



Service Manual

Nakamichi

PA-5 PA-5E

Power Amplifier



CONTENTS

1. General	1
2. Parts Location for Electrical Adjustment	2
3. Electrical Adjustments	2
3. 1. Preparation for Adjustment	2
3. 2. Idling Current Adjustment	2
4. Mechanism Ass'y and Parts List	3
4. 1. Synthesis	4
4. 2. Front Panel Ass'y (A01)	4
4. 3. Rear Panel Ass'y (A02)	5
5. Mounting Diagrams and Parts List	5
5. 1. Clipping LED P.C.B. Ass'y	5
5. 2. Power LED P.C.B. Ass'y	5
5. 3. Limiter P.C.B. Ass'y	5
5. 4. Amp. L P.C.B. Ass'y	6
5. 5. Amp. R P.C.B. Ass'y	7
6. Schematic Diagram	8
7. Wiring Diagram	9
8. Block Diagram	9
9. Specifications	10

1. GENERAL

1.1. Voltage Selector

Voltage selector is installed on the rear panel for Other version of the Nakazichi PA-5. This voltage selector can select 110 V, 120 V, 220 V or 240 V at customer's disposal.

1.2. Packing Materials, Owner's Manual and Auxiliary Parts

Part No.	Description	Qty
OF03904A	Outer Carton PA-5	1
OF03906A	Outer Carton PA-5E	1
OF03903A	Inner Carton PA-5	1
OF03905A	Inner Carton PA-5E	1
OF03908A	Packing	2
OD04531A	Owner's Manual (English)	1
OD04530A	Owner's Manual (English/German/French)	1
OB90137A	Power Cord PA-5 (U.S.A. & Others)	1
OB90139A	Power Cord PA-5 (Australia)	1
OB90138A	Power Cord PA-5E (Europe)	1
OB90154A	Power Cord PA-5E (Switzerland)	1
OB90140A	Power Cord PA-5E (UK)	1
OF03887A	Power Cord Band	1
OB90164A	Fuse 6A PA-5 (U.S.A., Canada & Others)	1
OB90166A	Fuse T2.5A PA-5 (Australia) & PA-5E	1

2. PARTS LOCATION FOR ELECTRICAL ADJUSTMENT

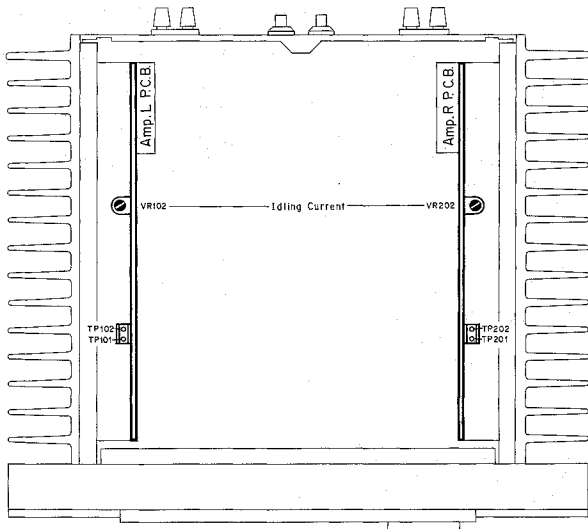


Fig. 2

3. ELECTRICAL ADJUSTMENTS

3.1. Preparation for Adjustment

- (1) Insert shorting pins into the Input Jacks.
- (2) Remove loads of the speaker terminals.
- (3) Before starting adjustment, allow twenty minutes or more after power is turned ON. In this case, the Tape Cover must be installed.

3.2. Idling Current Adjustment

- (1) Connect a DC voltmeter between TP101 and TP102 (TP201 and TP202) on the Amp. L (R) P.C.B. Assy.
- (2) Adjust VR102 (VR202) to obtain 40 mV on the DC voltmeter (Idling current: 40 mA).
- (3) Remove shorting pins from the Input Jacks.

4. MECHANISM ASS'Y AND PARTS LIST

Schematic Ref. No.	Part No.	Description	Qty	Schematic Ref. No.	Part No.	Description	Qty
		Synthesis Serial No.: B20701001 -		A01	HA04920A HA04921A	Front Panel Assy PA-5 Front Panel Assy PA-5E Serial No.: B20701001 -	1 1
01	HA04920A	Front Panel Assy PA-5	1				
	HA04921A	Front Panel Assy PA-5E	1				
02	BA0588A	Clipping LED P.C.B. Assy	2	01	0K04754A	Sub Front Panel	1
03	BA05687A	Power LED P.C.B. Assy	1	02	0H04681A	Lens A	2
04	0J05097A	Front Chassis	1	03	0E04753A	Front Panel PA-5	1
05	0B71004A	Power Switch	1		0H04766A	Front Panel PA-5E	1
06	0J05095A	Cushion A	2	04	HA04849A	Power Switch Knob Assy	1
07	BA05897A	Limitier P.C.B. Assy PA-5 (U.S.A. & Canada)	1	05	0J05000B	Power Switch Spring	1
	BA05898A	Limitier P.C.B. Assy PA-5 (Australia & Others) & PA-5E	1	06	0H04652B	Power Switch Guide	1
				07	0H04653B	Lens B	1
				L01	0E00866A	M2.6x4 @ Binding	5
08	0H04769A	Heat Sink LF	1				
09	0J05096A	Cushion B	2				
10	0H04768A	Side Cover L	1				
11	0H04760A	Heat Sink LR	1				
12	0J05101A	Upper Channel L	1				
13	0J05099A	Lower Channel L	1				
14	0J05103A	P.C.B. Holder	2				
15	BA05868A	Amp. L P.C.B. Assy	1				
16	0H04762A	Top Cover	1				
17	0J05094A	Cushion C	4				
18	0J05098A	Ground Plate	1				
19	0B12253A	Diode Bridge 15G4B41	1				
20	0B50061A	Power Transformer PA-5 (U.S.A. & Canada)	1				
	0B50062A	Power Transformer PA-5 (Others)	1				
	0B50062A	Power Transformer PA-5 (Australia & PA-5E)	1				
21	0B40366A	Electrolytic Capacitor 47000uF 80V	2				
22	0H04765A	Bottom Chassis	1				
23	0J05104A	Leg	4				
24	0H04761A	Heat Sink RF	1				
25	0H04764A	Side Cover R	1				
26	0H04762A	Heat Sink RR	1				
27	0J05100A	Lower Channel R	1				
28	0J05102A	Upper Channel R	1				
29	BA05969A	Amp. R P.C.B. Assy	1				
30	0M04377B	Caution Label	1				
31	HA04926A	Rear Panel Assy PA-5 (U.S.A.)	1				
	HA04923A	Rear Panel Assy PA-5 (Others)	1				
	HA04924A	Rear Panel Assy PA-5 (Australia)	1				
	HA04925A	Rear Panel Assy PA-5E	1				
	HA04954A	Rear Panel Assy PA-5 (Canada)	1				
32	0B70049A	Voltage Selector PA-5 (Others)	1				
33	0B08515A	Insu-Lock	20				
L01	0E00921A	BT3x3 @ Binding (Black Chromate)	7				
L02	0E00668A	BT3x8 @ Binding	8				
L03	0E00857A	BT3x6 @ Binding	2				
L04	0E00896A	M3x6 @ Binding	2				
L05	0E00970A	M3x4 @ Binding (Black Chromate)	14				
L06	0E00688A	BT3x12 @ Binding	4				
L07	0E03290A	M4x15 @ Binding (Bronze)	29				
L08	0E03030A	M3x6 @ Binding (Nickel)	4				
L09	0E00713A	M3x8 @ Trias (Bronze)	9				
L10	0E0325A	M4x8 @ Binding (Gold Plated)	5				
L11	0E03287A	M4x6 @ Binding (Gold Plated)	4				
L12	0E03336A	M5x6 @ Binding (Black Chromate)	4				
L13	0E03296A	M4x4 @ Binding (Black Chromate)	7				
L14	0E00852A	BT4x12 @ Binding (Black Chromate)	4				
L15	0E03336A	Nut Hex. M5 (Black Chromate)	4				
L16	0E00594A	M3x8 @ Binding (Bronze)	4				
L17	0E00818A	M3x8 @ Binding (Black Chromate) (PA-5 (Others))	2				
-	0E00752A	Eyelet 2x3 PA-5 (Canada)	2				

4.1. Synthesis

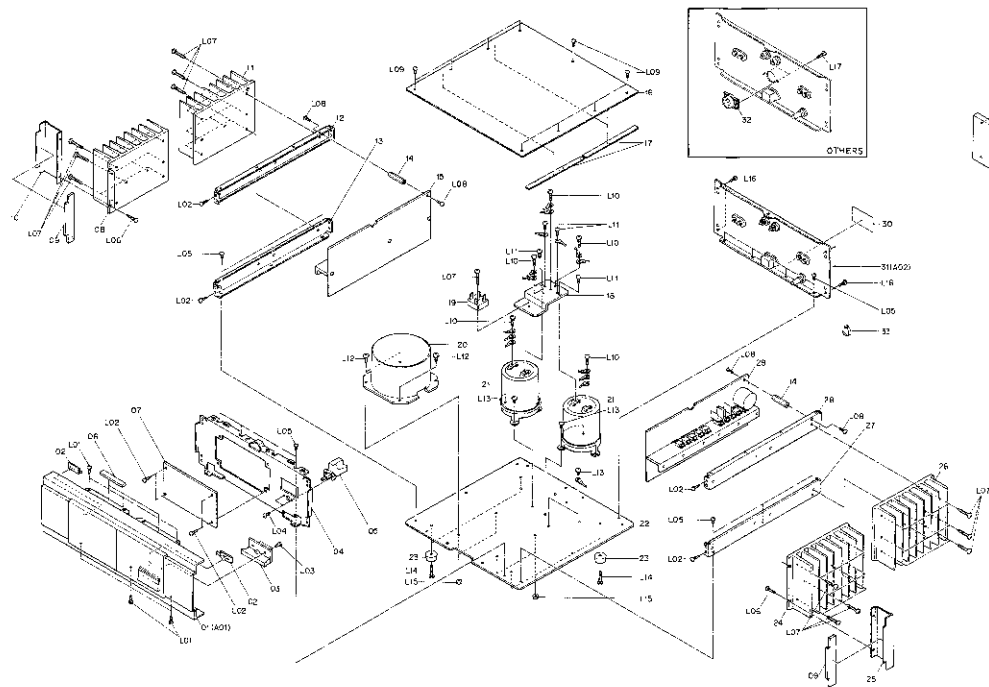


Fig. 4.1

4.2. Front Panel Assy (A01)

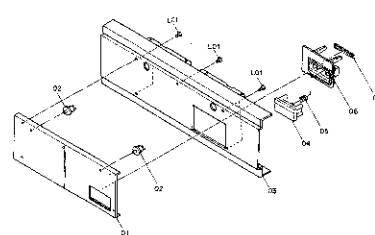


Fig. 4.2

5. MOUNTING DIAGRAMS AND PARTS LIST

4.3. Rear Panel Assy (A02)

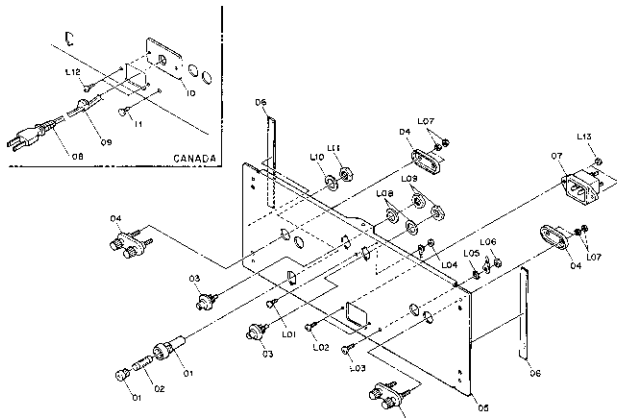


Fig. 4.3

Schematic Ref. No.	Part No.	Description	Qty	Schematic Ref. No.	Part No.	Description	Qty
A02	HA04926A	Rear Panel Assy FA-5 (U.S.A.)	1	L04	0E00972A	Nut Hex. M3	1
	HA04928A	Rear Panel Assy FA-5 (Others)	1	L05	0E00078A	Washer 4mm Threaded-Lock (except FA-5 (Canada))	1
	HA04929A	Rear Panel Assy FA-5 (Australia)	1	L06	0E00506A	Nut Hex. M4 (except FA-5 (Canada))	1
	HA04925A	Rear Panel Assy FA-5E (Canada)	1	L07	---	---	8
01	0B90093A	Fuse Holder PA-5 (U.S.A., Canada & Others)	1	L08	---	Washer for Pin Jack	2
	0B90094A	Fuse Holder PA-5 (Australia) & PA-5E	1	L09	---	Nut for Pin Jack	1
	0B90164A	Fuse 6A PA-5 (U.S.A., Canada & Others)	1	L10	---	Washer for Fuse Holder	1
	0B90166A	Fuse T2.5A PA-5 (Australia) & PA-5E	1	L11	---	Nut for Fuse Holder	1
03	0B81364A	Pin Jack	2	L12	0E00921A	M3x8 S Binding (Black Chromate)	2
	0B81365A	Speaker Output Terminal	2	L13	0E00507A	Nut Hex. M3 PA-5 (U.S.A.)	2
	0B04710A	Rear Panel FA-3 (U.S.A.)	1				
	0H04756A	Rear Panel FA-3 (Others)	1				
06	0H04757A	Rear Panel FA-3 (Australia)	1				
	0H04758A	Rear Panel FA-3E	1				
	0H04759A	Rear Panel FA-3 (Canada)	2				
	0M01625A	Rear Panel Cushion	1				
08	0B89092A	AC Inlet PA-5 (U.S.A.)	1				
	0B90087A	AC Inlet PA-5 (Australia & Others) & PA-5E	1				
	0B90155A	Power Cord PA-5 (Canada)	1				
	0B90157A	Cord Bushing PA-5 (Canada)	1				
10	0H04716A	Bushing Holder PA-5 (Canada)	1				
	11	0M0169A	Plug PA-5 (Canada)	1			
	L01	0E00594A	M3x8 S Binding (Bronze)	1			
	L02	0E00518A	M3x8 S Binding (Black Chromate)	2			
L03	0E03055A	M4x8 S Binding (Black Chromate) (except PA-5 (Canada))	1				

Notes: 1. Mounting diagram shows a dip side view of the printed circuit board.

2. Diode is 1SS53, 1B1553, or 1BS176 unless otherwise specified.

3. Abbreviation for part name:

TR - Transistor, SID - Silicon Diode, ZD - Zener Diode

RK - Carbon Resistor, RM - Metal Film Resistor, RF - Fail Safe Type Resistor, RC - Cement Resistor

GE - Electrolytic Capacitor, CM - Mylar Capacitor, C - Mica Capacitor

5.1. Clipping LED P.C.B. Assy



Fig. 5.1

5.2. Power LED P.C.B. Assy

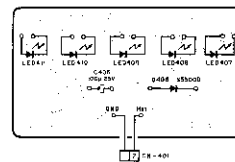
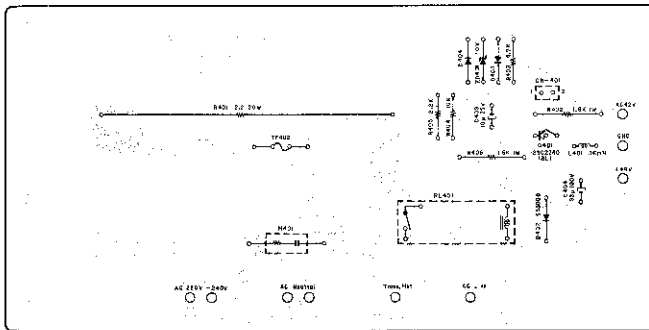


Fig. 5.2

5.3. Limiter P.C.B. Assy



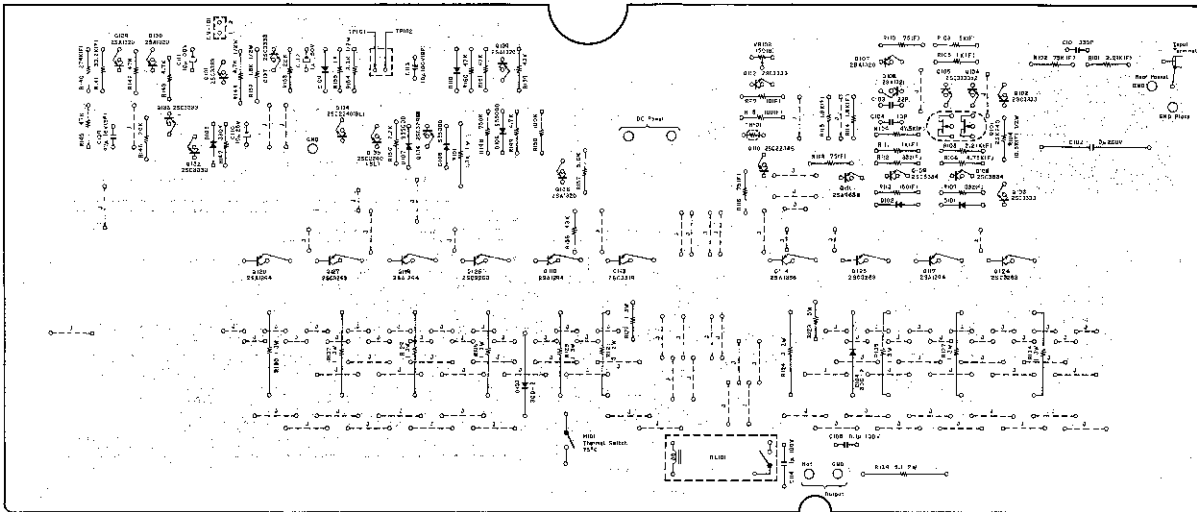


Fig. 5.4

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description			
R403	0B01846A	RK 4.7K 1/4W J	8A09568A	Amp. L.P.C.B. Assy	R108	0B09547A	RM 2.21K 1/4W F	R15A	0B01889A	RK 160K 1/4W J	Q114	0B10136A	TR 2SA1386	
R404	0B01888A	RK 10K 1/4W J			R109	0B22688A	RM 47.5K 1/4W F	C101	0A41041A	C 330P 100V J	Q117-120	0B10098A	TR 2SA1294 (4)	
R405	0B05022A	RK 2.2K 1/4W J	0B06291A	Amp. L.P.C.B. Assy	R110,116	0B22658A	RM 75 1/4W F	C102	0B41588A	CM 15K 200V K	Q124-127	0B10098A	TR 2SC2563 (4)	
R406	0B24091A	RF 1.6K 1W J	0B06297A	FPT 2SK240	119			C103	0B41588A	C 22F 50V J	TH101	0B13003A	Thermistor 102F	
C403	0B01974A	CF 10u 25V		(41K 1/2 W V)	R113	0B22633A	RM 150 1/4W F	C104	0B41537A	C 10P 50V J		0B01452	Heat Sink (1)	
C404	0B40341A	CE 35u 100V	0B10103A	TR 2SC3333	R114,115	0B09569A	RM 1.8K 1/4W F	C108	0B41537A	CM 0.1u 100V J		0B01478	Sheet A (1)	
RL401	0B09082A	Relay 10A 250VAC	Q102-105		R117	0B22666A	RM 10 1/4W F	C109	0B40331A	CE 47u 16V (BP)		0B0175A	Sheet B (1)	
M401	0B08445A	Spark Killer PA-5 (U.S.A. & Canada)	112,121		R118	0B22657A	RM 100 1/4W F	C110	0B41746A	CE 1u 50V		0B0187A	Sheet C @ Binding (11)	
		PA-5 (Australia & Others) & PA-5E	131		R121,124	0B24098A	RF 3 2W J	C111	0B40330A	CE 10u 100V				
			Q106,109	0B10143A	TR 2SC3334	R122,123	0B24004A	RC 1 SW K	C112	0B01400A	CE 1u 50V			
			Q107,129	0B10102A	TR 2SA1320	R127-130	0B24092A	RF 1 SW J	C113	0B40371A	CE 10u 100V (BP)			
			130,138			136-137			C114	0B41610A	CM 1u 100V J			
			Q108	0B10142A	TR 2SA1321	R139	0B24059A	RF 5.1 2W J	RL101	0B09083A	Relay 10A 250VAC			
			Q134,135	0B08145A	TR 2SC2240 (BL)	R140	0B09752A	RM 274K 1/4W F	M101	0B41610A	Thermal Switch 75°C			
			Q138	0B10145A	TR 2SC2888	R141	0B09446A	RM 38.2K 1/4W F		0E00754A	M3x8 S Fan (3)			
			D105,102	0B06181A	SID 35553	R142,145	0B09641A	RK 47K 1/4W J						
			106,109			160,151								
			113			R143,149	0B01848A	RK 4.7K 1/4W J	Q110	0B10101A	TR 2SC2238B			
			Q109	0B10142A	TR 2SA1321	R144	0B24062A	RF 4.7K 1/2W J	0B0175A	Heat Sink 10-220 (1)				
			Q139	0B08145A	TR 2SC2888	R146	0B09509A	RK 20K 1/4W J						
			D105,104	0B06458A	SID 30D-2	R147	0B09787A	RK 330K 1/4W J						
			D105,107	0B12202A	SID 85000D	R148	0B09755A	RK 750K 1/4W J						
			105			R149	0B09509A	RK 20K 1/4W J						
			VR192	0B32052A	Potentiometer 150	R150	0B05622A	RK 2.2K 1/4W J	Q311	0E00972A	M3x5 G Binding (1)			
			R101	0B23398A	RM 2.21K 1/4W F	R151	0B24059A	RF 1.8K 1/2W J		0E00972A	M3x5 G Binding (1)			
			R102	0B09492A	RM 75K 1/4W F	R152	0B24081A	RF 1.8K 1/2W J		0B01700A	TR 2SA968 (3)			
			R103	0B0K340A	RM 15K 1/4W F	R153	0B06415A	RK 22u 1/4W J		0B0172A	Heat Sink 10-220			
			R104	0B22670A	RM 10.5K 1/2W F	R154	0B24081A	RF 5.8K 1/2W J						
			R105,111	0B08491A	RM 1K 1/4W F	R155	0B01857A	RK 1K 1/4W J						
			R106	0B0K424A	RM 4.75K 1/4W F	R156,159	0B09750A	RF 43K 1/4W J						
			R107,112	0D09760A	RM 32 1/4W F	R157	0B01887A	RK 5.8K 1/4W J	Q313	0E00972A	M3x5 G Binding (1)			
									0B10187A	TR 2SC2510				

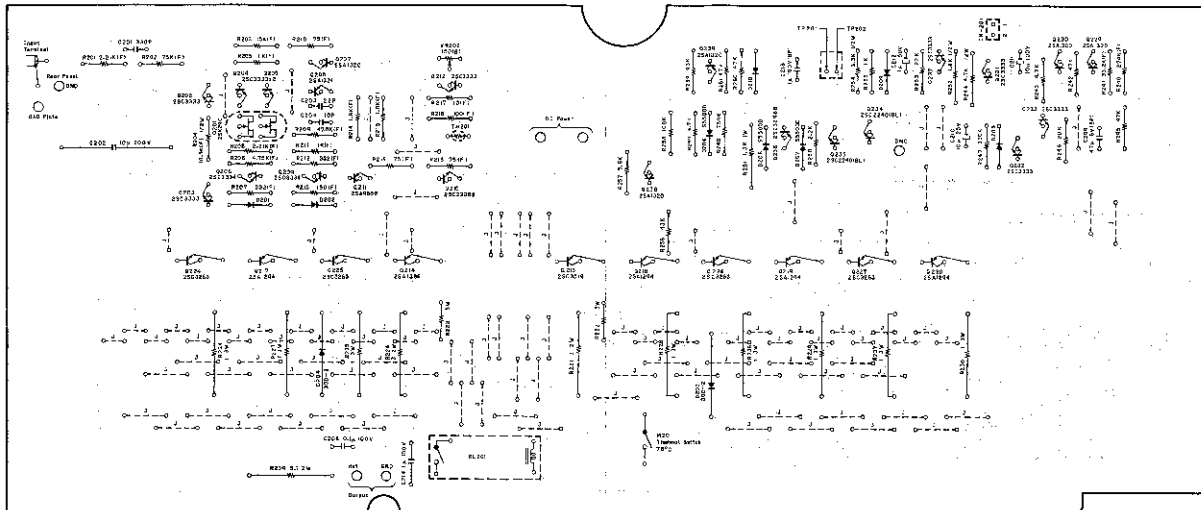
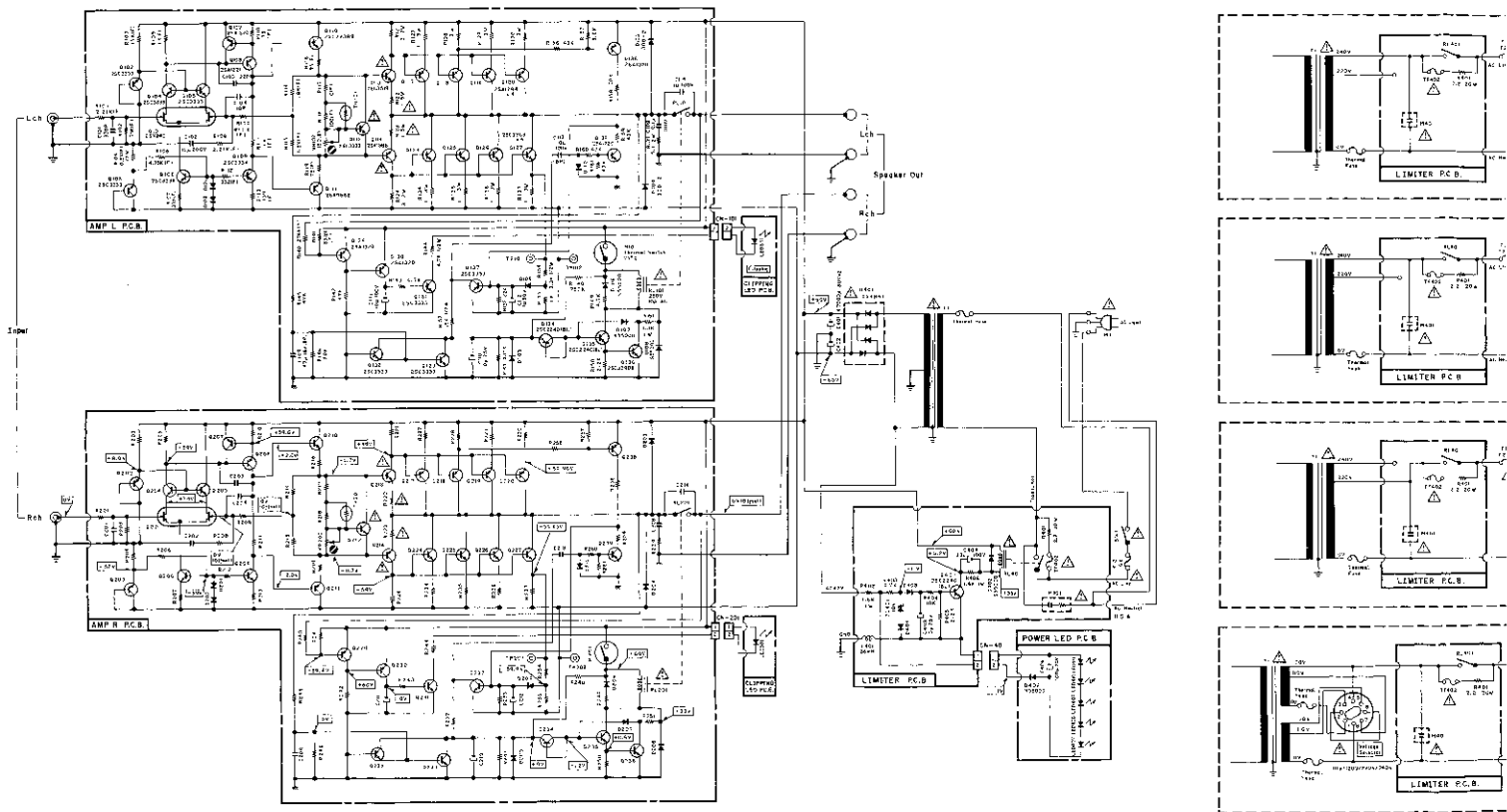


Fig. 5.5

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
	EA09090A	Amp. R.F.C.N. Assy	R206	0B09547A	RM 2.21K 1/4W F	R238	0B01889A	RK 100K 1/4W J	Q214	0B10136A	TR 2SA1386
	0B09028A	Amp. R.F.C.B.	R209	0B23688A	RM 47.9K 1/4W F	C201	0B41041A	C 350P 100V J	Q217-220	0B10084A	TR 2SA1384 (4)
Q201	0B09527A	PTT 2SC2440 (CR. BL. V)	R210,216	0B22832A	RM 75 1/4W F	C202	0B41036A	CM 10u 250V K	Q224-227	0B10084A	TR 2SC2363 (4)
Q202-203	0B10100A	TR 2SC3383 (S)	R213	0B22638A	RM 150 1/4W F	C203	0B41539A	C 22P 50V J	TR400	0B30050A	Thermistor 102F
212,221			R214,215	0B09586A	RM 1.9K 1/4W F	C204	0B41538A	C 10P 50V J		0B90146B	Heat Sink (1)
232,233			R217	0B22687A	RM 1.9K 1/4W F	C208	0B41877A	CM 0.1u 100V J		0B90147B	Sheet A (1)
Q206,209	0B10143A	TR 2SC3334	R218	0B22687A	RM 100 1/4W F	C208	0B40531A	CE 47u 16V (BP)		0B90175A	Sheet B (1)
Q207,236	0B10102A	TR 2SA1349	R221,224	0B24688A	RF 3 2W J	C210	0B01874A	CE 10u 25V		0F08138A	Mix.10 @ Binding (11)
239,238			R222,223	0B84984A	NC 1 SW K	C212	0B40230A	CE 10u 100V			
239			R227,230	0B24924A	RF 1 SW J	C212	0B40971A	CE 10u 100V (BP)			
239			234-237			C214	0B41875A	CM 1u 100V J			
Q208	0B10142A	TR 2SA1321	R239	0B24036A	RF 2.7 2W J	RL201	0B90083A	Relay 10A 250V AC			
Q234,235	0B09142A	TR 2SC2246 (BL)	R240	0B09752A	RM 274K 1/4W F	M201	0B90084A	Thermal Switch 7F C			
Q236	0B10145A	TR 2SC3398B	R241	0B09446A	RM 23.2K 1/4W F		0B81866A	2PS Post			
D201,202	0B09181A	SLD 1S553	R242,245	0B09541A	RK 47K 1/4W J		0E00754A	Mix.5 Pan (3)			
206,209			260,261			Q210	0B10101A	TR 2SC2288B			
210			R243,249	0B01846A	RK 47K 1/4W J		0B90176A	Heat Sink TO-220			
D204,204	0B06428A	SLD 30D-C	R244	0B24066A	RF 4.7K 1/4W J		0E00966A	Mix.5 @ binding (1)			
D205,207	0B10225A	SLD 3C500D	R246	0B09509A	RK 20K 1/4W J		0B90072A	(Nickel)			
208			R247	0B09721A	RK 250K 1/4W J		0B01040A	TR 2SA888B (2)			
VR202	0B23052A	Potentiometer 150	R248	0B09755A	RK 750K 1/4W J	Q211	0B90173A	Heat Sink TO-220			
R201	0B22952A	RM 2.21K 1/4W F	R249	0B09822A	RK 2.2K 1/4W J		0F00966A	Mix.5 @ Binding (1)			
R202	0B09682A	RM 75K 1/4W F	R252	0B24061A	RF 1.8K 1/2W J		0E00572A	Nut Hex. M2 (1)			
R203	0B09840A	RM 1.2K 1/4W F	R253	0B09618A	RK 22K 1/4W J		0B10137A	TR 2SC3619			
R204	0B22870A	RM 10.5K 1/2W F	R254	0B24689A	RF 3.3K 1/2W J						
R206,211	0B09491A	RM 1K 1/4W F	R256	0B01887A	RK 1K 1/4W J						
R208	0B09424A	RM 4.75K 1/4W F	R257	0B09750A	RK 48K 1/4W J	Q213					
R207,212	0B09760A	RM 332 1/4W F	R257	0B01887A	RK 5.6K 1/4W J						

6. SCHEMATIC DIAGRAM



Notes: 1. Diode is 1S853, 1S1555, or 1S176 unless otherwise specified.
 2. Voltages shown in \square are typical value with no input signal at 60 Hz.

Fig. 6

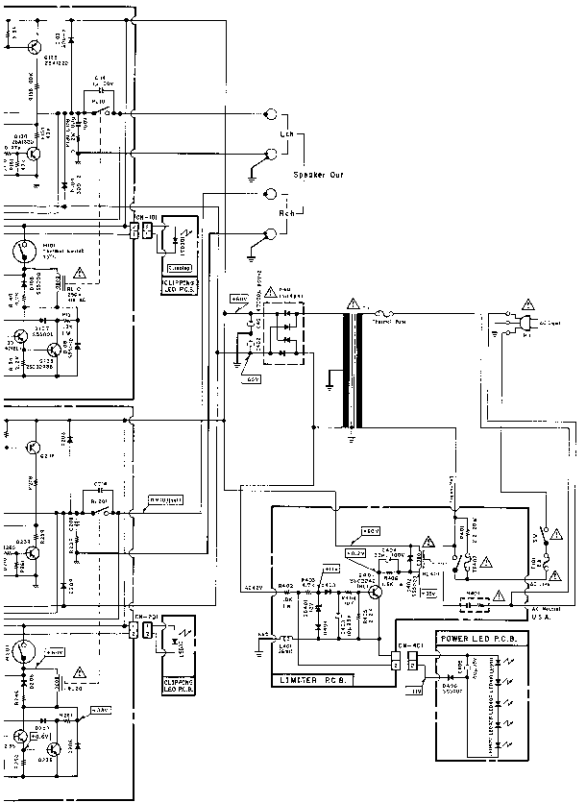
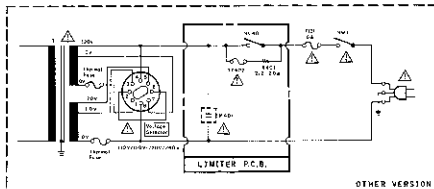
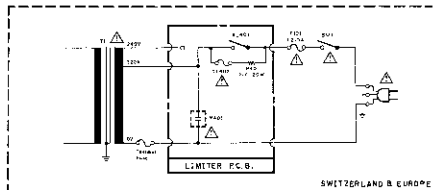
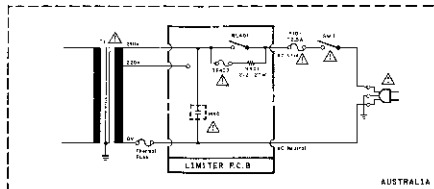
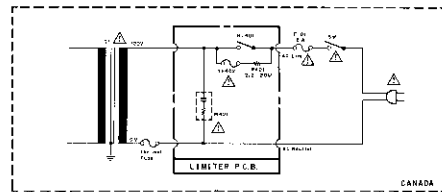
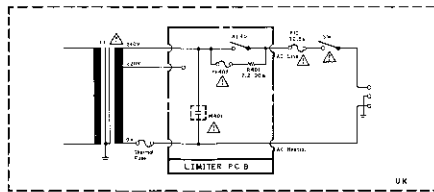



Fig. 6



WARNING:
Parts marked with the symbol  have critical characteristics.
Use **ONLY** replacement parts recommended by the manufacturer.
It is recommended that the unit be operated from a suitable DC supply or batteries during initial check-out procedures.

CAUTION:
Before returning the unit to the customer, make sure you make either (1) a leakage current check or (2) a line to chassis resistance check. If the leakage current exceeds 0.5 milliamp, or if the resistance from chassis to either side of the power cord is less than 240 k ohms, the unit is defective.
WARNING - DO NOT return the unit to the customer until the problem is located and corrected.

7. WIRING DIAGRAM

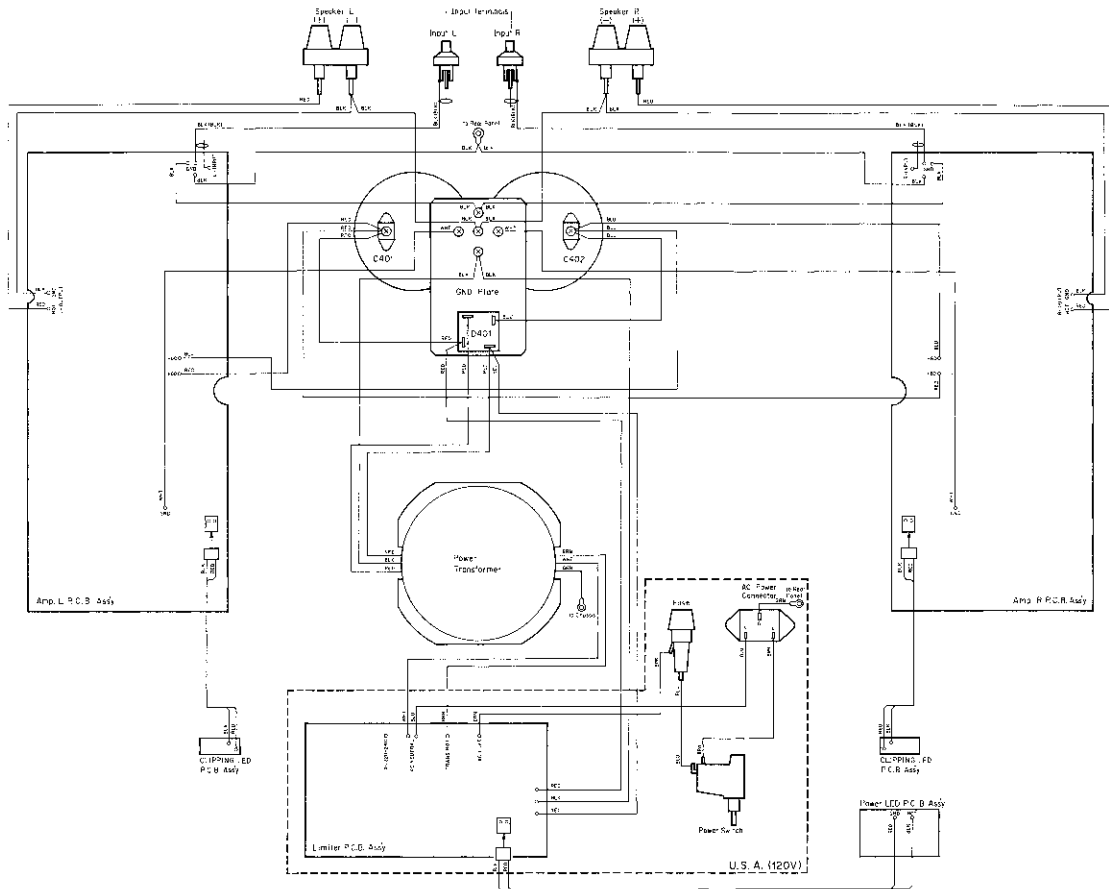
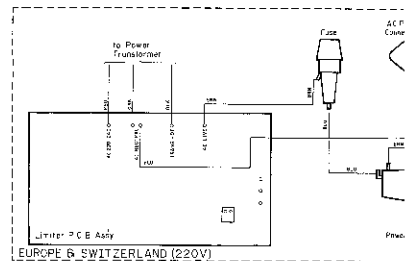
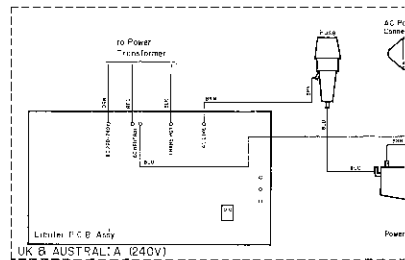


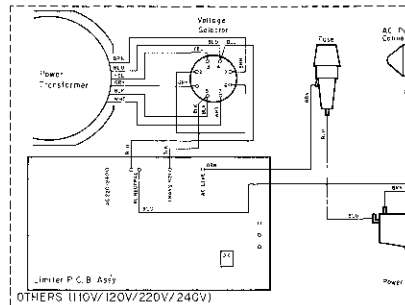
Fig. 7



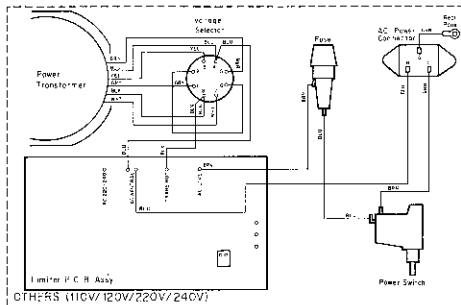
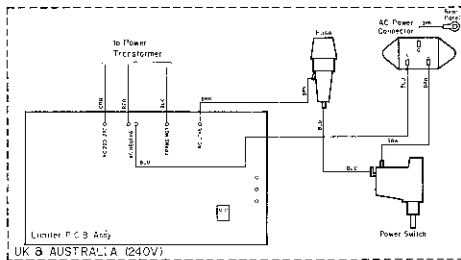
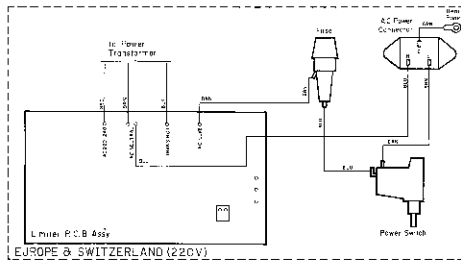
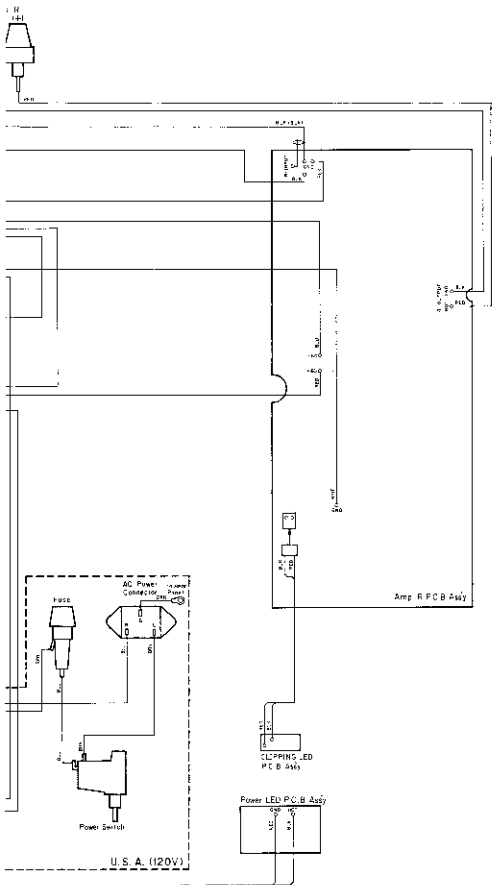
EUROPE & SWITZERLAND (220V)



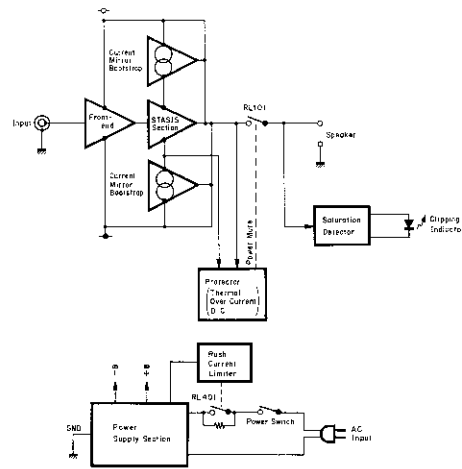
UK & AUSTRALIA (240V)



OTHERS (110V/120V/220V/240V)



8. BLOCK DIAGRAM



- Notes: 1. Table of wire colors
- | | | |
|--------------|--------------|-------------|
| BRN - Brown | GRN - Green | WHT - White |
| RED - Red | BLU - Blue | BLK - Black |
| ORN - Orange | VIO - Violet | |
| YEL - Yellow | GRY - Grey | |

2. Component side view of the P.C.B. is illustrated unless otherwise specified.
 3. Wire tube color is shown in ().

9. SPECIFICATIONS

Continuous Average Power	100 W x 2 (8 ohms, both channels driven, 20-20,000 Hz, 0.1% THD)
Output (NEW IHF)	
Dynamic Power per Channel	150 W (8 ohms)
Dynamic Head Room	1.7 dB (8 ohms)
(New IHF)	
Power Bandwidth (Half	5 Hz - 50 kHz
Rated Power, 0.1% THD)	
Damping Factor (NEW IHF)	Greater than 60/60/60
20 Hz/1 kHz/20 kHz	
Input Sensitivity/Impedance	1.4 V/75 k ohms (rated power)
(New IHF)	140 mV (1 W output)
Frequency Response	20-20,000 Hz +0, -0.5 dB
(1 W, NEW IHF)	7-150,000 Hz +0, -3 dB
Signal to Noise Ratio	Better than 120 dB
(Input Shorted, Rated Power, IHF-A-WTD)	
Residual Noise Level	Less than 25 μ V
(IHF-A-WTD)	
Total Harmonic Distortion	Less than 0.1%
(Rated Power, 20-20,000 Hz)	
Intermodulation Distortion	Less than 0.1%
(Rated Power, 60 Hz: 7 kHz, 4:1)	
Stereo Separation	100/90/70 dB
(Input Shorted)	
100 Hz/1 kHz/10 kHz	
Output Complement	10 transistors per channel
Output Current Capability	12 A continuous, 35 A peak (per channel)
Power Supply	450 W toroidal transformer, 94,000 μ F total filter capacitance
Power Source	120, 220, 240, 110-120/220-240 V AC; 50/60 Hz (According to country of sale)
Power Consumption	450 W max.
Dimensions	435 (W) x 135 (H) x 368 (D) mm 17-1/8 (W) x 5-5/16 (H) x 14-1/2 (D) inches
Approximate Weight	16 kg; 35 lbs., 4 oz.

- Specifications and design are subject to change for further improvement without notice.
- STASIS manufactured under license from Threshold Corporation.
- STASIS is a trademark of Threshold Corporation.

Service Manual

Nakamichi PA-5, PA-5E

Nakamichi Corporation

Tokyo Office
Shinjuku Daiichi Seimei Bldg.
2-7-1 Nishishinjuku, Tokyo
Phone (03) 342-4461
Telex : 2324721 (NAKAM J)

Nakamichi U.S.A. Corporation

19701 South Vermont Avenue
Torrance, California 90502
Phone : (213) 538-8150

Nakamichi GmbH

Stephanienstrasse 6, 4000 Düsseldorf 1
Phone : (0211) 359036