

ONKYO SERVICE MANUAL

Stereo Power Amplifier

MODEL M-5590



UG

220V AC, 50Hz

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PARTS NUMBERS APPEAR AS SHOWN IN THIS MANUAL.

MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

TABLE OF CONTENTS

Specifications	2
Precautions	2
Block diagram	3
Adjustment procedures	4
Front panel facilities	4
Packing procedures	5
Chassis-exploded view	6
Printed board parts list	8
System connections	11
IC Block diagram	12
Schematic diagram	13
Printed circuit board view	15

ONKYO[®]
AUDIO COMPONENTS

SPECIFICATIONS

Music Power Output:	2 × 450 watts at 4 ohms, 1 kHz (DIN)	2 × 260 watts at 8 ohms, 1 kHz (DIN)
Continuous Power Output:	2 × 315 watts at 4 ohms, 1 kHz (DIN)	2 × 215 watts at 8 ohms, 1 kHz (DIN)
	200 watts per channel, min. RMS, at 8 ohms, both channels driven, from 20 Hz to 20 kHz, with no more than 0.003% THD	
Total harmonic distortion:	0.003% at rated power	
	0.003% at 1 watt output	
Intermodulation distortion:	0.003% at rated power	
Frequency response:	+0, -1.5 dB at 1 Hz to 100kHz	
Input sensitivity:	1.0V	
Input impedance:	20kohms	
Damping factor:	140 (8 ohms, 1 kHz)	
S/N ratio:	120 dB (IHFA, Shorted)	
Outputs:	SPEAKERS 1 & 2, AC OUTLET (120V models only)	
Inputs:	INPUT (VARIABLE, DIRECT)	
Power Supply:	AC 220V, 50Hz	
Dimensions:	465(W) × 185(H) × 426(D) mm	
	18 5/16" × 7 9/32" × 16 25/32"	
Weight:	25 kg, (55.1 lbs.)	

Specifications and features are subject to change without notice.

PRECAUTIONS

1. Replacing the fuses

For continued protection against risk fire, replace only with same type and same rating fuse.

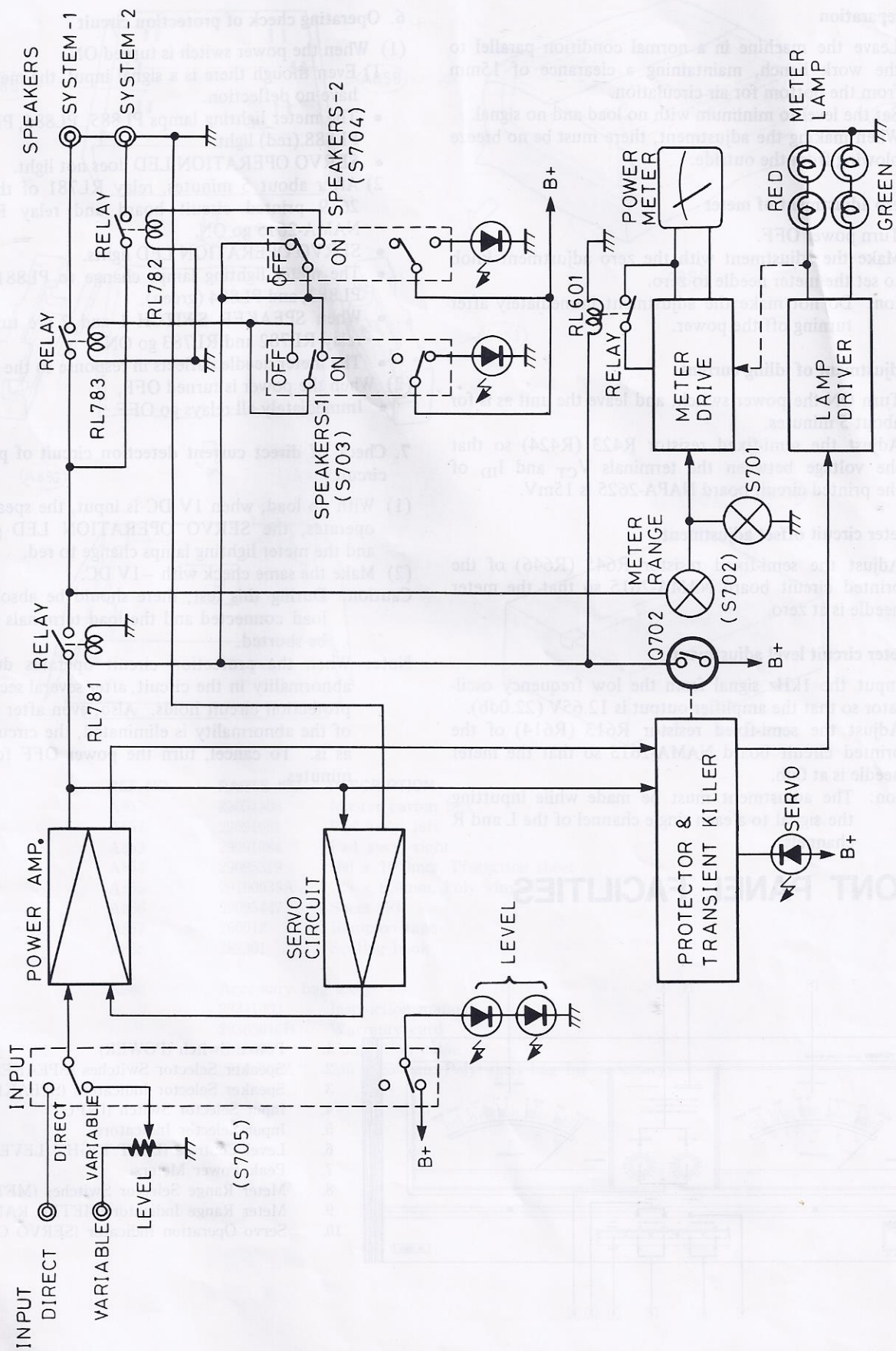
CIRCUIT NO.	PARTS NO.	DESCRIPTION
F803, F804	252077	4A-SE-EAK, Primary fuse
F702	252074	2A-SE-EAK, Secondary fuse

2. Replacing the lamp

This unit uses the lamp listed below.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL881, PL882	210191	PL14V 150mA (Green)
PL883, PL884		
PL885, PL886	210192	PL14V 150mA (Orange)
PL887, PL888		

BLOCK DIAGRAM



ADJUSTMENT PROCEDURES

1. Preparation

- (1) Leave the machine in a normal condition parallel to the work bench, maintaining a clearance of 15mm from the bottom for air circulation.
- (2) Set the level to minimum with no load and no signal.
- (3) When making the adjustment, there must be no breeze blowing from the outside.

2. Zero adjustment of meter

- (1) Turn power OFF.
- (2) Make the adjustment with the zero adjustment knob to set the meter needle to zero.

Caution: Do not make the adjustment immediately after turning off the power.

3. Adjustment of idling current

- (1) Turn ON the power switch, and leave the unit as is for about 5 minutes.
- (2) Adjust the semi-fixed resistor R423 (R424) so that the voltage between the terminals V_{CT} and I_{ID} of the printed circuit board NAPA-2625 is 15mV.

4. Meter circuit offset adjustment

- (1) Adjust the semi-fixed resistor R645 (R646) of the printed circuit board NAMA-2615 so that the meter needle is at zero.

5. Meter circuit level adjustment

- (1) Input the 1kHz signal from the low frequency oscillator so that the amplifier output is 12.65V (22.0db).
- (2) Adjust the semi-fixed resistor R613 (R614) of the printed circuit board NAMA-2615 so that the meter needle is at 0db.

Caution: The adjustment must be made while inputting the signal to a each single channel of the L and R channels.

6. Operating check of protection circuit

- (1) When the power switch is turned ON,
 - 1) Even though there is a signal input, the meter should have no deflection.
 - The meter lighting lamps PL885, PL886, PL887, and PL888 (red) light.
 - SERVO OPERATION LED does not light.
 - 2) After about 5 minutes, relay RL781 of the NAOP-2619 printed circuit board and relay RL601 of NAMA-2615 go ON.
 - SERVO OPERATION LED lights.
 - The meter lighting lamps change to PL881, PL882, PL883, and PL884 (green).
 - When SPEAKER SWITCH 1 and 2 are turned ON, relay RL782 and RL783 go ON.
 - The meter needle deflects in response to the signal.
- (2) When the power is turned OFF,
 - Immediately all relays go OFF.

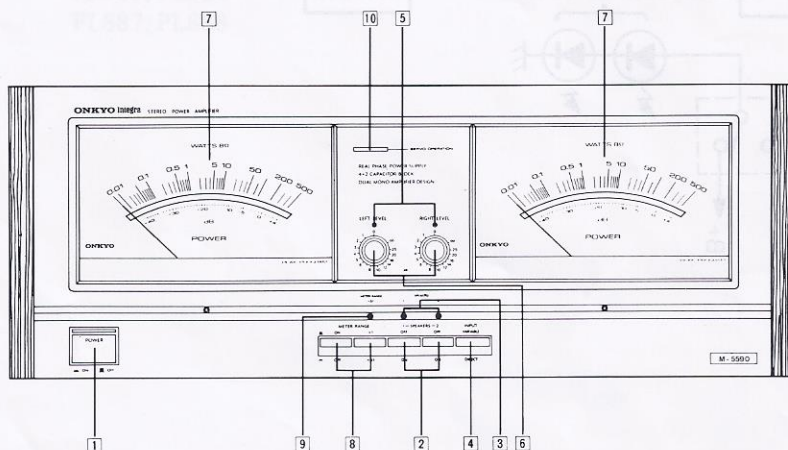
7. Check of direct current detection circuit of protection circuit

- (1) With no load, when 1V DC is input, the speaker relay operates, the SERVO OPERATION LED goes out, and the meter lighting lamps change to red.
- (2) Make the same check with -1V DC.

Caution: During this test, there should be absolutely no load connected and the load terminals must not be shorted.

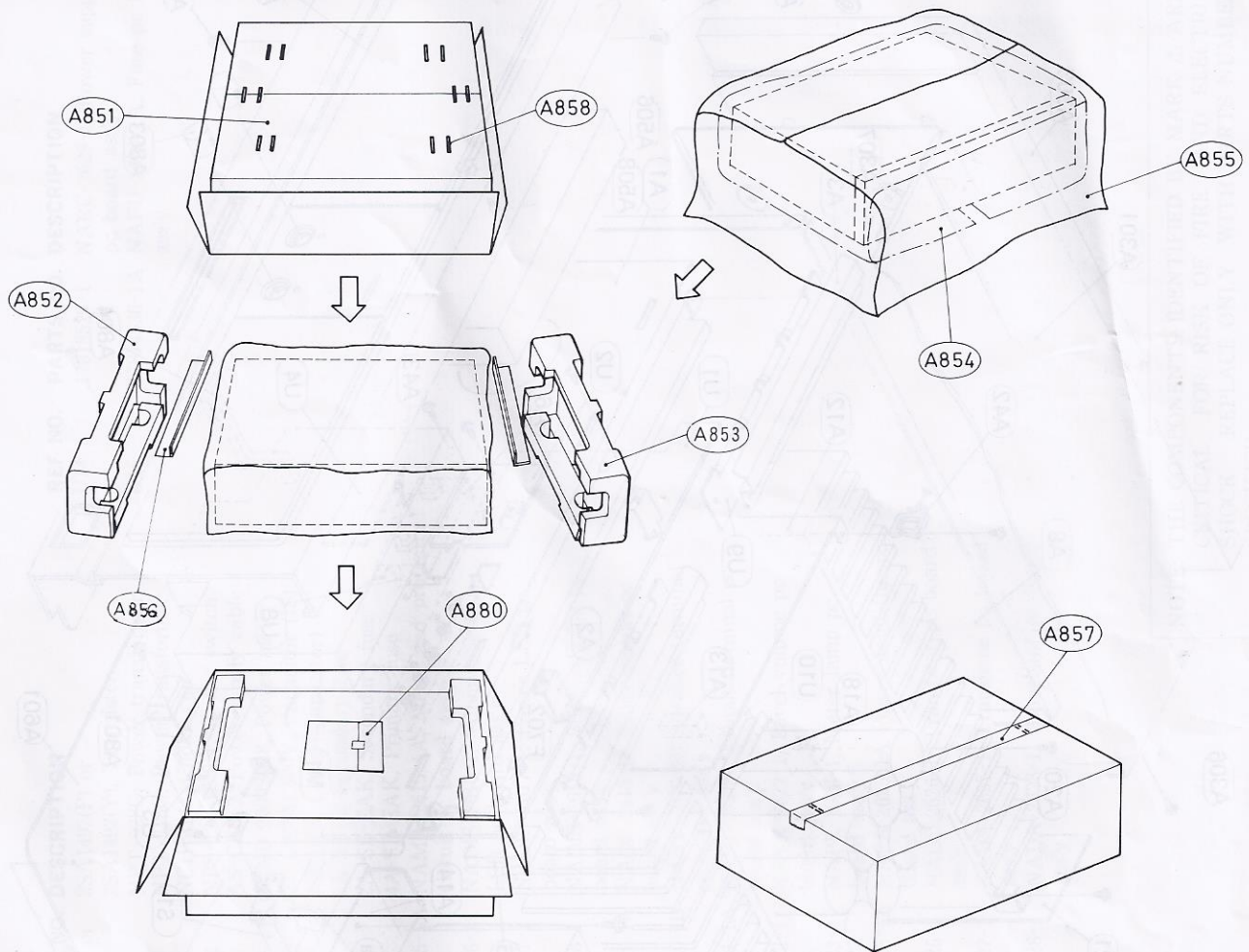
Note: When the protection circuit operates due to an abnormality in the circuit, after several seconds, the protection circuit holds. Also, even after the cause of the abnormality is eliminated, the circuit is held as is. To cancel, turn the power OFF for several minutes.

FRONT PANEL FACILITIES



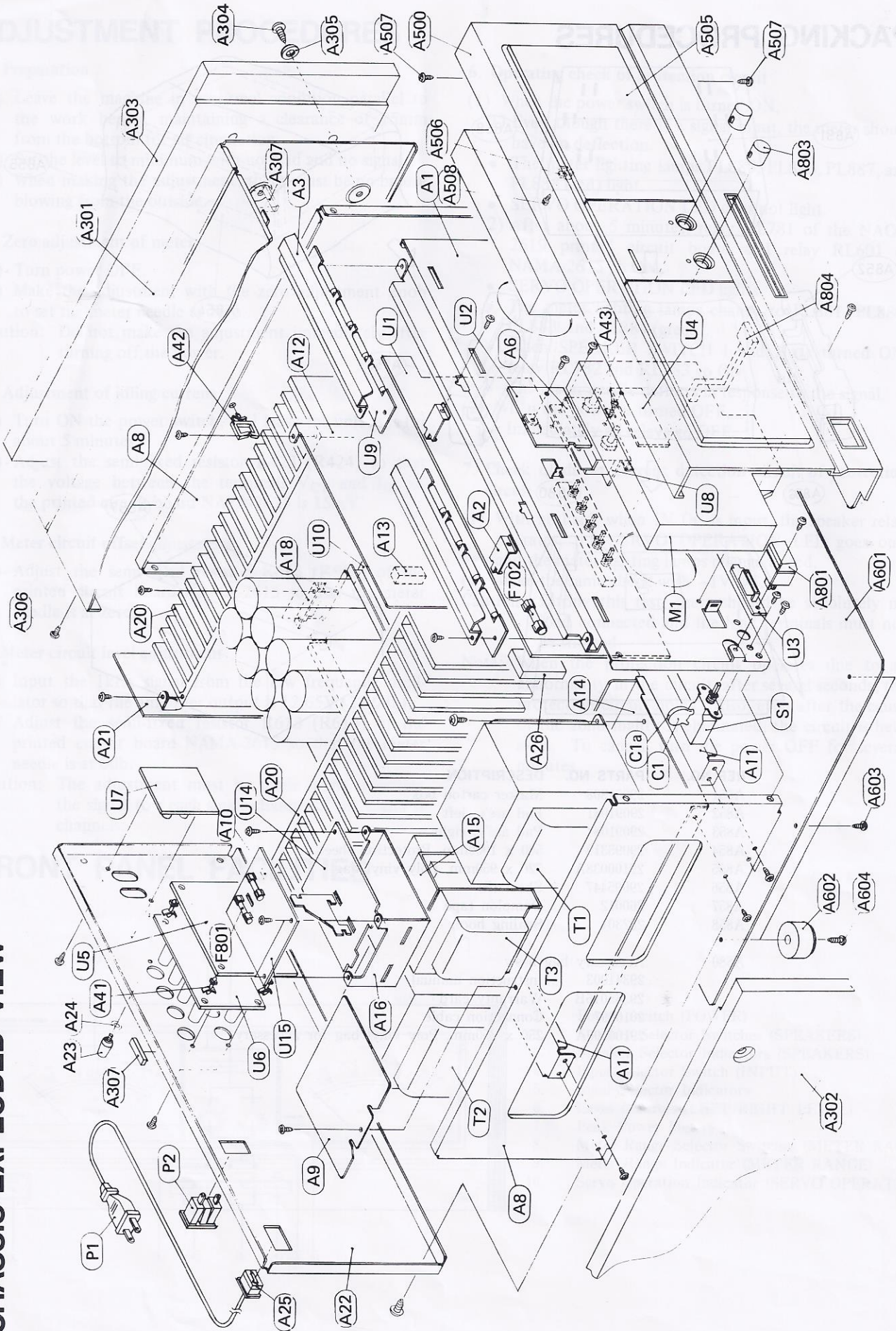
1. Power Switch (POWER)
2. Speaker Selector Switches (SPEAKERS)
3. Speaker Selector Indicators (SPEAKERS)
4. Input Selector Switch (INPUT)
5. Input Selector Indicators
6. Level Controls (LEFT/RIGHT LEVEL)
7. Peak Power Meters
8. Meter Range Selector Switches (METER RANGE)
9. Meter Range Indicator (METER RANGE)
10. Servo Operation Indicator (SERVO OPERATION)

PACKING PROCEDURES



REF NO.	PARTS NO.	DESCRIPTION
A851	29051308	Master carton box
A852	29091081	Pad ass'y, left
A853	29091084	Pad ass'y, right
A854	29095319	500 x 1000mm, Protection sheet
A855	29100038A	720 x 950mm, Poly-vinyl bag
A856	29095447	Sheet (P)
A857	260012	Damplon tape
A858	282301	Sealing hook
A880	Accessory bag ass'y	
	29341003	Instruction manual
	29365016B	Warranty card
	2010097	Connection cable
	29100006A	250 x 350mm, Poly-vinyl bag for accessory

CHASSIS-EXPLODED VIEW



CHASSIS-EXPLODED VIEW-PARTS LIST

REF NO.	PARTS NO.	DESCRIPTION	REF NO.	PARTS NO.	DESCRIPTION	REF NO.	PARTS NO.	DESCRIPTION
A1	27110285A	Front bracket	Q455,Q456	2201665 or	2SA1492(P) or	U14	17818529-1	NARC-2629-1, Power supply circuit pc board ass'y
A2	271141064	Bracket (RPC)	Q459,Q460	2201664	2SA1492(Y), Transistor	U15	17814530-1A	NAFU-2630-1A, Fuse pc board ass'y
A3	27141065A	Bracket (LAMP)	△ T1	2300129	NPT-928G, Power transformer			
A6	27141066A	Bracket (VOL)	△ T2	2300099	NPT-918G, Power transformer			
A8	27115204A	Side bracket	△ T3,T4	231097	NCH-3144, Choke coil			
A9	28175129	Insulating plate	△ S1	25035381	NPS-121-L345P, Power switch			
A10	29360626-1	Label	△ P1	253092-1	AS-CEE-2, Power supply cable			
A11	27130427	Bracket	M1,M2	243148	NIND-2000S148, Power meter			
A12	27150212B	Shield plate	△ C1,C2	3500065A	0.01μF, AC400V, Capacitor (IS)			
A14	27130428A	Bracket (PT)	F702	252044	2A ST-6, Secondary fuse			
A15	27130429	Bracket (PHT)		252074	2A-SE-EAK, Secondary fuse			
A16	27141067	Bracket (PC)	△ F803,F804	252077	4A-SE-EAK, Primary fuse			
A18	27141068	Bracket (HE)	U1	17814515-1A	NAMA-2615-1A, Meter and protector circuit pc board ass'y			
A20	27160186	Radiator	U2	17818516-1	NADIS-2616-1, Volume/Servo			
A21	27150215A	Shield plate	U3	17818517-1	NADIS-2617-1, Power LED pc board ass'y			
A22	27120851	Back panel	U4	17818518-1	NADIS-2618-1, Speaker LED pc board ass'y			
A23	25060041	3 × 14mm, Ground terminal	U5	17812519-1A	NAOP-2619-1A, Relay circuit pc board ass'y			
A24	87644010	W4 × 10F(BC), Washer	U6	17812520-1B	NAST-2620-1B, Speaker terminal pc board ass'y			
A25	27300750	#2271, Bushing (Power supply cable)	U7	17812521-1A	NAPJ-2621-1A, Input terminal pc board ass'y			
A26	28140676	11 × 50 × 30mm, Cushion	U8	17818522-1	NAVR-2622-1, Level volume pc board ass'y			
A40	27190009	Holder	U9	17818523-1	NAPL-2623-1, Meter lamp pc board ass'y			
A41	27190480	Holder	U10	17812525-1A	NAPA-2625-1A, Power amplifier pc board ass'y			
A42	27300243	WS-2WS, Wire holder	U11	17818526-1	NACC-2626-1, Transistor pc board ass'y			
A43	27190458	WLS-06-0, Holder	U12	17818527-1	NADA-2627-1, Transistor pc board ass'y			
A301	28184319B	Top cover	U13	17818528-1	NADA-2628-1, Transistor pc board ass'y			
A302	28185257	Side board (L)						
A303	28185259	Side board (R)						
A304	836440303	4STV × 30FN(BC), Screw						
A305	870086	4 × 12BS(BC), Special washer						
A306	838440089	4TTB + 8C(BC), Tapping screw						
A307	28140020	4 × 10 × 40mm, Cushion						
A500	17812121	Front panel ass'y						
A505	28191351B	Clear plate						
A506	27190451	Holder, (Grass)						
A508	833430080	3TTP+8P(BC), Tapping screw						
A601	27170226-1A	Bottom board						
A602	280889B	Bottom leg						
A603	831430088	3TTW + 8B(BC), Tapping screw						
A604	831430168	3TTW + 16B(BC), Tapping screw						
A801	28322541	Knob ass'y (POW)						
A803	28322542A	Knob (VOL)						
A804	28322543A	Knob (PUSH)						
Q449,Q450	2201653 or	2SC3856(O) or						
Q453,Q454	2201655 or	2SC3856(P) or						
Q457,Q458	2201654	2SC3856(Y), Transistor						
Q451,Q452	2201663 or	2SA1492(O) or						

NOTE: THE COMPONENTS IDENTIFIED BY MARK Δ ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

PRINTED CIRCUIT BOARD PARTS LIST

METER AND PROTECTOR CIRCUIT PC BOARD (NAMA-2615-1A)

CIRCUIT NO.	PARTS NO.	DESCRIPTION	CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistors		R723	442520474	4.7 Ω , 1/2W, Metal oxide film
Q201,Q202	2212806 or	2SK389(BL) or	R724	441721814	180 Ω , 2W, Metal oxide film
	2212807	2SK389(V)	R725	441720474	4.7 Ω , 2W, Metal oxide film
Q601,Q602	2211945	2SK246(GR)	R727	442520474	4.7 Ω , 1/2W, Metal oxide film
Q604,Q605	2211255	2SC1815(GR)	R735	442521824	1.8k Ω , 1/2W, Metal oxide film
Q702	2211504	2SA950(Y)		Switch	
Q703	2211455	2SA1015(GR)	S701~S705	25035522	NPS-242-222-162L484
Q704,Q705	2201276 or	2SB772(P) or		Relay	
	2201275	2SB772(Q)	RL601	25065048	FRL-644D-12/2AS
Q706	2201286 or	2SD882(P) or		Fuse holders	
	2201285	2SD882(Q)	F701a	250113	S-N5051
	ICs		F702a	25050065	YSH403T
Q203,Q204	222652	M5218L		Fuse label	
Q603	222529	TA7318P(R)		29360364	T2A/250V
Q606,Q607	222502	NJM4558DX		Sockets	
Q701	222584	TA7317P	JC601,JC607	25050282	NSCT-5P110
	Diodes		JC409	25050283	NSCT-6P111
D201~D204	223155	1SS138	JC603	25050281	NSCT-4P109
D205~D208	2239651 or	RD13E-B1 or	JC401,JC402,JC604	25050285	NSCT-8P113
	2243241	MTZ13-A	P201,P202	2000553	NSAS-6P509 Socket ass'y
D601,D602	223145	1S2076TD	P703	2000550	NSAS-6P506 Socket ass'y
D603,D604	2239672 or	RD15E-B2 or			
	2243252	MTZ-15B			
D605	223145	1S2076TD			
D701	223155	1SS138			
D702	2239493 or	RD6.2E-B3 or			
D703	2239533 or	RD7.5E-B3 or			
	2243183	MTZ7.5-C			
	2243163	MTZ6.2-C			
D705	223868	2W02			
	Capacitors				
C201~C204	372125614	560pF, 50V, Styrene			
C205~C208	372122214	220pF, 50V, Styrene			
C215~C218	391251017	100 μ F, 25V, Elect. (MUSE)			
C223~C226	354741019	100 μ F, 16V, Elect.			
C601,C602	354784799	0.47 μ , 50V, Elect.			
C605,C606	354780339	3.3 μ F, 50V, Elect.			
C607	354780109	1 μ F, 50V, Elect.			
C608,C609	379121035	0.01 μ F, 50V, Film (DEW)			
C613,C614	354752209	22 μ F, 25V, Elect.			
C615,C616	354780339	3.3 μ F, 50V, Elect.			
C617,C618	354754709	47 μ F, 25V, Elect.			
C701,C702	354722219	220 μ F, 6.3V, Elect.			
C704	354732209	22 μ F, 10V, Elect.			
C706	354784799	0.47 μ F, 50V, Elect.			
C707	354732219	220 μ F, 10V, Elect.			
C708	354742229	2200 μ F, 16V, Elect.			
C710	379121045	0.1 μ F, 50V, Film (DEW)			
C711	354741009	10 μ F, 16V, Elect.			
	Resistors				
R215,R216	441722434	24 k Ω , 2W, Metal oxide film			
R225,R226	442524724	4.7k Ω , 1/2W, Metal oxide film			
R613,R614	5221023	N10HR470BEM, Semi-fixed			
R633,R634	4000028	D33A, Thermistor			
R645,R646	5221023	N10HR470BEM, Semi-fixed			
R717	442520684	6.8 Ω , 1/2W, Metal oxide film			
R718	442528204	82 Ω , 1/2W, Metal oxide film			
R719	442524714	470 Ω , 1/2W, Metal oxide film			
R720	441720274	2.7 Ω , 2W, Metal oxide film			
R721	442524714	470 Ω , 1/2W, Metal oxide film			
R722	442522214	220 Ω , 1/2W, Metal oxide film			

VOLUME/SERVO LED PC BOARD (NADIS-2616-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Diodes	
D710,D711	225137CG or	SEL-2413E-CG or
	225137CY or	SEL-2413E-CY or
	225137DG or	SEL-2413E-DG or
	225137DY	SEL-2413E-DY
D712,D713	225174 or	SLR55MC3N or
	225173	SLR55MC3M
	Holders	
	27190453	Holder (SLED)
	27190319A	Holder (LED)

POWER LED PC BOARD (NADIS-2617-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Diodes	
D714,D715	225142	SEL2913K
	Holder	
	27190454	Holder (PLED)

SPEAKER LED PC BOARD (NADIS-2618-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Diodes	
D716	225167RB or	GL-5HY10-RB or
	225167RC	GL-5HY10-RC
D717,D718	225174 or	SLR55MC3N or
	225173	SLR55MC3M

CIRCUIT NO. PARTS NO. DESCRIPTION

Holders
27190319A Holder (LED)

RELAY CIRCUIT PC BOARD (NAOP-2619-1A)

CIRCUIT NO. PARTS NO. DESCRIPTION

D781~D783 Diodes
223145 1S2076TD

L781~L784 Coils
L785,L786 231015 S-0.8C
230904 B-20L-44

C781,C782 Capacitors
C783~C786 379131025 0.001 μ F, 100V, Film (DEW)
379121245 0.12 μ F, 50V, Film (DEW)

R781~R784 Resistors
R785,R786 441620514 5.1 Ω , 1W, Metal oxide film
441720514 5.1 Ω , 2W, Metal oxide film

RL781 ~RL783 Relais
25065036 NRL-4P3A-DC12-01

JC407,JC408 Sockets
JC603 25050273 NSCT-9P101
25050268 NSCT-4P96

SPEAKER TERMINAL PC BOARD (NAST-2620-1B)

CIRCUIT NO. PARTS NO. DESCRIPTION

C791~C794 Capacitors
379131025 0.001 μ F, 100V, Film (DEW)

P791,P792 Terminals
25060101 NTM-4PDMN41

INPUT TERMINAL PC BOARD (NAPJ-2621-1A)

CIRCUIT NO. PARTS NO. DESCRIPTION

C101~C104 Capacitors
372123914 390pF, 50V, Styrene

P101 Terminal
25045196 NPJ-4PDBL77

LEVEL VOLUME PC BOARD (NAVR-2622-1)

CIRCUIT NO. PARTS NO. DESCRIPTION

R151,R152 Resistors
5104183A N27DGL30KB30

P151 Sockets
P152 2000551 NSAS-6P507
2000552 NSAS-6P508

METER LAMP PC BOARD (NAPL-2623-1)

CIRCUIT NO. PARTS NO. DESCRIPTION

Lamps
PL881 ~PL884 210191 PL14V150mA (Green)
PL885 ~PL888 210192 PL14V150mA (Orange)

POWER AMPLIFIER PC BOARD (NAPA-2625-1A)

CIRCUIT NO. PARTS NO. DESCRIPTION

Q401~Q404 Transistors
2211732 or 2SC1845(F) or
2211733 2SC1845(E)

Q405,Q406 2211792 or 2SA992(F) or
2211793 2SA992(E)

Q407,Q408 2211414 2SC1627(Y)

Q411~Q414 2211782 or 2SA991(F) or
2211783 2SA991(E)

Q415~Q418 2211902 or 2SC1844(F) or
2211903 2SC1844(E)

Q421~Q424 2211359 or 2SA949-Y(ONK) or
2211358 2SA949-O(ONK)

Q425,Q426 2211639 or 2SC2229-Y(ONK) or
2211638 2SC2229-O(ONK)

Q427,Q428 2211792 or 2SA992(F) or
2211793 2SA992(E)

Q429,Q430 2212560 2SC3333

Q431,Q432 2211255 2SC1815(GR)

Q433,Q434 2211455 2SA1015(GR)

Q435,Q436 2211639 or 2SC2229-Y(ONK) or
2211638 2SC2229-O(ONK)

Q437,Q438 2211359 or 2SA949-Y(ONK) or
2211358 2SA949-O(ONK)

Q441 2200394 2SC1625(Y)

Q442 2200404 2SA815(Y)

D401~D408 Diodes
223155 1SS138
225218 LTZ-MR15, LED
223162 1SS82
225218 LTZ-MR15, LED
223155 1SS138
223168 DA210S
223155 1SS138
223145 1S2076TD
223863 GP-30DL
223162 1SS82
2243293 MTZ22-C
2243251 MTZ15-A
223155 1SS138

L401,L402 Coils
231098 NCH-4145

C198,L199 Capacitors
379124725 4700pF, 50V, Film (DEW)
354723319 330 μ F, 6.3V, Elect.
391241007 10 μ F, 16V, Elect. (MUSE)
379121025 0.001 μ F, 50V, Film (DEW)
391241007 10 μ F, 16V, Elect. (MUSE)
379131035 0.01 μ F, 100V, Film (DEW)
379131045 0.1 μ F, 100V, Film (DEW)
379122245 0.22 μ F, 50V, Film (DEW)
379124735 0.047 μ F, 50V, Film (DEW)
354752209 22 μ F, 25V, Elect.
354751019 100 μ F, 25V, Elect.
3504197 10000 μ F, 90V, Elect.
354780339 3.3 μ F, 50V, Elect.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Resistors	
R401~R404	442525614	560 Ω, 1/2W, Metal oxide film
R405,R406	442523314	330 Ω, 1/2W, Metal oxide film
R411,R412	442521614	160 Ω, 1/2W, Metal oxide film
R413,R414	441625634	56 kΩ, 1W, Metal oxide film
R415,R416	442521534	15 kΩ, 1/2W, Metal oxide film
R423,R424	5225076	N10HR22KBDM, Semi-fixed
R425~R428	442520514	5.1 Ω, 1/2W, Metal oxide film
R429~R432	441724324	4.3kΩ, 2W, Metal oxide film
R433~R436	442521214	120 Ω, 1/2W, Metal oxide film
R445~R448	442523914	390 Ω, 1/2W, Metal oxide film
R449,R450	442521204	12Ω, 1/2W, Metal oxide film
R457~R460	442525104	51Ω, 1/2W, Metal oxide film
R463,R464	442520514	5.1 Ω, 1/2W, Metal oxide film
R465,R466	441720754	7.5 Ω, 2W, Metal oxide film
R467~R478	442520224	2.2 Ω, 1/2W, Metal oxide film
R479~R490	442521014	100 Ω, 1/2W, Metal oxide film
R491~R504	4000080	0.47Ω, 5W, Metal plate
R505~R516	4000063	0.47Ω, 2W, Metal plate
R531,R532	441621024	1kΩ, 1W, Metal oxide film
R535	441724324	4.3kΩ, 2W, Metal oxide film
	Sockets	
JC403,JC404	25050267	NSCT-3P95
JC405,JC406,JC409	25050270	NSCT-6P98
	Bracket	
	27130430	Bracket (KE)
	Bus plate	
	27300826A	Bus (S)
	27300827A	Bus (C)

TRANSISTOR PC BOARD (NACC-2626-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistor	
Q403(Q444)	2212864 or 2212863	2SC3419(Y) or 2SC3419(O)
	Capacitor	
C463(C464)	379122235	0.022 μF, 50V, Film (DEW)

TRANSISTOR PC BOARD (NADA-2627-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistor	
Q445(Q446)	2201684 or 2201683	2SC3298A(Y) or 2SC3298A(O)

TRANSISTOR PC BOARD (NADA-2628-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Transistor	
Q447(Q448)	2201674 or 2201673	2SA1306A(Y) or 2SA1306A(O)

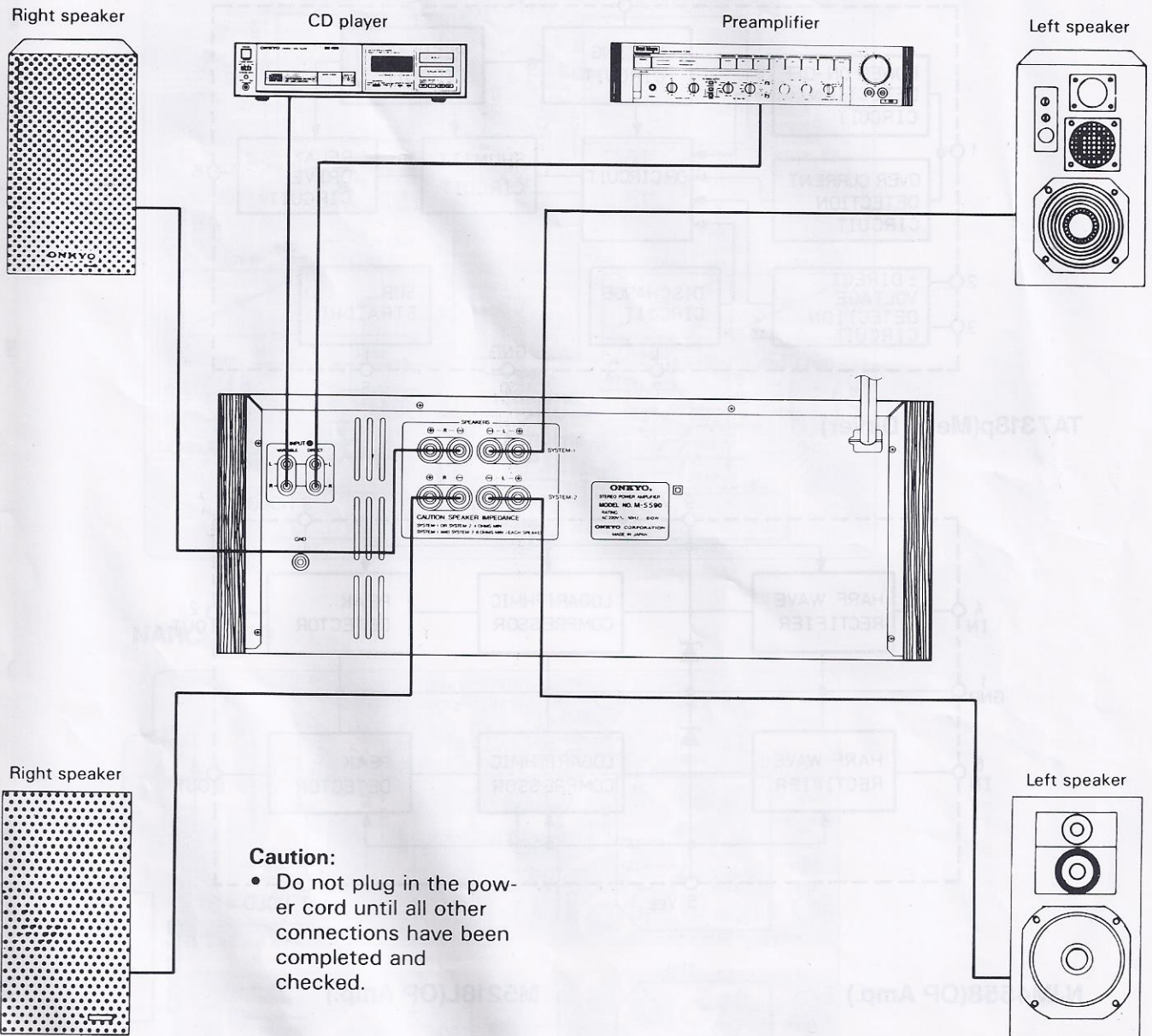
POWER SUPPLY CIRCUIT PC BOARD (NARC-2629-1)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Diodes	
D801,D802	22380008	RB604
	Capacitors	
C801~C804	375103345	0.33μF, 125V, Film (ME)
C805,C806	375104745	0.47μF, 125V, Film (ME)
	Resistors	
R801~R804	442522294	0.22Ω, 1/2W, Metal oxide film
R805,R806	442527504	75Ω, 1/2W, Metal oxide film

FUSE PC BOARD (NAFU-2630-1A)

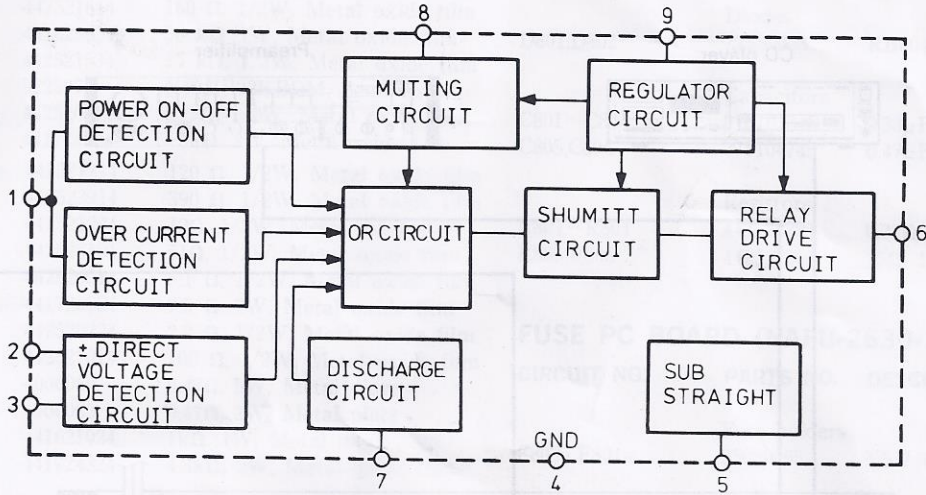
CIRCUIT NO.	PARTS NO.	DESCRIPTION
	Fuse holders	
F803a,F804a	25050065	YSH403T
	Terminals	
P801,P802	25060092	NTM-1S33

SYSTEM CONNECTIONS

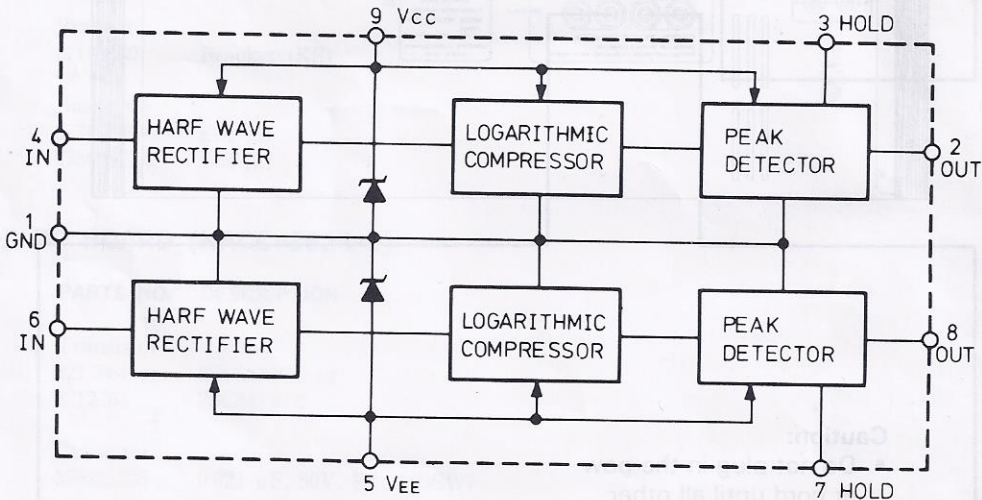


IC BLOCK DIAGRAM

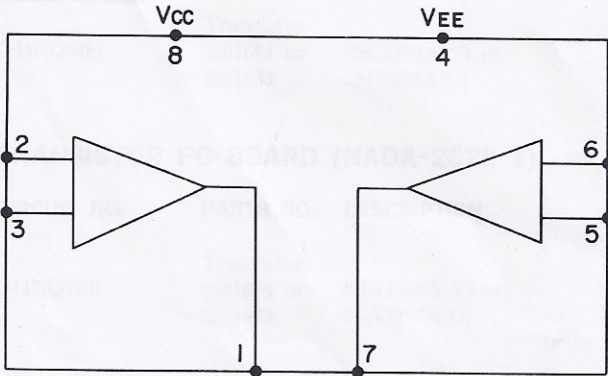
TA7317p(Protective Driver)



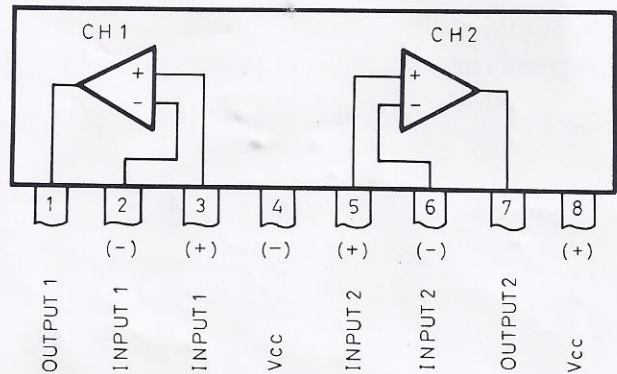
TA7318p(Meter Dirver)



NJM4558(OP Amp.)

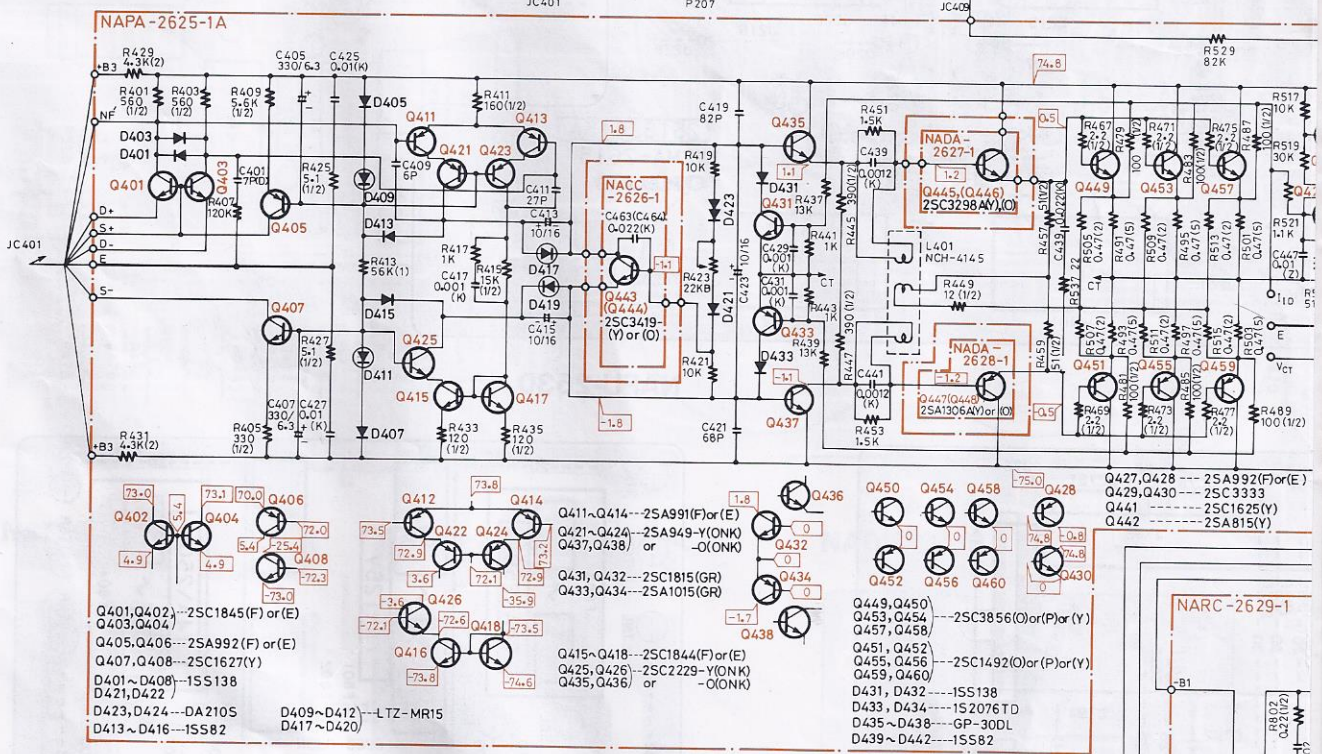
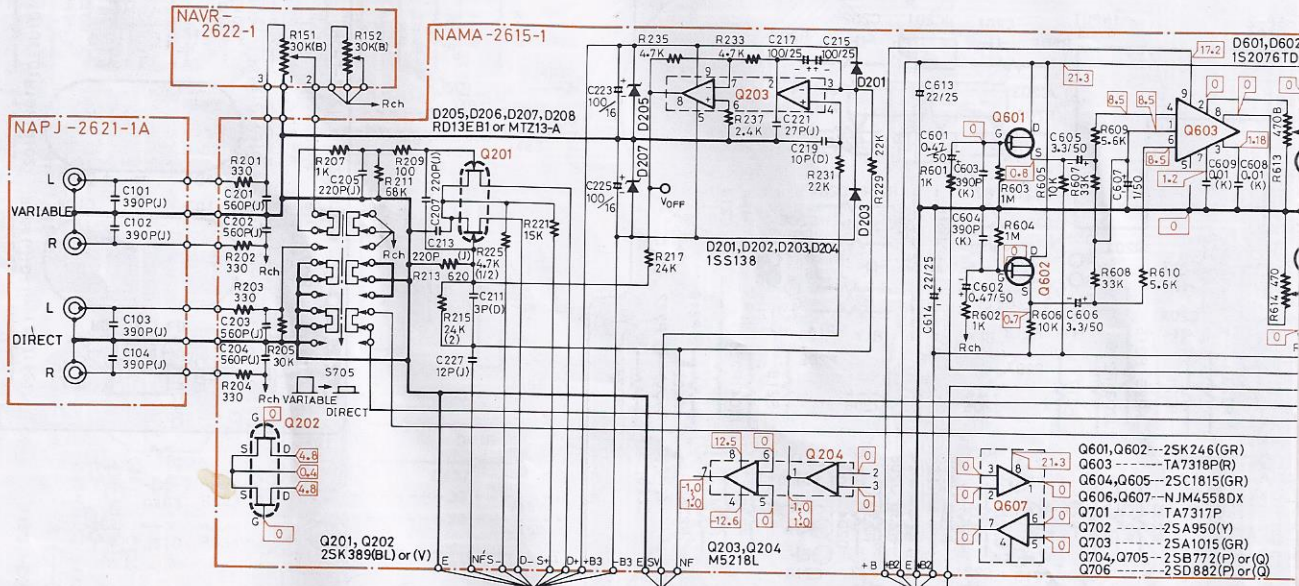


M5218L(OP Amp.)



SCHEMATIC DIAGRAM

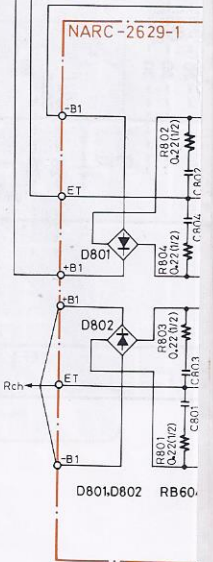
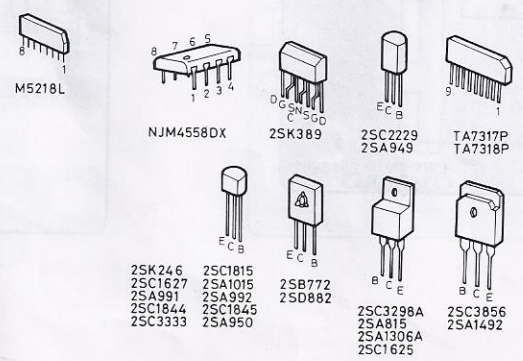
A
B
C
D
E

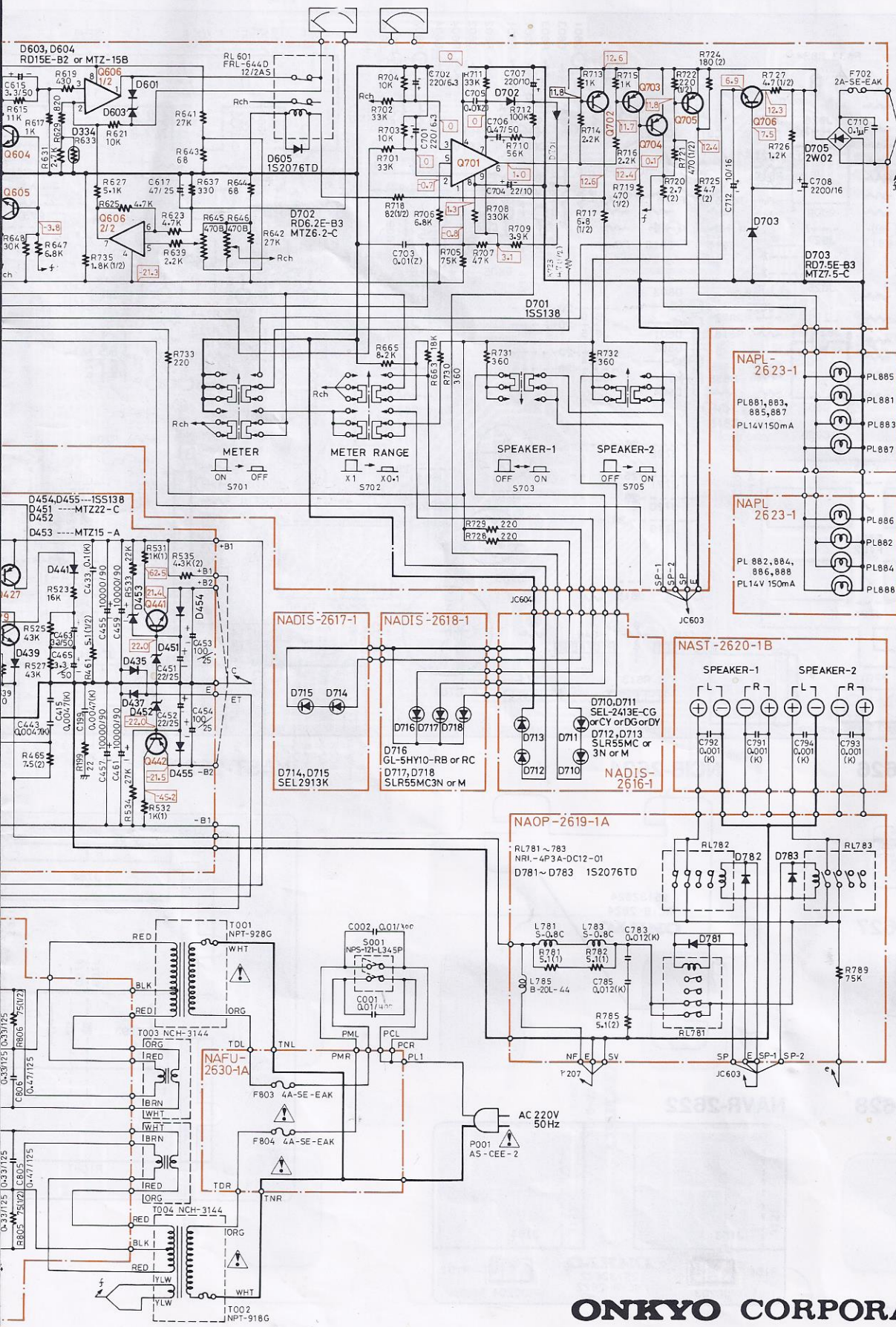


NOTES

- ALL RESISTORS ARE IN OHMS, 1/4 WATT UNLESS OTHERWISE NOTED.
- ALL CAPACITORS ARE IN μ F, 50V UNLESS OTHERWISE NOTED.
- ELECTROLYTIC CAPACITORS (+) ARE IN μ F/WV.
- VOLTAGE (MEASURED WITH V.T.V.M.) (NO INPUT SIGNAL).
- CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.
- THE COMPONENTS IDENTIFIED BY MARK ∇ ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.

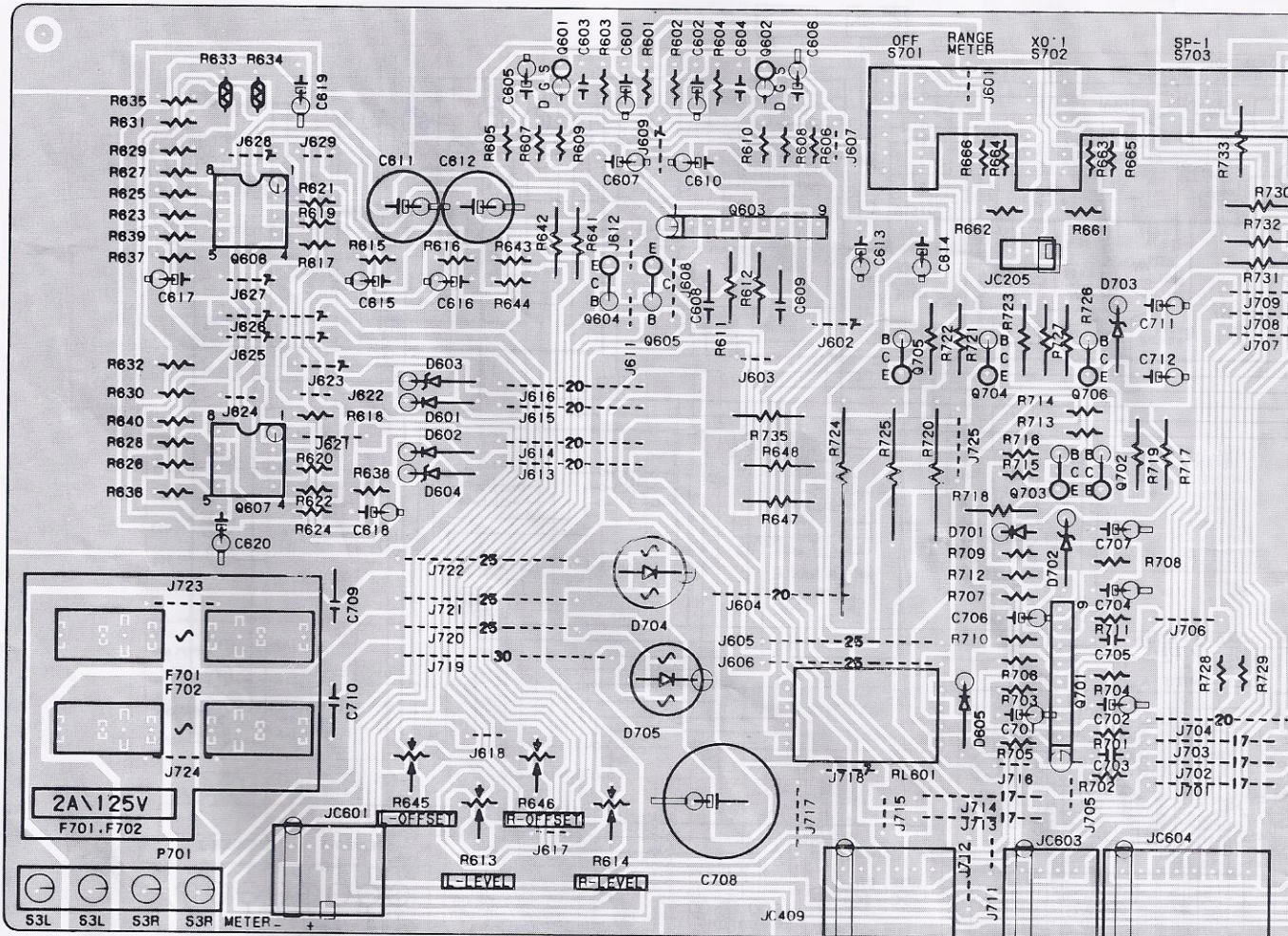
C	D	G	J	K	M	Z
$\pm 0.25\%$	$\pm 0.5\%$	$\pm 2\%$	$\pm 5\%$	$\pm 10\%$	± 2.0	$\pm 80\%$





PRINTED CIRCUIT BOARD VIEW FROM BOTTOM SIDE

NAMA-2615



NACC-2626



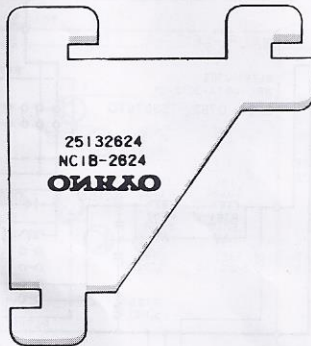
NADA-2627



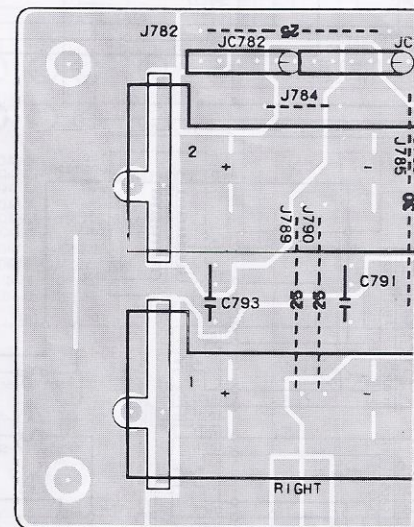
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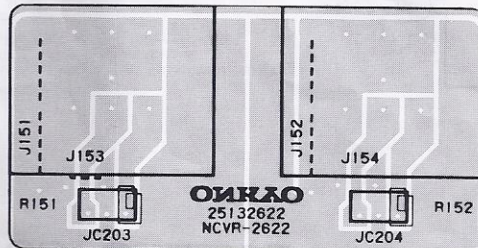
NCIB-2624



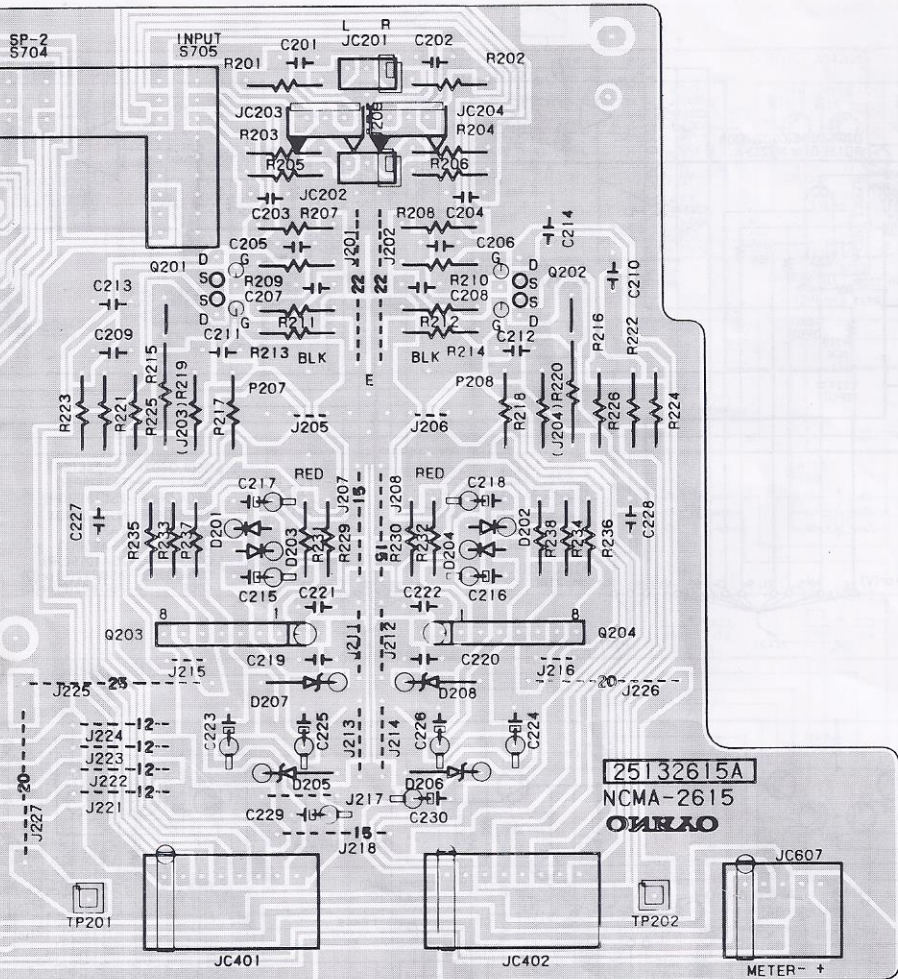
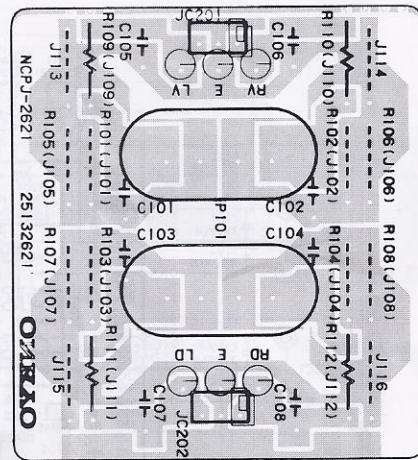
NAST-2620



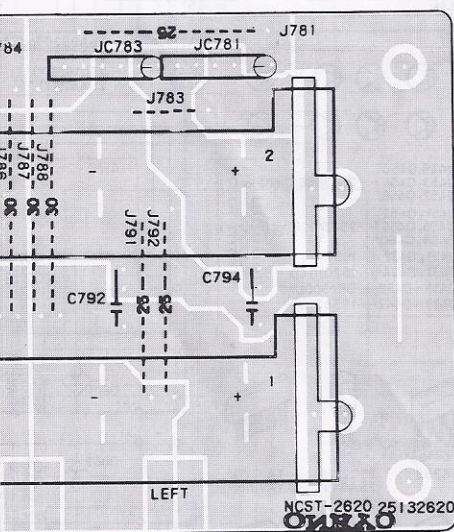
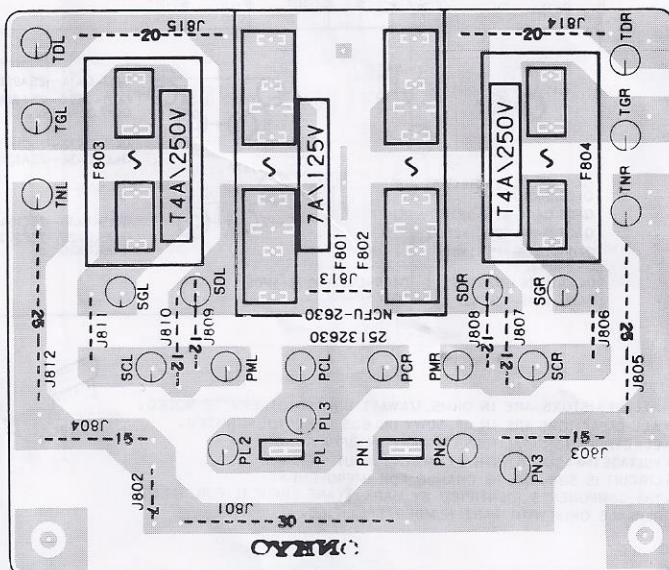
NAVR-2622



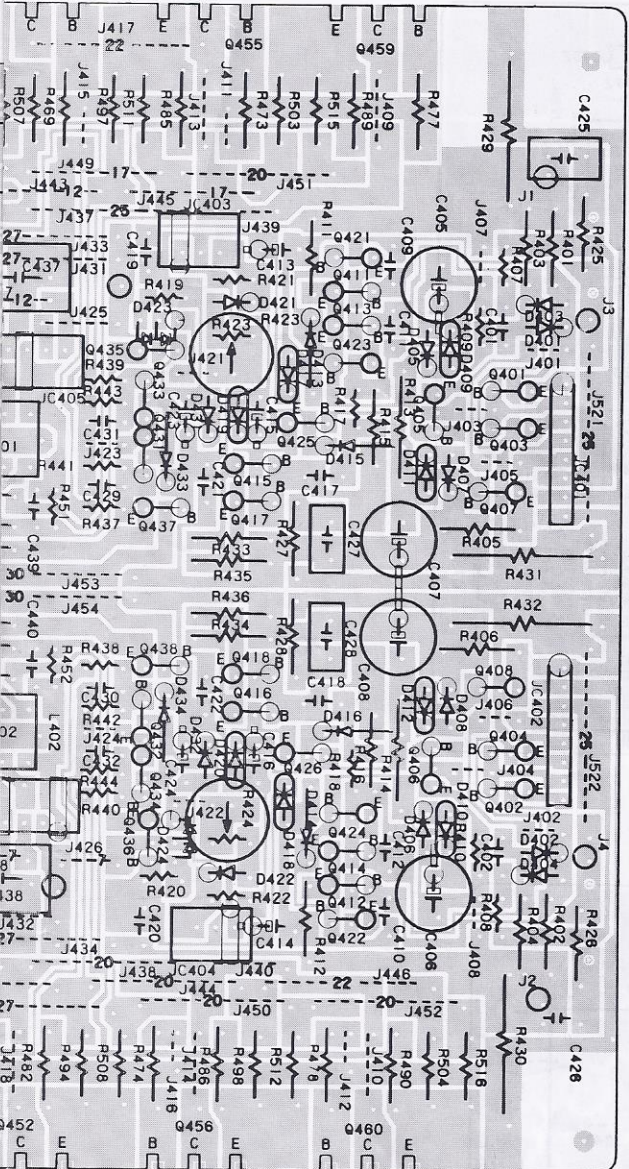
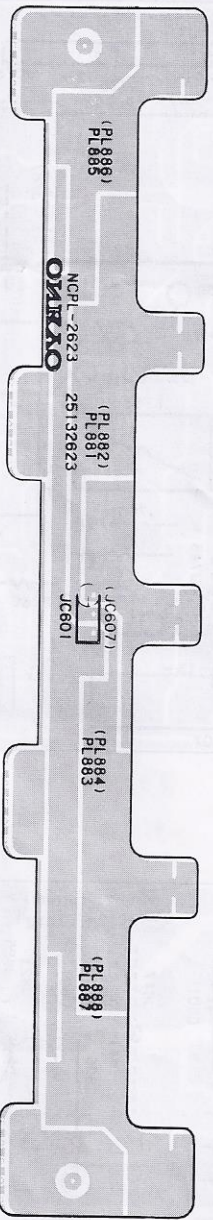
NAPJ-2621



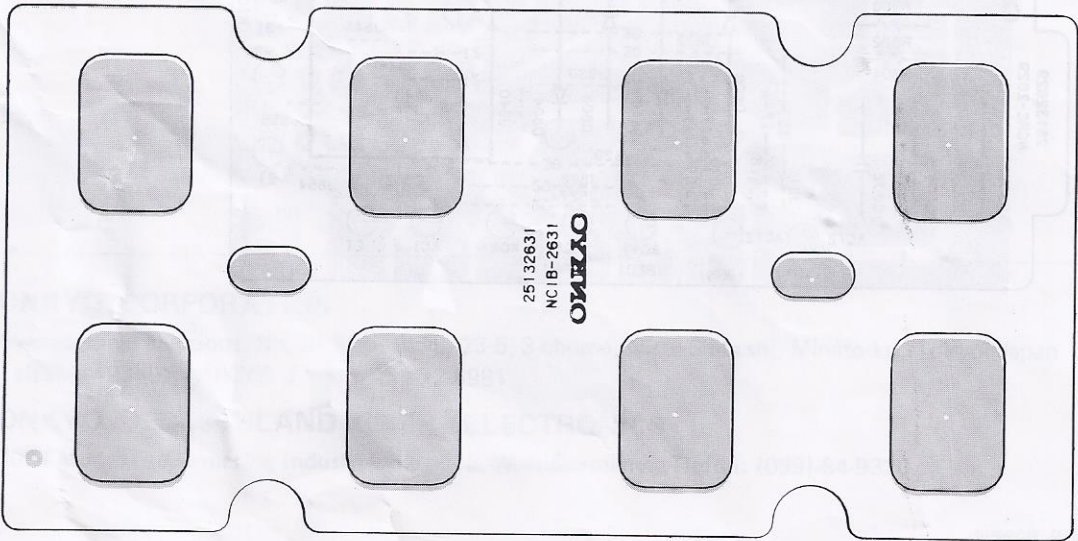
NAFU-2630



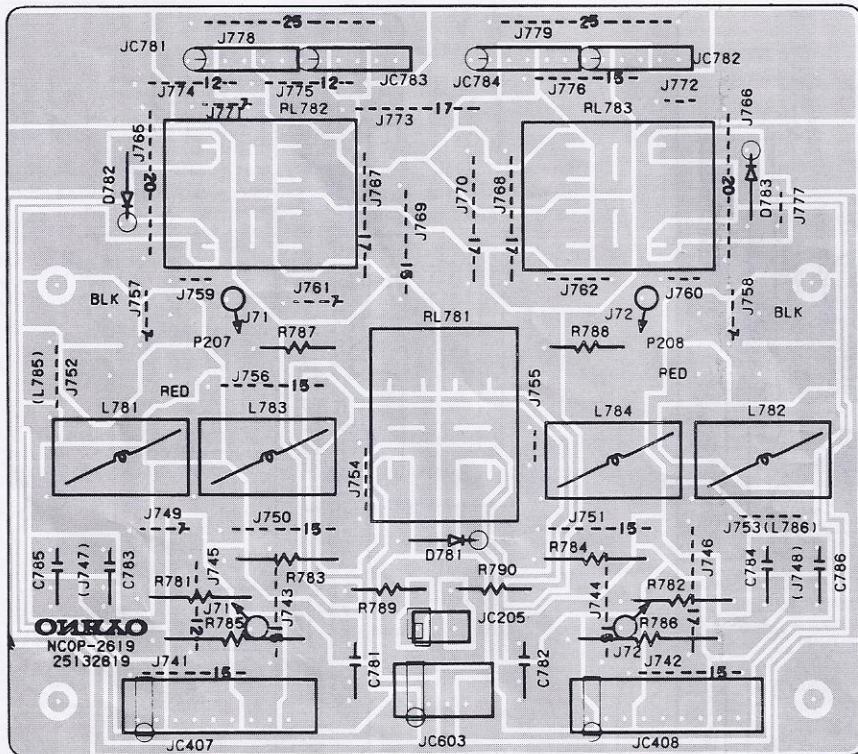
NAPL-2623



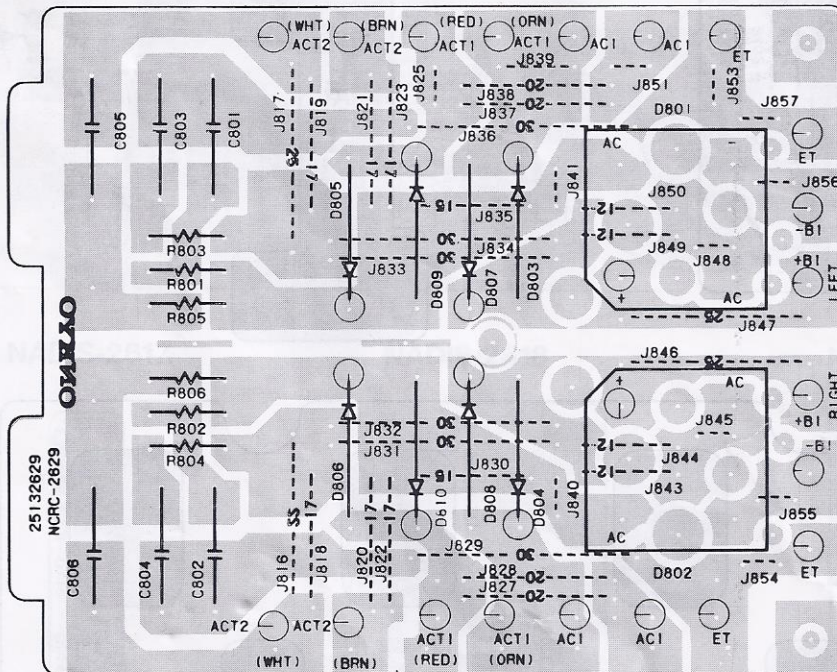
NCIB-2631



NAOP-2619



NARC-2629



ONKYO CORPORATION

International Division: No. 24 Mori Bldg., 23-5, 3-chome, Nishi-Sinbashi, Minato-ku, Tokyo, Japan
Telex: 2423551 ONKYO J. Tel. 03-432-6981

ONKYO DEUTSCHLAND GMBH, ELECTRONICS

8034 Munchen-Germering Industriestrasse 18, West Germany. Telefon: (089)-84-9320