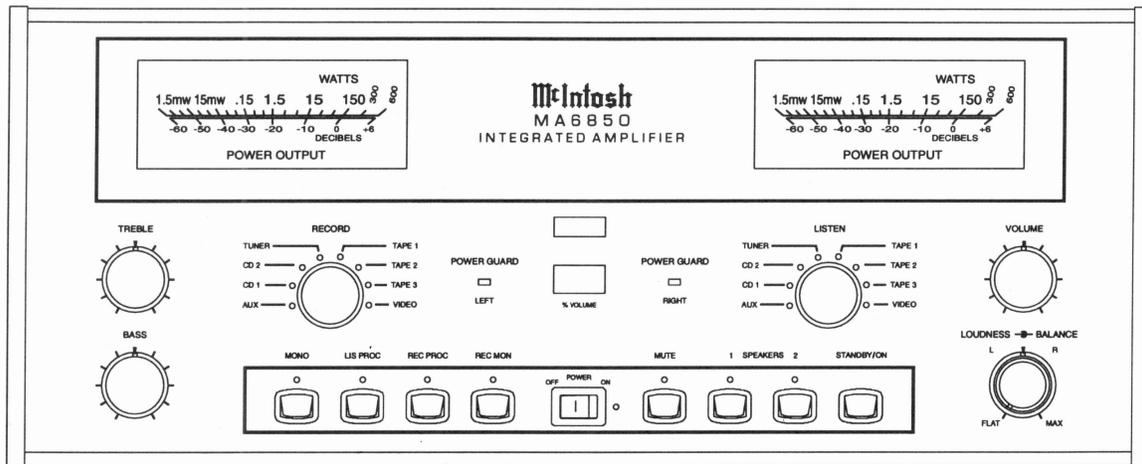


MA6850

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

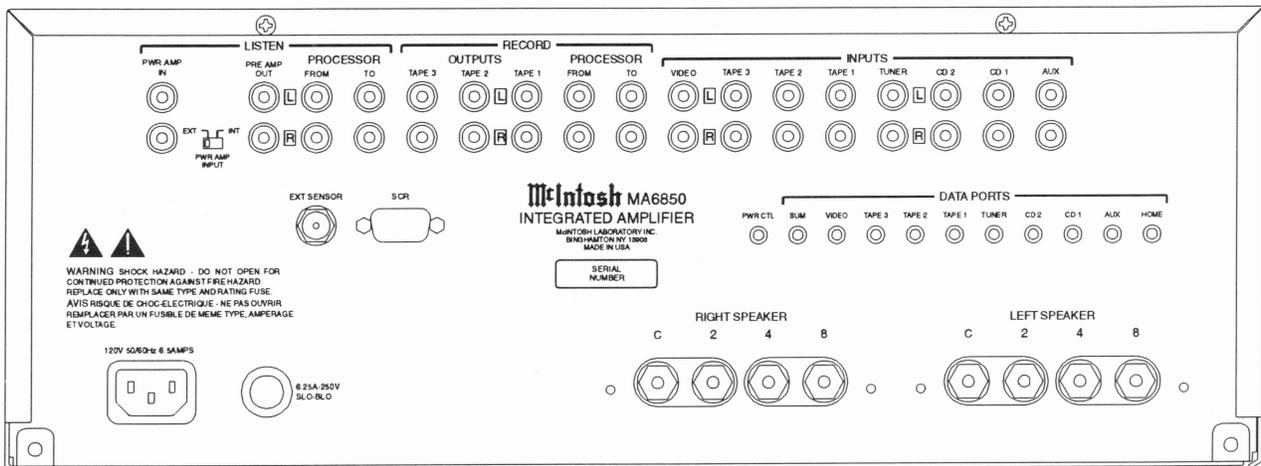


Fig. 1 Rear view

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

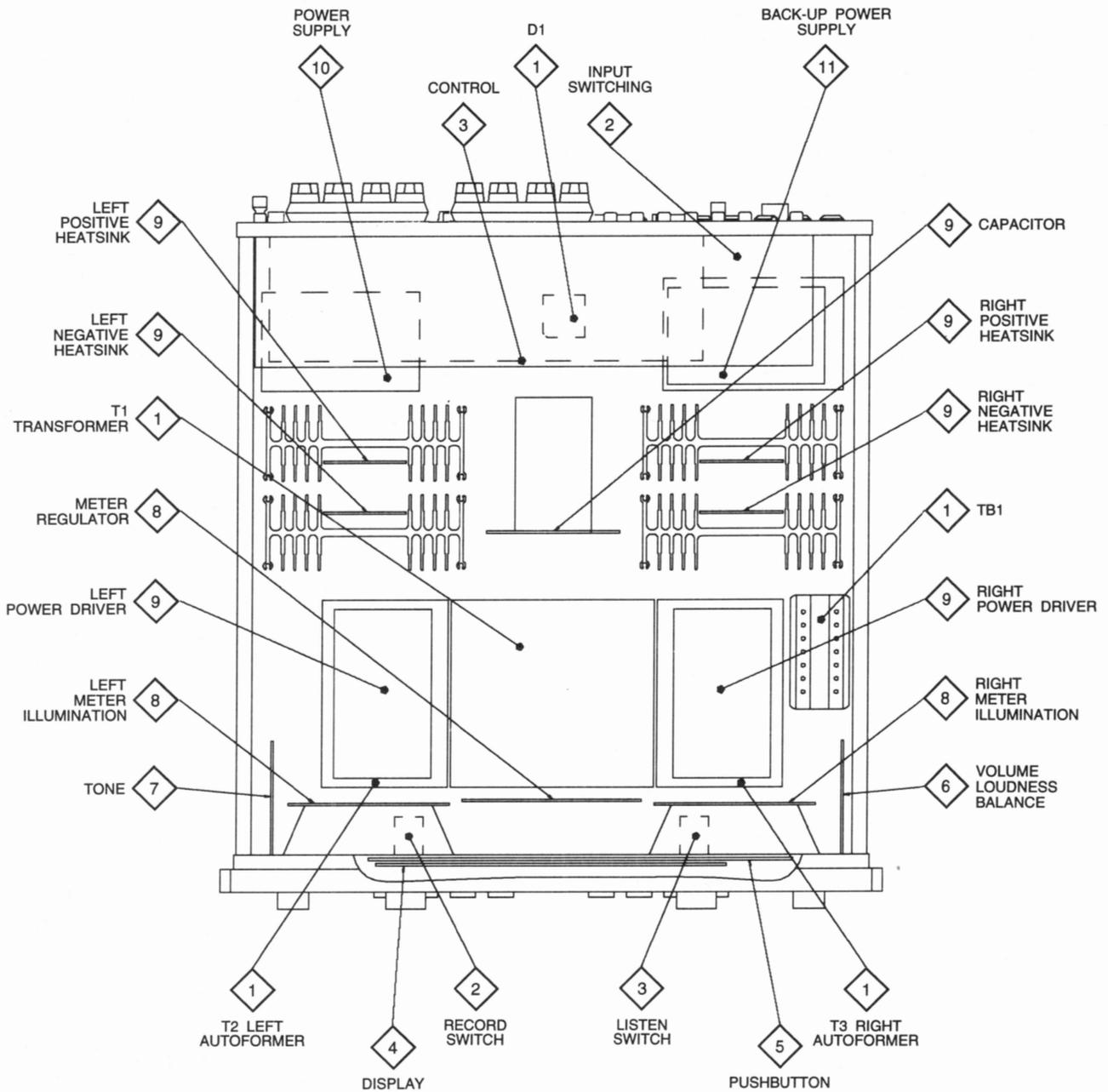
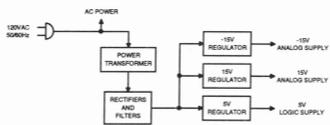
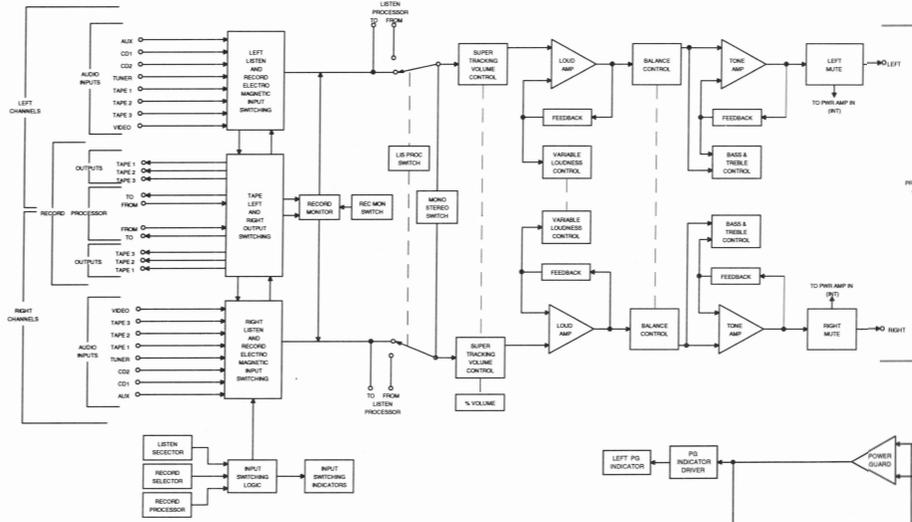


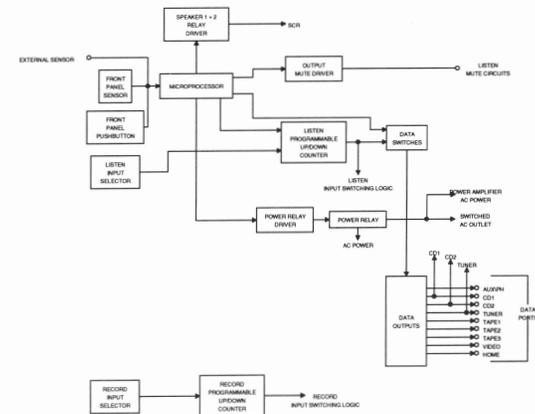
Fig. 2 Top view with cover removed

Block Diagram

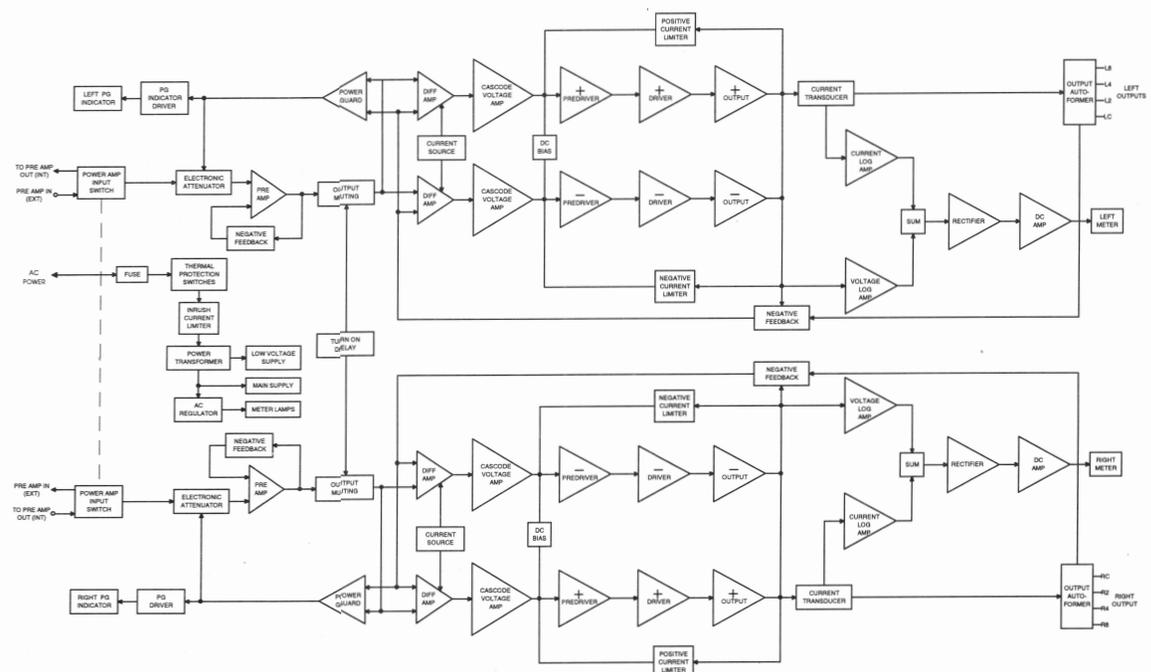
MA6850 BLOCK DIAGRAM
ANALOG AND POWER SUPPLY



REMOTE CONTROL LOGIC



POWER AMPLIFIER



Interconnection Diagram 1

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

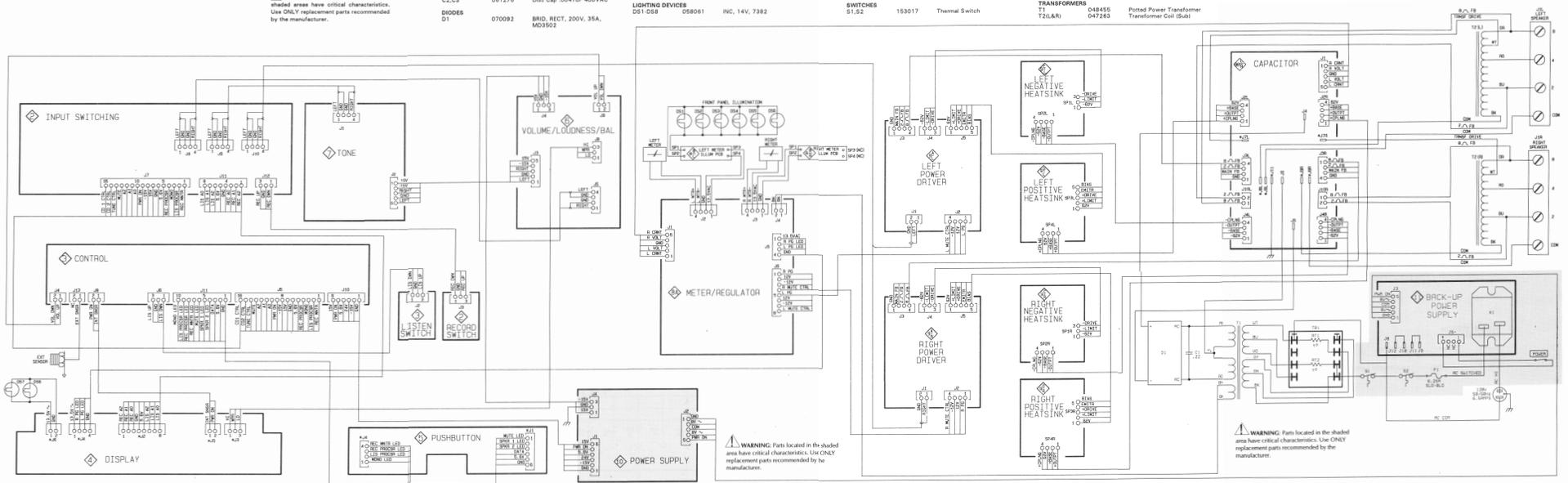
INTERCONNECTION PARTS LIST

Symbol	Part	Description
CAPACITORS		
C1	052008	Capacitor Assy
C2,C3	081276	Dist Cap 0047µF 400VAC
DIODES		
D1	070092	BRD. RECT, 200V, 35A, M03902

FUSES		
F1	089061	Fuse 6.25A 250V 5.B.
LIGHTING DEVICES		
D31,D32	058061	INC, 14V, 7382

METERS	
M1,M2	124052 Meter
SWITCHES	
S1,S2	153017 Thermal Switch

THERMISTORS	
RT1,RT2	144151 Thermistor, 5 ohm
TRANSFORMERS	
T1	048455 Potted Power Transformer
T2(L,R)	047283 Transformer Coil (Sub)



7

8

9

10



Input Switching & Record Switching

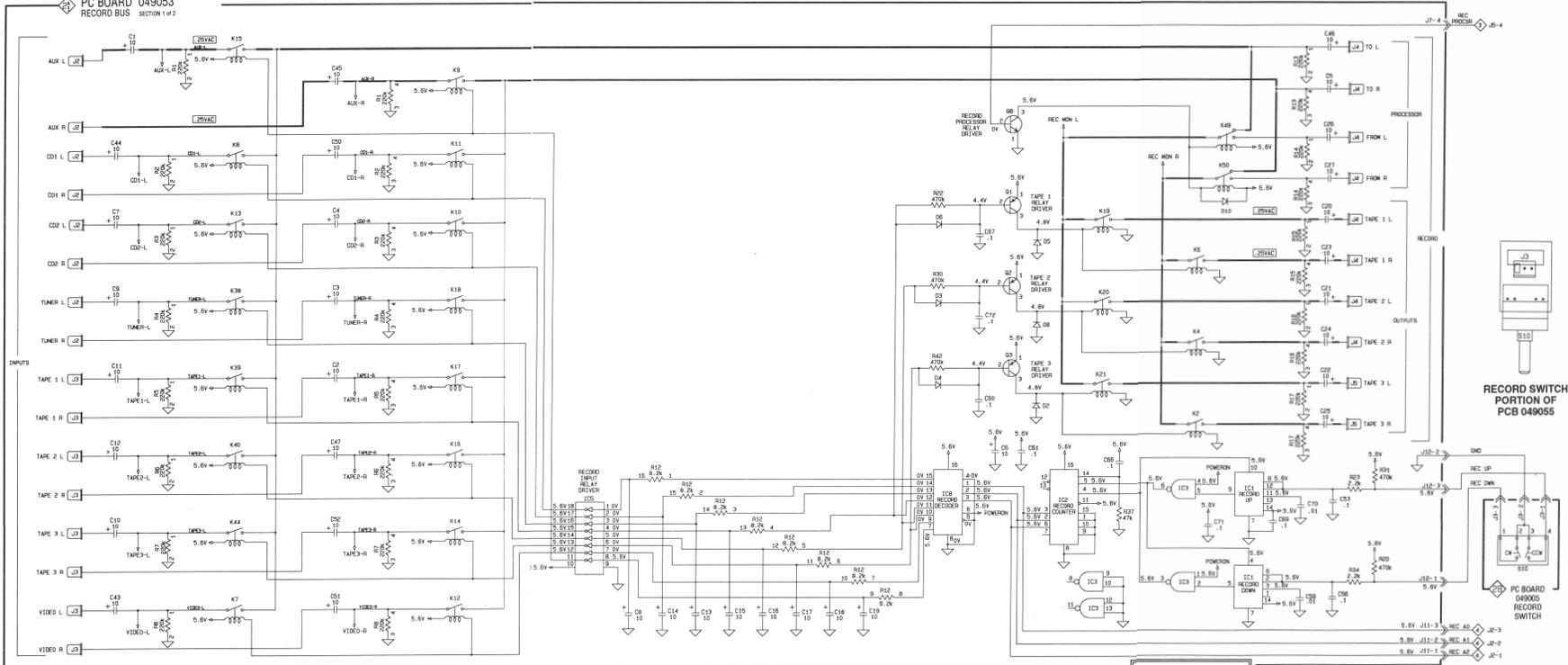
INPUT SWITCHING PARTS LIST

<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

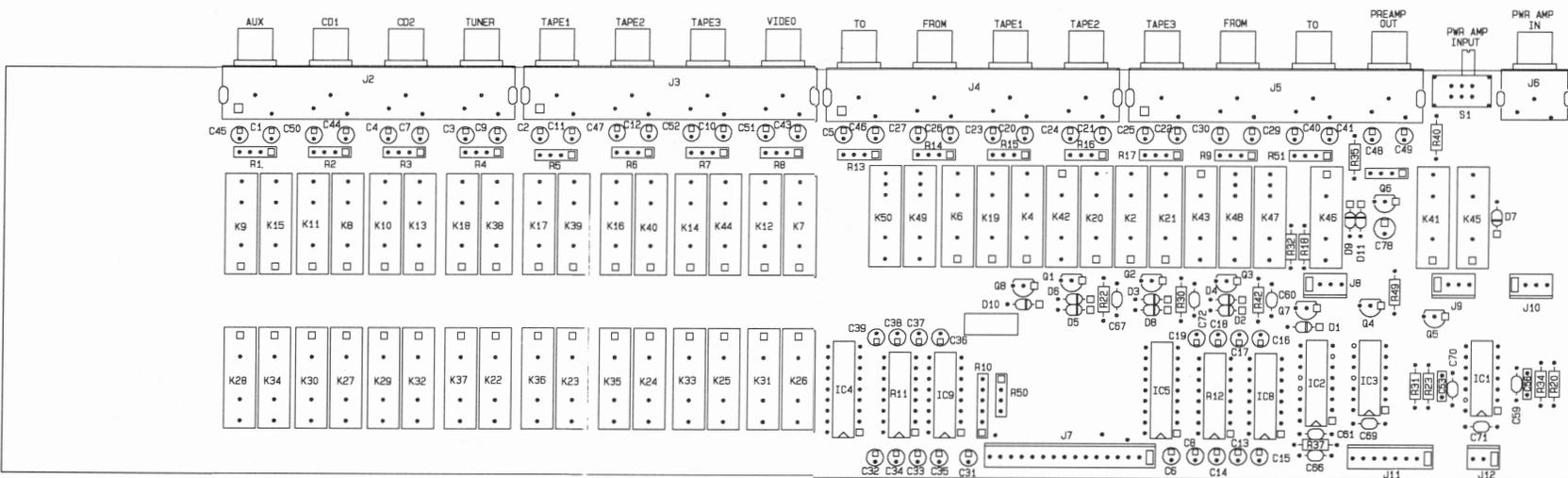
<i>Symbol</i>	<i>Part</i>	<i>Description</i>
SWITCHES		
S10	146249	Input Selector Switch

PC BOARD 049053
RECORD BUS SECTION 1 of 2



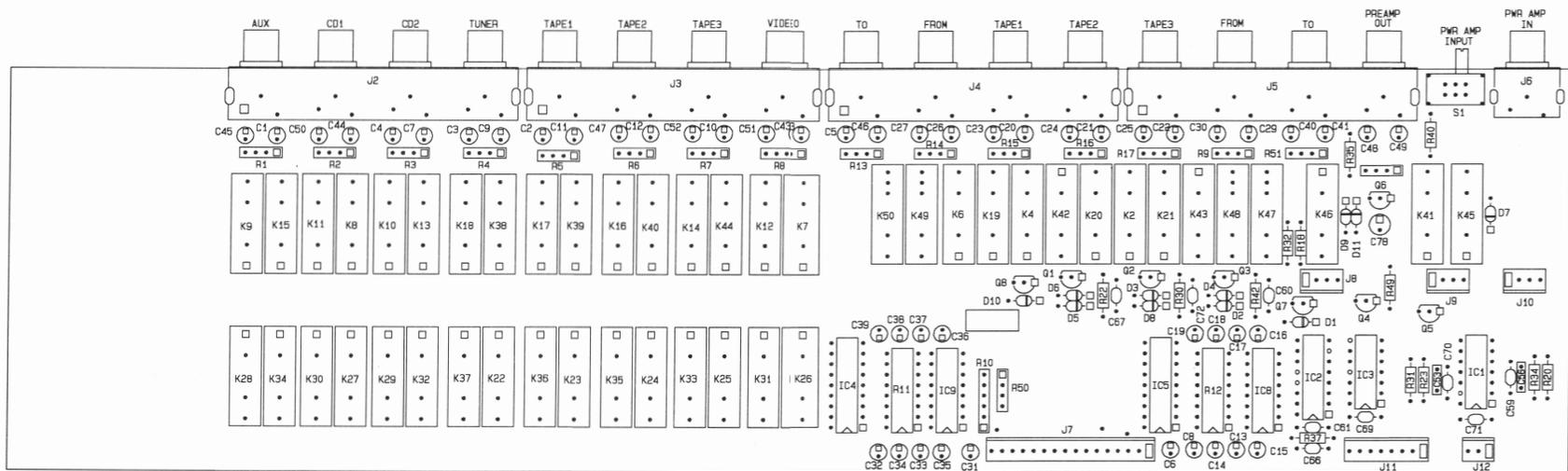
POWER CONNECTIONS
IC3 7 = GND
14 = 5V

Input Switching 2



INPUT SWITCHING PCB 049053

2 Input Switching

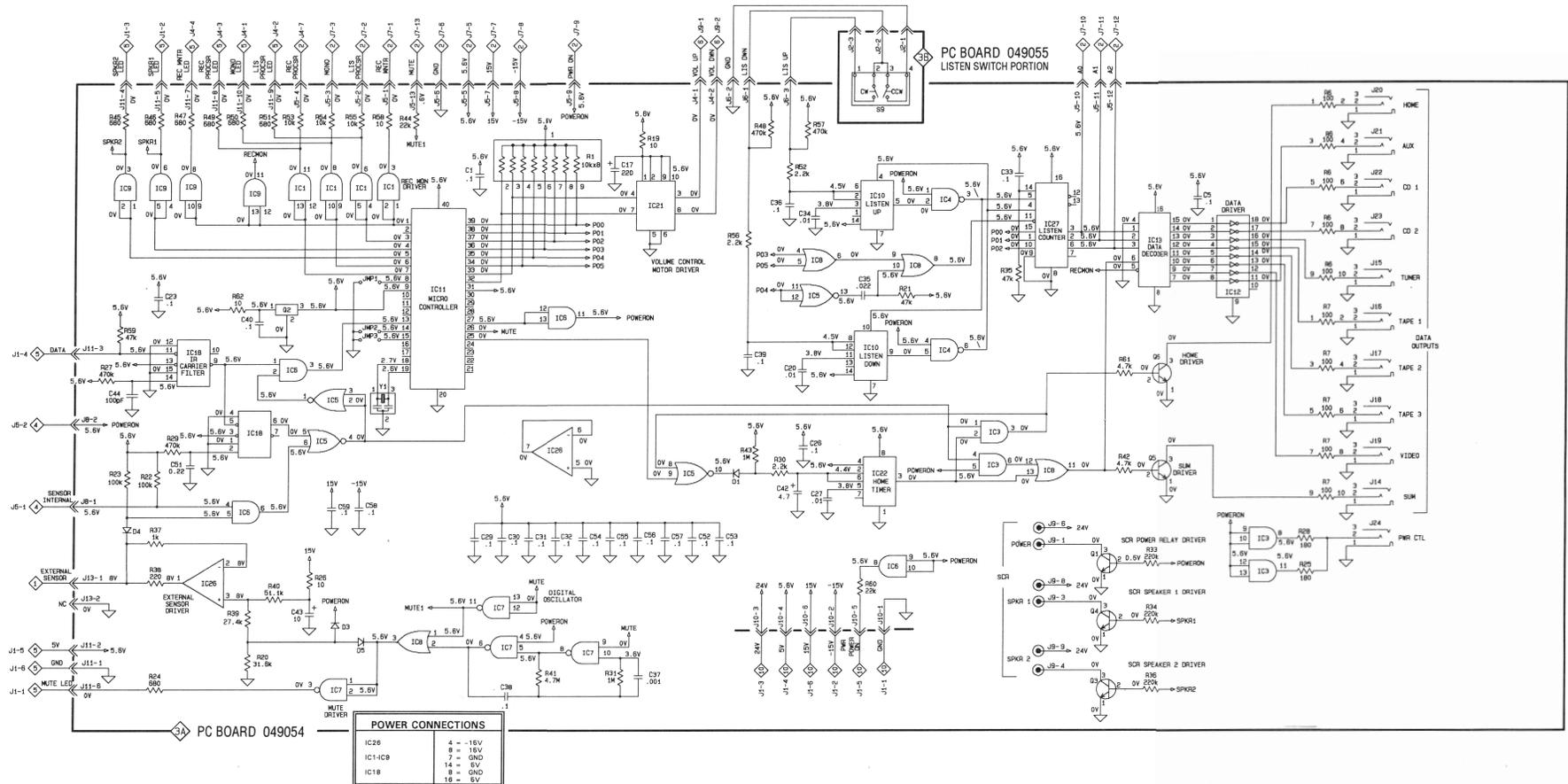


INPUT SWITCHING PCB 049053

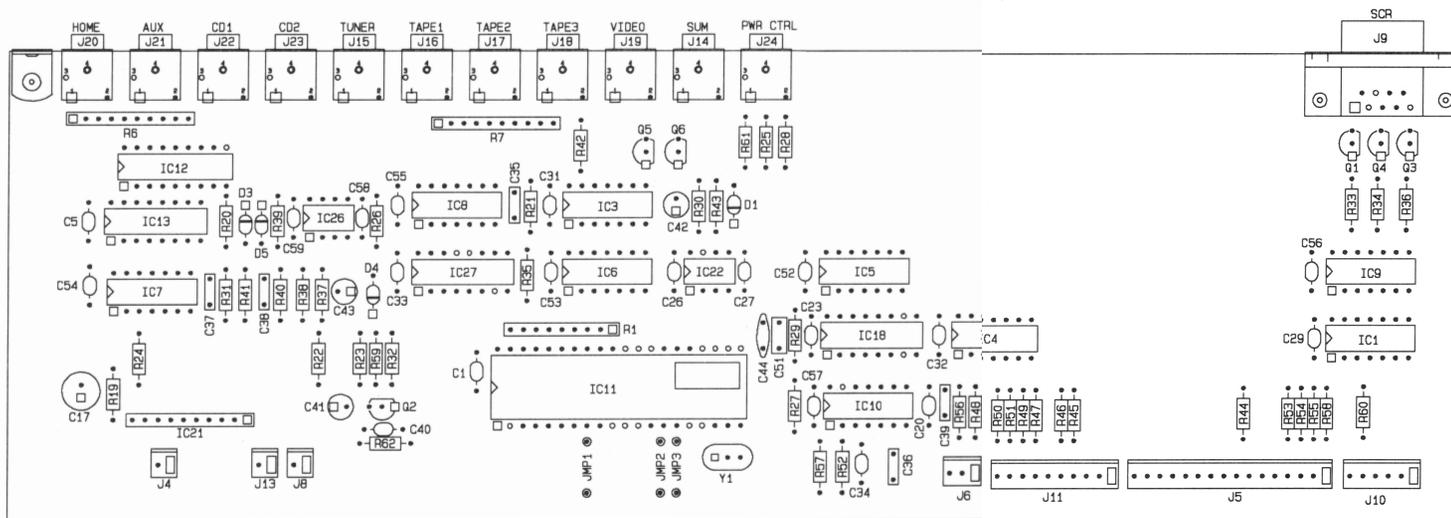
INPUT SWITCHING PARTS LIST

<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**

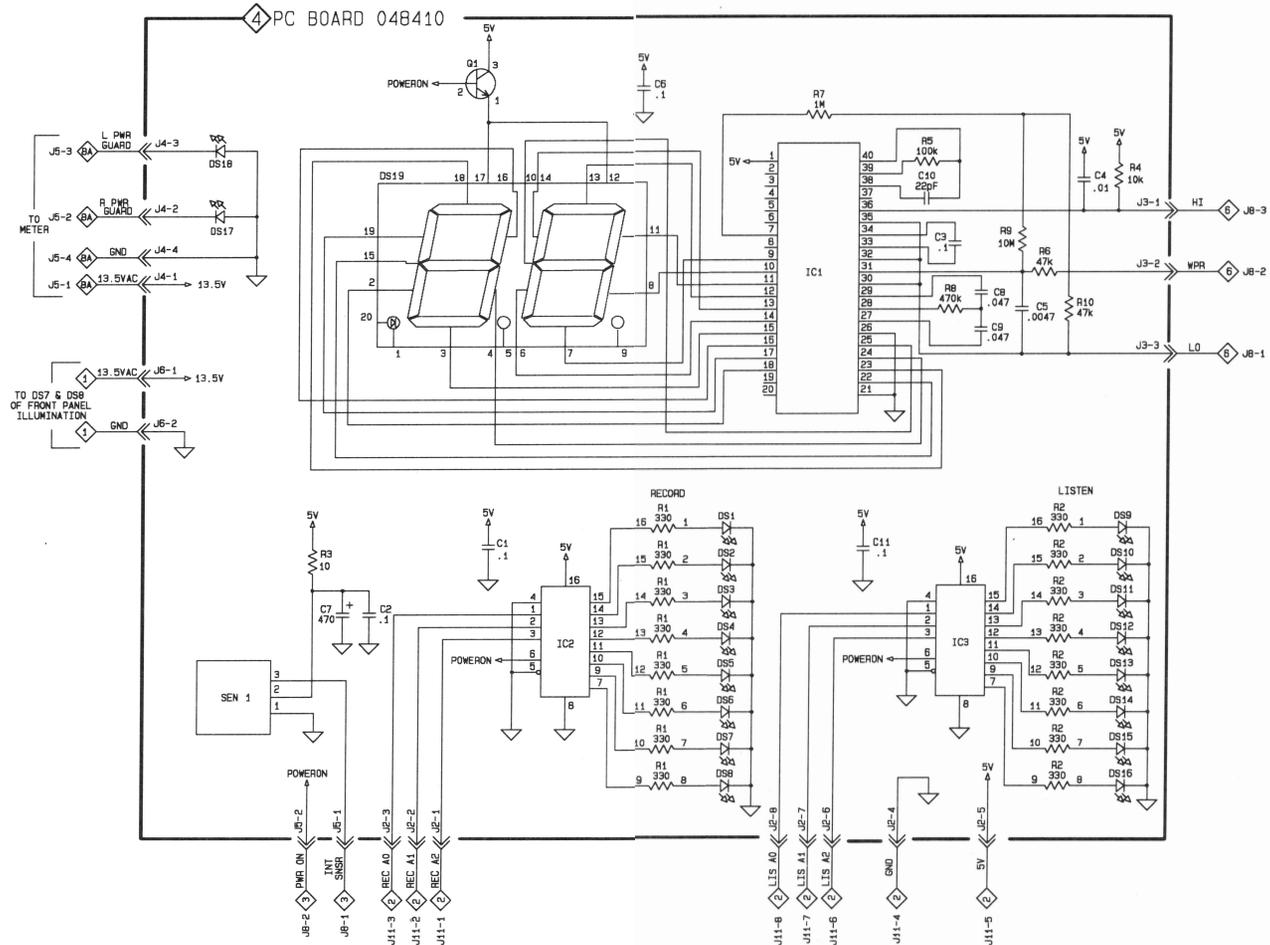
LISTEN SWITCH PARTS LIST

Symbol	Part	Description
SWITCHES		
S9	146249	Input Selector Switch

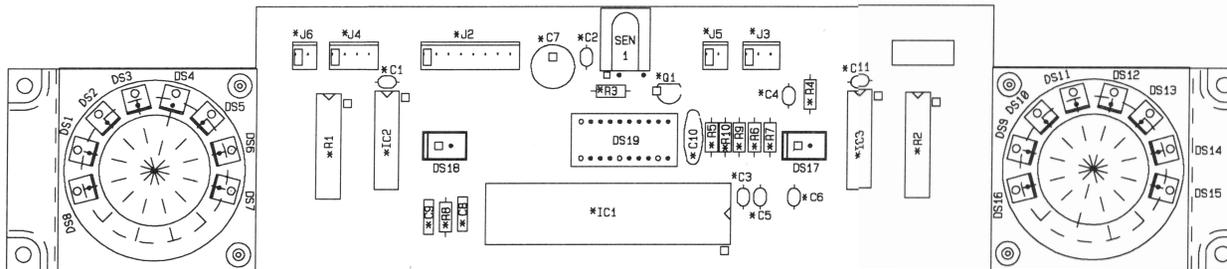
CONTROL BRD. PARTS LIST

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, NE556N
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

4 Display



ASTERISKED (*) COMPONENTS
LOCATED ON THE REVERSE OR
BACKSIDE OF THE BOARD

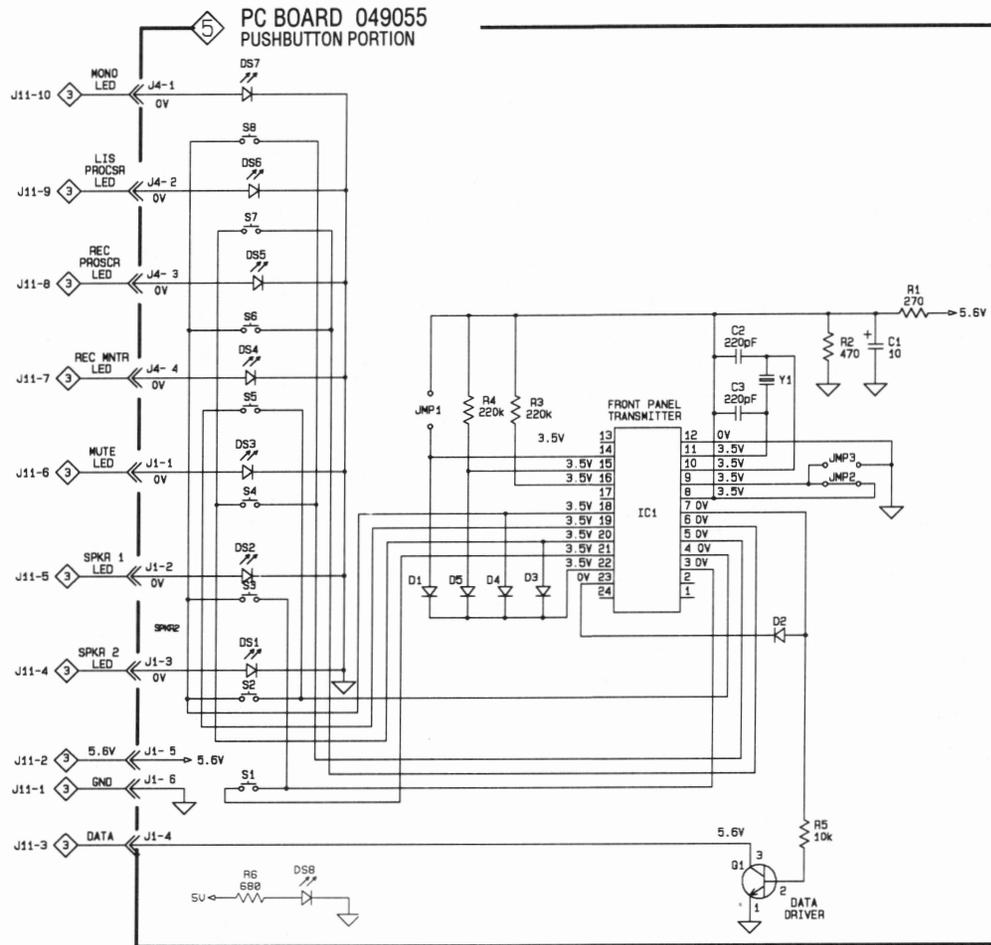


DISPLAY PCB 048410

DISPLAY PARTS LIST

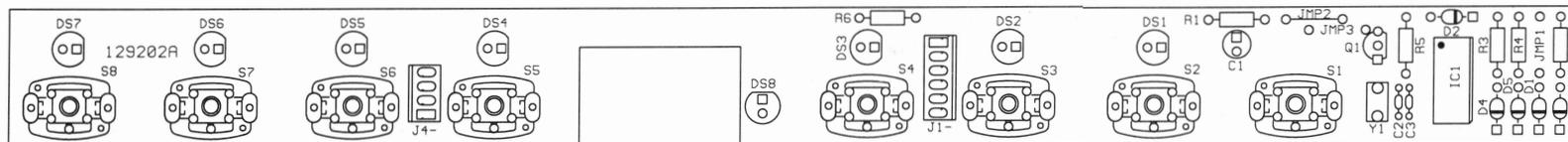
Symbol	Part	Description
INTEGRATED CIRCUITS		
IC1	133152	3-1/2 Digit A/D Converter, TSC7107CPL
IC2, IC3	133170	3 to 8 Line Decoder, Latch, 74HC237N
LIGHTING DEVICES		
DS1-DS16	058109	LED, Red, SBR551SQR
DS17, DS18	058121	LED, Amber Bar, MV15-3101
DS19	058129	LED, 2-Digit Display, Red

Pushbutton 5

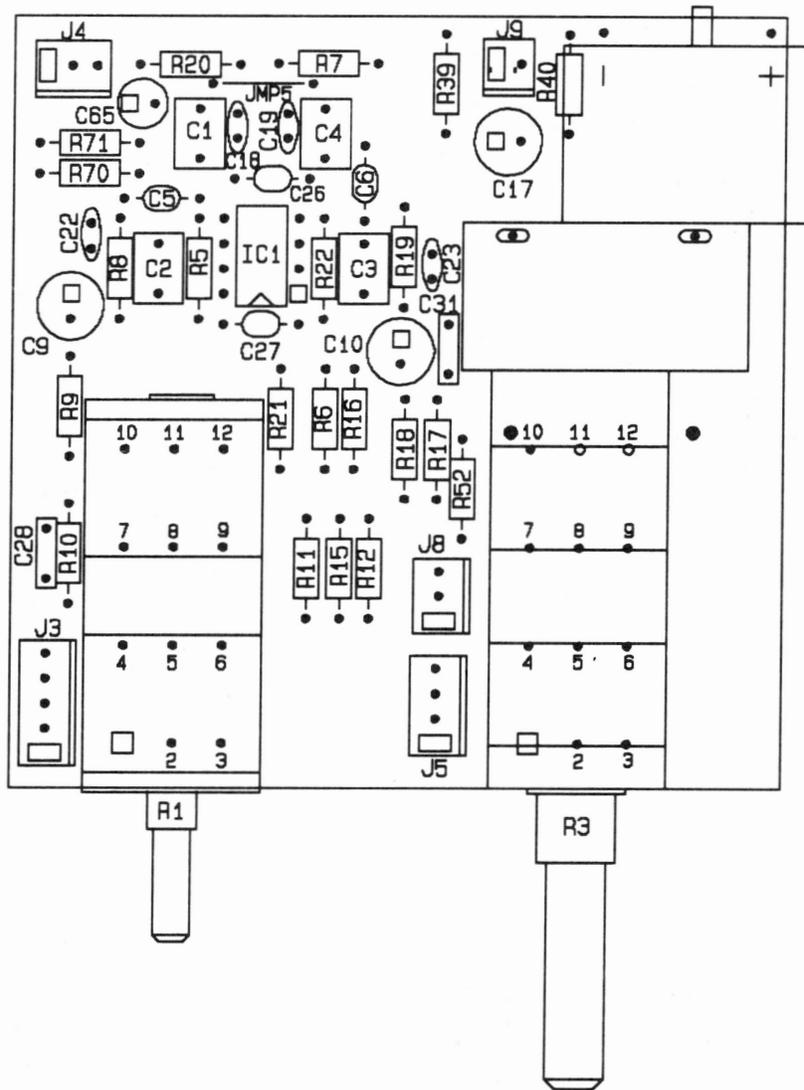


PUSHBUTTON PARTS LIST

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**

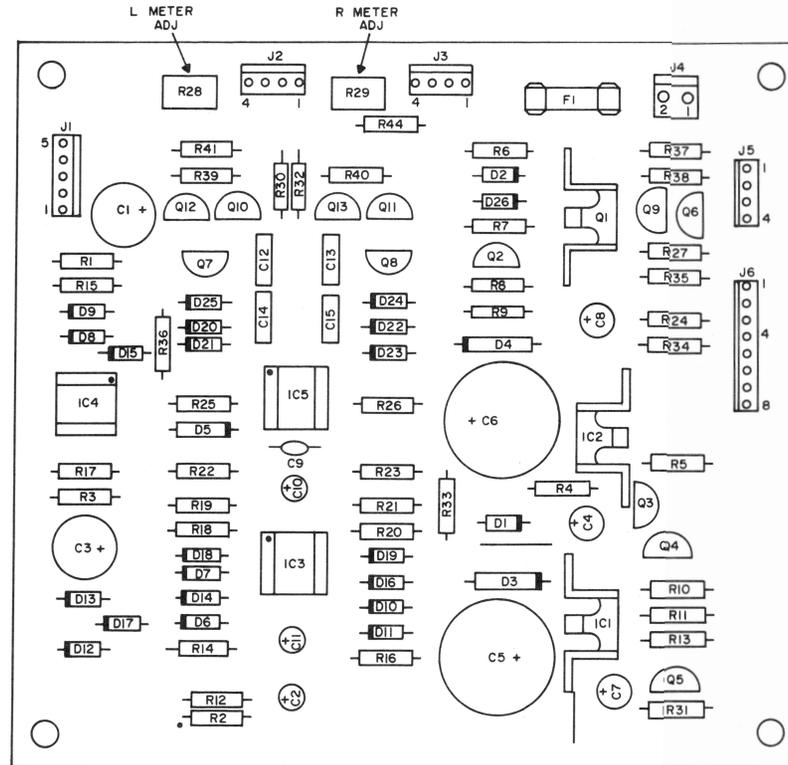
**VOL./LDNS./BAL.
PARTS LIST**

<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

8 Meter/Regulator

METER REGULATOR PARTS LIST

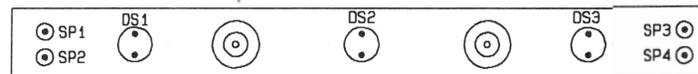
Symbol	Part	Description
DIODES		
D1	070047	SIG, 75V, 100mA, 1N4148
D2	070099	ZN, 12V, 5%, 500mW, 1N5242B
D3,D4	070131	RECT, 400V, 1A, 1N4004
D5	070085	ZN, 6.2V, 5%, 500mW, 1N5234B
D6-D22	070047	SIG, 75V, 150mA, 1N4148
FUSES		
F1	089052	Fuse, SB, 1.5A, 250V, 2AG
INTEGRATED CIRCUITS		
IC1	133156	+12V Regulator, 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

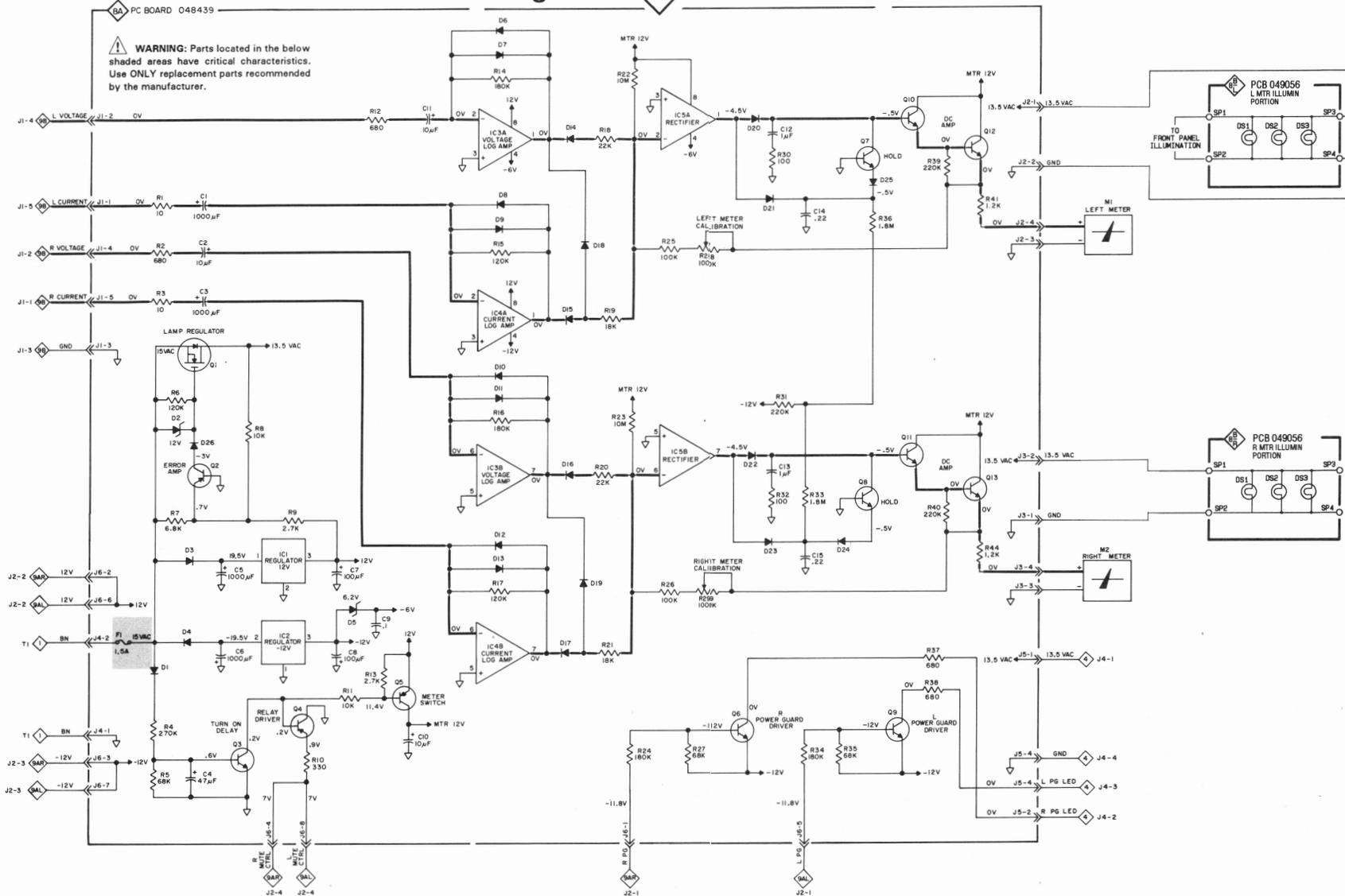


**LEFT & RIGHT
METER ILLUMINATION
OF PCB 049056**

Meter/Regulator 8

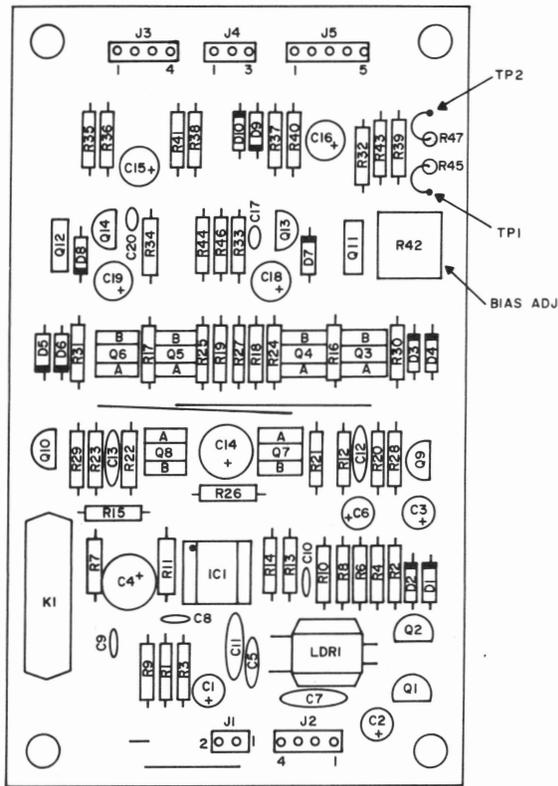
BA PC BOARD 048439

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



9

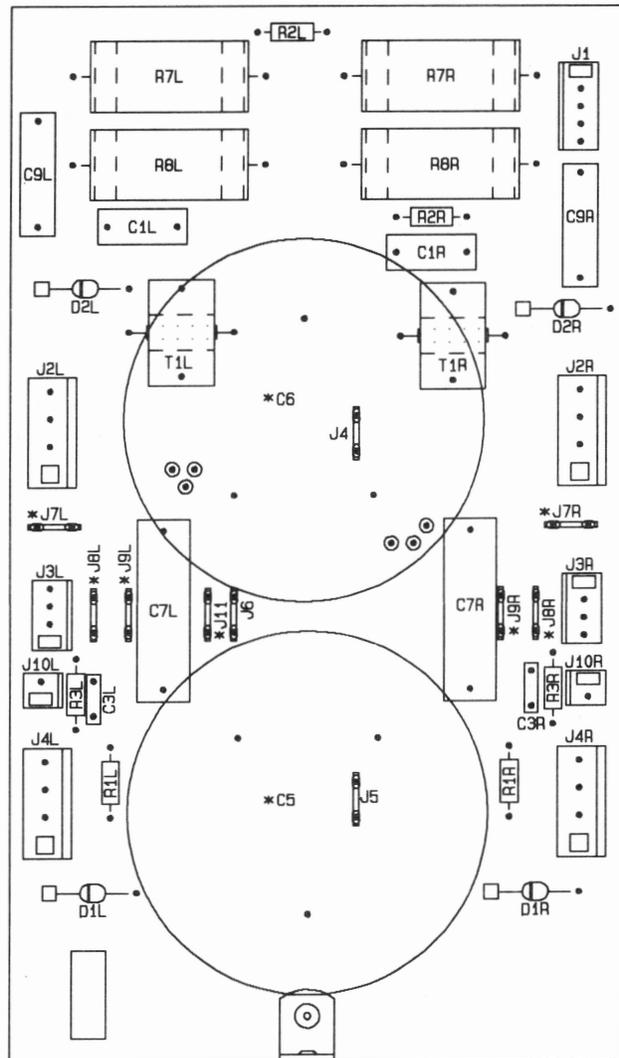
Amplifier



**LEFT & RIGHT
POWER DRIVER
PCB 047359**

POWER DRIVER LEFT AND RIGHT PARTS LIST

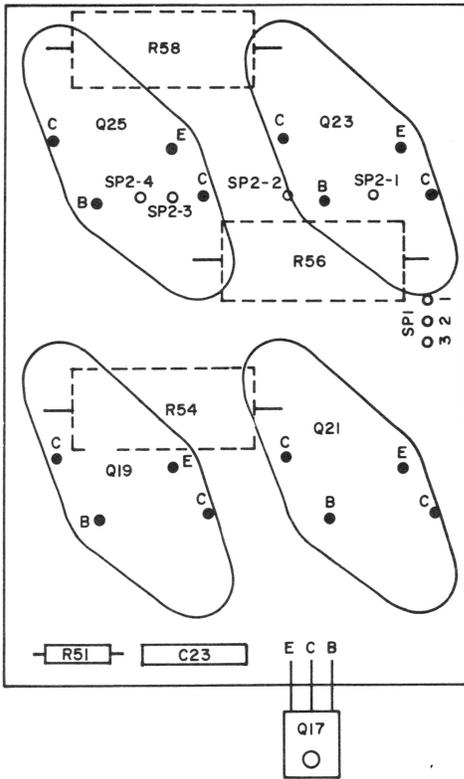
Symbol	Part	Description
DIODES		
D1-D10	070047	SIG, 75V, 150mA, 1N4148
INTEGRATED CIRCUITS		
IC1	133094	Dual Op Amp, NE5532N
RELAYS		
K1	087050	SPST, 5VDC, Reed, HE3321A0400
RESISTORS (LIGHT DEPENDENT)		
LDR1	144179	LDR, VTL5C9
TRANSISTORS		
Q1, Q2	132224	PNP, MPS4126
Q3	132253	PNP, Dual, 2SA1237G
Q4	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



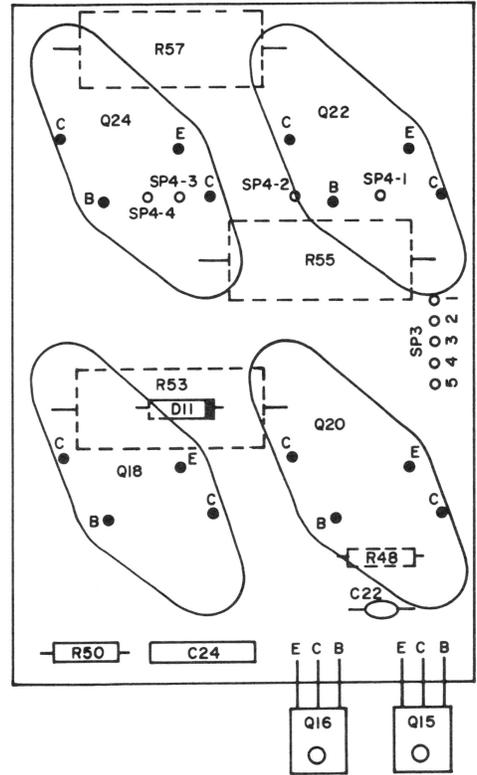
CAPACITOR PCB 048433

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**

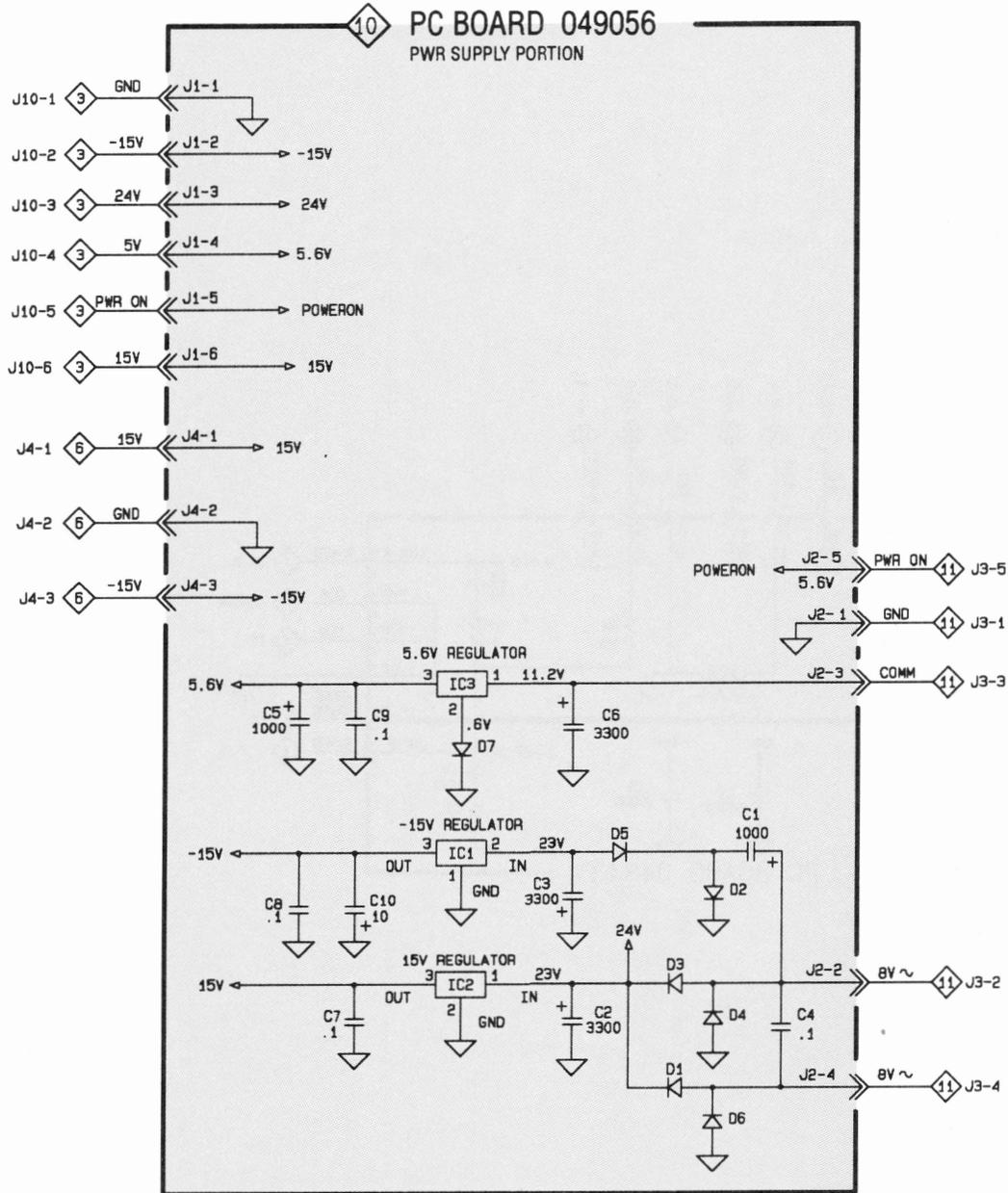
Symbol	Part	Description
TRANSISTORS		
Q17	132249	PNP, 2SA1480D OR E
Q19	132247	PNP, MJ15021
Q21	132213	PNP
Q23	132213	PNP
Q25	132213	PNP

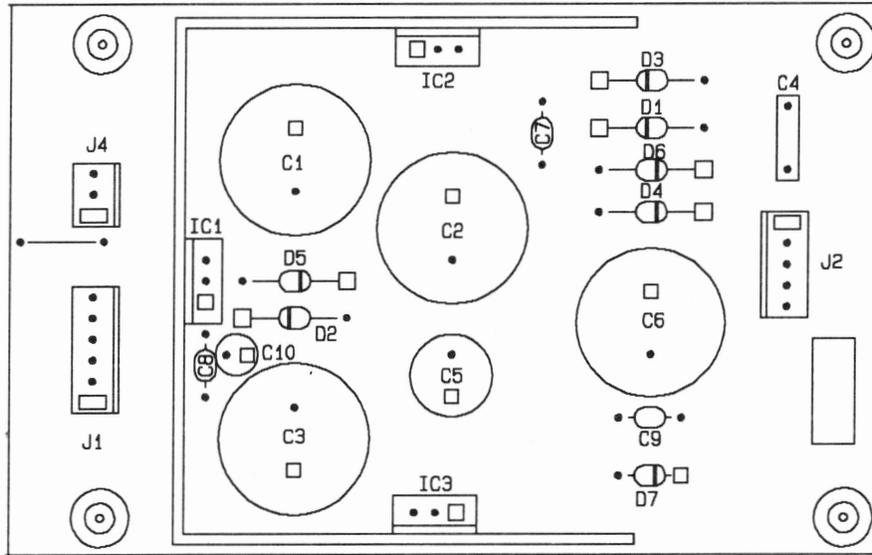
**POSITIVE HEATSINK
LEFT AND RIGHT
PARTS LIST**

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

10 Power Supply

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



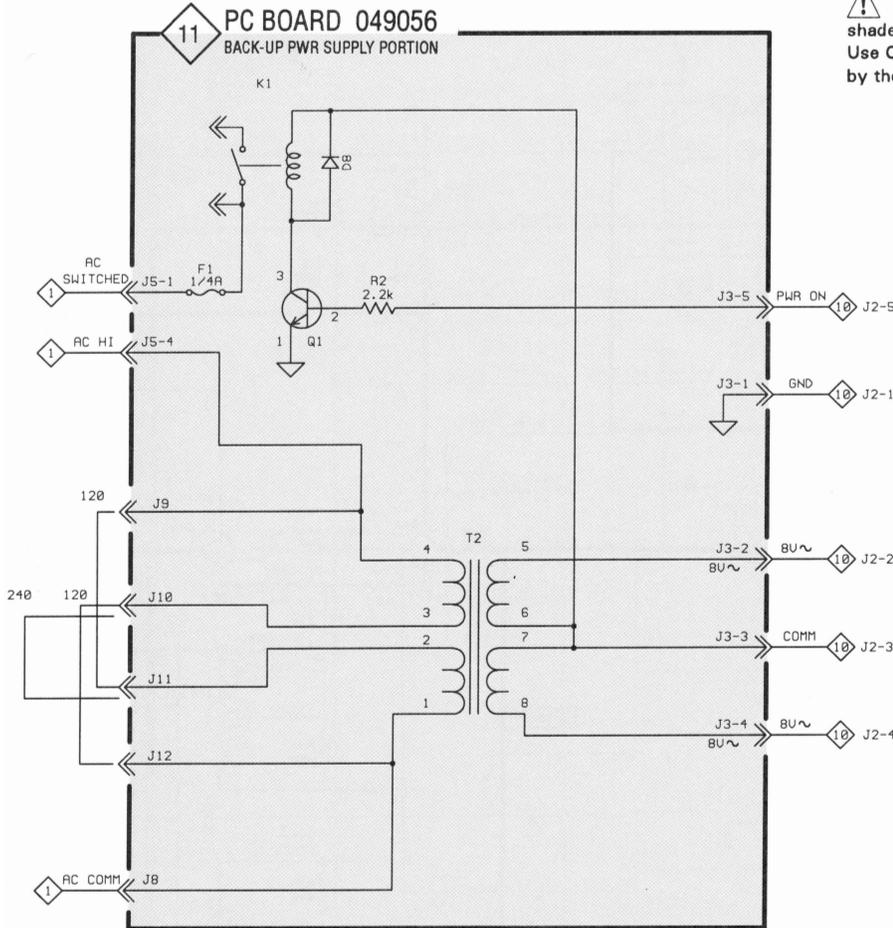


**POWER SUPPLY
PORTION OF
PCB 049056**

**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

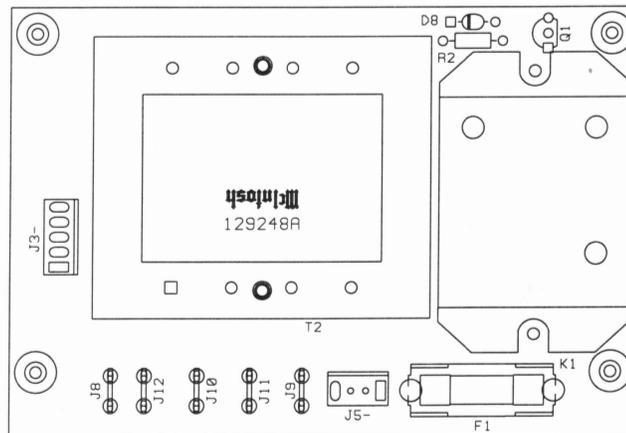
11 Back-up Power Supply



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

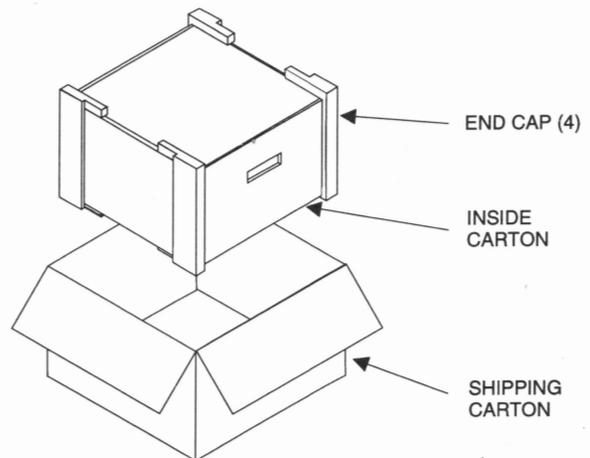
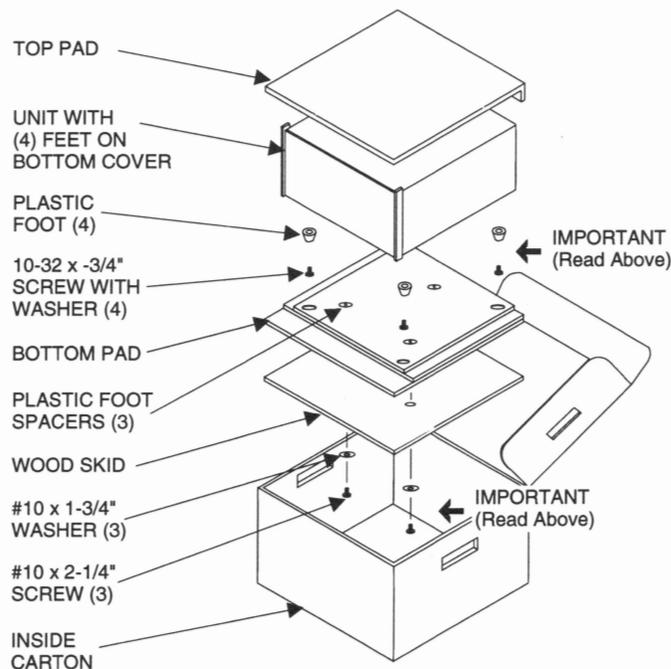
In the event it is necessary to repack the unit for shipment, the unit must be packed exactly as shown below.

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

The continuous improvement of its products is the policy of McIntosh Laboratory Incorporated, who reserve the right to improve design without notice. Because of the constant upgrading of McIntosh products' circuitry and components, the Company cannot insure, and does not warrant, the accuracy of the within schematic material, which is intended for information only.