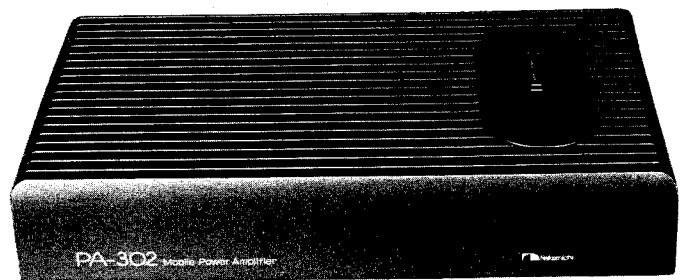




Service Manual

Nakamichi PA-302

Mobile Power Amplifier



PA-102

Mobile Power Amplifier



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1. GENERAL

1.1. Notes on Order of Spare Parts

Note that the Main P.C.B. Ass'y and Power Supply P.C.B. Ass'y do not include the following parts. Please order the excluded parts together with P.C.B. Ass'y to complete a set of P.C.B. Ass'y.

P. C. B. Ass'y	Excluded Parts	
	Part Name	Remarks
Main P.C.B. Ass'y (BA07735A)	● TR Block A Ass'y1pce. (BA07738A)	Ref. No. 15 in Fig. 4.1. Consists of transistors and heat sink.
Power Supply P.C.B. Ass'y (BA07736A)	● TR Block B Ass'y1pce. (BA07657A)	Ref. No. 10 in Fig. 4.1. Consists of transistors and heat sink.
	● TR Block C Ass'y1pce. (BA07658A)	Ref. No. 12 in Fig. 4.1. Consists of diodes and heat sink.
	● Converter Transformer1pce. (0B50164A)	Ref. No. 23 in Fig. 4.1. (T401)
	● Choke Coil1pce. (0B51314B)	Ref. No. 24 in Fig. 4.1. (L401)

1.2. Destination

- U.S.A. and Canada
- Other
- Europe
- Japan

1.3. Package Ass'y

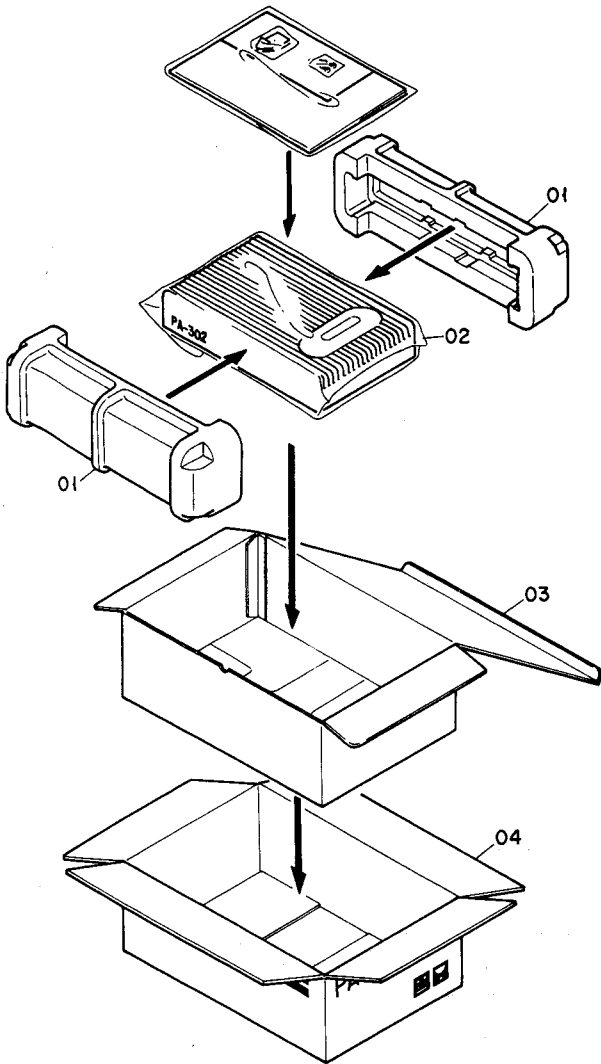


Fig. 1.1

1.4. Accessory Ass'y

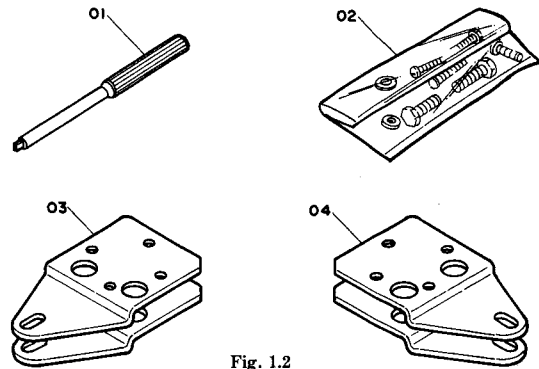


Fig. 1.2

Schematic Ref No.	Part No.	Description	Q'ty
Package Ass'y			
01	0F04250B	Packing (U.S.A./Other/Europe)	2
	0F04260B	Packing (Japan)	2
02	0F04249B	Poly-Bag (270×500×0.08)	1
03	0F04336A	Inner Carton (U.S.A.)	1
	0F04337A	Inner Carton (Other/Europe)	1
04	0F04338A	Inner Carton (Japan)	1
	0F04341A	Outer Carton (U.S.A.)	1
	0F04342A	Outer Carton (Other/Europe)	1
	0F04343A	Outer Carton (Japan)	1
Accessory Ass'y			
01	0D03903C	Screwdriver	1
02	DA04253A	Screw Ass'y	1
03	0H05572A	Mounting Plate A	2
04	0H05589A	Mounting Plate B	2
—	0D03092B	Poly-Bag (320×340×0.08)	1
—	0D04593A	Poly-Bag (80×100×0.05)	1
—	0D05003A	Owner's Manual (English/German/French)	1
—	0D05004A	Owner's Manual (Japanese)	1

2. REMOVAL PROCEDURE

2.1. Fuse

Pull out F01 (Fuse 30A) toward you. (F01 is hard to remove.)

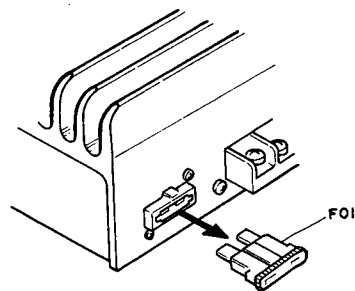


Fig. 2 Rear View

3. ADJUSTMENT

3.1. Parts Location for Adjustment

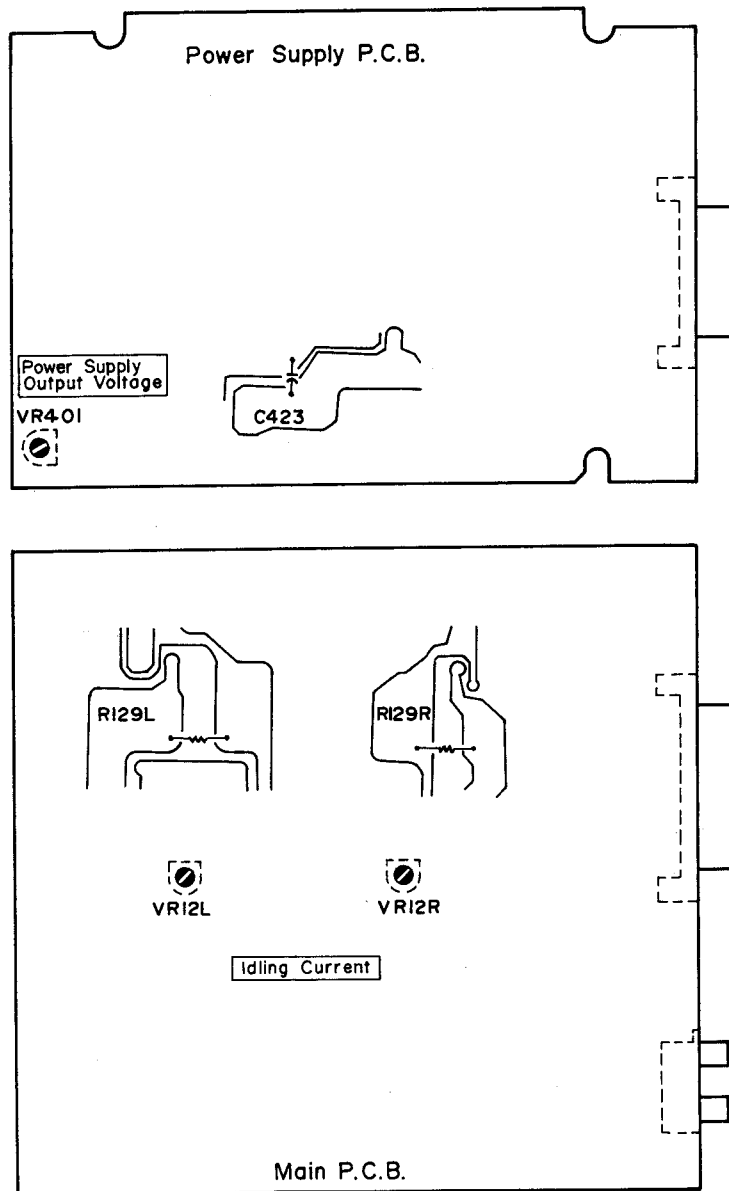


Fig. 3

3.2. Adjustment Procedures

Note : Perform adjustment from the bottom of the PA-302.

3.2.1. Power Supply Output Voltage

- (1) Connect a DC voltmeter across C423.
- (2) Supply 14.4V DC to +14.4V Terminal and Remote Terminal of the PA-302.
- (3) Adjust VR401 to obtain +33.0V on the DC voltmeter.

3.2.2 Idling Current (Main P.C.B. Ass'y)

- (1) Insert shorting pins into Input Pin Jacks.
- (2) Connect a DC millivoltmeter across R129L (R129R).
- (3) Adjust VR12L (VR12R) to obtain 3mV (approx. 15mA) on the DC millivoltmeter.
- (4) Remove the shorting pins.

4. MECHANISM ASS'Y AND PARTS LIST

4.1. Synthesis

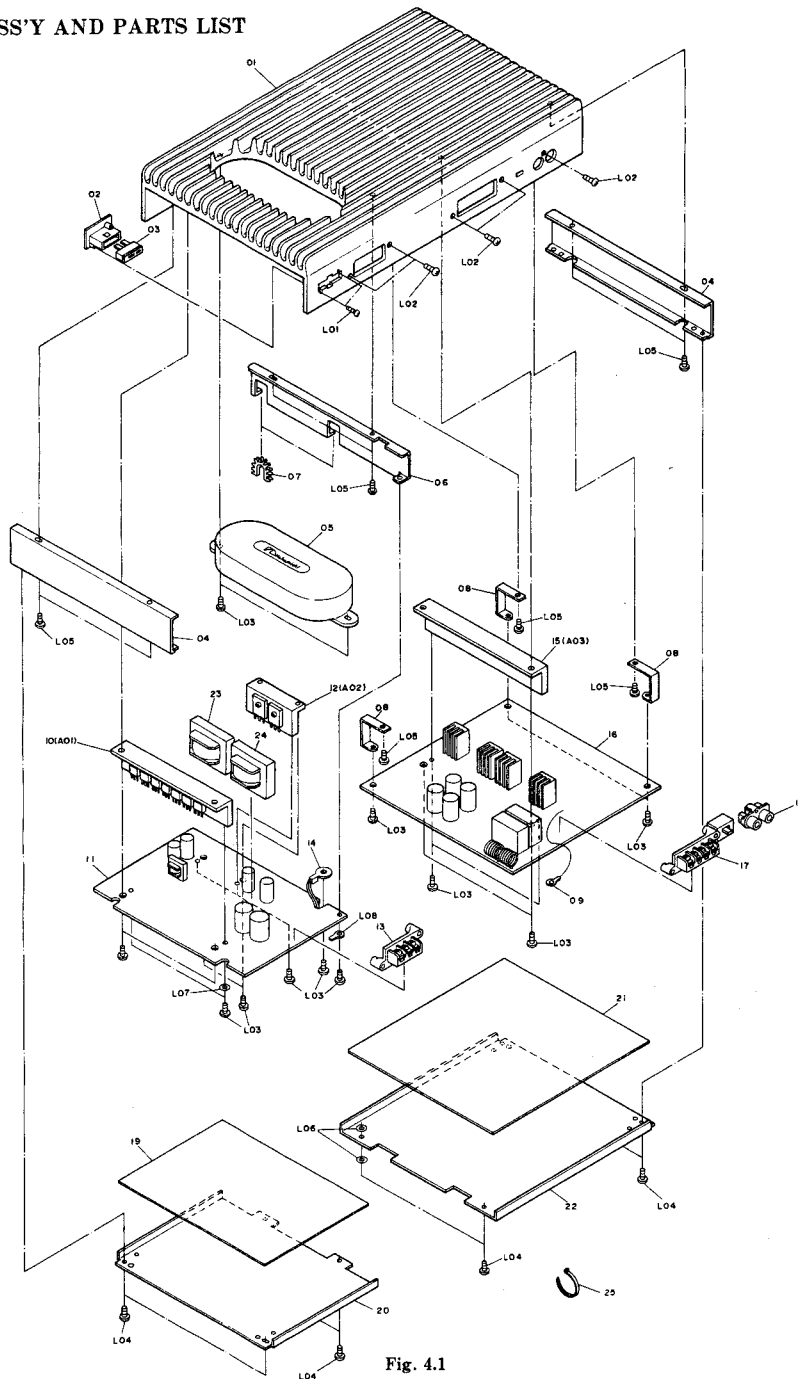


Fig. 4.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
4.1. Synthesis				17	0B84107A 0B84153A	Terminal 4P (U.S.A.) (TM-401) Terminal 4P (Gold) (Other/Europe/ Japan) (TM-401)	1 1
		Synthesis		18	0B81630A	Pin Jack 2P (Gold)	1
01	0H05637A	Heat Sink	1	19	0J05923A	Bottom Sheet-A	1
02	BA07737A	Fuse P.C.B. Ass'y	1	20	0H05575A	Bottom Cover-A	1
03	0B90403A	Fuse 30A	1	21	0J05924A	Bottom Sheet-B	1
04	0H05573A	Side Chassis	2	22	0H05576A	Bottom Cover-B	1
05	HA05715A	Transformer Cover Ass'y	1	23	0B50164A	Converter Transformer (T401 on Power Supply P.C.B. Ass'y)	1
06	0J05919B	Center Chassis	1	24	0B51314B	Choke Coil (L401 on Power Supply P.C.B. Ass'y)	1
07	0J05966A	Free Bushing	2				
08	0J05994A	PCB Holder	3	25	0B08515A	Insu-Lock	5
09	0B80281A	Chassis Ground A'ssy	1	L01	0E00974A	BT 2×8 ⊕ Binding (Black Chromate)	
10	BA07657A	TR Block B Ass'y (A01)	1	L02	0E00948A	BT 3×10 ⊕ Binding (Black Chromate)	
11	BA07736A*	Power Supply P.C.B. Ass'y	1	L03	0E00868A	BT 3×8 ⊕ Binding	
12	BA07658A	TR Block C Ass'y (A02)	1	L04	0E00860A	BT 3×6 ⊕ Binding (Black Chromate)	
13	0B84106A	Terminal 3P (U.S.A.) (TM101)	1	L05	0E03013A	BT 3×5 ⊕ Binding	
	0B84152A	Terminal 3P (Gold) (Other/Europe/ Japan) (TM101)	1	L06	0J05057A	Insulator Washer 3.4×7×0.5	
14	0B19013A	Thermistor PTH487A01BE471 (TH401)	1	L07	0J06007A	Fiber Washer 8×3.1×0.5	
15	BA07738A	TR Block A Ass'y (A03)	1	L08	0E00174A	Earth Lug B-4	
16	BA07735A*	Main P.C.B. Ass'y	1				

* : See item 1.1.

4.2. TR Block B Ass'y (A01)

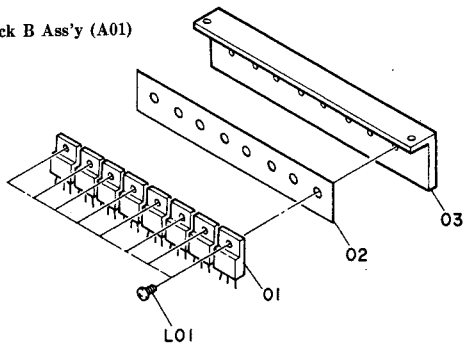


Fig. 4.2

Schematic Ref. No.	Part No.	Description	Q'ty
4.2. TR Block B Ass'y (A01)			
A01	BA07657A	TR BLock B Ass'y	
01	0B10315A	TR 2SD1445A (Q412-419)	8
02	0J05946A	Transistor Sheet B	1
03	0J05921A	Heat Sink B	1
L01	0E03319A	M 3×8 ⊕ Binding	

4.3. TR Block C Ass'y (A02)

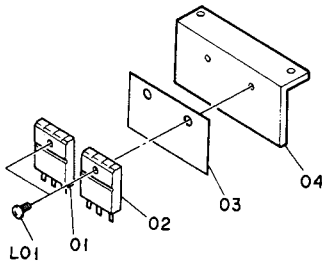


Fig. 4.3

Schematic Ref. No.	Part No.	Description	Q'ty
4.3. TR Block C Ass'y (A02)			
A02	BA07658A	TR Block C Ass'y	
01	0B12611A	FMU-32S (D409)	1
02	0B12612A	FMU-32R (D410)	1
03	0J05947A	Transistor Sheet C	1
04	0J05922A	Heat Sink C	1
L01	0E03319A	M 3×8 ⊕ Binding	

4.4. TR Block A Ass'y (A03)

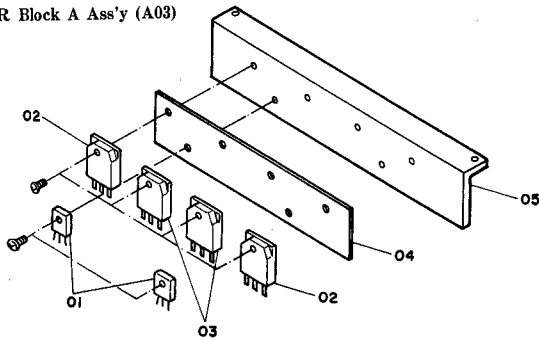


Fig. 4.4

Schematic Ref. No.	Part No.	Description	Q'ty
4.4 TR Block A Ass'y (A03)			
A03	BA07738A	TR Block A Ass'y	
01	0B10199A	TR 2SC3421 (Q111L,R)	2
02	0B10250A	TR 2SC3856 O.Y (Q114L,R)	2
03	0B10251A	TR 2SA1492 O.Y (Q115L,R)	2
04	0J05945A	Transistor Sheet A	1
05	0J05920B	Heat Sink A	1
L01	0E03319A	M 3×8 ⊕ Binding	

5. MOUNTING DIAGRAMS

- Notes :
1. Mounting diagram shows a dip side view of the printed circuit board.
 2. Diode is 1SS53 1S1555, or 1SS176 unless otherwise specified.
 3. Following transistors are interchangeable with each other.
 - a. 2SA733, 2SA608SP, 2SA1048, 2SA1175
 - b. 2SC945, 2SC536SP, 2SC2458, 2SC2785
 4. 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
 CE—Electrolytic Capacitor, CC—Ceramic Capacitor
 CML—Mylar Capacitor, CSP—Polystyrene Capacitor

5.1. Main P.C.B. Ass'y

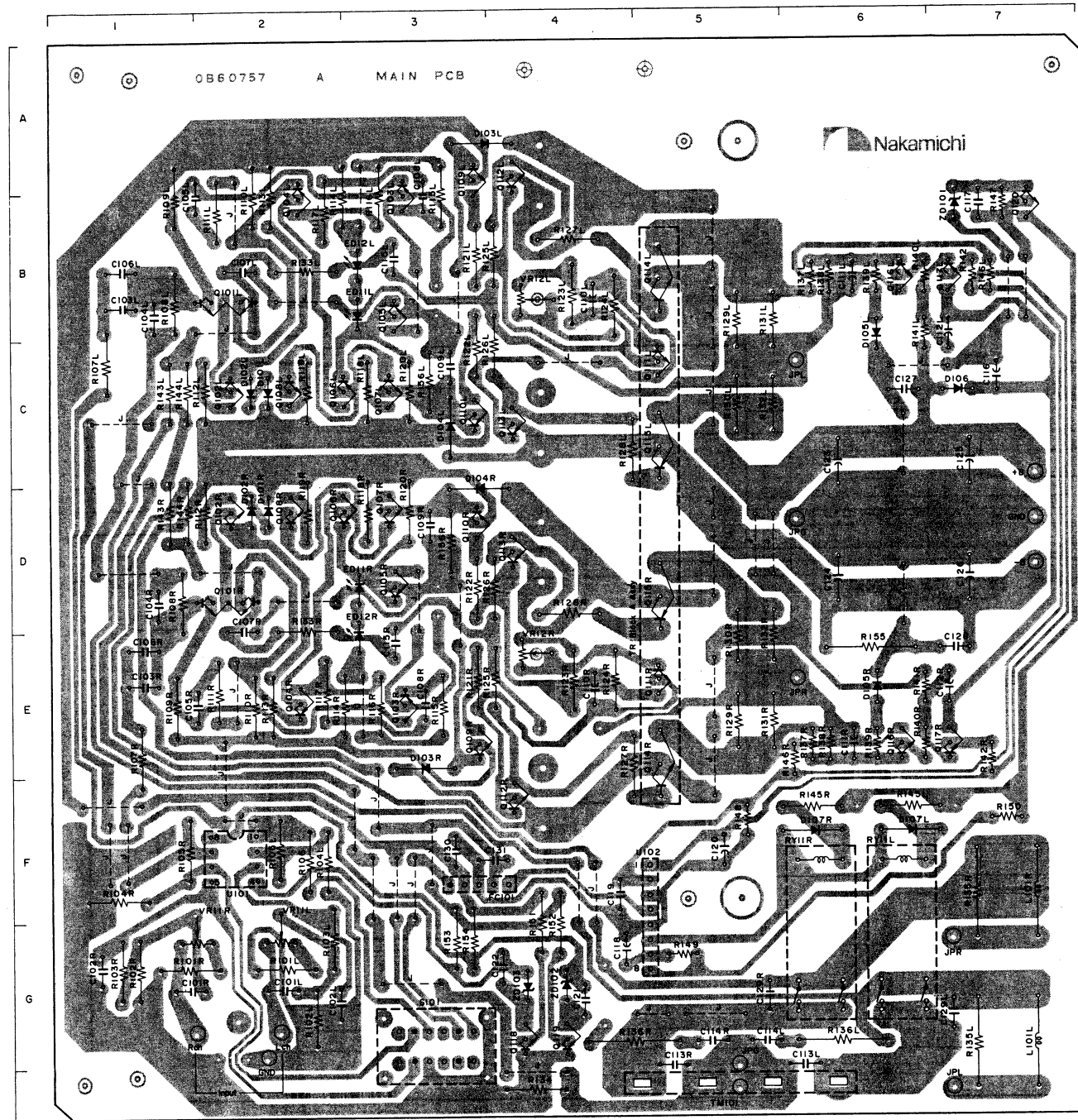


Fig. 5.1

Semiconductor Location (Main P.C.B. Ass'y)
cf. * on TR Block Ass'y

Ref. No.	Location	Ref. No.	Location	Ref. No.	Location	Ref. No.	Location
U101	F-2	Q118	G-4	Q109	(L) A-3 (R) E-3	D105	(L) C-6 (R) E-6
U102	F-5	Q119	G-4	Q110	(L) C-3 (R) D-3	D106	C-7
Q101	(L) B-2 (R) D-2	Q120	B-7	Q111*	(L) C-5 (R) E-5	D107	(L) F-6 (R) F-6
Q102	(L) C-2 (R) D-2	ZD101	B-7	Q112	(L) A-4 (R) F-4	ED11	(L) B-3 (R) D-3
Q103	(L) B-3 (R) E-3	ZD102	G-4	Q113	(L) C-4 (R) D-4	ED12	(L) B-3 (R) D-3
Q104	(L) B-2 (R) E-2	ZD103	G-4	Q114*	(L) B-5 (R) E-5		
Q105	(L) B-3 (R) D-3	D101	(L) C-2 (R) D-2	Q115*	(L) C-5 (R) D-5		
Q106	(L) C-2 (R) D-2	D102	(L) C-2 (R) D-2	Q116	(L) B-6 (R) E-6		
Q107	(L) C-3 (R) D-3	D103	(L) A-3 (R) E-3	Q117	(L) B-7 (R) E-7		
Q108	(L) C-2 (R) D-2	D104	(L) C-3 (R) D-3				

5.2. Power Supply P.C.B. Ass'y

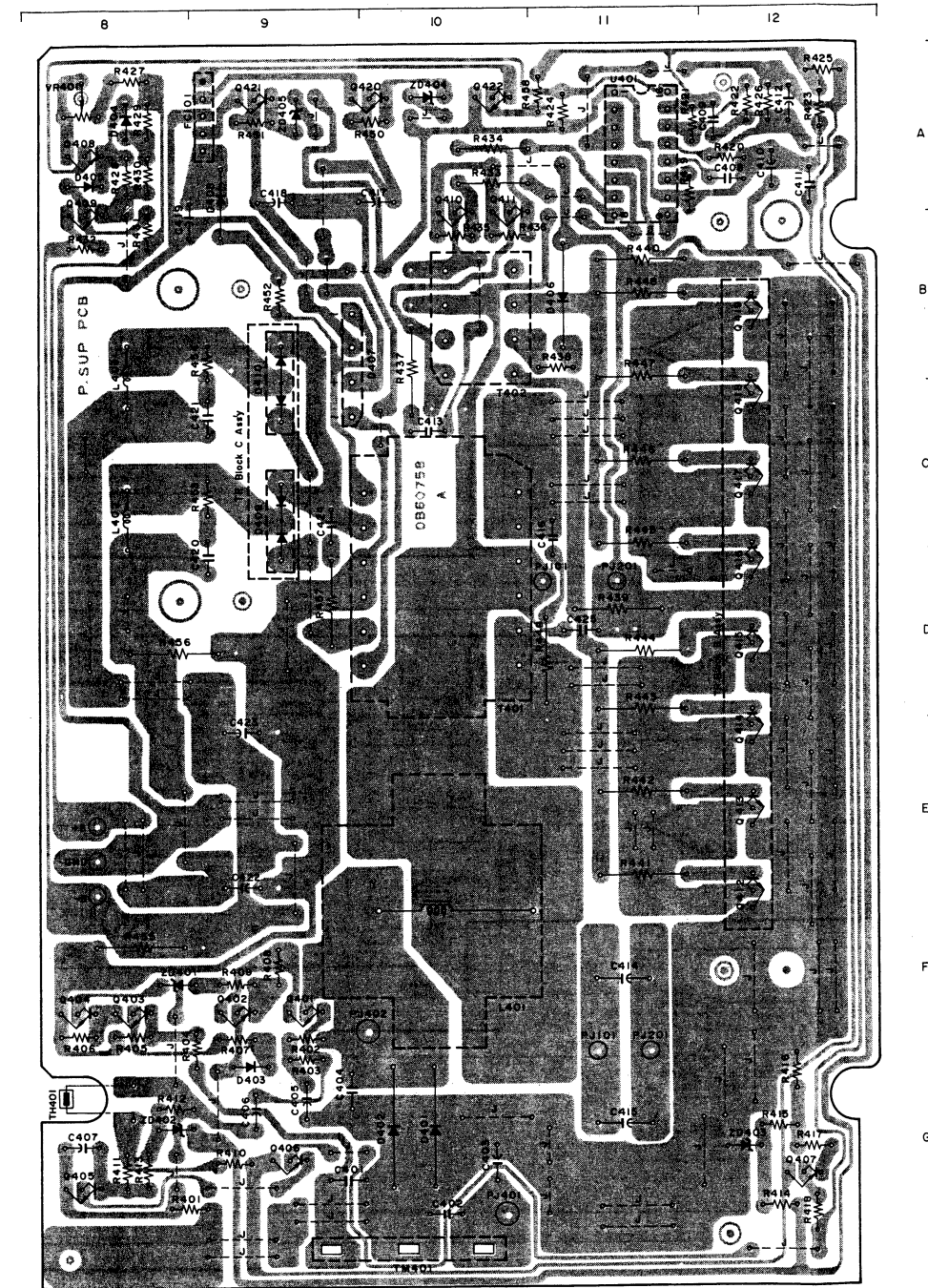


Fig. 5.2

Semiconductor Location (Power Supply P.C.B. Ass'y)
cf. * on TR Block Ass'y

Ref. No.	Location	Ref. No.	Location	Ref. No.	Location	Ref. No.	Location
U401	A-11	Q419*	B-12	Q410	A-10	D402	G-10
Q401	F-9	Q420	A-10	Q411	A-10	D403	G-9
Q402	F-9	Q421	A-9	Q412*	F-12	D404	A-8
Q403	F-8	Q422	A-10	Q413*	E-12	D405	A-8
Q404	F-8	ZD401	F-8	Q414*	E-12	D406	B-11
Q405	G-8	ZD402	G-8	Q415*	D-12	D407	B-9
Q406	G-9	ZD403	G-12	Q416*	D-12	D408	A-9
Q407	G-12	ZD404	A-10	Q417*	C-12	D409*	C-9
Q408	A-8	ZD405	A-9	Q418*	C-12	D410*	C-9
Q409	B-8	D401	G-10				

5.3. Fuse P.C.B. Ass'y

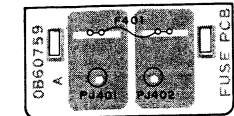
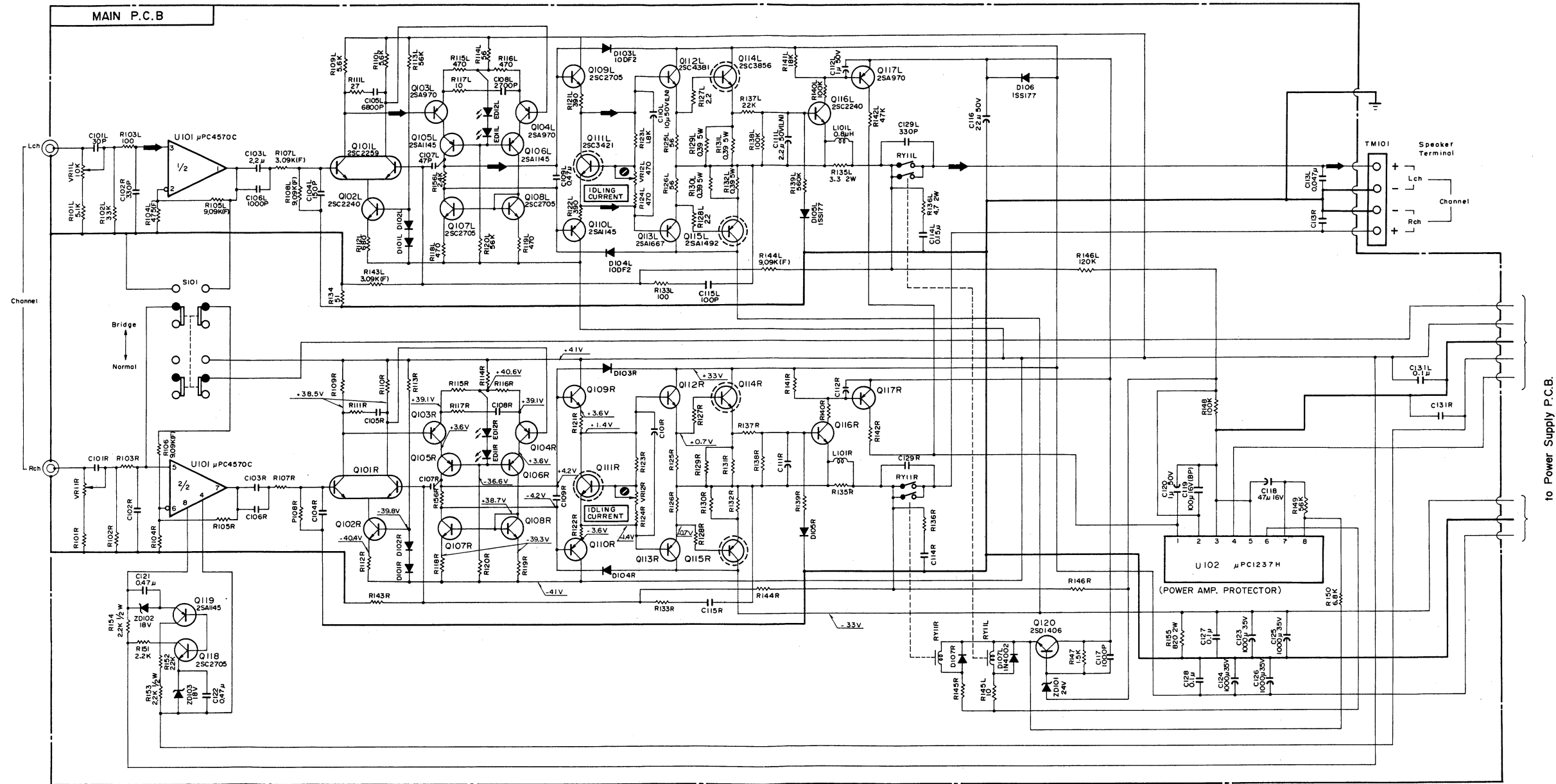


Fig. 5.3

6. SCHEMATIC DIAGRAM



Notes : Q111L/R, Q114L/R, Q115L/R are included in TR Block A Ass'y

Fig. 6.1

7. WIRING DIAGRAM

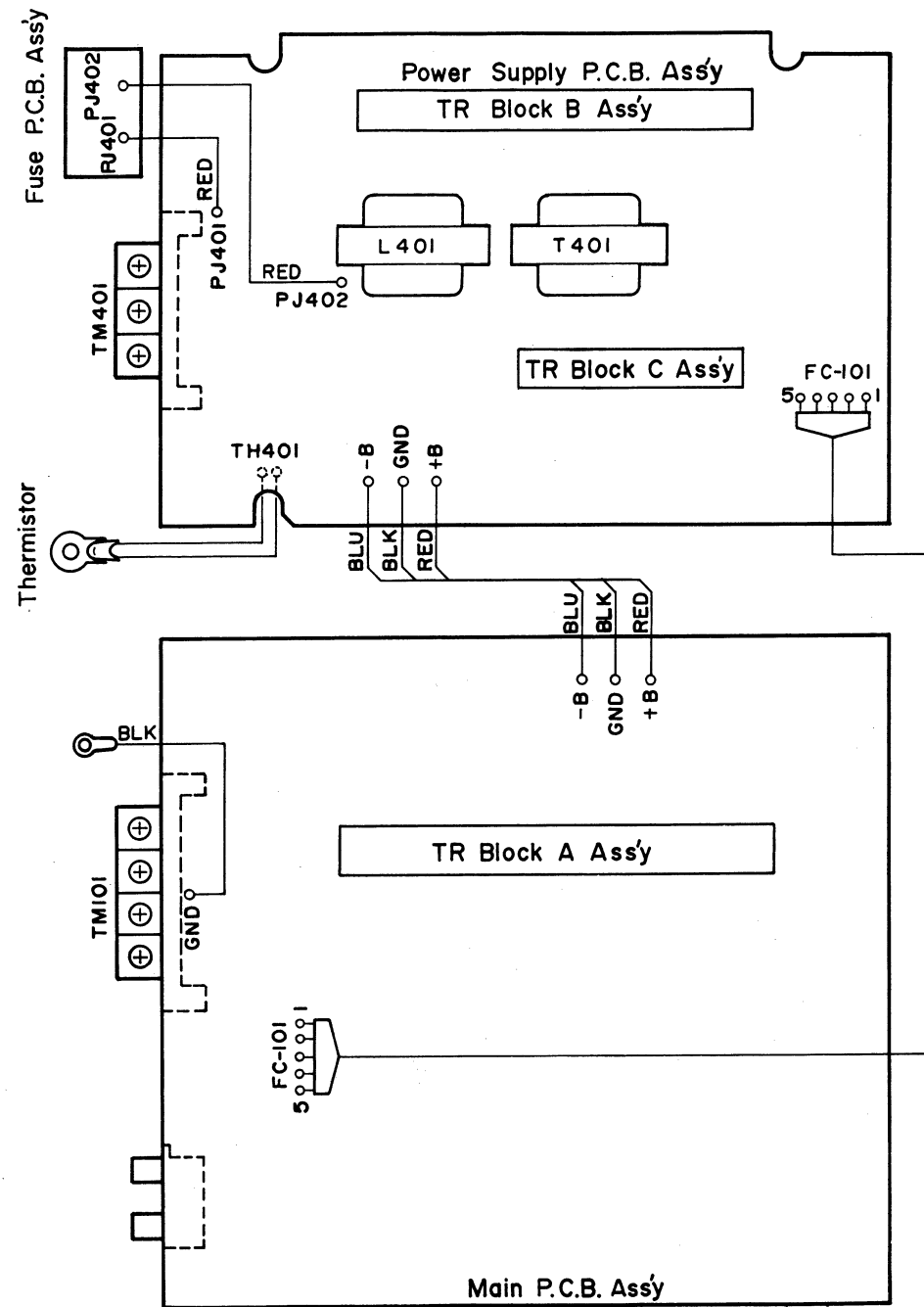


Fig. 7

- Notes : 1. Table of wire colors
 BRN—Brown BLU—Blue
 RED—Red VIO—violet
 ORN—Orange GRY—Gray
 YEL—Yellow WHT—White
 GRN—Green BLK—Black
2. Component side view of the P.C.B. is illustrated unless otherwise specified.

8. BLOCK DIAGRAM

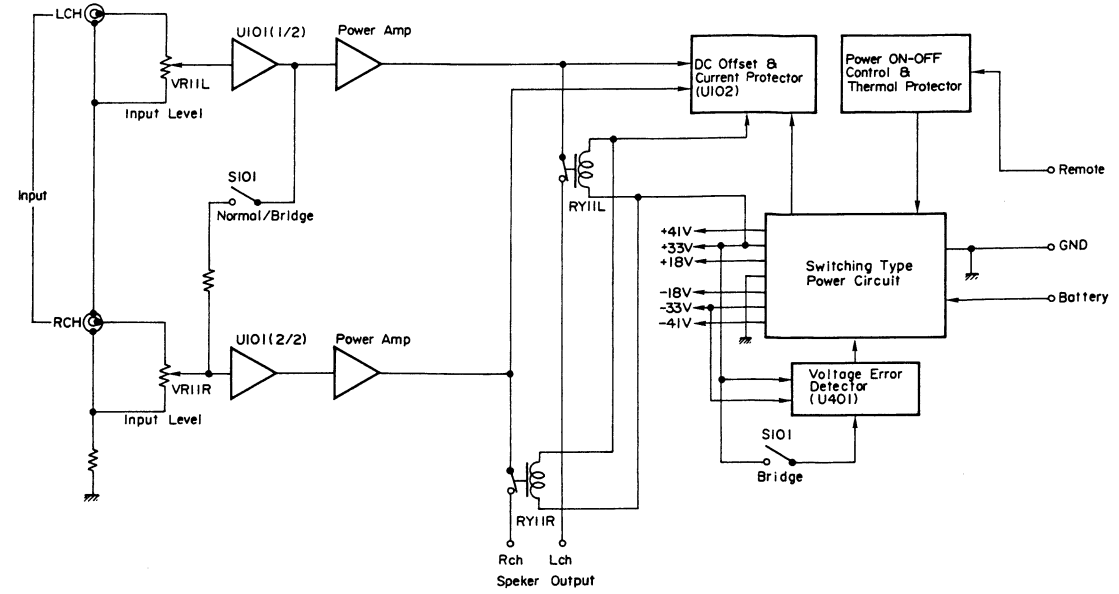
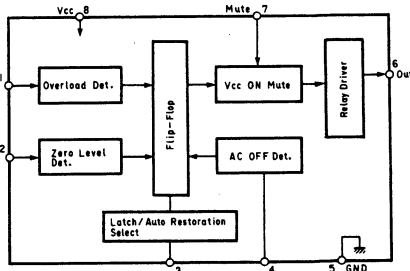
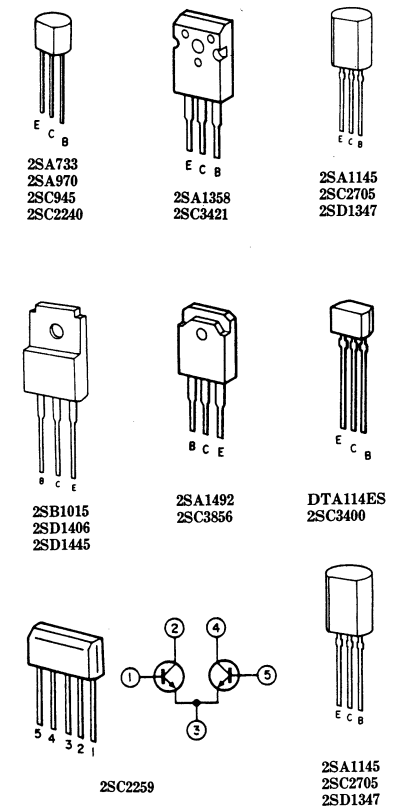
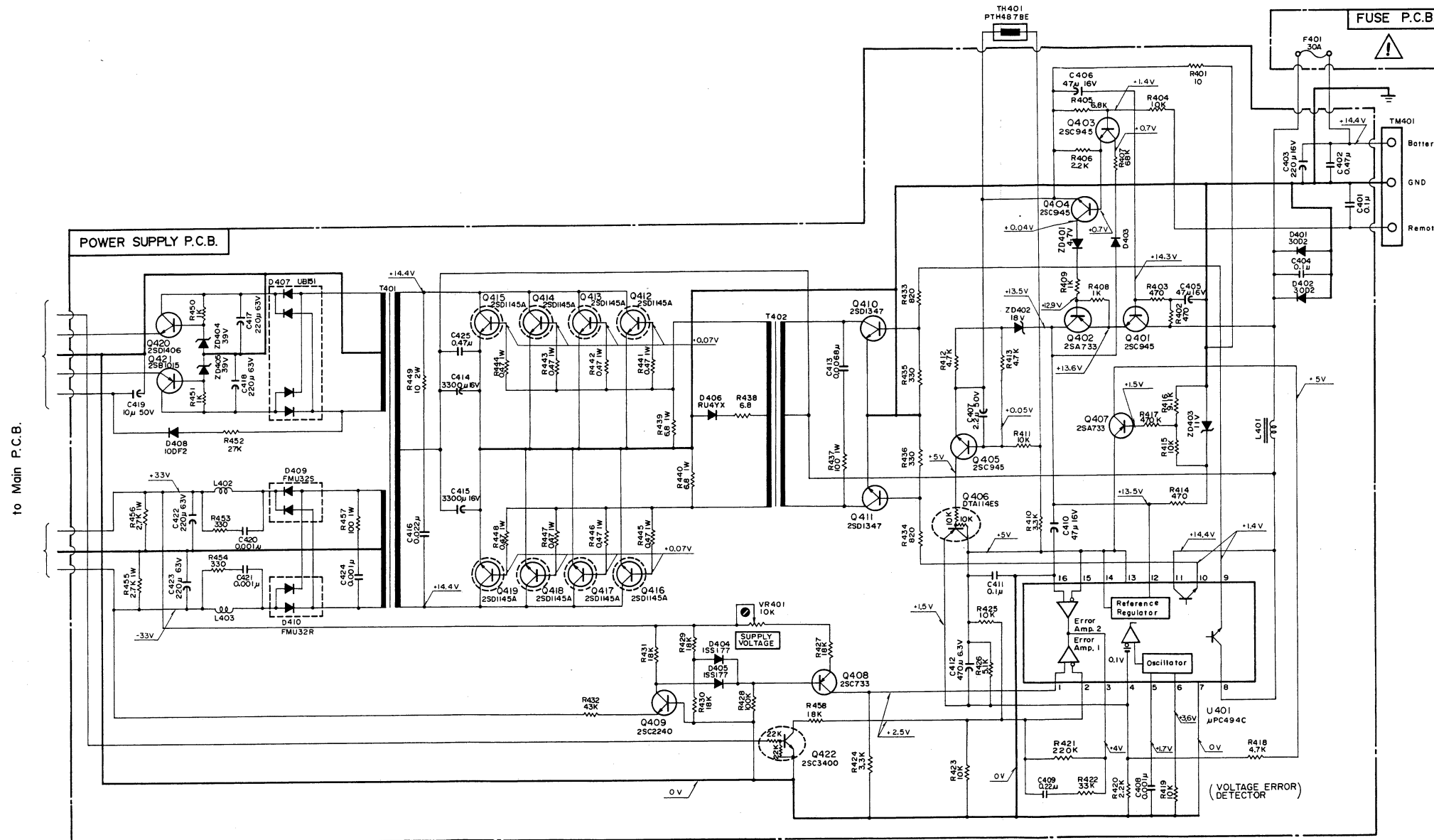


Fig. 8

9. SPECIFICATIONS

- Continuous Power Output80 W × 2 RMS (both channels driven, 4ohms, 1kHz, 0.005% THD)
 160 W × 1 RMS (monaural, 4 ohms, 1 kHz, 0.01% THD)
- Power Bandwidth10—50,000 Hz (4 ohms, 0.1% THD)
- Total Harmonic Distortion0.005% (4 ohms, 1 kHz, 80 W × 2)
- Frequency Response10—50,000 Hz +1, -3 dB (with input sensitivity control at max.)
 20—20,000 Hz ±1 dB
- Signal to Noise Ratio.....Better than 110 dB (IHF A-WTD, at rated power, with input sensitivity control at max.)
- Damping FactorGreater than 1,000 (4 ohms, 1 kHz)
- Input Sensitivity/Impedance.....0.3—0.8 V variable/10 kohms ("Normal" position)
 0.2—0.55 V variable/10 kohms ("Bridge" position)
- Stereo SeparationBetter than 80 dB (4 ohms, 1 kHz)
- Power Source14.4 V DC negative ground (10.8—15.6 V allowable)
- Current Consumption
 Max.26 A (both channels driven, 4 ohms, 80 W × 2)
 36 A (monaural, 4 ohms, 160 W × 1)
- MusicApprox. 10 A (4ohms)
- Min.Approx. 2 A (Idling)
- Load ImpedanceAbove 4 ohms
- Dimensions*320 (W) × 56 (H) × 190 (D) mm
 12-5/8 (W) × 2-3/16 (H) × 7-1/2 (D) inches
- Approximate Weight3.7 kg/8 lbs. 3 oz.

- * : Dimensions do not include protruding parts. Height is the panel height.
- Unless otherwise noted, the specs for PA-302 are measured with both channels driven
- Specifications and design are subject to change for further improvement without notice.



Power Amp. Protector IC μPC1237H

Notes : 1. Q412-Q419 are included in TR Block B Ass'y.
2. D409,D410 are included in TR Block C Ass'y.

Fig. 6.2

Notes : 1. Diode is 1SS176 unless otherwise specified.
2. Following transistors are interchangeable with each other.
a. 2SA733, 2SA608SP, 2SA1048, 2SA2785
b. 2SC945, 2SC536SP, 2SC2458, 2SC2785
3. Voltage measuring conditions :
• With no input signal applied to the input jacks.
• With no load connected to the speaker terminals.



Service Manual

Nakamichi PA-102

Mobile Power Amplifier

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1. GENERAL

1.1. Destination

- U.S.A. and Canada
- Other
- Europe
- Japan

1.2. Package Ass'y

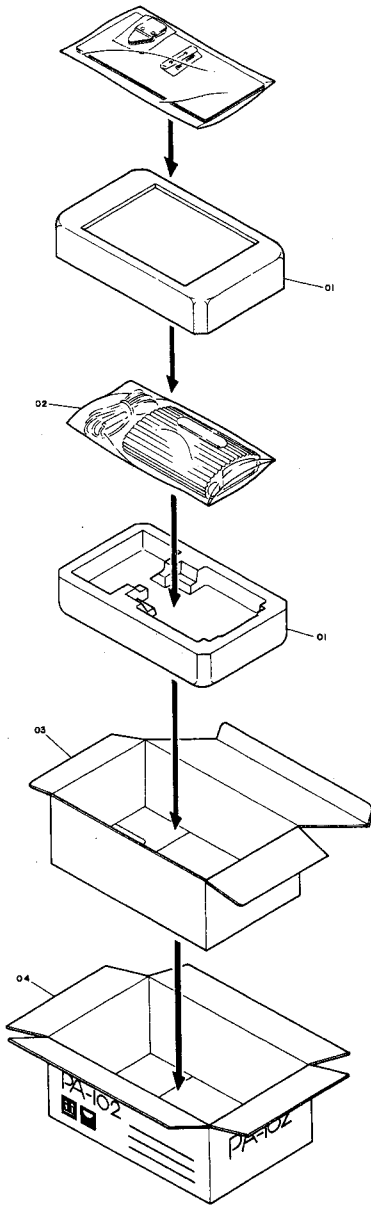


Fig. 1.1

1.3. Accessory Ass'y

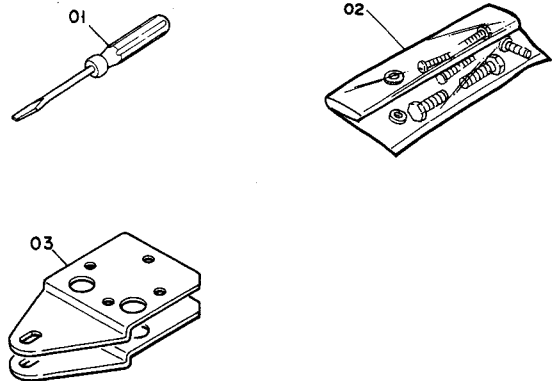


Fig. 1.2

Schematic Ref No.	Part No.	Description	Q'ty
Package Ass'y			
01	0F04284A	Packing (U.S.A./Other/Europe)	2
	0F04285A	Packing (Japan)	2
02	0F03854A	Poly-Bag (160×240×0.06)	1
03	0F04289A	Inner Carton (U.S.A)	1
	0F04332A	Inner Carton (Other/Europe)	1
	0F04290A	Inner Carton (Japan)	1
04	0F04296A	Outer Carton (U.S.A)	1
	0F04333A	Outer Carton (Other/Europe)	1
Accessory Ass'y			
01	0D04389A	Screwdriver	1
02	DA04293A	Screw Ass'y	1
03	0H05589A	Mounting Plate	2
—	0D04593A	Poly-Bag (250×250×0.08)	1
—	0D04210A	Poly-Bag (130×250×0.03)	1
—	0D05001A	Owner's Manual (English/German/ French)	1
—	0D05002A	Owner's Manual (Japanese)	1

2. MECHANISM ASS'Y AND PARTS LIST

2.1. Synthesis

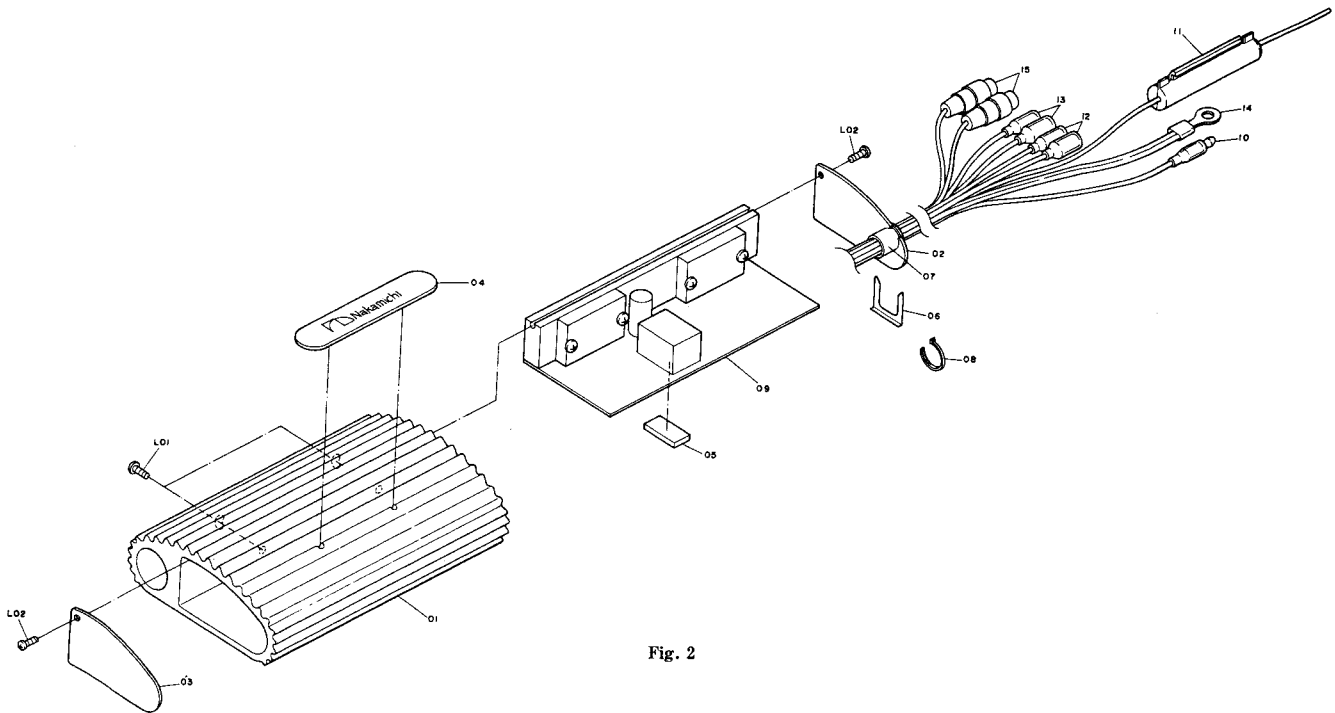


Fig. 2

Schematic Ref No.	Part No.	Description	Q'ty
2.1. Synthesis			
		Synthesis	
01	0H05613B	Heat Sink	1
02	0H05614A	Side Cover A	1
03	0H05615A	Side Cover B	1
04	0H05623B	Name Plate	1
05	0J04411A	Chusion	1
06	0J05092A	Snap Plate	1
07	0J05345A	Cord Bushing	2
08	0B90019A	Insu-Lock (SKB80)	2
09	BA07685A	Main P.C.B. Ass'y	1
10	0B83774A	Remote Cable (Blue/White)	1
11	0B83775A	Battery Cable (Yellow)	1
12	0B84185B	Speaker Cable L (White/Black)	1
13	0B84186B	Speaker Cable R (Grey/Black)	1
14	0B84187A	Ground Cable	1
15	0B84188A	Input Cable	1
L01	0E00948A	BT 3×10 ⊕ Binding (Black Chromate)	
L02	0E03555A	BT 3×8 ⊕ Truss (Black Chromate)	

3. MOUNTING DIAGRAMS

- Notes :
1. Mounting diagram shows a dip side view of the printed circuit board.
 2. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
 3. Following transistors are interchangeable with each other.
 - a. 2SA733, 2SA608SP, 2SA1048, 2SA1175
 - b. 2SC945, 2SC536SP, 2SC2458, 2SC2785
 4. Abbreviation for part name :
 - TR—Transistor, SiD—Silicon Diode
 - RK—Carbon Resistor
 - C—Mica Capacitor, CPP—PP Capacitor
 - CE—Electrolytic Capacitor, CML—Mylar Capacitor

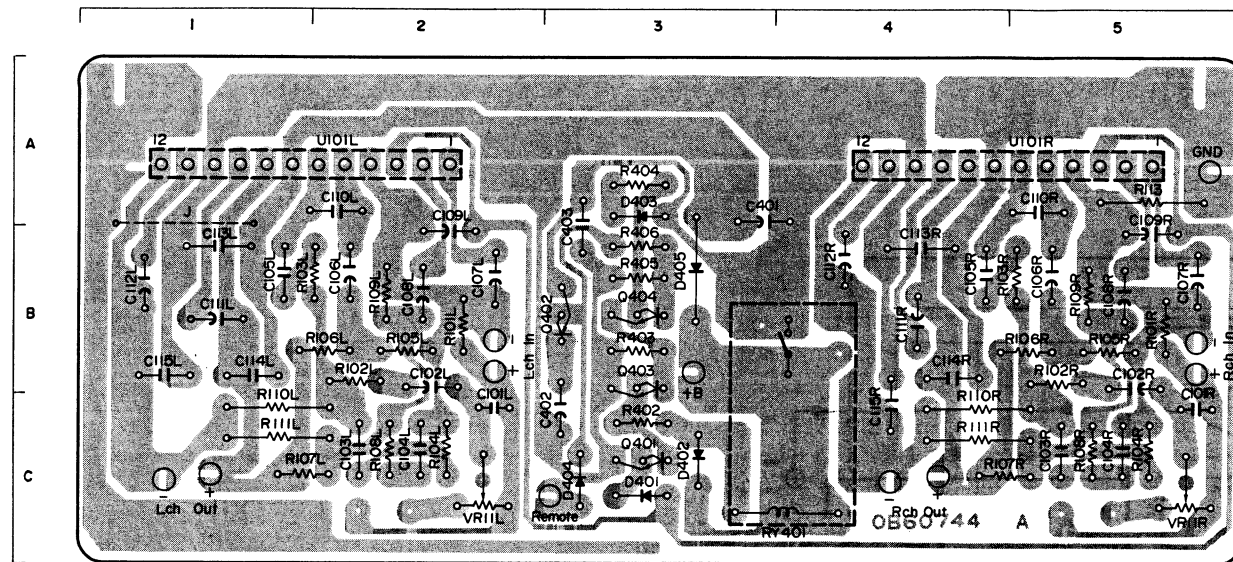
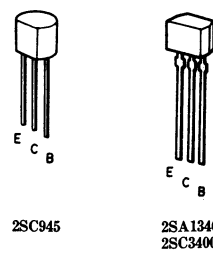


Fig. 3

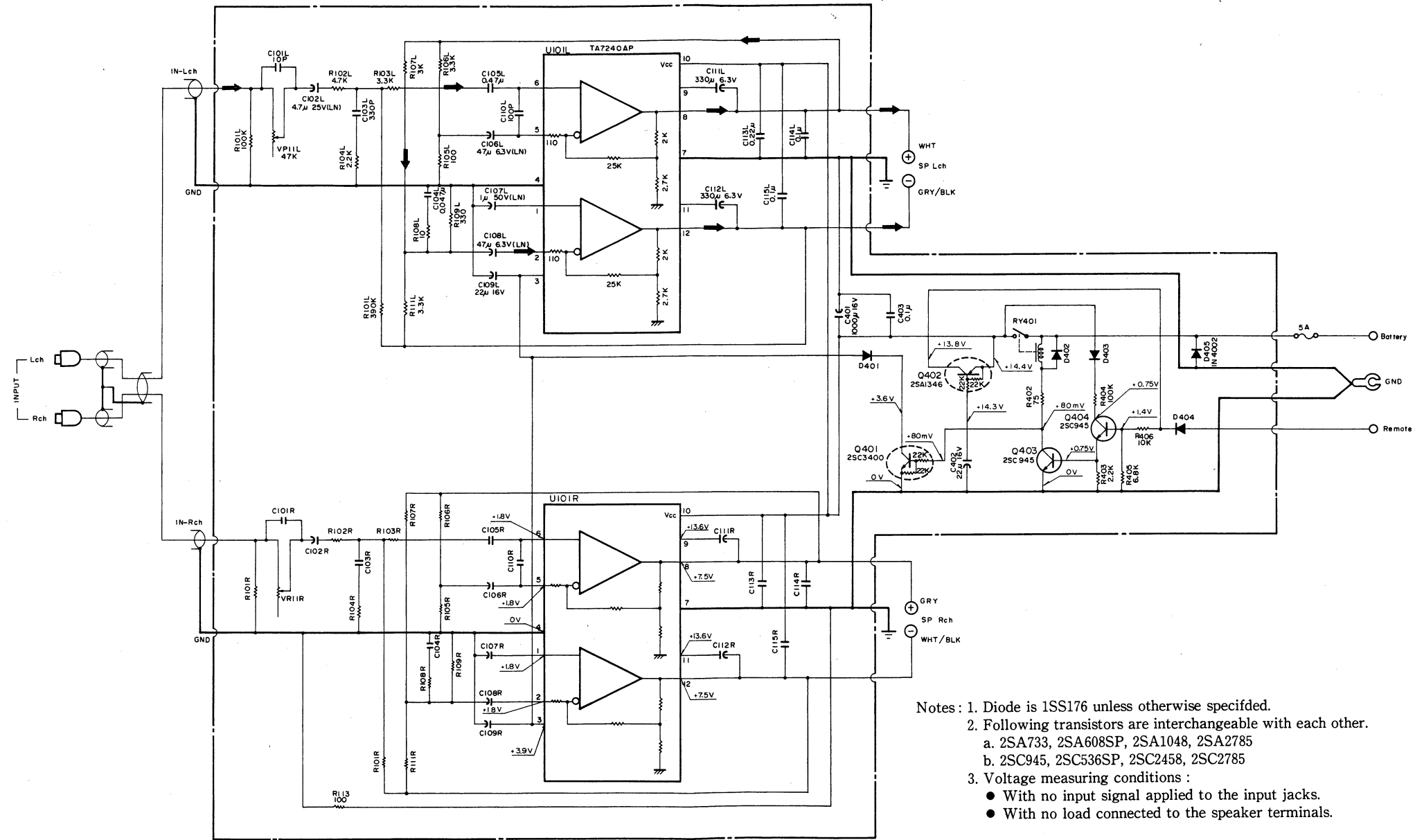
Schematic Ref. No.	Part No.	Description
3.1. Main P.C.B. Ass'y		
	BA07685A	Main P.C.B. Ass'y
	0B60744A	Main P.C.B.
U101L,R	0B11033A	IC TA7240AP
Q401	0B10002A	TR 2SC3400
Q402	0B10004A	TR 2SC1346
Q403,404	0B06100A	TR 2SC945 (K,P,Q)
D401,402	0B06398A	SiD 1SS176
D403,404	0B06398A	SiD 1SS176
D405	0B12586A	SiD 1N4002
VR11L,R	0B32084A	Semi-VR 47K (B)
R101L,R	0B09725A	RK 100K 1/6W J
R102L,R	0B09693A	RK 4.7K 1/6W J
R103L,R	0B09689A	RK 3.3K 1/6W J
R104L,R	0B09685A	RK 2.2K 1/6W J
R105L,R	0B09653A	RK 100 1/6W J
R106L,R	0B09689A	RK 3.3K 1/6W J
R107L,R	0B09688A	RK 3.0K 1/6W J
R108L,R	0B09629A	RK 10 1/6W J
R109L,R	0B09665A	RK 330 1/6W J
R110L,R	0B05676A	RK 390K 1/4W J
R111L,R	0B09533A	RK 3.3K 1/4W J
R113	0B01679A	RK 100 1/4W J
R402	0B09650A	RK 75 1/6W J
R403	0B09685A	RK 2.2K 1/6W J
R404	0B09725A	RK 100K 1/6W J
R405	0B09697A	RK 6.8K 1/6W J
R406	0B09701A	RK 10K 1/6W J
C101L,R	0B41512A	C 10p 50V D
C102L,R	0B09833A	CE 4.7μ 25V (LN)
C103L,R	0B41213A	CPP 330p 100V J
C104L,R	0B41294A	CML 0.047μ 50V J
C105L,R	0B47081A	CML 0.47μ 100V J
C106L,R	0B09815A	CE 47μ 6.3V (LN)
C107L,R	0B09814A	CE 1.0μ 50V (LN)
C108L,R	0B09815A	CE 47μ 6.3V (LN)
C109L,R	0B40163A	CE 22μ 16V
C110L,R	0B09302A	C 100p 50V J
C111L,R	0B40051A	CE 330μ 6.3V
C112L,R	0B40051A	CE 330μ 6.3V
C113L,R	0B47079A	CML 0.22μ 63V J
C114L,R	0B41298A	CML 0.1μ 50V J
C115L,R	0B41298A	CML 0.1μ 50V J
C401	0B40651A	CE 1000μ 16V
C402	0B40075A	CE 22μ 16V
C403	0B47077A	CML 0.1μ 63V J
RY401	0B90427A	JZ Relay 12V
	0J05971A	Heat Sink-A
	0E03138A	M3 × 10⊕Binding
	0E00868A	BT3 × 8⊕Binding

Semiconductor Location

Ref. No.	Location
U101L	A-2
U101R	A-5
Q401	C-3
Q402	B-3
Q403	B-3
Q404	B-3
D401	C-3
D402	C-3
D403	A-3
D404	C-3
D405	B-3



4. SCHEMATIC DIAGRAM



5. SPECIFICATIONS

Continuous Power Output	14 W × 2RMS (both channels driven, 4 ohms, 1 kHz, 0.05% THD)
Power Bandwidth	20—20,000 Hz (both channels driven, 4 ohms, 0.5% THD)
Total Harmonic Distortion	0.008% (4 ohms, 400 Hz, 5 W × 2)
Frequency Responce	10—50,000 Hz + 1, -3 dB (with input sensitivity control at min.) 20—20,000 Hz ± 1 dB
Signal to Noise Ratio	Better than 100 dB (IHF A-WTD, at rated power, input sensitivity controls at min.)
Damping Factor	Greater than 150 (4 ohms, 400 Hz)
Input Sensitivity/Impedance	0.2—0.8 V variable/20 kohms
Channel Separation	Better than 80 dB (4 ohms, 400 Hz)
Power Source	14.4 V DC negative ground (10.8—15.6 V allowable)
Current Consumption	
Max.	3.5 A (both channels driven, 4 ohms, 14 W × 2)
Music	Approx. 1.5 A (4 ohms)
Load Impedance	Above 4 ohms
Dimensions*	89 (W) × 36 (H) × 125 (D) mm 3-1/2 (W) × 1-7/16 (H) × 4-15/16 (D) inches
Approximate Weight	510 g/1 lb. 2oz

* : Dimensions do not include protruding parts. Height is the panel height.

● Specifications and design are subject to change for further improvement without notice.