McIntosh audio power ratings are in accordance with the Federal Trade Commission Regulation of November 4, 1974 concerning power output claims for amplifiers used in home entertainment products.

**STEREO POWER OUTPUT**
200 watts into 8 ohm loads or 300 watts into 4 ohm loads is the minimum sine wave continuous average power output per channel for 20 Hz to 20,000 Hz with both channels operating, which is:
- 40.0 volts RMS across 8 ohms
- 34.8 volts RMS across 4 ohms.

**MONO (BRIDGED) POWER OUTPUT**
600 watts into an 8 ohm load is the minimum sine wave continuous average power output from 20 Hz to 20,000 Hz, which is:
- 68.3 volts RMS across 8 ohms.

**OUTPUT LOAD IMPEDANCE**
- STEREO 4 ohms to 8 ohms
- MONO 8 ohms obtained by connecting across the output terminals of both channels.

**RATED POWER BAND**
20 Hz to 20,000 Hz

**TOTAL HARMONIC DISTORTION**
- **STEREO** 0.01% maximum harmonic distortion at any power level from 250 milliwatts to rated power from 20 Hz to 20,000 Hz with both channels operating.
- **MONO** 0.01% maximum harmonic distortion at any power level from 250 milliwatts to rated power from 20 Hz to 20,000 Hz.

**INTERMODULATION DISTORTION**
- **STEREO** 0.01% maximum at any power level from 250 milliwatts to rated power with both channels operating, for any combination of frequencies from 20 Hz to 20,000 Hz.
- **MONO** 0.01% maximum at any power level from 250 milliwatts to rated power, for any combination of frequencies from 20 Hz to 20,000 Hz.

**FREQUENCY RESPONSE (at one watt output)**
- +0.3 dB from 20 Hz to 20,000 Hz
- -0.1 dB from 10 Hz to 100,000 Hz

**HUM AND NOISE**
- 100 dB below rated output
- 90 dB IHF

**Ratings**
- **IHF DYNAMIC HEADROOM**
  - 2.1 dB at 4 ohm load
  - 1.7 dB at 8 ohm load
- **DAMPING FACTOR**
  - Greater than 100
- **INPUT IMPEDANCE**
  - 20,000 ohms
- **INPUT SENSITIVITY**
  - Switchable for either 1.4 volt or 2.5 volt
- **POWER REQUIREMENT**
  - 120 volts, 50/60 Hz, 0.6 to 15 amperes
Outside Views

Fig. 1. Top View

Fig. 2. Front View
General Notes

1. Unless otherwise noted, all voltages indicated on the following schematics are measured under the following conditions:
   a. AC input at 120 volts, 60Hz.
   b. All voltages are ±10% with respect to ground.
   c. High impedance (10 megohm) voltmeter must be used.
   d. Front panel controls set at:
      POWER: ON
   e. Rear panel controls set at:
      MODE: STEREO
      INPUT LEVEL: 2.5V

2. The voltages enclosed in a box (Sections 2 through 4) are signal voltages that are measured with a 2.5V, 1kHz signal connected to both channels of the INPUT jacks.

3. Unless otherwise specified:
   a. Resistor values are in ohms.
   b. Capacitor values smaller than 1 are microfarads (μF), and capacitor values greater than 1 are in picofarads (pF).
   c. Inductor values are in microhenries (μH).

4. Symbols used in this manual are in conformance with the book "Electrical and Electronics Graphic Symbols and Reference Designations" published by the IEEE. Some important symbols are described below:

- Plug disconnect (pin 2)
- Solder connection (pin 2)
- Section number reference.
- Wire connects to pin 18 of Section 4.
- PC board ground
- PC board ground (isolated connection)
- Chassis ground
Section Locations

Disassembly Instructions

TOP COVER. Remove the screws and lift off top. Make sure in reassembly that the 8 longer screws thread into the heatsinks.

BOTTOM COVER. Does not need to be removed for any section disassembly.

FRONT PANEL. Remove 2 screws from both the bottom and top covers. Remove 3 screws from each side and pull the front panel straight out, disconnecting 2 wire plugs.

SECTION 1

INPUT PC Board. Remove the top cover. Remove the heatsink blocking access to the PC board (see Section 2 & 3. Heatsink removal below). Remove 6 screws holding the PC board to the rear panel, then lift out, disconnecting 2 wire plugs and unsoldering 1 wire.

METER LIGHT PC Board. Remove the top cover and front panel. Remove 2 screws that hold the meter reflector to the subpanel. Remove 2 screws that hold the PC board to the reflector. Disconnect 1 wire plug.

PANEL LIGHT PC Board. Remove the front panel. Disconnect 2 remaining wire plugs from the PC board. Push against the PC board near the white snap-fasteners to unfasten, then lift out through the unit top.

SECTIONS 2 and 3

AMPLIFIER PC Board (LEFT OR RIGHT). Remove the top cover. Use a resistor to discharge the main storage capacitors C3 and C4 to chassis ground. Remove 2 screws holding the PC board bracket to the bottom. Disconnect 6 wire plugs and lift out.

HEATSINKS (ALL). Remove the top cover. Remove 2 screws holding the heatsink to the bottom cover. Disconnect 1 wire plug from both the junction and amplifier PC boards, then lift out heatsink assembly.

JUNCTION PC Board. Remove the top cover. Disconnect 4 wire plugs and unsolder 7 wires. Remove 2 screws holding the PC board to the main storage capacitors, then lift out.

SECTION 4

POWER SUPPLY/DISPLAY PC Board. Remove the top cover and the front panel. Disconnect 4 wire plugs and unsolder 3 wires. Push against the PC board near the white snap-fasteners to unfasten, then lift out.
Amplifier (Right Channel)
POWER SUPPLY/DISPLAY

PARTS LIST

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Part</th>
<th>Description</th>
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CAPACITORS (ELECT = Electrolytic)
- C001 080537 ELECT, 2.5μF, 50V
- C002 080535 ELECT, 220μF, 10V
- C003 080535 ELECT, 220μF, 10V
- C004 060235 ELECT, 47μF, 16V

DIODES (SIL = Signal, BRID = Bridge, ZN = Zener)
- *D001 070407 SIL, 7-9V, 10mA, BR1418
- *D002 070407 SIL, 7-9V, 10mA, BR1418
- *D003 070412 BRID, 200V, 1A, W159
- *D004 070407 SIL, 7-9V, 10mA, BR1418
- *D005 070407 SIL, 7-9V, 10mA, BR1418
- *D006 070407 SIL, 7-9V, 10mA, BR1418
- *D007 070407 SIL, 7-9V, 10mA, BR1418
- *D008 070407 SIL, 7-9V, 10mA, BR1418

LIGHTING DEVICES (INC = Incandescent)
- *S001 050802 INC, 6V, 7381
- *S002 050802 INC, 6V, 7381
- *S003 050801 INC, 14V, 7382
- *S004 050801 INC, 14V, 7382
- *S005 050801 INC, 14V, 7382

FUSES (FA = Fast Acting)
- FA01 080505. Fuse, Fa, 3A, 250V

RESISTORS (CF = Carbon Film)
- R001 14150F CF, 3.3kΩ, 1/4W
- R002 14150F CF, 13kΩ, 1/4W
- R003 14150F CF, 13kΩ, 1/4W
- R004 14150F CF, 13kΩ, 1/4W
- R005 14150F CF, 13kΩ, 1/4W

TRANSISTOR (NPN = NPN, DAR = Darlington, PNP = PNP, MPS = MPS)
- *Q001 132474 PNP, MPS-A14
- *Q002 132506 NPN, DAR, Selected MPS-A14

*Parts marked with an asterisk (*) are replacement parts stocked by our Service Department and must be ordered by part number. Parts not marked may be obtained from electronic parts suppliers.
Alignment

BIAS ADJUSTMENT
The heatsinks must be cool for proper setting. Remove the top cover and operate the amplifier with no input signal. Adjust the bias for 20 ± 2 millivolts at the test points as follows: Left Channel - Connect the probes of a DC millivolt meter, negative to TP1 and positive to TP2. Adjust R228 (bias adjust) on the Amplifier PC board. Right Channel - Connect the probes of a DC millivolt meter, negative to TP4 and positive to TP3. Adjust R328 (bias adjust) on the Amplifier PC board.

METER ADJUSTMENT
Remove the top cover and check meter zero settings with the AC power off. Remove the front panel and adjust meter zero settings, if necessary. Connect and operate the amplifier at exactly 200 watts into 8 ohm loads with a 1kHz input. Adjust R203 (Left) and R303 (Right) for 200 on the WATTS AT 8 OHMS scale.

Fig. 6. Alignment locations.
Circuit Operation

Component numbers quoted below are for the left channel circuit. The input signal passes through an input attenuator switched to 0dB or -5dB by the INPUT LEVEL switch. The signal passes on to the Amplifier PC board where it is amplified by a differential amplifier, Q206 and Q207. The other input of the differential amplifier is from the negative feedback network, R236 and R237. The current mirror Q208 and Q209, combines the differential signal to a single output to drive the cascade gain stage, Q210 and Q211. The diode trio D213, D214 and D215 set the base voltage for Q211. The output drivers then amplify the current from the collector of Q211 in a complimentary Darlington circuit made up of Q220, Q221, Q222 and Q223. The output stage is also a complimentary circuit with four output transistors of each half connected in parallel. The output from each heatsink assembly is combined on the Junction PC board and passes through choke L201 to the speaker output terminals.

MONO OPERATION

Mono bridged operation is selected by MODE switch S2 on the Input PC board. In the MONO position, the right channel amplifier operates normally, and the left channel input is disabled. The right channel output is connected to the left channel feedback network through R312 on the Left Amplifier PC board. The left channel inverts the input with a gain of one.

TURN-ON DISPLAY

The bias of the entire amplifier is switched on after a time delay of about one second. The time delay is generated on the Power Supply PC board. D401, Q402 and C401 develop a negative voltage from the 11.6 volt AC winding on the power transformer T1. This negative voltage slowly charges C404 through R402 to -1.2 volts where transistor Q401 conducts. Current from the collector of Q401 flows to the base of Q214 on the Amplifier PC board, which supplies -80 volts to the amplifier bias system.

AMPLIFIER BIAS and MUTING

The bias of the entire amplifier is switched by the turn-on delay system through Q214 which turns on the -80 volt current. The differential amplifier stage is regulated from -80 to -18 volts by Zener D812. This -18 volts also biases the gate of the output muting FET (Q208) to cut off, allowing the input signal to pass on the base of Q206. A 6 milliamperes current source (Q215 and Q213) is also supplied by the switched -80 volts.

OUTPUT STAGE IDLE CURRENT

The power output stage bias is set by components that sense the temperature at various points to keep the idle current constant regardless of heatsink temperature. Q212 senses the temperature of driver transistors Q221 and Q222. D216 senses the temperature of predriver Q220 and Q223. The output heatsink temperature is sensed by Q224, and the temperature of R261 is measured by D221.

OUTPUT TRANSISTOR PROTECTION

The output transistors are protected against excessive dissipation by current limiters Q216, Q217, Q218 and Q219. The output current is sensed by measuring the voltage across R261 and R262. The current limit level is dynamically varied in response to the collector to emitter voltage. If the collector to emitter voltage is lowered, more current is allowed to the output terminals.

LOUDSPEAKER PROTECTION

The loudspeakers are protected against amplifier failure by a Crowbar circuit which triggers if there is more than 15 volts DC at the output terminals. The AC component of the output signal is removed by filter R288 and C229. Q233, Q234 and Q235 detect the presence of DC at either polarity of C229. They are connected so they latch ON if an error is detected. The emitter of Q233 triggers the gate of SCR Q236. The SCR can conduct 400 amps, which effectively shorts the secondary of the power transformer T1. This will blow the 15A primary fuse F1.

TEMPERATURE PROTECTION

The negative heatsinks contain thermal switches that open if the temperature reaches 200°F. As the switch opens, the -80 volts is removed from the driver PC board which stops bias to the entire channel as described in the bias section during turn-on delay. When the -80 volts is off, the -40 volts at pin 5 of the Power Supply PC board falls to -5 volts. This causes the Temp Lamp Driver Q402 to conduct, lighting the TEMP lamp to indicate the thermal switch has tripped. Q402 conducts if either channel overheats, but the bias of each channel is independently disabled by a thermal switch.

POWER GUARD

The amplifier input and feedback signals are fed respectively into the noninverting and inverting inputs of the POWER GUARD amplifier/compandor IC202. The output (distortion) is rectified by a bridge rectifier, D209, D210, D211 and the base-emitter junction of Q203. The rectified AC is filtered by C209 and fed to the LED section of LDR201. The LED illuminates if distortion is present, causing reduced resistance in the light-dependent resistor section, LDR201 and R211 form a voltage divider which attenuates the amplifier input signal. Q203 and Q204 amplify the rectified distortion sufficiently to light the POWER GUARD lamp, DS403 on the Power Supply PC board.
METERS
The speaker output flows through R210 to diodes D207 and D208, which convert the linear input to logarithmic curves to expand the meter dynamic range (50dB). D205 and D206 are steering diodes for the rectifier IC201. Positive signals are routed to the positive input, and negative signals to the negative input. The output of IC201 is therefore positive for either polarity of signal voltage, performing full-wave rectification. The rectified voltage flows through D201 and charges capacitor C201.

SHORT-TIME HOLD. The output of IC201 also charges C202 through D203. When the signal is reduced, C202 discharges through R201 until its voltage is low enough that D202 conducts. Unless D202 is conducting, there is no discharge path for C201, so it keeps its charge, holding the peak for about 300 milliseconds until D202 conducts to discharge it.

DC AMP and FEEDBACK. Q201 and Q202 boost the current from the rectifier circuit to drive the meter M1. The sensitivity (and calibration) of the meter drive circuit is set by a negative feedback loop, consisting of R203, R204 and R206.

POWER SUPPLY
The primary voltage to the power transformer T1 is switched by relay K1. Its 110 volt DC coil is powered by a DC supply, D2 and C5, and switched by the pushbutton POWER switch. Low voltage DC source and indicator lamps (power supply PC board), and all panel lamps are powered by the 11.6 volt secondary of T1. This winding, floating to chassis ground, is full-wave rectified by D403 and filtered by C402 and C403. The DC ground reference is set by R403 and Zener D405. The low voltage DC negative output is regulated to −6 volts by D405, and the +8 volts is unregulated.