

ONKYO® SERVICE MANUAL

DUAL SUPER SERVO STEREO POWER AMPLIFIER MODEL M-5060

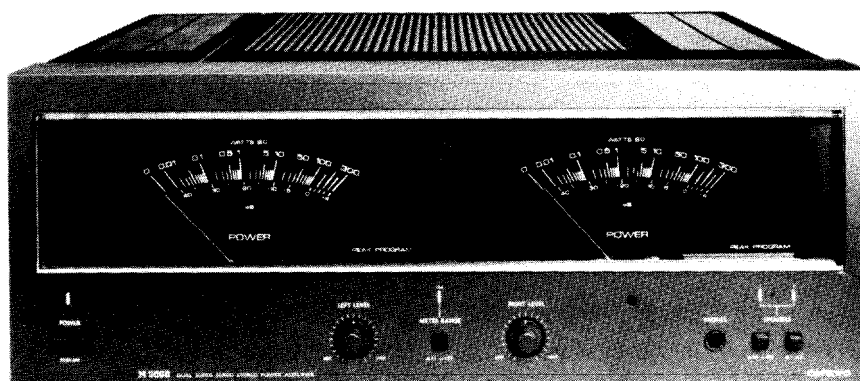


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ONKYO®
AUDIO COMPONENTS

SPECIFICATIONS

D Model

Power Output:	120 watts per channel, min. RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.005% total harmonic distortion.
Total Harmonic Distortion:	0.005% at Rated power 0.005% at 1 watt output
Intermodulation Distortion:	0.005% at Rated power
Frequency Response:	+0, -1.5 dB at 1 Hz ~ 100 kHz
Input Sensitivity:	1.5 V
Input Impedance:	47 k Ω
Damping Factor:	140 (8 Ω , 1 kHz)
Signal to Noise Ratio:	94 dB (IHF A-202)
Power Supply Rating:	AC120 V 60 Hz
Outputs:	SPEAKERS 1 & 2, AC OUTLET, PHONES
Inputs:	INPUT P
Semiconductors:	2 FETs, 47 Transistors, 40 Diodes, 6 ICs
Dimensions:	450 (W) x 174 (H) x 400 (D) mm (17-3/4" x 6-7/8" x 15-3/4")
Weight:	17.8 kg (39.2 lbs.)

Specifications and features are subject to change without notice.

G Model

Power Output:	120 watts per channel, min RMS, at 8 ohms both channels driven, from 20 Hz to 20 kHz, with no more than 0.005% total harmonic distortion.
Total Harmonic Distortion:	0.005% at Rated power 0.005% at 1 watt output
Intermodulation Distortion:	0.005% at Rated power
Frequency Response:	+0, -1.5 dB at 1 Hz ~ 100 kHz
Input Sensitivity:	1.5 V
Input Impedance:	47 k Ω
Damping Factor:	140 (8 Ω , 1 kHz)
Signal to Noise Ratio:	94 dB (IHF A-202)
Power Supply Rating:	AC220 V 50 Hz
Outputs:	SPEAKERS 1 & 2, PHONES
Inputs:	INPUT P
Semiconductors:	2 FETs, 47 Transistors, 40 Diodes, 6 ICs
Dimensions:	450 (W) x 174 (H) x 400 (D) mm (17-3/4" x 6-7/8" x 15-3/4")
Weight:	17.8 kg (39.2 lbs.)

Specifications and features are subject to change without notice.

FEATURES

1. Dual Super-Servo System

Adapting the present super-servo to dual system has made control of the total positive and negative signal path possible, thereby cutting out a number of internally generated distortion sources. Power supply and ground source distortion has been reduced and improvement has been particularly dramatic in the power amp where distortion has a pronounced effect on tonal quality.

2. Linear Switching System

Linear switching is used in the output stage of the power amp. Operationally this is the most simple method and produces the best results. Also, using a high FT (cut-off frequency) transistor has completely eliminated switching distortion improving sound purity.

3. High Quality and High Power

Based on monaural construction, 120 watts per channel with 0.003% distortion at rated output. Starting with the dual super-servo, the most advanced technology available writes new standards for music reproduction.

4. Quick Responding, Large Peak Meters

Large, quick response dual level meters with 65mm needles have been selected for the M-5060. These meters work in conjunction with the transient killer circuit and protection circuit, providing a means to monitor operation. Power meter illumination is also featured.

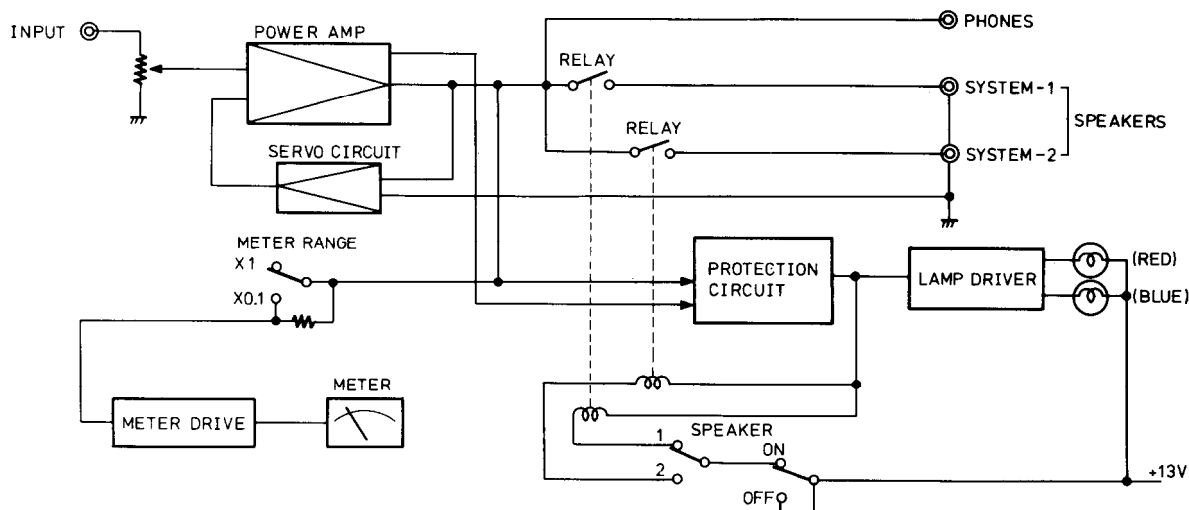
5. Dual Super-Servo System Power Section

This unit forms the power section for the P-3060 Dual Super-Servo amp system. This combination maximizes all the advantages of the total system. Naturally, it may be used with other preamps and still retain all the merits inherent in its dual super-servo design.

6. Dual Power Supply — Dual Monaural Amp Construction

Two large power supplies constructed using parts selected under the most critical criteria help maintain musical purity.

BLOCK DIAGRAM



CIRCUIT DESCRIPTION

Dual Super-Servo

When a musical note in the form of a signal is reproduced in an amplifier, if only the input signal were faithfully reproduced everything would be fine. But in reality, a number of other signal components not musical in origin (mainly ultralow frequency noise from mechanical sources) are input along with the musical signal. There are also various undesirable distortions generated internally within the amp itself. This is particularly true of a DC amp simply because of its wide bandwidth. Its ability to amplify signals at low frequency means that these undesired ones are also amplified, resulting in a modified harmonic.

With the super-servo system, the DC amp used to amplify musical signals is controlled by a separate servo amp, eliminating undesirable ultralow frequency components and suppressing thermal noise generated by the preamp. It also allows coupling without the use of capacitors between the input and output of the amp. However, with the dual super-servo, a servo has been added to the negative side (ground-side) of the amp, maintaining ground reference at 0 and suppressing any undesirable signals (meaning distortion) caused by ground impedance. Ground is considered the reference point on amps and should be maintained at 0, but due to the various contact resistances and impedances, it is in fact almost impossible to do. Especially on large current carrying power amps. In past attempts to solve this problem, larger power supplies have been used and busbars employed to lower ground impedance, but as a practical matter heavy gauge wiring and busbars cannot be used throughout the signal path and for ground wires, and even if they could, it would still be impossible to keep ground impedance at 0. This problem is solved in the dual super-servo system.

The signal ground point is perfectly locked with a separate servo; distortion caused by fluctuations in the ground and power supply or due to connector impedance between the pre and main amp has been completely eliminated with a resulting improvement in tonal quality.

Power amp M-5060 is in itself a dual super-servo amp, however, connected to preamp P-3060 using a super-servo cord will result in even better sound improvement.

ADJUSTMENTS

1. Preparations

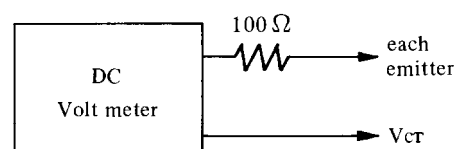
- (1) When making adjustments, lower the pedestals of the unit and set it on a level bench. Make sure a space of at least 15 mm exists between the bench and the bottom of the unit for ventilation.
- (2) Place the unit at lowest level, no load, and no signal.
- (3) During adjustment, any drafts in the room will cause unstable readings.

2. Adjusting the meter to ZERO

- (1) With the power supply OFF, adjust the screw on the lower part of the meter until the needle is on 0.
- (2) Do not make this adjustment immediately after turning OFF the power supply. Wait until the meter circuit has discharged.

3. Adjusting idling current

- (1) Remove the cover. Turn ON the power supply to obtain voltage between VCT and IID of board NAMA-752. After waiting 5 minutes, adjust VR R4039 (R4040) until a reading of 12 mV is obtained. (After 20 minutes of stabilization, the reading should be 16 mV.)
- (2) After the above adjustment is completed, make certain the voltage reading between VCT and the emitters of Q4025 (Q4026), Q4029 (Q4030), and Q4031 (Q4032) is approximately the same. When making this test, use a 100 Ω resistance between the testing device and emitter as shown in the drawing at right.



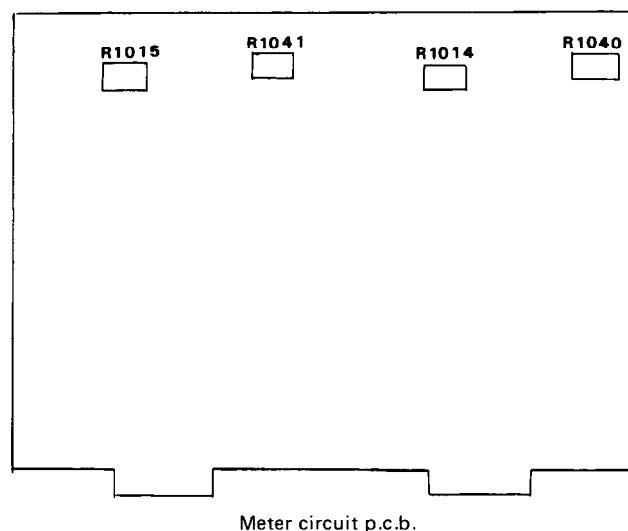
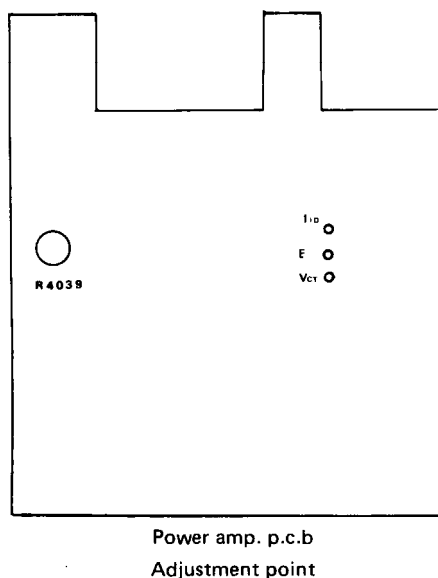
4. Adjusting meter offset

After the power supply switch is ON, wait 5 minutes and without signal input, adjust OFFSET VR R1040 (R1041) on board NAME-758 to the point the meter reads 0.

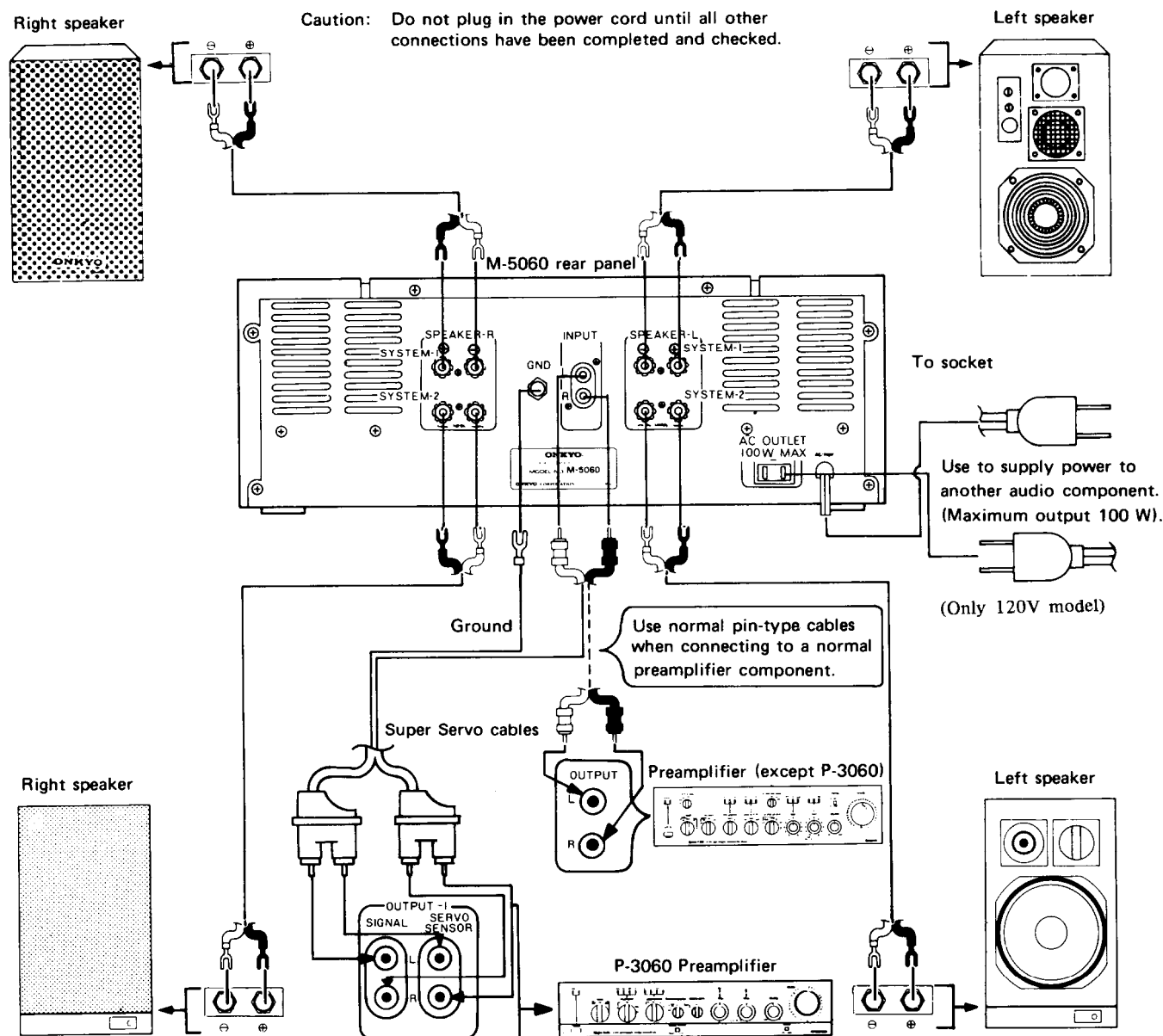
5. Meter level adjustment

Apply a 1 kHz test signal to the INPUT terminal of the left channel and set the M-5060 meter ranging switch to X 0.1. Adjust input to the point the voltage reading (no load) at the speaker output is 9.8 V (19.82 dBV), and adjust LEVEL VR R1014 (R1015) on board NAME-758 until the meter reads 0. Adjust the right channel the same way. (Do not apply signals to the right and left channel simultaneously.)

NOTE: The numbered transistors and variable resistors in paranthesis () apply to the right channel.

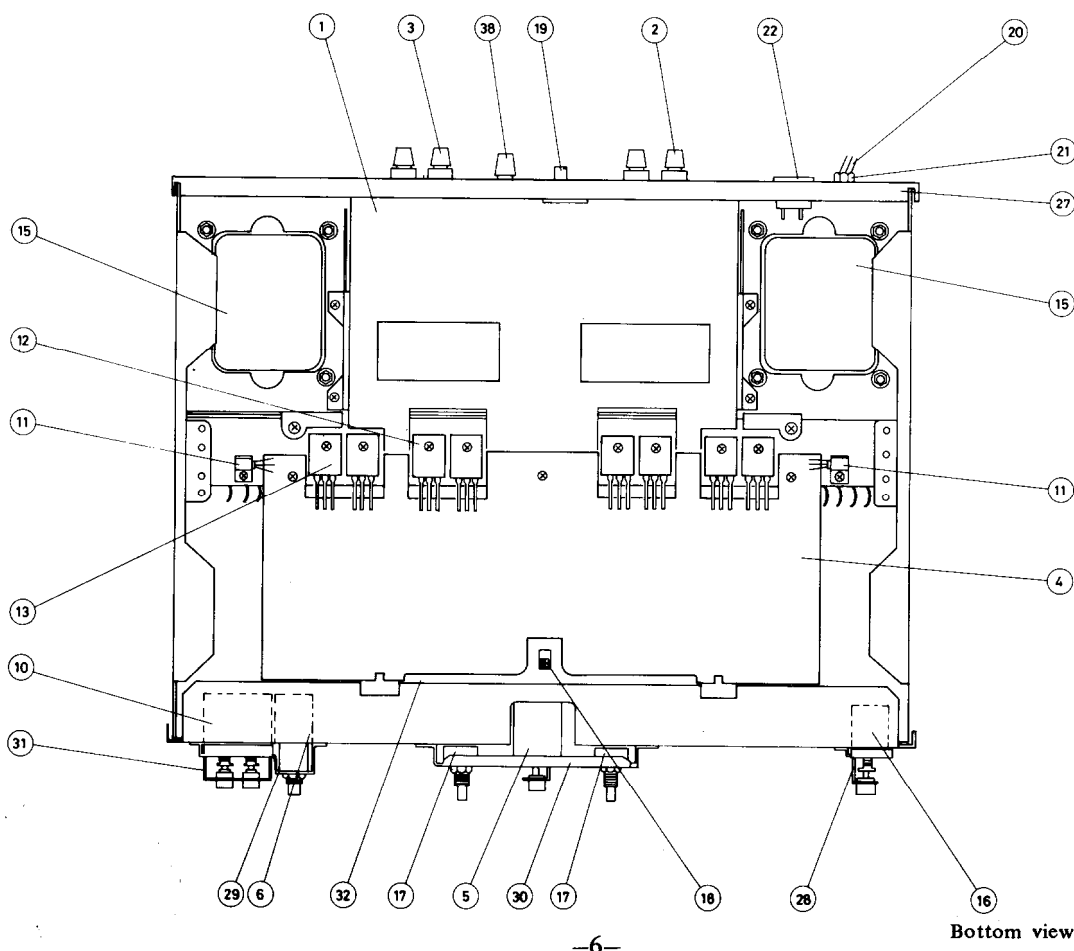
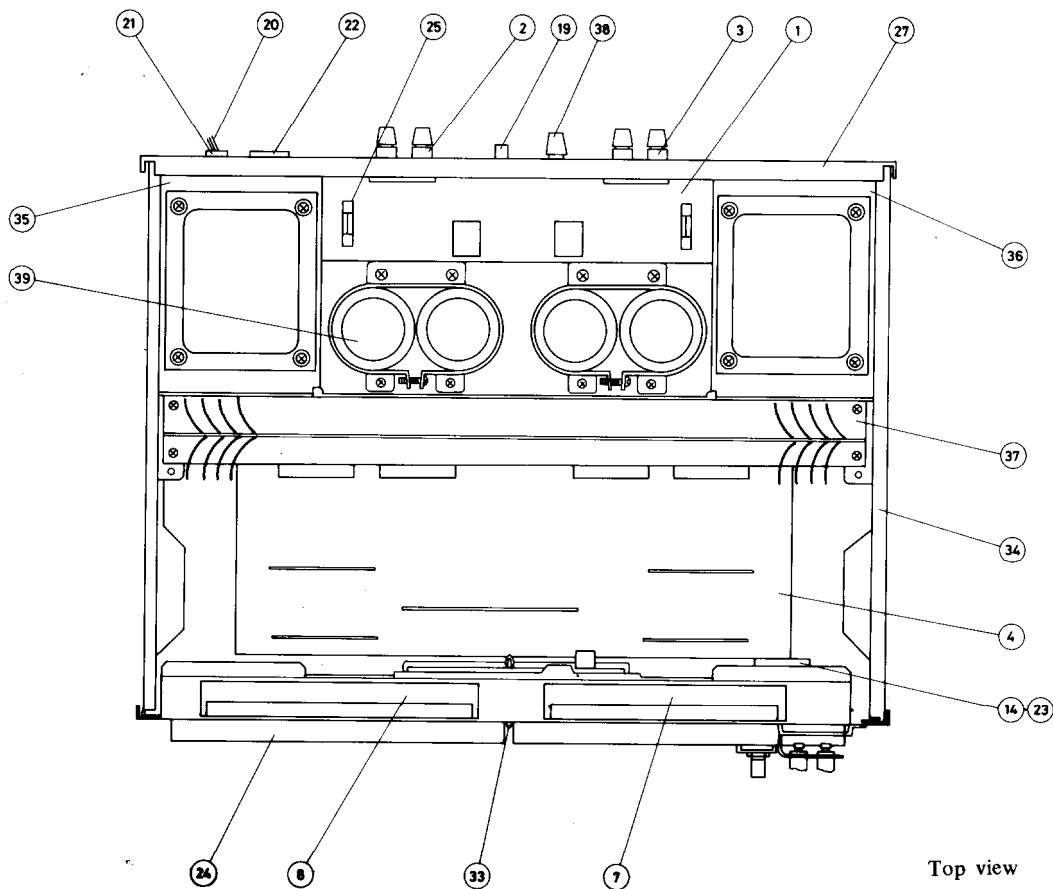


CONNECTION DIAGRAM



- It is recommended that the Onkyo P-3060 preamplifier be used with the M-5060 because the P-3060 features the same Dual Super Servo system. In this case, connect the M-5060 and P-3060 to each other with the special Super Servo cables supplied (these cables are supplied only with the P-3060). However, if a different preamplifier is connected to the M-5060, use normal pin-type connecting cables.
- Since the M-5060 is a high grade high power amplifier component, use only high grade speaker systems capable of doing justice to the excellent quality of sound reproduction achieved by the M-5060.
- Note that although the allowable speaker impedance range is $4\ \Omega$ to $16\ \Omega$, the speaker systems selected for use with the M-5060 should have a high power handling capacity. If speaker systems of low maximum input power rating are used and the volume level is increased to very high levels, the speakers will probably be damaged. Check the maximum input power rating before connecting to the M-5060.
- Use sturdy coaxial speaker cables for the speaker connections. The use of thin leads is not recommended because the resultant higher speaker lead impedance will affect the quality of sound reproduction.
- In order to protect speakers from possible damage, always turn the M-5060 power switch off before connecting (or disconnecting) the speaker systems.
- Be particularly careful not to short circuit the speaker cables at any time.
- Keep the power cord away from the pin-type cables and speaker cables since close proximity can result in induction hum.

COMPONENT LOCATION



COMPONENT LOCATION — PARTS LIST

D Model				G Model			
REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION	REF. NO.	CIRCUIT NO.	PARTS NO.	DESCRIPTION
1	U001	12609549B	NAPS-749b, Protector/rectifier circuit pc board ass'y	1	U001	12612549C	NAPS-749C, Protector/rectifier circuit pc board ass'y
2	U002	12732550	NAOP-750, Left side speaker terminals pc board ass'y	2	U002	12732550	NAOP-750, Left side speaker terminals pc board ass'y
3	U003	12732551	NAOP-751, Right side speaker terminals pc board ass'y	3	U003	12732551	NAOP-751, Right side speaker terminals pc board ass'y
4	U004	12732552	NAMA-752, Power amplifier pc board ass'y	4	U004	12732552	NAMA-752, Power amplifier pc board ass'y
5	U006	12609554A	NASW-754a, Meter range selector pc board ass'y	5	U006	12609554A	NASW-754a, Meter range selector pc board ass'y
6	U005	12732553	NAHP-753, Headphone terminal pc board ass'y	6	U005	12732553	NAHP-753, Headphone terminal pc board ass'y
7	U008	12732556	NAPL-756, Meter illumination lamp pc board ass'y	7	U008	12732556	NAPL-756, Meter illumination lamp pc board ass'y
8	U009	12732557	NAPL-757, Meter illumination lamp pc board ass'y	8	U009	12732557	NAPL-757, Meter illumination lamp pc board ass'y
9	U010	12732558	NAME-758, Meter drive circuit pc board ass'y	9	U010	12732558	NAME-758, Meter drive circuit pc board ass'y
10	U007	12609555B	NASW-755b, Speaker selector pc board ass'y	10	U007	12609555B	NASW-755b, Speaker selector pc board ass'y
11	Q4013,Q4014	2211255	2SC1815(GR), Thermal detector transistor	11	Q4013,Q4014	2211255	2SC1815(GR), Thermal detector transistor
12	Q4025,Q4026 or Q4027,Q4028	2201164 or 2201163	2SC2581(Y) or 2SC2581(O), Power amplifier transistor	12	Q4025,Q4026 or Q4027,Q4028	2201164 or 2201163	2SC2881(Y) or 2SC2881(O), Power amplifier transistor
13	Q4029,Q4030 or Q4031,Q4032	2201154 or 2201153	2SA1106(Y) or 2SA1106(O), Power amplifier transistor	13	Q4029,Q4030 or Q4031,Q4032	2201154 or 2201153	2SA1106(Y) or 2SA1106(O), Power amplifier transistor
14	D001	223848 or 223804	GP08B or SR1K-2, Silicon diode	14	D001	223848 or 223804	GP08B or SR1K-2, Silicon diode
15	T001,T002	230391	NPT-690D, Power transformer	15	T001,T002	230392	NPT-690G, Power transformer
16	C001	3500054	125V, 0.01 μ F, CS capacitor	16	C001,C002	3500058	PME265MB510, IS capacitor
	S001	25035061A	NPS-121-L26P, Power switch		S001	25035176	NPS-111-L140, Power switch
17	R001,R002	5146016	N16R100KB25M, Output level variable resistor	17	R001,R002	5146016	N16R100KB25M, Output level variable resistor
18	S002	25065126	NSS-2259, Slide switch	18	S002	25065126	NSS-2259, Slide switch
19	P001	25045048	NPJ-2PRBL23, Input terminal	19	P001	25045048	NPJ-2PRBL23, Input terminal
20	P003	253100	AS-UC-4, Power supply cord	20	P003	253092	AS-CEE-2, Power supply cord
21		270280	SR-4K-4, Strainrelief	21		270280	SR-4K-4, Strainrelief
22	P004	25050032	S-I 6444-02, AC outlet	22	RL001	25065104	NRL-4P3A-DC12-03, Relay
23	RL001	25065104	NRL-4P3A-DC12-03, Relay	23		243113	NIND-2000S113, Output meter
24	M001,M002	243113	NIND-2000S113, Output meter	24	M001,M002	243113	NIND-2000S113, Output meter
25	F101,F102	252050	5A, ST-6, Fuse	25	A001	27110097	Front bracket
26	A001	27110097	Front bracket	26		27120239	Back panel
27		27120238A	Back panel	27		27140313	Bracket, power
28		27140313	Bracket, power	28		27140314	Bracket, headphone
29		27140314	Bracket, headphone	29		27140315	Bracket, volume
30		27140315	Bracket, volume	30		27140316	Bracket, lamp
31		27140316	Bracket, lamp	31		27130219	Bracket, pc board
32		27130219	Bracket, pc board	32		27190062	Holder
33		27190062	Holder	33		27115053B	Side bracket
34		27115053B	Side bracket	34		27130172	Bracket, power transformer
35		27130172	Bracket, power transformer	35		27130173	Bracket, power transformer
36		27130173	Bracket, power transformer	36		27160060	Radiator
37		27160060	Radiator	37	P002	TP160B	Ground terminal
38	P002	TP160B	Ground terminal	38	C101-C104	3504126	18, 000 μ Fx2, 69V, Elect. capacitor
39	C101-C104	3504126	18, 000 μ Fx2, 69V, Elect. capacitor	39	F001-F002	252075	2.5A-SE-EAK, Fuse
					F003-F006	252078	5A-SE-EAK, Fuse
					F007-F008	252070	1A-SE-EAK, Fuse
					F001-F008	25065096	Fuseholder

PRECAUTIONS

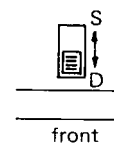
- For continued protection against fire hazard, replace only with same type and same rating fuse.

AC fuse	CIRCUIT NO.	PARTS NO.	DESCRIPTION	
	F101, F102	252050	5A (ST-6)	120V model
	F101, F102	252075	2.5A SE-EAK	220V model
	F003-F006	252078	5A SE-EAK	
	F007, F008	252070	1A SE-EAK	

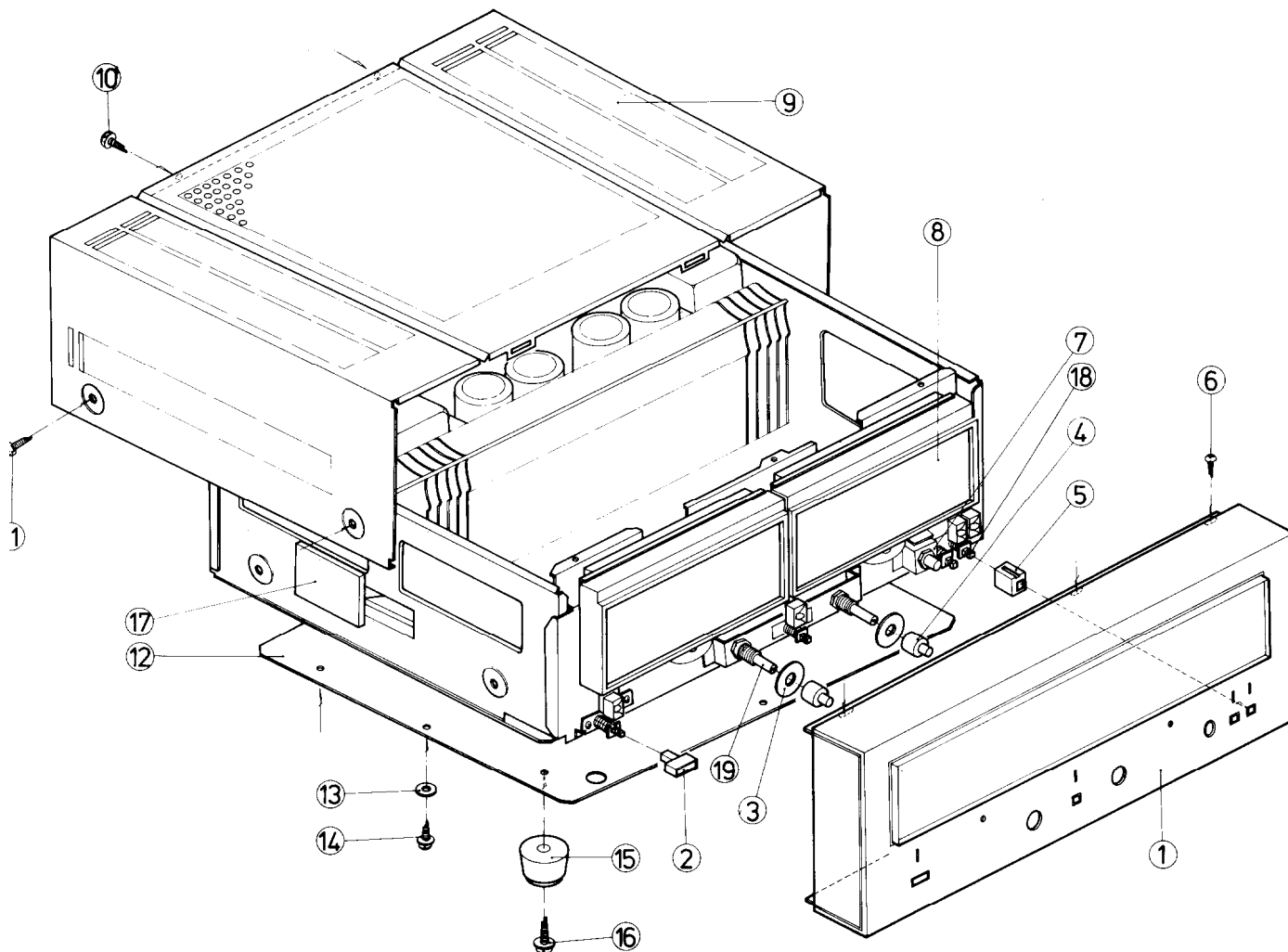
- Replacement for power, complementary and driver transistors, if necessary, must be made from the same beta (HFE) group as the original type.

- Super Servo Switch

A super servo switch is located in the base of this unit to turn the dual super servo circuitry on and off. Slide the switch with a screwdriver or similar instrument. To compare music played back with dual and normal super servo, use a selection with plenty of depth such as an orchestral or choral performance. First listen at the dual setting, then replay the same section at the super servo setting. At the factory, this switch is set to the dual super servo position; it should be left in this position during normal playback to take advantage of the dual super servo circuitry.



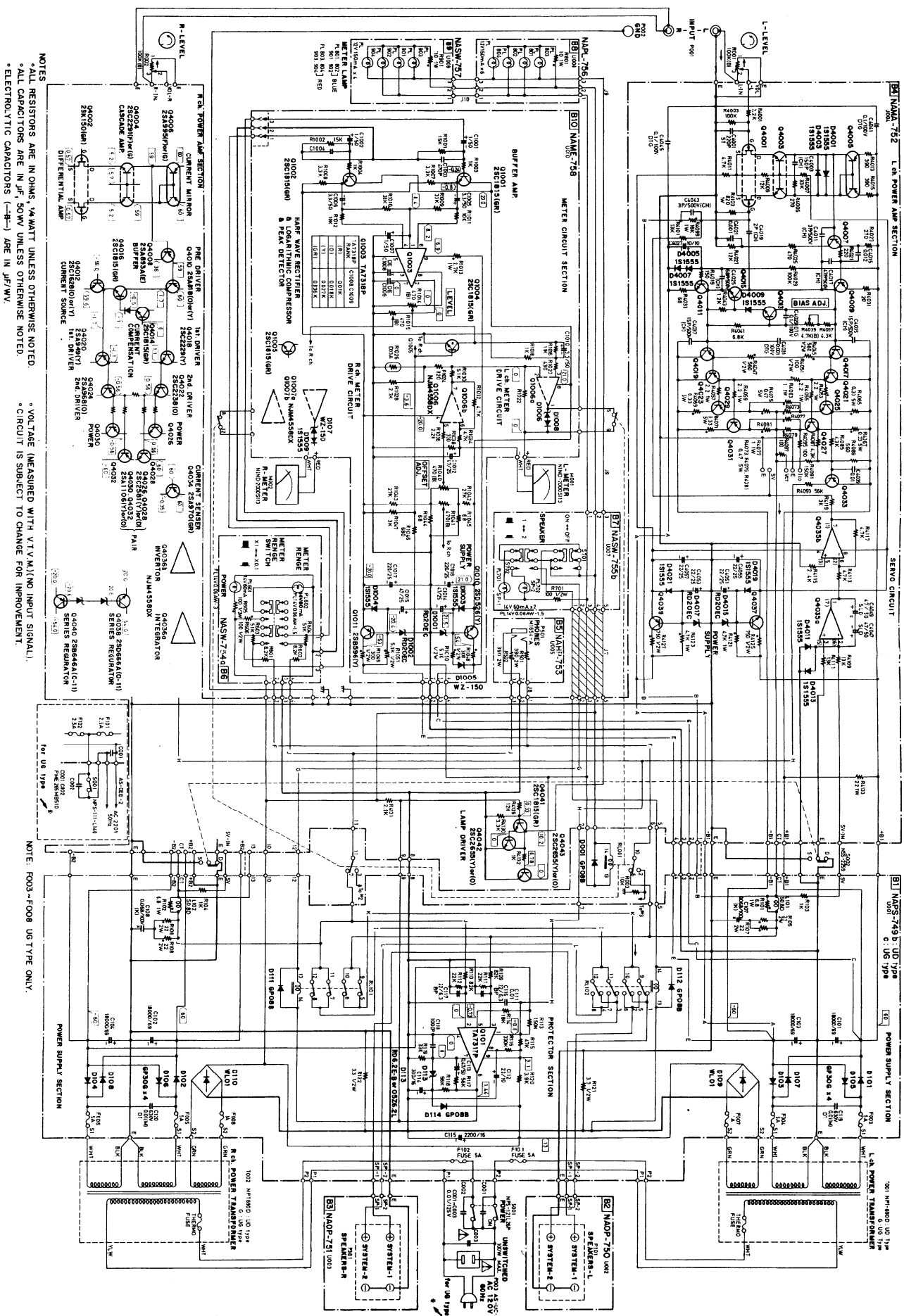
EXPLODED VIEW



EXPLODED VIEW – PARTS LIST

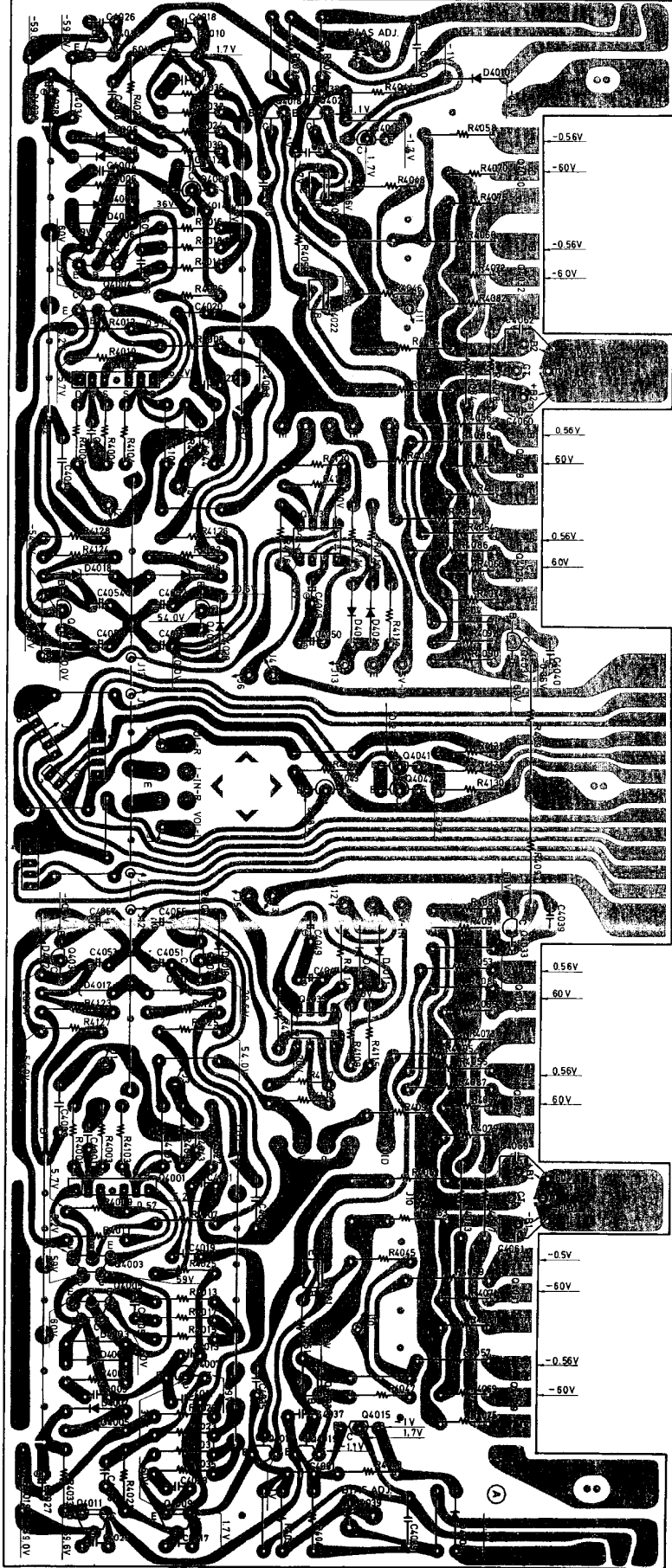
REF. NO.	PARTS NO.	DESCRIPTION	REF. NO.	PARTS NO.	DESCRIPTION
1	12609121	Front panel ass'y	8	243113	NIND-2000S113, VU meter
	27210155	Panel (S)	9	28184067	Top cover
	28191047	Glass plate		28140020	Cushion
	28125074	End cap	10	838440109	4TTB+10C(BC), Tapping screw
	28198523A	Facet	11	838440109	4TTB+10C(BC), Tapping screw
	27267056	Guide, power knob	12	27170082	Bottom board
	28140218	145×6×7t, Cushion (Glass plate)	13	870048	Nylon washer
	834430062	3STS+6BQ(BC), Tapping screw	14	831430082	3STW+8BQ, Tapping screw
2	28320279	Knob, power switch	15	280889A	Leg
3	28140127	Cushion	16	831130162	3STW+16BQ, Tapping screw
4	28320375A	Knob, volume	17	27270041	Spacer
5	12792125	Push knob ass'y	18	12609555B	NASW-755b, Switch pc board ass'y
6	834430062	3STS+6BQ(BC), Tapping screw	19	5146016	N16R100KB25M, Variable resistor
7	12732553	NAHP-753, Headphone terminal pc board ass'y			

SCHEMATIC DIAGRAM



ONKYO CORPORATION

POWER AMPLIFIER PC BOARD VIEW FROM BOTTOM SIDE



SPEAKER TERMINAL (NAOP-750/751)

- PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
25060039	NTM-4PDMN10.	Speaker terminal

POWER AMPLIFIER PC BOARD (NAMA-752)

- PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q4001, Q4002	2211475	Transistors 2SK150(GR), F.E.T.
Q4003, Q4010	2211445 or 2211446	2SC2291(E) or 2SC2291(F)
Q4005, Q4006	2211516 or 2211517	2SA993(E) or 2SA993(F)
Q4007, Q4008	2211665	2SA893A(E)
Q4009, Q4010	2210772 or 2210774	2SA818(O) or 2SA818(Y)
Q4011, Q4012	2210784 or 2210782	2SC1628(O) or 2SC1628(Y)
Q4013, Q4016	2211555	2SC1815(GR)
Q4017, Q4018	2211634	2SC2299(Y)
Q4019, Q4020	2211354	2SA949(Y)
Q4021, Q4022	2200863	2SC2238(O)

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q4023, Q4024	2200873	2SA968(O)
Q4025, Q4028	2201164 or 2201163	2SC2581(Y) or 2SC2581(O)
Q4029, Q4032	2201154 or 2201153	2SA1106(Y) or 2SA1106(O)
Q4033, Q4034	2211395	2SA970(GR)
Q4037, Q4038	2211277	2SD666A(O)-(1)
Q4039, Q4040	2211267	2SB646A(O)-(1)
Q4041, Q4042	2211235	2SC1815(GR)
Q4043	2211884 or 2211883	2SC2655(Y) or 2SC2655(O)
Q4035, Q4036	222502	1C4 NIM-455BDX
D4001, D4014	223105	Diodes 1S1555
D4015, D4018	223974	RD20EC
D4019, D4022	223105	1S1535
C4001, C4002	37232215	Capacitors 220PF±10%, 50V, ST
C4015, C4016	37412125	0.01µF±10%, 50V, DE
C4021, C4022	374121025	1.000PF±10%, 50V, DE
C4027, C4028	352741001	10µF, 16V, Elec.

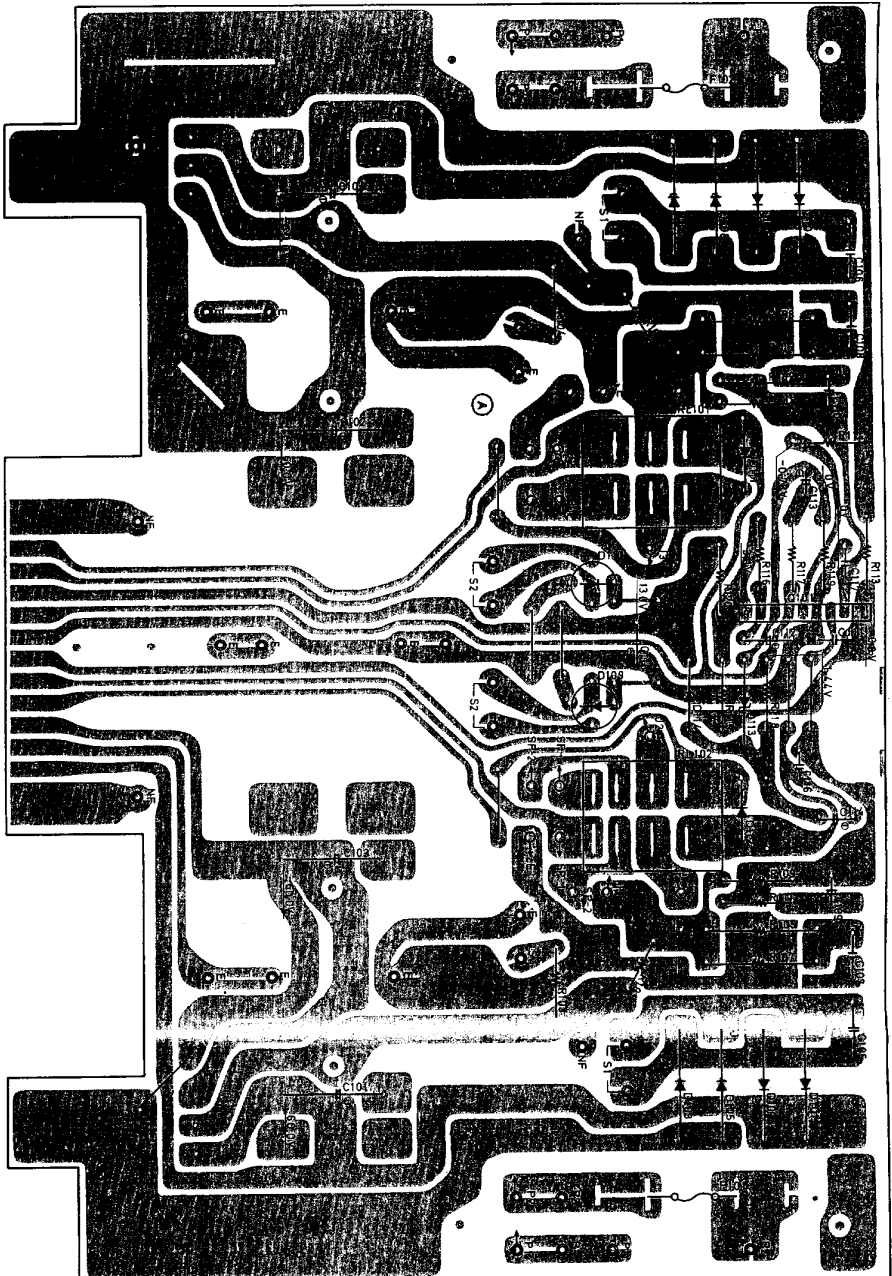
CIRCUIT NO.	PARTS NO.	DESCRIPTION
C4029, C4030	3800003	0.1µF, 100V, DTC
C4031, C4032	3800004	0.01µF, 100V, DTC
C4041, C4042	3800003	0.1µF, 100V, DTC
C4045, C4046	390884707	47µF, 50V, SLD
C4047, C4048	352752201	22µF, 25V, Elec.
C4049, C4050	5225072	N10HR-4, 7KBDM, Semi-fixed
C4051, C4058	442525614	560Ω, 1/2W, Metal oxide film
R4031, R4032	442521014	100Ω, 1/2W, Metal oxide film
R4035, R4036	442520224	2.2Ω, 1/2W, Metal oxide film
R4065, R4072	4000054	0.33Ω, 5W, Metal plate
R4073, R4076	4000047	0.47Ω, 5W, Metal plate
R4077, R4078	451630104	1Ω, 1W, Metal
R4079, R4082	4000047	0.47Ω, 5W, Metal plate
R4083, R4084	451630104	1Ω, 1W, Metal
R4099, R4100	441621634	16Ω, 1W, Metal oxide film
R4103, R4104	441628214	820Ω, 1W, Metal oxide film
R4121, R4124	441624724	4.7kΩ, 1W, Metal oxide film
R4125, R4128	442527514	750Ω, 1/2W, Metal oxide film

HEADPHONE AMPLIFIER PC BOARD (NAMP-753)

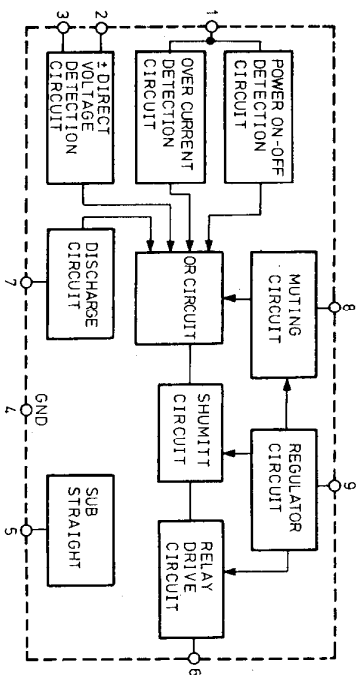
- PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R501, R502	442723914	390Ω, 2W, Metal oxide film resistor
P501	25045062	M1654-A, Stereo headphone jack

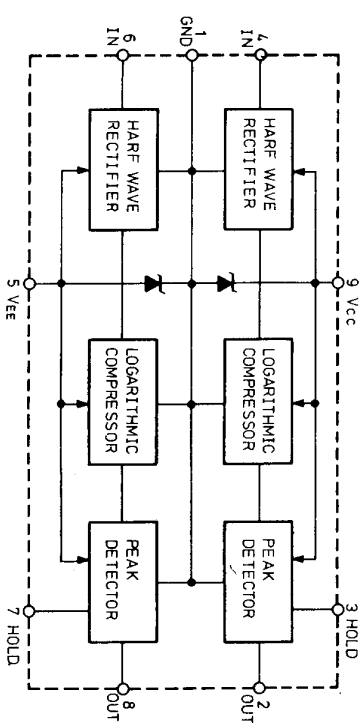
PROTECTOR AND RECTIFIER PC BOARD VIEW FROM BOTTOM SIDE



TA7317P block diagram



TA7318P block diagram



PROTECTOR AND RECTIFIER CIRCUIT PC BOARD (NAPS-749) - PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q101	ICs	
	22584	TA7317P
D101-D108	Diodes	
D109, D110	223841	GR-30G
D111, D112	223842	WL01
D113	223804	GR-08B or SR1K-2
	223949 or 224042	RD6,2E-B or RD6,2E-B or 0526,2L
L101, L102	Coils	
	231016	S-0,8D
C101-C104	Capacitors	
C107, C108	3504126	CE62W69V18, 000x2, Elect.
C112	374136835	0.068uF+10%, 100V, DE
	352732201	22uF, 10V, Elect

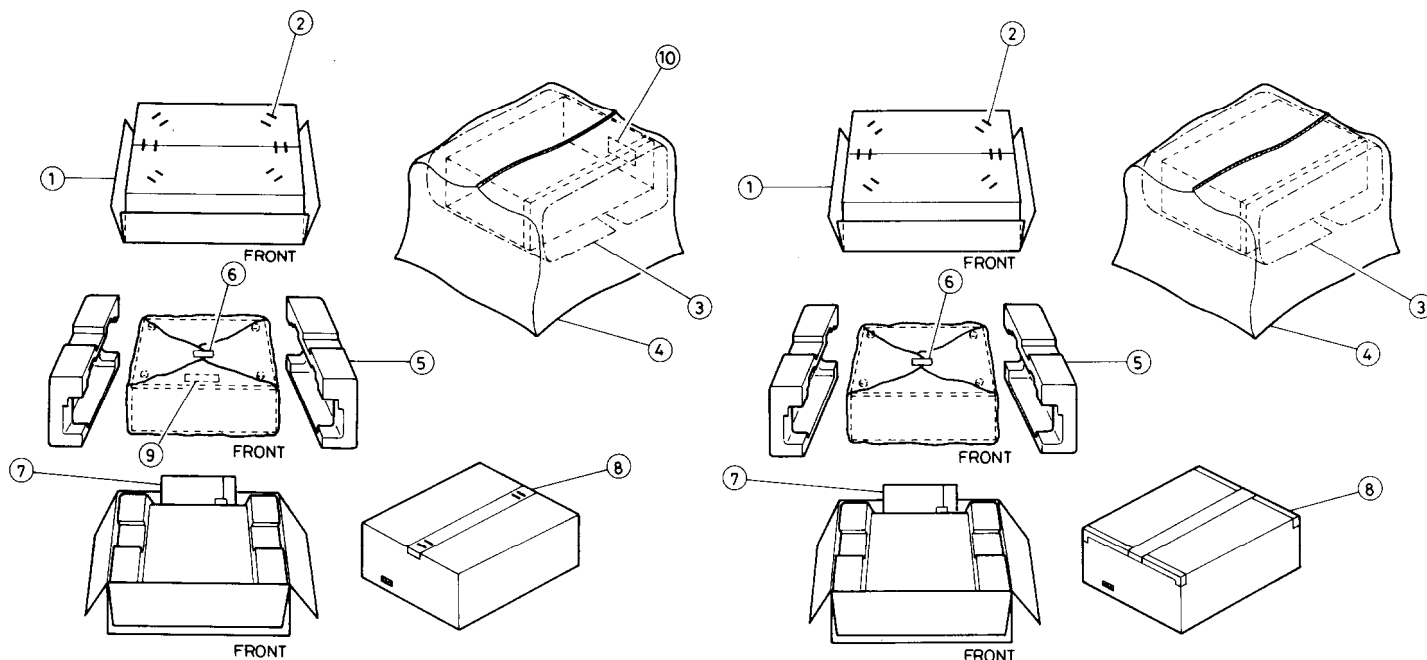
220V Model

CIRCUIT NO.	PARTS NO.	DESCRIPTION
Q101	IC	
	22584	TA7317P
D101-D108	Diodes	
D109, D110	223841	GR-30G
D111, D112	223842	WL01
D113	223804	GR-08B or SR1K-2
	223949 or 224042	RD6,2E-B or RD6,2E-B or 0526,2L
L101, L102	Coils	
	231016	S-0,8D
C101-C104	Capacitors	
C107, C108	3504126	CE62W69V18, 000x2, Elect.
C112	374136835	0.068uF+10%, 100V, DE
C113	352732201	22uF, 10V, Elect.
C114	352732201	0.47uF, 50V, Elect.
C115	352744311	330uF, 16V, Elect.
C116, C117	352744311	2.200uF, 16V, Elect.
C119, C120	352922206	22uF, 6.3V, Non-polar elect.
	384171037	0.01uF, 630V, DT

SWITCH CIRCUIT PC BOARD (NASW-754a) - PARTS LIST

CIRCUIT NO.	PARTS NO.	DESCRIPTION
R101, R102	Resistors	
R105-R108	451630684	6.8Ω, 1W, Metal
	442722204F	22Ω, 2W, Metal oxide film
RL101	Relais	
RL102	25065036	NRL-4P3ADC12-04
	25065124	NRL-4P3ADC12-04
Lamps		
PL601	210083	PL14V0.06AW-3
PL602	210084	PL14V0.06AW-1.5
Resistors		
R605, R606	441521014	100Ω, 1/2W, Metal oxide film
	2000151	2000151
Switch	NSAS-3P028	NSAS-3P028
	25035164	25035164

PACKING PROCEDURES



PACKING PROCEDURES – PARTS LIST 120V Model

REF. NO.	PARTS NO.	DESCRIPTION
1	29050375	Master carton box
2	282301	Sealing hook
3	290008-1	500×1,000mm, Protection sheet
4	29100034	650×850mm, Poly bag
5	29090527	Pad
6	261504	30×10mm, Tape
7	2010069	Connection cord
	29340434	Instruction manual
	29365006	Warranty card (Only U.S.A. model)
	29358002	Service Station list (Only U.S.A. model)
	29100005	220×330mm, Poly bag
8	260012	50×1000mm, Tape
9	29360363	Caution label (Only U.S.A. model)
10	29355059	Label (Only U.S.A. model)

PACKING PROCEDURES – PARTS LIST 220V Model

REF. NO.	PARTS NO.	DESCRIPTION
1	29050375	Master carton box
2	282301	Sealing hook
3	290008-1	500×1,000mm, Protection sheet
4	29100034	650×850mm, Poly bag
5	29090527	Pad
6	261504	30×10mm, Tape
7	2010069	Connection cord
	29340435	Instruction manual
	29365005-2	Warranty card (Only Germany model)
	29100005	220×330mm, Poly bag
8	260012	50×1000mm, Tape

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