SERVICE BULLETIN FOR
MODEL 260
SOLID STATE STEREO AMPLIFIER

Tape Output
Rated Voltage Output to Tape Recorder
Minimum Recommended Load Resistance

0.5 v
200 K ohms

Pre-Amplifier
Input:
Tape Head - Input Impedance
Signal for Rated Output
S/N Ratio
Phono - Input Impedance (All Switch Positions)
Signal for Rated Output (Adjustable by Switch)
S/N Ratio
High Level Inputs - Input Impedance
Signal for Rated Output
S/N Ratio
Frequency Response in Flat Position
Treble Controls Measured at 10,000 cps, Boost and Cut
Bass Controls Measured at 50 cps, Boost and Cut
Scratch Filter
Rumble Filter
Loudness Compensation (Maximum)
Loudness Compensation

47 K ohms
2 mv
52 db
47 K ohms
3, 5, 9 mv
55 db
60 K ohms
.5 v
75 db
20-20 KC ± 1.0 db
10 db ± 2 db
12 db ± 2 db
-4 db/octave: -3 db @ 5 K cps
-10 db @ 50 cps ± 2 db
+9 db @ 50 cps
+2.5 db @ 10 K cps

Amplifiers
Power Ratio (Watts Per Channel)
@ 0.8% Harmonic Distortion
@ 4 ohms
@ 8 ohms
Continuous Power Output
Single Channel @ 0.8% Harmonic Distortion
Continuous Output Both Channels
@ 0.8% Harmonic Distortion
Frequency Response
Power Bandwidth at Rated Distortion (IHF Method)
Damping Factor
Range of Line Voltage and Frequency
Power Consumption - 117 v at 60 cps (Stand-by)

60 watts per channel
50 watts per channel
40 watts
30 watts per channel
20-20,000 cps ± 1 db
20-20,000 cps
20
105-120 v, 50-60 cps
25 w
EQUIPMENT NEEDED
Audio Oscillator
TVVM
Oscilloscope
VOM
Load Box
Attenuator
Distortion Analyzer
Variac or 117 Regulated Line
Factory Dielectric Test Set

Set Controls to the Following:
Front Panel
Input Selector
EXTRA 2
Stereo Selector
STEREO
Tone Controls (Bass & Treble)
Flat "0"
Loudness/Power
Ac OFF
Balance Control
Flat "0"
Tone Controls
IN
Rumble Filter
OUT
Noise Filter
OUT
Tape
NORMAL
Compensator
LOUDNESS
Remote Speaker
OFF
Main Speaker
ON

Rear Panel
Preamp Sensitivity
Max.
Remote Speakers
STEREO

Internal
Potentiometers Z-PC-D7 R6 & R106 (Balance Pot) Max CCW
Potentiometers Z-PC-D7 R11 & R111 (Bias Pot) Max CCW

Measure resistance to chassis in the following locations (positive side of VOM battery to ground - chassis), meter on 1000 scale:

Output Transistor Collector (supply side) Q1 & Q101 1.6 - 2.1 kohm
Output Transistor Collector (midpoint) Q2 & Q 102 1.5 - 1.9 kohm
Main Speaker "H" Terminal 450 - 500 ohm
33V Source 2.2 - 2.8 kohm

Measure resistance across stabistors in forward direction (1.0 - 1.5 kohm) on rear panel of Rx1000 scale.

1. Bias and Balance Adjustment and Voltage Checks

With no signal input and 8 ohm loads connected to Main speaker taps, turn power on keeping loudness pot at minimum setting. Watch carefully for any signs of voltage shorts or overheating.
Measure voltage at collector of Q1 - should measure between 68 and 75 volts. Set voltage at pin 2 of Test Point jack for Left Channel, and pin 1 of Test Point jack for Right Channel on rear panel for one-half supply voltage (approx. 35 volts) using D7-R6 (Left Channel) and D7-R106 (Right Channel) balance pots.

Using Triplett Vom, set to 12mA scale, adjust bias pots for 0.8 mA current from pin 3 of Test Point jack for Left channel and pin 4 of Test Point jack for Right channel, D7-R11 for Left Channel and D7-R111 for Right Channel.

Recheck balance adjustment and reset balance pots if necessary.

a) Check voltage at 33 volt source (across DZ-33) for voltage of 30 - 36 volts.

2. Sensitivity Check

Connect audio oscillator through attenuator into Extra 2 input jack. Set attenuator for an output from attenuator of 0 dB on 0.3V scale of VTVM, 400Hz. Turn loudness pot to maximum. Observe output at speaker terminals of 0 dB on 10 volt scale ±2 dB. Turn loudness to minimum. At this point recheck and readjust bias if necessary. Note: Check that difference in channels is no greater than 2dB. Repeat for Extra 1 jack input, and tuner jack input.

Distortion Check

Using a 400 Hz distortion analyzer, distortion must be no greater than 0.4% at 16 volts into an 8 ohm load (32 watts)

4. Loudness Control Check

Set attenuator for output of +20 dB (0 dB on 10V scale). Check tracking of Left and Right channels in 10 dB steps to -50 db, maximum deviation 2 dB.

Check loudness response in electrical flat position:

<table>
<thead>
<tr>
<th>L/V in Loudness</th>
<th>L/V in Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz - 0 dB</td>
<td>Flat Response</td>
</tr>
<tr>
<td>10 kHz - +2.0 +1 dB</td>
<td></td>
</tr>
<tr>
<td>100 Hz - +7.0 +2 dB</td>
<td></td>
</tr>
</tbody>
</table>

With level control at min. OUTPUT should be -73 dB with respect to 16 volt or 32 watt level.

5. Tone Control Check

With Loudness at max., adjust attenuator to obtain 0 dB on 3 volt scale at 1kHz. Use attenuator to obtain OUTPUT on 3 volt scale for Bass and Treble Boost measurements.

<table>
<thead>
<tr>
<th>Bass 100Hz</th>
<th>Treble 10 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boost 9 +2 dB</td>
<td>Boost 9+2 dB</td>
</tr>
<tr>
<td>Cut 10 +2 dB</td>
<td>Cut 9 +2 dB</td>
</tr>
</tbody>
</table>

6. Tone Control Bypass Switch Test

Turn Bass and Treble controls for max. boost with loudness control at max. and attenuation adjusted to obtain 0 dB on 3 volt scale at 1 kHz, at the following frequencies check the effect of the tone control bypass switch:

<table>
<thead>
<tr>
<th>Tone Controls In</th>
<th>Tone Controls Bypassed</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Hz +9 +2 dB</td>
<td>-3 +1 dB</td>
</tr>
<tr>
<td>1 kHz 0</td>
<td>-3 +1 dB</td>
</tr>
<tr>
<td>10 kHz +9 +2 dB</td>
<td>-3 +1 dB</td>
</tr>
</tbody>
</table>

Return Tone Control Bypass pushbutton to Normal (Tone controls in) position.
7. Frequency Response Check

Set Tone controls and Balance control flat ("0" position)

Attenuator oscillator to obtain 0 dB on 3 volt scale at 1 kHz when measured at speaker terminals with 8 ohm load. Sweep oscillator frequency and monitor OUTPUT. Maximum variation ±1 dB from 40 Hz to 15 kHz. Signal down points should be less than 17 Hz low end and 25-40 kHz high end. Return to 1 kHz.

8. Crosstalk Check

Feed input into Right channel. Record Left channel with Stereo Selectro Switch in Mono position, 1 kHz signal. Switch Stereo Selectro Switch to Stereo. Measure 45 dB loss minimum. With Noise Filter IN measure -16 to -25 dB loss minimum. Return oscillator to left input.

9. Stereo Selector Switch Check

<table>
<thead>
<tr>
<th>For Left Channel Input</th>
<th>Stereo Switch Position</th>
<th>For Right Channel Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Left Output</td>
<td>Bal. Left</td>
<td>No Signal</td>
</tr>
<tr>
<td>Signal (-0.6 dB)</td>
<td>Bal. Right</td>
<td>Signal (-0.6 dB)</td>
</tr>
<tr>
<td>No Signal</td>
<td>Monaural</td>
<td>Signal (-2 dB)</td>
</tr>
<tr>
<td>Signal (-2 dB)</td>
<td>Stereo</td>
<td>Signal (0 dB)</td>
</tr>
<tr>
<td>No Signal</td>
<td>Rev. Stereo</td>
<td>No Signal</td>
</tr>
<tr>
<td>Signal (0 dB)</td>
<td>Left Input</td>
<td>No Signal</td>
</tr>
<tr>
<td>No Signal</td>
<td>Right Input</td>
<td>Signal (-1.5 dB)</td>
</tr>
<tr>
<td>Signal (-1.5 dB)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Signal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

10. Rumble-Noise Filter: Normal output level 0 dB on 3V scale, Loudness pot max.

Rumble In: 100 Hz -5 ±2 dB
Noise In: 10 kHz -10 ±2 dB

11. Balance Control Check

With oscillator in Left channel input, monitor Left channel output. Turn balance pot to Balance Left. Note no loss of signal. Turn Balance pot to Balance Right. Note complete loss of signal.

Repeat for opposite effect when feeding and monitoring Right channel.

12. Speaker Switch Check

(a) Feed signal to Left input. Monitoring Left channel Main speaker output, set input for output of 0 dB on 3V scale. Switch monitor to Left channel remote output. Note no signal. Push remote speaker switch ON. Note output of approx. -2 dB on 3V scale. Push Main speaker switch OFF. Note return of output to 0 dB. Push Remote speaker switch OFF. Note loss of output. Monitor Main speaker output. Note no output. Push Main speaker switch ON. Note output of 0 dB on 3V scale.

(b) Remote Speaker Mono-Stereo Switch Check

Connect 8 ohm load to Left Remote speaker output, push Remote Speaker switch ON, Main speaker switch off. Feed signal to left input, set input for an output of 0 dB on 3V scale. Switch Remote Speaker switch (rear chassis) from Stereo to Mono. Note 12 dB ± 2dB drop in output level. Switch back to Stereo and note return to "0" dB. Return load to Main speaker output and switch OFF Remote speaker pushbutton. Switch ON Main speaker pushbutton.
13. Regulation Check

With signal output of 1 kHz, 0 dB on 3V scale, remove 8 ohm load. Note 0.5 dB max. rise in output.

14. Phone Jack (Front Panel) Check: Input L channel, selector-stereo.

With signal output of 1 kHz 0 dB on 3V scale at speaker terminals, remove VTVM from 8 ohm load and connect output from phone jack to VTVM. Tip of phone jack is Right channel. Phone jack output should be -5 dB with respect to speaker terminal output.

15. Tape Monitor Switch Check

Before removing or inserting inputs, turn Loudness control to minimum. With signal output of 1 kHz, 0 dB on 3V scale at speaker terminals Extra 2 input, switch Tape Monitor switch to IN position. Note complete loss of signal. Remove signal input from Extra 2 jack and plug into Tape In jack. Note signal restored as before. Switch tape monitor to OUT position; again note signal loss. Remove signal from Tape In jack and insert in Tape Out jack. Note signal restored.

16. Preamp Gain Check

Return signal input to EXTRA input and adjust level for output at 1 kHz of 0 dB on 3 volt scale with loudness control at maximum. Turn loudness control to min. Turn input selector to Phono. Attenuate -45 dB and plug input into Phono input. Turn loudness control to max. Output should be 1 ±1 dB on 3 volt scale. Switch preamp sensitivity from Max position to other positions and observe the following gain change with respect to Max. position:

<table>
<thead>
<tr>
<th>Position</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Med.</td>
<td>-5 ±1 dB</td>
</tr>
<tr>
<td>Min.</td>
<td>-10 ±1 dB</td>
</tr>
</tbody>
</table>

Return preamp sensitivity switch to max. position. Turn loudness control to min. Turn input selector to MIC. Remove input from phono input and place in MIC input (front panel). Turn loudness control to max. Note output of -1 ±1 dB on 3 volt scale. Repeat sensitivity check for MIC position. Note same gain changes as in phono position.

17. Phono and Microphone Frequency Response Check

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Phono</th>
<th>MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz</td>
<td>0 dB</td>
<td>0 dB</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-14 ±2 dB</td>
<td>-2 ±2 dB</td>
</tr>
<tr>
<td>100 Hz</td>
<td>+13 ±2 dB</td>
<td>-1 ±2 dB</td>
</tr>
</tbody>
</table>

18. Hum and Noise Checks

<table>
<thead>
<tr>
<th>Selector Switch Position</th>
<th>Loudness Max.</th>
<th>Loudness Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRA 1 and 2</td>
<td>5.0 mV</td>
<td>3.0 mV</td>
</tr>
<tr>
<td>PHONO (shorted inputs)</td>
<td>20.0 mV</td>
<td>3.0 mV</td>
</tr>
<tr>
<td>MIC (shorted inputs)</td>
<td>10.0 mV</td>
<td>3.0 mV</td>
</tr>
</tbody>
</table>

19. Repeat Steps 2 through 18 for Right Channel