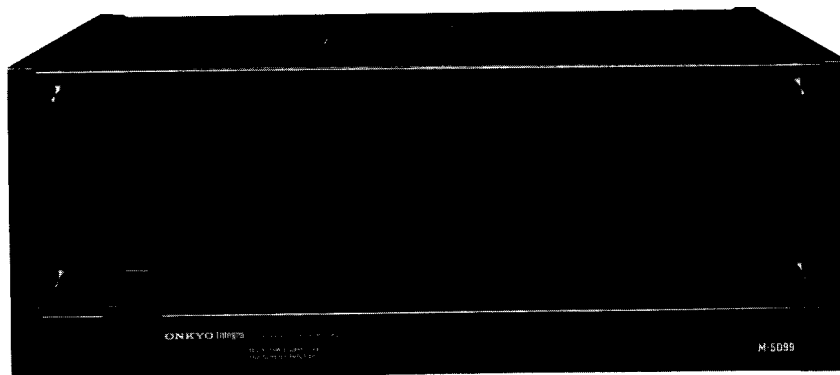


# ONKYO® SERVICE MANUAL

## Super Servo Stereo Power Amplifier MODEL M-5099



UD	120V AC, 60Hz
UG	220V AC, 50Hz
UW	120V or 220V AC, 50/60Hz

### SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK  $\triangle$  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.

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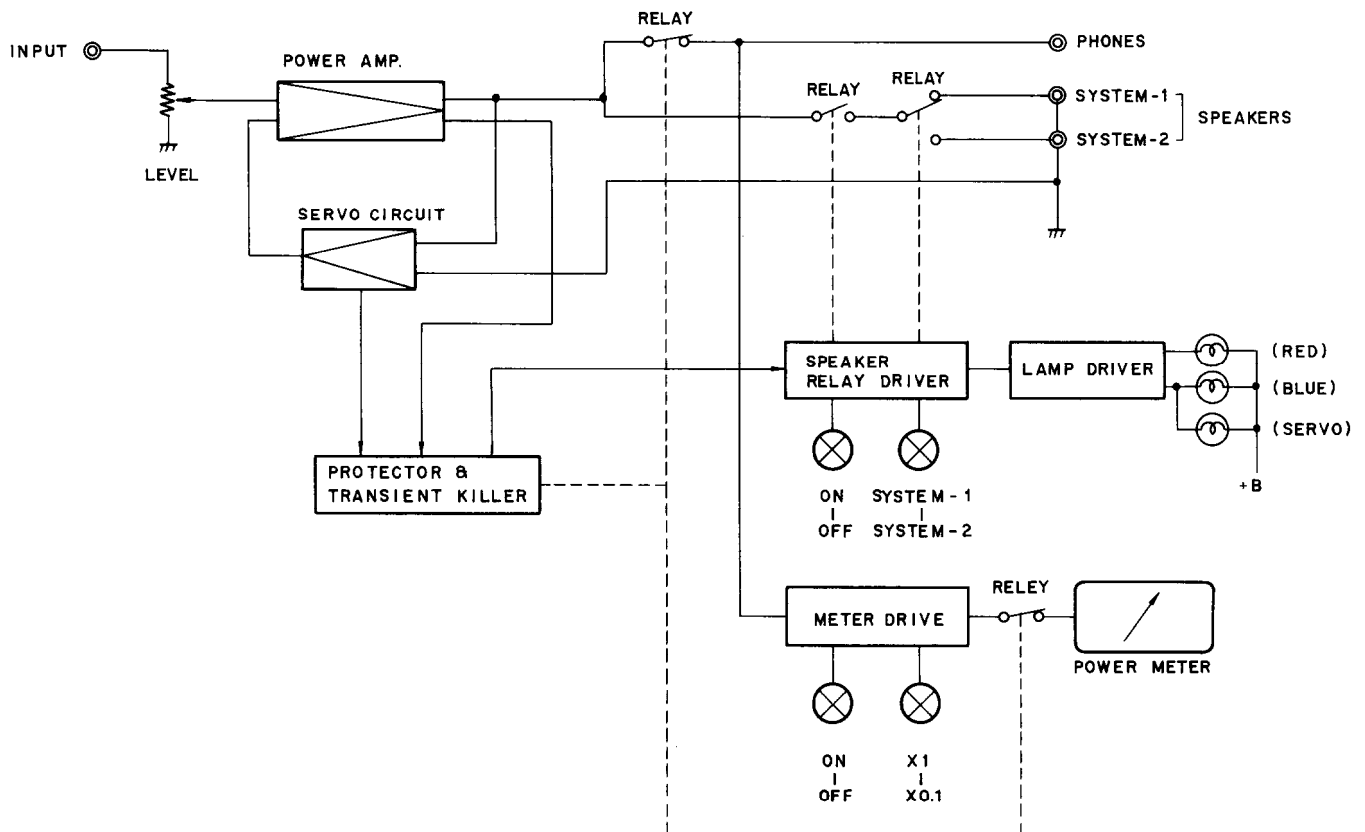


# SPECIFICATIONS

Power output:	210 watts per channel, minimum RMS, at 8 ohms, both channels driven, from 20 Hz to 20 kHz, with no more than 0.005% total harmonic distortion 220 watts per channel, into 8 ohms at 1 kHz, 0.005% THD	Outputs:	SPEAKERS 1 & 2, AC OUTLET (120V models only), PHONES
Total harmonic distortion:	0.005% at rated power 0.005% at 1 watt output	Inputs:	INPUT
Intermodulation distortion:	0.005% at rated power	Power supply:	AC 120V, 60 Hz [D model] AC 220V, 50 Hz [G model] AC 120V or 220V, 50/60 Hz [W model]
Frequency response:	+0, -1.5 dB at 1Hz - 100kHz	Semiconductors:	4 FETs, 82 transistors, 89 diodes, 7 ICs
Input sensitivity:	1.5V	Dimensions:	480(W) x 191(H) x 439(D)mm 18 5/64" x 7 33/64" x 17 9/32"
Input impedance:	47 kohms	Weight:	31 kg, (68.3 lbs.)
Damping factor:	200 (8 ohms, 1 kHz)		
S/N ratio:	126 dB (IHFA, Shorted)		

Specifications and features are subject to change without notice.

# BLOCK DIAGRAM



## 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
F601, F602	252052	7A(ST-6), Primary fuse (120V, 120V/220V model)
F601, F602	252077	4A-SE-EAK, Primary fuse (220V, 120V/220V model)

### 2. Replacing the lamp

This unit uses the lamp listed below.

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL801, PL802 PL901, PL902	210092	PL14V 150mA
PL803, PL804 PL903, PL904	210089	PL14V 150mA
PL701	210092	PL14V 150mA
PL702 ~ PL706	210094	PL14V 60mA-3.0

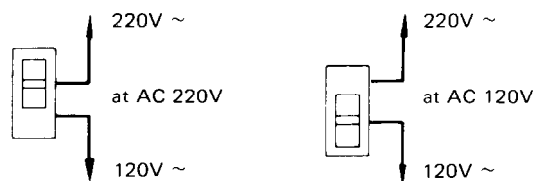
### 3. Insulation resistance measurement (Only U.S.A. model)

Connect the insulating-resistance tester between the plug of power supply cable and the terminal GND on the back panel.

Specifications; More than 10 MΩ at 500V.

### 4. Voltage selector (rear panel)

Worldwide models are equipped with a voltage selector to conform with local power supplies. Be sure to set this switch to match the voltage of the power supply in your area before turning the power switch on. Voltage is changed by sliding the groove in the switch with a screwdriver or similar instrument to the up or down position. Confirm that the switch has been moved all the way to the up or down before turning the power switch on. If there is no voltage selector switch on the unit you have purchased, it can only be used in areas where the power supply voltage is the same as that of the unit.



## ADJUSTMENT PROCEDURES

### ■ PREPARATIONS

- 1) Place the unit on a level surface, right side up, leaving at least 15 mm of space at the ventilation openings.
- 2) There should be no load or signal and the level should be at minimum.
- 3) The air should be calm, as moving air can upset the stability of the gauges.

#### 1. Meter Zero Point Adjustment

With the power off, align each needle with the "0" mark using the adjustment screw underneath each meter.

Caution: Do not perform this adjustment immediately after turning the power off. Perform after the meter circuit section has discharged.

#### 2. Idling Current Adjustment

Remove the top cover and, five minutes after the power has been turned on, adjust the semi-fixed resistor R126 (R226)

so that the voltage between Vct-lid on printed circuit board NADA-983 (or NADA-983a) is 13mV.

#### 3. Meter Offset Adjustment

About five minutes after turning power on and with no signal present, adjust the semi-fixed resistor R639(R640) on the pc board NAME-986 (or NAME-2343) to align each meter needle with "0".

#### 4. Meter Level Adjustment

Apply a 1kHz signal to the left channel input terminal and set the M-5099 meter range selector to x0.1. Adjust the input so that the speaker output terminal voltage (no load) is 12.65V (22.0 dBV). Then adjust the semi-fixed resistor R611 of pc board NAMA-986 (or NAMA-2343) so that the meter needle is aligned with 0dB. Adjust the right channel in the same manner with the R612. (Do not feed a signal to both the left and right channels at the same time.)

## CIRCUIT DESCRIPTION

In the dual Super Servo system, servo feedback loops are used in both the positive and negative sides of the amplifier to cancel out distortion generated within the amplifier itself. This double feedback configuration is particularly effective in power amps. where very large currents are handled, because it suppresses the generation of undesirable voltages created by the amp's internal wiring and differences in impedances between the various sections of the power amp. The benefits are an improvement in sonic clarity and an enhanced feeling of realism.

The dual servo feedback system used in this unit, along with the precision circuitry and high performance circuit components, means that the stability of this power supply is equivalent to a 100 times larger ordinary power supply.

### Outline

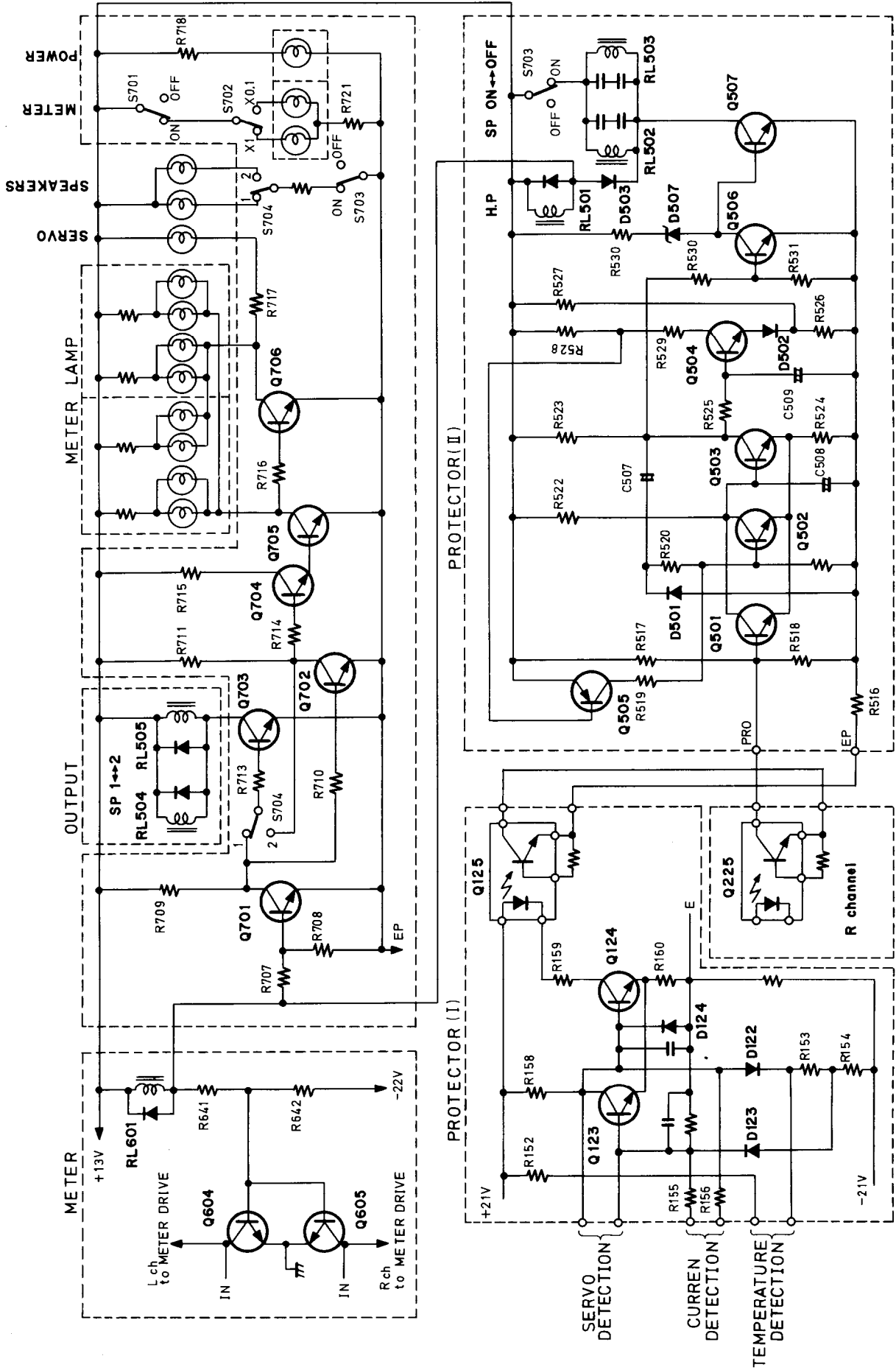
1. The first stage consists of a directly coupled cascode bootstrap dual FET differential amplifier. Next is an emitter follower buffer and a cascode current mirror push-pull class A pre-driver. The output stage is a 3-stage Darlington triple push-pull pure complementary system. Here servo feedback loops are added to both the positive and negative terminals on the output side to prevent the slight differences in impedances between circuits from generating undesirable voltages. This is a high power amplifier having a rated output power of 200W + 200W.
2. The dual super servo system functions to remove ultra-low frequency signal components created by gradual fluctuations in temperature, power supply voltage and other factors. Another reason for using this system is that it makes possible the elimination of all capacitors, a source of degradation of sound quality, from the signal path (the positive side of the amp) On the negative (ground) side, changes in the power supply cause corresponding movement in the speaker diaphragms since the speakers are directly connected to the power supply on the negative side. In ordinary amplifiers, this problem is dealt with by simply using heavier ground cables. Unfortunately, this method is not sufficiently effective in power amps because of the large currents that exist. The second servo loop in the ground line solves this problem by reducing the effect of fluctuations in the power supply to 1/100 th of the normal level.
3. The output transistors of most amplifiers use either the class B or AB push-pull system. Class A push-pull is used only rarely. In class B and AB, non-linearities are easily generated at points where the push-pull (positive and negative) waveforms are connected. This is the cause of switching distortion, a problem that can noticeably affect the clarity of sound reproduction. Switching distortion does not occur in class A amps, but this system does require very high currents because the operating point must be moved to the center. These high currents generate large amounts of heat, meaning that the efficiency of the power supply is extremely low.

To deal with switching distortion, this unit employs a linear switching system which uses a special bias current to correct the points where the upper and lower waves are connected. The result is very linear operating characteristics. Linear switching and the use of high ft power transistors yield amplification characteristics that are exactly the same as those of class A operation.

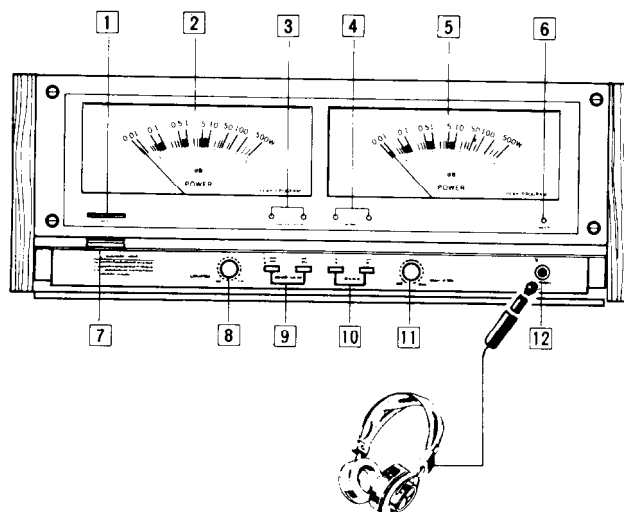
4. Highly accurate power meters that display the output levels at each instant are used. These meters have large drive sections to provide high speed response to output level changes. The logarithmic compression circuit, located on a monolithic IC, and meter temperature compensation circuit further improve the accuracy of the meter indications. The meter scales are very large to make them easy to read.
5. Ordinary iron is used in many of the structural parts. However, iron would cause harmonic distortion if it were used inside the chassis where magnetic flux exists. In this unit, all main components use non-ferrous metals to prevent the generation of harmonics, Thereby assuring higher waveform transmission fidelity.

### Circuit Description – Protection Circuitry

If, for some reason, a DC voltage is generated in the amp's output circuitry, an abnormal voltage will also be generated in the output terminal of the servo IC. If an abnormal current appears at power transistors, it is detected at Q307 and Q308 and at Q123 and Q124 of the protective circuitry detection section and the photo coupler Q125 is switched off. If the temperature at the power circuit rises to an abnormally high level, it is detected by the posistor R327 which causes the photo coupler Q125 to be switched off. When the L or R channel photo coupler is switched off, Q501 is switched on and Q507 is switched off to cut speaker relays RL502 and RL503 so that no output signal can go to the speakers. If the abnormal situation continues, the time constants of R525 and C509 cause Q504 and Q505 to switch on so that Q502 is also switched on. Since this loop is held, the protection circuitry will continue to function until power is switched off by the power switch.



## FRONT PANEL FACILITIES



1. Power indicator
2. Left channel power meter
3. Meter range indicators
4. Speaker output indicators
5. Right channel power meter
6. Servo operation indicator
7. Power switch
8. Left channel level control
9. Meter range selector switches
10. Speaker output selector switches
11. Right channel level control
12. Headphone jack

Before turning power on for the first time, turn the level controls [8] [11] all the way to the right, turn the volume control on the pre-amp to its minimum setting and confirm that both power meter needles are pointing at '0'.

When the power switch is turned on, both meters will be illuminated by a soft red light. After a short time, the illumination will change to normal and the SERVO OPERATION indicator [6] will light up.

Begin operation of the desired audio source and slowly raise the pre-amp volume control to the desired listening level.

Note that no sound will be produced until the SERVO OPERATION indicator [6] illuminates because the transient killer is operating during this time.

### Using the Meter Range Selector Switches

Use these switches to turn the power meters on and off and to select the sensitivity. When the left selector is ON (■) and the right selector is in the X0.1 (—) position, the meter sensitivity is increased by 10 times. For example, if the meters show 100 watts of output, the actual output power at that time is 10 watts. When the right selector is in the X1 (■) position, the meters show the actual output power. The meter range indicators [3] light to clearly show which mode has been selected. You should use the setting in which the needles do not move beyond the end of the scales. If the right selector is OFF (—), the meter needles will not move at all.

### Using the Level Controls

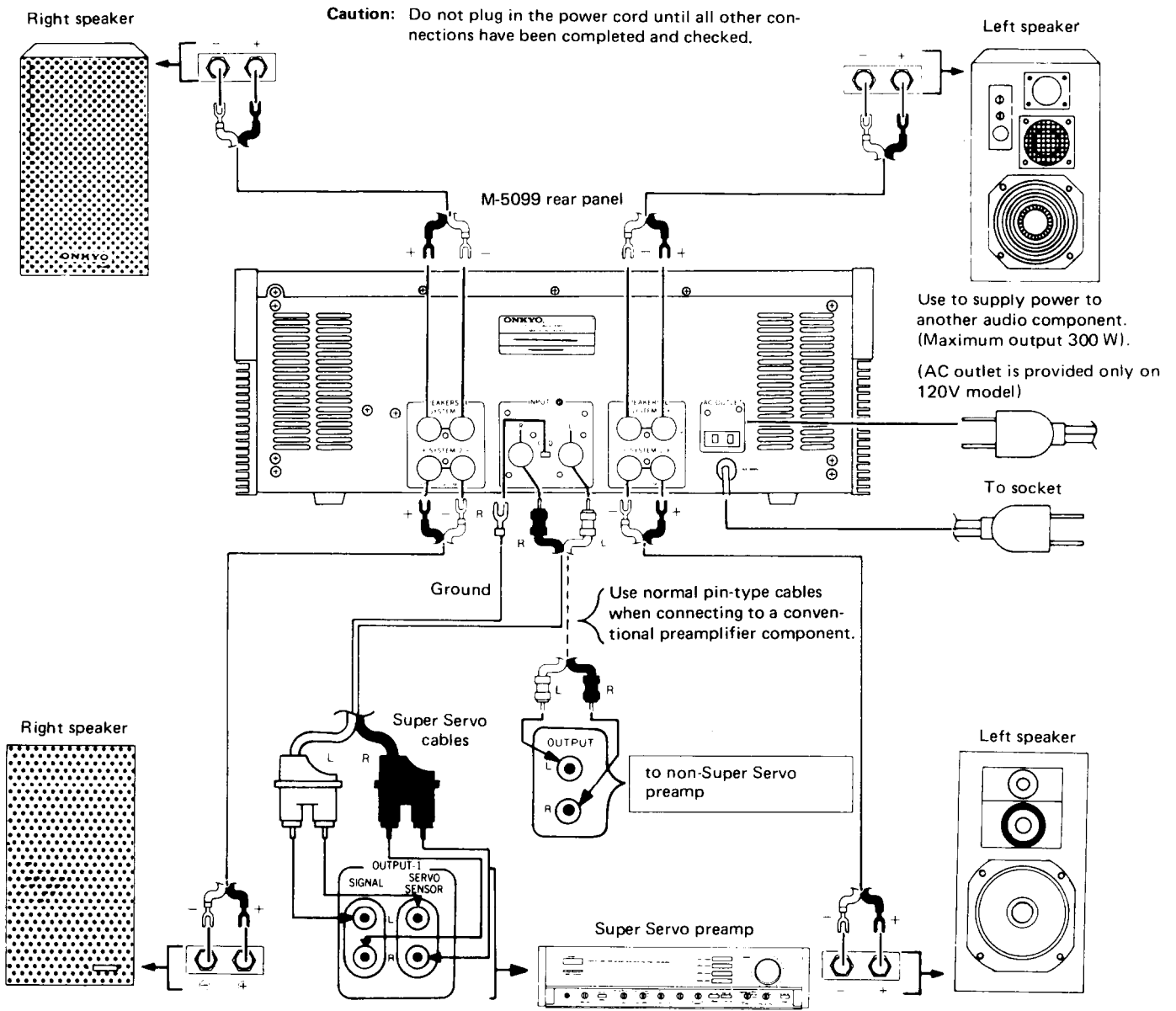
This unit is equipped with separate left and right channel output level controls. Normally, both controls should be turned all the way to the right (MAX.). If one speaker is much louder than the other due to your listening position or the speaker placement, adjust the level controls [8] [11] to obtain the proper balance between the speakers.

### Using the Speaker Output Selector Switches

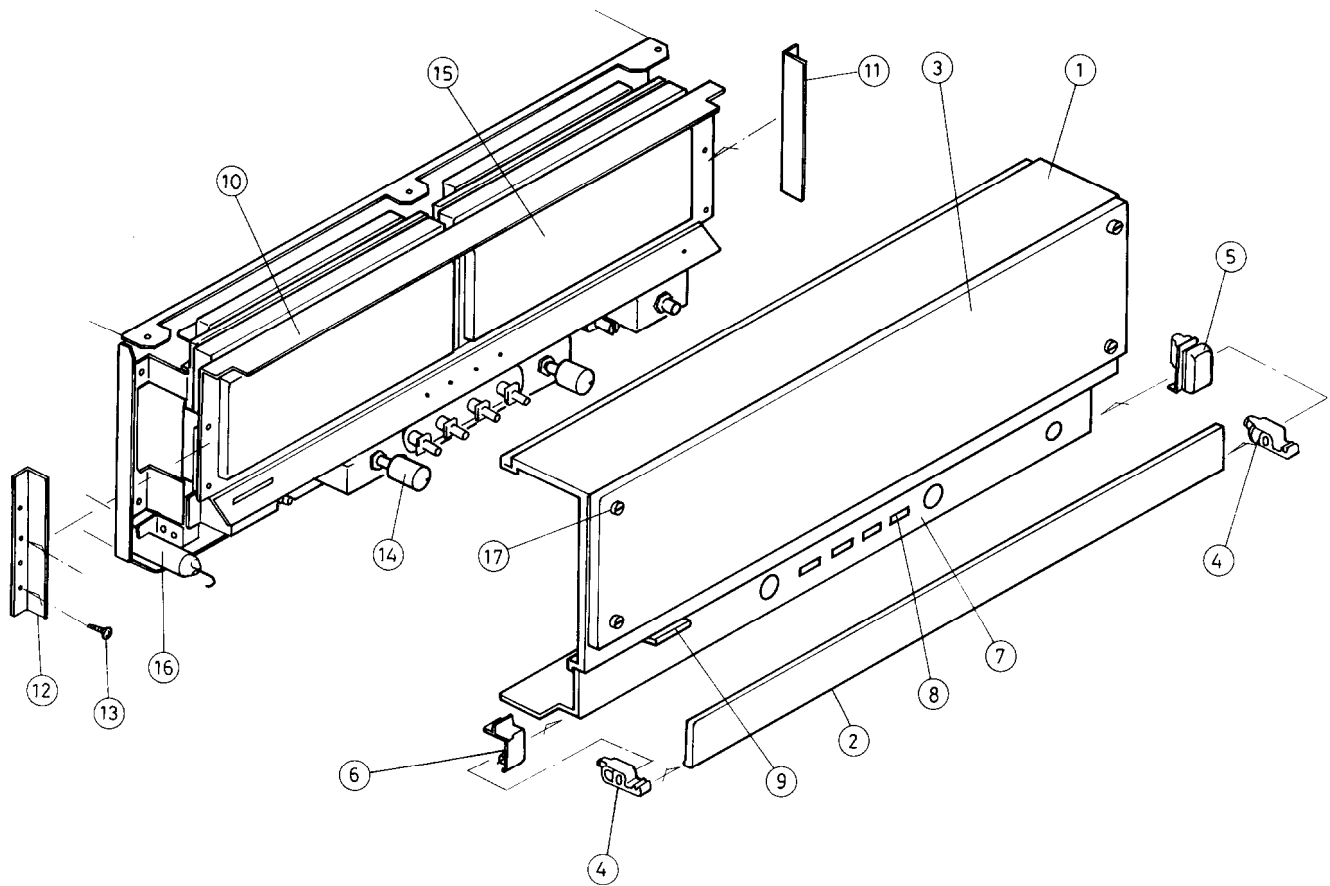
Depress the left selector to the OFF (—) position to shut off the output to all speakers. Depress the right selector to use only the speaker system connected to the SYSTEM 1 terminals on the rear panel of the M-5099.

When the right selector is in the IN (—) position, only the SYSTEM 2 speakers are heard. The speaker output indicators light to show which system is being used.

# SYSTEM CONNECTIONS



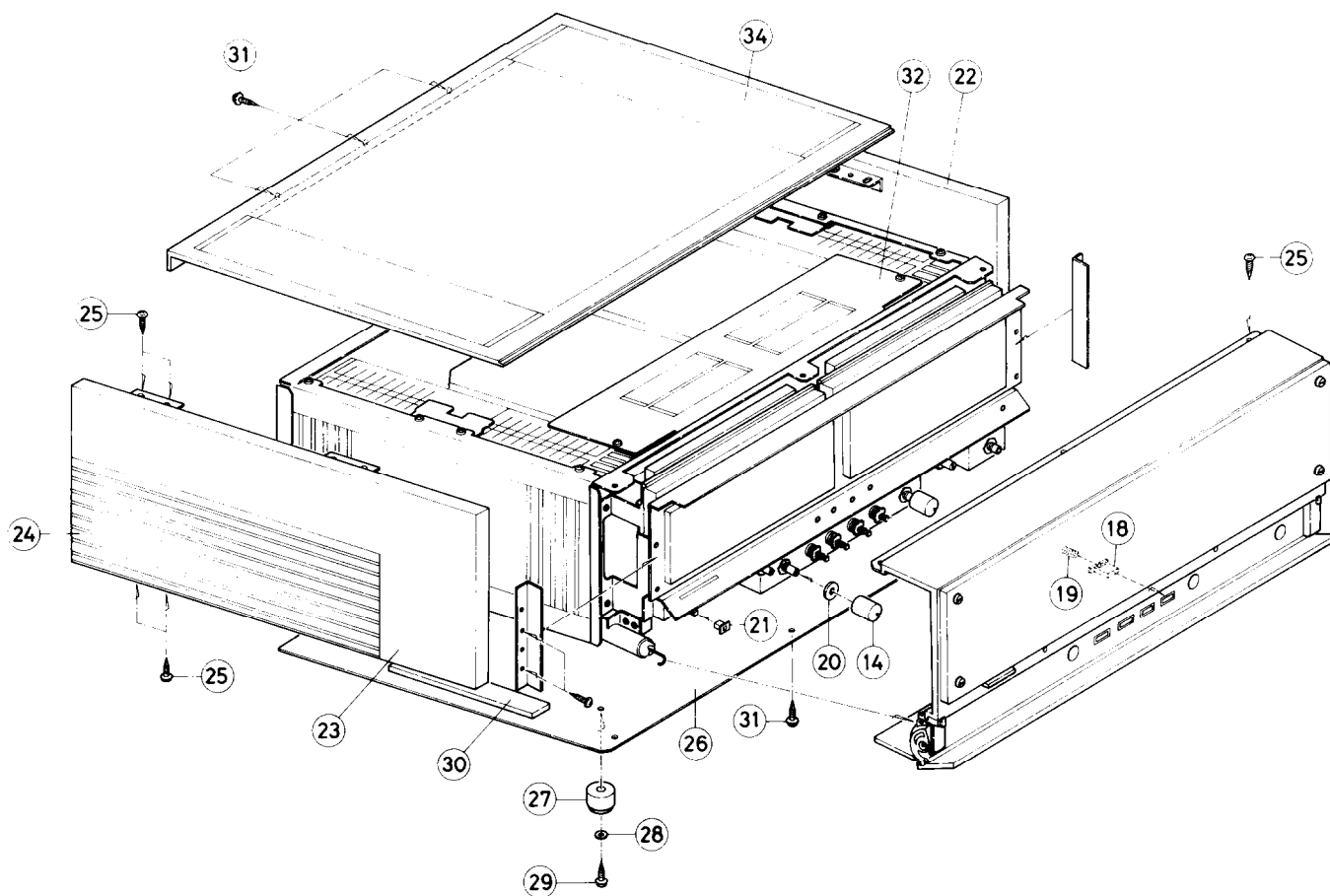
## EXPLODED VIEW PARTS LIST



REF. NO.	PARTS NO.	DESCRIPTION
1	17874121	Front panel ass'y (Include 2, 4 to 7 and 9)
2	27210588	Front panel S
2	28135104	Model plate
3	28191067	Clear plate
4	27300400A	Bearing L
5	28125083	End cap R
6	28125082	End cap L
7	27267083	Guide, push
8	28320479	Knob, push
9	27267084	Guide, power
9	28320480A	Knob, power
9	27180033	Spring B

REF. NO.	PARTS NO.	DESCRIPTION
10	27120736	Back panel ass'y [D]
	27120715	Back panel ass'y [G]
	27120776	Back panel ass'y [W]
11	27190092A	Holder
14	28320481	Knob, level
15	243134	Output meter
16	24610440	Damper ass'y
17	27300348	Special screw
	27270017A	Spacer
	863140	N-4F-N, Nut
	870052	Washer
	870054A	Wahser





REF. NO.	PARTS NO.	DESCRIPTION
18	28320479	Knob, push
19	27180049	Spring G
20	28140219	Cushion
21	27190091	Holder, push
22	28185124-1	Side panel R ass'y
23	28185123-1	Side panel L ass'y
24	27300345A	Plate, radiator
25	834430068	3TTS+6BQ(BC), Tapping screw

REF. NO.	PARTS NO.	DESCRIPTION
26	27170092	Bottom board
27	27175020	Leg
28	87613008	W3 x 8F, Washer
29	834130208	3STS+20BQ, Tapping screw
30	28140323	Cushion
31	831430088	3TTW+8BQ(BC), Tapping screw
32	28184102	Cover F
34	28184098	Cover

## NOTE

[D]: Only 120V model

[G]: Only 220V model

[W]: Only 120V/220V model

## PARTS LIST

SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.	SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.
A1	27110119	Front bracket		(A395a)	28185236A	Side panel [D] [G]	
A2	27140436	Bracket, power			28185245	Side panel [W]	
A3	27140435	Bracket, volume		(A395b)	27300345A	Radiator	24
A4	27140437	Bracket, headphone		(A395c)	27140434A	Bracket	
A5	27140438	Bracket, lamp A		(A395d)	27140441A	Bracket (U)	
A6	27140439	Bracket, lamp B		(A395e)	27140442B	Bracket (D)	
A7	27190009	Holder		(A395f)	85143113	M3.1+13F(BC), Wood screw	
A8	27300396	Insulating plate B		(A395g)	82143006	3P+6FN(BC), Pan head screw	
A13	27110120	Front Bracket B [D] [G]		(A395h)	28140327	1.5 x 7 x 104, Cushion	
	27110263	Front bracket B [W]		(A395i)	28140020	4 x 40 x 10, Cushion	
A18	27100035B	Chassis		A400	28185237A	Side panel ass'y, Right	22
A19	27130146	Bracket, power transformer				Side panel ass'y, Right [G]	
A20	27130232A	Bracket, pc board			28185246	Side panel ass'y, Right [W]	22
A22	27140257	Bracket, pc board		(A400a)	28185238A	Side panel [D] [G]	
A23	27270030	Spacer			28185245	Side panel [W]	
A24	27300358	Bus		A601	27170092	Bottom board	26
A25	27300395	Insulating plate A		A602	27175020	Leg	27
A37	27190029	Holder		A603	28140323	3 x 150 x 20, Cushion	30
A41	27260061	Shaft D		A604	834130208	3STS+20BQ, Tapping screw	29
A42	27160080	Radiator		A605	831430088	3TTW+8B(BC), Tapping screw	31
A43	27130144A	Bracket		A606	87613008	W3 x 8f, Washer	28
A44	27130231A	Bracket C		A801	28320480B	Knob, power	9
A45	27140440	Bracket HE		A802	28320481	Knob, level	14
A46	27140376B	Holding bracket, transistor		A803	28320479	Knob, push	8, 18
A52	27260043	Shaft ass'y		A804	893030	E-3, Circlip	
A62	27120736	Back panel [D]	10	A805	28140219	Cushion	20
	27120715	Back panel [G]		Q301 ~	2201223 or	2SC2773(0) or	
	27120776	Back panel [W]		Q303			
A63	270280	SR-4K-4, Strainrelief [D] [G]		Q401 ~	2201224	2SC2773(Y), Transistor	
	28190009	#2272,,Strainrelief [W]		Q403			
A70	27300380	Damper ass'y		Q304 ~	2201233 or	2SA1169(0) or	
A76	27260042	Shaft A		Q306			
A77	27140462	Bracket DA		Q404 ~	2201234	2SA1196(Y), Transistor	
A79	27140487	Bracket, door		Q406			
A350	17870121	Front panel ass'y	1	Q309,	2211255	2SC1815(GR), Transistor	
(A351)	27210588	Front panel S ass'y	2	Q409			
(A352)	28135104	Model plate	2	D1 ~ D4	223841	GP-30G, Silicon diode	
(A353)	28191067	Clear plate	3	L503,	230904	B-20L-44, Core [G]	
(A354)	27300400A	Bearing	4	L504			
A355	28125082	End cap, Left	6	C1 $\Delta$	3500065A	0.01 $\mu$ F, AC400V/125V Capacitor IS	
A356	28125083	End cap, Right	5			30,000 $\mu$ F, 90V, Capacitor, elect.	
(A357)	28140314	2 x 5 x 7, Cushion		C2 ~ C5	3504151		
A358	28140296	0.5 x 30 x 7, Cushion				Capacitor DTG	
(A359)	28140324	1.5 x 20 x 10, Cushion		C6, C7	3800003		
(A360)	27267084	Guide, power	9	C8 $\Delta$	3500065A	0.01 $\mu$ F, AC400V/125V, Capacitor IS [G]	
(A361)	27267083	Guide, push	7			SB-1925, Cover, Capacitor [G]	
(A362)	27180033	Spring B	9	C8a	27300601		
(A363)	27180049	Spring G	8, 19			1000 pF, 100V, Capacitor, DEW [G]	
A364	28140318	3 x 150 x 10, Cushion		C11 ~	278131027		
A365	27300399A	Bearing R		C14			
A366	28133036A	Back plate		R1, R2	5104112	N27D100KB25M, Output level variable resistor	
A367	27190092A	Holder	11			PTHBB471TS, Posistor	
A372	27300348A	Special screw	17	R327,	4000045		
A374	863140	N-4F-N, Nutt		R427			
A375	870052	Washer		F601,	252052	7A(ST-6), Fuse [D]	
A376	870054A	Washer		F602 $\Delta$			
A377	28140024	Cushion			252077	4A-SE-EAK, Fuse [G] [W]	
A378	27190091	Holder, push	21	F601a $\Delta$	25050211	H0455, Fuse holder [W]	
A384	28184102	Cover F	32	F601b	29360486	7A125V, Fuse label [D]	
A385	28184098A	Cover	34		29360374	T4A/250V, Fuse label [W]	
A386	28140020	4 x 10 x 40, Cushion		M1, M2	243134	NIND-2000S134, Meter [D] [G]	15
A388	28140260	Cushion			243147	NIND-2000S147, Meter [W]	
A395	28185235A	Side panel ass'y, (Left) [D] [G]	23	P1, P2	25045054	NPJ-1PRBL28, Input terminal	
	28185244	Side panel ass'y (Left) [W]					

	SYMBOL NO.	PARTS NO.	DESCRIPTION	REF. NO.
A	P3	25045062	M1654A, Stereo headphone jack	
	P4 $\triangle$	253100	AS-UC-4, Power supply cable [D]	
	$\triangle$	253092	AS-CEE-2, Power supply cable [G]	
	$\triangle$	253131	AS-CEE-3, Power supply cable [W]	
	P5 $\triangle$	25050046	NSCT-2P15, AC outlet [D]	
	P6	27300168	Speaker terminal	
	P7, P8	25060039	NTM-4PDMN10, Terminal	
	P9 $\triangle$	25108005	Terminal [G]	
	S1 $\triangle$	25035290	NPS-111-L256P, Power switch [D]	
	$\triangle$	25035289	NPS-111-L255P, Power switch [G] [W]	
B	S2 $\triangle$	25065195	NSS-1288P, Slide switch [W]	
	T1, T2 $\triangle$	230599	NPT-722D, Power transformer [D]	
	$\triangle$	230636	NPT-722GS, Power transformer [G]	
	$\triangle$	2300009	NPT-722DG, Power transformer [W]	
		2000166	NSAS-3P062, Socket	
		2000162	NSAS-16P045, Socket	
		2000163	NSAS-10P046, Socket	
		223018	AC316A, Accessory, Transistor	
	U1	12731583	NADA-983, Driver amplifier pc board ass'y [D] [W]	
		17874583A	NADA-983a, Driver amplifier pc board ass'y [G]	
C	U2	12731584	NAMP-984, Power amplifier pc board ass'y	
	U3	12731585	NAPC-985, Protector circuit pc board ass'y [D]	
		17874585A	NAPC-985a, Protector circuit pc board ass'y [G]	
		17870533-1	NAPC-2433-1, Protector circuit pc board ass'y [W]	
	U4	12731586	NAME-986, Peak meter driver pc board ass'y [D]	
		17874543	NAME-2343, Peak meter driver pc board ass'y [G]	
		17870543-1A	NAME-2343-1A, Peak meter driver pc board ass'y [W]	
	U5	12731587A	NAPL-987A, Meter indicator lamp pc board ass'y [D] [G]	
		17870532-1	NAPL-2432-1, Meter indicator lamp pc board ass'y [W]	
	U6	12731587B	NAPL-987B, Meter indicator lamp pc board ass'y	
D	U7	12731582	NASW-982, Switch pc board ass'y	
	U8	12731508	NAPL-1008, Power indicator lamp pc board ass'y	

E

## NOTE

[D]: Only 120V model

[G]: Only 220V model

[W]: Only 120V/220V model

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

# PRINTED CIRCUIT BOARD PARTS LIST

## SWITCH PC BOARD (NASW-982)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Transistors</b>	
Q701, Q702	2211255	2SC1815 (GR)
Q703	2211884	2SC2655 (Y) or
	2211883	2SC2655 (O)
Q704	2211255	2SC1815 (GR)
Q705, Q706	2201286	2SC882 (P) or
	2201285	2SD882 (Q)
	<b>Lamps</b>	
PL702 ~ PL706	210094	PL14V60mA-W-3.0
	<b>Resistors</b>	
R709, R711	441525614	560 $\Omega$ , 1/2W, Metal oxide film
R712, R717	441526204	62 $\Omega$ , 1/2W, Metal oxide film
R715, R716	441525614	560 $\Omega$ , 1/2W, Metal oxide film
R718	441520564	5.6 $\Omega$ , 1/2W, Metal oxide film
R719, R720	4000028	D33A, Thermistor
R721	441526204	62 $\Omega$ , 1/2W, Metal oxide film
	<b>Switch</b>	
S701 ~ S704	25035228	NPS-222-242-L192
	<b>Sockets</b>	
	2000158	NSAS-3P041, 3P
	2000159	NSAS-5P042, 5P
	2000160	NSAS-4P043, 4P
	2000161	NSAS-8P044, 8P

## DRIVER AMPLIFIER PC BOARD (NADA-983, NADA-983a)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Transistors</b>	
Q01	2211916 or	2SK240 (BL) or
	2211917	2SK240 (V), F.E.T.
Q02 ~ Q04	2211732 or	2SC1845 (F) or
	2211733	2SC1845 (E)
Q05 ~ Q07	2211792 or	2SA992 (F) or
	2211793	2SA992 (E)
Q08	2211140	2SA798 (0-001)
Q09, Q10	2212041,	2SA916 (K),
	2212042 or	2SA916 (L) or
	2212043	2SA916 (M)
Q11	2211255	2SC1815 (GR)
Q12, Q14	2212031,	2SC1941 (K),
	2212032 or	2SC1941 (L) or
	2212033	2SC1941 (M)
Q13	2211445 or	2SC2291 (F) or
	2211446	2SC2291 (O)
Q15	2212041,	2SA916 (K),
	2212042 or	2SA916 (L) or
	2212043	2SA916 (M)
Q16	2200863 or	2SC2238 (O) or
	2200864	2SC2238 (Y)
Q17	2200873 or	2SA968 (O) or
	2200874	2SA968 (Y)
Q18	2211792 or	2SA992 (F) or
	2211793	2SA992 (E)
Q19	2211732 or	2SC1845 (F) or
	2211733	2SC1845 (E)
Q20	2200394	2SC1625 (Y)
Q21	2200404	2SA815 (Y)
Q23, Q24	2211255	2SC1815 (GR)
	<b>IC</b>	
Q22	222502	NJM4558DX
	<b>Photo diode/transistor</b>	
Q25	226007	TLP531
	<b>Diodes</b>	
D01, D02	223145	1S2076TD
D03 ~ D06	4000068	VD1222
D07	223145	1S2076TD

D08, D09	4000068	VD1222
D10, D11	2239771	RD24E-B1
D12 ~ D19	223145T	1S2076TD
D20, D21	2239633	RD12E-B3
D22 ~ D24	223145T	1S2076TD
	<b>Capacitors</b>	
C01	372122214	220 pF $\pm$ 5%, 50V, ST
C03	379121035P	0.01 $\mu$ F, 50V, DEW
C06, C15	352741009	10 $\mu$ F, 16V, Elect.
C16	379224737	0.047 $\mu$ F, 50V, DEW
C19	379221037	0.01 $\mu$ F, 50V, DEW
C20	379144735	0.047 $\mu$ F, 200V, DEW
C30, C31	352752209	22 $\mu$ F, 25V, Elect.
C32, C33	352751009	10 $\mu$ F, 25V, Elect.
C34, C35	352751019	100 $\mu$ F, 25V, Elect.
C39	379144725	4700 pF, 200V, DEW [G]
	<b>Resistors</b>	
R01	441621024	1 k $\Omega$ , 1W, Metal oxide film
R02	441621044	100k $\Omega$ , 1W, Metal oxide film
R03	441626824F	6.8k $\Omega$ , 1W, Metal oxide film
R11	441522724KF	2.7 k $\Omega$ , 1/2W, Metal oxide film
R20	41723334F	33k $\Omega$ , 2W, Metal oxide film
R21	441621634F	16k $\Omega$ , 1W, Metal oxide film
R26	5225072	N10HR4.7KBDM, Semi-fixed
R31, R32	441524714KF	470 $\Omega$ , 1/2W, Metal oxide film
R33, R34	441524704KF	47 $\Omega$ , 1/2W, Metal oxide film
R35, R37	441622734	27k $\Omega$ , 1W, Metal oxide film
R38	441621024	1k $\Omega$ , 1W, Metal oxide film
R41, R42	441621024F	1k $\Omega$ , 1W, Metal oxide film
R48, R49	441521214KF	120 $\Omega$ , 1/2W, Metal oxide film
R60	441521514KF	150 $\Omega$ , 1/2W, Metal oxide film
R61	441622724F	2.7k $\Omega$ , 1W, Metal oxide film
R63	441722204	22 $\Omega$ , 2W, Metal oxide film
R65	441524704	47 $\Omega$ , 1/2W, Metal oxide film [G]

### Radiators

27160048A

### Bus

27300157A

### Plugs

25065070

NPLG-8P15

25065055

NPLG-5P11

### Casies

27300342

A

27300343

B

### Bracket

22012

RH-14

## POWER AMPLIFIER PC BOARD (NAMP-984)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Transistors</b>	
Q07	2211792 or	2SA992(F) or
	2211793	2SA992(E)
Q08	2211732 or	2SC1845(F) or
	2211733	2SC1845(E)
	<b>Capacitors</b>	
C01	3800003	0.1 $\mu$ F, 100V, DTG
C02, C04	379131047	0.1 $\mu$ F, 100V, DEW
C08	379221037	0.01 $\mu$ F, 50V, DEW
	<b>Resistors</b>	
R01 ~ R06	441520274	2.7 $\Omega$ , 1/2W, Metal oxide film
R07 ~ R09	4000075	0.47 $\Omega$ , 2W, Metal plate
R10 ~ R12	441720104	1 $\Omega$ , 2W, Metal oxide film
R13 ~ R16	4000077 or	0.27 $\Omega$ , 5W, Metal plate
	4000083	0.27 $\Omega$ , 5W, Metal plate
R23 ~ R25	441523314	330 $\Omega$ , 1/2W, Metal oxide film

**Plugs**

25065070 NPLG-8P15  
25065055 NPLG-5P11

**PROTECTOR CIRCUIT PC BOARD (NAPC-985, NAPC-985a, NAPC-2433-1)**

A	CIRCUIT NO.	PARTS NO.	DESCRIPTION
		<b>Transistors</b>	
	Q501 ~ Q504	2211255	2SC1815(GR)
	Q505	2211455	2SA1015(GR)
	Q506	2211255	2SC1815(GR)
	Q507	2211884 or 2211883	2SC2655(Y) or 2SC2655(O)
		<b>Diodes</b>	
	D501 ~ D504	223145	1S2076TD
	D507	2239511 or	RD6.8E-B1 or
	D508	223145	1S2076TD
		<b>Coils</b>	
	L501, L502	231015	S-0.8c
		<b>Capacitors</b>	
	C501, C502	379135635	0.056 $\mu$ F, 100V, DEW
	C503 ~ C506	352780109	1 $\mu$ F, 50V, Elect.
	C507, C508	352741019	100 $\mu$ F, 16V, Elect.
	C509	352742219	220 $\mu$ F, 16V, Elect.
	C510	352744719	470 $\mu$ F, 16V, Elect.
	C512 ~ C515	352780479	4.7 $\mu$ F, 50V, Elect.
	C516, C517	379131027	1000pF, 100V, DEW [G]
		<b>Resistors</b>	
	R501, R502	441720474F	4.7 $\Omega$ , 2W, Metal oxide film
	R501, R502	441620244	2.4 $\Omega$ , 1W, Metal oxide film [G]
	R503~R508	441721504F	15 $\Omega$ , 2W, Metal oxide film
	R509, R510	441823314F	330 $\Omega$ , 3W, Metal oxide film
	R511, R512	441521014KF	100 $\Omega$ , 1/2W, Metal oxide film
	R513 ~ R516	441520334KF	3.3 $\Omega$ , 1/2W, Metal oxide film
	R523	441525614KF	560 $\Omega$ , 1/2W, Metal oxide film
	R524	441526804KF	68 $\Omega$ , 1/2W, Metal oxide film
	R534, R535	441620244	2.4 $\Omega$ , 1W, Metal oxide film [G]
		<b>Relaies</b>	
	RL501	25065139	NRL-2P0, 3ADC12-05
	RL502, RL503	25065140	NRL-2P5A-DC12-06
	RL504, RL505	25065141	NRL-2P5A-DC12-07
		<b>Plug</b>	
		25065070	NPLG-8P15

**PEAK METER DRIVE AMPLIFIER PC BOARD (NAME-986, NAME-2343, NAME-2343-1A)**

D	CIRCUIT NO.	PARTS NO.	DESCRIPTION
		<b>ICs</b>	
	Q603	222529	TA7318P(R)
	Q606, Q607	222502	NJM4558DX
		<b>Transistors</b>	
	Q601, Q602	2211945	2SK246(GR), F.E.T.
	Q604, Q605	2211255	2SC1815(GR)
	Q608	2211792 or 2211793	2SA992(F) or 2SA992(E)
	Q609	2211732 or 2211733	2SC1845(F) or 2SC1845(E)
	Q610	2200394	2SC1625(Y)
	Q611	2200404	2SA815(Y)
	Q612	2211643 or 2211644	2SA965(O) or 2SA965 (Y)
		<b>Diodes</b>	
	D601, D602	223145T	1S2076TD
	D603, D604	2239672	RD15E-B2
	D605	223145	1S2076TD
	D606, D607	4000068	VD1222
	D608	2239672	RD15E-B2

D609, D610  
D611  
D612, D613  
D612, D613  
D614 ~ D629  
D630, D631

2239771  
223145T  
223862  
223869  
223841  
223145T

RD24E-B1  
1S2076TD  
WL01  
W01 [W]  
GP30G  
1S2076TD

C601, C602  
C605, C606  
C607  
C608, C609  
C610, C611  
C612, C613  
C614, C615  
C618, C619  
C620  
C625, C626  
C623 ~ C628

**Capacitors**

352784799P 0.47 $\mu$ F, 50V, Elect.  
352780339P 3.3 $\mu$ F, 50V, Elect.  
352780109T 1 $\mu$ F, 50V, Elect.  
379121035 0.01 $\mu$ F, 50V, DEW  
352780339 3.3 $\mu$ F, 50V, Elect.  
352754709 47 $\mu$ F, 25V, Elect.  
352751019 100 $\mu$ F, 25V, Elect.  
352751019 100 $\mu$ F, 25V, Elect.  
352753329 3,300 $\mu$ F, 25V, Elect.  
379131047 0.1 $\mu$ F, 100V, DEW  
379121047 0.1 $\mu$ F, 50V, DEW

**Resistors**

R611, R612 5225067 N10HR470BDM, Semi-fixed  
R639, R640 5225067 N10HR470BDM, Semi fixed  
R644, R645 441521214KF 120 $\Omega$ , 1/2W, Metal oxide film  
R646, R647 441625614KF 560 $\Omega$ , 1W, Metal oxide film  
R648 441523904KF 39 $\Omega$ , 1/2W, Metal oxide film  
R649 441621824KF 1.8k $\Omega$ , 1W, Metal oxide film  
R652 ~ R656 4000076 0.22 $\Omega$ , 5W, Metal plate

**Relaies**

RL601 25065048 FRL-644-D1212AS  
RL602 25065140 NRL-2P5A-DC12-06

**Plugs**

25065055 NPLG-5P11  
25065068 NPLG-4P13

**Fuse holder**

250113 SN5051  
25065096 NPF-073 [G]

**Fuse label**

29360486 7A125V [W]

**Radiators**

27160029 RAD-07

**METER ILLUMINATION LAMP PC BOARD (NAPL-987A)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Lamps</b>	
PL801, PL802	210092	PL14V150mA
PL803, PL804	210089	PL14V150mA
	<b>Resistors</b>	
R801	441620124	1.2 $\Omega$ , 1W, Metal oxide film
R802	441620434	4.3 $\Omega$ , 1W, Metal oxide film
	<b>Case</b>	
	27250021	Lamp case
	<b>Plugs</b>	
	25055039	NPLG-3P30, Plug

**METER ILLUMINATION LAMP PC BOARD (NAPL-987B)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
	<b>Lamps</b>	
PL901, PL902	210092	PL14V150mA
PL903, PL904	210089	PL14V150mA
	<b>Resistors</b>	
R901	441620124	1.2 $\Omega$ , 1W, Metal oxide film
R902	441620434	4.3 $\Omega$ , 1W, Metal oxide film
	<b>Case</b>	
	2725021	Lamp case
	<b>Socket</b>	
	2000151	NSAS-3P028 Socket

**POWER INDICATOR PC BOARD (NAPL-1008)**

CIRCUIT NO.	PARTS NO.	DESCRIPTION
PL701	210092	PL14V 150mA, Lamp

**SWITCH PC BOARD (NASW-2432-1)—PARTS LIST**

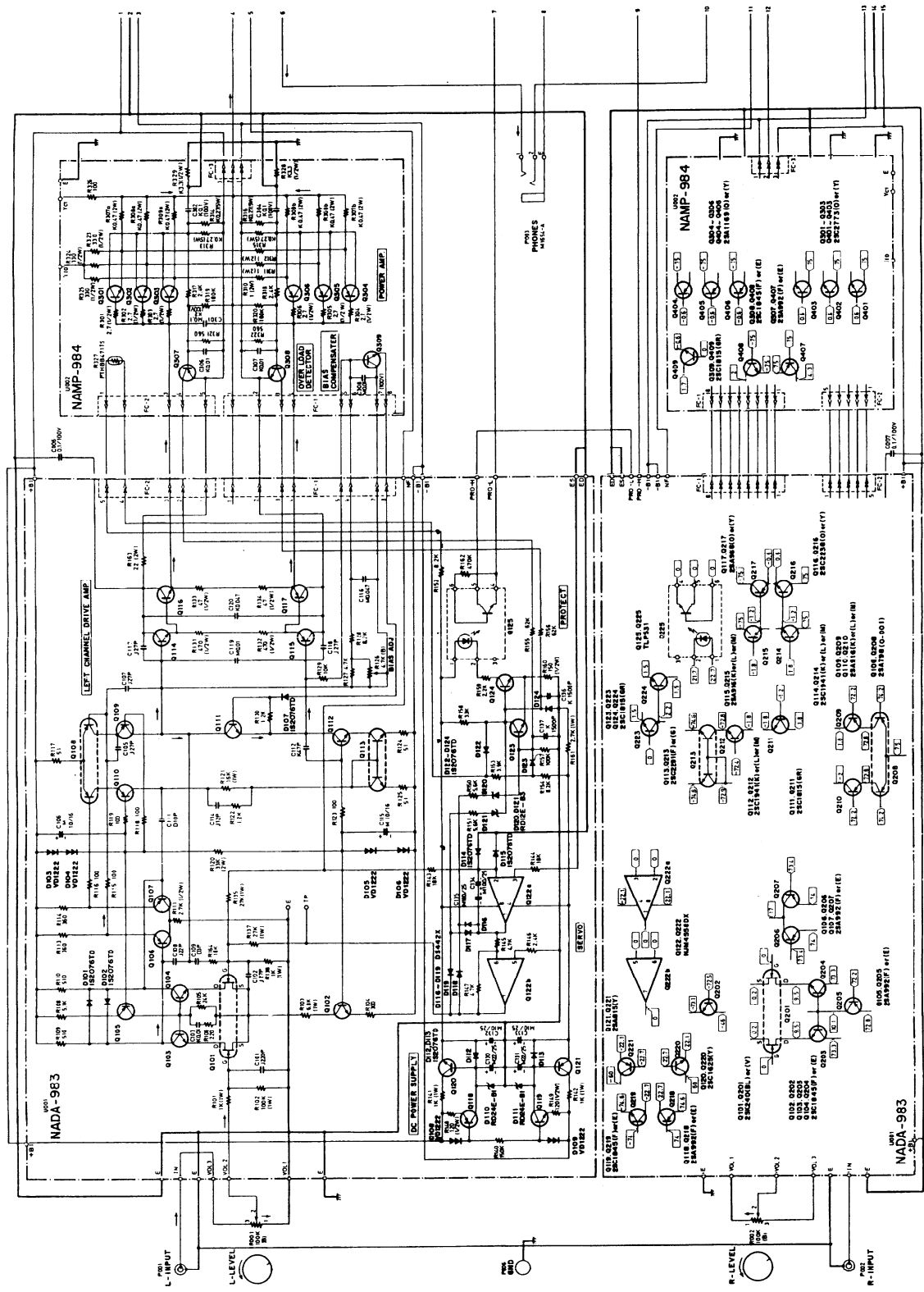
CIRCUIT NO.	PARTS NO.	DESCRIPTION
<b>Transistors</b>		
Q701	2211255	2SC1815(GR)
Q702, Q703	2201286 or 2201285	2SD822(P) or 2SC882(Q)
<b>Lamps</b>		
PL702 ~ PL706	210094	PL14V60mAW-3.0
<b>Resistors</b>		
R709, R710	441526204	62Ω, 1/2W, Metal oxide film
R715, R716	442525614	560Ω, 1/2W, Metal oxide film
R717	442526204	62Ω, 1/2W, Metal oxide film
R718	442520564	5.6Ω, 1/2W, Metal oxide film
R719, R720	4000028	D33A, Thermistor
R721	442526204	62Ω, 1/2W, Metal oxide film
<b>Switch</b>		
S701 ~ S704	25035228	NPS-222-242-L192
<b>Sockets</b>		
	2000158	NSAS-3P041, 3P
	2000159	NSAS-5P042, 5P
	2000160	NSAS-4P043, 4P
	2000161	NSAS-8P044, 8P

**NOTE**

[G]: Only 220V model

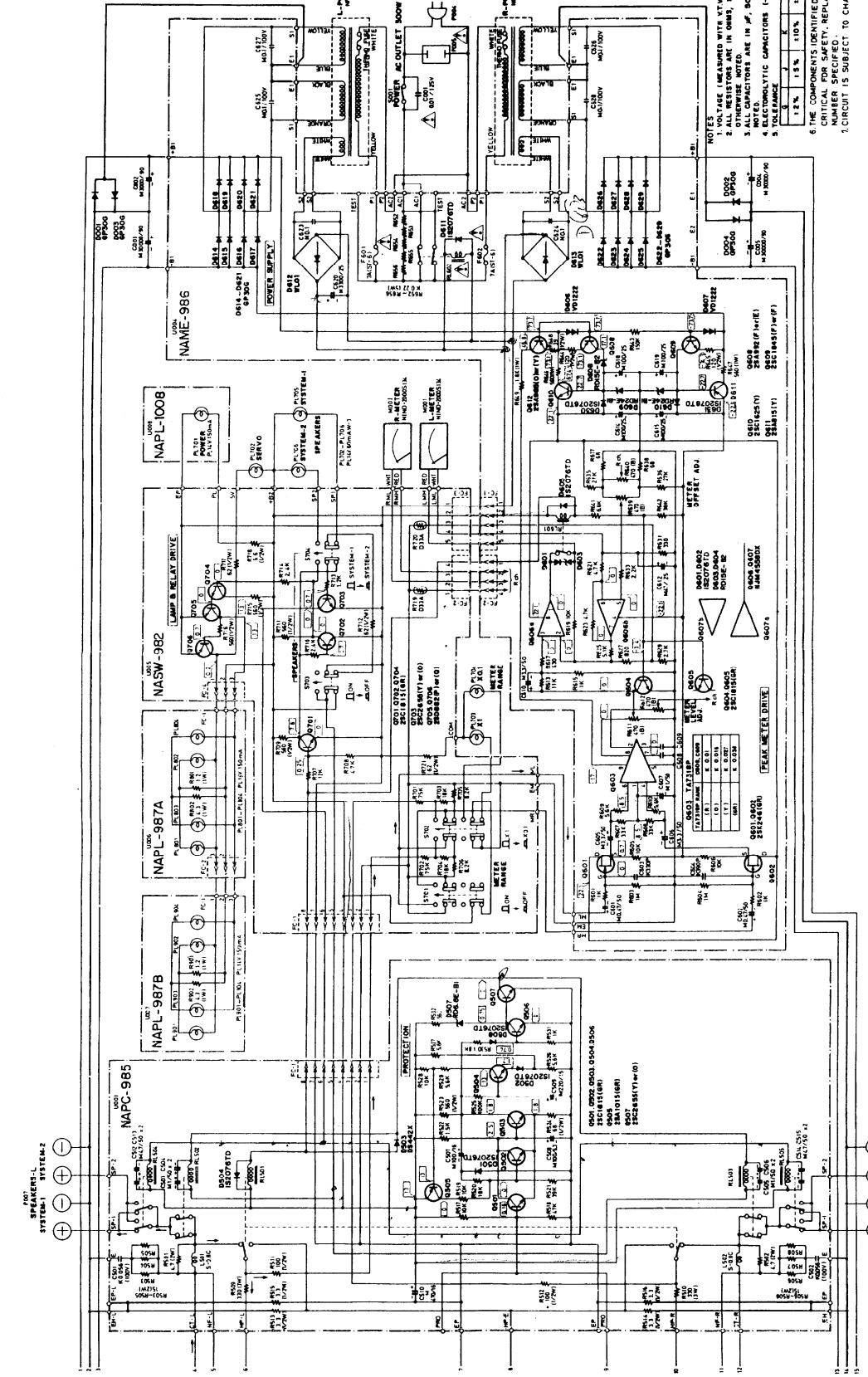
[W]: Only 120V/220V model

**SCHEMATIC DIAGRAM No. 1**  
 (120V Model, 120V/220V Model)



# SCHEMATIC DIAGRAM No. 2

(120V Model)



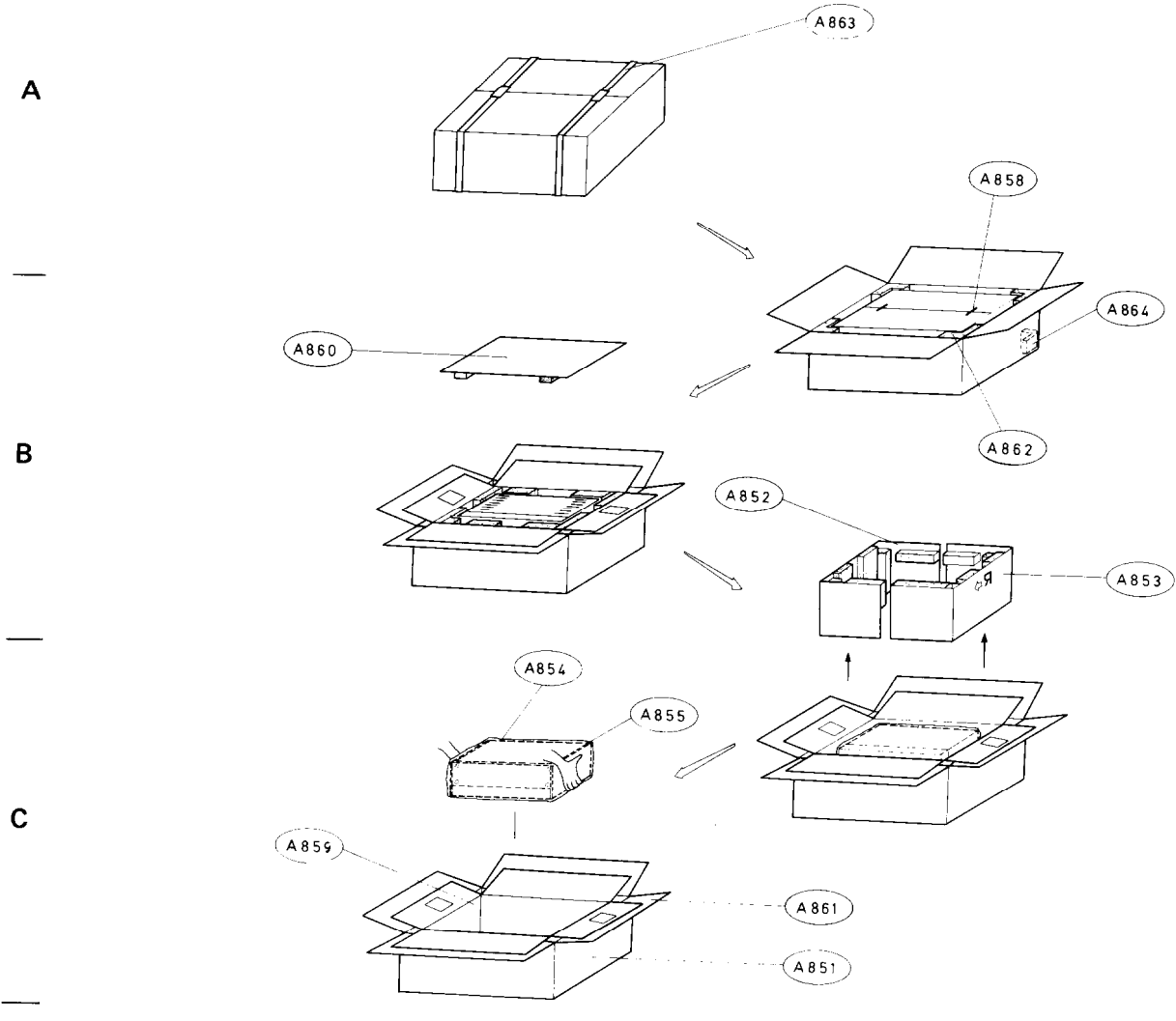
- NOTES
1. VOLTAGE (MEASURED WITH VTVM) (NO INPUT SIGNAL)
  2. STANDBY CURRENT (AC IN ON, 100WATT UNLESS OTHERWISE NOTED)
  3. ALL CAPACITORS ARE IN  $\mu$ F, UNLESS OTHERWISE SPECIFIED
  4. ELECTROLYTIC CAPACITORS (-) ARE IN  $\mu$ F/75V
  5. TOLERANCE
- |  |     |     |     |      |      |      |      |      |      |      |
|--|-----|-----|-----|------|------|------|------|------|------|------|
|  | 12% | 15% | 10% | 100% | 100% | 100% | 100% | 100% | 100% | 100% |
|  |     |     |     |      |      |      |      |      |      |      |
6. THE COMPONENTS IDENTIFIED BY MARK  $\Delta$  ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.
7. CIRCUIT IS SUBJECT TO CHANGE FOR IMPROVEMENT.

STEREO POWER AMPLIFIER  
M-5099  
SCHEMATIC DIAGRAM

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# PACKING PROCEDURES



	REF. NO.	PART NO.	DESCRIPTION	
D	A851	29051126	Master carton box	
	A852	29091029	Pad, left	
	A853	29091030	Pad, right	
	A854	29095395	500 × 880mm, Protection sheet	
	A855	29100035A	720 × 1,020, Poly-vinyl bag	
	A858	282301	Sealing hook	
	A859	29090587	Pad, bottom	
	A860	29090588	Pad, top	
	A861	29051122	Master carton box G	
	A862	29090589	Pad	
	A863	29112010	Band	
	A864	29090429	Pad, corner	
	E	A880	Accessory bag ass'y	
			29340881	Instruction manual [D] [G] [W]
		29340931	Instruction manual [G] [W]	
		2010069	Connection cable	
		29100005	250 × 350mm, Poly-vinyl bag for accessory	

NOTE  
 [D]: Only 120V model  
 [G]: Only 220V model  
 [W]: Only 120V/220V model