The Fisher
202
Stereophonic AM-FM Receiver
test equipment and service tips

The following equipment is required to completely test and align modern high-fidelity amplifiers, tuners, and receivers.

- Line Voltage Auto-transformer or Voltage Regulator
- DC Vacuum Tube Voltmeter
- Oscilloscope (IF flat to 100 kHz Minimum)
- Low-Distortion Audio (Sine Wave) Generator
- Intermodulation Distortion Analyzer
- Harmonic Distortion Analyzer
- 2 – Load resistors, 8-Ohms, 100 Watt (Minimum Rating)
- AM/FM Signal Generator

10.7 MHz Sweep Generator
Multiplex Generator
(preferably with RF output)
455 kHz Sweep Generator
Ferrite Test Loop Stick
2 – Full Range Speakers for Listening Tests
Stereo Source – Turntable, Tape Recorder, etc.
Soldering Iron with Small Tip, Fully Insulated from AC Line
Suction Desoldering Tool

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-finished, 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 wattage of the iron) is important. Some 50-watt iron reach temperatures of 1,000°F, while others will hardly melt solder. Small-diameter tips should be used for small 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 element of the iron, may destroy transistors.

PARTS REMOVAL: If a part is not being returned for warranty factory replacement, it may be cut 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 desoldering 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 preventative in avoiding soldering 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 directly-coupled to it). In the time it takes for a dropped machine screw, washer, or screwdriver, to contact a pair of socket 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. Solder and unsolder each lead separately 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 may 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 (opens or shorts), always check all direct-coupled transistors and diodes in that channel. In addition, check the bias pot, 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, always check the bias adjustment 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 color banding on the transistor. Be sure to include this information when ordering replacement transistors.

When mounting a replacement power transistor, be sure the bottom of the flange, micro-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 micro-insulator, and between the micro 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 sized wires, can cause significant power losses in the system. 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 110 volts. All measured voltages are ±10%. DC voltages are measured to ground 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.

BECAUSE ITS PRODUCTS ARE SUBJECT TO CONTINUOUS IMPROVEMENT, FISHER RADIO RESERVES THE RIGHT TO MODIFY ANY DESIGN OR SPECIFICATION WITHOUT NOTICE AND WITHOUT INCURRING ANY OBLIGATION.
REMOVING DRESS PANEL
(1) Unplug AC power cord.
(2) Remove the screws securing the top and bottom covers to the chassis.
(3) Gently pull off the SELECTOR, VOLUME, BALANCE, TREBLE, BASS, POWER, SPEAKERS and Tuning control knobs from the control shafts.
(4) Remove the two screws on the top and two screws on the bottom of the chassis securing the dress panel to the chassis. Remove the dress panel by pulling it forward.
(5) Reverse the procedure for assembly.

REMOVING TUNING METER AND STEREOBEAM INDICATOR LAMP
(1) Remove dress panel. Refer to REMOVING DRESS PANEL procedure.
(2) Remove the two screws on the bottom side of the chassis, located above the MUTING ON-OFF switch, securing the bracket of the tuning meter and STEREOBEAM indicator lamp. Note the ground lug of resistor R18 secured to the bracket.
(3) Remove tuning meter and STEREOBEAM indicator lamp.
(4) Reverse the procedure for assembly.

REMOVING DIAL GLASS
(1) Remove the dress panel. Refer to REMOVING DRESS PANEL procedure.
(2) Remove screw attaching ground lug of resistor R18 to tuning meter and STEREOBEAM indicator bracket located on the chassis above the MUTING ON-OFF switch.
(3) Tap dial cord to tuning drum. Remove dial cord from the pulley which is attached to the dial housing.
(4) Remove the four screws securing the dial glass and meter housing to the front chassis.
(5) Remove the dial glass and meter housing.
(6) Remove the dial pointer by sliding its mounting carrier from its sliding rail.
(7) Very gently lift up the dial glass and meter housing and turn the housing towards you. Take a knife and gently detach the indicator holder and meter secured to the dial glass by double-sided adhesive tape.
(8) Use a knife and pry loose the dial glass, taking care not to damage the foam rubber mountings.
(9) Reverse procedure for assembly.

REMOVING INDICATOR LAMPS
(1) Unplug AC power cord.
(2) Remove the screws securing the top and bottom cover of the chassis.
(3) Use a pair of pliers and hold socket of defective lamp and gently pull defective lamp out of housing.
(4) Trace out leads of defective lamp to terminal strip and unsolder.
(5) Reverse procedure for lamp replacement.

REMOVING DIAL LAMPS
(1) Unplug AC power cord.
(2) Remove the screws securing the top and bottom covers of the chassis.
(3) Remove the two screws on top of dial glass and meter housing. Slide dial lamp bracket to the rear, and gently drop the bracket to get to the dial lamps.
(4) Replace defective lamp.
(5) Reverse the procedure for replacement of lamp bracket.

REMOVING PRINTED CIRCUIT BOARDS
(1) Unplug AC power cord. Remove the screws securing the top and bottom covers to the cover. Remove the covers.
(2) Remove the screws securing printed boards to the chassis.
(3) Remove printed circuit boards on dress panel. Refer to REMOVING DRESS PANEL procedure.
(4) Remove hex nuts from VOLUME, BALANCE, TREBLE, and BASS controls. Remove Control Amplifier Board.
(5) Remove screw which secures clamp holding both Driver Boards in place.
(6) Pull Driver Boards straight up to remove boards from plug-in sockets, and gain access to output transistors.
(7) Remove screw which secures heat sink bracket of transistor Q01 of Power Supply Board to chassis.
(8) Remove the screws which secure Power Supply Board to chassis, and remove board.
(9) Remove snap-on shrink at FM RF Board. Remove two screws securing tuning drum to tuning capacitor shaft. Slide drum off the shaft.
(10) Remove screws securing FM RF Board, and remove board.

REMOVAL OF POWER TRANSFORMER
To remove the power transformer, remove three screws securing power transformer to its mounting bracket.
DIAL STRINGING

1. Remove screws securing top and bottom covers to receiver chassis. Remove covers. Unsnap pointer from its sliding carrier. Remove carrier from the rail.
2. Rotate tuning drum fully clockwise.
3. Remove old dial cord. Be careful not to remove dial spring from its ear in the drum.
4. Tie end of new cord to end of dial spring. Make sure that dial spring is fastened to tuning drum as shown in the figure.
5. Guide dial cord through xim slot and wind a full turn around drum. Guide cord around pulleys A, B, and C. Wind dial cord three times around tuning shaft and over pulley D.
6. Wind cord 3/4 turn around tuning drum and through resistor.
7. Pull dial cord taut and hook cord to end of dial spring. Rotate tuning drum clockwise and counterclockwise to distribute the tensioning.
8. Repeat steps (6) and (7) until spring is tensioned. Then tie dial cord securely to end of spring.
9. Place dial cord over and under tabs on pointer carrier (see figure). Snap pointer onto sliding carrier.
10. Turn tuning drum fully counterclockwise. Slide pointer to indicate zero on tuning dial while holding turning drum fully counterclockwise.
11. Check dial calibration. Refer to FAN AM ALIGNMENT.

HARMONIC DISTORTION TEST

CAUTION:
1. Measure the power of one channel at a time.
2. Limit measurements to 10 minutes.
3. Use a load resistor with a minimum rating of 50 watts.
4. Set BASS and TREBLE controls to flat (0), SELECTOR switch to AUX 1, and POWER/SPKR switch to AC OFF.
5. Connect a low-distortion sine wave signal generator between L AUX 1 IN jack and chassis ground. Set the signal generator frequency to 1000 Hz and output level to minimum.
6. Connect the 8-ohm load resistor between L MAIN SPKR and COM terminals. Connect an AC VTM, oscilloscope, and harmonic distortion analyzer across the 8-ohm load resistor.
7. Set POWER/SPKR switch to MAIN. Turn VOLUME control slowly to maximum.
8. Adjust the signal generator output until the AC VTM indicates 14.15 V RMS (25 watts). The HD analyzer should indicate less than 1% harmonic distortion.
9. Repeat steps 11 through 8 for the right channel.
schematic shown on main chassis diagram
**CONTROL AMPLIFIER**

**POWER AMPLIFIER**

**CENTER VOLTAGE ADJUSTMENT**

1. Connect DC VTVM to pin 5 of left channel Drive Board. Connect AC power cord. Set POWER/SPKR switch to MAIN.
2. Adjust potentiometer VR01 of left channel Drive Board until DC VTVM indicates 21 V DC. Disconnect DC VTVM.
3. Repeat steps (1) and (2) for the right channel Drive Board.
AM, FM IF, and Meter schematic diagram for this board shown above.