

SERVICE MANUAL



116
PRE-AMPLIFIER

116
PRE-AMPLIFIER

The bottom half of the page features a large black rectangular area. On the left side of this area, the text "116" is written in a large, bold, white font, with "PRE-AMPLIFIER" in a smaller, bold, white font directly below it. On the right side of the same area, the text "116" is written in a very large, bold, white font, with "PRE-AMPLIFIER" in a smaller, bold, white font directly below it.

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SERVICE SAFETY PRECAUTIONS

1. Replacing the fuses

CAUTION FOR CONTINUED PROTECTION AGAINST THE RISK OF FIRE REPLACE ONLY WITH SAME TYPE OF FUSE.


<u>Reference No.</u>	<u>Part Number</u>	<u>Description</u>
F351,F352*AH	32S1250800TU	Fuse 800mA 250V Time Lag (UL/CSA)
F351,F352*C	32S1250800TS	Fuse 800mA 250V Time Lag (SEMKO)

NOTE :

<*AH > : USA, CANADIAN MODEL ONLY.

<*C > : EUROPEAN MODEL ONLY.

2. Safety-check out (Only U.S.A. model)

Parts marked with the symbol  are critical with regard to the risk of fire and electric shock. Replace only with parts recommended by the manufacturer.

Before returning the product to the customer, make leakage current or resistance measurements to determine that exposed parts are acceptably insulated from the supply circuit.

SPECIFICATIONS

Measured in accordance with EIA Standard RS-490 (IHF T-202).

PHONO INPUT

Input impedance (R and C)	MM	47 kohm + 200pF
	MC	100 ohms + 1000pF
Input sensitivity	MM	1.2mV ref. 0.5V out
	MM	5mV ref. 2.0V out
	MC	56uV ref. 0.5V out
	MC	240uV ref. 2.0V out
Input overload at 20Hz/1kHz/20kHz	MM	20mV/200mV/2000mV
	MC	1.2mV/12mV/90mV
Signal/Noise ratio (A-weighted)	MM	78dB ref. 0.5mV (cartidge connected)
	MC	78 dB ref. 0.5mV (100 ohm load)
THD (20Hz-20kHz) and IM dist.	MM/ MC	<0.02%
RIAA response accuracy	MM/ MC	+/-0.3dB

LINE LEVEL INPUTS (CD, Video, Tuner, Tape1, Tape2, Aux)

Input impedance (R and C)	20 kohm + 450pF	
Input sensitivity	ref. 0.5V	80mV
	ref. 2.0V	300mV
Signal/Noise ratio, A-weighted	ref. 0.5V	98dB
	ref. 2.0V	110dB
Frequency response, 20Hz-20kHz	+/-0.3dB	
Voltage gain	16dB	
THD + SMPTE+IHF I.M.	<0.02%	

LINE LEVEL OUTPUTS

Output impedance	Pre out	220 ohm
	Tape	Source Z +2 kohm
	Phones	120 ohm
Maximum output level	Pre out	>12V
	Tape	>10V
	Phones	>8V into 600 ohm
	Phones	>250mV into 8 ohm

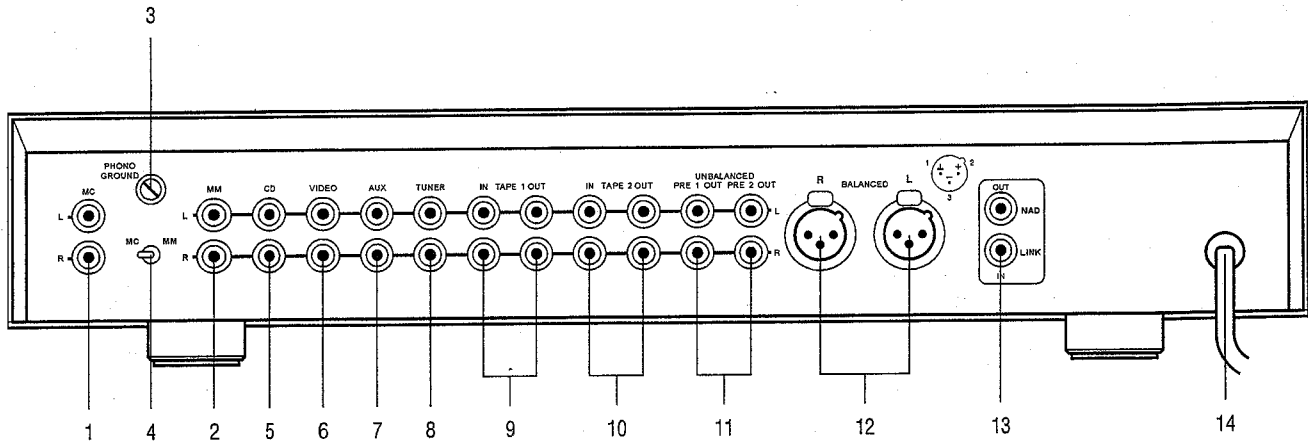
PHYSICAL SPECIFICATIONS

Dimensions in mm (Width x Height x Depth)	435 x85 x310
Net Weight	4.2Kg/9.3lbs
Shipping Weight	5.5Kg/12.1lbs

REAR PANEL /FRONT PANEL VIEW

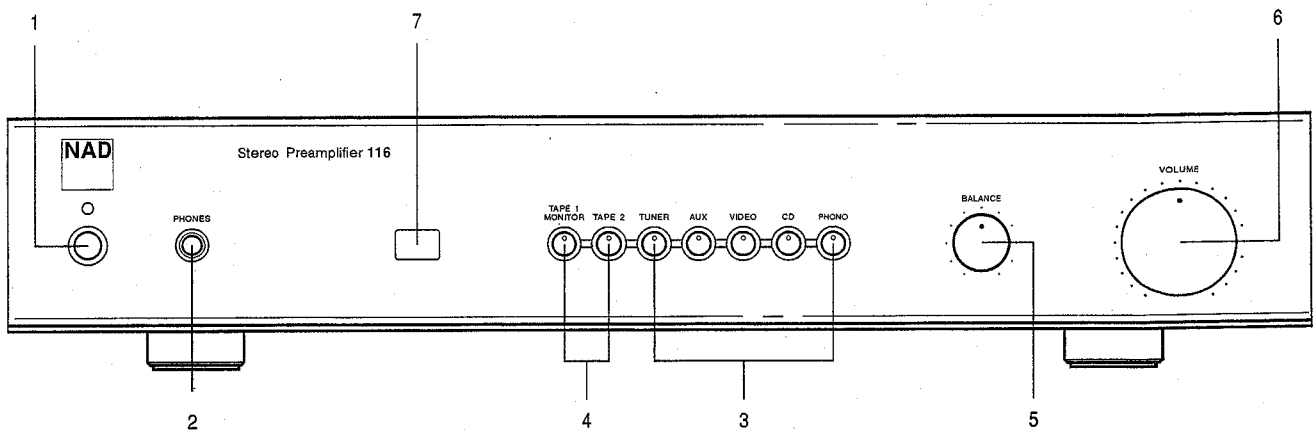
REAR PANEL

WARNING: TO PREVENT FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.



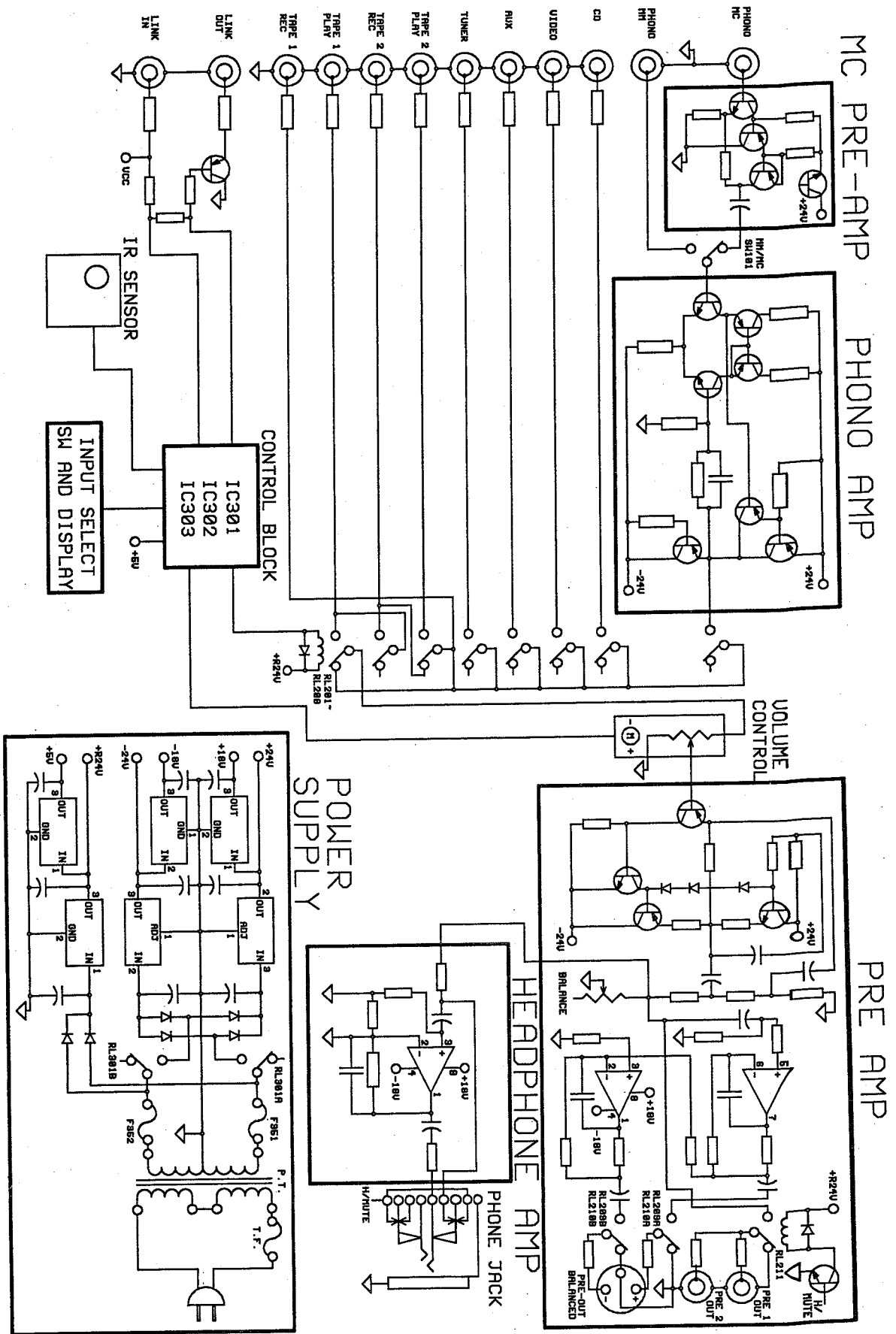
- | | |
|-----------------------------|----------------------|
| 1. MC INPUT | 8. TUNER INPUT |
| 2. MM INPUT | 9. TAPE 1 IN, OUT |
| 3. PHONO (GROUND) CONNECTOR | 10. TAPE 2 IN, OUT |
| 4. MC-MM SWITCH | 11. PRE 1, 2 OUT |
| 5. CD INPUT | 12. BALANCED OUTPUTS |
| 6. VIDEO INPUT | 13. NAD-LINK IN, OUT |
| 7. AUX INPUT | 14. AC POWER CORD |

FRONT PANEL

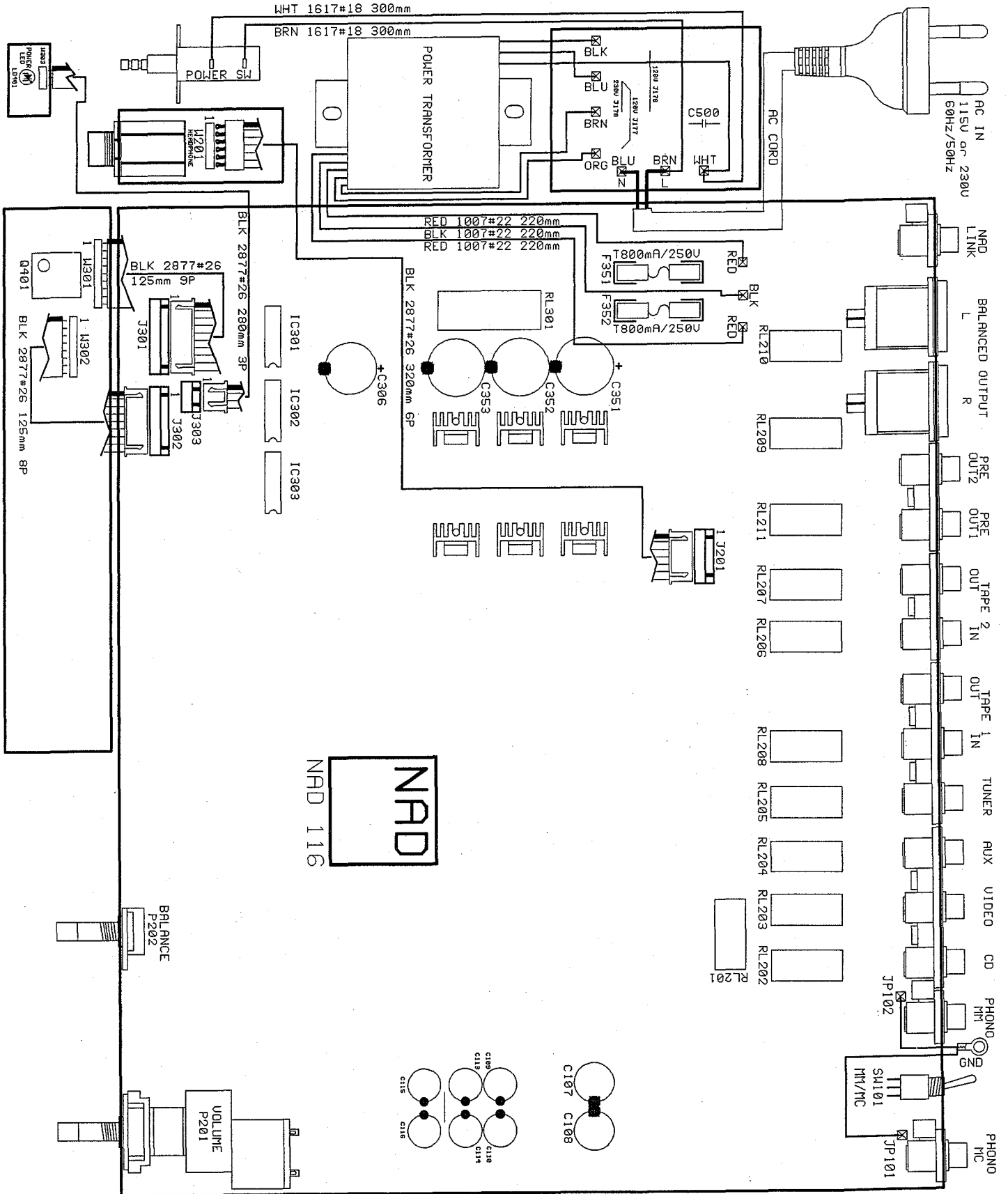


- | | |
|---------------------|---------------------|
| 1. POWER | 5. BALANCE |
| 2. HEADPHONE SOCKET | 6. VOLUME |
| 3. INPUT SELECTORS | 7. INFRA-RED SENSOR |
| 4. TAPE 1 / TAPE 2 | |

BLOCK DIAGRAM



WIRING DIAGRAM



DISASSEMBLY INSTRUCTIONS

TOP COVER REMOVAL

1. Remove parts in order of disassembly as numbered.
 - a. ① - ④ Machine screws M 4.0x6.0 from the side panels.
 - b. ⑤ Tapping screw T 3.0x6.0 from the back side.(See Fig. 1.)

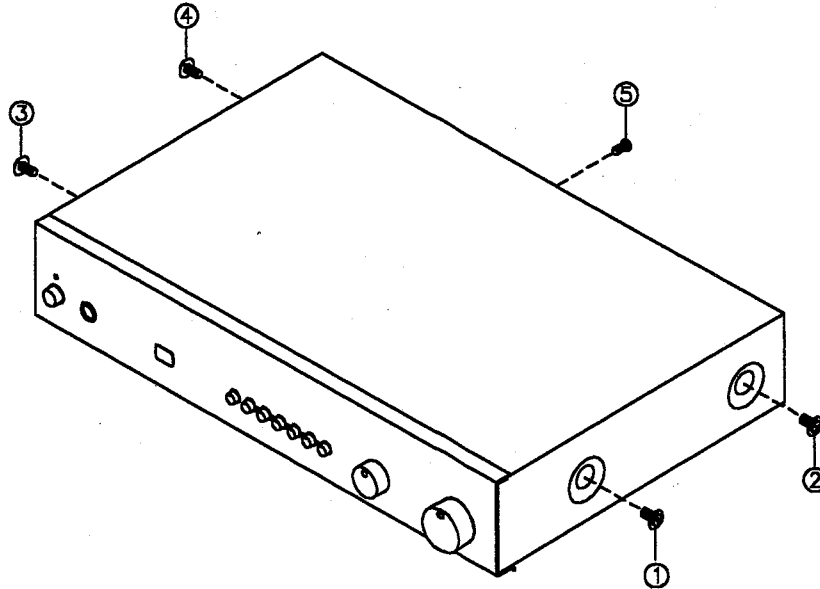


Fig. 1.

2. Pull both sides of TOP COVER outward and then remove in the direction as indicated by pointer ⑥. (See Fig. 2.)

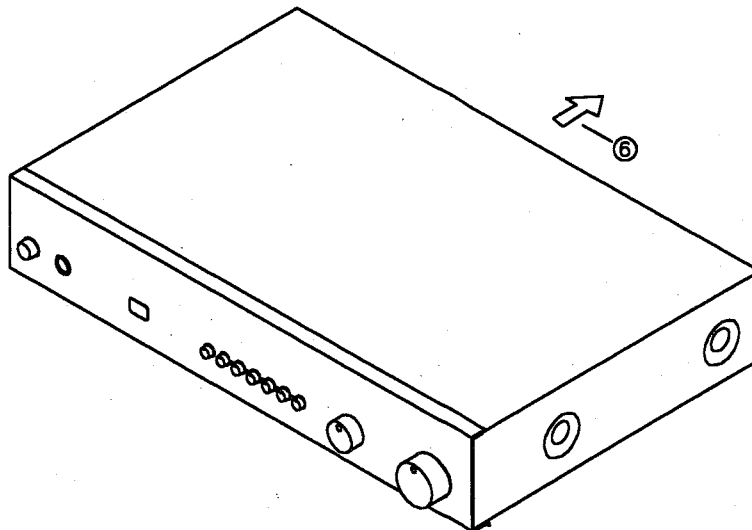
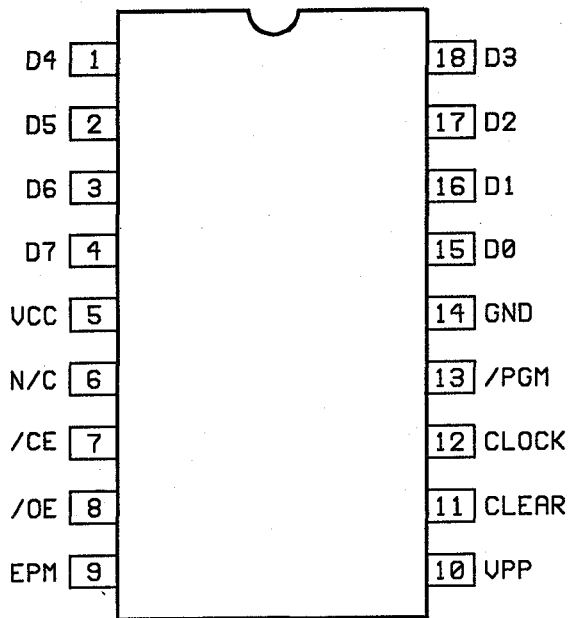


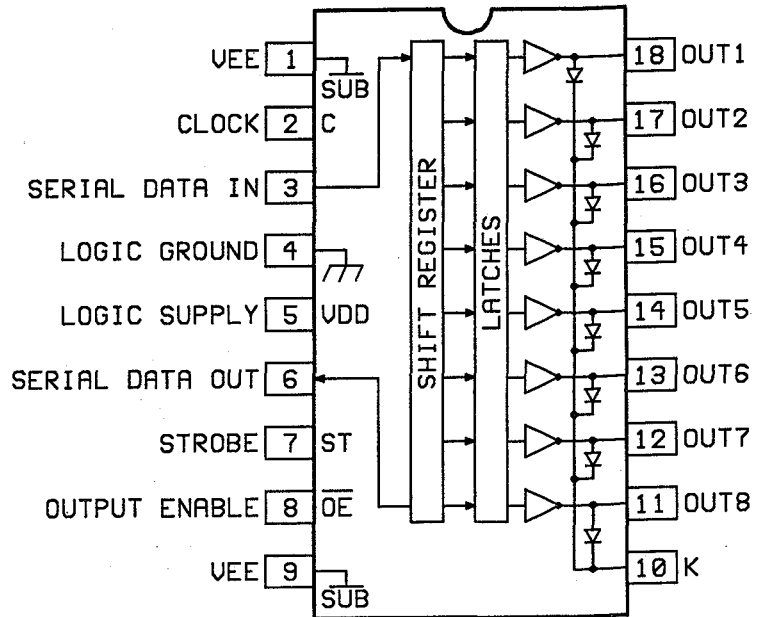
Fig. 2.

IC BLOCK DIAGRAM

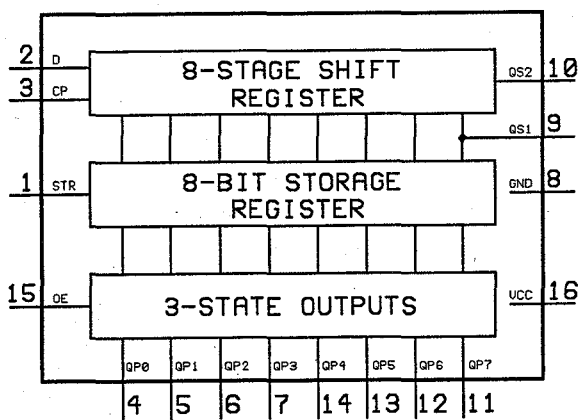
IC301
Z86C0812PSCR2649



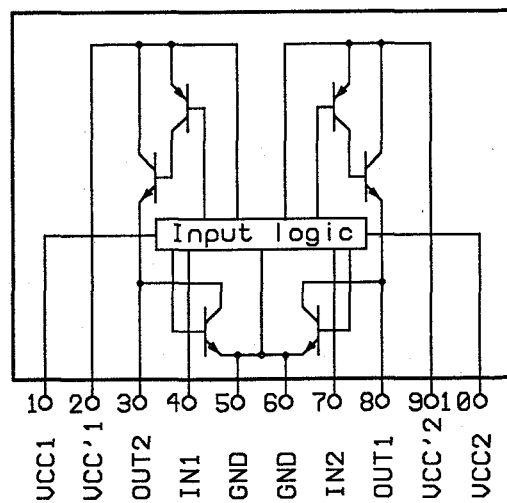
IC302
UCN5841A



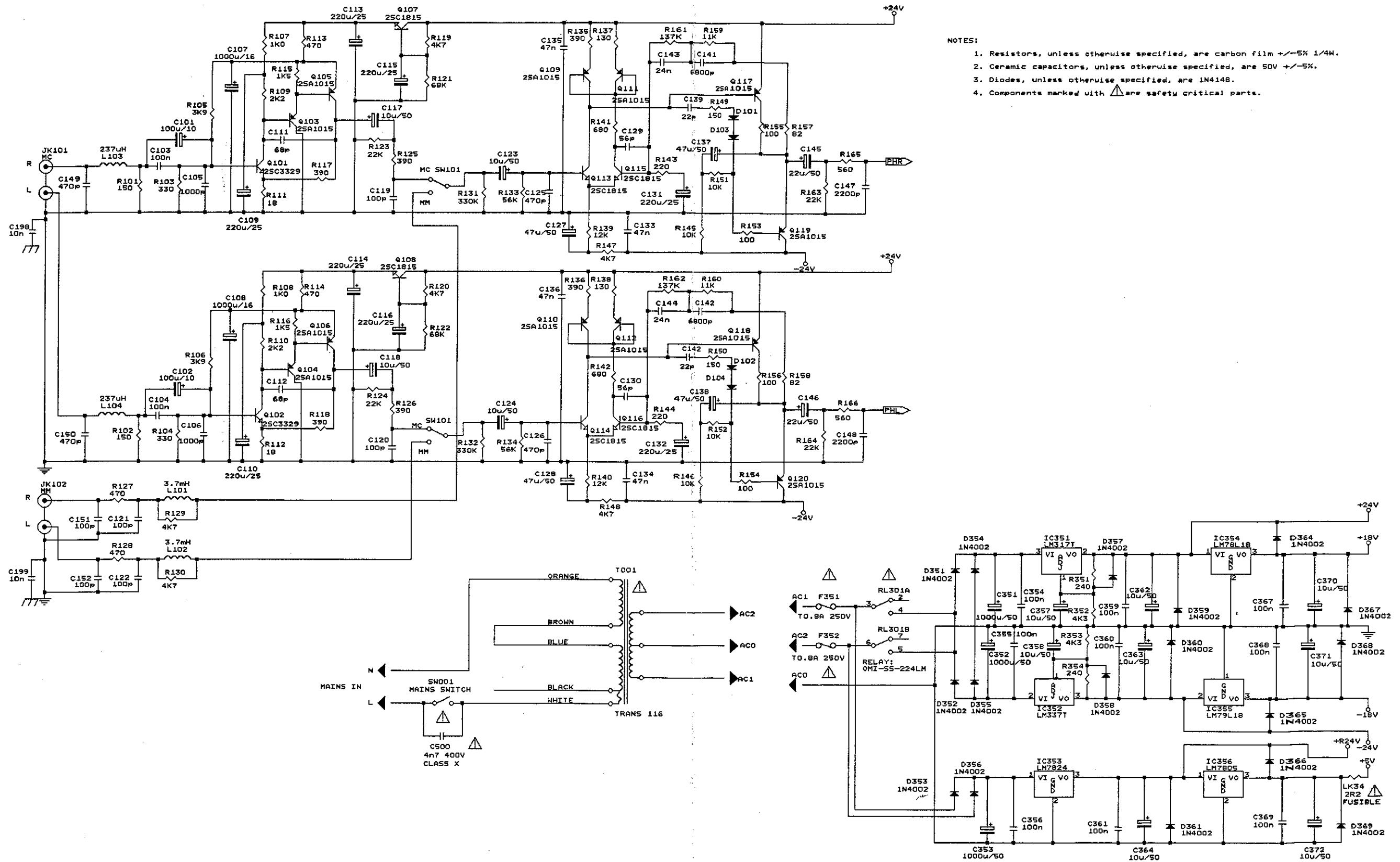
IC303 74HC4094



IC304 LB1642



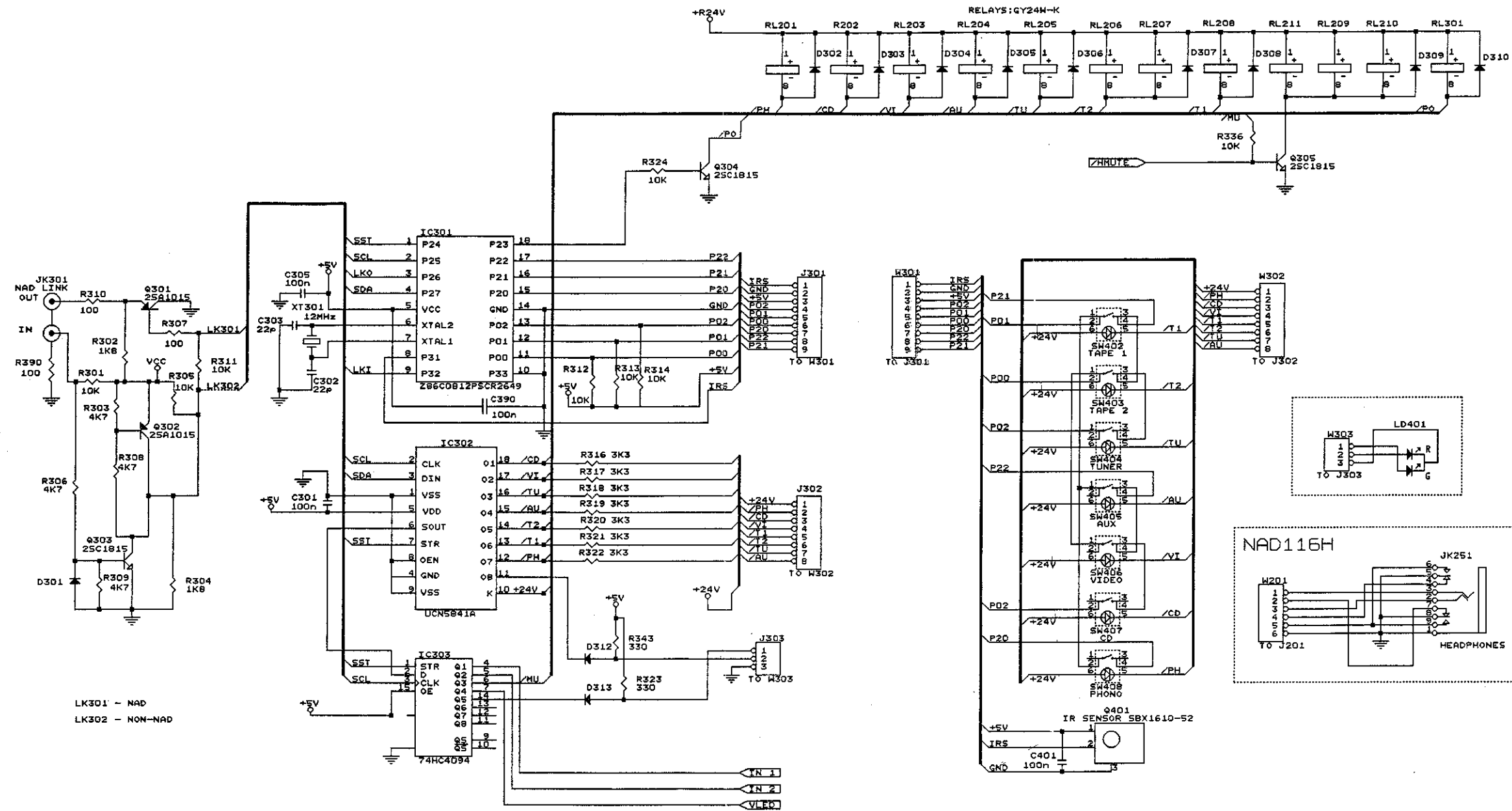
SCHEMATIC DIAGRAM(Phono Preamp/Power Supply)



NOTES:

1. Resistors, unless otherwise specified, are carbon film +/-5% 1/4W.
2. Ceramic capacitors, unless otherwise specified, are 50V +/-5%.
3. Diodes, unless otherwise specified, are 1N4148.
4. Components marked with \triangle are safety critical parts.

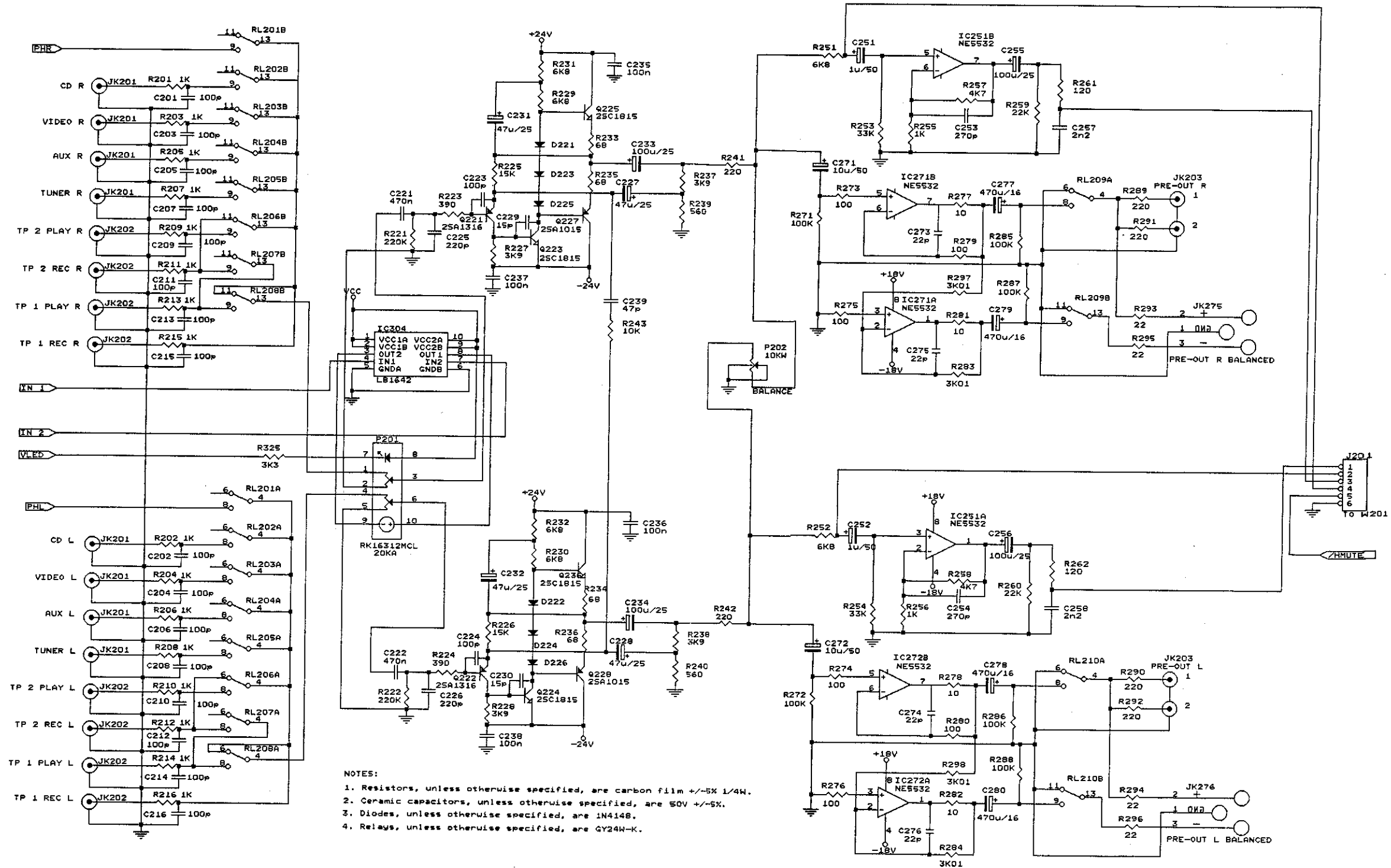
SCHEMATIC DIAGRAM(Microprocessor/Switch)



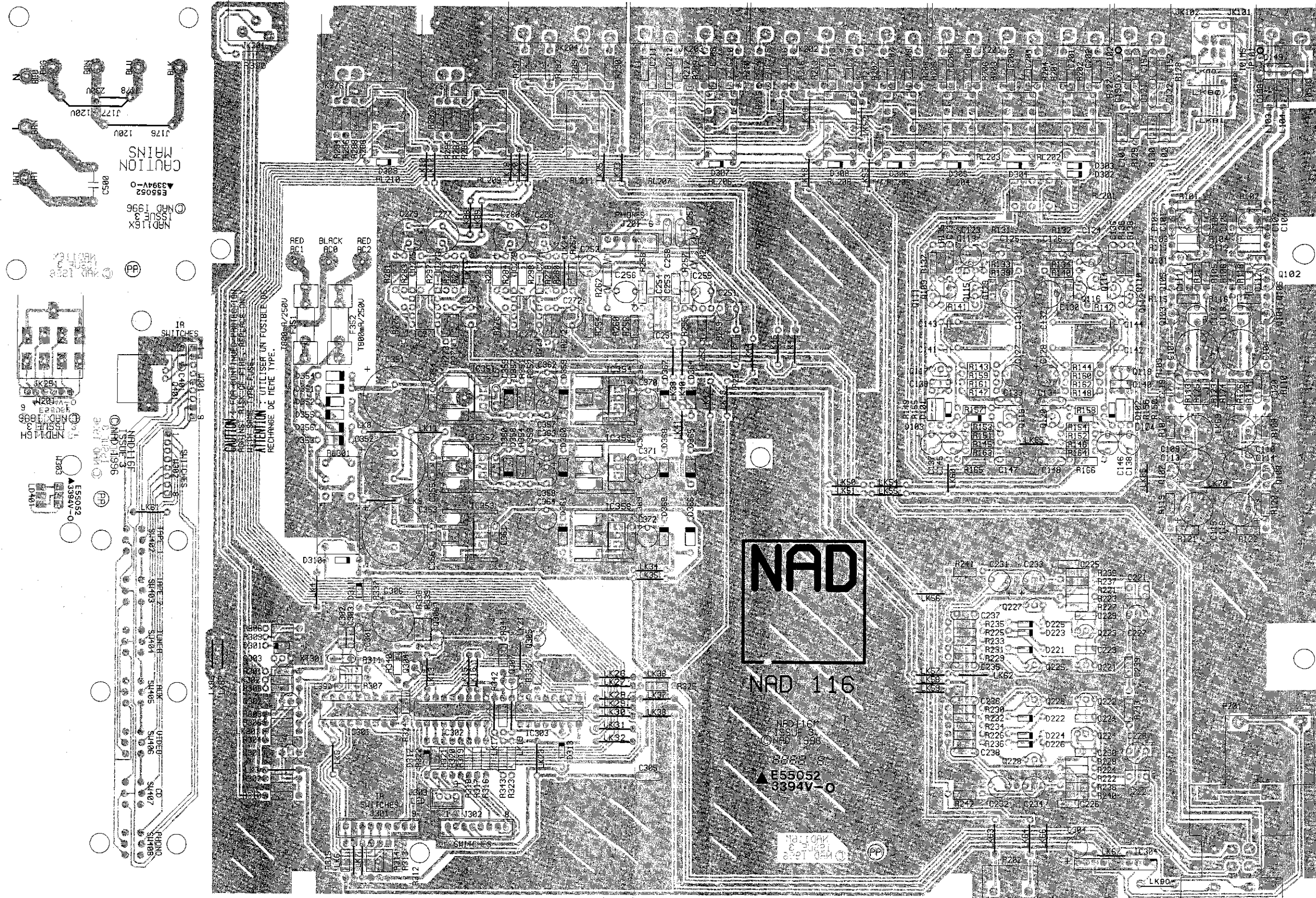
NOTES:

1. Resistors, unless otherwise specified, are carbon film +/-5% 1/4W.
2. Ceramic capacitors, unless otherwise specified, are 50V +/-5%.
3. Diodes, unless otherwise specified, are 1N4148.
4. Relays, unless otherwise specified, are GY24W-K.

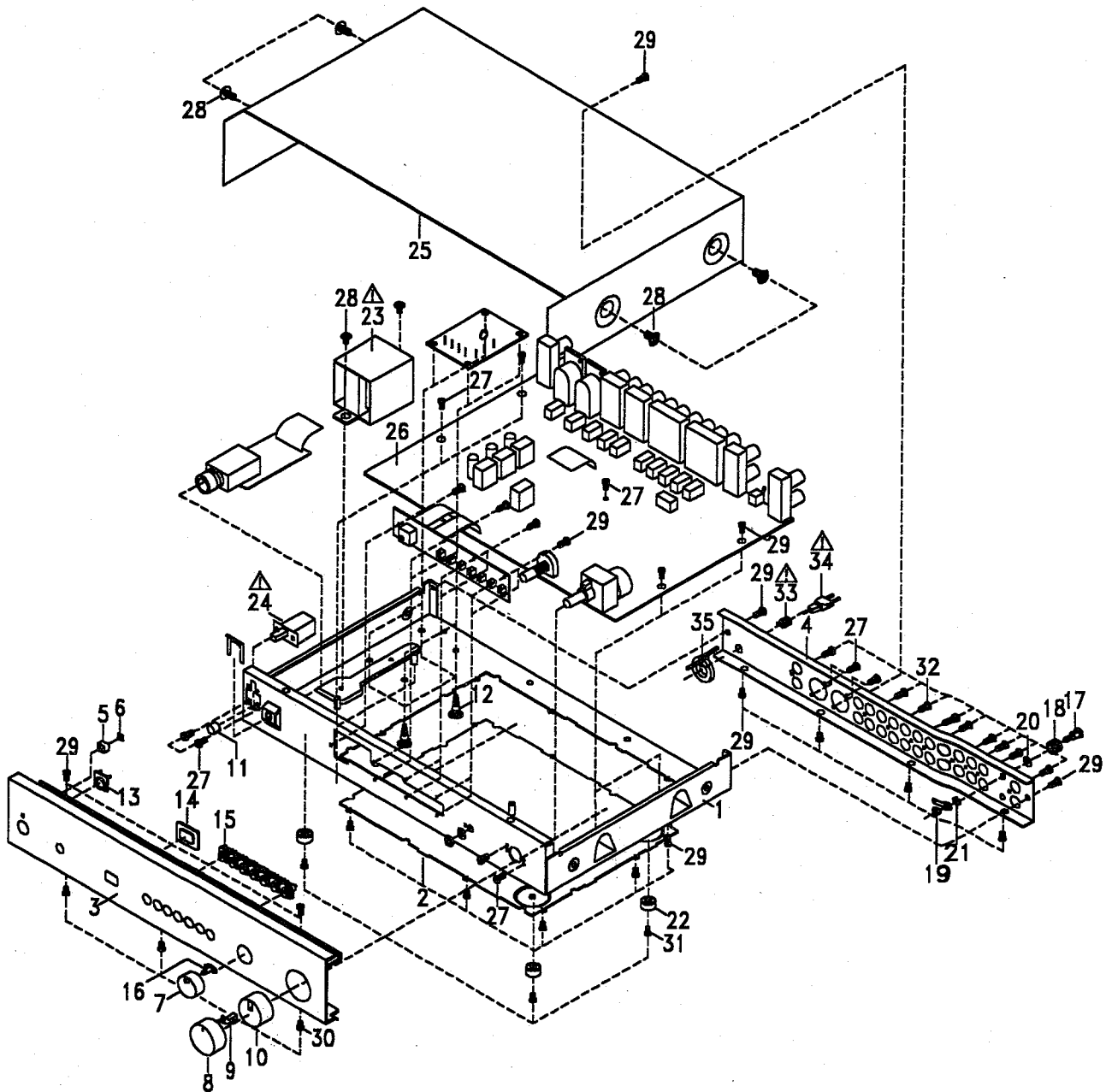
SCHEMATIC DIAGRAM(Input/Output)



PCB LAYOUT (Parts Side)



EXPLODED VIEW



EXPLODED VIEW PARTS LIST

ITEM	PART NO.	DESCRIPTION	QTY
1	11-6203	MAIN CHASSIS	1
2	11-6203-1	BOTTOM COVER	1
3	11-8064	FRONT PANEL	NAD 116 1
4*AH	11-8529-1	REAR PANEL	(115V) 1
4*B/B1/C	11-8529-2	REAR PANEL	(220V-240V) 1
5	13-8262	BEZEL,POWER LED	1
6	13-9006	LENS,POWER LED	1
7	12-3154	KNOB,CONTROL	BALANCE 1
8	12-1250	KNOB SKIN	VOLUME 1
9	12-1245	LENS,VOLUME KNOB	1
10	12-1246	KNOB CORE	1
11	12-3153	BUTTON,POWER	GREEN 1
12	13-8235BK	PCB SPACER	SCB-19 4
13	13-8261	BEZEL,POWER	1
14	12-1249	LENS,IR	1
15	12-1253	BUTTON A'SSY	INPUTS 1
16	13-9002	POINTER	1
17	15-2037	GND BOLT	1
18	15-2037-1	GND NUT	1
19	15-2037-2	NUT M3.5	1
20	15-2037-3	STOP WASHER	1
21	15-2037-5	GEAR WASHER	1
22	28-1050	RUBBER-FOOT	4
23	29-2169	TRANSFORMER	1
24	31-1213	SWITCH,POWER	SDDL1007U-EK TV-3 1
25	50-1042*A	COVER, TOP	1
26	90-1291	PCB ASS'Y	WITH COMPONENTS 1
27	S1B03+I06SL-2	MACHINE SCREW	M3*6 12
28	S1K04+I06SL-2	MACHINE SCREW	M4*6 W/WASHER 6
29	S2B03+I06SL-2	TAPPING SCREW	T3*6 28
30	S2B03+I08SL-2	TAPPING SCREW	T3*8 3
31	S2I03+I08SZ-2	TAPPING SCREW	T3*8 4
32	S3B03+I08SL-2	TAPPING SCREW	T3*8 9
33	14-5003	BUSHING	4RF-5 1
34*AH	14-5027	POWER CORD	AH VERSION 1
34*B	14-5029	POWER CORD	B VERSION 1
34*B1	14-5022	POWER CORD	B1 VERSION 1
34*C	14-5028	POWER CORD	C VERSION 1
35	29-3071	FERRITE RING	1

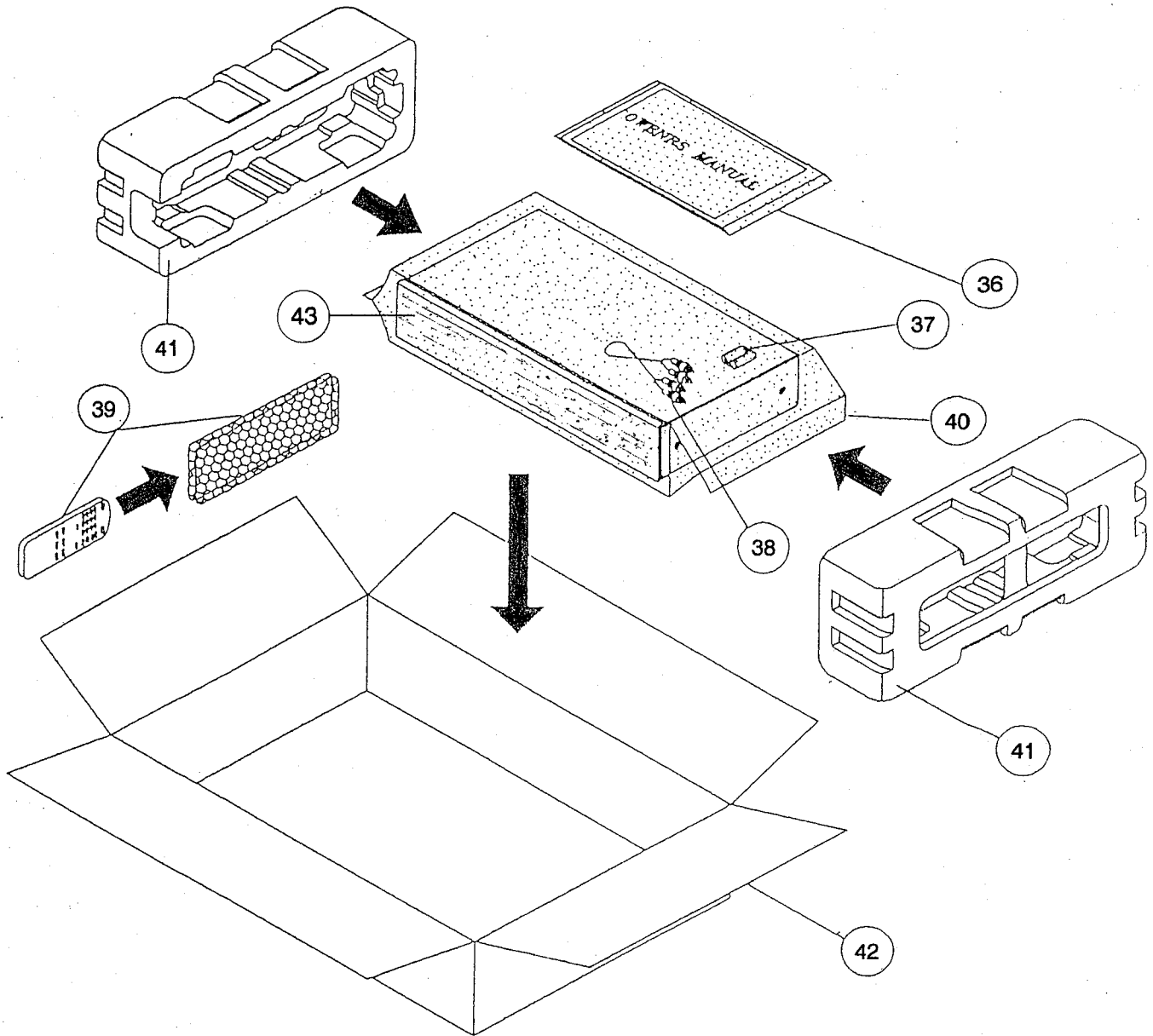
PARTS LIST

SYMBOL NO.	REF.NO	PARTS NO.	DESCRIPTION	Q'TY	
MAIN PCB MODULE	(MD90-1291)	(MD90-1291)	NAD-116	WITH COMPONENTS	1
MAIN PCB					
PCB1	19-1291	19-1291	MAIN PCB	WITHOUT COMPONENTS	1
CAPACITORS					
C101,C102	17-1ER107ML	17-1ER107ML	CAP.EL	100uF/10V+-20% L.L TAP	2
C103,C104	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	2
C105,C106	17-6.3GR102J	17-6.3GR102J	CAP.MP	1nF/63V +-5% (BOX) TAP	2
C107,C108	17-1.6EF108M	17-1.6EF108M	CAP.EL	1000uF/16V +-20%	2
C109,C110	17-2.5ER227M	17-2.5ER227M	CAP.EL	200uF/25V +-20% TAP	2
C113-C116	17-2.5ER227M	17-2.5ER227M	CAP.EL	200uF/25V +-20% TAP	4
C117,C118	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	2
C123,C124	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	2
C125,C126	17-5MD471J	17-5MD471J	CAP.MC	470pF/50V +-5% TAP BLUE	2
C127,C128	17-5ER476M	17-5ER476M	CAP.EL	47uF/50V +-20% TAP	2
C131,C132	17-2.5ER227M	17-2.5ER227M	CAP.EL	200uF/25V +-20% TAP	2
C133-C136	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	4
C137,C138	17-5ER476M	17-5ER476M	CAP.EL	47uF/50V +-20% TAP	2
C141,C142	17-6.3GR682J	17-6.3GR682J	CAP.MP	6n8F/63V +-5% (BOX) TAP	2
C143,C144	17-5PR243J	17-5PR243J	CAP.PP	24nF/50V +-5% TAP RED	2
C145,C146	17-5ER226M	17-5ER226M	CAP.EL	22uF/50V +-20% TAP	2
C147,C148	17-6.3GR222J	17-6.3GR222J	CAP.MP	2n2F/63V +-5% (BOX) TAP	2
C149,C150	17-5MD471J	17-5MD471J	CAP.MC	470pF/50V +-5% TAP BLUE	2
C221,C222	17-6.3GR474J	17-6.3GR474J	CAP.MP	470nF/63V +-5% (BOX) TAP	2
C227,C228	17-5ER476M	17-5ER476M	CAP.EL	47uF/50V +-20% TAP	2
C231,C232	17-5ER476M	17-5ER476M	CAP.EL	47uF/50V +-20% TAP	2
C233,C234	17-2.5ER107M	17-2.5ER107M	CAP.EL	100uF/25V +-20% TAP	2
C235-C238	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	4
C251,C252	17-5ER105M	17-5ER105M	CAP.EL	1uF/50V +-20% TAP	2
C255,C256	17-2.5ER107M	17-2.5ER107M	CAP.EL	100uF/25V +-20% TAP	2
C257,C258	17-6.3GR222J	17-6.3GR222J	CAP.MP	2n2F/63V +-5% (BOX) TAP	2
C271,C272	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	2
C277-C280	17-5ER476M	17-5ER476M	CAP.EL	47uF/50V +-20% TAP	4
C301	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	1
C304	17-2.5ER107M	17-2.5ER107M	CAP.EL	100uF/25V +-20% TAP	1
C306	17-5EF337M	17-5EF337M	CAP.EL	330uF/50V +-20%	1
C351-C353	17-5EF108M	17-5EF108M	CAP.EL	1000uF/50V +-20%	3
C354-C356	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	3
C357,C358	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	2
C359-C361	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	3
C362-C364	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	3
C367-C369	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	3
C370-C372	17-5ER106M	17-5ER106M	CAP.EL	10uF/50V +-20% TAP	3
C401	17-6.3GR104J	17-6.3GR104J	CAP.MP	100nF/63V +-5% (BOX) TAP	1
C500	17-40CR472M	17-40CR472M	CAP.AC-CER	4700pF/400V +-20%	1
DIODES					
D101-D104	1N4148	30-1N4148	DIODE SWITCH	1N4148 TAP	4
D221-D226	1N4148	30-1N4148	DIODE SWITCH	1N4148 TAP	6
D301-D313	1N4148	30-1N4148	DIODE SWITCH	1N4148 TAP	13
D351-D361	1N4002	30-1N4002	DIODE	1N4002 100V 1A TAP	11
D364-D369	1N4002	30-1N4002	DIODE	1N4002 100V 1A TAP	6
FUSES					
F351,F352*AH	32S1250800TU	32S1250800TU	FUSE	T800mA/250V 5x20mm UL/CSA	2
F351,F352*B/B1/C	32S1250800TS	32S1250800TS	FUSE	T800mA/250V 5x20mm SEMKO	2
FUSE HOLDERS					
F351,F352	32S2016	32S2016	FUSE HOLDER		4
ICS					
IC301	Z86C0812PSCR2649	30-Z86C0812PSCR2649	IC. MICON	Z86C0812PSCR2649	1
IC302	UCN5841A	30-UCN5841A	IC.	RELAY DRIVER UCN5841A	1
IC303	74HC4094	30-74HC4094	IC.	74HC4094	1

SYMBOL NO.	REF.NO	PARTS NO.	DESCRIPTION		Q'TY
IC304	LB1642	30-LB1642	IC.	LB1642	1
IC251	NE5532	30-NE5532	IC.	NE5532N DUAL OPAMP	1
IC271,IC272	NE5532	30-NE5532	IC.	NE5532N DUAL OPAMP	2
IC351	LM317	30-LM317	IC.	LM317	1
IC352	LM337	30-LM337	IC.	LM337	1
IC353	LM7824A	30-LM7824A	IC.	LM/AN/JRC/7824FA 1A	1
IC354	LM7818A	30-LM7818A	IC.	LM/AN/JRC/7818FA 1A	1
IC355	LM7918A	30-LM7918A	IC.	LM/AN/JRC/7918FA 1A	1
IC356	LM7805A	30-LM7805A	IC.	LM/AN/JRC/7805FA 1A	1
HEAT SINK					
	11-5099	11-5099	HEAT SINK	FOR IC351-IC355	5
	11-5099*A	11-5099*A	HEAT SINK	FOR IC356	1
RCA JACKS					
JK101,JK102	12-CPS-052CGA	12-CPS-052CGA	RCA JACK 2P	GOLD-PLATED CPS-052C-GA	2
JK201,JK202	12-CPS-056CGA	12-CPS-056CGA	RCA JACK 6P	GOLD-PLATED CPS-056CGA	2
JK203,JK204	12-CPS-054GA	12-CPS-054GA	RCA JACK 4P	GOLD-PLATED CPS-054GA	2
JK301	12-2182	12-2182	RCA JACK 2P	YELLOW, NAD LINK	1
HEADPHONE JACK					
JK251	12-2128G	12-2128G	H/P JACK	GOLD-PLATED	1
XLR JACK					
JK275,JK276	12-1000S	12-1000S	XLR JACK	XLR,MALE NC3MGC-H	2
COILS					
L101,L102	29-1089	29-1089	COIL, TOROIDAL	3.7mH	2
L103,L104	29-1109*A	29-1109*A	COIL, TOROIDAL	237uH	2
LED					
LD401	30-1132	30-1132	POWER LED	GRN/RED N116	1
VARIABLE RESISTORS					
P201	29-4211	29-4211	VR/MOTOR	2*20KB VOLUME	1
P202	29-4199	29-4199	VR	10KW BALANCE	1
TRANSISTORS					
Q101,Q102	30-2SC3329BL	30-2SC3329BL	TR.	2SC3329BL	2
Q103-Q106	30-2SA1015GR	30-2SA1015GR	TR.PNP	2SA1015GR	4
Q107,Q108	30-2SC1815GR	30-2SC1815GR	TR.NPN	2SC1815GR	2
Q109-Q112	30-2SA1015GR	30-2SA1015GR	TR.PNP	2SA1015GR	4
Q113-Q116	30-2SC1815GR	30-2SC1815GR	TR.NPN	2SC1815GR	4
Q117-Q120	30-2SA1015GR	30-2SA1015GR	TR.PNP	2SA1015GR	4
Q221,Q222	30-2SA1316GR	30-2SA1316GR	TR.	2SA1316GR	2
Q223-Q226	30-2SC1815GR	30-2SC1815GR	TR.NPN	2SC1815GR	4
Q227,Q228	30-2SA1015GR	30-2SA1015GR	TR.PNP	2SA1015GR	2
Q301,Q302	30-2SA1015GR	30-2SA1015GR	TR.PNP	2SA1015GR	2
Q303-Q307	30-2SC1815GR	30-2SC1815GR	TR.NPN	2SC1815GR	5
IR RECEIVER					
Q401	30-LTM9052-4	30-LTM9052-4	IR RECEIVER	LTM9052-4/SBX1610-52	1
RESISTORS					
LK34	16-1:4FN2R2J	16-1:4FN2R2J	RES.FUSEABLE	2.2 1/4W +-5%	1
R103,R104	16-1:4MA331F	16-1:4MA331F	RES.MF	330 1/4W +-1% 52mm TAP	2
R105,R106	16-1:4MA392F	16-1:4MA392F	RES.MF	3K9 1/4W +-1% 52mm TAP	2
R109,R110	16-1:4MA222F	16-1:4MA222F	RES.MF	2K2 1/4W +-1% 52mm TAP	2
R111,R112	16-1:4MA180F	16-1:4MA180F	RES.MF	18 1/4W +-1% 52mm TAP	2
R115,R116	16-1:4MA152F	16-1:4MA152F	RES.MF	1K5 1/4W +-1% 52mm TAP	2
R117,R118	16-1:4MA391F	16-1:4MA391F	RES.MF	390 1/4W +-1% 52mm TAP	2
R139,R140	16-1:4MA123F	16-1:4MA123F	RES.MF	12K 1/4W +-1% 52mm TAP	2
R143,R144	16-1:4MA221F	16-1:4MA221F	RES.MF	220 1/4W +-1% 52mm TAP	2
R157,R158	16-1:4MA820F	16-1:4MA820F	RES.MF	82 1/4W +-1% 52mm TAP	2
R159,R160	16-1:4MA113F	16-1:4MA113F	RES.MF	11K 1/4W +-1% 52mm TAP	2
R161,R162	16-1:4MA1373F	16-1:4MA1373F	RES.MF	137K 1/4W +-1% 52mm TAP	2

SYMBOL NO.	REF.NO	PARTS NO.		DESCRIPTION	QTY
R225,R226	16-1:4MA153F	16-1:4MA153F	RES.MF	15K 1/4W +-1% 52mm TAP	2
R237,R238	16-1:4MA392F	16-1:4MA392F	RES.MF	3K9 1/4W +-1% 52mm TAP	2
R239,R240	16-1:4MA561F	16-1:4MA561F	RES.MF	560 1/4W +-1% 52mm TAP	2
R241,R242	16-1:4MA221F	16-1:4MA221F	RES.MF	220 1/4W +-1% 52mm TAP	2
R251,R252	16-1:4MA682F	16-1:4MA682F	RES.MF	6K8 1/4W +-1% 52mm TAP	2
R253,R254	16-1:4MA333F	16-1:4MA333F	RES.MF	33K 1/4W +-1% 52mm TAP	2
R255,R256	16-1:4MA102F	16-1:4MA102F	RES.MF	1K 1/4W +-1% 52mm TAP	2
R257,R258	16-1:4MA472F	16-1:4MA472F	RES.MF	1K7 1/4W +-1% 52mm TAP	2
R283,R284	16-1:4MA3011F	16-1:4MA3011F	RES.MF	3K01 1/4W +-1% 52mm TAP	2
R293,R294	16-1:4MA220F	16-1:4MA220F	RES.MF	22 1/4W +-1% 52mm TAP	2
R295,R296	16-1:4MA220F	16-1:4MA220F	RES.MF	22 1/4W +-1% 52mm TAP	2
R297,R298	16-1:4MA3011F	16-1:4MA3011F	RES.MF	3K01 1/4W +-1% 52mm TAP	2
R339	16-1:4MA222F	16-1:4MA222F	RES.MF	2K2 1/4W +-1% 52mm TAP	1
RELAYS					
RL201-211	35-3043A	35-3043A	RELAY	MR62-24SR 24V DC	11
RL301	35-3044-1	35-3044-1	RELAY	DC24V OMI-SS-224LM.N116	1
SWITCHES					
SW101	31-1368	31-1368	TOGGLE SW	MC/MM N116	1
SW402	31-1369	31-1369	SW	ALPS SKHOFH INTEGRAL LEDS	1
SW403-408	31-1372	31-1372	TACT SW	W/LED GRN SKHQFG N116	6
CRYSTAL					
XT301	30-4021	30-4021	CRYSTAL	12MHz	1

PACKING DIAGRAM



ITEM	PARTS NO.	DESCRIPTION	Q'TY
36	21-4101	OWNER'S MANUAL	1
37	37-C1.5V3	BATTERY "AA" 1.5V	2
38	27-2012	RCA CABLE	1
39	RC-0012	REMOTE CONTROL UNIT	1
40	26-0716	PE - BAG	1
41	34-1090	POLYFOAM	2
42	CT-5291	CARTON	1
43	34-2001	EPE FASCIA COVER	1

NOTES:

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