ground to pin 5A. Desense AFC pushbutton. Set SELECTOR switch to 42CH STEREO.
(27) Apply composite multiplex signal to the EXTERNAL MODULATION input of generator. Modulator generator with 19kHz pilot (110V) and 440Hz audio (88kHz) on left channel only. Set generator for 125kHz peak deviation, generator output to 2mV.

(28) Adjust core of C2501 and C2502 for maximum DC at pin 72 at least +6.7V.
(29) Set generator for ±16kHz peak deviation. STEREO BEACON lamp should light, and meter should indicate at least ±1.7VDC.

SEPARATION

(30) Connect AC VTVM to RDCR OUT FRONT L jack. Connect another AC VTVM to RDCR OUT FRONT R jack. Temporarily set R565 SEPARATION ADJUST to its approximate mechanical center of range.
(31) Adjust core of C2505 for minimum indication on right channel meter.
(32) Adjust R565 for minimum indication on right channel meter (at least 36V9 below left channel).
(33) Modulate right channel of multiplex signal. Left channel meter should indicate at least 38V9 below right channel. If necessary, readjust C2505 and repeat steps (31) and (32).

STEREO BEACON

(34) Reduce generator output to 15V. STEREO BEACON lamp should turn off. Increase generator output to 35V. Lamp should turn on. There is no adjustment for this test.

38kHz TRAP

(35) Turn off audio and modulate generator with 13kHz pilot, ±1kHz deviation. Set generator output to zero. Connect scope to RDCR OUT FRONT R jack.
(36) Adjust core of C2503 to remove 38kHz component from 19kHz waveform.

AUTOSCAN ADJUSTMENT AND TEST

Alignment of FM IF and RF, MPX and Detector should be checked before attempting to adjust autoscann circuit.
(1) Connect FM signal generator to R702 OUT FRONT L jack. Connect another 120-ohm composition terminals through 120-ohm composition resistors, one in series with each lead from the generator. Connect DC VTVM to pin 34 on autoscann board, ground to pin 5P.
(2) Set SELECTOR to FM and MODE TO 2CH STEREO. Slide FRONT and REAR VOLUME controls to 0. Desense AUTOSCAN MODE pushbutton, release all others.
(3) Set generator frequency to 88 MHz. Modulate generator with 400Hz, ±25kHz deviation. Set generator output to 10mV.
(4) Tune receiver to generator frequency (at 88MHz) by pressing CONTINUOUS pushbutton, release when meter reaches high end of scale.
(5) Adjust HOLD control R660 to 0V. Press and hold CONTINUOUS pushbutton until meter reaches high end of scale.
(6) Receiver should automatically tune to generator frequency at 88 MHz. After 5 seconds, DC VTVM should indicate 0.
(7) Set generator frequency to 110kHz. Tune receiver to generator frequency by pressing either CONTINUOUS or ONE STATION pushbutton. After 5 seconds, meter should indicate less than 200mV.

AM ALIGNMENT

(1) Set SELECTOR to AM and slide FRONT and REAR VOLUME controls to 0.
(2) Connect 400 kHz sine wave generator to pin 70, generator ground to pin 5V. Use a 0.1pf capacitor in series with generator lead.
(3) Using a low capacitance probe, connect scope input to pin 5AS of RF AM LF (function of R440, R441, and R442). Scope input to pin 5V. Desense bottom core of C251 (primary) by turning clockwise.
(4) Adjust core of C2302 for maximum gain.
(b) Connect scope to pin 61, ground to pin SW. Adjust top and bottom cores of Z361 for maximum display and symmetry. Note that the frequency at which maximum response is obtained may be ±3.5 kHz from center frequency. See AM IF illustration. Disconnect test equipment.

FRONT END

(b) Open EXT AM ANTenna GND link. Connect AM signal generator to the EXT AM ANT and GND terminals. Use a 220 pF capacitor in series with generator lead. Connect AC VTM to REDR OUT FRONT L jack.

(1) Set generator frequency and dial pointer to center of 600 kHz calibration bar. Modulate generator with 400 Hz, 30% modulation. Adjust Z301 and Z302 for maximum audio.

(6) Set generator frequency and dial pointer to center of 1400 kHz calibration bar. Adjust C306 and C283 for maximum audio.

(9) Repeat steps (7) and (8) for maximum gain.
CENTER VOLTAGE TEST
Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes.
Connect common lead of DC VTVM to chassis ground. Connect probe to each emitter terminal of Q811 and Q812 on rear and front amplifiers. Meter should indicate +35.5V (+3V) at each emitter. See illustration.

IDLING CURRENT ADJUSTMENT
Slide FRONT and REAR VOLUME controls to 0. Warm-up unit about 10 minutes. Set line voltage to 120 VAC.

REAR AMPLIFIERS
(1) Connect common lead of DC VTVM to emitter terminal of Q813 and probe to emitter terminal of Q811. See illustration. Set IDLING ADJUST R821 for indication of 20 to 40 mV.
(2) Connect DC VTVM between emitters of Q812 and Q814 and adjust R822 for indication of 20 to 40 mV.

FRONT AMPLIFIERS
Repeat steps (1) and (2).
FISHER RADIO • LONG ISLAND CITY • NEW YORK 11101