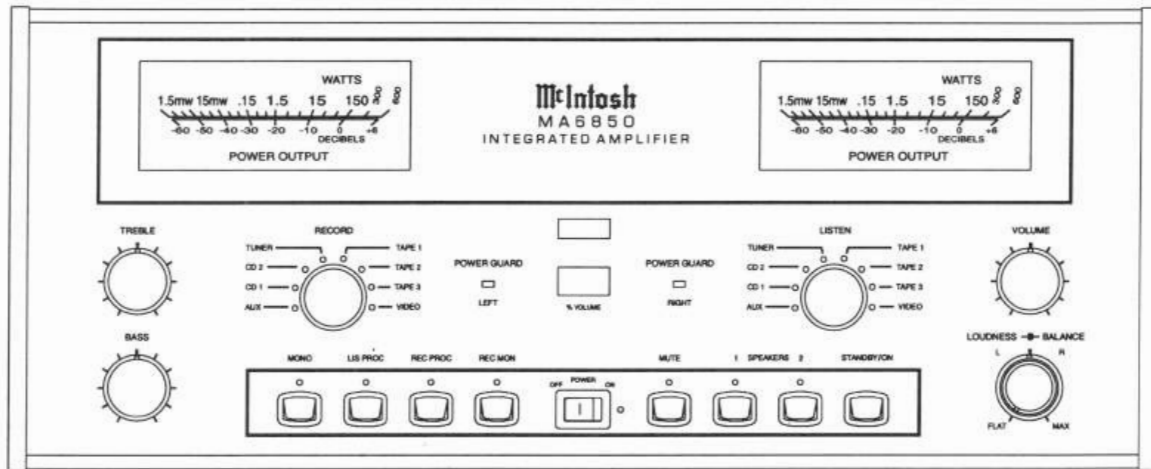


MA6850

INTEGRATED AMPLIFIER



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McIntosh

SERVICE MANUAL

Performance Specifications

POWER OUTPUT, STEREO

150 watts minimum sine wave continuous average power output per channel, both channels operating, into 2 ohms, 4 ohms or 8 ohm load impedance.

OUTPUT LOAD IMPEDANCES

2 ohms, 4 ohms and 8 ohms. Separate terminals are provided for each impedance output.

RATED POWER BAND

20Hz to 20,000Hz

TOTAL HARMONIC DISTORTION

0.005% maximum harmonic distortion at any power level from 250 milliwatts to 150 watts per channel from 20Hz to 20,000Hz, both channels operating.

INTERMODULATION DISTORTION

0.005% maximum if instantaneous peak power output is 300 watts or less per channel with both channels operating for any combination of frequencies from 20Hz to 20,000Hz.

FREQUENCY RESPONSE

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

HUM AND NOISE, (A WEIGHTED)

(Power Amplifier): 110dB below rated output. (Pre-amplifier)

High Level: 100dB below rated output, (91dB IHF)

IHF DYNAMIC HEADROOM

1.8dB

DAMPING FACTOR

Greater than 40

POWER GUARD

Clipping is prevented and THD does not exceed 2% with up to 14dB overdrive at 1000Hz.

INPUT IMPEDANCE

High Level: 22K ohms

PW AMP IN: 20,000 ohms

INPUT SENSITIVITY

High Level: 250mV for 150 watts output, (50mV IHF)

(1.4V at PREAMP OUT)

Power Amplifier at PW AMP IN: 1.4V for 150 watts output.

MAXIMUM INPUT SIGNAL

High Level: 10V

TONE CONTROLS

Bass and Treble variable, 12dB boost at 12dB cut

POWER REQUIREMENT

120V, 50/60Hz, 6.5 amperes UL/CSA

DIMENSIONS

17-1/2 inches (44.5cm) wide, by 7-1/16 inches high, by 20 inches (50.8cm) depth, (Includes clearance from connectors). Knob clearance required in front of mounting panel, 1-1/8 inches (2.9cm)

WEIGHT


70 pounds (31.8Kg) net, 89 pounds (40.4Kg) shipping.

Notes

1. The heavy lines on the schematics 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 $\pm 10\%$ with respect to ground. A high impedance (10 megohm) voltmeter must be used.
3. Unless otherwise specified:
 - a. Resistor values are in ohms.
 - b. Capacitor values are in microfarads (μF).
 - c. Inductor values are in microhenries (μH).
4. The voltages enclosed in a box are signal voltages that are measured with a 2.5mV, 1kHz signal connected to both channels at the PHONO input jacks.

Front panel controls are set at:

BALANCE CENTER DETENT
TREBLE/BASS CENTER DETENT
INPUT SELECTORS PHONO/AUX
LOUDNESS FLAT
MODE STEREO
POWER ON
VOLUME CLOCKWISE

5. On PC Board Drawings, Square Pad Indicates:
 - a. Polarized Capacitors - Positive
 - b. Diode - Cathode
 - c. Others - Pin 1
6. **WARNING:**
Parts marked with the symbol  have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.

Rear Panel

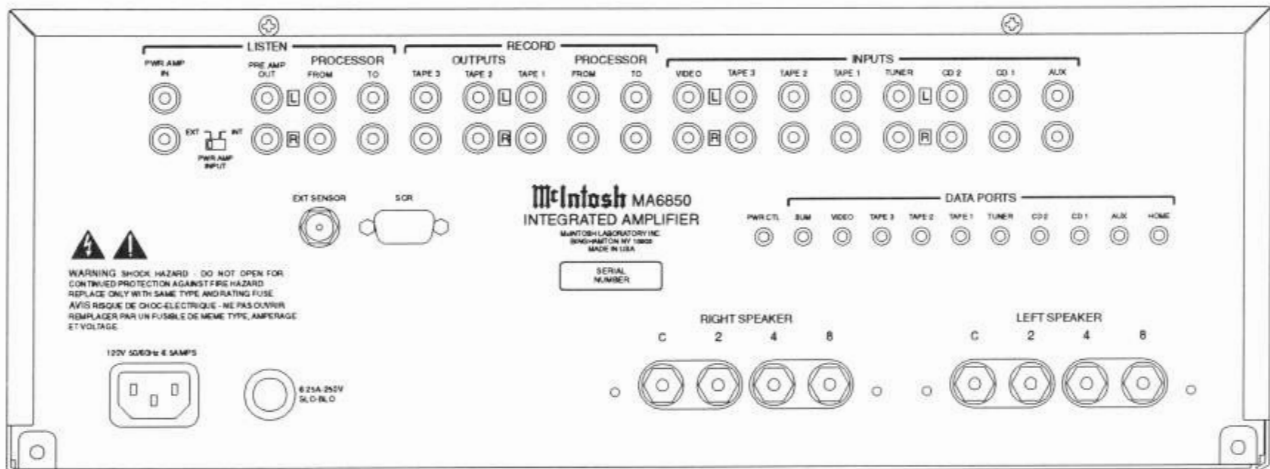


Fig. 1 Rear view

FRONT PANEL and TRIM PARTS LIST

| Part | Description |
|----------------|-------------------------------|
| 018489 | Top Panel Rail (Extrusion) |
| 048446 | Bottom Panel Rail (Extrusion) |
| 018345 | End Caps |
| 6800-FRNTPANEL | FRONT PANEL Complete |
| 090217 | Loudness Knob (Front) |
| 090215 | Treble/Bass/Volume Knob |
| 090187 | Balance Knob (Rear) |
| 090225 | Record/Listen Knob |
| 104017 | Knob Felt Washer, 3/4" Dia |

Section Locations

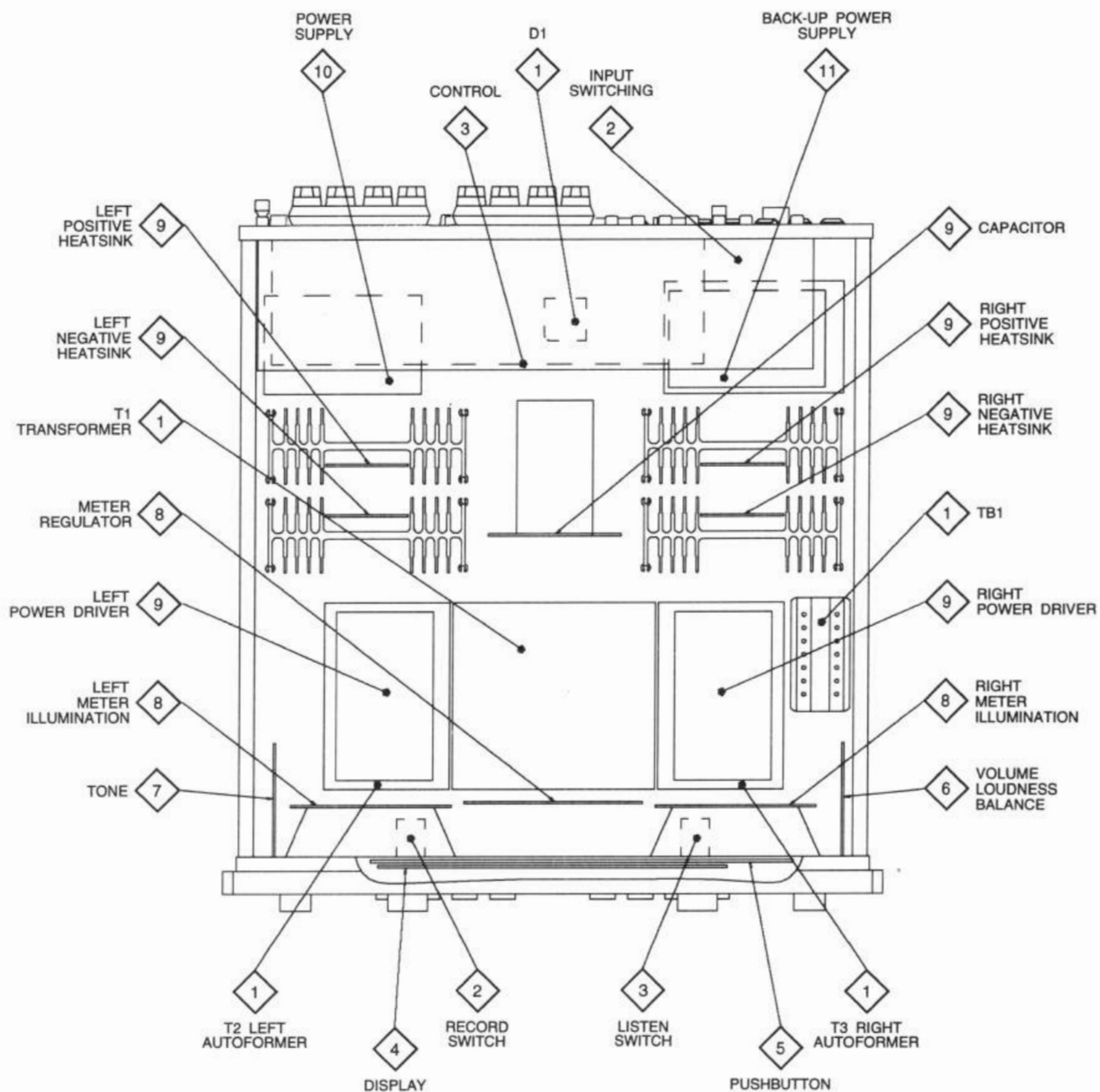


Fig. 2 Top view with cover removed

Interconnection Diagram 1

WARNING: Parts located in the below shaded areas have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.

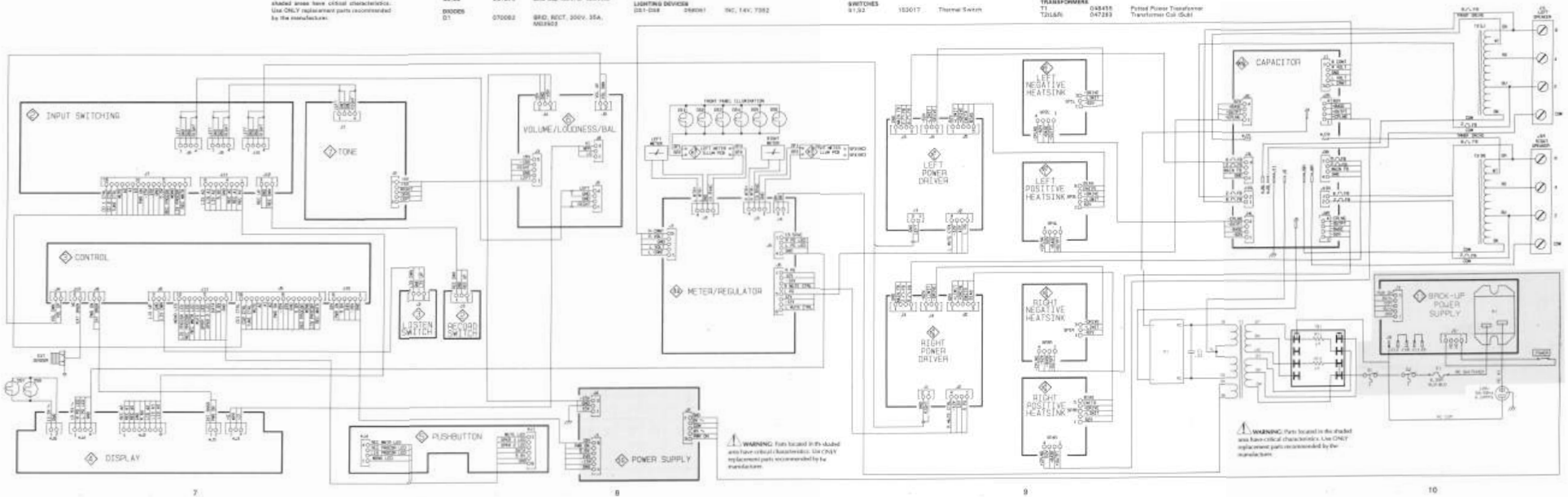
INTERCONNECTION PARTS LIST

| Symbol | Part | Description |
|-------------------|--------|------------------------------|
| CAPACITORS | | |
| C1 | DE3005 | Capacitor Assy |
| C2,C3 | 061276 | Dist Cap. 0047 uF 400VAC |
| DIODES | | |
| D1 | 070082 | BRD. RECT. 200V. 35A. M50352 |

| | | |
|-------------------------|--------|---------------------|
| FUSES | | |
| F1 | 089001 | Fuse 6.25A 250V 5.0 |
| LIGHTING DEVICES | | |
| LD1,LD2 | 218061 | INC. LAMP 75W2 |

| | | |
|-----------------|--------|----------------|
| METERS | | |
| M1,M2 | 124052 | Meter |
| SWITCHES | | |
| S1,S2 | 103017 | Thermal Switch |

| | | |
|---------------------|--------|-------------------------|
| THERMISTORS | | |
| RT1,RT2 | 144151 | Thermistor, 5 ohm |
| TRANSFORMERS | | |
| T1 | 038435 | Power Power Transformer |
| T2 | 047283 | Transformer Cir. 5-81 |



7

8

9

10

WARNING: Parts located in the shaded areas have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.

WARNING: Parts located in the shaded areas have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.



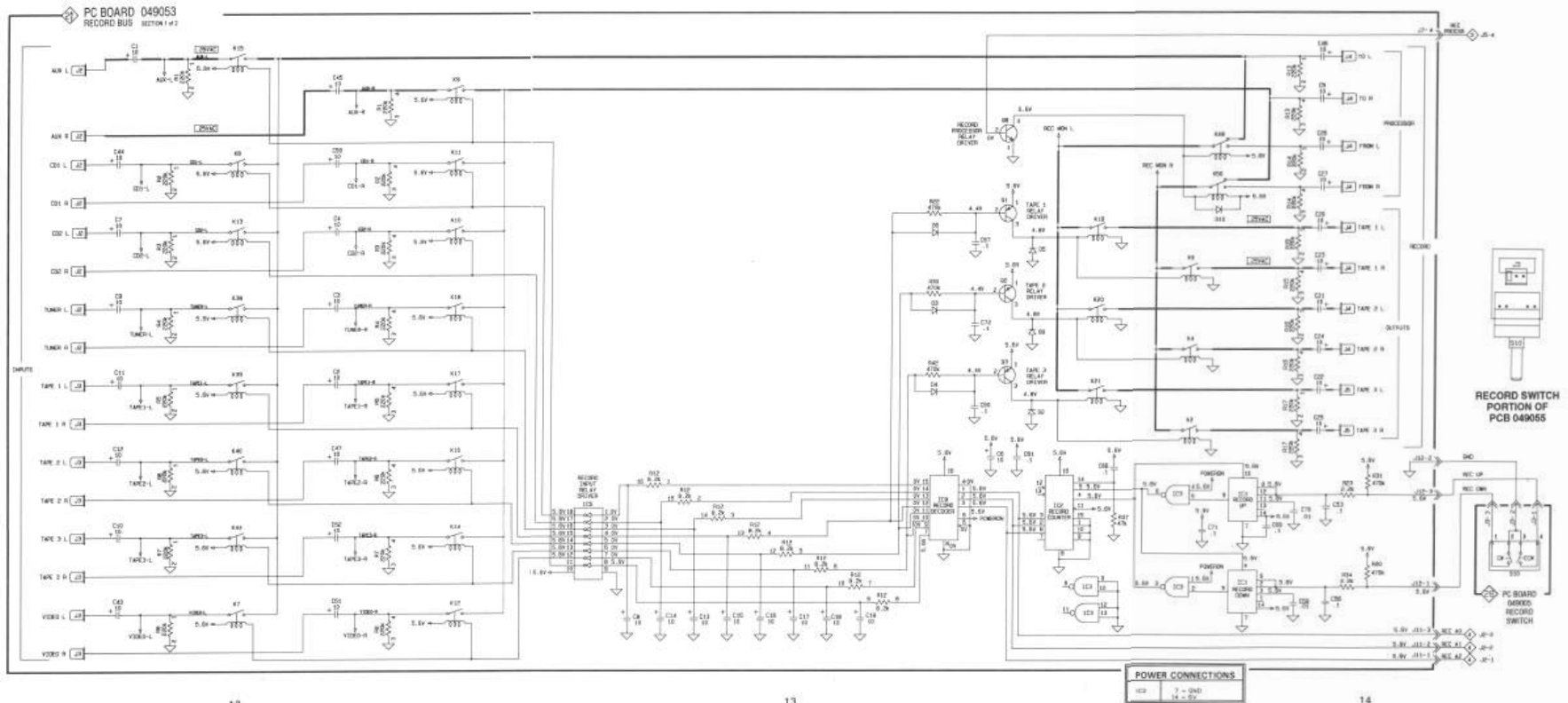
Input Switching & Record Switching

INPUT SWITCHING PARTS LIST

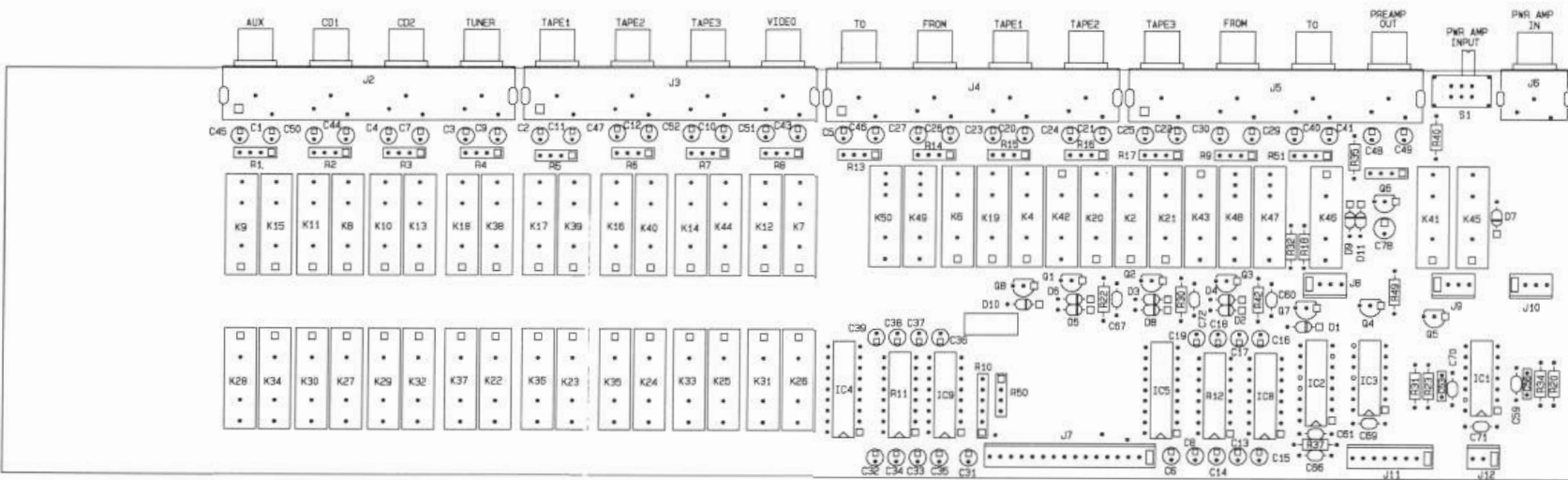
| <i>Symbol</i> | <i>Part</i> | <i>Description</i> |
|----------------------------|-------------|--|
| DIODES | | |
| D1-D11 | 070047 | SIG, 75V, 150mA, 1N4148 |
| INTEGRATED CIRCUITS | | |
| IC1-IC5 | 133116 | CMOS, Dual Timer, NE556N |
| IC2 | 133171 | CMOS, Binary UP/DOWN Counter, 74HC193N |
| IC3 | 133161 | CMOS, Quad 2-Input NAND Gate, 74HC00N |
| IC4,IC5 | 133169 | Octal Darlington Transistor Array, ULN2801 |
| IC8,IC9 | 133170 | 3 to 8 Line Decoder, Latch, 74HC237N |
| RELAYS | | |
| K2,K4,K6-K46 | 087050 | SPST, 5VDC, Reed, HE3321A0400 |
| K47-K50 | 087056 | Form 1C, 5VDC, Reed, HE3321C0500 |
| SWITCHES | | |
| S1 | 148059 | Slide Switch DPDT |
| TRANSISTORS | | |
| Q1-Q3 | 132182 | PNP, DAR, MPSA64 |
| Q4,Q5,Q7,Q8 | 132223 | NPN, MPS4124 |
| Q6 | 132090 | NPN, DAR, MPSA25 |

RECORD SWITCH PARTS LIST

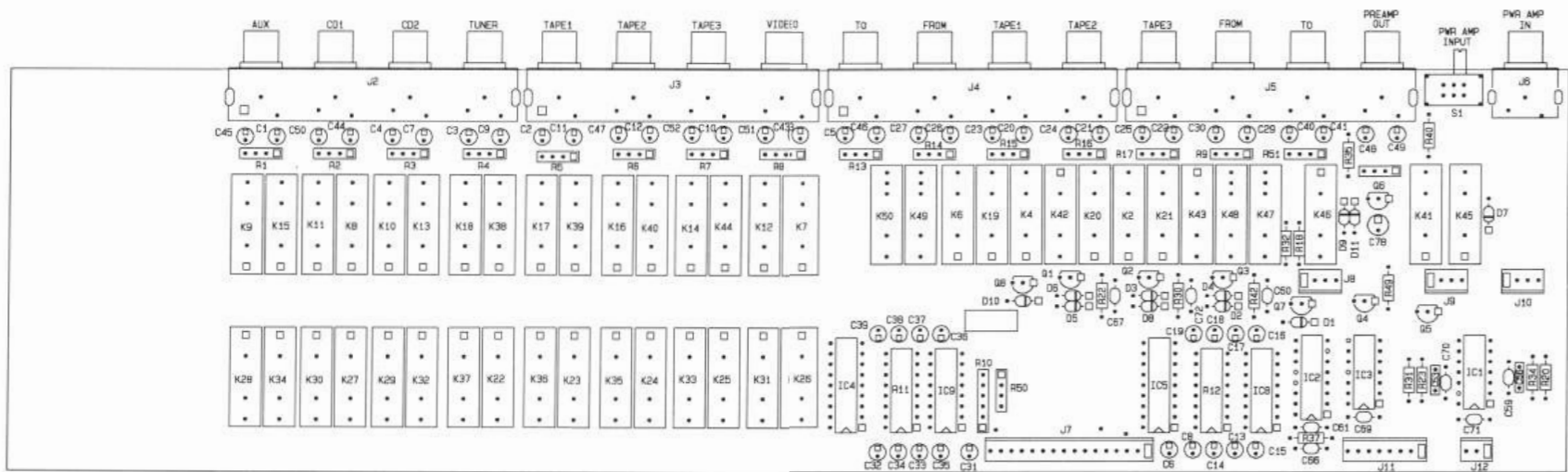
| <i>Symbol</i> | <i>Part</i> | <i>Description</i> |
|-----------------|-------------|-----------------------|
| SWITCHES | | |
| S10 | 146249 | Input Selector Switch |



Input Switching 2

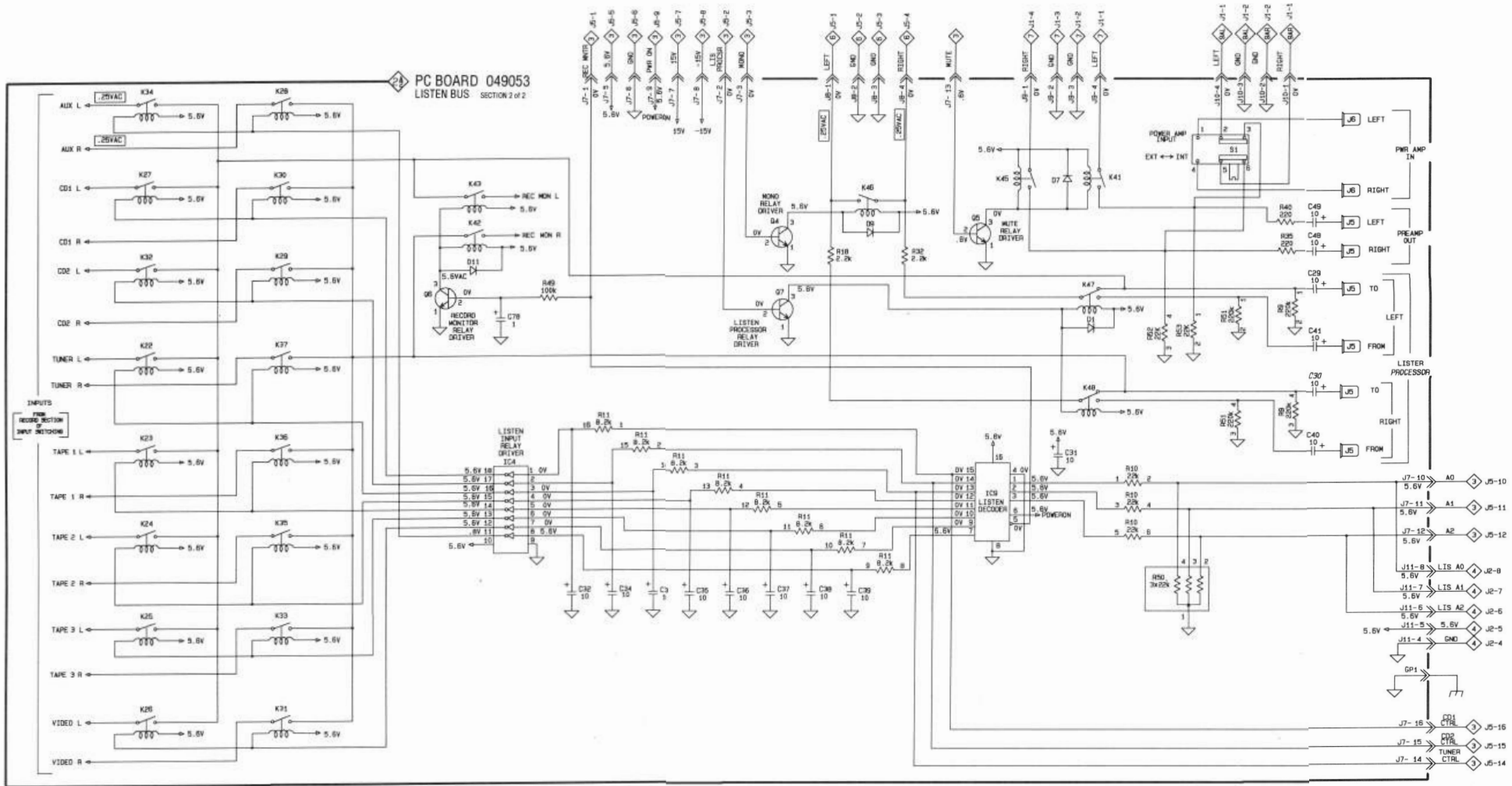


2 Input Switching



INPUT SWITCHING PCB 049053

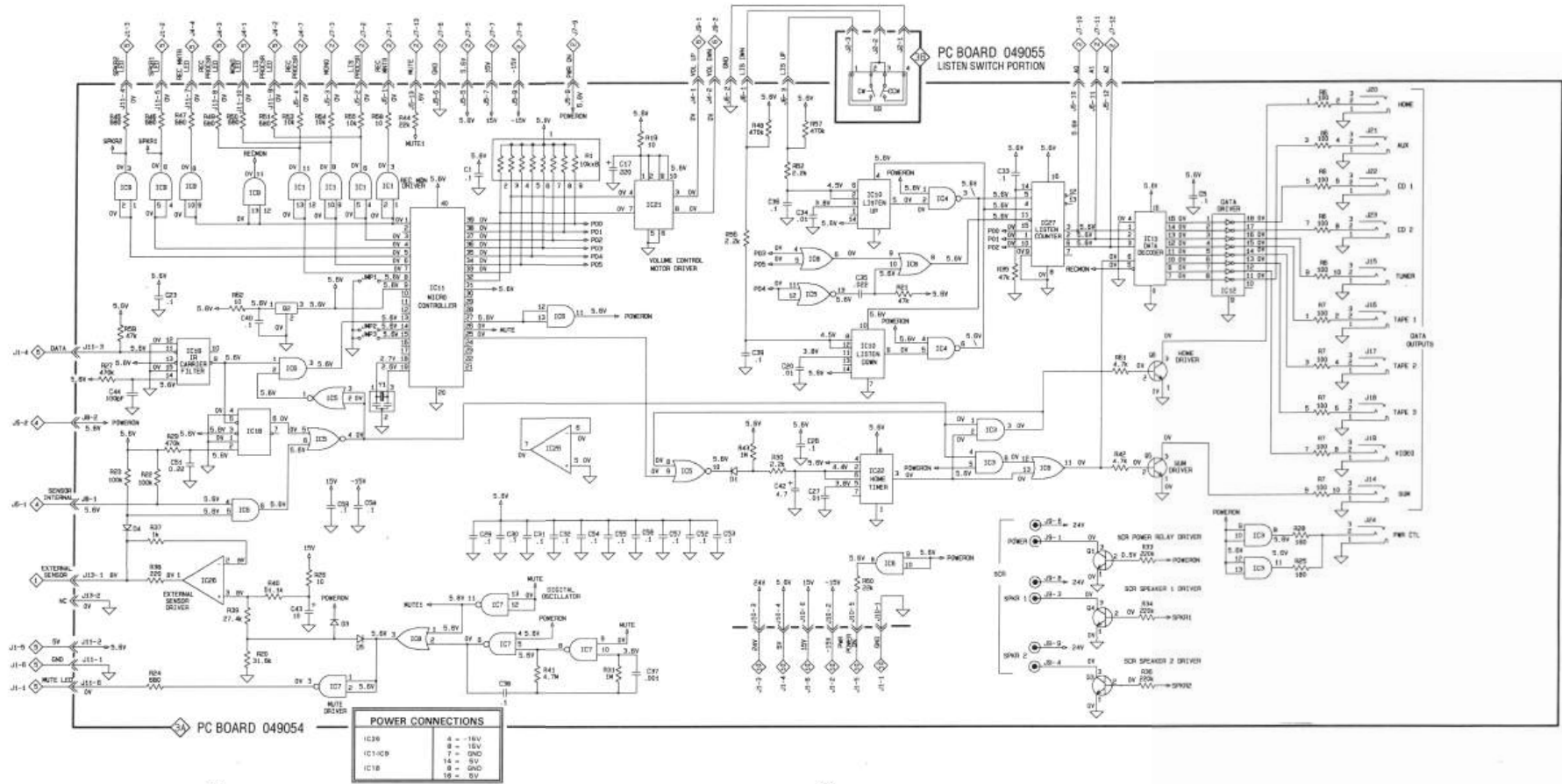
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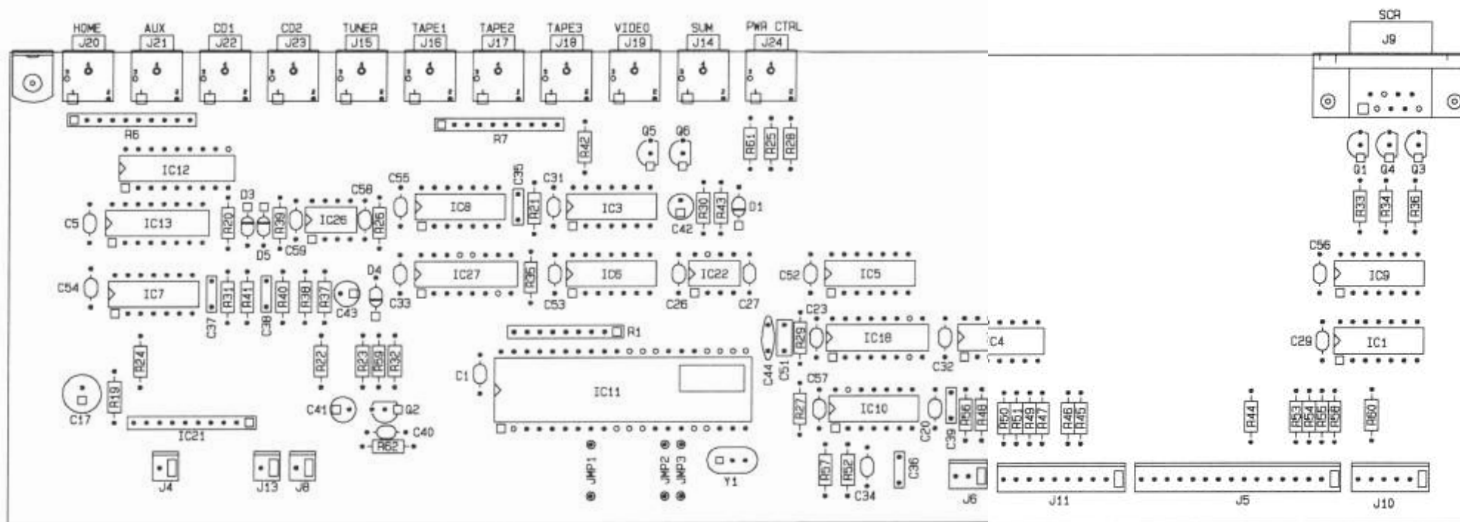
INPUT SWITCHING PARTS LIST

| <i>Symbol</i> | <i>Part</i> | <i>Description</i> |
|----------------------------|-------------|--|
| DIODES | | |
| D1-D11 | 070047 | SIG, 75V, 150mA, 1N4148 |
| INTEGRATED CIRCUITS | | |
| IC1-IC5 | 133116 | CMOS, Dual Timer, NE556N |
| IC2 | 133171 | CMOS, Binary UP/DOWN Counter, 74HC193N |
| IC3 | 133161 | CMOS, Quad 2-Input NAND Gate, 74HC00N |
| IC4,IC5 | 133169 | Octal Darlington Transistor Array, ULN2801 |
| IC8,IC9 | 133170 | 3 to 8 Line Decoder, Latch, 74HC237N |
| RELAYS | | |
| K2,K4,K6-K46 | 087050 | SPST, 5VDC, Reed, HE3321A0400 |
| K47-K50 | 087056 | Form 1C, 5VDC, Reed, HE3321C0500 |
| SWITCHES | | |
| S1 | 148059 | Slide Switch DPDT |
| TRANSISTORS | | |
| Q1-Q3 | 132182 | PNP, DAR, MPSA64 |
| Q4,Q5,Q7,Q8 | 132223 | NPN, MPS4124 |
| Q6 | 132090 | NPN, DAR, MPSA25 |

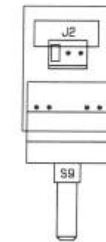
3 Control & Listen Switch



Control & Listen Switch 3



CONTROL PCB 049054



LISTEN SWITCH PORTION OF PCB 049055

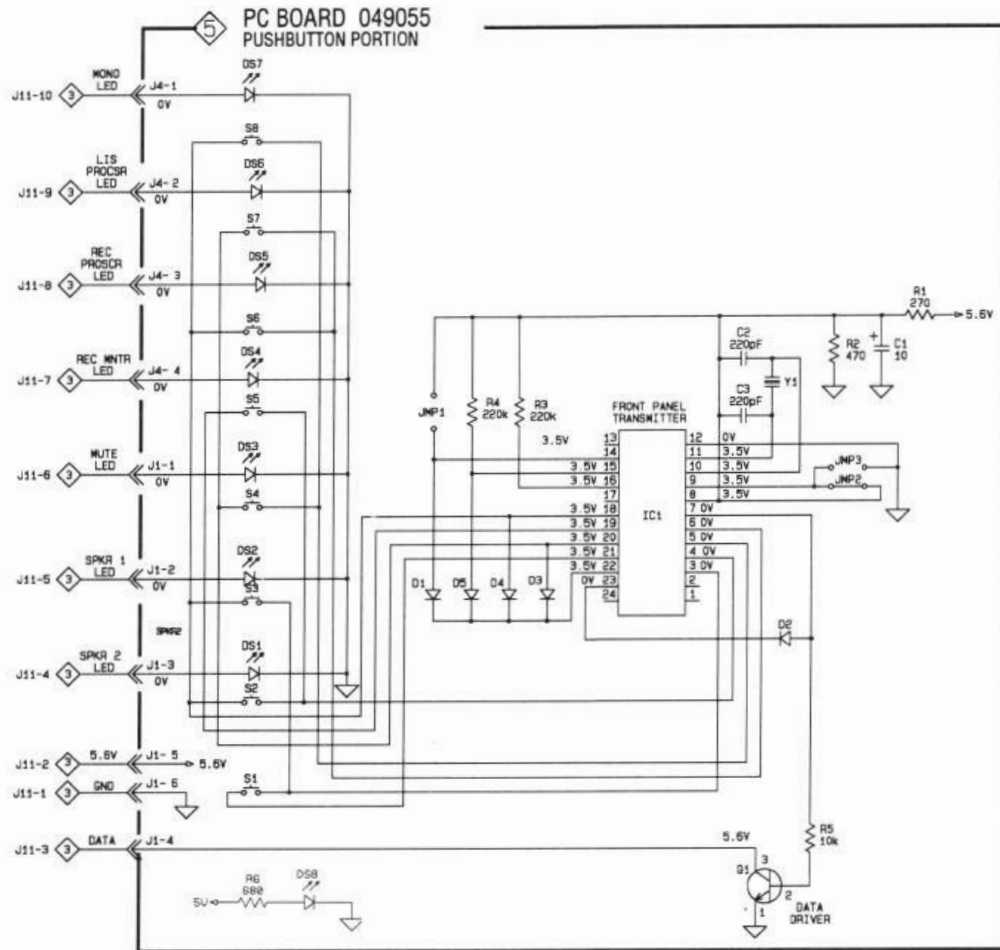
LISTEN SWITCH PARTS LIST

| Symbol | Part | Description |
|----------|--------|-----------------------|
| SWITCHES | | |
| S9 | 146249 | Input Selector Switch |

CONTROL BRD. PARTS LIST

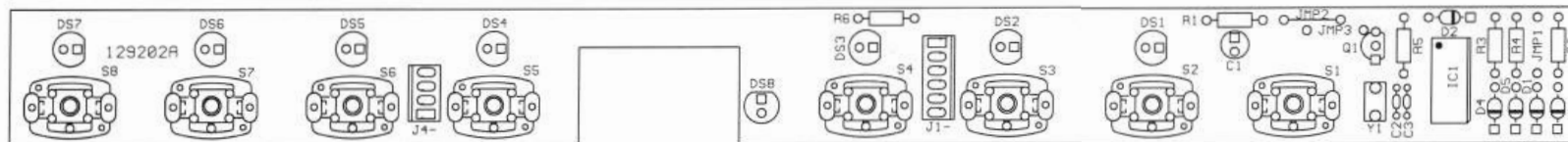
| Symbol | Part | Description |
|----------------------------|--------|---|
| CRYSTALS | | |
| Y1 | 180039 | Ceramic Resonator, 6MHz |
| DIODES | | |
| D1, D3-D5 | 070047 | SIG, 75V, 150mA, 1N4148 |
| INTEGRATED CIRCUITS | | |
| IC1 | 133175 | CMOS, Quad 2-Input AND Gate, MC74HC08AN |
| IC3 | 133175 | CMOS, Quad 2-Input AND Gate, MC74HC08AN |
| IC4 | 133161 | CMOS, Quad 2-Input NAND Gate, 74HC00N |
| IC5 | 133176 | CMOS, Quad 2-Input NOR Gate, MC74HC02AN |
| IC6 | 133175 | CMOS, Quad 2-Input AND Gate, MC74HC08AN |
| IC7 | 133161 | CMOS, Quad 2-Input NAND Gate, 74HC00N |
| IC8 | 133167 | Quad 2-Input OR Gate, MC74HC32AN |
| IC9 | 133175 | CMOS, Quad 2-Input AND Gate, MC74HC08AN |
| IC10 | 133116 | CMOS, Dual Timer, NE555N |
| IC11 | 133177 | Custom 80C51 Microcontroller, 80C51 |
| IC12 | 133180 | 8 Line Driver Array, LB1720 |
| IC13 | 133170 | 3 to 8 Line Decoder, Latch, 74HC237N |
| IC18 | 133182 | Dual Monostable Multivibrator, MC74HC4538AN |
| IC21 | 133191 | DC Motor Driver, LB1642B |
| IC22 | 133141 | Timer, NE555N |
| IC26 | 133189 | Dual Op-Amp, MC33178P |
| IC27 | 133171 | Custom 80C51 Microcontroller, 80C51 |
| TRANSISTORS | | |
| Q1 | 132090 | NPN, DAR, MPSA25 |
| Q2 | 133241 | PST573EuP Reset POS |
| Q3, Q4 | 132090 | NPN, DAR, MPSA25 |
| Q5-Q6 | 132223 | NPN, MPS4124 |

Pushbutton 5

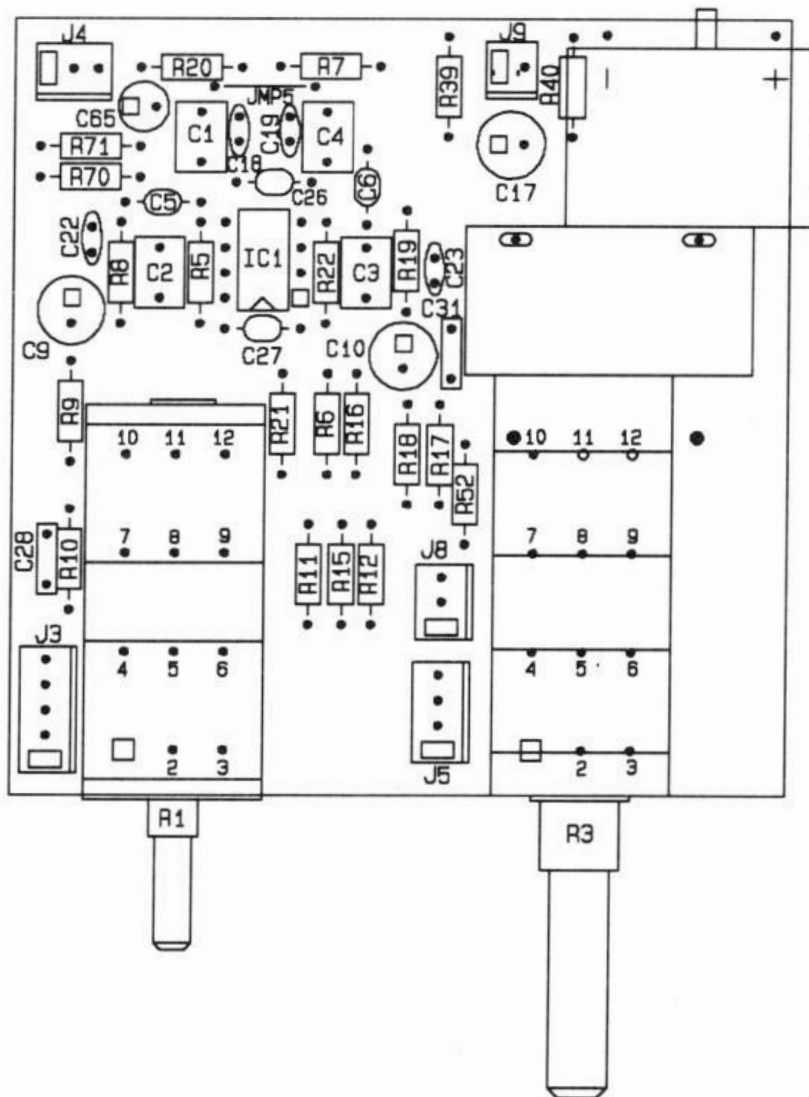


PUSHBUTTON PARTS LIST

| Symbol | Part | Description |
|----------------------------|--------|---------------------------------|
| CRYSTALS | | |
| Y1 | 180033 | Ceramic Resonator, 455kHz, ± 3% |
| DIODES | | |
| D1-D5 | 070047 | SIG, 75V, 150mA, 1N4148 |
| INTEGRATED CIRCUITS | | |
| IC1 | 133188 | Transmitter, UPD6122G-001 |
| LIGHTING DEVICES | | |
| DS1-DS7 | 070093 | LED, Red, HP5085-4658 |
| SWITCHES | | |
| S1-S8 | 150058 | Tact Switch, Momentary |
| TRANSISTORS | | |
| Q1 | 132223 | NPN, MPS4124 |



PUSHBUTTON PORTION
OF PCB 049055



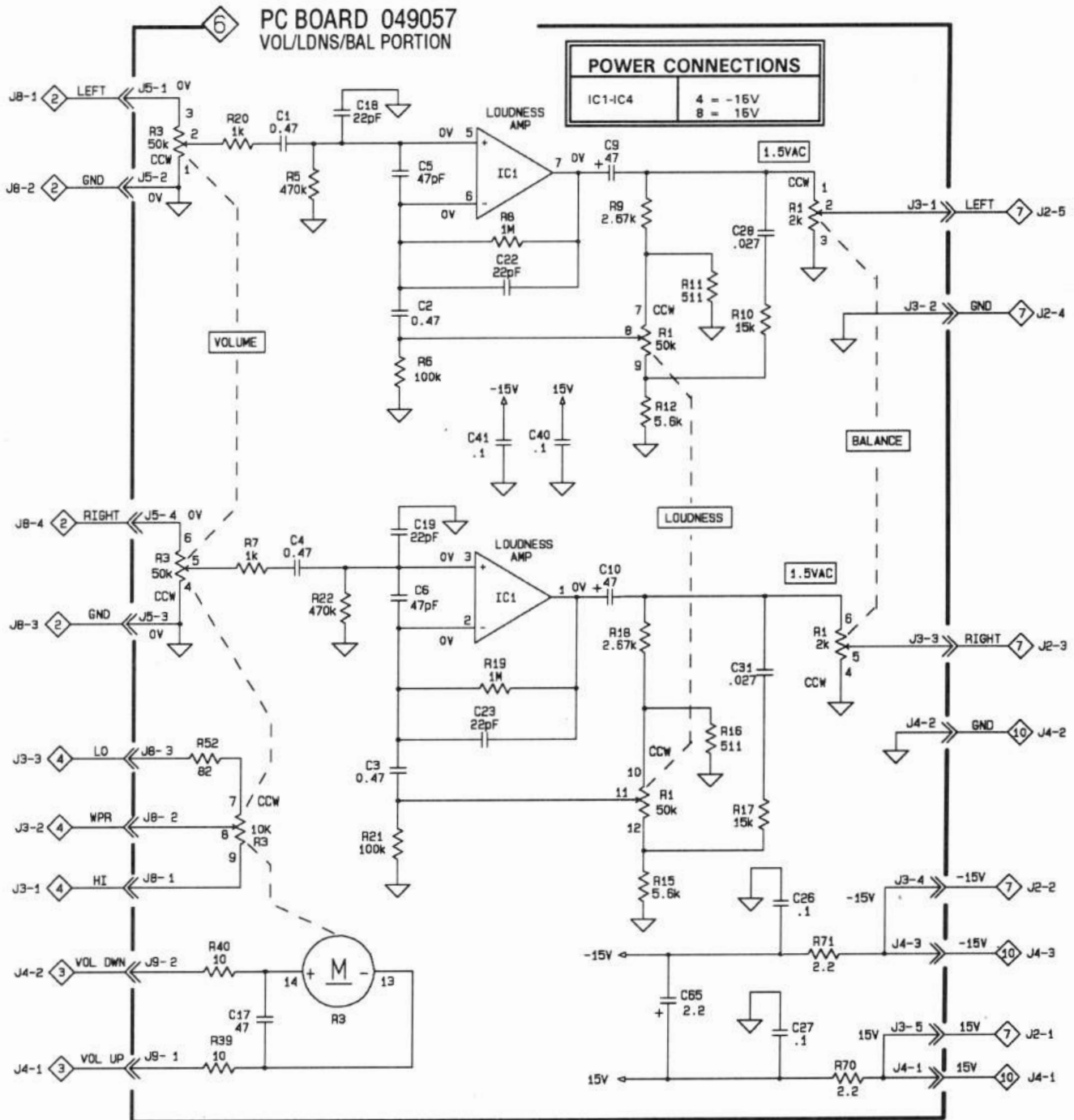
**VOL./LDNS./BAL.
PORTION OF
PCB 049057**

**VOL./LDNS./BAL.
PARTS LIST**

| <i>Symbol</i> | <i>Part</i> | <i>Description</i> |
|----------------------------|-------------|--------------------------------------|
| INTEGRATED CIRCUITS | | |
| IC1 | 133094 | Dual Op Amp, NE5532N |
| RESISTORS | | |
| R1 | 134448 | POT, 50K ohm |
| R3 | 134472 | Motor Driven 4 Gang Vol Control 18mm |

Volume, Loudness, Balance

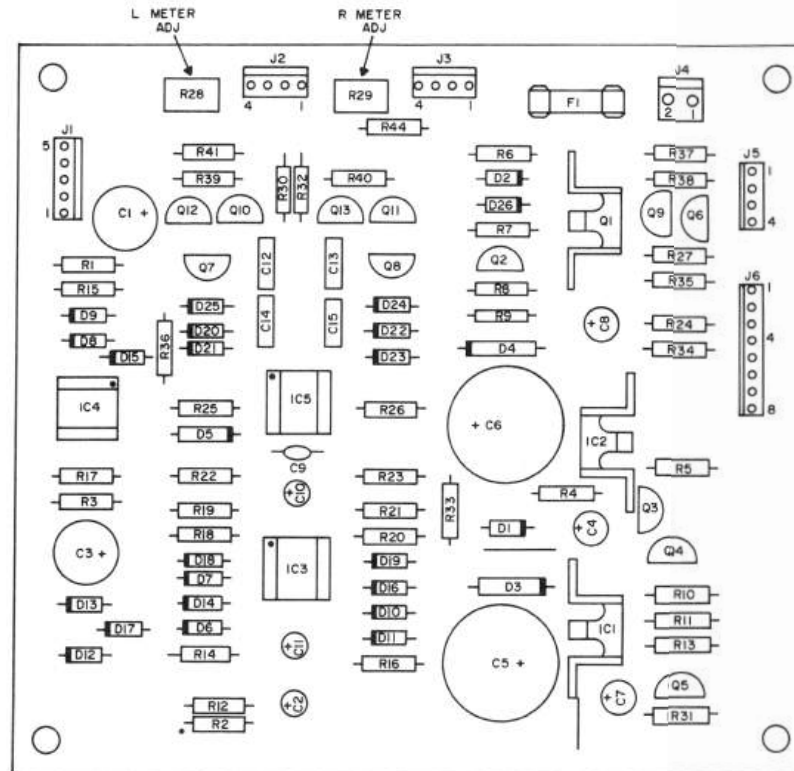
6



8 Meter/Regulator

METER REGULATOR PARTS LIST

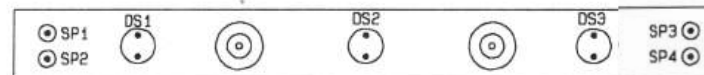
| Symbol | Part | Description |
|----------------------------|--------|--|
| DIODES | | |
| D1 | 070047 | SIG, 75V, 100mA, 1N4148 |
| D2 | 070099 | ZN, 12V, 5%, 500mW, 1N5242B |
| D3,D4 | 070131 | RECT, 400V, 1A, 1N4004 |
| D5 | 070085 | ZN, 6.2V, 5%, 500mW, 1N5234B |
| D6-D22 | 070047 | SIG, 75V, 150mA, 1N4148 |
| FUSES | | |
| F1 | 089052 | Fuse, SB, 1.5A, 250V, 2AG |
| INTEGRATED CIRCUITS | | |
| IC1 | 133156 | + 12V Regulator, MC78M12CT |
| IC2 | 133155 | -12V Regulator, MC79M12CT |
| IC3,IC4 | 133028 | Dual Hi-speed Operational Amp, MC4558CP1 |
| IC5 | 133094 | Dual Operational Amp, NE5532N |
| METERS | | |
| M1,M2 | 124047 | METER |
| TRANSISTORS | | |
| Q1 | 132242 | N, FET, BUZ71A |
| Q2 | 132224 | PNP, MPS4126 |
| Q3 | 132223 | NPN, MPS4124 |
| Q4,Q5 | 132224 | PNP, MPS4126 |
| Q6 | 132090 | NPN, DAR, MPSA25 |
| Q7,Q8 | 132223 | NPN, MPS4124 |
| Q9 | 132090 | NPN, DAR, MPSA25 |
| Q10-Q13 | 132254 | NPN, 2SC2362KG |



**METER/REGULATOR
PCB 048439**

METER (LEFT & RIGHT) ILLUMINATION PARTS LIST

| Symbol | Part | Description |
|-----------------------------------|--------|----------------|
| LAMPS and LIGHTING DEVICES | | |
| DS1-DS3 | 058120 | INC, 14V, 7373 |

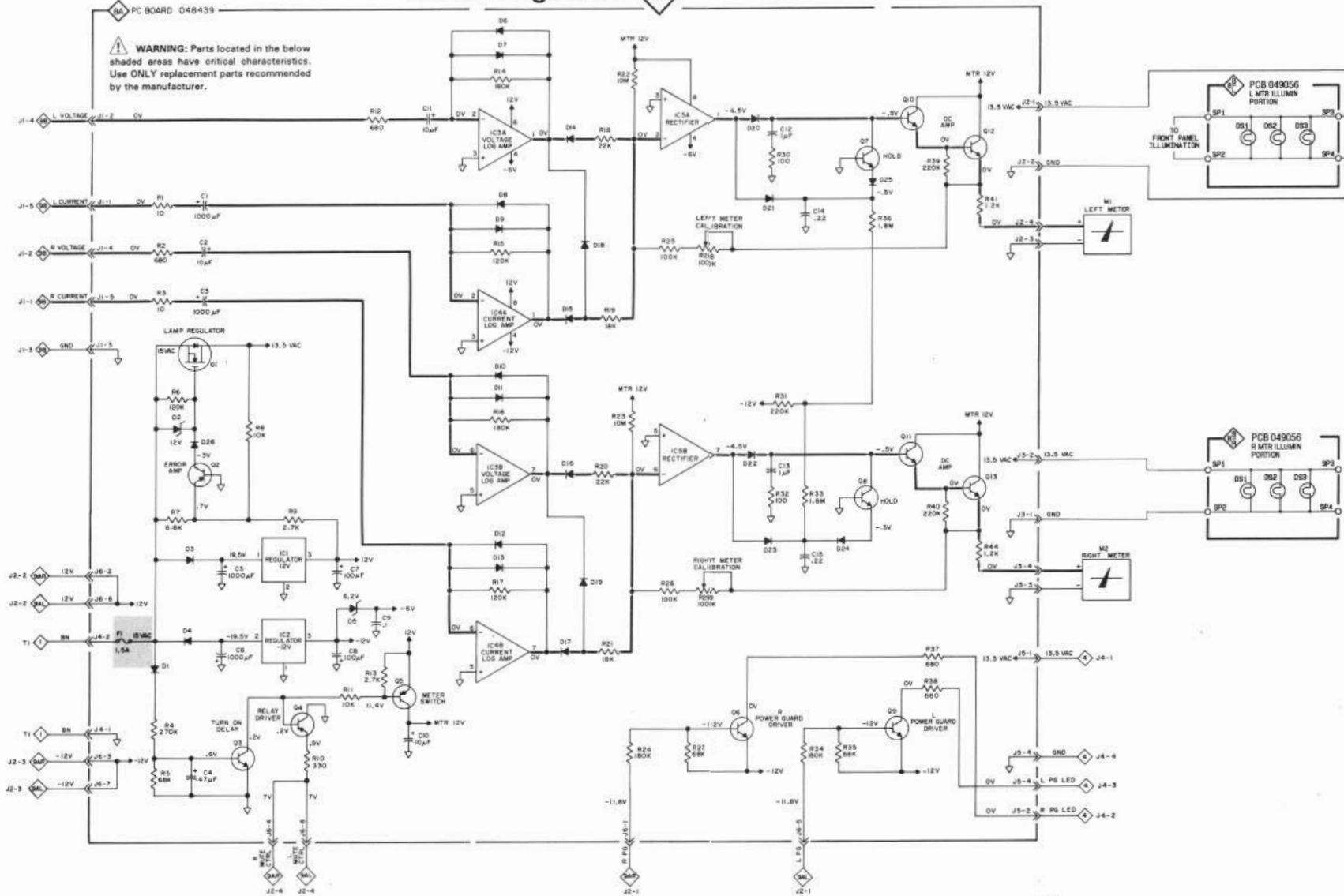


**LEFT & RIGHT
METER ILLUMINATION
OF PCB 049056**

Meter/Regulator 8

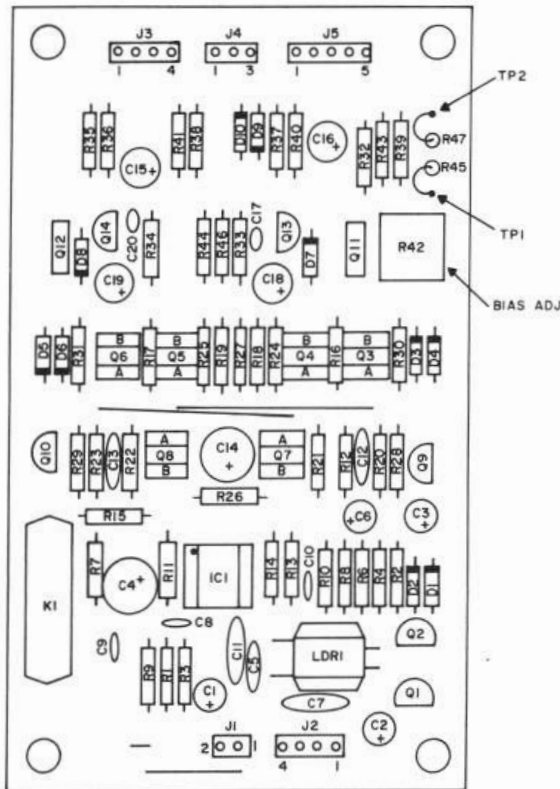
PC BOARD 048439

WARNING: Parts located in the below shaded areas have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.



9

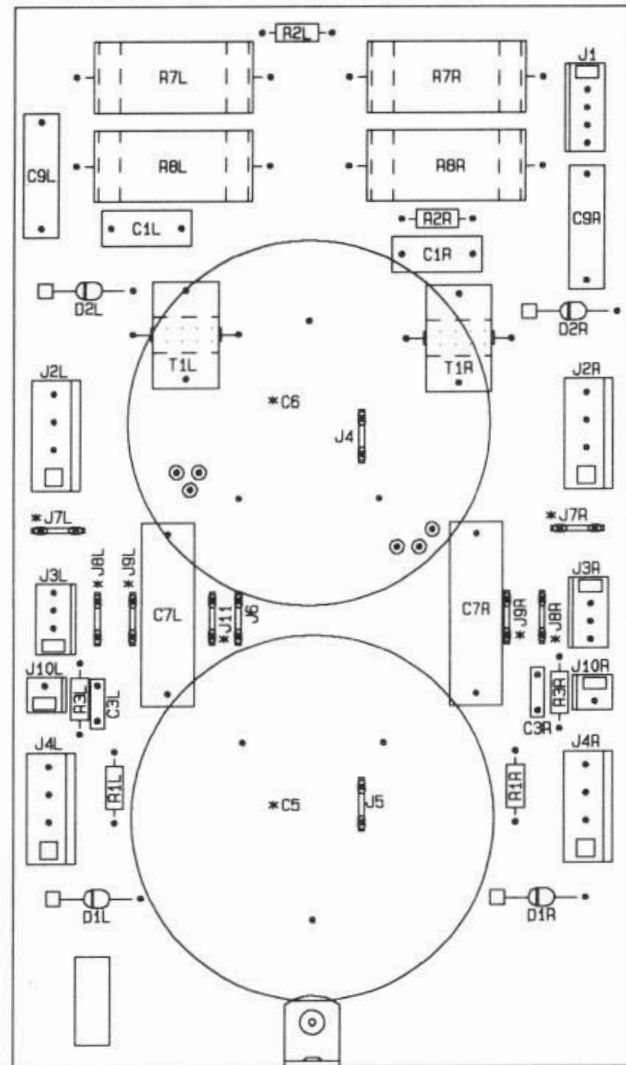
Amplifier



**LEFT & RIGHT
POWER DRIVER
PCB 047359**

POWER DRIVER LEFT AND RIGHT PARTS LIST

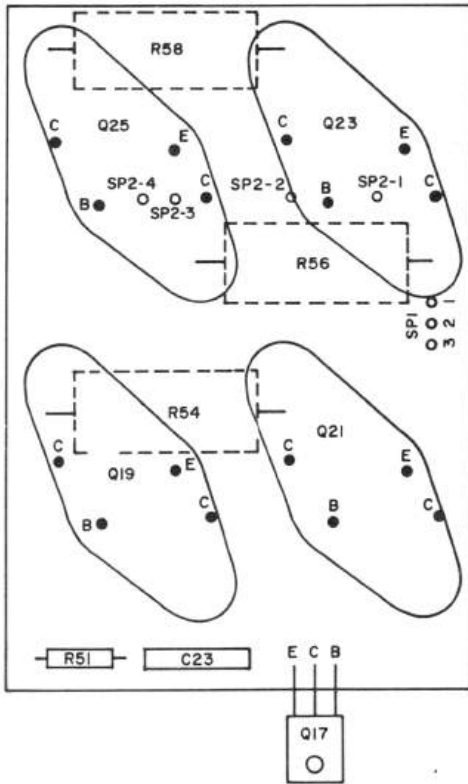
| Symbol | Part | Description |
|------------------------------------|--------|-------------------------------|
| DIODES | | |
| D1-D10 | 070047 | SIG, 75V, 150mA, 1N4148 |
| INTEGRATED CIRCUITS | | |
| IC1 | 133094 | Dual Op Amp, NE5532N |
| RELAYS | | |
| K1 | 087050 | SPST, 5VDC, Reed, HE3321A0400 |
| RESISTORS (LIGHT DEPENDENT) | | |
| LDR1 | 144179 | LDR, VTL5C9 |
| TRANSISTORS | | |
| Q1, Q2 | 132224 | PNP, MPS4126 |
| Q3 | 132253 | PNP, Dual, 2SA1237G |
| Q4 | 132250 | NPN, Dual, 2SC3066G |
| Q5 | 132251 | PNP, Dual, 2SA1239G |
| Q6 | 132252 | NPN, Dual, 2SC3064G |
| Q7 | 132250 | NPN, Dual, 2SC3066G |
| Q8 | 132251 | PNP, Dual, 2SA1239G |
| Q9 | 132136 | NPN, MPSA42 |
| Q10 | 132147 | PNP, MPSA92 |
| Q11 | 132249 | PNP, 2SA1480D or 2SA1480E |
| Q12 | 132248 | NPN, 2SC3790D or 2SC3790E |
| Q13 | 132223 | NPN, MPS4124 |
| Q14 | 132224 | PNP, MPS4126 |



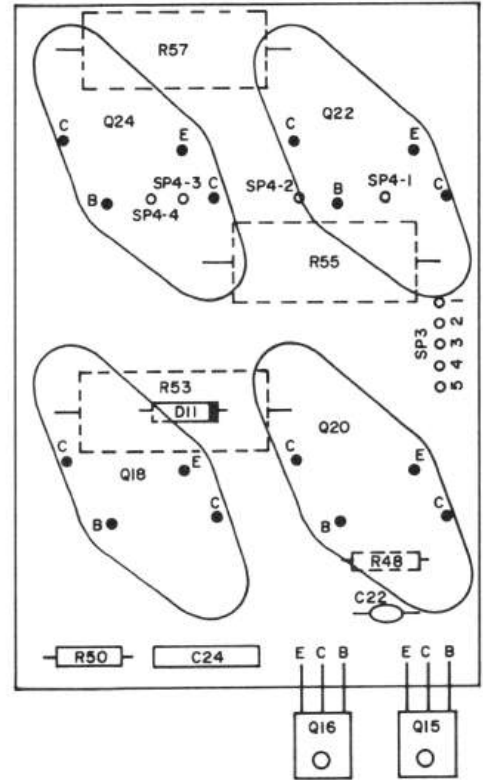
CAPACITOR PCB 048433

CAPACITOR BRD. PARTS LIST

| Symbol | Part | Description |
|---------------------|--------|-----------------------------|
| CAPACITORS | | |
| C5, C6 | 066442 | Capacitor Elect 57000uF/40V |
| DIODES | | |
| D1, D2 | 070031 | RECT, 400V, 1.5A |
| TRANSFORMERS | | |
| T1 | 159215 | Current |



LEFT & RIGHT
NEGATIVE HEATSINK
PCB 047112



LEFT & RIGHT
POSITIVE HEATSINK
PCB 047110

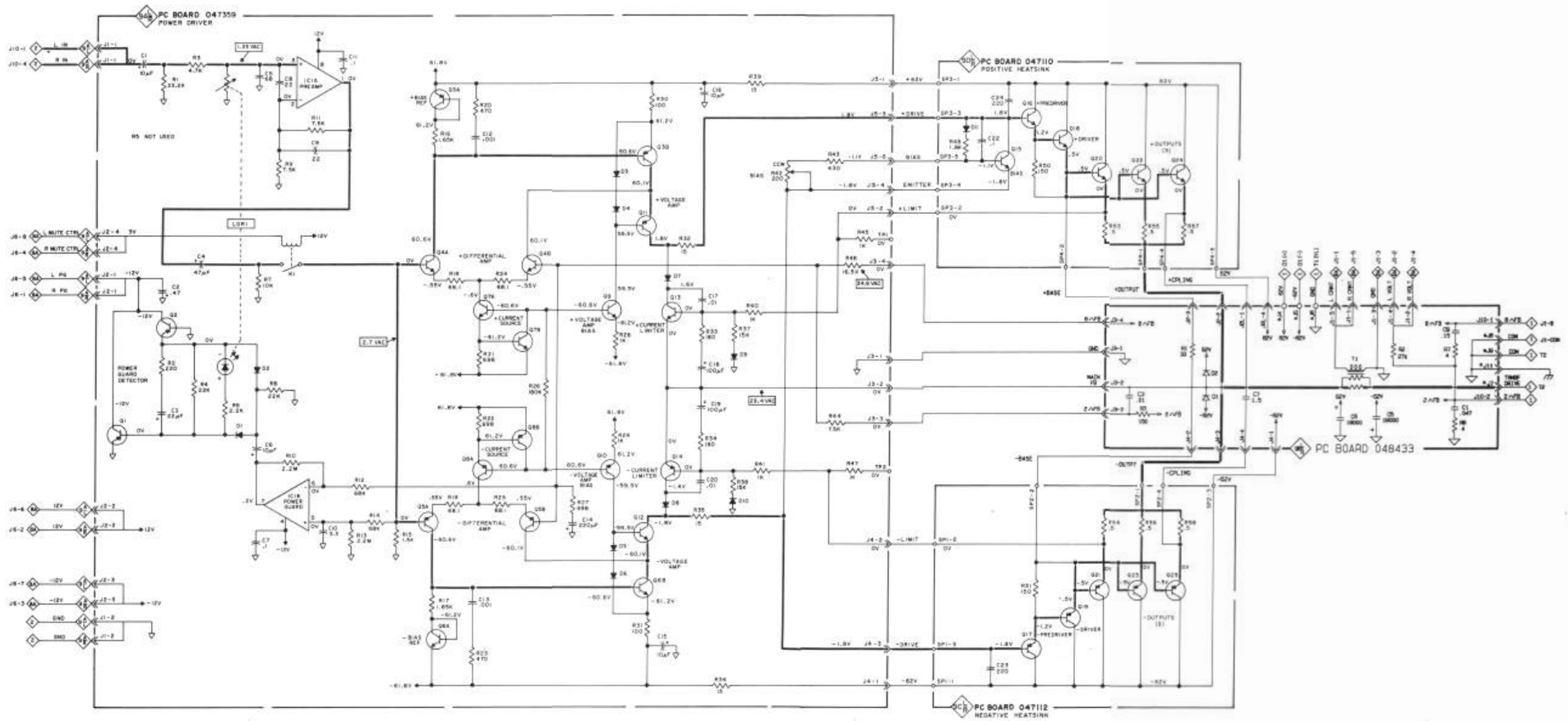
**NEGATIVE HEATSINK
LEFT AND RIGHT
PARTS LIST**

| Symbol | Part | Description |
|--------------------|--------|--------------------|
| TRANSISTORS | | |
| Q17 | 132249 | PNP, 2SA1480D OR E |
| Q19 | 132247 | PNP, MJ15021 |
| Q21 | 132213 | PNP |
| Q23 | 132213 | PNP |
| Q25 | 132213 | PNP |

**POSITIVE HEATSINK
LEFT AND RIGHT
PARTS LIST**

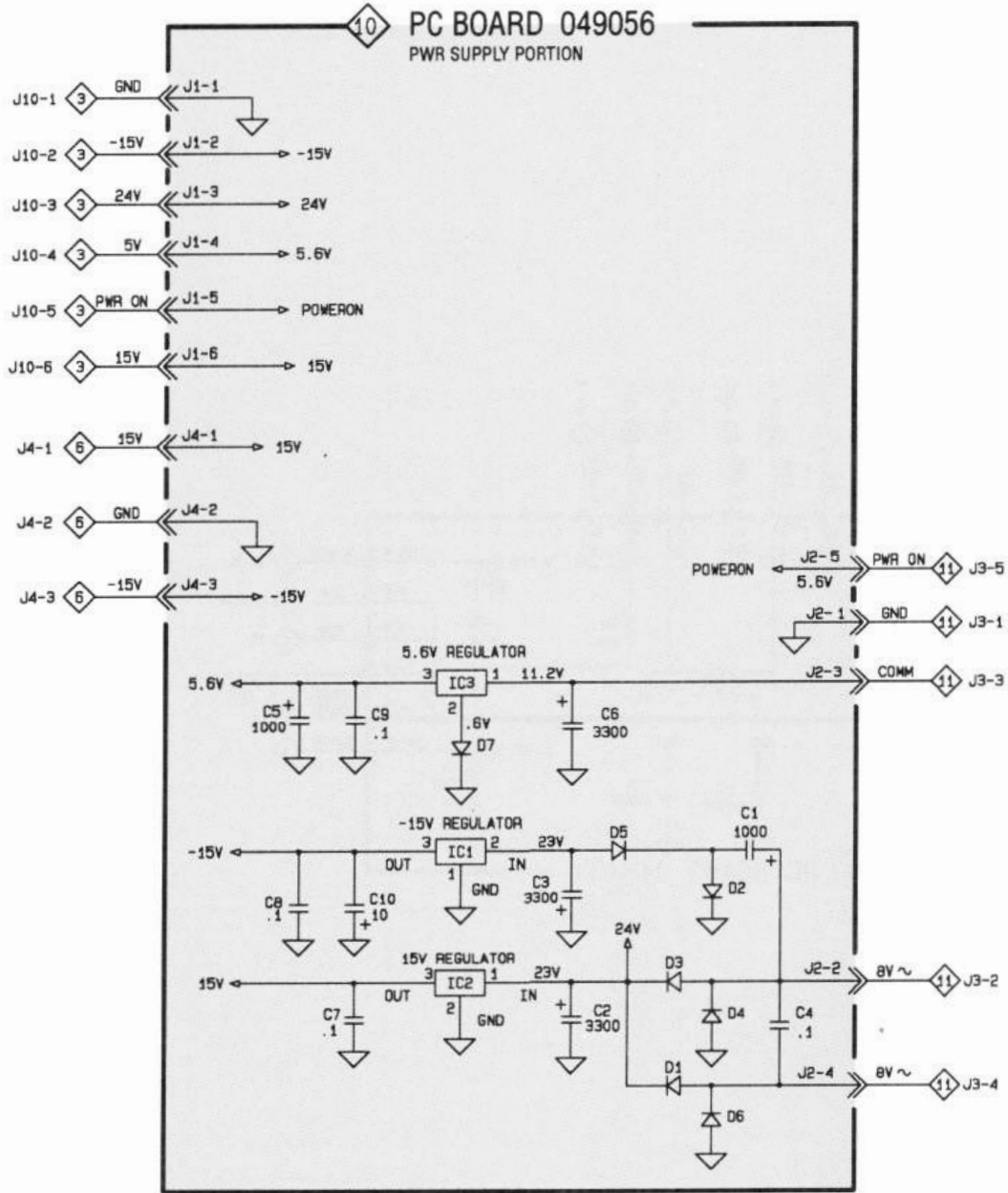
| Symbol | Part | Description |
|--------------------|--------|-------------------------|
| DIODES | | |
| D1 | 070047 | SIG, 75V, 150mA, 1N4148 |
| TRANSISTORS | | |
| Q15, Q16 | 132248 | NPN, 2SC3790D or E |
| Q18 | 132246 | NPN, MJ15020 |
| Q20 | 132212 | NPN |
| Q24 | 132212 | NPN |

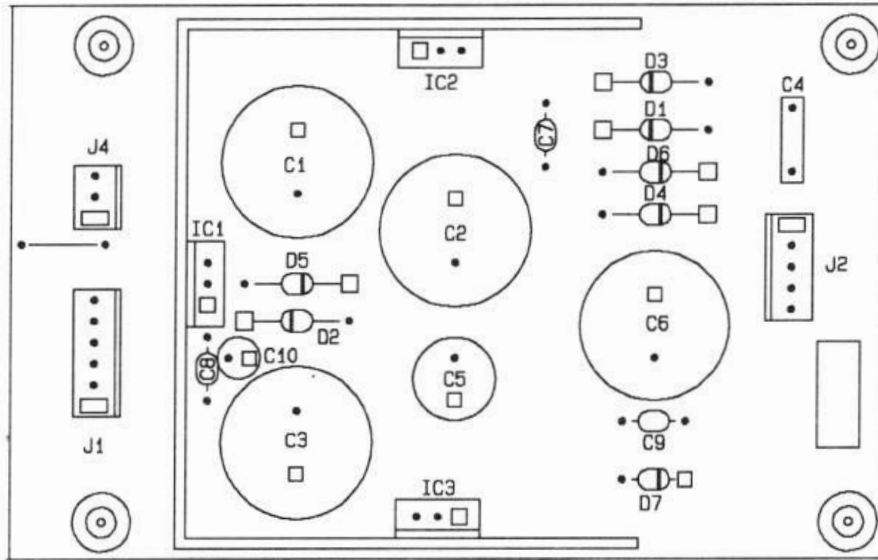
Amplifier 9



10 Power Supply

WARNING: Parts located in the below shaded area have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.



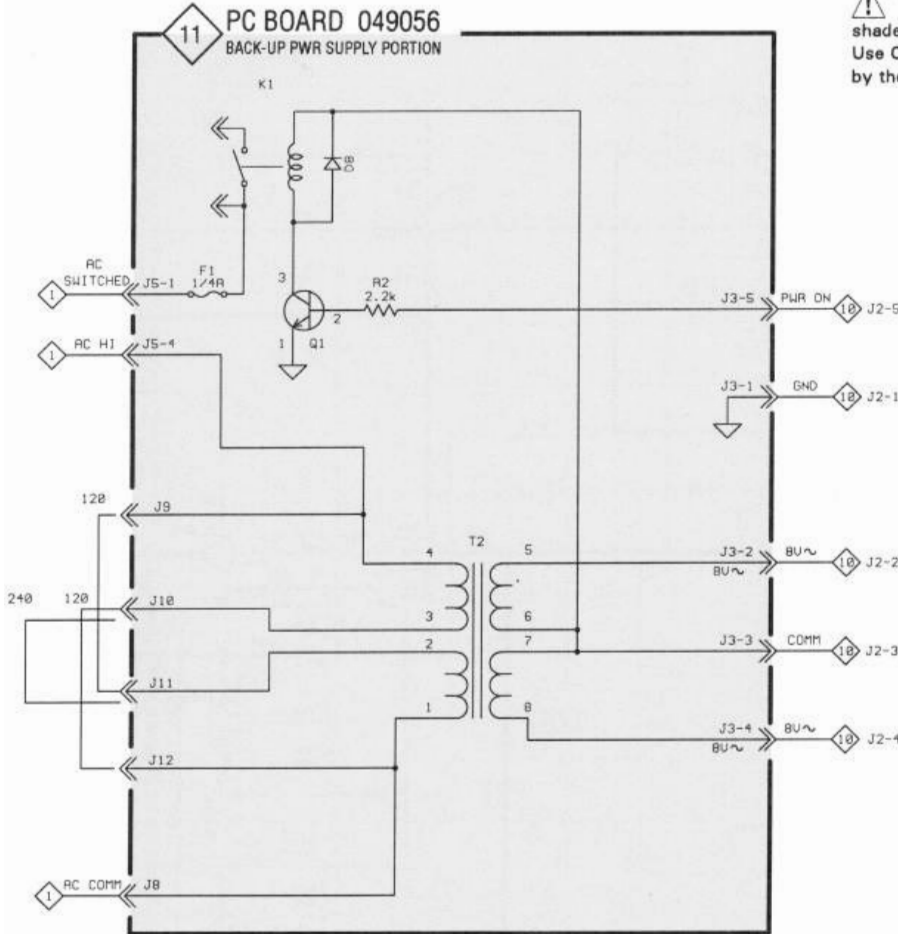


**POWER SUPPLY
PORTION OF
PCB 049056**

**POWER SUPPLY
PARTS LIST**

| <i>Symbol</i> | <i>Part</i> | <i>Description</i> |
|----------------------------|-------------|------------------------------|
| DIODES | | |
| D1-D7 | 070131 | RECT, 400V, 1A, 1N4004 |
| INTEGRATED CIRCUITS | | |
| IC1 | 133153 | -15V Regulator, MC79M15CT |
| IC2 | 133154 | 15V Regulator, MC78M15CT |
| IC3 | 133108 | 5V Regulator MC7805CT |

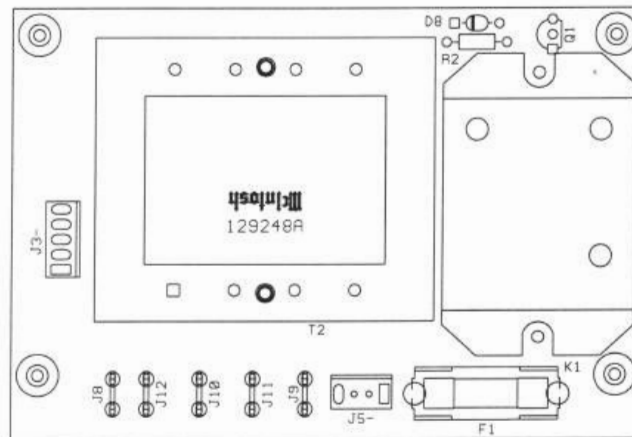
11 Back-up Power Supply



WARNING: Parts located in the below shaded area have critical characteristics. Use ONLY replacement parts recommended by the manufacturer.

BACK-UP POWER SUPPLY PARTS LIST

| Symbol | Part | Description |
|---------------------|--------|--------------------------|
| DIODES | | |
| D8 | 070047 | SIG, 75V, 150mA, 1N414 |
| FUSES | | |
| F1 | 089053 | Fuse, SB, 1/4A, 250V, 2A |
| RELAYS | | |
| K1 | 087061 | Relay, 12V, TV15, PCB |
| TRANSFORMERS | | |
| T2 | 159211 | Power |
| TRANSISTORS | | |
| Q1 | 132090 | NPN, DAR, MPSA25 |



BACK-UP POWER SUPPLY
PORTION OF
PCB 049056

Repacking Instructions

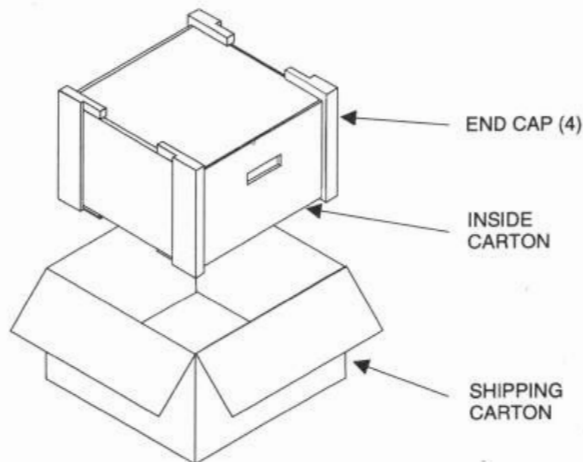
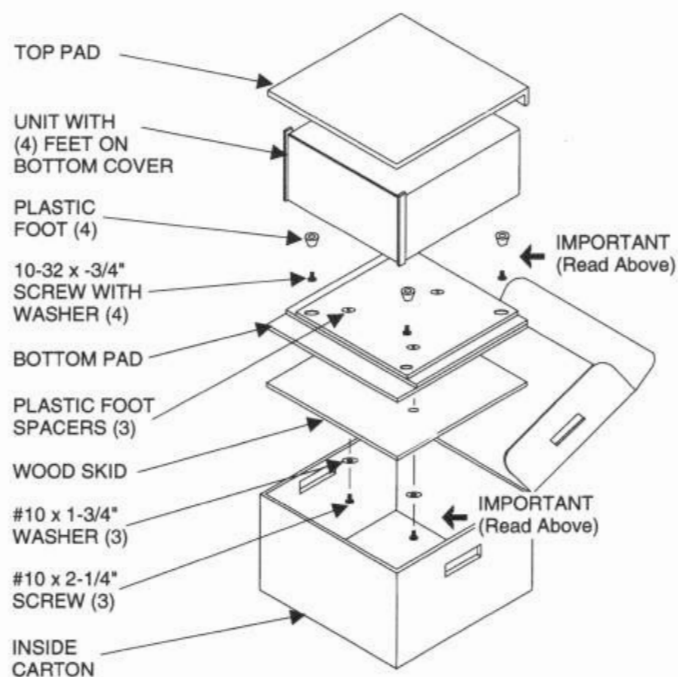
In the event it is necessary to repack the unit for shipment, the unit must be packed exactly as shown below.

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.

| Qty. | Part No. | Description |
|------|----------|---|
| 1 | 033888 | Shipping carton only |
| 4 | 033887 | End cap (Foam pad) |
| 1 | 033697 | Inside carton only |
| 1 | 033725 | Top pad |
| 1 | 033698 | Bottom pad |
| 3 | 017218 | Plastic foot (spacer) |
| 1 | 033699 | Wood skid |
| 3 | 101169 | #10 x 2-1/4" Wood screw |
| 3 | 104033 | #10 x 1-3/4" Flat washer |
| 4 | 017218 | Plastic foot |
| 4 | 100159 | #10-32 x 3/4" Machine screw |
| 4 | 104083 | #10 x 7/16" Flat washer |
| 1 | 048572 | Shipping carton complete with all the above parts |



MA6850

INTEGRATED AMPLIFIER

SERVICE MANUAL

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