

# McIntosh

## C 28

*PREAMPLIFIER*



## SERVICE INFORMATION

STARTING WITH SERIAL NO. 91X50

McINTOSH LABORATORY INC. 2 CHAMBERS STREET BINGHAMTON, NEW YORK

## ELECTRICAL SPECIFICATIONS

## FREQUENCY RESPONSE

+0 to 0.5 dB from 20 Hz to 20,000 Hz.

## DISTORTION

Less than 0.1% at each output at rated output level, 20 Hz to 20,000 Hz.

## INPUT SENSITIVITY AND IMPEDANCE

Phono 1 and Phono 2  
2 millivolts at 47k ohms (1,000 Hz)

Aux, Tuner, Tape 1 and Tape 2  
0.25 volts at 250k ohms

Microphone  
2.5 millivolts at 500k ohms

Tape Head  
2 millivolts at 500k ohms (500 Hz)

## HUM AND NOISE

Aux, Tuner, Tape 1 and Tape 2  
90 dB below rated output

Phono 1, Phono 2 and Tape Head  
78 dB below 10 millivolt input, equivalent to less than 1.2 microvolts at the input terminals.

Microphone  
Less than 1.5 microvolts at the input terminals.

## OUTPUT LEVEL AND IMPEDANCE

Main Output  
2.5 volts with rated input, less than 100 ohms source impedance, to operate into 47k ohm or greater load.

Tape Output  
0.25 volts with rated input, less than 150 ohm source impedance, to operate into 47k ohm or greater load.

Headphone/Line Output  
0.75 volts into 8 ohm load or 3.0 volts into 600 ohm line, less than 0.2 ohms source impedance. Level controls provided.

Center Channel  
0.7 volts with rated input to both channels. Level control provided.

## BASS CONTROL

+  
±20 dB at 20 Hz.

## TREBLE CONTROL

±18 dB at 20,000 Hz.

## L.F. FILTER

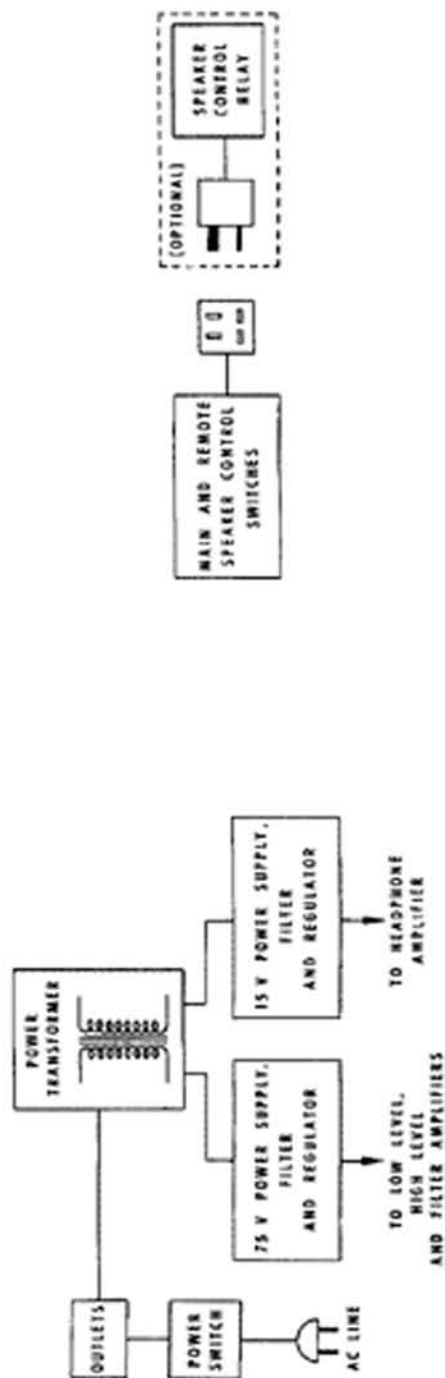
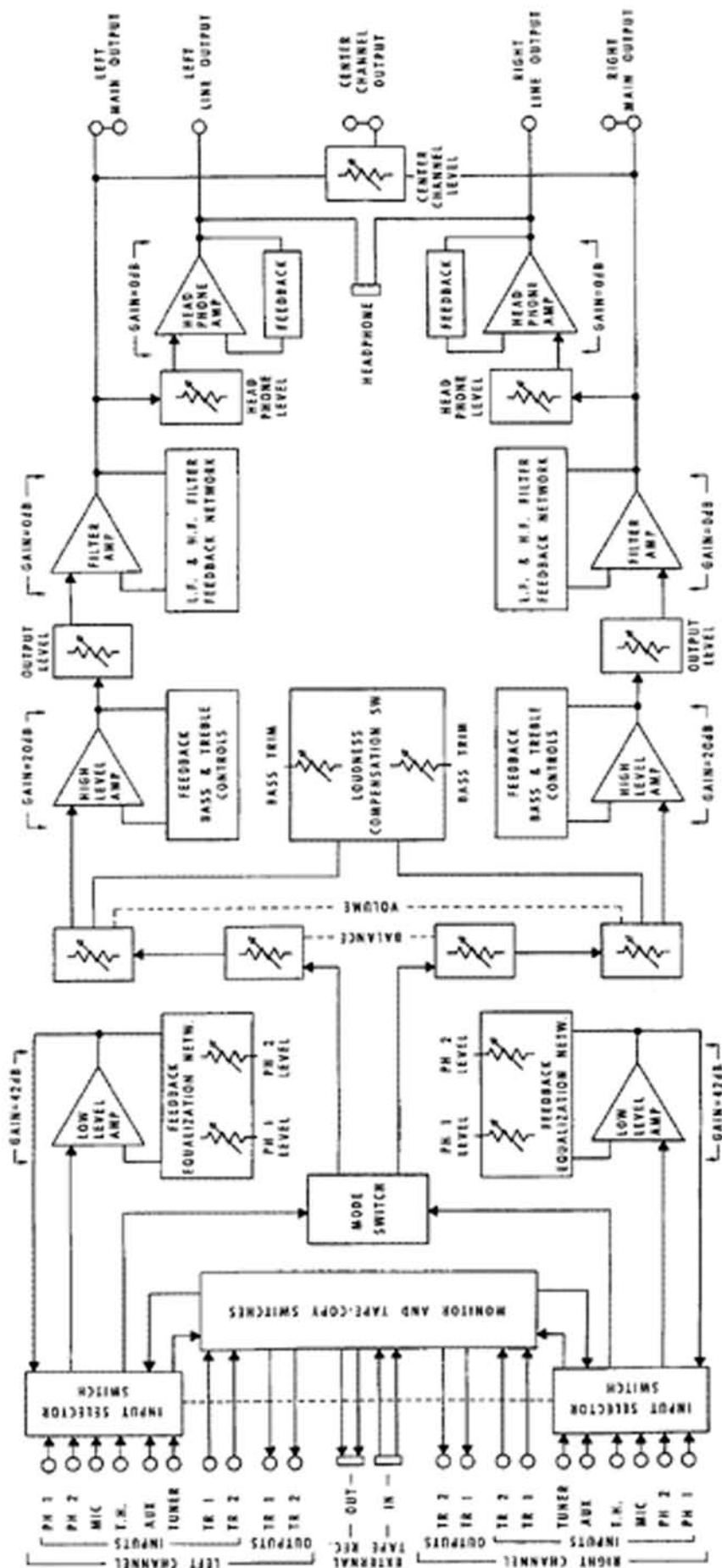
Flat or roll off below 50 Hz, active filter 12 dB/octave down 18 dB at 20 Hz.

## H.F. FILTER

Flat or roll off above 7,000 Hz, active filter 12 dB/octave down 20 dB at 20,000 Hz.

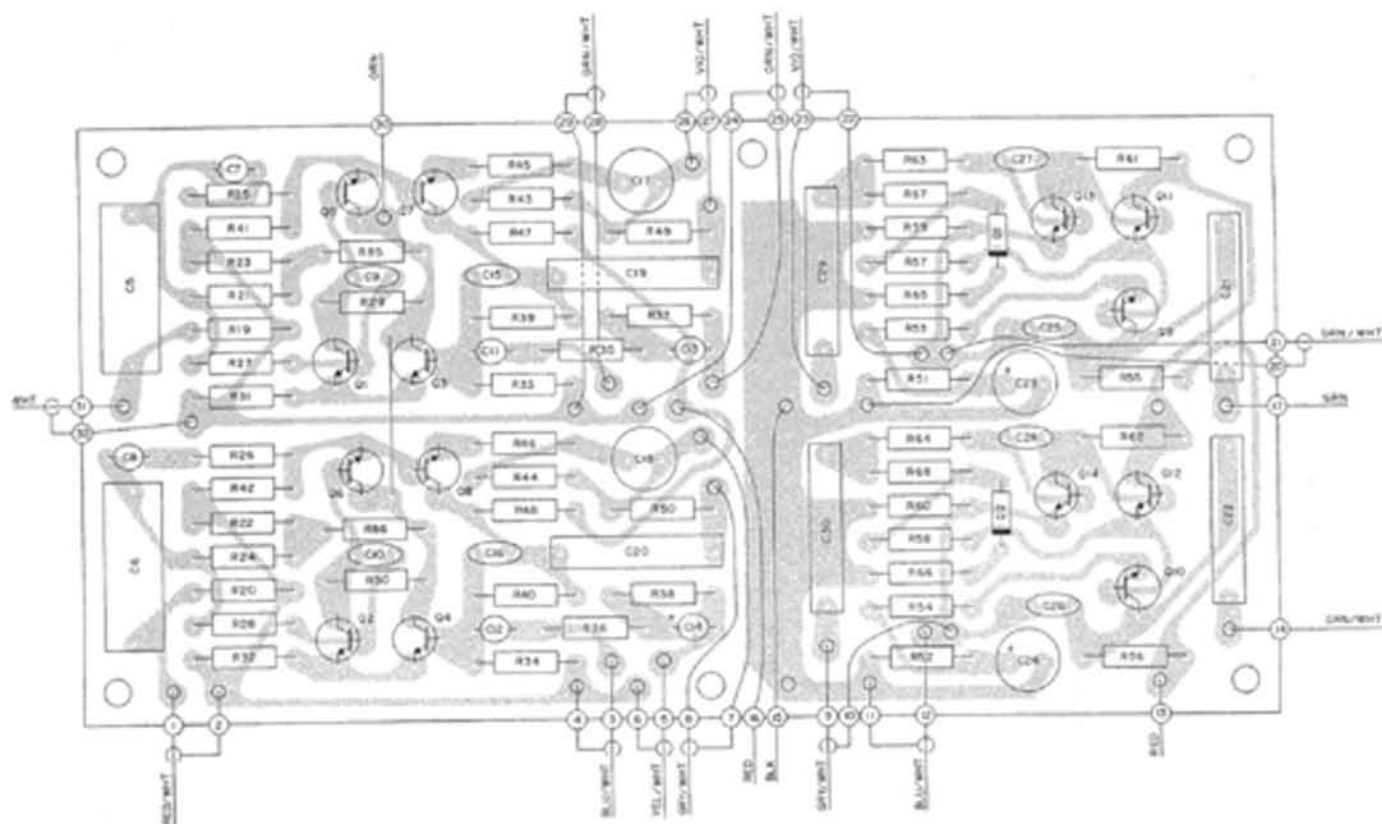
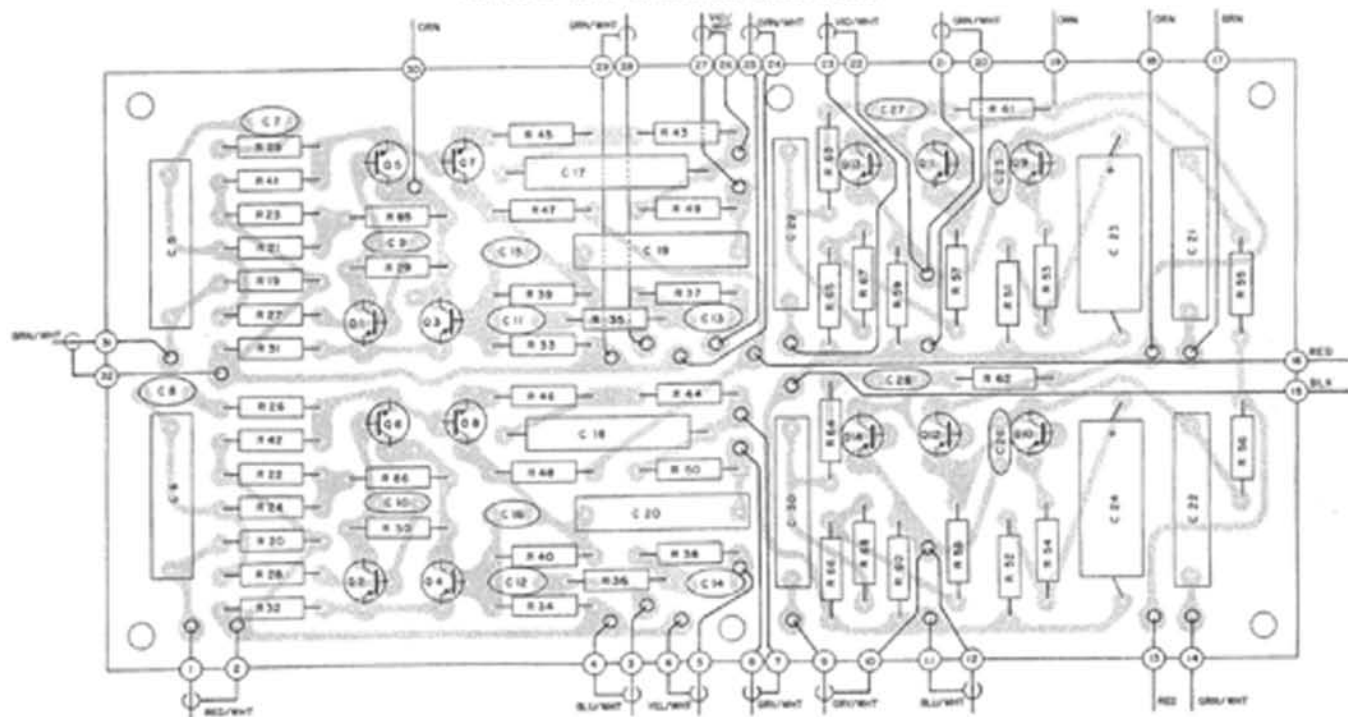
## POWER REQUIREMENT

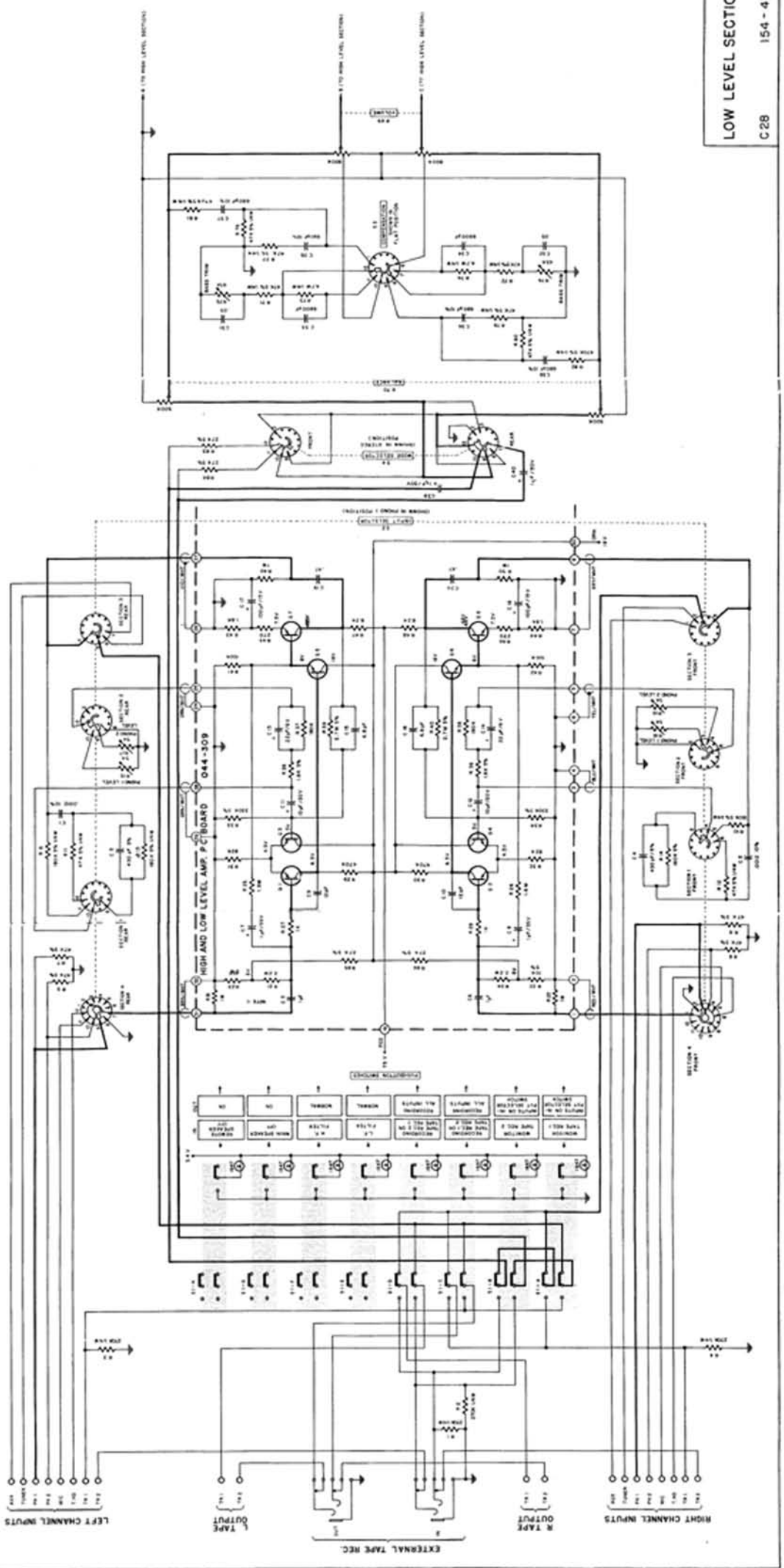
117 volts, 50/60 Hz, 45 watts.



C 28 BLOCK DIAGRAM

## HIGH 8 LOW LEVEL PC BOARD 044-309

HIGH 8 LOW LEVEL PRINTED CIRCUIT BOARD  
FOR UNITS WITH SERIAL NOS. BELOW 30X00



## SCHEMATIC NOTES

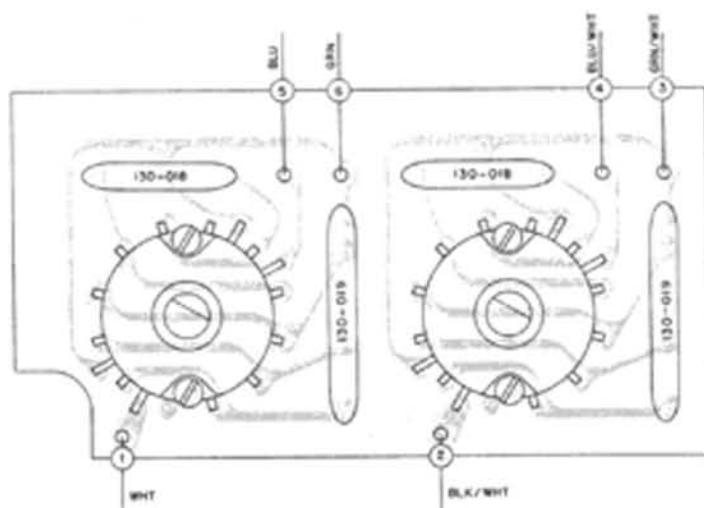
1. Unless otherwise specified: Resistance values are in ohms, 1/2 watt, and 10% tolerance; capacitance values smaller than 1 are in microfarads ( $\mu\text{F}$ ); capacitance values greater than 1 are in picofarads (pF); inductors are in microhenries ( $\mu\text{H}$ ).
2. Printed circuit board components are outlined on the schematics by dotted lines. The circled numbers around the dotted lines correspond to the numbers on the PC Board layouts.
3. The heavy lines on the schematics denote the primary signal path.
4. The terminal numbering of rotary switches is for reference only.
5. All voltages indicated on the schematics are measured under the following conditions:
  - a. Use of an 11 megohm input impedance VTVM.
  - b. All voltages  $\pm 10\%$  with respect to chassis ground.
  - c. No signal at input terminals.
  - d. AC input at 117 volts, 50/60 Hz.
  - e. Front panel controls at:

|                |                                     |
|----------------|-------------------------------------|
| Volume         | Fully CCW, but with power switch on |
| Mode           | Stereo                              |
| Input selector | Phono 1                             |
| Loudness       | Flat                                |

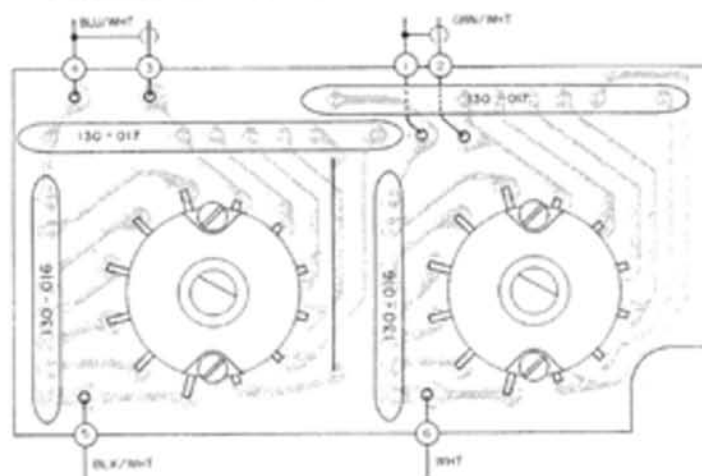
All other controls at normal positions.



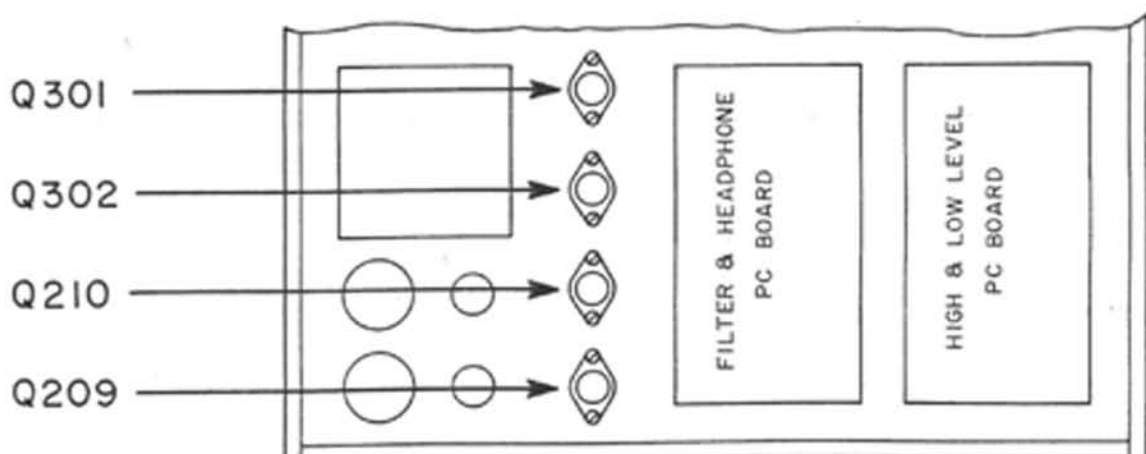
BASS PRINTED CIRCUIT BOARD 044-066



TREBLE PRINTED CIRCUIT BOARD 044-065



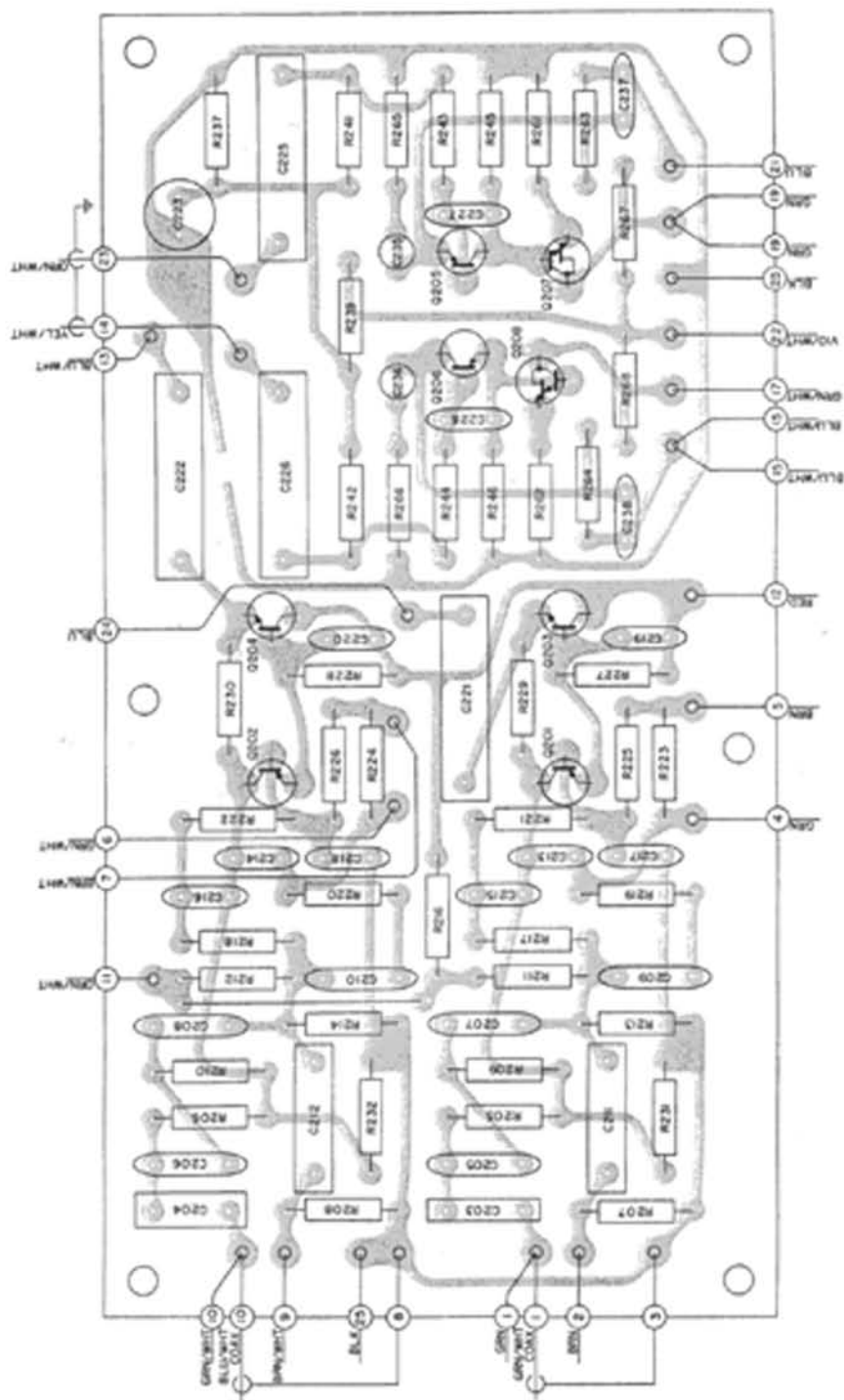
TOP VIEW



REAR OF UNIT

LOCATION OF TRANSISTORS NOT ON PRINTED CIRCUIT BOARDS

FILTER &amp; HEADPHONE PRINTED CIRCUIT BOARD 044-509







## REPLACEMENT PARTS

All parts not listed are common items obtainable from radio parts jobbers.

Replacement parts may be obtained when ordered by PART NUMBER from:

McIntosh Laboratory, Inc.  
Customer Service Department  
2 Chambers Street  
Binghamton, New York 13903  
(telephone 607-723-3512)

## CAPACITORS

| Symbol Number | Description                               | Part Number |
|---------------|---|-------------|
| C5,6          | Mylar 1 $\mu$ F 250V                      | 064-088     |
| C7,8          | Elect. 1 $\mu$ F 35V                      | 066-147     |
| C11,12        | Elect. 10 $\mu$ F 20V                     | 066-149     |
| C13,14        | Elect. 22 $\mu$ F 6V                      | 066-151     |
| C17,18        | Elect. 100 $\mu$ F 16V                    | 066-177     |
| C19,20        | Mylar .47 $\mu$ F 250V                    | 064-069     |
| C21,22        | Mylar .47 $\mu$ F 250V                    | 064-069     |
| C23,24        | Elect. 100 $\mu$ F 16V                    | 066-177     |
| C29,30        | Mylar .47 $\mu$ F 250V                    | 064-069     |
| C201,202      | Elect. 1 $\mu$ F 35V                      | 066-147     |
| C203,204      | Mylar .047 $\mu$ F 250V                   | 064-085     |
| C205,206      | Mylar .01 $\mu$ F 250V                    | 064-040     |
| C207,208      | Mylar .01 $\mu$ F 250V                    | 064-040     |
| C209,210      | Mylar .01 $\mu$ F 250V                    | 064-040     |
| C211,212      | Mylar .22 $\mu$ F 250V                    | 064-068     |
| C221,222      | Mylar 1 $\mu$ F 250V                      | 064-088     |
| C223          | Elect. 100 $\mu$ F 16V                    | 066-177     |
| C225,226      | Mylar 1 $\mu$ F 250V                      | 064-088     |
| C231,232      | Elect. 3000 $\mu$ F 20V                   | 066-130     |
| C301          | Elect. 50/2000/2000 $\mu$ F<br>200/25/20V | 066-132     |
| C302          | Elect. 500/200/50 $\mu$ F<br>150/80/80V   | 066-131     |
| C303          | Mylar 1 $\mu$ F 250V                      | 064-104     |
| C304          | Mylar .22 $\mu$ F 250V                    | 064-043     |
| C305          | Elect. 100 $\mu$ F 40V                    | 066-206     |
| C308          | Elect. 640 $\mu$ F 25V                    | 066-135     |
| DIODES        |   |             |
| D1,2          | Si. Signal Diode                          | 070-047     |
| D301          | Full Wave Bridge 400V                     | 070-044     |
| D302          | Full Wave Bridge 50V                      | 070-045     |
| D303          | Si. Rectifier                             | 070-031     |
| D304          | Zener Diode 75V                           | 070-025     |
| D305          | Bias Diode                                | 070-046     |

F301 Fuse, 1 ampere 089-002

## TRANSISTORS

|          |                    |         |
|----------|--------------------|---------|
| Q1,2     | Si. NPN transistor | 132-105 |
| Q3,4     | Si. NPN transistor | 132-093 |
| Q5,6     | Si. NPN transistor | 132-093 |
| Q7,8     | Si. NPN transistor | 132-095 |
| Q9,10    | Si. NPN transistor | 132-095 |
| Q11,12   | NPN transistor     | 132-092 |
| Q13,14   | Si. NPN transistor | 132-105 |
| Q201,202 | Si. PNP transistor | 132-096 |
| Q203,204 | Si. NPN transistor | 132-095 |
| Q205,206 | Si. PNP transistor | 132-096 |
| Q207,208 | Si. NPN transistor | 132-090 |
| Q209,210 | Si. NPN transistor | 132-106 |
| Q301     | Si. NPN transistor | 132-028 |
| Q302     | Si. NPN transistor | 132-106 |

## POTENTIOMETERS

|          |                         |         |
|----------|-------------------------|---------|
| R15,16   | Phono level control     | 134-219 |
| R17,18   | Phono level control     | 134-219 |
| R69      | Volume control          | 134-210 |
| R70      | Balance control         | 134-209 |
| R75,76   | Bass trim control       | 134-186 |
| R201,202 | Output level control    | 134-186 |
| R233,234 | Headphone level control | 134-186 |
| R259     | Center channel level    | 134-186 |

## RESISTORS

|          |                             |         |
|----------|-----------------------------|---------|
| R251,252 | Wirewound 15 $\Omega$ 5% 7W | 139-073 |
| R301     | Wirewound 1.5k 5% 5W        | 139-074 |

## SWITCHES

|          |                       |         |
|----------|-----------------------|---------|
| S1       | Pushbutton switch     | 150-005 |
| S2       | Input selector switch | 146-131 |
| S4       | Mode selector switch  | 146-134 |
| S101,102 | Treble control switch | 146-133 |
| S103,104 | Bass control switch   | 146-132 |
| S302     | Power amp. switch     | 148-028 |

## TRANSFORMERS

|      |                   |         |
|------|-------------------|---------|
| T301 | Power transformer | 044-062 |
|------|-------------------|---------|

## MODULES

|  |                       |         |
|--|-----------------------|---------|
|  | Tone control (treble) | 130-016 |
|--|-----------------------|---------|

|                          |         |
|--------------------------|---------|
| Tone control (treble)    | 130-017 |
| Tone control (bass)      | 130-018 |
| Tone control (bass)      | 130-019 |
| LAMPS                    |         |
| #1866 (Front Panel)      | 058-014 |
| #1847 (Pushbutton Lamps) | 058-008 |
| Indicator Lamp           | 058-041 |
| FRONT PANEL & TRIM       |         |
| Front panel              | 044-067 |
| Front panel end caps     | 018-120 |
| Volume control knob      | 044-372 |
| Mode selector knob       | 044-372 |
| Input selector knob      | 044-372 |
| Left bass knob           | 044-371 |
| Right bass knob          | 044-371 |
| Left treble knob         | 044-371 |
| Right treble knob        | 044-371 |
| Balance knob             | 090-100 |
| Comp. knob               | 044-375 |
| Pushbutton               | 017-128 |
| Bass trim knob           | 090-010 |
| Phono level knob         | 090-010 |
| Headphone level knob     | 090-010 |
| Output level knob        | 090-010 |
| Center channel knob      | 090-010 |
| MOUNTING SYSTEM          |         |
| Shelf Bracket (right)    | 043-622 |
| Shelf Bracket (left)     | 043-623 |
| Mounting Template #100   | 038-179 |
| Hardware Package         | 043-792 |
| MISCELLANEOUS ITEMS      |         |
| Line Cord                | 170-021 |
| Fuseholder               | 178-001 |
| Shipping carton          | 044-082 |
| Plastic feet             | 017-041 |
| Shorting plug            | 127-001 |
| Audio cable (6')         | 170-015 |
| Owners manual            | 038-628 |

REPLACEMENT PARTS  
FOR SCR 1

|      |                       |         |
|------|-----------------------|---------|
| K1,2 | Relay 3PST            | 087-011 |
|      | Terminal Block        | 074-003 |
|      | Interconnecting Cable | 170-062 |

REPLACEMENT PARTS  
FOR SCR 2

|      |                       |         |
|------|-----------------------|---------|
| K1,2 | Relay 3PST            | 087-011 |
| K3   | Relay 5PST            | 087-009 |
|      | Terminal Block        | 074-003 |
|      | AC Power Cord         | 170-081 |
|      | Interconnecting Cable | 170-067 |

30C102557-M3756-1