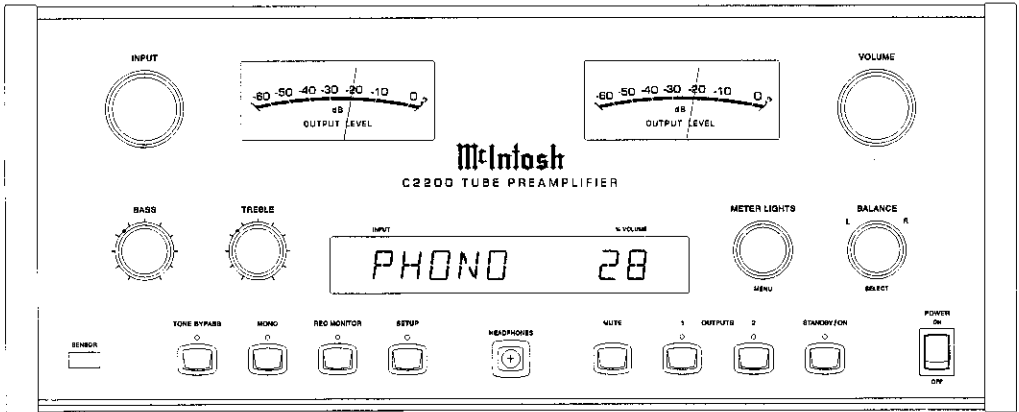




# C2200

## TUBE PREAMPLIFIER



### CONTENTS

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# SERVICE MANUAL

# PERFORMANCE SPECIFICATIONS

## Frequency Response

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

## Total Harmonic Distortion

0.08% from 20Hz to 20,000Hz

## Signal To Noise Ratio

Phono, 80dB

High Level, 93dB

## Maximum Voltage Output

8Vrms Unbalanced, 16Vrms Balanced

## Output Impedance

250 ohms Unbalanced, 500 ohms Balanced

## Sensitivity

Phono MM, 4.4mV for 2.5V rated output

High Level, 450mV for 2.5V rated output

## Input Impedance

Phono MM, 47k ohms, 65pF

High Level, 22k Unbalanced, 47k Balanced

## Maximum Input Signal

Phono MM, 50mV @ 1,000Hz

High Level, 5V Unbalanced, 10V Balanced

## Power Requirements

100 Volts, 50/60Hz at 70 watts

110 Volts, 50/60Hz at 70 watts

120 Volts, 50/60Hz at 70 watts

220 Volts, 50/60Hz at 70 watts

230 Volts, 50/60Hz at 70 watts

240 Volts, 50/60Hz at 70 watts

*Note: Refer to the rear panel of the C2200 for the correct voltage.*

## Tube Compliment

Phono Circuitry:

2 - 12AX7A

2 - 12AT7A

High Level Circuitry:

2 - 12AX7A

2 - 12AT7A


## Overall Dimensions

17-1/2 inches (44.5cm) W, 7-5/8 inches (19.37cm) H, 20 inches (44.5cm) D (including clearance for connectors)

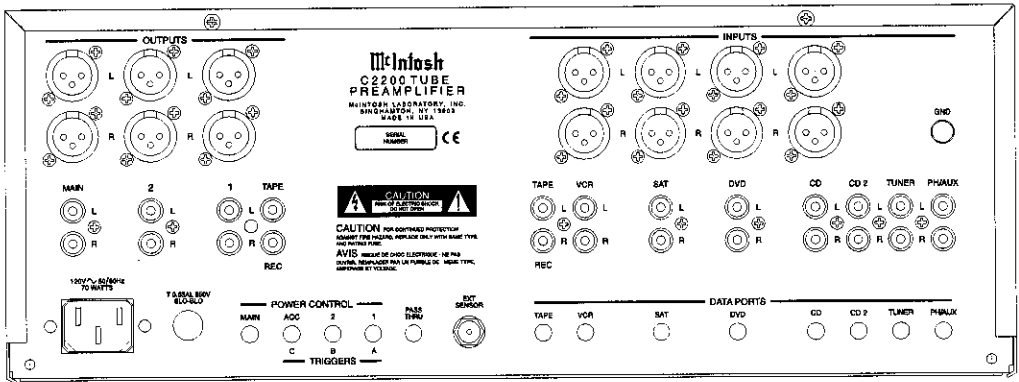
## Weight

26.75 pounds (12.14kg) net, 47.75 pounds (21.67kg) in shipping carton

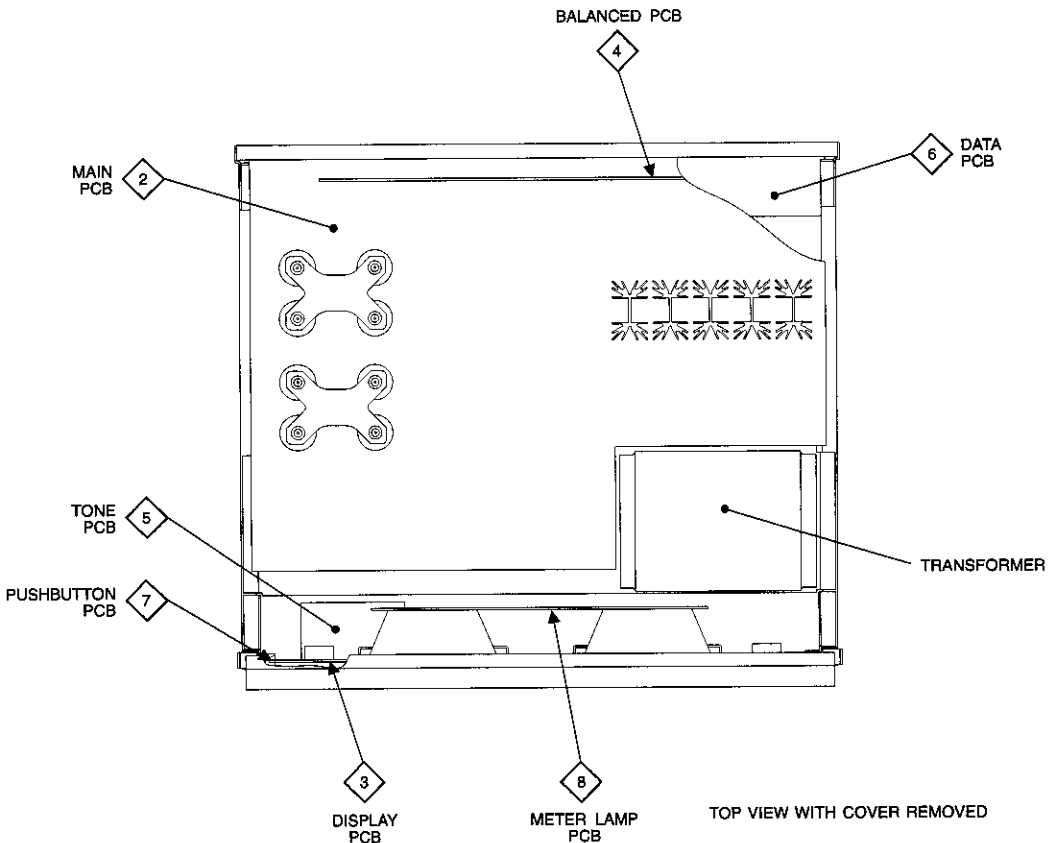
## NOTES

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.
4. On PC board drawings, Square pad indicates:
  - a. Polarized Capacitors - Positive
  - b. Diodes - Cathode
  - c. Others - Pin 1
5. **WARNING**  
Parts marked with the symbol  have critical characteristics. Use only replacement parts recommended by the manufacturer.

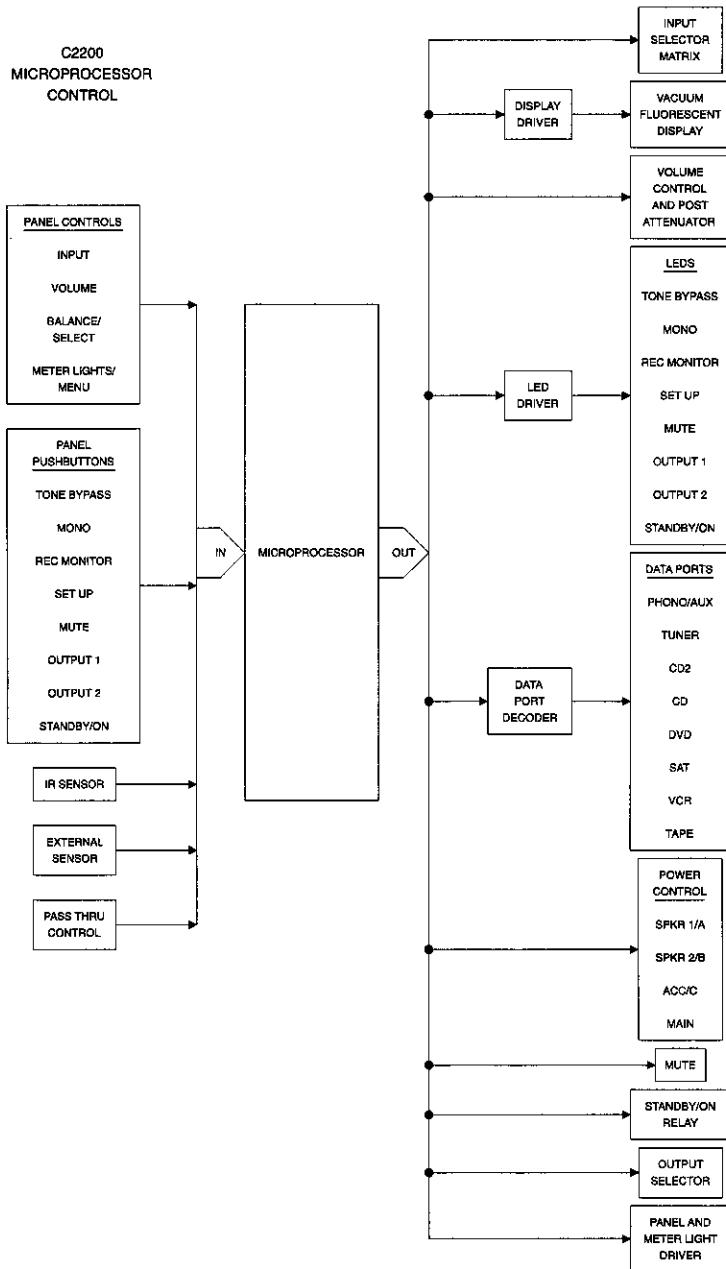
# REAR PANEL



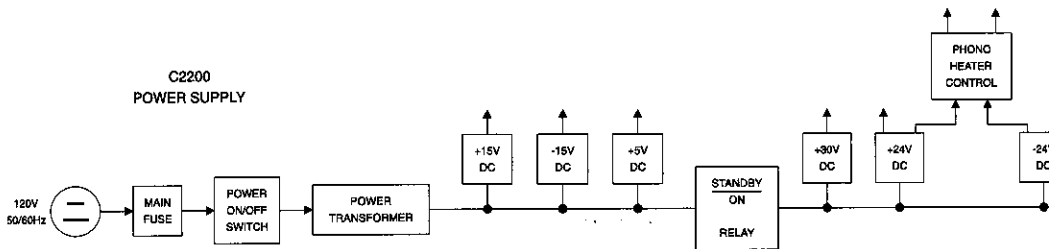
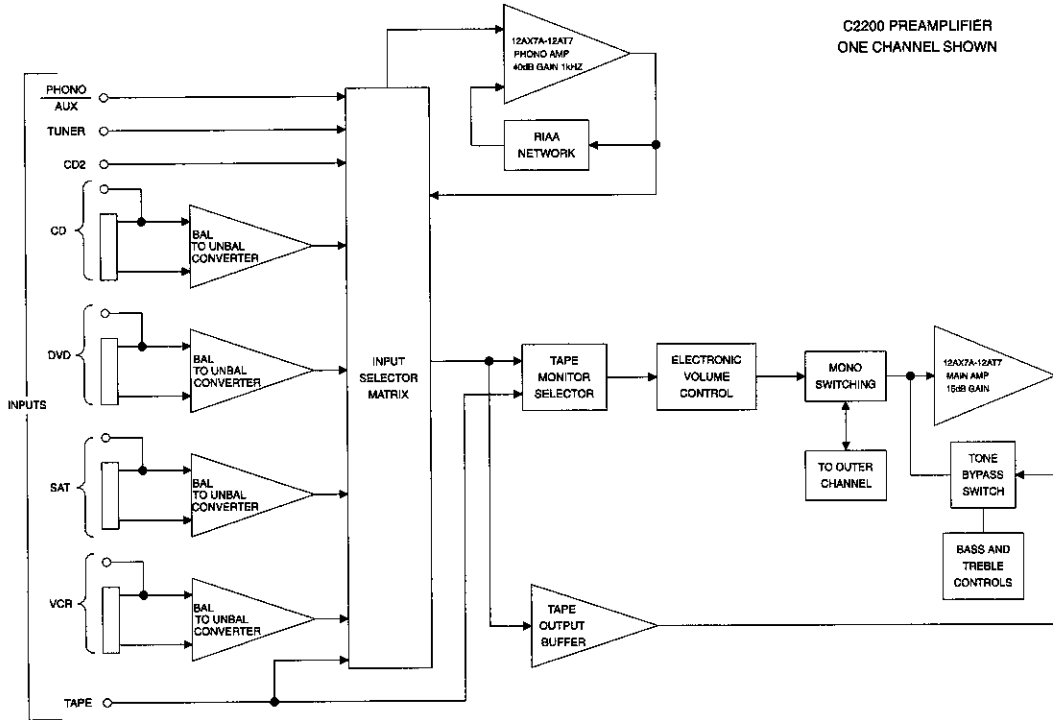
# SECTION LOCATIONS

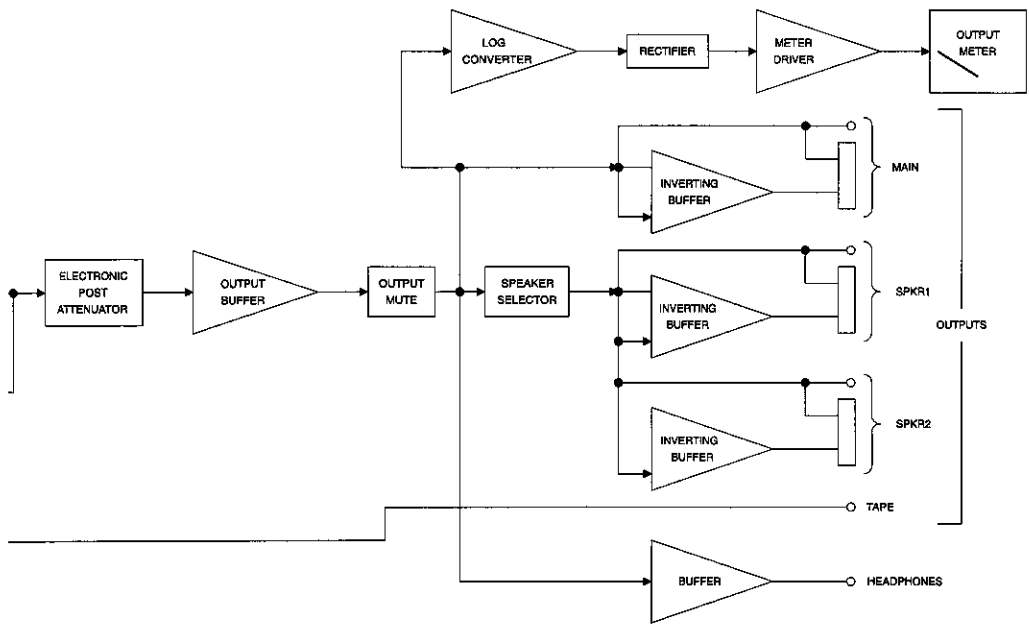


# BLOCK DIAGRAM



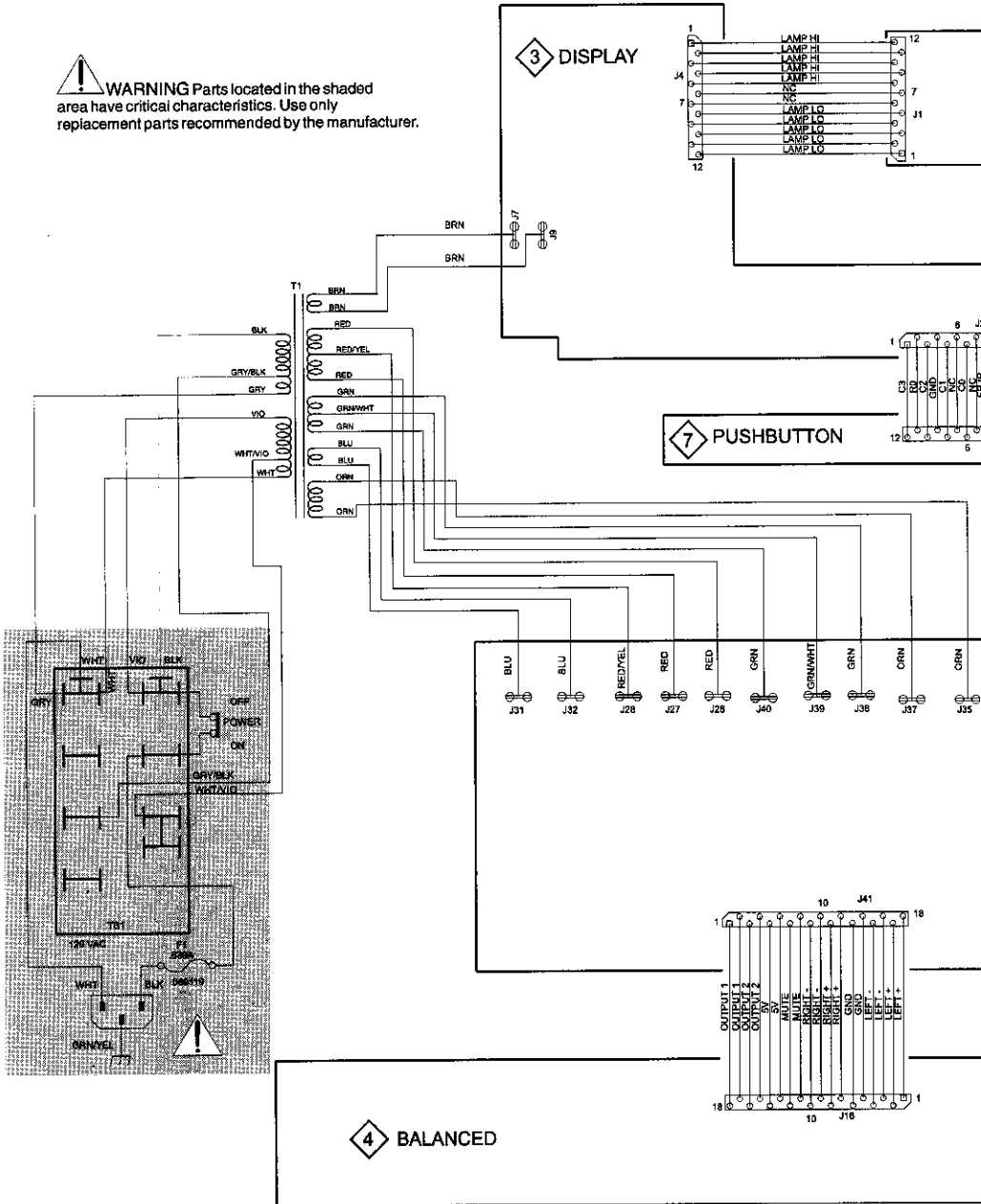
# BLOCK DIAGRAM con't



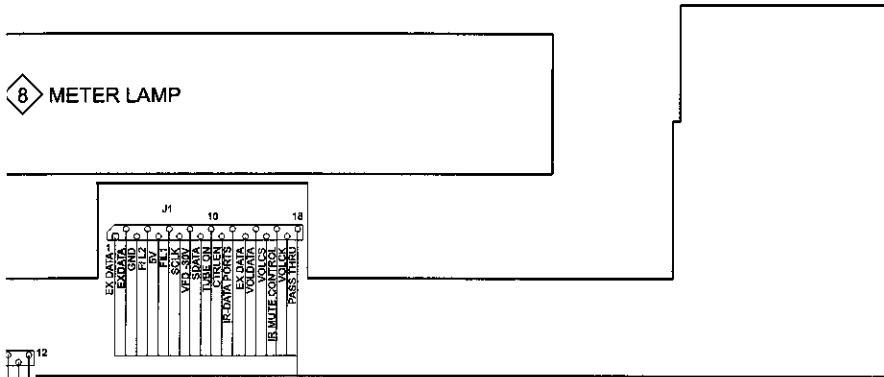


# 1 INTERCONNECT

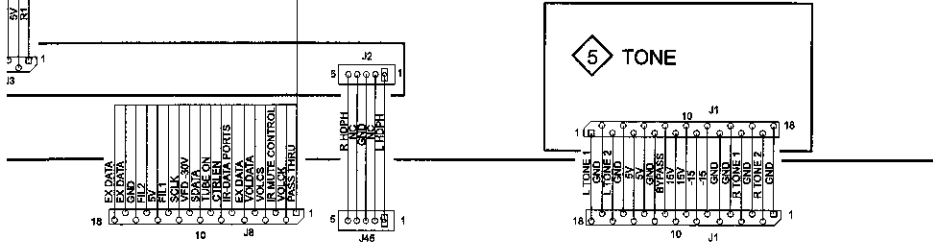
**!** **WARNING** Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.



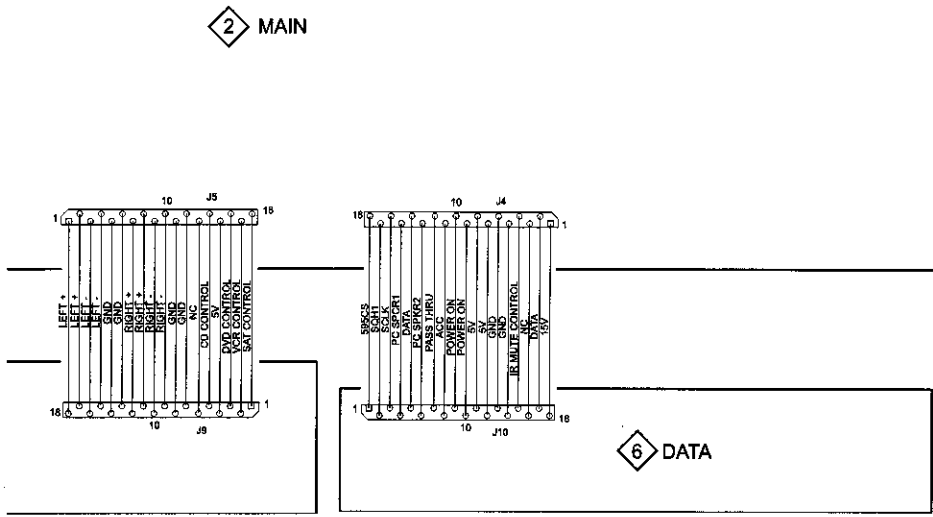
8 METER LAMP



5 TONE



2 MAIN

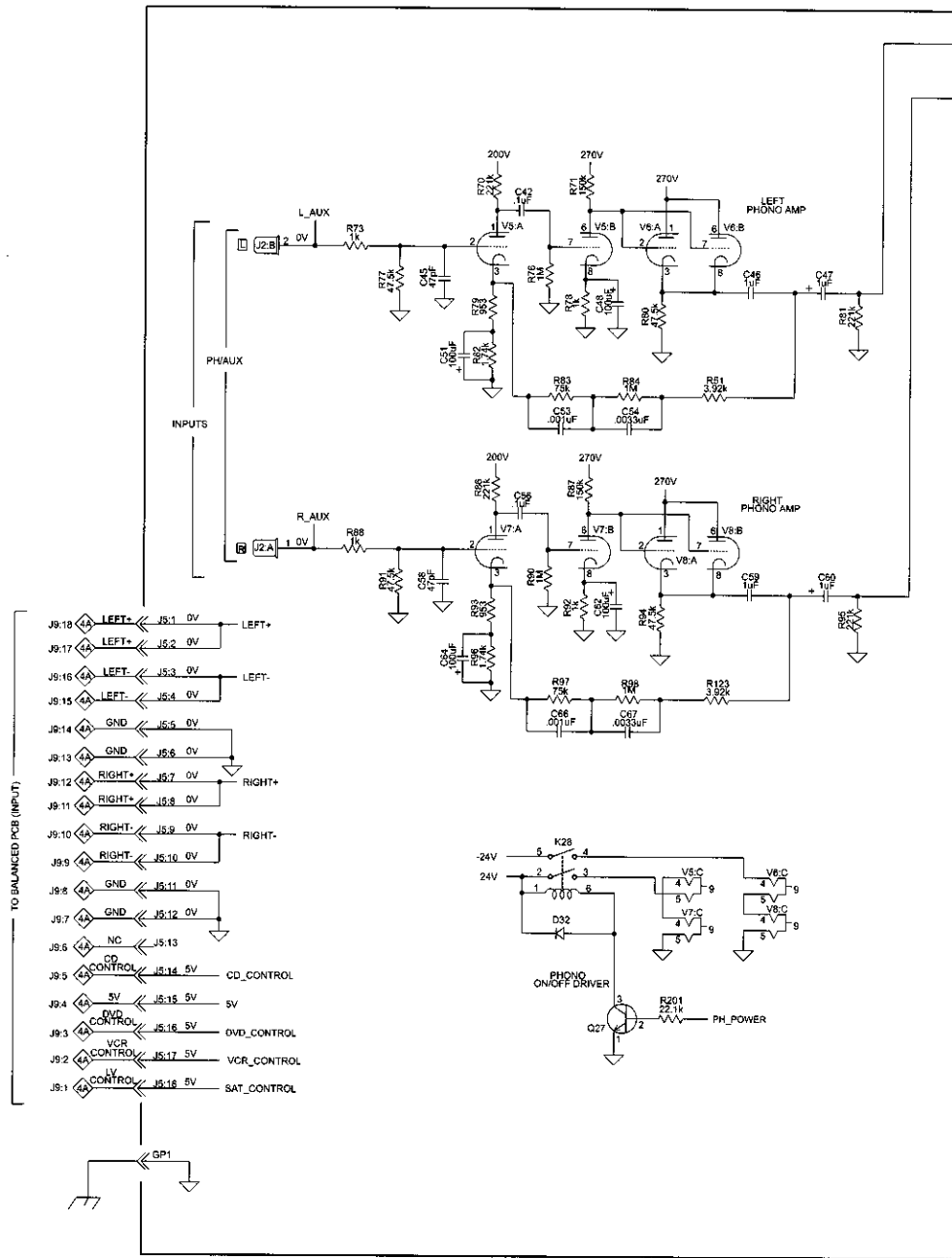


6 DATA

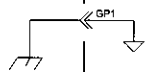


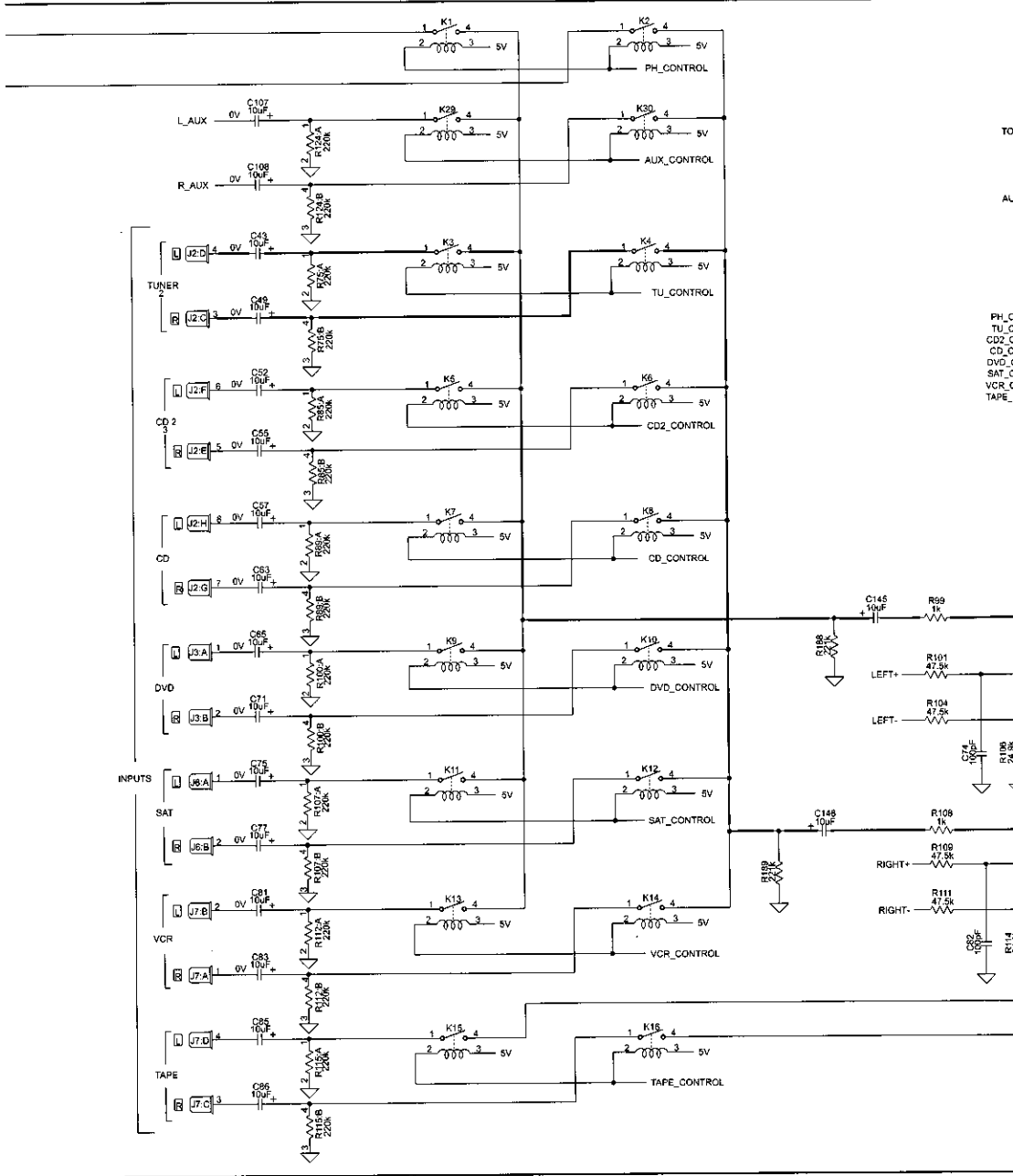
2A

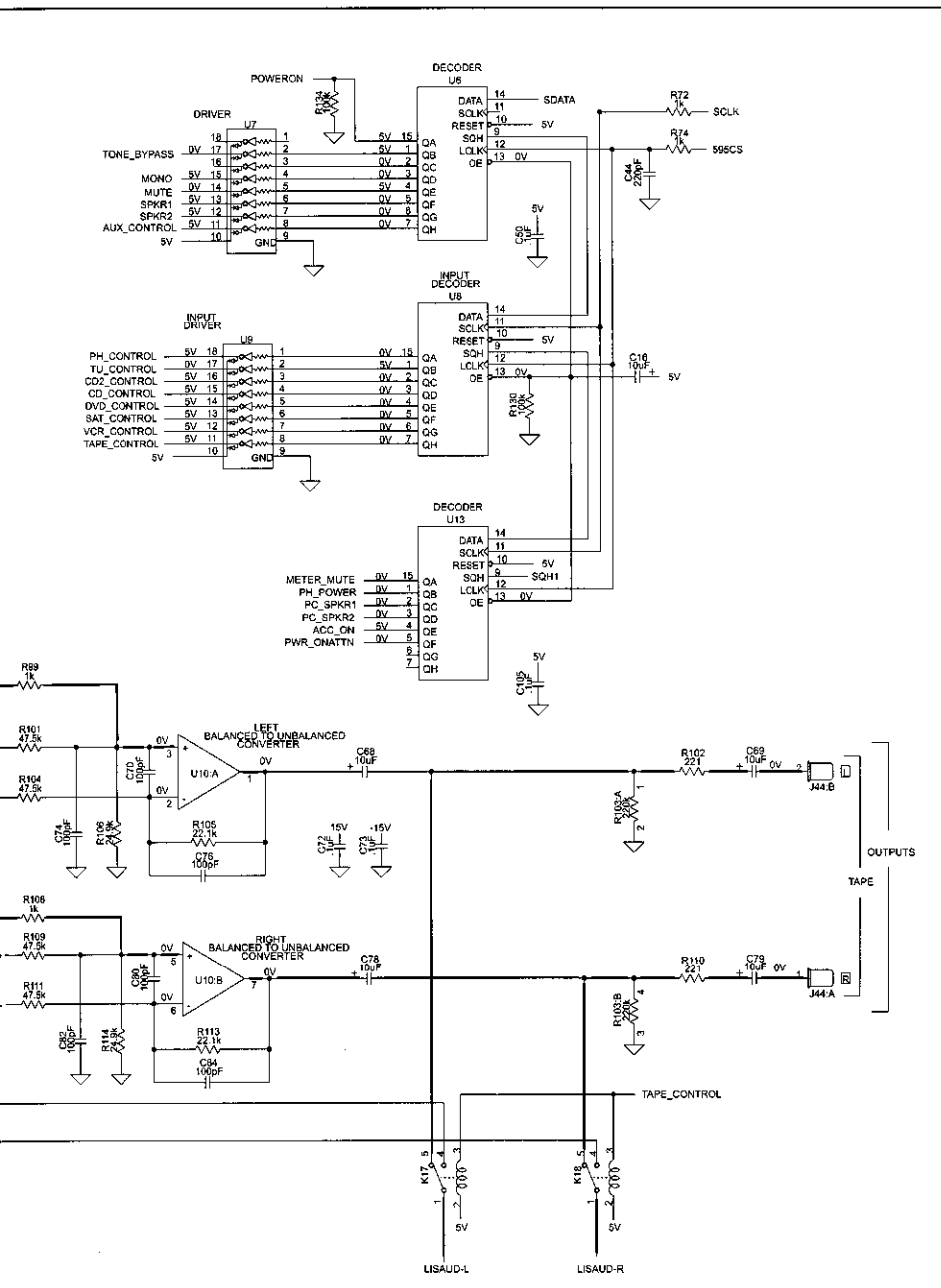
MAIN 049710 SECTION 1 OF 5



- TO BALANCED PCB (INPUT)
- J9:19 4A LEFT- J5:1 0V LEFT+
  - J9:17 4A LEFT+ J5:2 0V
  - J9:16 4A LEFT- J5:3 0V LEFT-
  - J9:15 4A LEFT+ J5:4 0V
  - J9:14 4A GND J5:5 0V
  - J9:13 4A GND J5:6 0V
  - J9:12 4A RIGHT+ J5:7 0V RIGHT+
  - J9:11 4A RIGHT+ J5:8 0V
  - J9:10 4A RIGHT- J5:9 0V RIGHT-
  - J9:9 4A RIGHT- J5:10 0V
  - J9:8 4A GND J5:11 0V
  - J9:7 4A GND J5:12 0V
  - J9:6 4A NC J5:13
  - J9:5 4A CD CONTROL J5:14 5V CD\_CONTROL
  - J9:4 4A 5V J5:15 5V 5V
  - J9:3 4A DVD CONTROL J5:16 5V DVD\_CONTROL
  - J9:2 4A VCR CONTROL J5:17 5V VCR\_CONTROL
  - J9:1 4A TV CONTROL J5:18 5V SAT\_CONTROL

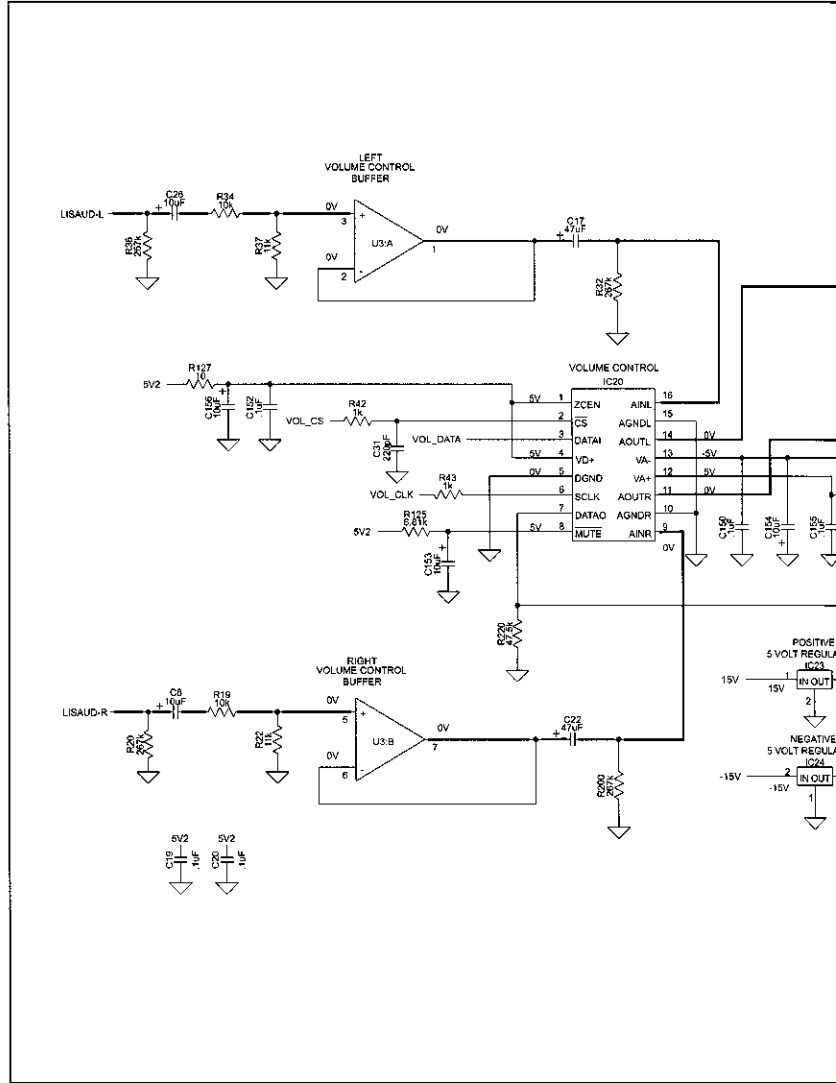


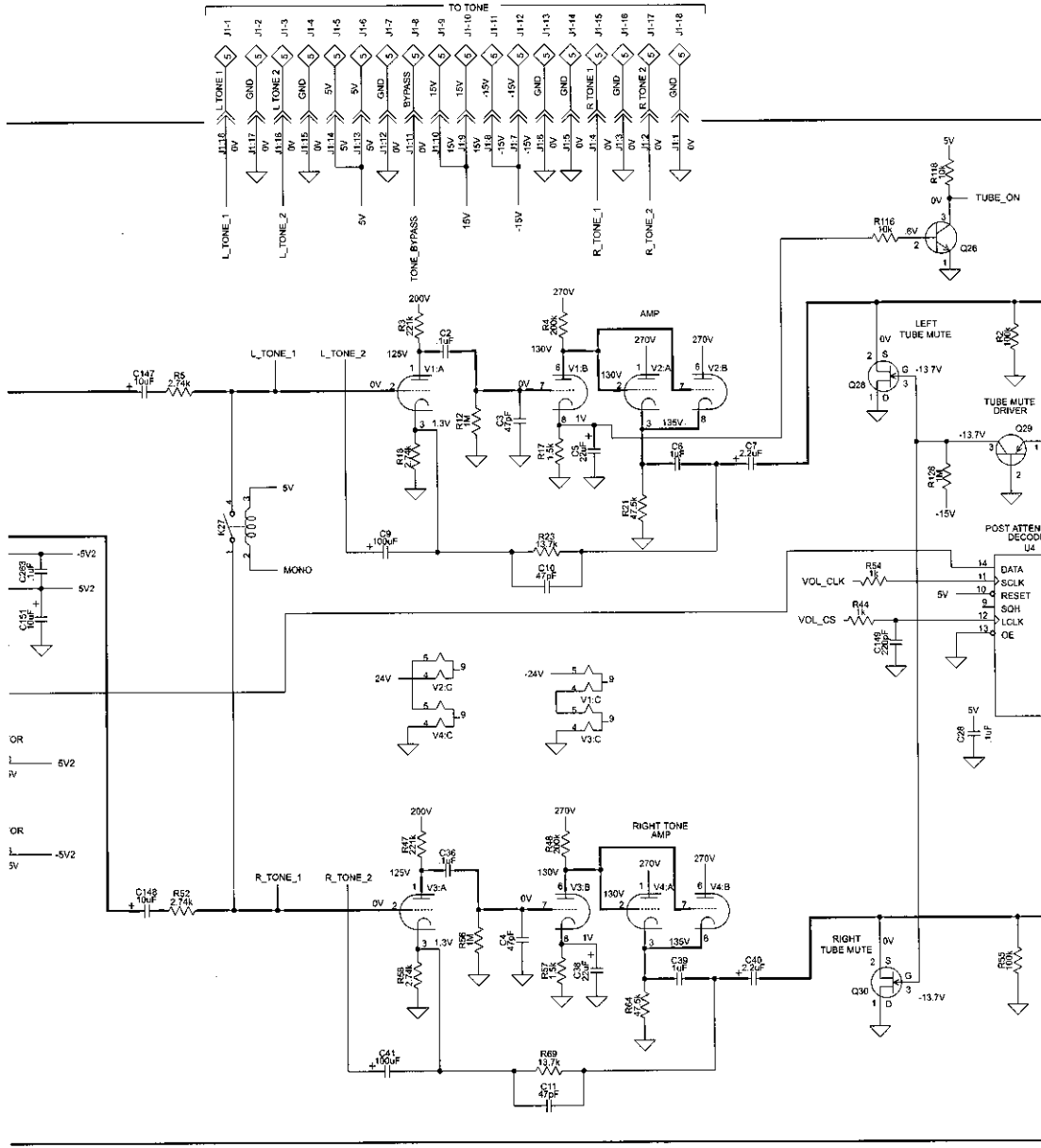


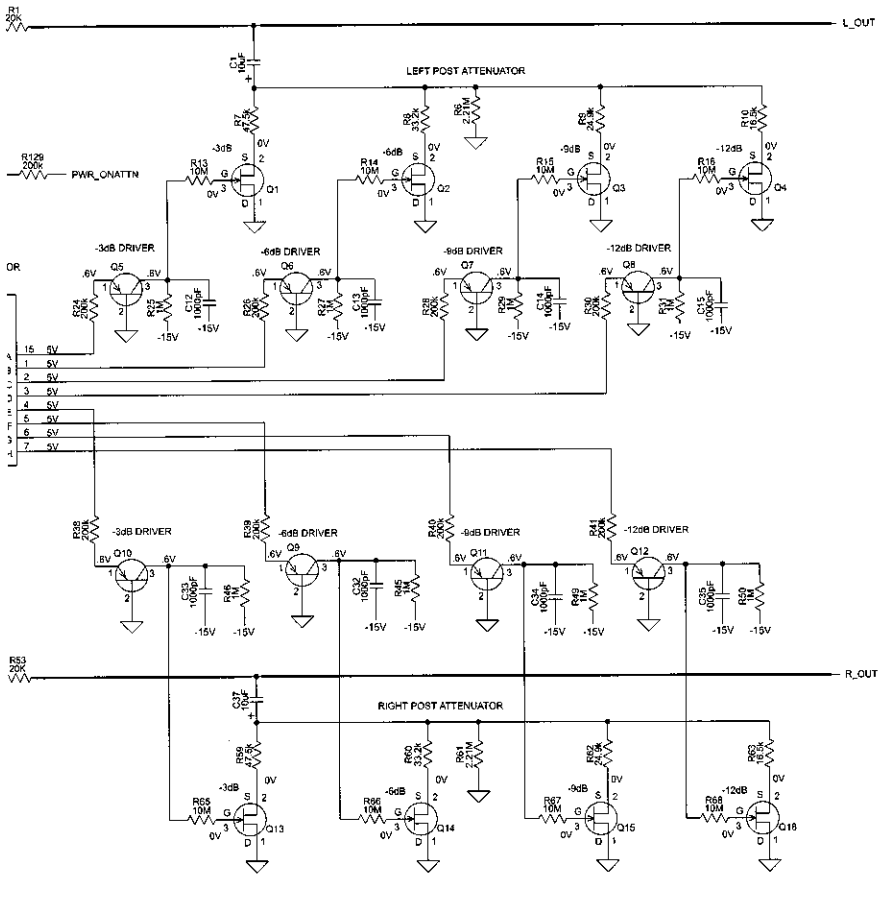




MAIN 049710 SECTION 2 OF 5

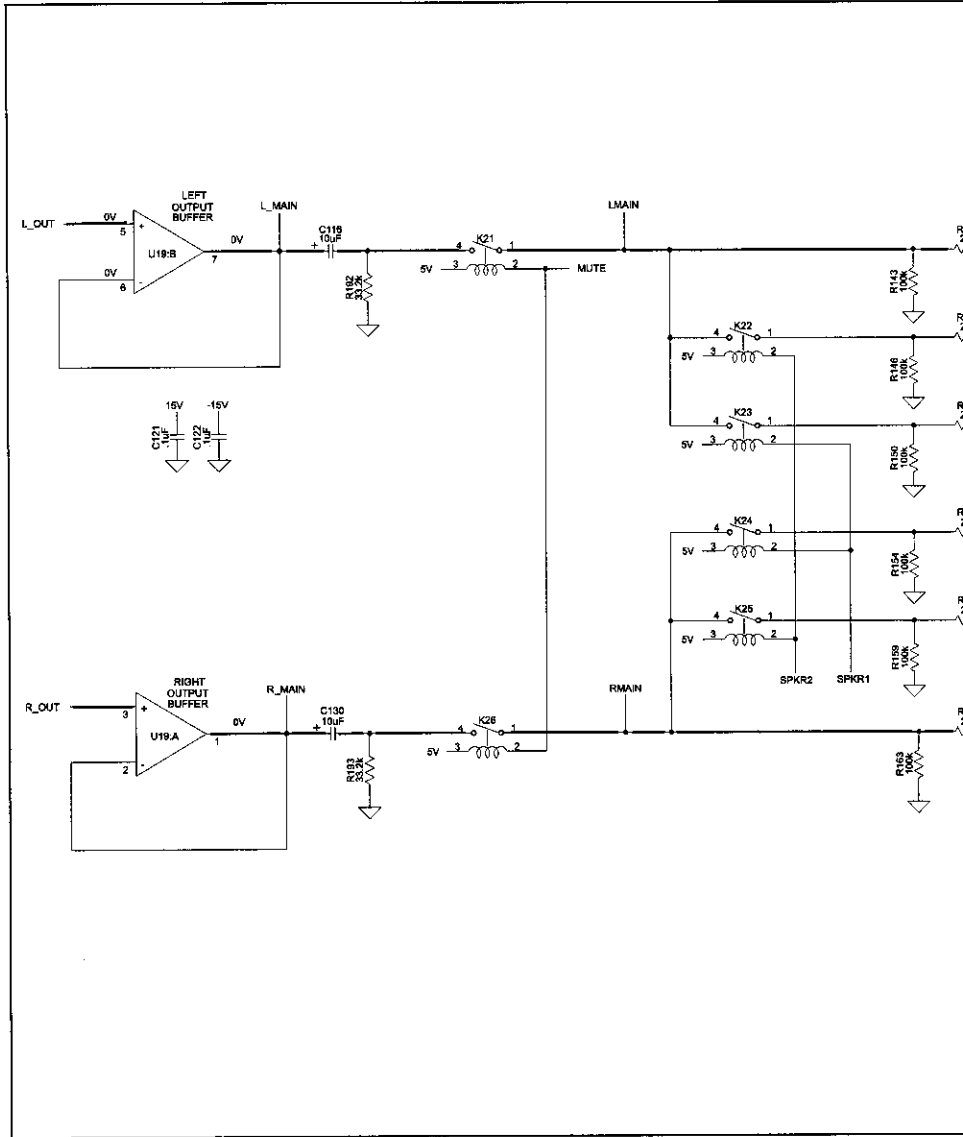


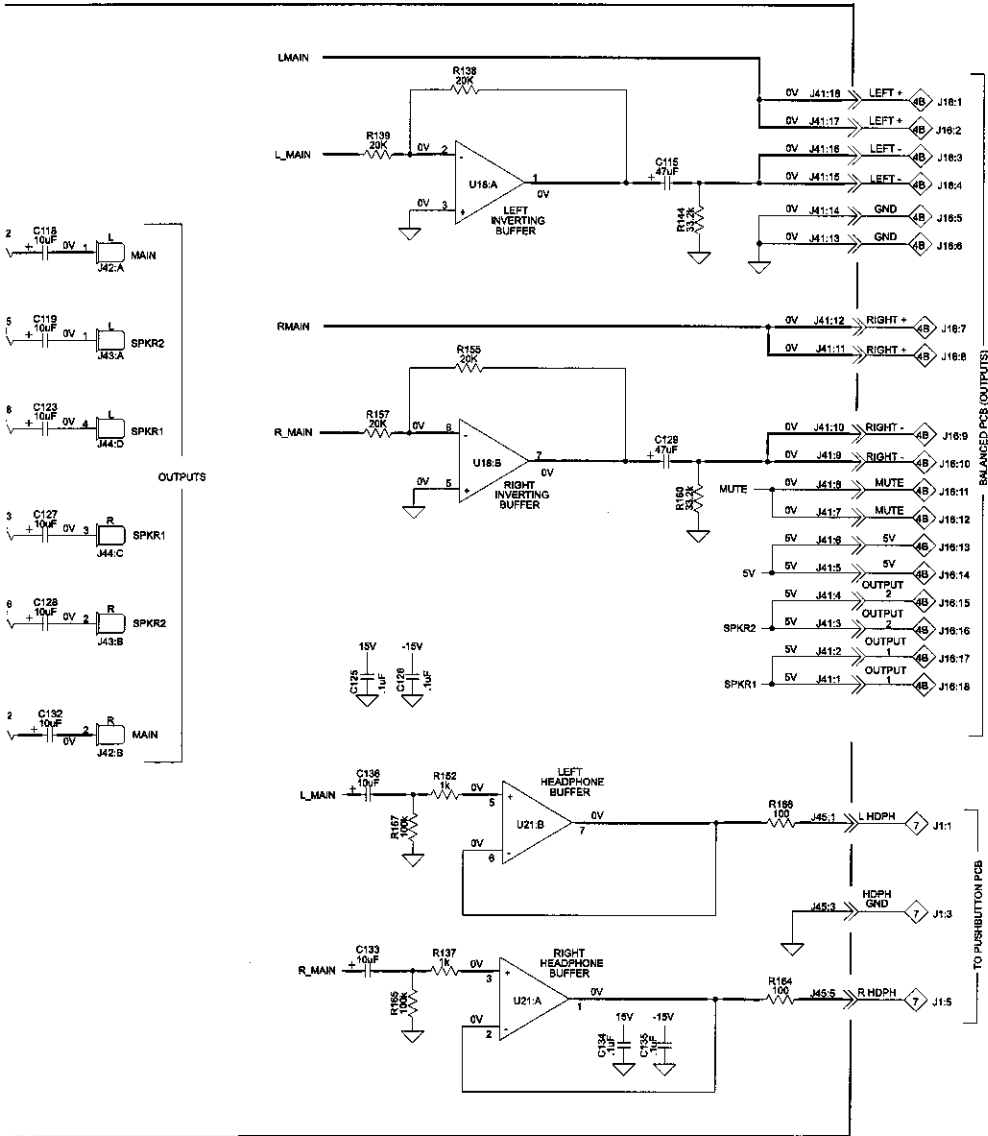






MAIN 049710 SECTION 3 OF 5

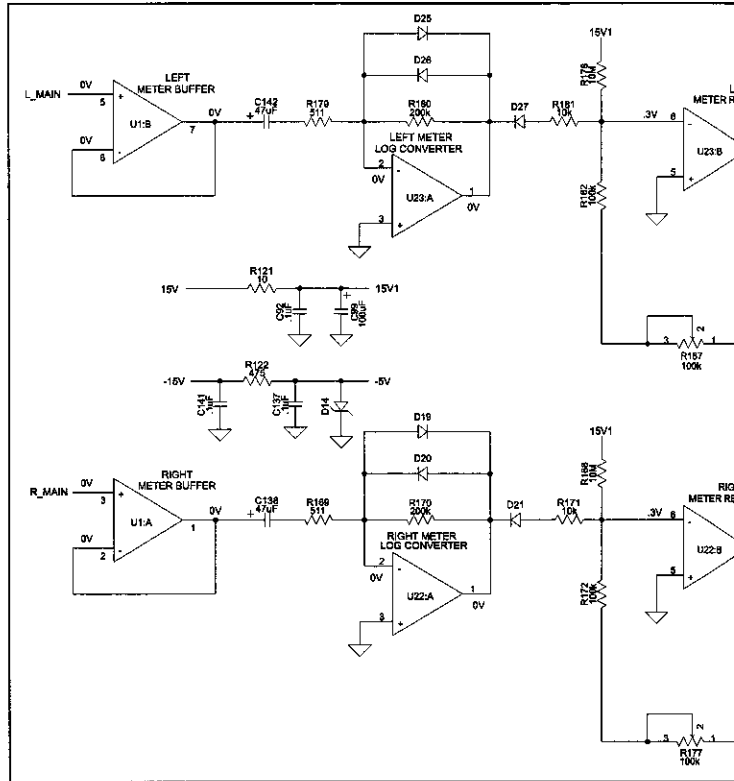


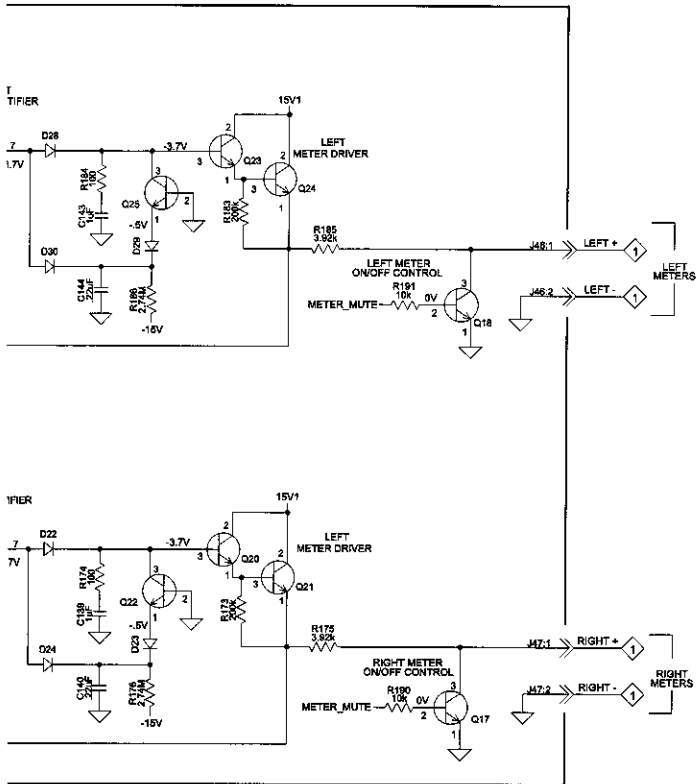




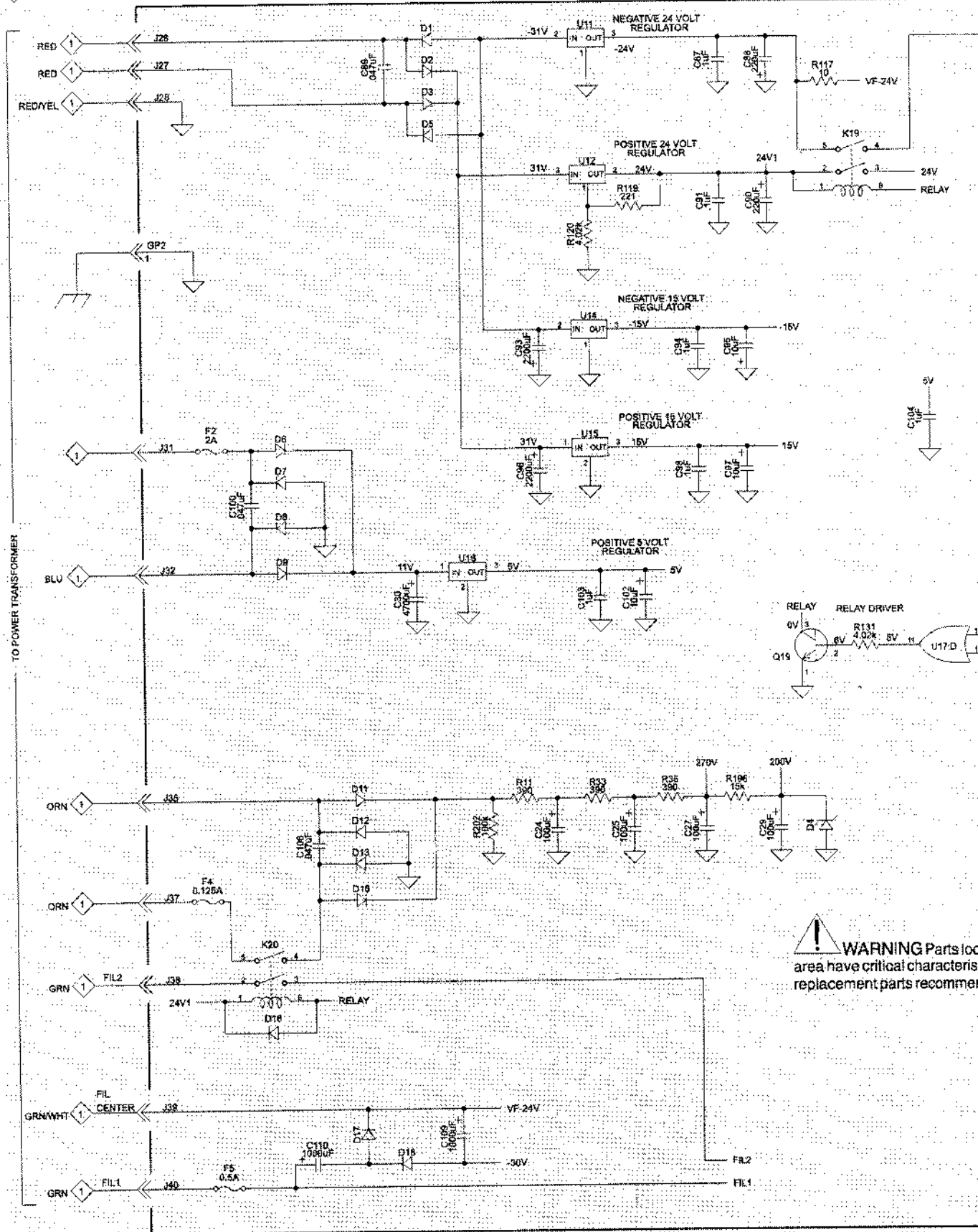


# MAIN 049710 SECTION 4 OF 5

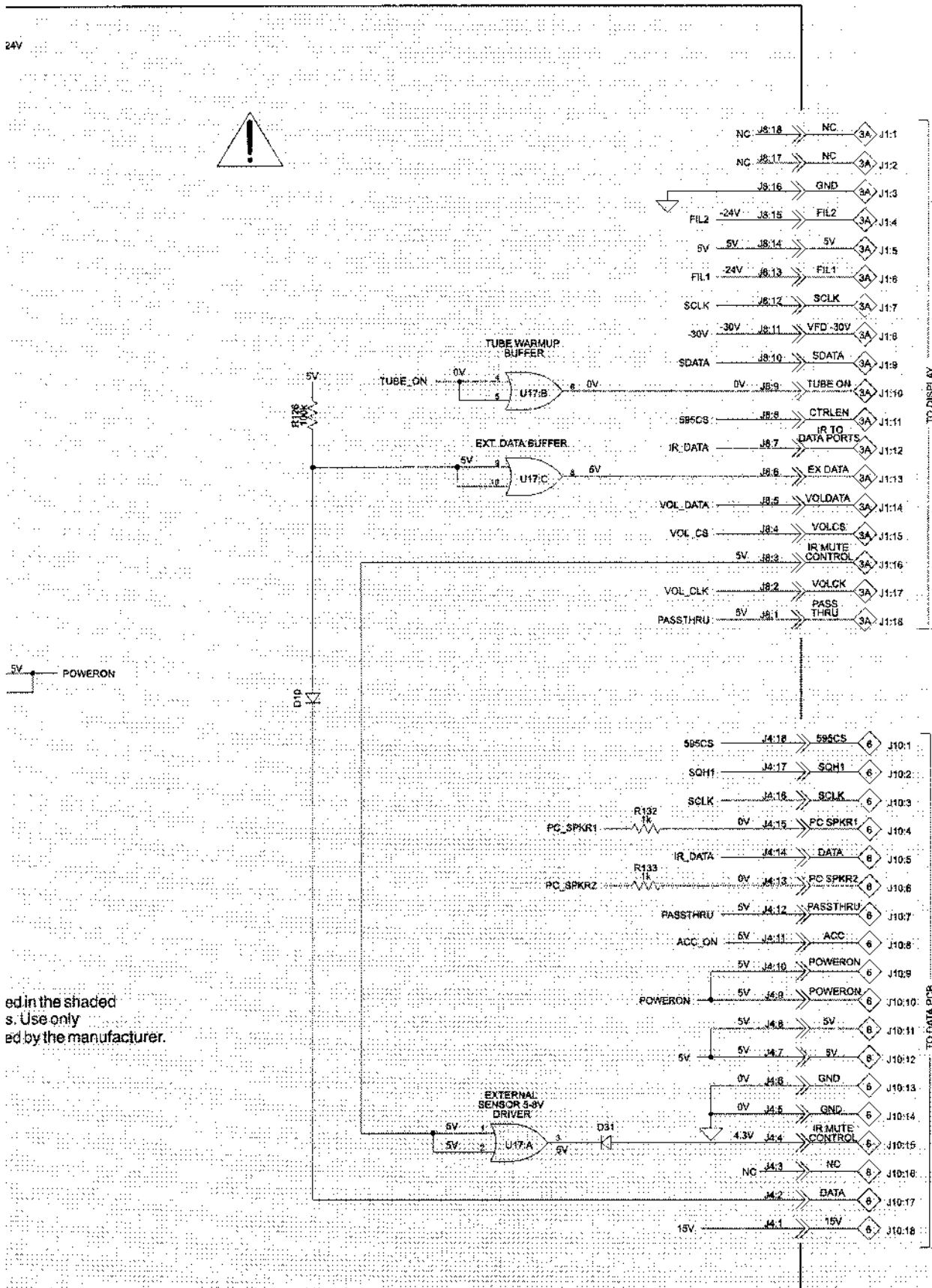




# 2E MAIN 049710 SECTION 5 OF 5




24V

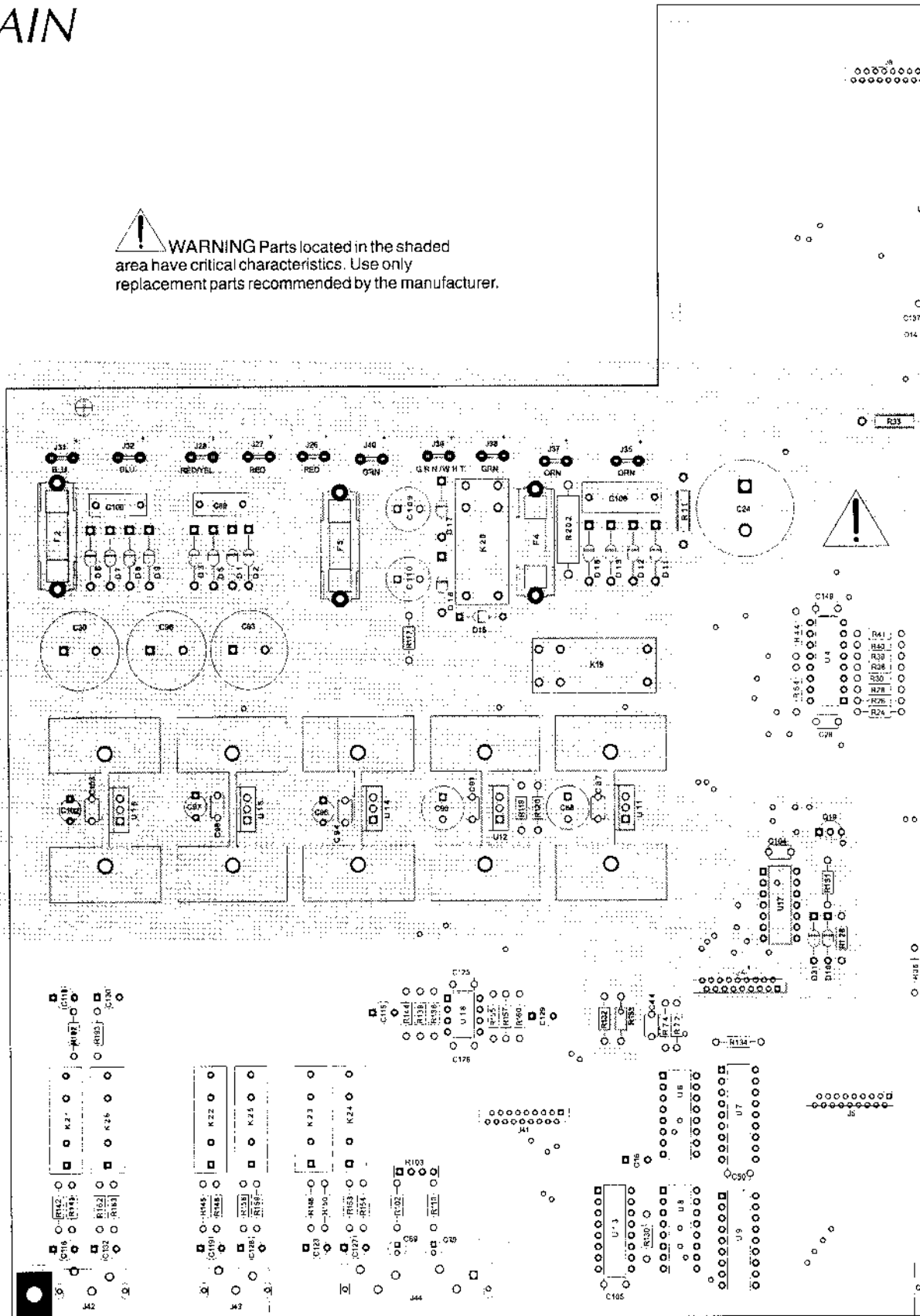


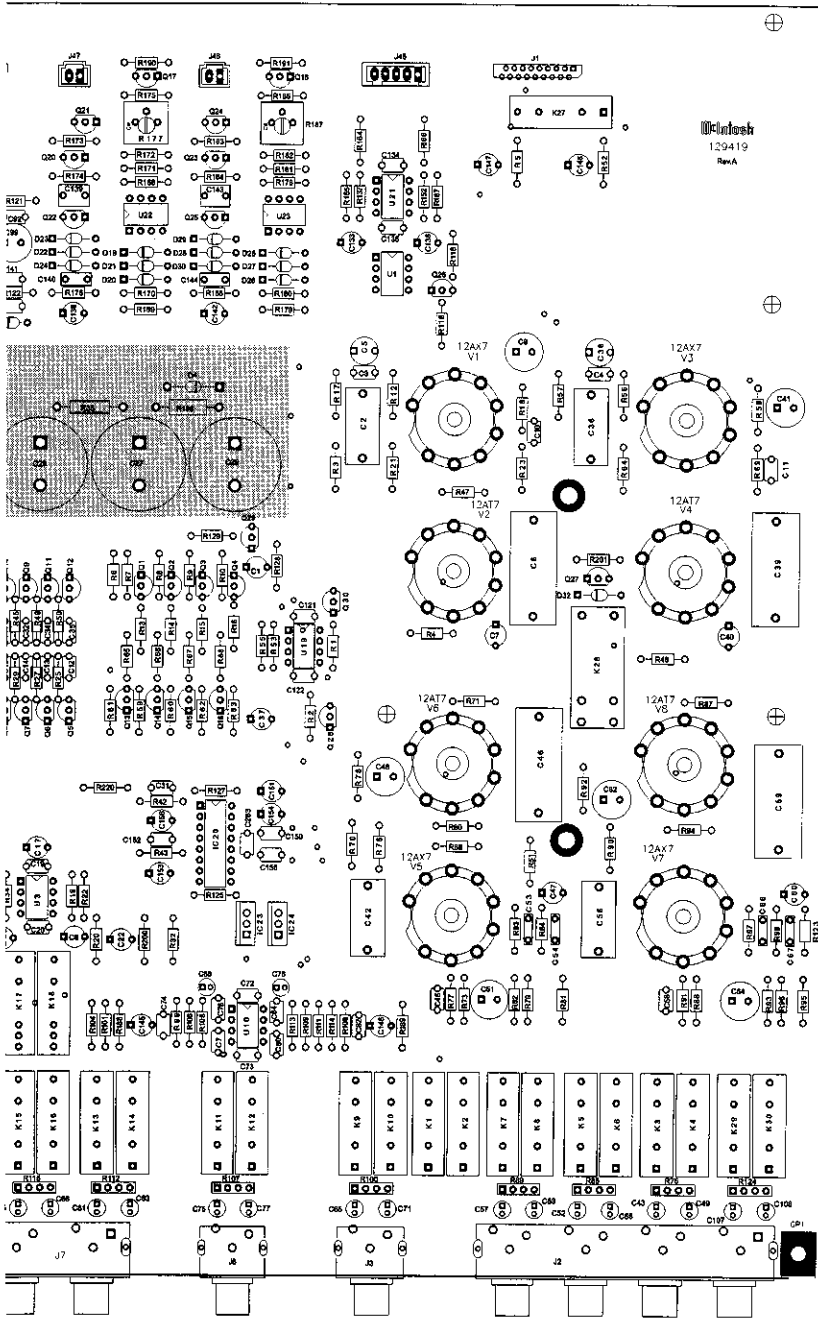
ed in the shaded  
s. Use only  
ed by the manufacturer.

# 2

# MAIN

 **WARNING** Parts located in the shaded area have critical characteristics. Use only replacement parts recommended by the manufacturer.

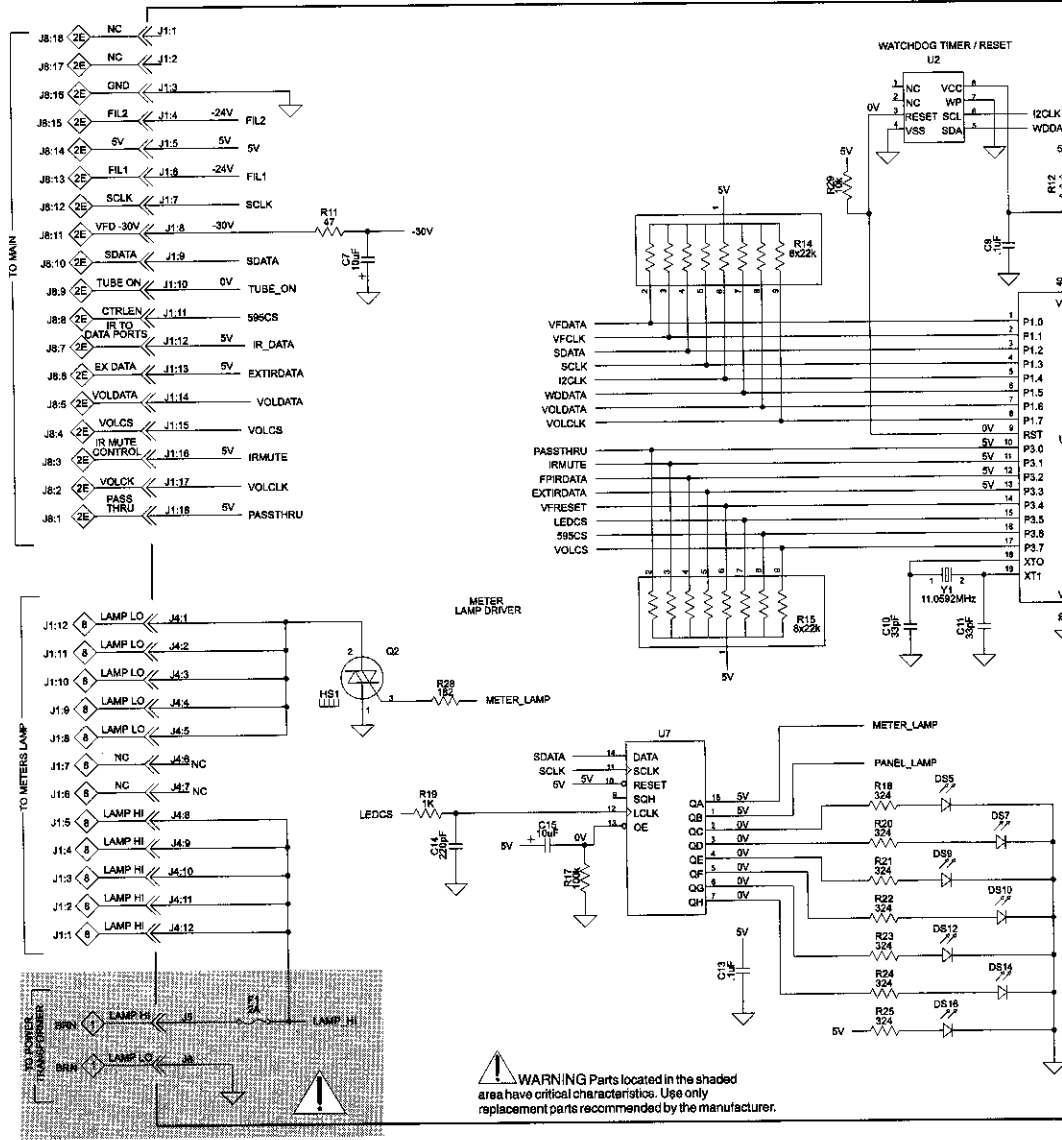


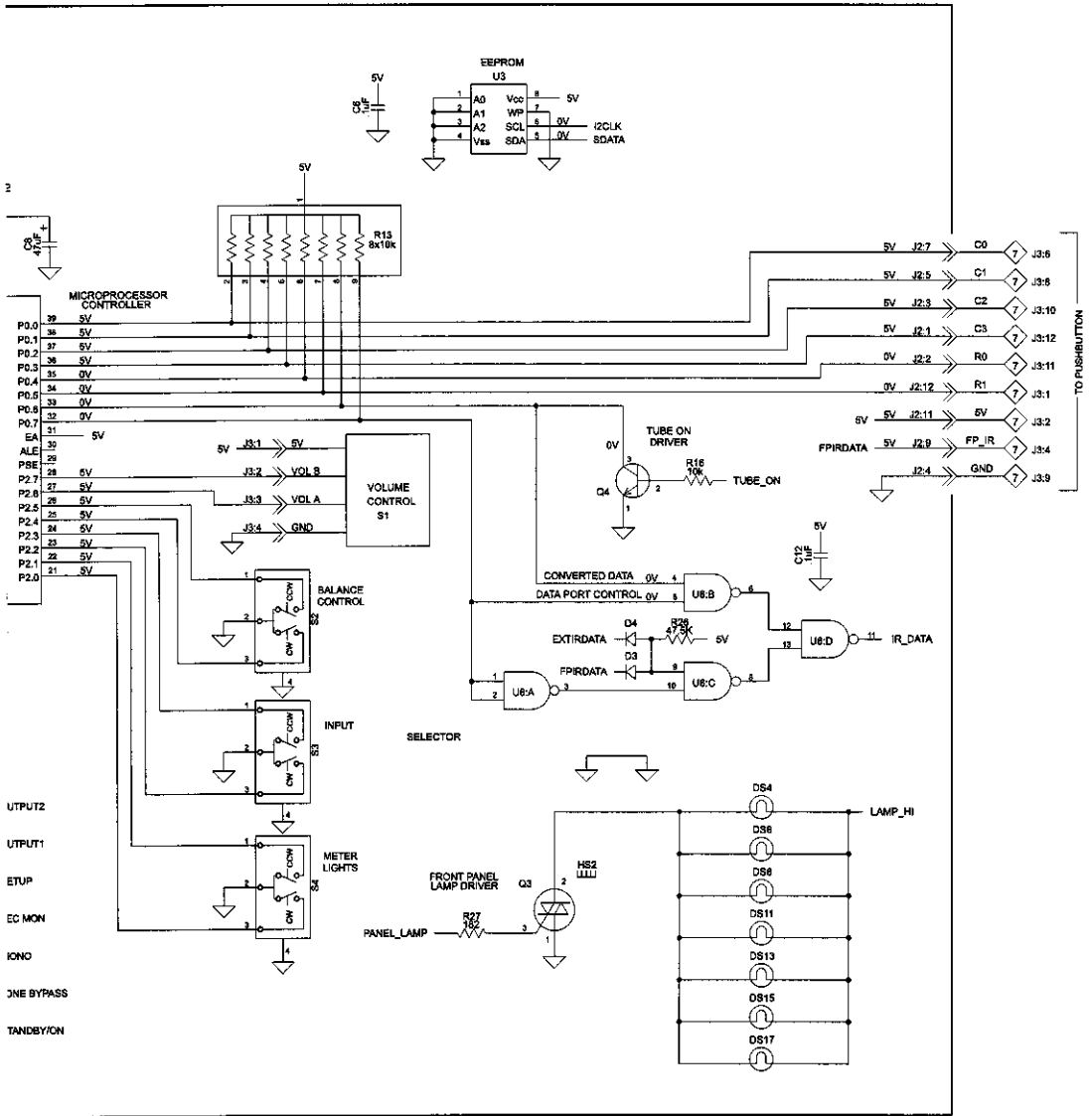


129419  
Rev A

SEE BACKSIDE OF PCB

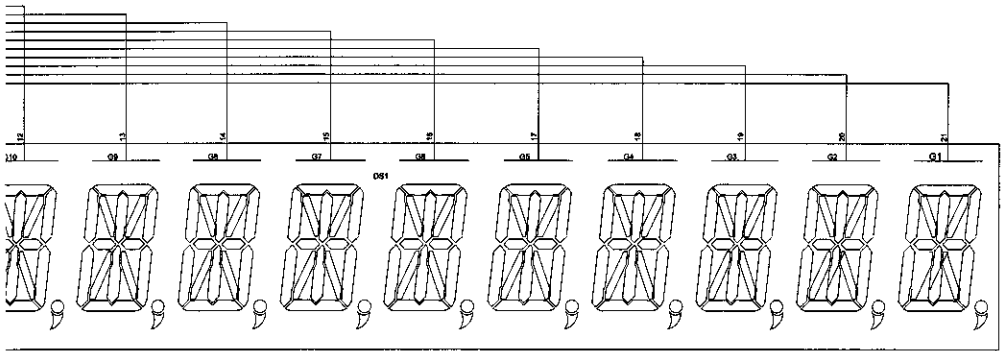
# 3A DISPLAY 049709 SECTION 1 OF 2



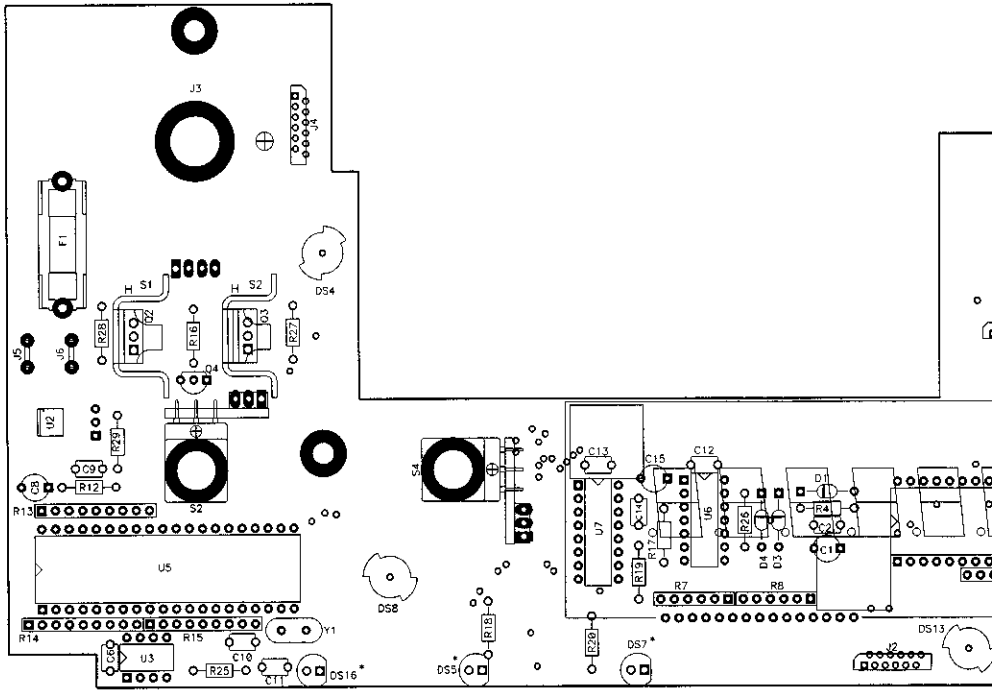




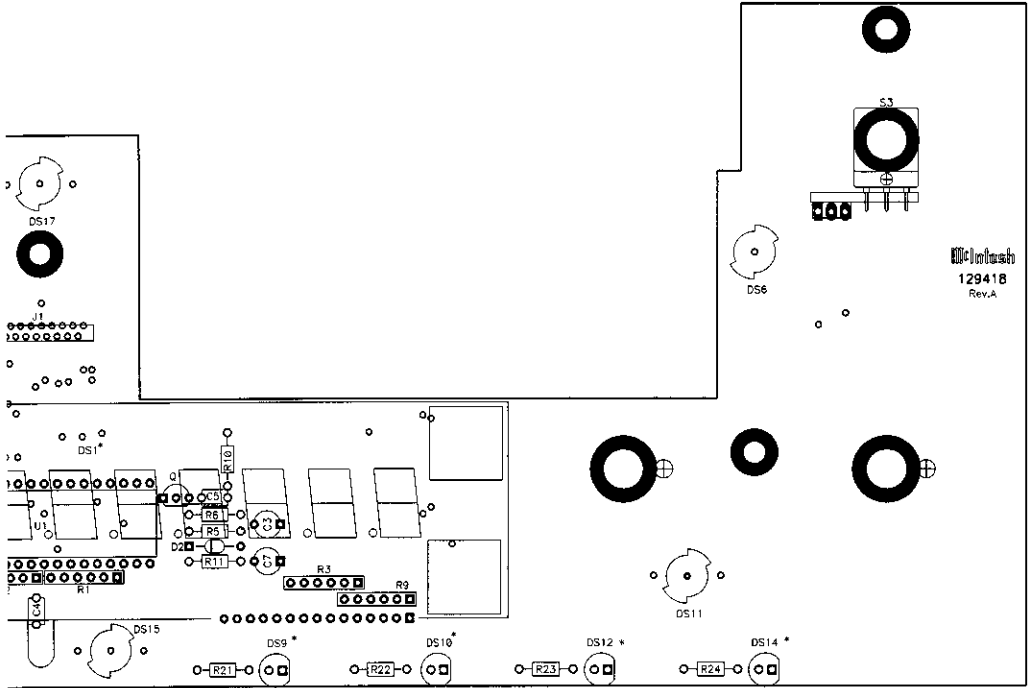




# 3 DISPLAY



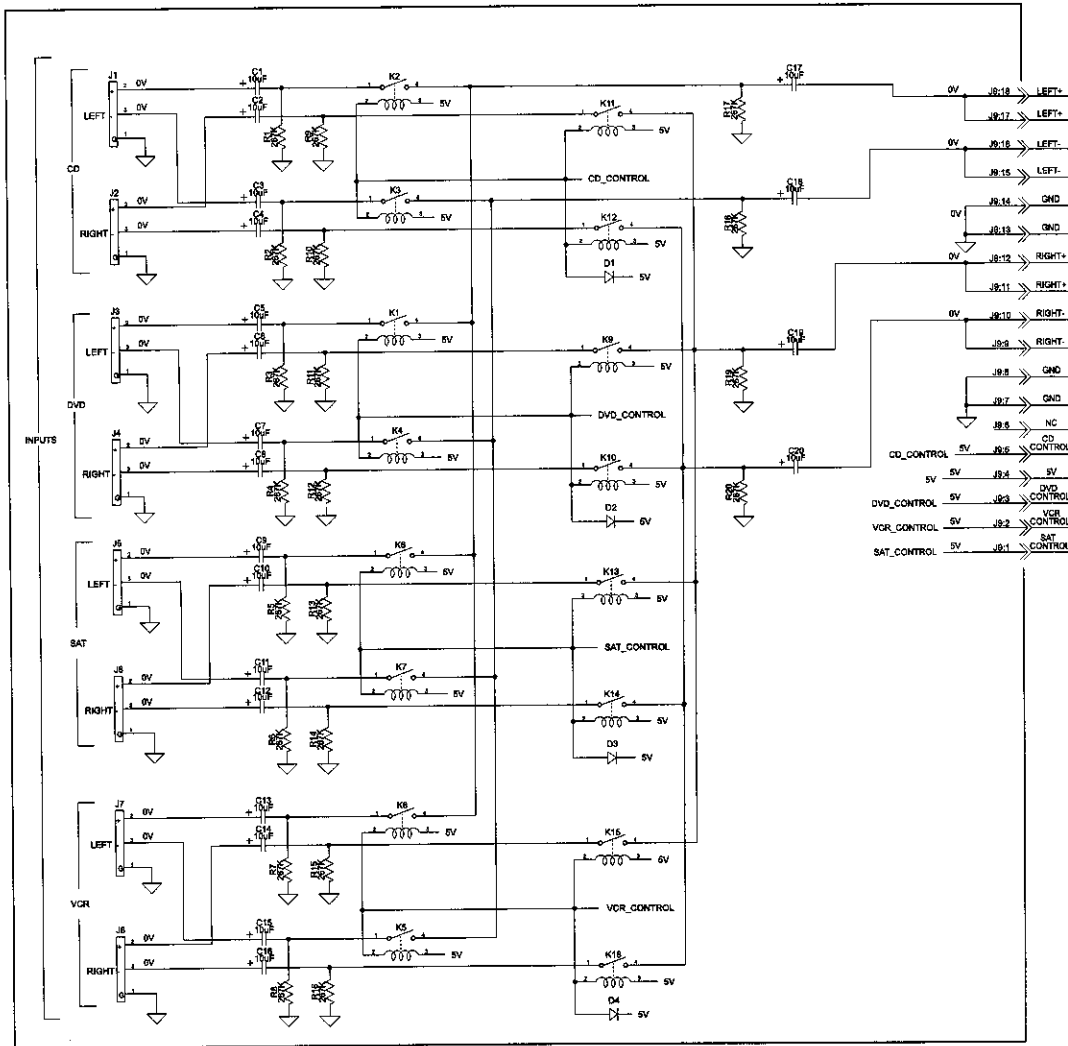
\* DENOTES COMPONENTS ON REVERSE



OR BACKSIDE OF PC BD



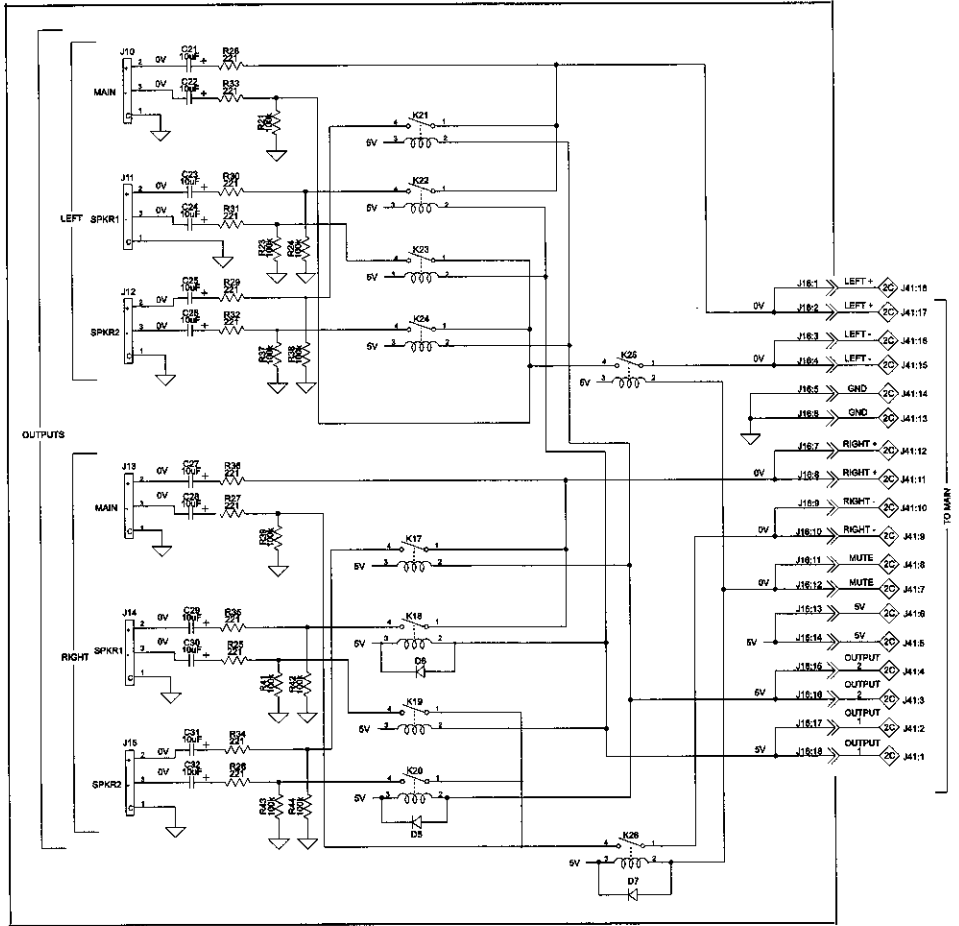
# BALANCED 049707





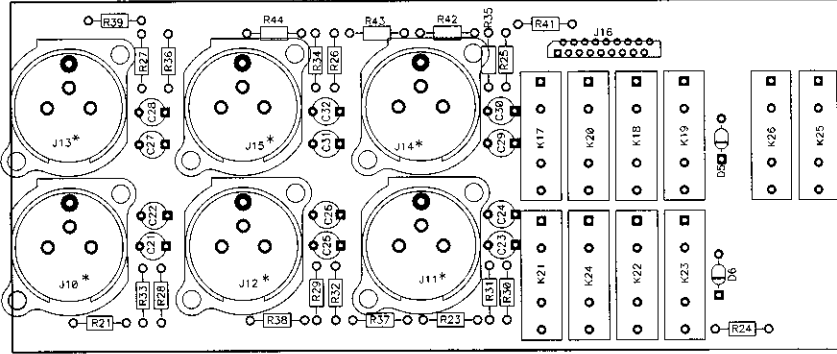
# BALANCED 049707

- > J5-1
- > J5-2
- > J5-3
- > J5-4
- > J5-5
- > J5-6
- > J5-7
- > J5-8
- > J5-9
- > J5-10
- > J5-11
- > J5-12
- > J5-13
- > J5-14
- > J5-15
- > J5-16
- > J5-17
- > J5-18



4

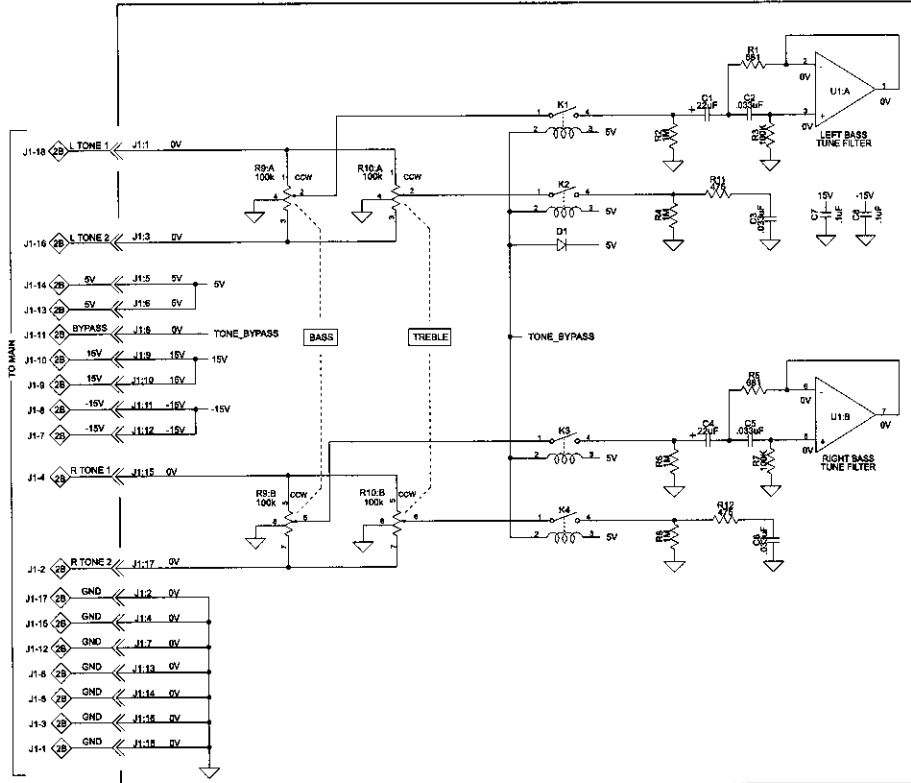
BALANCED 049707



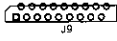
• DENOTES

5

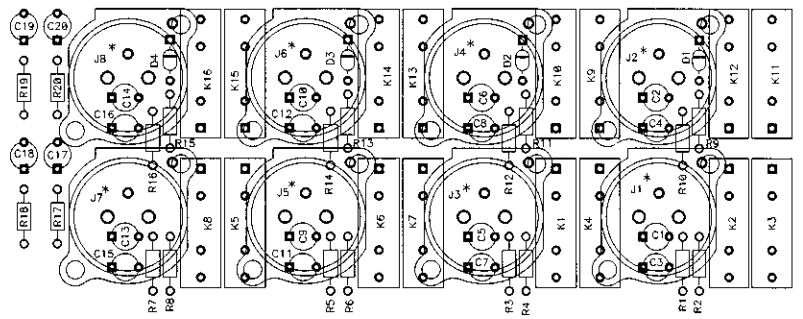
TONE 049712



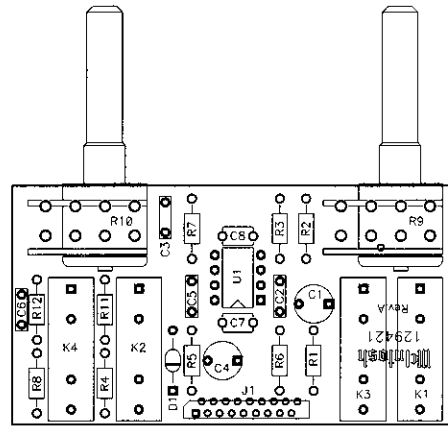
07-1-0



129416  
Rev. A



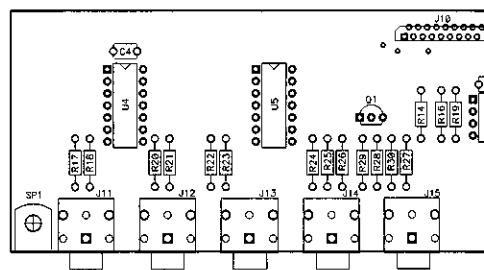
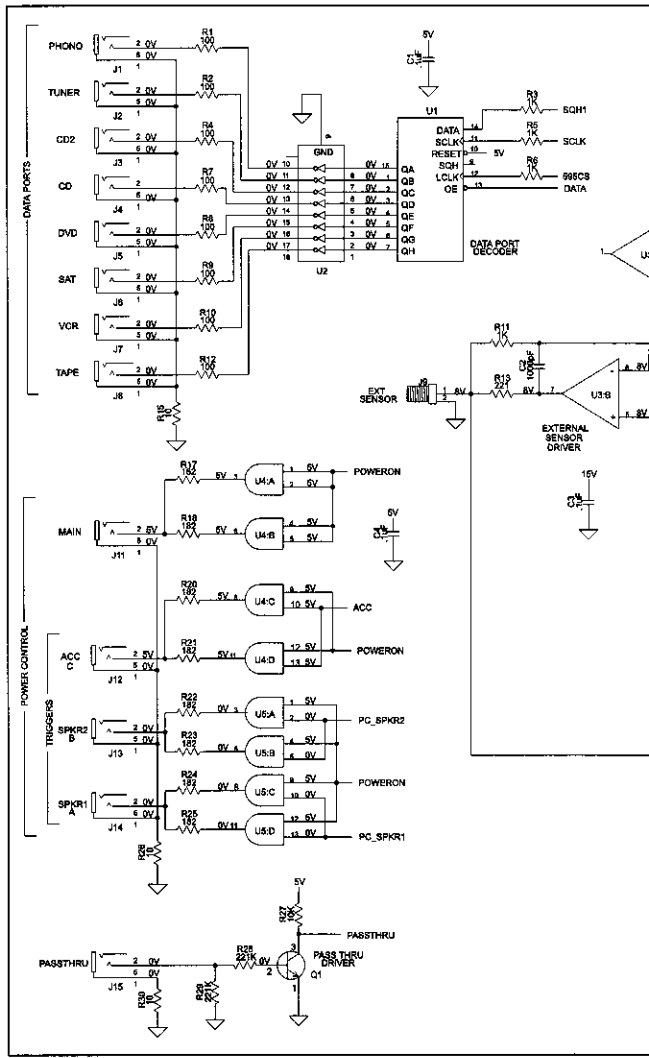
COMPONENTS ON REVERSE OR BACKSIDE OF PCB





6

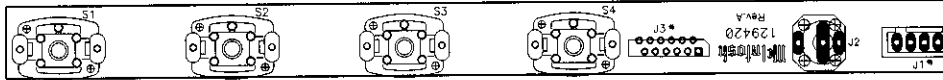
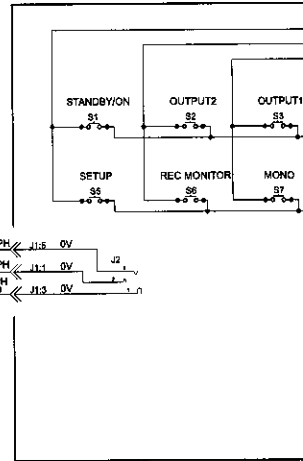
DATA 049708





7

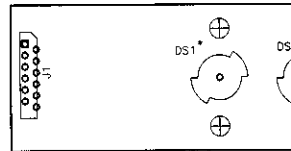
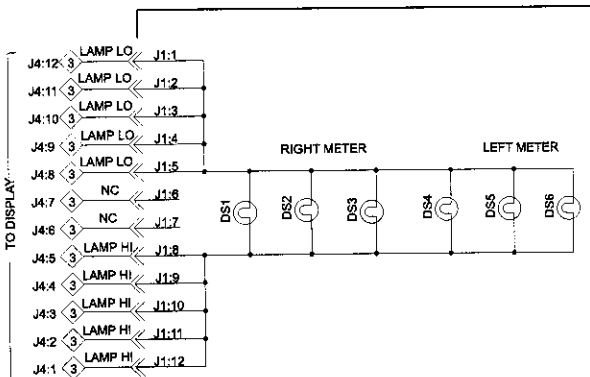
PUSHBUTTON 049711

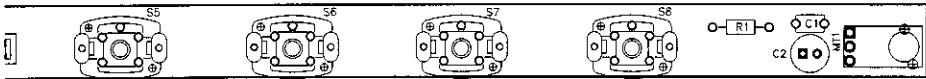
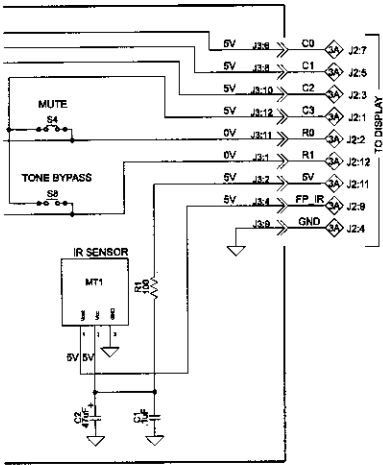


\* DENOTES COMPONENTS ON REVERSE

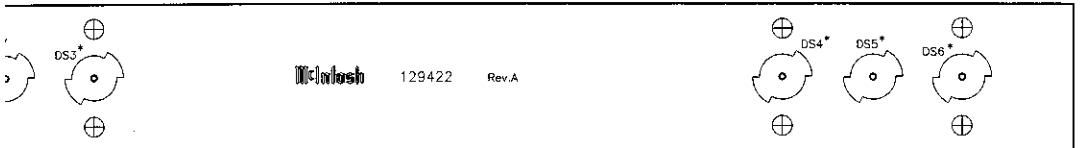
8

METER LAMP 049713





SE OR BACKSIDE OF PC BD



\* DENOTES COMPONENTS ON REVERSE OR BACKSIDE OF PC BD

# PARTS LIST

Ref.No.	Description	Part No.			
<b>◆</b>	<b>INTERCONNECT</b>				
F1	FUSE .630AL 250V SLO-BLO	089119			
T1	POWER TRANSFORMER	049722			
<b>◆</b>	<b>MAIN 049710</b>				
GP1	BRACKET PCB CARD MOUNTING	003611			
GP2	BRACKET PCB CARD MOUNTING	003611			
C3	CAP MONO 47PF 200V 10% NPO	061299			
C4	CAP MONO 47PF 200V 10% NPO	061299			
C10	CAP MONO 47PF 200V 10% NPO	061299			
C11	CAP MONO 47PF 200V 10% NPO	061299			
C45	CAP MONO 47PF 200V 10% NPO	061299			
C58	CAP MONO 47PF 200V 10% NPO	061299			
C70	CAP MONO 100PF 100V 10% NPO	061300			
C74	CAP MONO 100PF 100V 10% NPO	061300			
C76	CAP MONO 100PF 100V 10% NPO	061300			
C80	CAP MONO 100PF 100V 10% NPO	061300			
C82	CAP MONO 100PF 100V 10% NPO	061300			
C84	CAP MONO 100PF 100V 10% NPO	061300			
C31	CAP MONO 220PF 100V 10% NPO	061301			
C44	CAP MONO 220PF 100V 10% NPO	061301			
C149	CAP MONO 220PF 100V 10% NPO	061301			
C12	CAP MONO 1000PF 50V 10% NPO	061303			
C13	CAP MONO 1000PF 50V 10% NPO	061303			
C14	CAP MONO 1000PF 50V 10% NPO	061303			
C15	CAP MONO 1000PF 50V 10% NPO	061303			
C32	CAP MONO 1000PF 50V 10% NPO	061303			
C33	CAP MONO 1000PF 50V 10% NPO	061303			
C34	CAP MONO 1000PF 50V 10% NPO	061303			
C35	CAP MONO 1000PF 50V 10% NPO	061303			
C19	CAP MONO .1UF 50V 20% Z5U	061305			
C20	CAP MONO .1UF 50V 20% Z5U	061305			
C28	CAP MONO .1UF 50V 20% Z5U	061305			
C50	CAP MONO .1UF 50V 20% Z5U	061305			
C72	CAP MONO .1UF 50V 20% Z5U	061305			
C73	CAP MONO .1UF 50V 20% Z5U	061305			
C87	CAP MONO .1UF 50V 20% Z5U	061305			
C91	CAP MONO .1UF 50V 20% Z5U	061305			
C92	CAP MONO .1UF 50V 20% Z5U	061305			
C94	CAP MONO .1UF 50V 20% Z5U	061305			
C98	CAP MONO .1UF 50V 20% Z5U	061305			
C103	CAP MONO .1UF 50V 20% Z5U	061305			
C104	CAP MONO .1UF 50V 20% Z5U	061305			
C105	CAP MONO .1UF 50V 20% Z5U	061305			
C121	CAP MONO .1UF 50V 20% Z5U	061305			
C122	CAP MONO .1UF 50V 20% Z5U	061305			
C125	CAP MONO .1UF 50V 20% Z5U	061305			
C126	CAP MONO .1UF 50V 20% Z5U	061305			
C134	CAP MONO .1UF 50V 20% Z5U	061305			
C135	CAP MONO .1UF 50V 20% Z5U	061305			
C137	CAP MONO .1UF 50V 20% Z5U	061305			
C141	CAP MONO .1UF 50V 20% Z5U	061305			
C150	CAP MONO .1UF 50V 20% Z5U	061305			
C152	CAP MONO .1UF 50V 20% Z5U	061305			
C155	CAP MONO .1UF 50V 20% Z5U	061305			
C263	CAP MONO .1UF 50V 20% Z5U	061305			
C53	CAP PF 0.001UF 5% 63VDC	064300			
C66	CAP PF 0.001UF 5% 63VDC	064300			
C54	CAP MPF 0.0033UF 5% 63VDC	064306			
C67	CAP MPF 0.0033UF 5% 63VDC	064306			
C140	CAP MPF 0.22UF 5% 63VDC	064329			
C144	CAP MPF 0.22UF 5% 63VDC	064329			
C139	CAP MPF 0.1UF 100V	064337			
C143	CAP MPF 0.1UF 100V	064337			
C89	CAP POLYPROP .047UF 10% 250VDC	064364			
C100	CAP POLYPROP .047UF 10% 250VDC	064364			
C2	CAP MPF 0.1UF 630VDC	064431			
C36	CAP MPF 0.1UF 630VDC	064431			
C42	CAP MPF 0.1UF 630VDC	064431			
C56	CAP MPF 0.1UF 630VDC	064431			
C6	CAP POLYPROP .1UF 20% 250VDC	064433			
C39	CAP POLYPROP .1UF 20% 250VDC	064433			
C46	CAP POLYPROP .1UF 20% 250VDC	064433			
C59	CAP POLYPROP .1UF 20% 250VDC	064433			
C106	CAP POLY .047UF 10% 1000VDC	064434			
C9	CAP ELECT 100UF 25V-50V				066151
C41	CAP ELECT 100UF 25V-50V				066151
C46	CAP ELECT 100UF 25V-50V				066151
C51	CAP ELECT 100UF 25V-50V				066151
C62	CAP ELECT 100UF 25V-50V				066151
C64	CAP ELECT 100UF 25V-50V				066151
C99	CAP ELECT 100UF 25V-50V				066151
C88	CAP ELECT 220UF 50V 20%				066254
C90	CAP ELECT 220UF 50V 20%				066254
C43	CAP ELECT 10UF 16V 4X5 CASE				066382
C49	CAP ELECT 10UF 16V 4X5 CASE				066382
C52	CAP ELECT 10UF 16V 4X5 CASE				066382
C55	CAP ELECT 10UF 16V 4X5 CASE				066382
C57	CAP ELECT 10UF 16V 4X5 CASE				066382
C63	CAP ELECT 10UF 16V 4X5 CASE				066382
C65	CAP ELECT 10UF 16V 4X5 CASE				066382
C68	CAP ELECT 10UF 16V 4X5 CASE				066382
C69	CAP ELECT 10UF 16V 4X5 CASE				066382
C71	CAP ELECT 10UF 16V 4X5 CASE				066382
C75	CAP ELECT 10UF 16V 4X5 CASE				066382
C77	CAP ELECT 10UF 16V 4X5 CASE				066382
C78	CAP ELECT 10UF 16V 4X5 CASE				066382
C79	CAP ELECT 10UF 16V 4X5 CASE				066382
C81	CAP ELECT 10UF 16V 4X5 CASE				066382
C83	CAP ELECT 10UF 16V 4X5 CASE				066382
C85	CAP ELECT 10UF 16V 4X5 CASE				066382
C86	CAP ELECT 10UF 16V 4X5 CASE				066382
C107	CAP ELECT 10UF 16V 4X5 CASE				066382
C108	CAP ELECT 10UF 16V 4X5 CASE				066382
C93	CAP ELECT 2200UF 50V 20%				066440
C96	CAP ELECT 2200UF 50V 20%				066440
C30	CAP ELECT 4700UF 35V				066443
C1	CAP ELECT 10UF 50V				066445
C8	CAP ELECT 10UF 50V				066445
C16	CAP ELECT 10UF 50V				066445
C26	CAP ELECT 10UF 50V				066445
C37	CAP ELECT 10UF 50V				066445
C95	CAP ELECT 10UF 50V				066445
C97	CAP ELECT 10UF 50V				066445
C102	CAP ELECT 10UF 50V				066445
C116	CAP ELECT 10UF 50V				066445
C118	CAP ELECT 10UF 50V				066445
C119	CAP ELECT 10UF 50V				066445
C123	CAP ELECT 10UF 50V				066445
C127	CAP ELECT 10UF 50V				066445
C128	CAP ELECT 10UF 50V				066445
C130	CAP ELECT 10UF 50V				066445
C132	CAP ELECT 10UF 50V				066445
C133	CAP ELECT 10UF 50V				066445
C136	CAP ELECT 10UF 50V				066445
C145	CAP ELECT 10UF 50V				066445
C146	CAP ELECT 10UF 50V				066445
C147	CAP ELECT 10UF 50V				066445
C148	CAP ELECT 10UF 50V				066445
C161	CAP ELECT 10UF 50V				066445
C153	CAP ELECT 10UF 50V				066445
C154	CAP ELECT 10UF 50V				066445
C156	CAP ELECT 10UF 50V				066445
C17	CAP ELECT 47UF 35V				066446
C22	CAP ELECT 47UF 35V				066446
C115	CAP ELECT 47UF 35V				066446
C129	CAP ELECT 47UF 35V				066446
C138	CAP ELECT 47UF 35V				066446
C142	CAP ELECT 47UF 35V				066446
C24	CAP ELECT 100UF 400V				066458
C25	CAP ELECT 100UF 400V				066458
C27	CAP ELECT 100UF 400V				066458
C29	CAP ELECT 100UF 400V				066458
C5	CAP ELECT 22UF 100V				066506
C38	CAP ELECT 22UF 100V				066506
C47	CAP ELECT 1UF 50V				066510
C60	CAP ELECT 1UF 50V				066510
C7	CAP ELECT 2.2UF 50V				066511
C40	CAP ELECT 2.2UF 50V				066511
C109	CAP ELECT 1000UF 25V				066513
C110	CAP ELECT 1000UF 25V				066513
D1	DIODE SIL 400 PIV @ 1.5A				070031
D2	DIODE SIL 400 PIV @ 1.5A				070031
D3	DIODE SIL 400 PIV @ 1.5A				070031
D5	DIODE SIL 400 PIV @ 1.5A				070031

D6	DIODE SIL 400 PIV @ 1.5A	070031	J4	CONN FFC 18PIN	117765
D7	DIODE SIL 400 PIV @ 1.5A	070031	J5	CONN FFC 18PIN	117765
D8	DIODE SIL 400 PIV @ 1.5A	070031	J8	CONN FFC 18PIN	117765
D9	DIODE SIL 400 PIV @ 1.5A	070031	J41	CONN FFC 18PIN	117765
D10	DIODE SILICON	070047	J46	HEADER 2 PIN LATCHING	117766
D16	DIODE SILICON	070047	J47	HEADER 2 PIN LATCHING	117766
D19	DIODE SILICON	070047	Q1	TRANSISTOR N JFET	132193
D20	DIODE SILICON	070047	Q2	TRANSISTOR N JFET	132193
D21	DIODE SILICON	070047	Q3	TRANSISTOR N JFET	132193
D22	DIODE SILICON	070047	Q4	TRANSISTOR N JFET	132193
D23	DIODE SILICON	070047	Q13	TRANSISTOR N JFET	132193
D24	DIODE SILICON	070047	Q14	TRANSISTOR N JFET	132193
D25	DIODE SILICON	070047	Q15	TRANSISTOR N JFET	132193
D26	DIODE SILICON	070047	Q16	TRANSISTOR N JFET	132193
D27	DIODE SILICON	070047	Q28	TRANSISTOR N JFET	132193
D28	DIODE SILICON	070047	Q30	TRANSISTOR N JFET	132193
D29	DIODE SILICON	070047	Q17	TRANSISTOR NPN	132223
D30	DIODE SILICON	070047	Q18	TRANSISTOR NPN	132223
D31	DIODE SILICON	070047	Q19	TRANSISTOR NPN	132223
D32	DIODE SILICON	070047	Q22	TRANSISTOR NPN	132223
D11	DIODE RECTIFIER	070131	Q25	TRANSISTOR NPN	132223
D12	DIODE RECTIFIER	070131	Q26	TRANSISTOR NPN	132223
D13	DIODE RECTIFIER	070131	Q27	TRANSISTOR NPN	132223
D15	DIODE RECTIFIER	070131	Q5	TRANSISTOR PNP	132224
D17	DIODE RECTIFIER	070131	Q6	TRANSISTOR PNP	132224
D18	DIODE RECTIFIER	070131	Q7	TRANSISTOR PNP	132224
D14	DIODE ZENER 5V	070132	Q8	TRANSISTOR PNP	132224
D4	DIODE ZENER 200V 1.5W	070146	Q9	TRANSISTOR PNP	132224
K1	RELAY REED FORM 1A 5V 500 OHMS	087050	Q10	TRANSISTOR PNP	132224
K2	RELAY REED FORM 1A 5V 500 OHMS	087050	Q11	TRANSISTOR PNP	132224
K3	RELAY REED FORM 1A 5V 500 OHMS	087050	Q12	TRANSISTOR PNP	132224
K4	RELAY REED FORM 1A 5V 500 OHMS	087050	Q29	TRANSISTOR PNP	132224
K5	RELAY REED FORM 1A 5V 500 OHMS	087050	Q20	TRANSISTOR SI NPN 25V	132254
K6	RELAY REED FORM 1A 5V 500 OHMS	087050	Q21	TRANSISTOR SI NPN 25V	132254
K7	RELAY REED FORM 1A 5V 500 OHMS	087050	Q23	TRANSISTOR SI NPN 25V	132254
K8	RELAY REED FORM 1A 5V 500 OHMS	087050	Q24	TRANSISTOR SI NPN 25V	132254
K9	RELAY REED FORM 1A 5V 500 OHMS	087050	U16	MC7805CT 5V 1A REG	133108
K10	RELAY REED FORM 1A 5V 500 OHMS	087050	U14	MC78M15CT -15V .5A REG	133153
K11	RELAY REED FORM 1A 5V 500 OHMS	087050	U15	MC78M18CT 15V .5A REG	133154
K12	RELAY REED FORM 1A 5V 500 OHMS	087050	U17	IC 2 INPUT X 4	133167
K13	RELAY REED FORM 1A 5V 500 OHMS	087050	U4	IC SHFT REG SER-PAR	133186
K14	RELAY REED FORM 1A 5V 500 OHMS	087050	U6	IC SHFT REG SER-PAR	133186
K15	RELAY REED FORM 1A 5V 500 OHMS	087050	U8	IC SHFT REG SER-PAR	133186
K16	RELAY REED FORM 1A 5V 500 OHMS	087050	U13	IC SHFT REG SER-PAR	133186
K21	RELAY REED FORM 1A 5V 500 OHMS	087050	IC23	IC REGULATOR 5V	133250
K22	RELAY REED FORM 1A 5V 500 OHMS	087050	IC24	IC -5V REGULATOR	133253
K23	RELAY REED FORM 1A 5V 500 OHMS	087050	U7	IC OCTAL DARLINGTON TRANS ARRAY	133258
K24	RELAY REED FORM 1A 5V 500 OHMS	087050	U9	IC OCTAL DARLINGTON TRANS ARRAY	133258
K25	RELAY REED FORM 1A 5V 500 OHMS	087050	U1	IC DUAL OPERATIONAL AMPLIFIER	133260
K26	RELAY REED FORM 1A 5V 500 OHMS	087050	U3	IC DUAL OPERATIONAL AMPLIFIER	133260
K27	RELAY REED FORM 1A 5V 500 OHMS	087050	U10	IC DUAL OPERATIONAL AMPLIFIER	133260
K29	RELAY REED FORM 1A 5V 500 OHMS	087050	U18	IC DUAL OPERATIONAL AMPLIFIER	133260
K30	RELAY REED FORM 1A 5V 500 OHMS	087050	U19	IC DUAL OPERATIONAL AMPLIFIER	133260
K17	RELAY REED FORM 1C 5V 125 OHM	087056	U21	IC DUAL OPERATIONAL AMPLIFIER	133260
K18	RELAY REED FORM 1C 5V 125 OHM	087056	U22	IC DUAL OPERATIONAL AMPLIFIER	133260
K19	RELAY 24VDC 5A 277VAC	087057	U23	IC DUAL OPERATIONAL AMPLIFIER	133260
K20	RELAY 24VDC 5A 277VAC	087057	IC01	MC7924CT -24V 1A REG	133306
K28	RELAY 24VDC 5A 277VAC	087057	IC20	IC STEREO DGLT VOLUME CONTROL	133331
F2	2A 5x20 fuse	089088	U12	LM317T 1.5A Adjustable Reg	133333
F5	0.5A 5x20 fuse IEC	089092	R177	POT TRIM 100K 10% 3/8IN SQ	134389
F4	0.125A 5x20 fuse IEC	089094	R187	POT TRIM 100K 10% 3/8IN SQ	134389
J3	JACK PHONO GOLD PJ261G	117436	R8	RES MF 33.2K 1% 1/4W	144015
J6	JACK PHONO GOLD PJ261G	117436	R80	RES MF 33.2K 1% 1/4W	144015
J42	JACK PHONO GOLD PJ261G	117436	R144	RES MF 33.2K 1% 1/4W	144015
J43	JACK PHONO GOLD PJ261G	117436	R160	RES MF 33.2K 1% 1/4W	144015
J7	JACK PHONO 4P RCA GOLD PLATED	117450	R192	RES MF 33.2K 1% 1/4W	144015
J44	JACK PHONO 4P RCA GOLD PLATED	117450	R193	RES MF 33.2K 1% 1/4W	144015
J2	JACK PHONO 8P GOLD PLATED	117455	R19	RES MF 10K 1% 1/4W	144053
J45	CONN 5	117478	R34	RES MF 10K 1% 1/4W	144053
J28	BLADE FASTON W/FEET	117708	R116	RES MF 10K 1% 1/4W	144053
J27	BLADE FASTON W/FEET	117708	R118	RES MF 10K 1% 1/4W	144053
J28	BLADE FASTON W/FEET	117708	R171	RES MF 10K 1% 1/4W	144053
J31	BLADE FASTON W/FEET	117708	R171	RES MF 10K 1% 1/4W	144053
J32	BLADE FASTON W/FEET	117708	R181	RES MF 10K 1% 1/4W	144053
J35	BLADE FASTON W/FEET	117708	R190	RES MF 10K 1% 1/4W	144053
J37	BLADE FASTON W/FEET	117708	R191	RES MF 10K 1% 1/4W	144053
J38	BLADE FASTON W/FEET	117708	R122	RES MF 475 OHM 1% 1/4W	144088
J39	BLADE FASTON W/FEET	117708	R42	RES MF 1K 1% 1/4W	144090
J40	BLADE FASTON W/FEET	117708	R43	RES MF 1K 1% 1/4W	144090
J1	CONN FFC 18PIN	117765	R44	RES MF 1K 1% 1/4W	144090
			R54	RES MF 1K 1% 1/4W	144090

# PARTS LIST con't

Ref No.	Description	Part No.			
R72	RES MF 1K 1% 1/4W	144090	R83	RES MF 75K 1% 1/4W	144156
R73	RES MF 1K 1% 1/4W	144090	R97	RES MF 75K 1% 1/4W	144156
R74	RES MF 1K 1% 1/4W	144090	R117	RES MF 10 OHM 1% 1/4W	144157
R78	RES MF 1K 1% 1/4W	144090	R121	RES MF 10 OHM 1% 1/4W	144157
R88	RES MF 1K 1% 1/4W	144090	R127	RES MF 10 OHM 1% 1/4W	144157
R92	RES MF 1K 1% 1/4W	144090	R102	RES MF 221 OHM 1% 1/4W	144172
R99	RES MF 1K 1% 1/4W	144090	R110	RES MF 221 OHM 1% 1/4W	144172
R108	RES MF 1K 1% 1/4W	144090	R119	RES MF 221 OHM 1% 1/4W	144172
R132	RES MF 1K 1% 1/4W	144090	R142	RES MF 221 OHM 1% 1/4W	144172
R133	RES MF 1K 1% 1/4W	144090	R145	RES MF 221 OHM 1% 1/4W	144172
R137	RES MF 1K 1% 1/4W	144090	R148	RES MF 221 OHM 1% 1/4W	144172
R152	RES MF 1K 1% 1/4W	144090	R153	RES MF 221 OHM 1% 1/4W	144172
R120	RES MF 4.02K 1% 1/4W	144096	R156	RES MF 221 OHM 1% 1/4W	144172
R131	RES MF 4.02K 1% 1/4W	144096	R162	RES MF 221 OHM 1% 1/4W	144172
R22	RES MF 11K 1% 1/4W	144101	R105	RES MF 22.1K 1% 1/4W	144187
R37	RES MF 11K 1% 1/4W	144101	R113	RES MF 22.1K 1% 1/4W	144187
R10	RES 16.5K 1% 1/4W	144103	R201	RES MF 22.1K 1% 1/4W	144187
R63	RES 16.5K 1% 1/4W	144103	R164	RES MF 100 OHM 1% 1/4W	144196
R1	RES MF 20K 1% 1/4W	144104	R166	RES MF 100 OHM 1% 1/4W	144196
R53	RES MF 20K 1% 1/4W	144104	R174	RES MF 100 OHM 1% 1/4W	144196
R139	RES MF 20K 1% 1/4W	144104	R184	RES MF 100 OHM 1% 1/4W	144196
R139	RES MF 20K 1% 1/4W	144104	R61	RES MF 3920 OHM 1% 1/4W	144198
R155	RES MF 20K 1% 1/4W	144104	R123	RES MF 3920 OHM 1% 1/4W	144198
R157	RES MF 20K 1% 1/4W	144104	R175	RES MF 3920 OHM 1% 1/4W	144198
R7	RES MF 47.5K 1% 1/4W	144108	R185	RES MF 3920 OHM 1% 1/4W	144198
R21	RES MF 47.5K 1% 1/4W	144108	R75	RES NETWORK 2X220K ISO	144262
R59	RES MF 47.5K 1% 1/4W	144108	R85	RES NETWORK 2X220K ISO	144262
R64	RES MF 47.5K 1% 1/4W	144108	R89	RES NETWORK 2X220K ISO	144262
R77	RES MF 47.5K 1% 1/4W	144108	R100	RES NETWORK 2X220K ISO	144262
R80	RES MF 47.5K 1% 1/4W	144108	R103	RES NETWORK 2X220K ISO	144262
R91	RES MF 47.5K 1% 1/4W	144108	R107	RES NETWORK 2X220K ISO	144262
R94	RES MF 47.5K 1% 1/4W	144108	R112	RES NETWORK 2X220K ISO	144262
R101	RES MF 47.5K 1% 1/4W	144108	R115	RES NETWORK 2X220K ISO	144262
R104	RES MF 47.5K 1% 1/4W	144108	R124	RES NETWORK 2X220K ISO	144262
R109	RES MF 47.5K 1% 1/4W	144108	R13	RES MF 10M 1% 1/4W	144264
R111	RES MF 47.5K 1% 1/4W	144108	R14	RES MF 10M 1% 1/4W	144264
R220	RES MF 47.5K 1% 1/4W	144108	R15	RES MF 10M 1% 1/4W	144264
R2	RES MF 100K 1% 1/4W	144113	R16	RES MF 10M 1% 1/4W	144264
R55	RES MF 100K 1% 1/4W	144113	R65	RES MF 10M 1% 1/4W	144264
R126	RES MF 100K 1% 1/4W	144113	R66	RES MF 10M 1% 1/4W	144264
R130	RES MF 100K 1% 1/4W	144113	R67	RES MF 10M 1% 1/4W	144264
R134	RES MF 100K 1% 1/4W	144113	R68	RES MF 10M 1% 1/4W	144264
R143	RES MF 100K 1% 1/4W	144113	R168	RES MF 10M 1% 1/4W	144264
R146	RES MF 100K 1% 1/4W	144113	R178	RES MF 10M 1% 1/4W	144264
R150	RES MF 100K 1% 1/4W	144113	R6	RES MF 2.21M 1/4W	144265
R154	RES MF 100K 1% 1/4W	144113	R61	RES MF 2.21M 1/4W	144265
R159	RES MF 100K 1% 1/4W	144113	R12	RES MF 1M 1/4W	144269
R163	RES MF 100K 1% 1/4W	144113	R25	RES MF 1M 1/4W	144269
R165	RES MF 100K 1% 1/4W	144113	R27	RES MF 1M 1/4W	144269
R167	RES MF 100K 1% 1/4W	144113	R29	RES MF 1M 1/4W	144269
R172	RES MF 100K 1% 1/4W	144113	R31	RES MF 1M 1/4W	144269
R182	RES MF 100K 1% 1/4W	144113	R45	RES MF 1M 1/4W	144269
R4	RES MF 200K 1% 1/4W	144117	R46	RES MF 1M 1/4W	144269
R24	RES MF 200K 1% 1/4W	144117	R49	RES MF 1M 1/4W	144269
R26	RES MF 200K 1% 1/4W	144117	R50	RES MF 1M 1/4W	144269
R28	RES MF 200K 1% 1/4W	144117	R56	RES MF 1M 1/4W	144269
R30	RES MF 200K 1% 1/4W	144117	R76	RES MF 1M 1/4W	144269
R38	RES MF 200K 1% 1/4W	144117	R84	RES MF 1M 1/4W	144269
R39	RES MF 200K 1% 1/4W	144117	R90	RES MF 1M 1/4W	144269
R40	RES MF 200K 1% 1/4W	144117	R98	RES MF 1M 1/4W	144269
R41	RES MF 200K 1% 1/4W	144117	R128	RES MF 1M 1/4W	144269
R48	RES MF 200K 1% 1/4W	144117	R176	RES MF 2.74M 1/4W	144271
R129	RES MF 200K 1% 1/4W	144117	R186	RES MF 2.74M 1/4W	144271
R170	RES MF 200K 1% 1/4W	144117	R125	RES MF 6.81K 1% 1/4W	144297
R173	RES MF 200K 1% 1/4W	144117	R5	RES MF 2.74K 1% 1/4W	144304
R180	RES MF 200K 1% 1/4W	144117	R18	RES MF 2.74K 1% 1/4W	144304
R183	RES MF 200K 1% 1/4W	144117	R52	RES MF 2.74K 1% 1/4W	144304
R20	RES MF 267K 1% 1/4W	144118	R58	RES MF 2.74K 1% 1/4W	144304
R32	RES MF 267K 1% 1/4W	144118	R23	RES MF 13.7K 1% 1/4W	144342
R36	RES MF 267K 1% 1/4W	144118	R69	RES MF 13.7K 1% 1/4W	144342
R200	RES MF 267K 1% 1/4W	144118	R82	RES MF 1.74K 1% 1/4W	144351
R169	RES 511 OHM 1% 1/4W	144123	R96	RES MF 1.74K 1% 1/4W	144351
R179	RES 511 OHM 1% 1/4W	144123	R71	RES MF 150K 1% 1/4W	144419
R17	RES MF 1.5K 1% 1/4W	144128	R87	RES MF 150K 1% 1/4W	144419
R57	RES MF 1.5K 1% 1/4W	144128	R3	RES MF 221K 1% 1/4W	144421
			R47	RES MF 221K 1% 1/4W	144421
			R70	RES MF 221K 1% 1/4W	144421
			R81	RES MF 221K 1% 1/4W	144421
			R86	RES MF 221K 1% 1/4W	144421
			R95	RES MF 221K 1% 1/4W	144421

R188	RES MF 221K 1% 1/4W	144421
R189	RES MF 221K 1% 1/4W	144421
R196	RES MF 15K 1% 1/2W	144426
R202	RES MO 100K 5% 2W	144438
R9	RES MF 24.9K 1% 1/4W	144439
R62	RES MF 24.9K 1% 1/4W	144439
R106	RES MF 24.9K 1% 1/4W	144439
R114	RES MF 24.9K 1% 1/4W	144439
R11	RES MO 390 OHM 5% 1W	144467
R33	RES MO 390 OHM 5% 1W	144467
R35	RES MO 390 OHM 5% 1W	144467
R79	RES MF 953 OHM 1/4W 1%	144473
R93	RES MF 953 OHM 1/4W 1%	144473
V1	TUBE ELEC 12AX7	185019
V3	TUBE ELEC 12AX7	185019
V5	TUBE ELEC 12AX7	185019
V7	TUBE ELEC 12AX7	185019
V2	TUBE 12AT7	185067
V4	TUBE 12AT7	185067
V6	TUBE 12AT7	185067
V8	TUBE 12AT7	185067

### ◇ DISPLAY 049709

S2	SWITCH ROT PULSE	146249
S3	SWITCH ROT PULSE	146249
S4	SWITCH ROT PULSE	146249
DS1	DISPLAY 12 CHARACTER	058150
DS4	LAMP INCANDESCENT 14V 100MA	058153
DS6	LAMP INCANDESCENT 14V 100MA	058153
DS8	LAMP INCANDESCENT 14V 100MA	058153
DS11	LAMP INCANDESCENT 14V 100MA	058153
DS13	LAMP INCANDESCENT 14V 100MA	058153
DS15	LAMP INCANDESCENT 14V 100MA	058153
DS17	LAMP INCANDESCENT 14V 100MA	058153
C14	CAP MONO 220PF 100V 10% NPO	061301
C2	CAP MONO .1UF 50V 20% Z5U	061305
C4	CAP MONO .1UF 50V 20% Z5U	061305
C5	CAP MONO .1UF 50V 20% Z5U	061305
C6	CAP MONO .1UF 50V 20% Z5U	061305
C9	CAP MONO .1UF 50V 20% Z5U	061305
C12	CAP MONO .1UF 50V 20% Z5U	061305
C13	CAP MONO .1UF 50V 20% Z5U	061305
C10	CAP MONO 33PF 200V 5%NPO T&R	061307
C11	CAP MONO 33PF 200V 5%NPO T&R	061307
C7	CAP ELECT 10UF 50V	066445
C15	CAP ELECT 10UF 50V	066445
C1	CAP ELECT 47UF 35V	066446
C3	CAP ELECT 47UF 35V	066446
C8	CAP ELECT 47UF 35V	066446
D1	DIODE SILICON	070047
D3	DIODE SILICON	070047
D4	DIODE SILICON	070047
D2	DIODE ZENER 15V 1W	070061
DS5	LED LAMP RED	070093
DS7	LED LAMP RED	070093
DS9	LED LAMP RED	070093
DS10	LED LAMP RED	070093
DS12	LED LAMP RED	070093
DS14	LED LAMP RED	070093
DS16	LED LAMP RED	070093
HS1	HEATSINK T0220	080014
HS2	HEATSINK T0220	080014
F1	2A 5x20 fuse	089088
J5	BLADE FASTON W/FEET	117708
J6	BLADE FASTON W/FEET	117708
J2	CONN 12 PIN FFC	117720
J4	CONN 12 PIN FFC	117720
J1	CONN FFC 18PIN	117785
Q2	TRIAC 8A 200V	131021
Q3	TRIAC 8A 200V	131021
Q4	TRANSISTOR NPN	132223
Q1	TRANSISTOR PNP	132224
U6	IC NAND 2 INPUT X 4	133161
U7	IC SHIFT REG SER-PAR	133186
U4	IC MICRO RESET POS	133241
U3	IC CMOS EPROM	133249
U1	IC OCTAL BUFFER 3-STATE	133347
U2	IC CPU SUPERVISOR	133424
U5	IC PROGRAMMED C2200 V1.03	133466
R11	RES FP 47 OHM 5% 1/4W	137042

R10	RES MF 10K 1% 1/4W	144053
R16	RES MF 10K 1% 1/4W	144053
R29	RES MF 10K 1% 1/4W	144053
R19	RES MF 1K 1% 1/4W	144080
R6	RES MF 47.5K 1% 1/4W	144108
R26	RES MF 47.5K 1% 1/4W	144108
R17	RES MF 100K 1% 1/4W	144113
R4	RES MF 10 OHM 1% 1/4W	144157
R12	RES MF 10 OHM 1% 1/4W	144157
R14	RES NETWORK 9X-1-223	144238
R15	RES NETWORK 9X-1-223	144238
R13	RES NET 10K X8 RES B	144258
R27	RES MF 182 OHM 1/4W 1%	144273
R28	RES MF 182 OHM 1/4W 1%	144273
R18	RES MF 324 OHM 1% 1/4W	144338
R20	RES MF 324 OHM 1% 1/4W	144338
R21	RES MF 324 OHM 1% 1/4W	144338
R22	RES MF 324 OHM 1% 1/4W	144338
R23	RES MF 324 OHM 1% 1/4W	144338
R24	RES MF 324 OHM 1% 1/4W	144338
R25	RES MF 324 OHM 1% 1/4W	144338
R5	RES MF 1.74K 1% 1/4W	144351
R1	RES NET 100KB	144450
R2	RES NET 100KB	144450
R3	RES NET 100KB	144450
R7	RES NET 100KB	144450
R8	RES NET 100KB	144450
R9	RES NET 100KB	144450
J3	ENCODER OPTICAL ROTARY	146246
Y1	CRYSTAL 11.0592MHZ	180051

### ◇ BALANCED 049707

C1	CAP ELECT 10UF 50V	066445
C2	CAP ELECT 10UF 50V	066445
C3	CAP ELECT 10UF 50V	066445
C4	CAP ELECT 10UF 50V	066445
C5	CAP ELECT 10UF 50V	066445
C6	CAP ELECT 10UF 50V	066445
C7	CAP ELECT 10UF 50V	066445
C8	CAP ELECT 10UF 50V	066445
C9	CAP ELECT 10UF 50V	066445
C10	CAP ELECT 10UF 50V	066445
C11	CAP ELECT 10UF 50V	066445
C12	CAP ELECT 10UF 50V	066445
C13	CAP ELECT 10UF 50V	066445
C14	CAP ELECT 10UF 50V	066445
C15	CAP ELECT 10UF 50V	066445
C16	CAP ELECT 10UF 50V	066445
C17	CAP ELECT 10UF 50V	066445
C18	CAP ELECT 10UF 50V	066445
C19	CAP ELECT 10UF 50V	066445
C20	CAP ELECT 10UF 50V	066445
C21	CAP ELECT 10UF 50V	066445
C22	CAP ELECT 10UF 50V	066445
C23	CAP ELECT 10UF 50V	066445
C24	CAP ELECT 10UF 50V	066445
C25	CAP ELECT 10UF 50V	066445
C26	CAP ELECT 10UF 50V	066445
C27	CAP ELECT 10UF 50V	066445
C28	CAP ELECT 10UF 50V	066445
C29	CAP ELECT 10UF 50V	066445
C30	CAP ELECT 10UF 50V	066445
C31	CAP ELECT 10UF 50V	066445
C32	CAP ELECT 10UF 50V	066445
D1	DIODE SILICON	070047
D2	DIODE SILICON	070047
D3	DIODE SILICON	070047
D4	DIODE SILICON	070047
D5	DIODE SILICON	070047
D6	DIODE SILICON	070047
D7	DIODE SILICON	070047
K1	RELAY REED FORM 1A 5V 500 OHMS	087050
K2	RELAY REED FORM 1A 5V 500 OHMS	087050
K3	RELAY REED FORM 1A 5V 500 OHMS	087050
K4	RELAY REED FORM 1A 5V 500 OHMS	087050
K5	RELAY REED FORM 1A 5V 500 OHMS	087050
K6	RELAY REED FORM 1A 5V 500 OHMS	087050
K7	RELAY REED FORM 1A 5V 500 OHMS	087050
K8	RELAY REED FORM 1A 5V 500 OHMS	087050
K9	RELAY REED FORM 1A 5V 500 OHMS	087050



# PARTS LIST con't

RefNo.	Description	PartNo.				
K10	RELAY REED FORM 1A 5V 500 OHMS	087050		R33	RES MF 221 OHM 1% 1/4W	144172
K11	RELAY REED FORM 1A 5V 500 OHMS	087050		R34	RES MF 221 OHM 1% 1/4W	144172
K12	RELAY REED FORM 1A 5V 500 OHMS	087050		R35	RES MF 221 OHM 1% 1/4W	144172
K13	RELAY REED FORM 1A 5V 500 OHMS	087050		R36	RES MF 221 OHM 1% 1/4W	144172
K14	RELAY REED FORM 1A 5V 500 OHMS	087050				
K15	RELAY REED FORM 1A 5V 500 OHMS	087050		◇	<b>ZONE 049712</b>	
K16	RELAY REED FORM 1A 5V 500 OHMS	087050		C7	CAP MONO .1UF 50V 20% Z5U	061305
K17	RELAY REED FORM 1A 5V 500 OHMS	087050		C8	CAP MONO .1UF 50V 20% Z5U	061305
K18	RELAY REED FORM 1A 5V 500 OHMS	087050		C2	CAP MPF 0.033UF 5% 63VDC	064318
K19	RELAY REED FORM 1A 5V 500 OHMS	087050		C3	CAP MPF 0.033UF 5% 63VDC	064318
K20	RELAY REED FORM 1A 5V 500 OHMS	087050		C5	CAP MPF 0.033UF 5% 63VDC	064318
K21	RELAY REED FORM 1A 5V 500 OHMS	087050		C6	CAP MPF 0.033UF 5% 63VDC	064318
K22	RELAY REED FORM 1A 5V 500 OHMS	087050		C1	CAP ELECT 22UF 100V	066506
K23	RELAY REED FORM 1A 5V 500 OHMS	087050		C4	CAP ELECT 22UF 100V	066506
K24	RELAY REED FORM 1A 5V 500 OHMS	087050		D1	DIODE SILICON	070047
K25	RELAY REED FORM 1A 5V 500 OHMS	087050		K1	RELAY REED FORM 1A 5V 500 OHMS	087050
K26	RELAY REED FORM 1A 5V 500 OHMS	087050		K2	RELAY REED FORM 1A 5V 500 OHMS	087050
J1	RECEPTACLE XLR FEMALE	117668		K3	RELAY REED FORM 1A 5V 500 OHMS	087050
J2	RECEPTACLE XLR FEMALE	117668		K4	RELAY REED FORM 1A 5V 500 OHMS	087050
J3	RECEPTACLE XLR FEMALE	117668		J1	CONN FFC 18PIN	117765
J4	RECEPTACLE XLR FEMALE	117668		U1	IC OPERATIONAL AMPLIFIER	133028
J5	RECEPTACLE XLR FEMALE	117668		R9	Potentiometer	134457
J6	RECEPTACLE XLR FEMALE	117668		R10	Potentiometer	134457
J7	RECEPTACLE XLR FEMALE	117668		R11	RES MF 475 OHM 1% 1/4W	144086
J8	RECEPTACLE XLR FEMALE	117668		R12	RES MF 475 OHM 1% 1/4W	144086
J10	RECEPTACLE XLR MALE	117669		R3	RES MF 100K 1% 1/4W	144113
J11	RECEPTACLE XLR MALE	117669		R7	RES MF 100K 1% 1/4W	144113
J12	RECEPTACLE XLR MALE	117669		R1	RES MF 681 OHM 1% 1/4W	144195
J13	RECEPTACLE XLR MALE	117669		R5	RES MF 681 OHM 1% 1/4W	144195
J14	RECEPTACLE XLR MALE	117669		R2	RES MF 1M 1/4W	144269
J15	RECEPTACLE XLR MALE	117669		R4	RES MF 1M 1/4W	144269
J9	CONN FFC 18PIN	117765		R6	RES MF 1M 1/4W	144269
J16	CONN FFC 18PIN	117765		R8	RES MF 1M 1/4W	144269
R21	RES MF 100K 1% 1/4W	144113				
R23	RES MF 100K 1% 1/4W	144113		◇	<b>DATA 049708</b>	
R24	RES MF 100K 1% 1/4W	144113		SP1	BRACKET PCB CARD MOUNTING	003611
R37	RES MF 100K 1% 1/4W	144113		SP2	BRACKET PCB CARD MOUNTING	003611
R38	RES MF 100K 1% 1/4W	144113		SP3	BRACKET PCB CARD MOUNTING	003611
R39	RES MF 100K 1% 1/4W	144113		C2	CAP MONO 1000PF 50V 10% NPO	061303
R41	RES MF 100K 1% 1/4W	144113		C1	CAP MONO .1UF 50V 20% Z5U	061305
R42	RES MF 100K 1% 1/4W	144113		C3	CAP MONO .1UF 50V 20% Z5U	061305
R43	RES MF 100K 1% 1/4W	144113		C4	CAP MONO .1UF 50V 20% Z5U	061305
R44	RES MF 100K 1% 1/4W	144113		J9	CONN GOLD P RIGHT ANGLE	117681
R1	RES MF 267K 1% 1/4W	144118		J1	JACK HEADPHONE STEREO 1/8IN	117759
R2	RES MF 267K 1% 1/4W	144118		J2	JACK HEADPHONE STEREO 1/8IN	117759
R3	RES MF 267K 1% 1/4W	144118		J3	JACK HEADPHONE STEREO 1/8IN	117759
R4	RES MF 267K 1% 1/4W	144118		J4	JACK HEADPHONE STEREO 1/8IN	117759
R5	RES MF 267K 1% 1/4W	144118		J5	JACK HEADPHONE STEREO 1/8IN	117759
R6	RES MF 267K 1% 1/4W	144118		J6	JACK HEADPHONE STEREO 1/8IN	117759
R7	RES MF 267K 1% 1/4W	144118		J7	JACK HEADPHONE STEREO 1/8IN	117759
R8	RES MF 267K 1% 1/4W	144118		J8	JACK HEADPHONE STEREO 1/8IN	117759
R9	RES MF 267K 1% 1/4W	144118		J11	JACK HEADPHONE STEREO 1/8IN	117759
R10	RES MF 267K 1% 1/4W	144118		J12	JACK HEADPHONE STEREO 1/8IN	117759
R11	RES MF 267K 1% 1/4W	144118		J13	JACK HEADPHONE STEREO 1/8IN	117759
R12	RES MF 267K 1% 1/4W	144118		J14	JACK HEADPHONE STEREO 1/8IN	117759
R13	RES MF 267K 1% 1/4W	144118		J15	JACK HEADPHONE STEREO 1/8IN	117759
R14	RES MF 267K 1% 1/4W	144118		J10	CONN FFC 18PIN	117765
R15	RES MF 267K 1% 1/4W	144118		Q1	TRANSISTOR NPN	132223
R16	RES MF 267K 1% 1/4W	144118		U4	IC AND 2 INPUT X 4	133175
R17	RES MF 267K 1% 1/4W	144118		U5	IC AND 2 INPUT X 4	133175
R18	RES MF 267K 1% 1/4W	144118		U2	LB1720	133180
R19	RES MF 267K 1% 1/4W	144118		U1	IC SHFT REG SER-PAR	133186
R20	RES MF 267K 1% 1/4W	144118		U3	IC OPERATIONAL AMPLIFIER	133189
R25	RES MF 221 OHM 1% 1/4W	144172		R27	RES MF 10K 1% 1/4W	144053
R26	RES MF 221 OHM 1% 1/4W	144172		R3	RES MF 1K 1% 1/4W	144090
R27	RES MF 221 OHM 1% 1/4W	144172		R5	RES MF 1K 1% 1/4W	144090
R28	RES MF 221 OHM 1% 1/4W	144172		R6	RES MF 1K 1% 1/4W	144090
R29	RES MF 221 OHM 1% 1/4W	144172		R11	RES MF 1K 1% 1/4W	144090
R30	RES MF 221 OHM 1% 1/4W	144172		R16	RES MF 27.4K 1% 1/4W	144141
R31	RES MF 221 OHM 1% 1/4W	144172		R19	RES MF 31.8K 1% 1/4W	144148
R32	RES MF 221 OHM 1% 1/4W	144172		R14	RES MF 51.1K 1% 1/4W	144155

R15	RES MF 10 OHM 1% 1/4W	144157
R26	RES MF 10 OHM 1% 1/4W	144157
R30	RES MF 10 OHM 1% 1/4W	144157
R13	RES MF 221 OHM 1% 1/4W	144172
R1	RES MF 100 OHM 1% 1/4W	144196
R2	RES MF 100 OHM 1% 1/4W	144196
R4	RES MF 100 OHM 1% 1/4W	144196
R7	RES MF 100 OHM 1% 1/4W	144196
R8	RES MF 100 OHM 1% 1/4W	144196
R9	RES MF 100 OHM 1% 1/4W	144196
R10	RES MF 100 OHM 1% 1/4W	144196
R12	RES MF 100 OHM 1% 1/4W	144196
R17	RES MF 182 OHM 1/4W 1%	144273
R18	RES MF 182 OHM 1/4W 1%	144273
R20	RES MF 182 OHM 1/4W 1%	144273
R21	RES MF 182 OHM 1/4W 1%	144273
R22	RES MF 182 OHM 1/4W 1%	144273
R23	RES MF 182 OHM 1/4W 1%	144273
R24	RES MF 182 OHM 1/4W 1%	144273
R25	RES MF 182 OHM 1/4W 1%	144273
R28	RES MF 221K 1% 1/4W	144421
R29	RES MF 221K 1% 1/4W	144421



#### PUSHBUTTON 049711

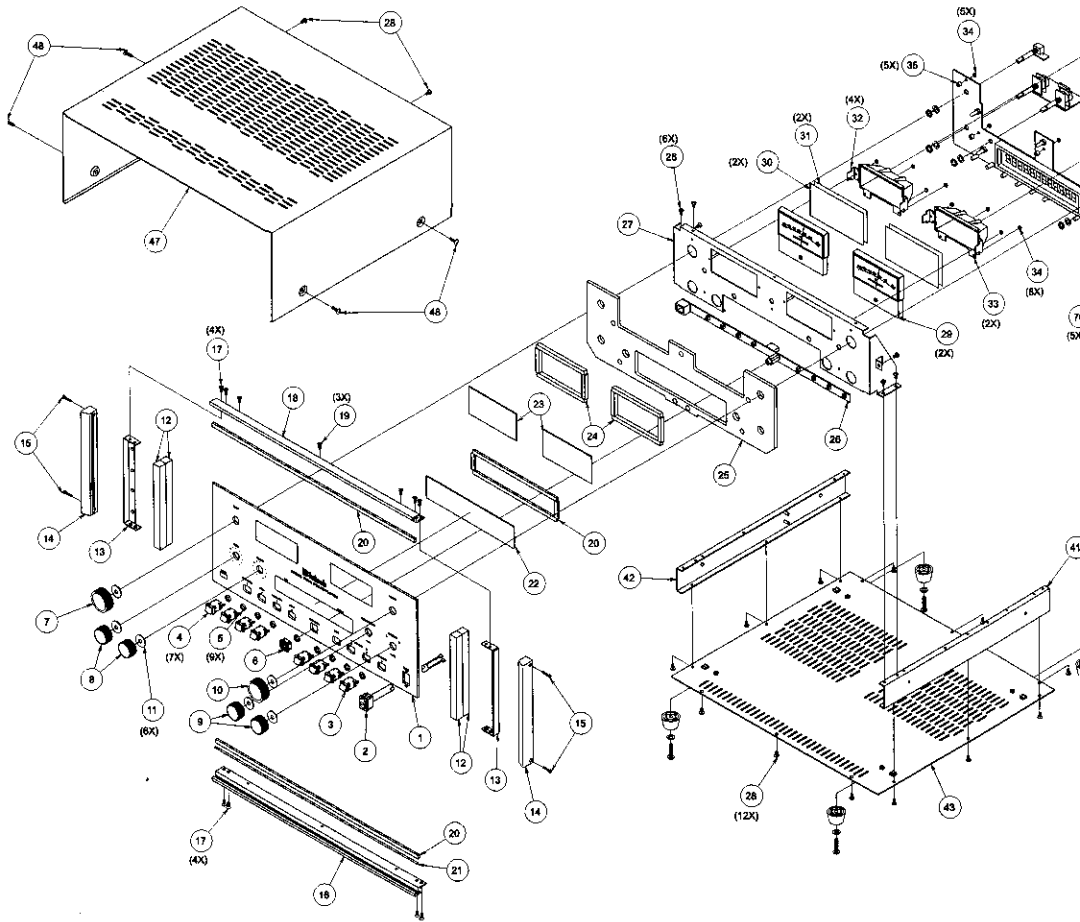
C1	CAP MONO .1UF 50V 20% Z5U	061305
C2	CAP ELECT 47UF 16V 6.3X5 CASE	066380
J2	JACK PHONO 1/8 STEREO VER	117462
J1	CONN 5	117478
J3	CONN 12 PIN FFC	117720
MT1	SENSOR IR 38KHZ	121046
R1	RES MF 100 OHM 1% 1/4W	144196
S1	SWITCH PB TACK	150058
S2	SWITCH PB TACK	150058
S3	SWITCH PB TACK	150058
S4	SWITCH PB TACK	150058
S5	SWITCH PB TACK	150058
S6	SWITCH PB TACK	150058
S7	SWITCH PB TACK	150058
S8	SWITCH PB TACK	150058

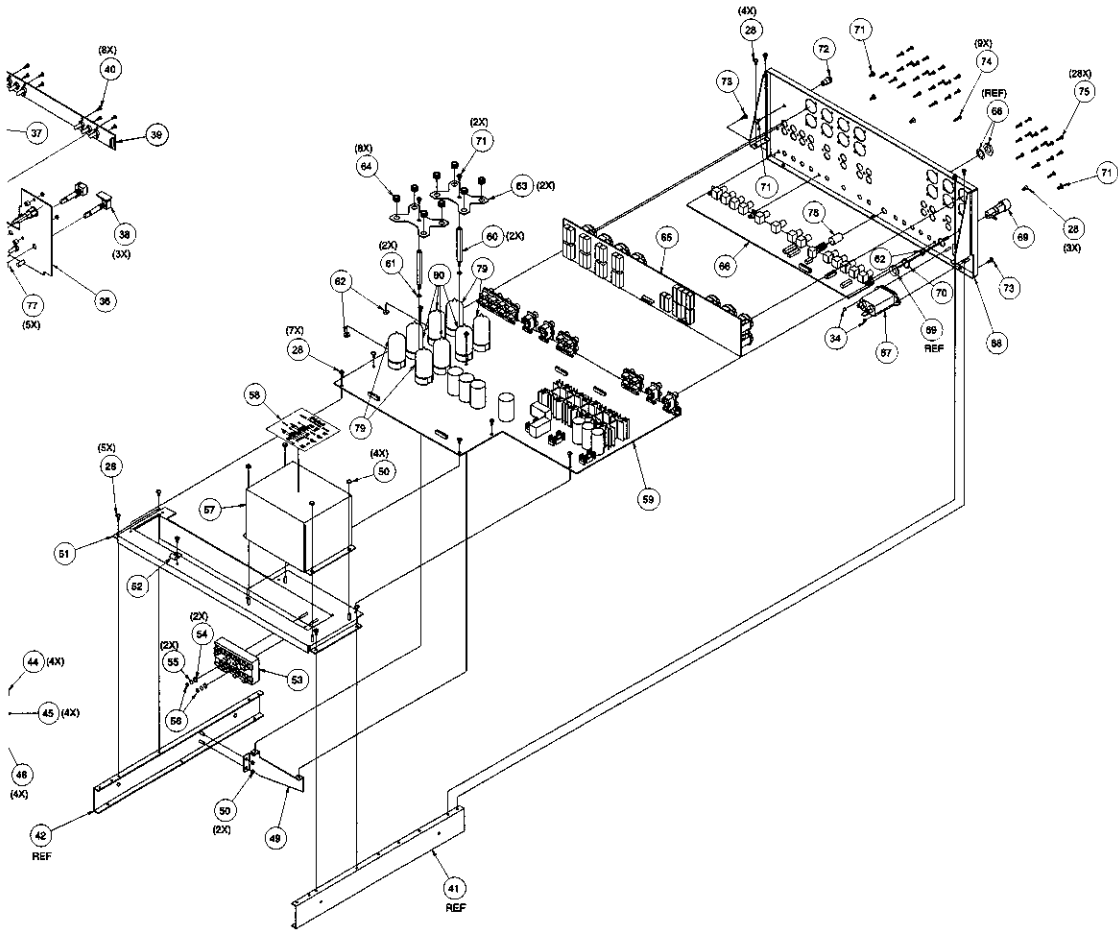


#### METER LAMP 049713

DS1	LAMP INCANDESCENT 14V 100MA	058153
DS2	LAMP INCANDESCENT 14V 100MA	058153
DS3	LAMP INCANDESCENT 14V 100MA	058153
DS4	LAMP INCANDESCENT 14V 100MA	058153
DS5	LAMP INCANDESCENT 14V 100MA	058153
DS6	LAMP INCANDESCENT 14V 100MA	058153
J1	CONN 12 PIN FFC	117720

# C2200 EXPLODED VIEW





# C2200 EXPLODED VIEW PARTS LIST

Ref No.	Part No.	Description
1	016462	GLASS
2	171026	CABLE ASSY PWR SW/FUSE HOLDER
3	017531	PUSHBUTTON ASSY RED
4	017517	PUSHBUTTON ASSY BLK
5	078033	O-RING
6	017854	BEZEL HEADPHONE
7	049637	ASSY KNOB 34 MTRC NO INDEX
7	049753	ASSY KNOB 34 MTRC NO INDEX GOLD
8	049725	ASSY KNOB 25.5 MTRC INDEX
8	049739	ASSY KNOB 25.5 MTRC INDEX GOLD
9	049724	ASSY KNOB 25.5 MTRC NO INDEX
9	049738	ASSY KNOB 25.5 MTRC NO INDEX GOLD
10	049726	ASSY 34 AMRCN NO INDEX
10	049740	ASSY 34 AMRCN NO INDEX GOLD
11	104073	WASHER FELT 1/4 X 5/8
12	094360	TAPE FOAM 1/2 X 1/2
13	004899	BRACKET EXTRUSION
14	018612	ENDCAP 7"
14	018694	ENDCAP 7" GOLD
15	101042	SCREW TS 4-40 X 1/2 SLOT FILLISTER
16	018605	EXTRUSION BOTTOM
17	100149	SCREW MACH 6-32 X 1/4 FL U/H ST
18	018587	EXTRUSION TOP
19	101172	SCREW TS 6-32 X 1/4 PH FL U/C
20	094016	TAPE FOAM 1/4 X 1/8
21	098113	CORD DIAL .027 BLK BRAID SILK
22	017738	PLEXI FILTER
23	092437	FILTER METER
24	094017	TAPE FOAM 1/4 X 1/4
25	017875	PLEXIGLAS
26	049711	PUSHBUTTON PCB ASSY
27	005215	SUBPANEL
28	101054	SCREW TAPITTE 6-32 X 1/4 PH PN BLK
29	124082	METER
30	092435	FILTER AZURE BLUE
31	092436	FILTER PALE BLUE
32	005216	CLAMP METER
33	052099	LIGHT BOX METER
34	102001	NUT KEP 4-40 CADMIUM PLATE
35	021094	SPACER STEEL #4 X 1/4
36	049709	DISPLAY PCB ASSY
37	049712	TONE PCB ASSY
38	049106	SWITCH PCB ASSY
39	049713	METER LAMP PCB ASSY
40	101150	SCREW HI/LO 4-24 X 1/4 PH PAN

41	005213	PANEL RIGHT SIDE
42	005214	PANEL LEFT SIDE
43	005212	COVER BOTTOM
44	017218	FOOT PLASTIC BLACK
45	104080	WASHER FLAT CLEAR ZINC
46	100159	SCREW MACH 10-32 X 3/4 PH PN BLK
47	005211	COVER TOP
48	101078	SCREW TAP 8-32 X 5/16 PH PN BLK
49	005231	BRACKET SUPPORT PCB
50	102045	NUT KEP 6-32 SPECIAL
51	005217	TRAY
52	017160	TAB MOUNTING .140 DIA MTG
53	074091	TERMINAL BLOCK AC
54	104001	WASHER FLAT STEEL 4 X 9/32 X .025
55	104004	WASHER LOCK 5 X .255 INT STAR
56	102022	NUT MACH 4-40 X 3/16 X 1/16
57	049722	ASSY TRANSFORMER POT
58	126842	DECAL TRANSFORMER
59	049710	MAIN PCB ASSY
60	112115	STANDOFF 2-1/4"
61	104007	WASHER LOCK 6 X .288 INT STAR
62	102020	NUT MACH 6-32 SELF-LOCK
63	005230	COVER TUBE
64	078031	GROMMET
65	049707	BALANCED PCB ASSY
66	049708	DATA PCB ASSY
67	117755	RECEPTACLE INPUT & LINE FILTER
68	005210	PANEL REAR
69	178122	HOLDER FUSE SOCKET UL/CSA
70	104016	WASHER INT STAR .5 X .630 X .022
71	100250	SCREW MACH SEMS 6-32 X 1/4 PH PN
72	084112	POST GROUND GOLD
73	101109	SCREW TAP 6-32 X 5/16 PH PN BLK
74	101114	SCREW SM 4-24 X 1/2 PH PN TYPE A
75	101197	SCREW HI/LO 4-24 X 3/8 PH RD BLK
76	110004	NUT CONTROL M7 X .75 HEX
77	104013	WASHER LOCK 5/16 X .435 X .002
78	017673	SPACER .380 ID X 3/8 LONG PHENOLIC
79	165065	TUBE 12AX7A
80	165067	TUBE 12AT7

# REPACKING INSTRUCTION

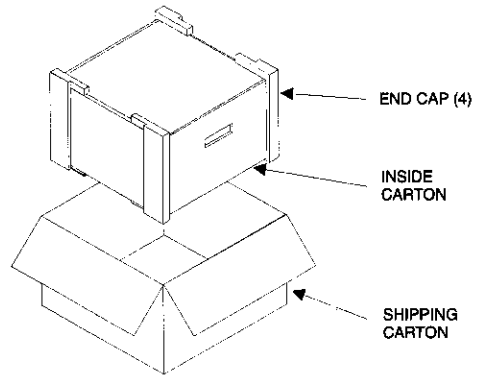
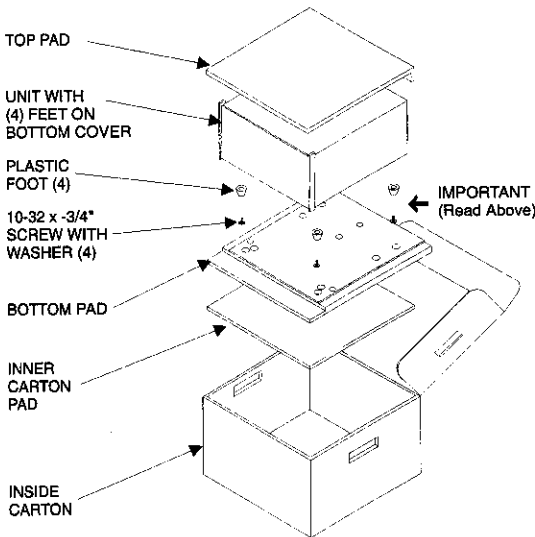
In the event it is necessary to repack the unit for shipment, the unit must be packed exactly as shown below.

**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. 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	Foam end cap
1	033697	Inside carton only
1	033725	Top pad
1	034008/	
	034194	Bottom pad
1	034037	Inner carton pad
4	017218	Plastic foot
4	100159	#10-32 x 3/4" Machine screw
4	104083	#10 x 7/16" Flat washer



# C2200

## TUBE PREAMPLIFIER

### 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.