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SERVICE MANUAL
**PERFORMANCE SPECIFICATIONS**

### Preamplifier and Processor Specifications

**Frequency Response**

**Stereo:**
- Left and Right Loudspeakers: +0-0.5dB from 20Hz-20,000Hz

**Music 1-4:**
- Left, Center, Right Loudspeakers: +0-0.5dB from 20Hz-20,000Hz
- Large Surround Loudspeakers: +0-0.5dB from 20Hz-20,000Hz

**Pro-Logic:**
- Left, Center, Right, Large Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
- Large Surround Loudspeakers: +1-3dB from 20Hz-6.3kHz
- Subwoofer*: 20Hz-140Hz

**Dolby Digital, DTS and External Input:**
- Left, Center, Right, Large Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
- Large Surround Loudspeakers: +/-0.5dB from 20Hz-20,000Hz
- Subwoofer*: 20Hz-140Hz

**Rated Output**
- 2V for all channels

**Input Impedance**
- 22k ohms

**Output Impedance**
- Less than 560 ohms for all channels

**Maximum Output Voltage**
- 8V

**Total Harmonic Distortion**
- 0.05% for all channels

**Sensitivity**
- Analog Input: 100mV IHF
- Dolby Level: 200mV Input
- External Input: 200mV for 2.0V Output

**Signal To Noise Ratio**
- Greater than 90dB A-weighted

**Maximum Input Signal**
- Analog Input: 6Vrms

**Tone Controls**
- +/-12dB from the flat setting

* If any of the channels have the Loudspeaker Setting of Small, the subwoofer has a electronic low pass filter with a corner frequency of 80Hz and a 24dB per Octave roll-off in all modes except external. The Frequency Response of the Subwoofer Channel is also determined by the Crossover Setting.

### Power Amplifier Specifications

**Power Output**
- Minimum sine wave continuous average power output per channel, all channels operating is: 100 watts into 4 ohm load, 70 watts into a 8 ohm load

**Rated Power Band**
- 20Hz to 20,000Hz

**Total Harmonic Distortion**
- Maximum Total Harmonic Distortion at any power level from 250 milliwatts to rated power output is: 0.05% for 4 or 8 ohm load

**Dynamic Headroom**
- 1.8dB

**Frequency Response**
- +0, -0.25dB from 20Hz to 20,000Hz
- +0, -3dB from 10Hz to 1000,000Hz

**Sensitivity**
- 1.0 Volt

**A-Weighted Signal To Noise Ratio**
- 92dB (112dB below rated output)

**Intermodulation Distortion**
- Maximum Intermodulation Distortion if instantaneous peak output per channel does not exceed twice the rated output, for any combination of frequencies from 20Hz to 20,000Hz, with all channels operating is: 0.05% for 4 or 8 ohm loads

**Input Impedance**
- 20,000 ohms

**Wide Band Damping Factor**
- 100 at 4 ohms
- 200 at 8 ohms

### General Specifications

**Power Requirements**
- 100 Volts, 50/60Hz at 8.4 Amps
- 110 Volts, 50/60Hz at 7.7 Amps
- 120 Volts, 50/60Hz at 7.0 Amps
- 220 Volts, 50/60Hz at 3.5 Amps
- 230 Volts, 50/60Hz at 3.5 Amps
- 240 Volts, 50/60Hz at 3.5 Amps

*Note: Refer to rear panel of the MHT200 for the correct voltage.*

**Dimensions**
- Front Panel: 17-3/4 inches (45.09cm) wide, 9-7/16 inches (23.97cm) high. Depth behind front mounting panel is 19 inches (48.26cm) including clearance for connectors. Panel clearance required in front of mounting panel is 1-1/8 inches (2.9cm).

**Weight**
- 73 pounds (33.1kg) net, 87 pounds (39.5kg) shipping
PERFORMANCE SPECIFICATIONS con’t

FM Tuner

Useable Sensitivity
14dBF which is 1.4uV across 75 ohms

50dB Quieting Sensitivity
Mono: 19dBF which is 2.4uV across 75 ohms
Stereo: 35dBF which is 15uV across 75 ohms

Signal To Noise Ratio
Mono: 75dB
Stereo: 70dB

Frequency Response
Mono: +0, -1dB from 20Hz to 15,000Hz
Stereo: +0, -1dB from 20Hz to 15,000Hz

Harmonic Distortion
Mono: 0.3% at 100Hz, 0.3% at 1,000Hz, 0.3% at 10,000Hz
Stereo: 0.45% at 100Hz, 0.45% at 1,000Hz, 0.65% at 10,000Hz

Intermodulation Distortion
Mono: 0.25%
Stereo: 0.45%

Capture Ratio
1.2dB

Alternate Channel Selectivity
75dB

Spurious Response
100dB

Image Response
75dB

RF Intermodulation
65dB

Stereo Separation
45dB at 100Hz
45dB at 1,000Hz
35dB at 10,000Hz

SCA Rejection
65dB

AM Tuner

Sensitivity
20uV External Antenna Input

Signal To Noise Ratio
48dB at 30% modulation
58dB at 100% modulation

Harmonic Distortion
0.5% maximum at 50% modulation

Frequency Response
50Hz to 6kHz NRSC

Adjacent Channel Selectivity
45dB minimum IHF

Image Rejection
65dB minimum from 540Hz to 1,600kHz

IF Rejection
80dB minimum

NOTES

1. The heavy lines on the schematic denote the primary signal path.

2. Unless otherwise noted, all voltages indicated on the schematics are measured under the following conditions:
   a. AC input at 120 volts, 50/60Hz.
   b. All voltages are +/-10% with respect to ground. A high impedance (10 megaohm) voltmeter must be used.

3. On PC board drawings, Square pad indicates:
   a. Polarized Capacitors - Positive
   b. Diodes - Cathode
   c. Others - Pin 1

4. WARNING
   Parts marked with the symbol ⛔ have critical characteristics. Use only replacement parts recommended by the manufacturer.
This returns the data to buffer after it has been latched in. It can be read after SPI_OUT_E has been triggered.
F1 = T1.6AL 250V
F2 = T500mA 250V
WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.
S-VIDEO 320125 SH 3 OF 5
Note: Fixed, feed an external processor. Hence no mute circuitry.
NOTE!!!

The colors on the Kunming jacks were turned around, so that the left input channel is now on the left in the backpanel.

The easiest way to get the channels right was to cross the left

**Nothing to do with Multiroom/Zone,** main power transformer is ON when +5V**
Tuner Alignment Procedure

FM Alignment Procedure
1. Connect an FM Signal Generator to Antenna Input.
2. Connect Distortion Analyzer to the TUNER INPUT RCA jacks. (These jacks act as the Tuner Output.)
3. Remove Top Cover and AM/FM TUNER Cover. Turn On the AC rocker switch. Press the red Standby button to turn the unit On.
4. Select Tuner with the Zone A selector knob. Put Tuner into FM mode and tune to 87.5MHz.
5. Adjust L5 (FM OSC Coil) for 3.5VDC at R46.
6. Tune to 108.5MHz and adjust C59 (FM OSC Trimmer Capacitor) for 24.5VDC at R46.
7. Repeat steps 4, 5 and 6 as necessary for a Tuning Voltage Range of 3.5VDC to 24.5VDC at R46.
8. Tune the Generator and Tuner to 900kHz and adjust Trimmers: L2 (FM MIX), L3 (FM RF) and L4 (FM ANT) for best sensitivity.
9. Repeat 8 and 9 until no improvement in sensitivity is noted.
10. Tune Generator to 900kHz, then off, and then on and adjust T9 (FM DETector Primary) for zero volts between TP1 and TP2 (relative to connector J6).
11. Tune the Generator to 900kHz and adjust the RF Output to 1000uV and 100% MONO modulation at 1000Hz. Then adjust T8 (FM DETector SEcondary) for lowest distortion.
12. Reduce the Generator Output to minimum and detune the Generator so the Receiver picks up only noise, then recheck the voltage between TP1 and TP2 (connector J6). Adjust T8 and C65 if needed. If it is not 0V/-0.2VDC, repeat steps 11 and 12. If there is interference from a station on this frequency, tune the Tuner to a nearby frequency free from interference for this measurement.
13. Tune the Generator to 900kHz with a 1000uV output. Then switch the Generator to stereo (left only) and adjust T10 (FM IF Transformer) for the lowest distortion at the TUNER INPUT RCA jacks.
14. Switch the Analyzer to the right channel TUNER INPUT jack and adjust R71 (MPX SEparation Pot) for best separation (minimum output).
15. Switch the Generator to the Right Channel and the Analyzer to the Left Channel. Adjust R71 (MPX SEparation Pot) and check for best separation (minimum output).
16. Disconnect voltmeter from TP1 and TP2 (J6). Reduce the generator output to SuV and adjust RT3 (STEREO SWITCH Pot) so the MPX light (Dot next to Signal Strength number) just comes on.

AM Alignment Procedure
1. Connect an AM Signal Generator to the RAA1 'EXT ANT' pin of the 5 pin connector. (Refer to Page 110.)
2. Connect a Distortion Analyzer to the MHT200 rear panel TUNER INPUT RCA jacks. (These jacks act as the Tuner Output.)
3. Tune to bottom of band, and adjust T11 (AM OSC Coil) for 3.0VDC at R46.
4. Tune to top of band and adjust C64 (AM OSC Trimmer Capacitor) for 26.0VDC at Connector R46.
5. Repeat steps 4 and 5 as necessary for a Tuning Voltage Range of 3.0 to 26.0VDC.
6. Tune the Generator and Tuner to 600kHz, then adjust Coils: T101 (AM ANT) and T12 (AM RF) for best sensitivity.
7. Note: Coil T101 (AM ANT) is located on the RAA1. It is labeled "L1".
8. Tune the Generator and Tuner to 1400kHz (200uV, 30% modulation), then adjust T7 (AM IF) for maximum signal.
9. Tune the Generator and Tuner to 1400kHz (100mV, 30% modulation). Slowly adjust R70 clockwise until the MHT100 front panel signal strength display reads "8".
10. Check both channels for signal to noise performance, and re-adjust R70 and as needed.
NOTE: SEE PAGE 105 - 106 FOR TUNER ALIGNMENT PROCEDURES
IC1
133506SP = BLANK IC
133507SP = MHT200 V6.44 PROGRAMMED IC

SET R1 FOR 5.3VDC AT PIN 2 OF CONNECTOR CN2

WARNING Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.
<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>016489 GLASS</td>
</tr>
<tr>
<td>2</td>
<td>140073 SWITCH DPDT ROCKER</td>
</tr>
<tr>
<td>3</td>
<td>017531 PUSHBUTTON ASSY RED</td>
</tr>
<tr>
<td>4</td>
<td>017517 PUSHBUTTON ASSY BLK</td>
</tr>
<tr>
<td>5</td>
<td>078033 O-RING</td>
</tr>
<tr>
<td>6</td>
<td>017938 BEZEL PUSHBUTTON</td>
</tr>
<tr>
<td>7</td>
<td>017852 PUSHBUTTON BLK</td>
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<tr>
<td>8</td>
<td>078032 O-RING</td>
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<tr>
<td>9</td>
<td>017741 RECEPTACLE PUSHBUTTON</td>
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<tr>
<td>10</td>
<td>017854 BEZEL HEADPHONE</td>
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<tr>
<td>11</td>
<td>049000 ASSY KNOB 25.5mm</td>
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<tr>
<td>12</td>
<td>104017 WASHER FELT</td>
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<tr>
<td>13</td>
<td>049598 ASSY KNOB 35mm</td>
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<tr>
<td>14</td>
<td>018706 EXTRUSION BOTTOM</td>
</tr>
<tr>
<td>15</td>
<td>094016 TAPE FOAM 1/4 X 1/8</td>
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<tr>
<td>16</td>
<td>098113 CORD DIAL .027 BLACK BRAID SILK</td>
</tr>
<tr>
<td>17</td>
<td>100149 SCREW MACH 6-32 X 1/4 FL U/H ST</td>
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<tr>
<td>18</td>
<td>018075 EXTRUSION TOP</td>
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<tr>
<td>19</td>
<td>101172 SCREW TC 6-32 X 1/4 PH FL UC</td>
</tr>
<tr>
<td>20</td>
<td>004500 TAPE FOAM 1/2 X 1/2</td>
</tr>
<tr>
<td>21</td>
<td>004039 BRACKET EXTRUSION</td>
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<tr>
<td>22</td>
<td>018015 END CAP 9</td>
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<tr>
<td>23</td>
<td>101042 SCREW TS 4-40 X 1/2 FILLISTER</td>
</tr>
<tr>
<td>24</td>
<td>017738 PLEXIFILTER</td>
</tr>
<tr>
<td>25</td>
<td>094017 TAPE FOAM 1/4 X 1/4</td>
</tr>
<tr>
<td>26</td>
<td>017851 PUSHBUTTON DISPLAY PLEXI</td>
</tr>
<tr>
<td>27</td>
<td>078050 PLEXIGLAS LOGO/TRIM/SURROUND</td>
</tr>
<tr>
<td>28</td>
<td>101054 SCREW TAPITITE 6-32 X 1/4 PH PN BLK</td>
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<tr>
<td>29</td>
<td>005163 TOP COVER</td>
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<tr>
<td>30</td>
<td>101078 SCREW TAPITITE 2-32 X 5/16 PH PN BLK</td>
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<tr>
<td>31</td>
<td>320143 MHT200 CONTROLLER SUBASSY</td>
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<tr>
<td>32</td>
<td>101109 SCREW TAPITITE 6-32 X 5/16 PH PN BLK</td>
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<tr>
<td>33</td>
<td>094443 SENSOR GASKET</td>
</tr>
<tr>
<td>34</td>
<td>017218 PCB STIFFENER</td>
</tr>
<tr>
<td>35</td>
<td>005078 REAR PANEL PLUG</td>
</tr>
</tbody>
</table>
In the event it is necessary to repack the unit for shipment, the unit must be packed exactly as shown below.

**IMPORTANT** - The four plastic feet must be attached to the bottom of the unit so they will locate in the four holes of the bottom pad. Two #10 x 2-1/4" screws and washers must be used to fasten the unit securely to the bottom pad and wood skid. Failure to do this will result in shipping damage.

If a shipping carton or any of the interior parts is needed, please call or write the Customer Service Department of McIntosh Laboratory. Order parts from the accompanying list by part number.

Use the original shipping carton and interior parts only if they are in good serviceable condition.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Part No.</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>033160</td>
<td>Slit scored wrap</td>
</tr>
<tr>
<td>1</td>
<td>034198</td>
<td>Inner carton top</td>
</tr>
<tr>
<td>1</td>
<td>033725</td>
<td>Top pad</td>
</tr>
<tr>
<td>4</td>
<td>017218</td>
<td>Plastic foot (unit)</td>
</tr>
<tr>
<td>1</td>
<td>033739</td>
<td>Poly bag</td>
</tr>
<tr>
<td>4</td>
<td>100159</td>
<td>#10-32 x 3/4&quot; Machine screw</td>
</tr>
<tr>
<td>4</td>
<td>104083</td>
<td>#10 x 7/16&quot; Flat washer</td>
</tr>
<tr>
<td>1</td>
<td>034197</td>
<td>Bottom pad</td>
</tr>
<tr>
<td>2</td>
<td>017218</td>
<td>Plastic foot (spacer)</td>
</tr>
<tr>
<td>1</td>
<td>034196</td>
<td>Shipping skid</td>
</tr>
<tr>
<td>2</td>
<td>101169</td>
<td>#10 x 2-1/4&quot; Wood screw</td>
</tr>
<tr>
<td>2</td>
<td>104033</td>
<td>#10 x 1-3/4&quot; Flat washer</td>
</tr>
<tr>
<td>2</td>
<td>034159</td>
<td>Foam end caps</td>
</tr>
<tr>
<td>1</td>
<td>034158</td>
<td>Shipping carton</td>
</tr>
<tr>
<td>1</td>
<td>034199</td>
<td>Inner carton bottom</td>
</tr>
</tbody>
</table>
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