CAUTION: This is a FISHER precision high-fidelity instrument. It should be serviced only by qualified personnel — trained in the repair of transistor equipment and printed circuitry.

TEST EQUIPMENT REQUIRED
The following are needed to completely test and align modern high-fidelity instruments such as amplifiers, tuners and receivers:

- Vacuum Tube Voltmeter (100-mV DC scale)
- Audio Vacuum Tube Voltmeter (10-mV AC scale)
- Oscilloscope (Flat to 100 kHz Minimum)
- Audio (Sine-Wave) Generator
- Intermodulation Distortion Analyzer
- Harmonic Distortion Analyzer
- AM/FM Signal Generator
- Multiplex Generator (preferably with RF output — FISHER Model 300 or equal)
- 10.7-MHz Sweep Generator
- 455-KHz Sweep Generator
- Line Voltage Auto-transformer, or Voltage Regulator
- 2 — Load Resistors, 4 or 8 Ohm, 50 Watt
- 2 — Full Range Speakers for Listening Tests
- Stereo Source — Turntable or Tape Recorder for Listening Tests
- Soldering Iron with Small Tip
- Fully Insulated from Power Line
- Solderless Desoldering Tool

PRECAUTIONS
Many of these items are included just as a reminder — they are normal procedures for experienced technicians. Shortcuts can be taken but often they cause additional damage — to transistors, circuit components or the printed-circuit board.

Soldering — A well-tinned, hot, clean soldering iron tip will make it easier to solder without damage to the printed-circuit board or the many circuit components mounted on it. It is not the wattage of the iron that counts — it is the heat available at the tip. Some 50-watt irons reach temperatures of 1,000° F — others will hardly melt solder. Small-diameter tips should be used for single solder connections — larger pyramidal and chisel tips are needed for larger areas.

- When removing defective resistors, capacitors, etc., the leads should be cut as close to the body of the circuit component as possible. (If the part is not being returned for in-warranty factory replacement it may be cut in half — with diagonal-cutting pliers — to make removal easier.)

- Special desoldering tips are made for unsoldering multiple-terminal units like IF transformers and electrolytic capacitors. By unsoldering all terminals at the same time the part can be removed with little chance of breaking the printed-circuit board.

- Always disconnect the chassis from the power line when soldering. Turning the power switch OFF is not enough. Power-line leakage paths, through the heating element, can destroy transistors.

Transistors — Never attempt to do any work on the transistor amplifiers without first disconnecting the AC linecord and waiting until the power supply filter-capacitors have discharged.

- Guard against shorts — it takes only an instant for a base-to-collector short to destroy that transistor and possibly others direct-coupled to it. (In the time it takes for a dropped machine screw, washer or even the screwdriver, to glance off a pair of socket terminals (or between a terminal and the chassis) a transistor can be ruined.)

- DO NOT bias the base of any transistor to, or near, the same voltage applied to its collector.

- DO NOT use an ohmmeter for testing transistors. The voltage applied through the test probes may be higher than the base-emitter breakdown voltage of the transistor.

Output Stage and Driver — Replacements for output and driver transistors, if necessary, must be made from the same beta group as the original type. The beta group is indicated by a colored dot on the mounting flange of the transistor. Be sure to include this information, when ordering replacement transistors.

- If one output transistor burns out (open or short), always remove ALL output transistors in that channel and check the bias adjustments, the control and other parts in the network with an ohmmeter before installing a new transistor. All output transistors in one channel will be destroyed if the base-bias circuit is open on the emitter end.

- When mounting a replacement power transistor be sure the bottom of the range, the micro insulator and the surface of the heat sink are free of foreign matter. Dust and grime can prevent perfect contact reducing heat transfer to the heat sink. Metallic particles can puncture the insulator and cause shorts — ruining 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 conduction. (Use Dow-Corning DC-3 or C2003H or equivalent compounds made for power transistor heat conduction.)

- Use care when making connections to speakers and output terminals. Any frayed wire ends can cause shorts that may burn out the output transistors — they are direct-coupled to the speakers. To reduce the possibility of shorts at the speakers, lugs should be used on the exposed ends or at least the ends of the stranded wires should be twisted to prevent frayed wire ends. The current in the speakers and output circuitry is quite high. Poor contacts or small size wire can cause power losses in the speaker system. Use 14 or 16 AWG for long runs of speaker wiring.

Voltage Measurements — Voltage measurements are made with the line voltage adjusted to 117 volts and all readings are ± 10%. All voltages are DC, measured with a VTVM to ground, with no signal input unless otherwise noted. Indicates 1-kHz audio voltages, measured with an audio AC VTVM to ground at various points from the phone input to the power amplifier output.

Alignment Procedures — Replacement of transistors and components in the front end, IF amplifier and multiplex decoder will normally not require realignment of these circuits. Realignment of these circuits, unless absolutely necessary, is not recommended. Do not attempt a 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 CORPORATION RESERVES THE RIGHT TO MODIFY ANY DESIGN OR SPECIFICATION WITHOUT NOTICE AND WITHOUT INFLICTING ANY OBLIGATION.

© COPYRIGHT 1968 FISHER RADIO CORPORATION. All Rights Reserved.
**SERVICE PROCEDURES**

**DIAL STRINGING**
- Disconnect AC power cord.
- Gently pull off all knobs from the front control shafts. Remove hex nuts from the control shafts and lift off the front panel.
- Drop out the defective lamp from the spring clip. Place the new lamp in the socket making certain that the unpainted side of the lamp faces the edge of the dial glass.
- Replace the front panel and secure with the hexnuts removed previously. Replace the knobs on the control shafts.

**CLEANING DIAL GLASS**
- Disconnect AC power cord.
- Gently pull off all knobs from the front control shafts. Remove the hex nuts from the control shafts and lift off the front panel.
- If there are foam-cushion strips located at the ends of the dial glass, remove them.
- Loosen the screws that hold the retaining clips to the dial glass. Swing the clips aside and lift off the dial glass.
- Remove dust with a dry cloth. If you wish to clean more thoroughly, use only plain lukewarm water; any stronger agent may damage the markings on the glass.
- Replace the dial glass and position it down and towards the left of the chassis front. Swing the retaining clips back into place and tighten the retaining clips screws. Replace the foam-cushion strips, if removed previously.
- Replace the front panel and secure with the hexnuts removed previously. Replace the knobs on the control shafts.

**POWER AMPLIFIER CENTER VOLTAGE ADJUSTMENT**
- Connect two 10K, 1/15W resistors in series across capacitor C19 (250uF). Connect the common lead of a DC VTVM to the junction of the two resistors.
- Connect DC VTVM to the junction of resistors R23 and R39. Adjust Center Voltage Adjust Pot, RB37 on left channel driver board for meter reading of 8.50 VDC.
- Connect DC VTVM to the junction of resistors R38 and R40. Adjust Center Voltage Adjust Pot, RB37 on right channel driver board for meter reading of 8.50 VDC.
- Disconnect 10K resistors.

**POWER AMPLIFIER IDLING CURRENT ADJUSTMENT**
- NOTE: This adjustment is to be performed only after completing Center Voltage Adjustment.
- Connect DC VTVM across resistor R37. Adjust Output Bias Adjust Pot, RB50 on left channel driver board for meter reading of 40.75V DC.
- Connect DC VTVM across resistor R38. Adjust Output Bias Adjust Pot, RB36 on right channel driver board for meter reading of 40.75V DC.

**REPLACING DIAL LAMPS**
- Disconnect AC power cord.
- Gently pull off all knobs from the front control shafts. Remove hex nuts from the control shafts and lift off the front panel.
- Drop out the defective lamp from the spring clip. Place the new lamp in the socket making certain that the unpainted side of the lamp faces the edge of the dial glass.
- Replace the front panel and secure with the hexnuts removed previously. Replace the knobs on the control shafts.

**REPLACING METER LAMP**
- Disconnect AC power cord.
- Remove the screws which hold the top cover to the chassis and lift off the top cover.
- Gently push in on the lamp and turn it counterclockwise to remove. Remove the metal lamp shade and place it on the new lamp in the same position. Place the new lamp in the socket, push gently and turn clockwise to lock it in place.
- Replace the top cover on the chassis and secure with the screws removed previously.

**CLEANING FRONT PANEL**
- WARNING: Use only plain lukewarm water and a freshly laundered, soft lint-free cloth to clean the front control panel.
NOTE: IF alignment must be performed before starting this procedure.

- Set TUNING dial pointer to zero (O) calibration mark on the logging scale. If the dial pointer does not coincide with the O at the extreme end of the black pointer, reposition the pointer assembly on the dial card and cement the pointer in place to prevent slippage.
- Connect DC VTVM to Test Point 301 on the IF board.
- Connect an RF generator to the NORM antenna terminals. Use a 120-ohm composite transmission line set in series with a network made from the generator; see Figure 1. Connect scope input and tuning dial pointer to 90 MHz (rf). DO NOT USE MODULATION (AM or FM) and keep the generator output low as possible during alignment procedure.
- Align oscillator trimmer (C2151) first, then adjust the RF coil (L734, L735, L736) for maximum reading on DC VTVM.
- Set DC VTVM resistance and tuning dial pointer to 10 MHz (rf)
- Reject several alignments until resonant cell is observed. Keep the generator output as low as possible during all adjustments.
- Adjust RF generator for output of 200 mV, with no modulation, at NORM antenna terminals. Use speakers or headphones to monitor the output.
- Turn up VOLUME control until noise is heard in the output. Adjust RF generator for output of 1 mV, gradually increase generator output to 200 mV. There should be a noticeable increase in the noise level. If necessary, adjust slightly AGC Adjust Pot PT716 to no increase in noise as the generator is varied from 1 mV to 200 mV.

IF ALIGNMENT

- Connect 10-7MHz (rf) sweep generator to Test Point 751 on the IF board and connect a combiner between terminals 3P and 3G on IF board. Connect scope vertical input through 220K resistor to Test Point 301. NOTE: Connect ground lead of generator to ground near Test Point 751 and ground of scope closest to scope input.
- Adjust generator output voltage and frequency to observe IF response curve. Use low generator output as possible. Measure voltage at Test Point 301 with DC VTVM during alignment and resistive generator output to keep meter reading from 1.2 to 2.5 VDC maximum.
- Define top range of 2300 amplitude.
- Align bottom range of 2300 amplitude, top and bottom bands of 2302, 2303, and 2305 for maximum gain and symmetry — see Figure 2. Repeat.
- Connect combiner between terminals 3S and 3G and connect scope vertical input through 220K resistor to Test Point 301. Align top range of 2300 for maximum gain and symmetry — see Figure 3.
- Connect scope and combiner input to Test Point 301. Connect DC VTVM to Test Point 302.
- Set generator output to 10.7 kHz (rf) with no sweeps. Verify generator frequency from minimum to maximum; reading in DC VTVM should increase with increase in signal.
- Connect scope input to 200V, Adjust Meter Adjust Pot PT14 for reading meter reading of 0.1 VDC. Connect scope vertical input through 220K resistor to terminal 0.
- Set generator for sweep and adjust generator output voltage to observe linear detector response. Use low generator output as possible. Adjust top and bottom bands of 2304 for maximum gain, resistive output for best linearity — see Figure 4.

FM TUNING METER CALIBRATION

- Connect an FM generator to the NORM antenna terminals. Use a 120-ohm composite transmission line set in series with a network made from the generator; see Figure 1. Connect scope input and tuning dial pointer to 90 MHz (rf).
- Set generator output to 90 kHz (rf) with no sweeps. Verify generator frequency from minimum to maximum; reading in DC VTVM should increase with increase in signal.
- Connect scope input to 200V, Adjust Meter Adjust Pot PT14 for reading meter reading of 0.1 VDC. Connect scope vertical input through 220K resistor to terminal 0.
- Set generator for sweep and adjust generator output voltage to observe linear detector response. Use low generator output as possible. Adjust top and bottom bands of 2304 for maximum gain, resistive output for best linearity — see Figure 4.

FM MUTING ADJUSTMENT

Set MUTING switch to OFF. Connect an FM generator to the NORM antenna terminals. Use a 120-ohm composite transmission line set in series with a network made from the generator; see Figure 1. Connect FM VTVM to LEFT or RIGHT CHANNEL RCDR jack.
- Set FM generator frequency and tuning dial pointer to 90 kHz (rf), adjust generator output for 125-5 kHz (rf) deviation at 10 kHz, set MUTING switch to ON. Increase generator output voltage for reading meter ranging from 1 dB to 20 dB. Verify generator frequency to ensure that meter is set as peak. Generator output voltage should be between 8 and 25 VDC. Note reading on AC VTVM.
- Set MUTING switch to OFF. Adjust MUTING Adjust Pot PT14 for reading on AC VTVM in 2.5 to 5 dB below previously noted.
- Reduce generator output in steps of 500 MHz, modulation or noise should be indicated in AC VTVM or RCDR jack.

HARMONIC DISTORTION TEST

Set BALANCE, BASS and TREBLE controls to their center positions. Set NODE/TAPE MONITOR switch in STEREO position. SELECTOR switch to AUX and speakers switch to MAIN. Set a LOUDNESS CONTROL and HIGH FILTER switches to OFF, Unplug AC power cord.
- Connect a 600-ohm resistor across the LEFT SPKR MAIN terminals. In parallel with the load resistor, connect the input leads of a harmonic distortion analyzer and the load of an AC VTVM capable of reading 0.1 VDC with accuracy.
- Connect loudspeaker audio line source generator, set for 1000 Hz and the LEFT AUX jack.
- Connect AC power cord and reduce VOLUME control to its maximum clockwise (full volume) position.
- Increase generator input to set 35 watts output (11.8 VAC across drain lead resistor). Harmonic distortion meter should read less than 0.8%. Repeat preceding steps for right channel.

INTERMODULATION DISTORTION TEST

Set BALANCE, BASS and TREBLE controls to their center positions. Set NODE/TAPE MONITOR switch in STEREO position. SELECTOR switch to AUX and SPEAKERS switch to MAIN. Pulse LOUDNESS CONTROL and HIGH FILTER switches to OFF. Unplug AC power cord.
- Connect a 50-ohm resistor across the LEFT SPKR MAIN terminals. In parallel with the load resistor, connect the input leads of an intermodulation distortion analyzer and the load of an AC VTVM capable of reading 0.1 VDC with accuracy.
- Connect 3 harmonic generator output to the LEFT AUX jack.

NOTE: Speaker common terminals are not at ground potential, IUT chassis and ground leads should be connected to AUX input ground only.
- Connect 50 ohm signal source and reduce VOLUME control to its maximum clockwise position (full volume).
- Connect 50 ohm signal source and reduce VOLUME control to its maximum clockwise position (full volume).
- Connect 35 watts output (11.8 VAC across drain lead resistor) and AFT ONE FULL MINUTE OF HARVEST TIME, PROCEED TO NEXT STEP.

POWER OUTPUT MEASUREMENT

The output amplifier of this unit is designed to deliver its full-rated power with program material (voice or music) into its rated 15-ohm loads for indefinite periods. When a constant audio output is used as a signal to measure the continuous RMS power output, the following precautions must be taken:
- Measure the power output of one channel at a time.
- Limit the measurement period to 10 minutes with a lead resistance between 4 and 16 ohms.

If the power output of both channels must ever be measured simultaneously, connect a load of 4 to 8 ohms per channel and limit measurements to a period not longer than 1 minute for a 40-Watt load and not longer than 3 minutes for a 80-Watt load.
MULTIPLEX ALIGNMENT

Two methods of aligning the multiplexer decoder are given. The preferred procedure uses a multiplexer generator with RF and 19 kHz output and with 1 kHz modulator, such as the Fisher Model 350 Multiplexer Generator. This is the better method of alignment since the front end and IF stages are also checked through use of this procedure. An alternate procedure for use with multiplexer generator not having an RF output is also given.

PREFERRED ALIGNMENT PROCEDURE

Set MUTING switch to OFF and SELECTOR switch to FM AUTO.
- Connect multiplexer generator to LOC antenna terminals. Use 170 kΩ series composition resistors. Also connect line to antenna port on multiplexer generator.
- Follow procedures given in Table 1 below.
- Note: Check the alignment of the IF amplifier before aligning the multiplexer decoder. Proper alignment can make proper multiplexer adjustment impossible.

<table>
<thead>
<tr>
<th>STEP</th>
<th>GENERATOR MODULATION</th>
<th>RF DEV.</th>
<th>INDICATOR TYPE AND CONNECTION</th>
<th>A ALIGNMENT</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 kHz pilot only.</td>
<td>-17.5 kHz (kc)</td>
<td>DC VTM to Test Point 405</td>
<td>2.46Ω top and bottom, 2.62Ω</td>
<td>Maximum DC VTM reading.</td>
</tr>
<tr>
<td>2</td>
<td>Short connection 4Ω to ground.</td>
<td>-</td>
<td>Stereo Beacon should light.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Connect portion of 1 kΩ (kc) generator output to scope horizontal input.</td>
<td>no mod.</td>
<td>Scope vertical input through 3 megohm resistor to Test Point 402, scope set for external sweep.</td>
<td>2.46Ω top</td>
<td>Stable Lissajous pattern 2:1 (Figure 1) as slow moving or possible.</td>
</tr>
<tr>
<td>4</td>
<td>Same as Step 3.</td>
<td>no mod.</td>
<td>Maximum scope amplitude, adjust 2.46Ω top as necessary for lowest moving Lissajous.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Disconnect connection 4Ω from ground.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Composite multiplexer signal 19 kHz (kc) on left channel only.</td>
<td>-17kHz</td>
<td>Audio (AC) VTM and scope input to left channel output on preamplifier board.</td>
<td>2.42Ω</td>
<td>Maximum audio AC VTM reading; clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>7</td>
<td>Composite multiplexer signal 19 kHz (kc) on right channel only.</td>
<td>17kHz</td>
<td>Same as Step 6.</td>
<td>Separation Control*</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 6.</td>
</tr>
<tr>
<td>8</td>
<td>Same as Step 7.</td>
<td>17kHz</td>
<td>Audio (AC) VTM and scope input to right channel output on preamplifier board.</td>
<td>-</td>
<td>Same audio AC VTM reading as obtained in Step 6 (12 dB); clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>9</td>
<td>Same as Step 6.</td>
<td>17kHz</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 8.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>19 kHz (kc) pilot only.</td>
<td>-13.5kHz (kc)</td>
<td>DC VTM to connection 4Ω.</td>
<td>Trigger Control</td>
<td>Stereo Beacon lights up with 0.8 V reading on DC VTM.</td>
</tr>
</tbody>
</table>

*NOTE: Separation Control is located on preamplifier board.

REFRERRED ALIGNMENT PROCEDURE

Set MUTING switch to OFF and SELECTOR switch to FM AUTO.
- Connect multiplexer generator to LOC antenna terminals. Use 170 kΩ series composition resistors. Also connect line to antenna port on multiplexer generator.
- Follow procedures given in Table 1 below.
- Note: Check the alignment of the IF amplifier before aligning the multiplexer decoder. Proper alignment can make proper multiplexer adjustment impossible.

<table>
<thead>
<tr>
<th>STEP</th>
<th>GENERATOR MODULATION</th>
<th>RF DEV.</th>
<th>INDICATOR TYPE AND CONNECTION</th>
<th>A ALIGNMENT</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 kHz pilot only.</td>
<td>-17.5 kHz (kc)</td>
<td>DC VTM to Test Point 405</td>
<td>2.46Ω top and bottom, 2.62Ω</td>
<td>Maximum DC VTM reading.</td>
</tr>
<tr>
<td>2</td>
<td>Short connection 4Ω to ground.</td>
<td>-</td>
<td>Stereo Beacon should light.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Connect portion of 1 kΩ (kc) generator output to scope horizontal input.</td>
<td>no mod.</td>
<td>Scope vertical input through 3 megohm resistor to Test Point 402, scope set for external sweep.</td>
<td>2.46Ω top</td>
<td>Stable Lissajous pattern 2:1 (Figure 1) as slow moving or possible.</td>
</tr>
<tr>
<td>4</td>
<td>Same as Step 3.</td>
<td>no mod.</td>
<td>Maximum scope amplitude, adjust 2.46Ω top as necessary for lowest moving Lissajous.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Disconnect connection 4Ω from ground.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Composite multiplexer signal 19 kHz (kc) on left channel only.</td>
<td>-17kHz</td>
<td>Audio (AC) VTM and scope input to left channel output on preamplifier board.</td>
<td>2.42Ω</td>
<td>Maximum audio AC VTM reading; clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>7</td>
<td>Composite multiplexer signal 19 kHz (kc) on right channel only.</td>
<td>17kHz</td>
<td>Same as Step 6.</td>
<td>Separation Control*</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 6.</td>
</tr>
<tr>
<td>8</td>
<td>Same as Step 7.</td>
<td>17kHz</td>
<td>Audio (AC) VTM and scope input to right channel output on preamplifier board.</td>
<td>-</td>
<td>Same audio AC VTM reading as obtained in Step 6 (12 dB); clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>9</td>
<td>Same as Step 6.</td>
<td>17kHz</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 8.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>19 kHz (kc) pilot only.</td>
<td>-13.5kHz (kc)</td>
<td>DC VTM to connection 4Ω.</td>
<td>Trigger Control</td>
<td>Stereo Beacon lights up with 0.8 V reading on DC VTM.</td>
</tr>
</tbody>
</table>

*NOTE: Separation Control is located on preamplifier board.

Figure 1. Lissajous Pattern for MUX Alignment.

TABLE 1
MULTIPLEX ALIGNMENT USING RF MULTIPLEX SIGNAL

<table>
<thead>
<tr>
<th>STEP</th>
<th>GENERATOR MODULATION</th>
<th>RF DEV.</th>
<th>INDICATOR TYPE AND CONNECTION</th>
<th>A ALIGNMENT</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 kHz pilot only.</td>
<td>-17.5 kHz (kc)</td>
<td>DC VTM to Test Point 405</td>
<td>2.46Ω top and bottom, 2.62Ω</td>
<td>Maximum DC VTM reading.</td>
</tr>
<tr>
<td>2</td>
<td>Short connection 4Ω to ground.</td>
<td>-</td>
<td>Stereo Beacon should light.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Connect portion of 1 kΩ (kc) generator output to scope horizontal input.</td>
<td>no mod.</td>
<td>Scope vertical input through 3 megohm resistor to Test Point 402, scope set for external sweep.</td>
<td>2.46Ω top</td>
<td>Stable Lissajous pattern 2:1 (Figure 1) as slow moving or possible.</td>
</tr>
<tr>
<td>4</td>
<td>Same as Step 3.</td>
<td>no mod.</td>
<td>Maximum scope amplitude, adjust 2.46Ω top as necessary for lowest moving Lissajous.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Disconnect connection 4Ω from ground.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Composite multiplexer signal 19 kHz (kc) on left channel only.</td>
<td>-17kHz</td>
<td>Audio (AC) VTM and scope input to left channel output on preamplifier board.</td>
<td>2.42Ω</td>
<td>Maximum audio AC VTM reading; clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>7</td>
<td>Composite multiplexer signal 19 kHz (kc) on right channel only.</td>
<td>17kHz</td>
<td>Same as Step 6.</td>
<td>Separation Control*</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 6.</td>
</tr>
<tr>
<td>8</td>
<td>Same as Step 7.</td>
<td>17kHz</td>
<td>Audio (AC) VTM and scope input to right channel output on preamplifier board.</td>
<td>-</td>
<td>Same audio AC VTM reading as obtained in Step 6 (12 dB); clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>9</td>
<td>Same as Step 6.</td>
<td>17kHz</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 8.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>19 kHz (kc) pilot only.</td>
<td>-13.5kHz (kc)</td>
<td>DC VTM to connection 4Ω.</td>
<td>Trigger Control</td>
<td>Stereo Beacon lights up with 0.8 V reading on DC VTM.</td>
</tr>
</tbody>
</table>

*NOTE: Separation Control is located on preamplifier board.

TABLE 2
MULTIPLEX ALIGNMENT USING COMPOSITE MULTIPLEX SIGNAL

<table>
<thead>
<tr>
<th>STEP</th>
<th>GENERATOR MODULATION</th>
<th>RF DEV.</th>
<th>INDICATOR TYPE AND CONNECTION</th>
<th>A ALIGNMENT</th>
<th>INDICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>19 kHz pilot only.</td>
<td>-17.5 kHz (kc)</td>
<td>DC VTM to Test Point 405</td>
<td>2.42Ω top and bottom, 2.62Ω</td>
<td>Maximum DC VTM reading.</td>
</tr>
<tr>
<td>2</td>
<td>Short connection 4Ω to ground.</td>
<td>-</td>
<td>Stereo Beacon should light.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Connect portion of 1 kΩ (kc) generator output to scope horizontal input.</td>
<td>no mod.</td>
<td>Scope vertical input through 3 megohm resistor to Test Point 402, scope set for external sweep.</td>
<td>2.42Ω top</td>
<td>Stable Lissajous pattern 2:1 (Figure 1) as slow moving or possible.</td>
</tr>
<tr>
<td>4</td>
<td>Same as Step 3.</td>
<td>no mod.</td>
<td>Maximum scope amplitude, adjust 2.42Ω top as necessary for lowest moving Lissajous.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Disconnect connection 4Ω from ground.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Composite multiplexer signal 19 kHz (kc) on left channel only.</td>
<td>-17kHz</td>
<td>Audio (AC) VTM and scope input to left channel output on preamplifier board.</td>
<td>2.42Ω</td>
<td>Maximum audio AC VTM reading; clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>7</td>
<td>Composite multiplexer signal 19 kHz (kc) on right channel only.</td>
<td>17kHz</td>
<td>Same as Step 6.</td>
<td>Separation Control*</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 6.</td>
</tr>
<tr>
<td>8</td>
<td>Same as Step 7.</td>
<td>17kHz</td>
<td>Audio (AC) VTM and scope input to right channel output on preamplifier board.</td>
<td>-</td>
<td>Same audio AC VTM reading as obtained in Step 6 (12 dB); clean 1 kHz sine wave on scope.</td>
</tr>
<tr>
<td>9</td>
<td>Same as Step 6.</td>
<td>17kHz</td>
<td>Minimum audio AC VTM reading at least 30 dB below reading in Step 8.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>19 kHz (kc) pilot only.</td>
<td>-13.5kHz (kc)</td>
<td>DC VTM to connection 4Ω.</td>
<td>Trigger Control</td>
<td>Stereo Beacon lights up with 0.8 V reading on DC VTM.</td>
</tr>
</tbody>
</table>

*NOTE: Separation Control is located on preamplifier board.
FE50D965 FM FRONT END

[Diagram of FM Front End Circuit]

- [Caption: L222 RF COIL]
- [Caption: C55, C53, C51, L75, L74, C75, C74, C72, L755, TF691]
- [Caption: Connector: ANTENNA INPUT, AGC, +5V TO +15V, INS 293]
1531 MULTIPLEX DECODER

BOARD VIEWED FROM COMPONENT SIDE

# NOT USED ON ALL CHASSIS.