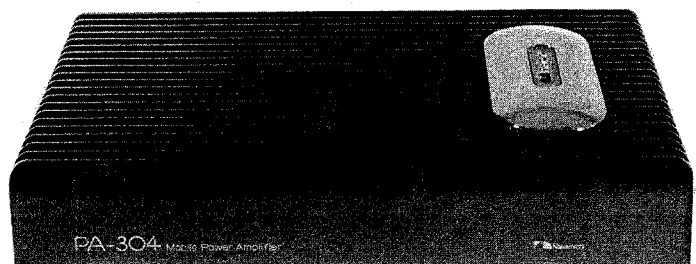




Service Manual

Nakamichi PA-304

Mobile Power Amplifier



CONTENTS

1. General	1
2. Removal Procedure	2
2. 1. Fuse	2
3. Adjustments	3
3. 1. Parts Location for Adjustment	3
3. 2. Adjustment Procedures	3
4. Mechanism Ass'y and Parts List	4
4. 1. Synthesis	4
4. 2. TR Block Ass'y B (A01)	5
4. 3. TR Block Ass'y C (A02)	5
4. 4. TR Block Ass'y A (A03)	5
5. Mounting Diagrams	5
5. 1. Power Supply P.C.B. Ass'y	6
5. 2. Main P.C.B. Ass'y	7
5. 3. Fuse P.C.B. Ass'y	7
5. 4. BTL Switch P.C.B. Ass'y	7
6. Wiring Diagram	8
7. Schematic Diagram	9
8. Block Diagram	10
9. Specifications	10

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 (BA07652A)	● TR Block Ass'y A 2 pcs. (BA07656A)	Ref. No. 15 in Fig. 4.1. Consists of transistors and heat sink.
Power Supply P.C.B. Ass'y (BA07653A)	● TR Block Ass'y B 1 pce. (BA07657A)	Ref. No. 10 in Fig. 4.1. Consists of transistors and heat sink.
	● TR Block Ass'y C 1 pce. (BA07658A)	Ref. No. 12 in Fig. 4.1. Consists of diodes and heat sink.
	● Converter Transformer . . 1 pce. (OB50158A)	Ref. No. 23 in Fig. 4.1. (T401)
	● Choke Coil 1 pce. (OB51314A)	Ref. No. 24 in Fig. 4.1. (L401)

1.2. Destination

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

1.3. Package Ass'y

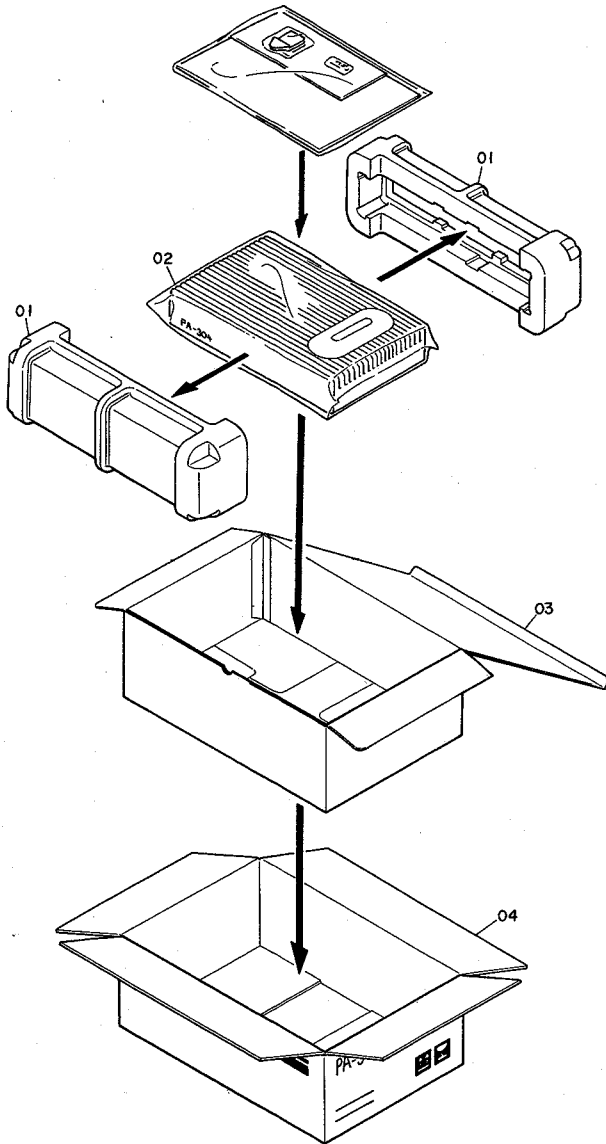


Fig. 1.1

1.4. Accessory Ass'y

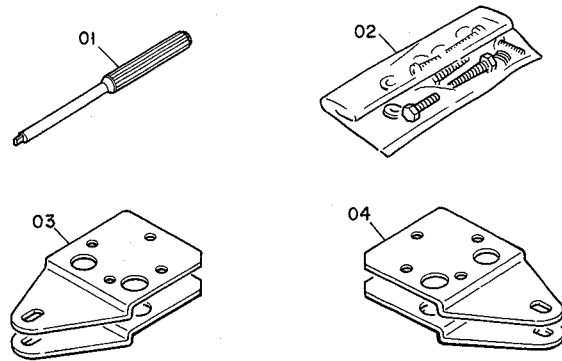


Fig. 1.2

Schematic Ref. No.	Part No.	Description	Qty
Package Ass'y			
01	0F04250B	Packing (U.S.A./Other/Europe)	2
	0F04260B	Packing (Japan)	2
02	0F04249B	Poly-Bag (300x400x0.08)	1
03	0F04268A	Outer Carton (U.S.A.)	1
	0F04329A	Outer Carton (Other/Europe)	1
	0F04269A	Outer Carton (Japan)	1
04	0F04251B	Inner Carton (U.S.A.)	1
	0F04328A	Inner Carton (Other/Europe)	1
	0F04261A	Inner Carton (Japan)	1
Accessory Ass'y			
01	0D03903C	Screwdriver	1
02	DA04253A	Screw Ass'y	1
03	0H05572A	Mounting Plate A	1
04	0H05589A	Mounting Plate B	1
—	0D03092B	Poly-Bag (320x340x0.08)	1
—	0D04593A	Poly-Bag (80x100x0.05)	1
—	0D04969A	Owner's Manual (English/ German/French)	1
—	0D04970A	Owner's Manual (Japanese)	1
—	0D04810A	Important Notice	1

2. REMOVAL PROCEDURE

2.1. Fuse

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

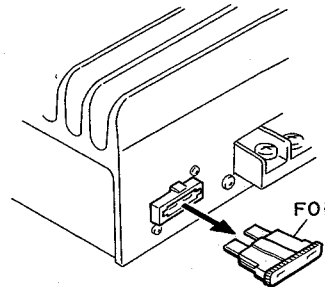
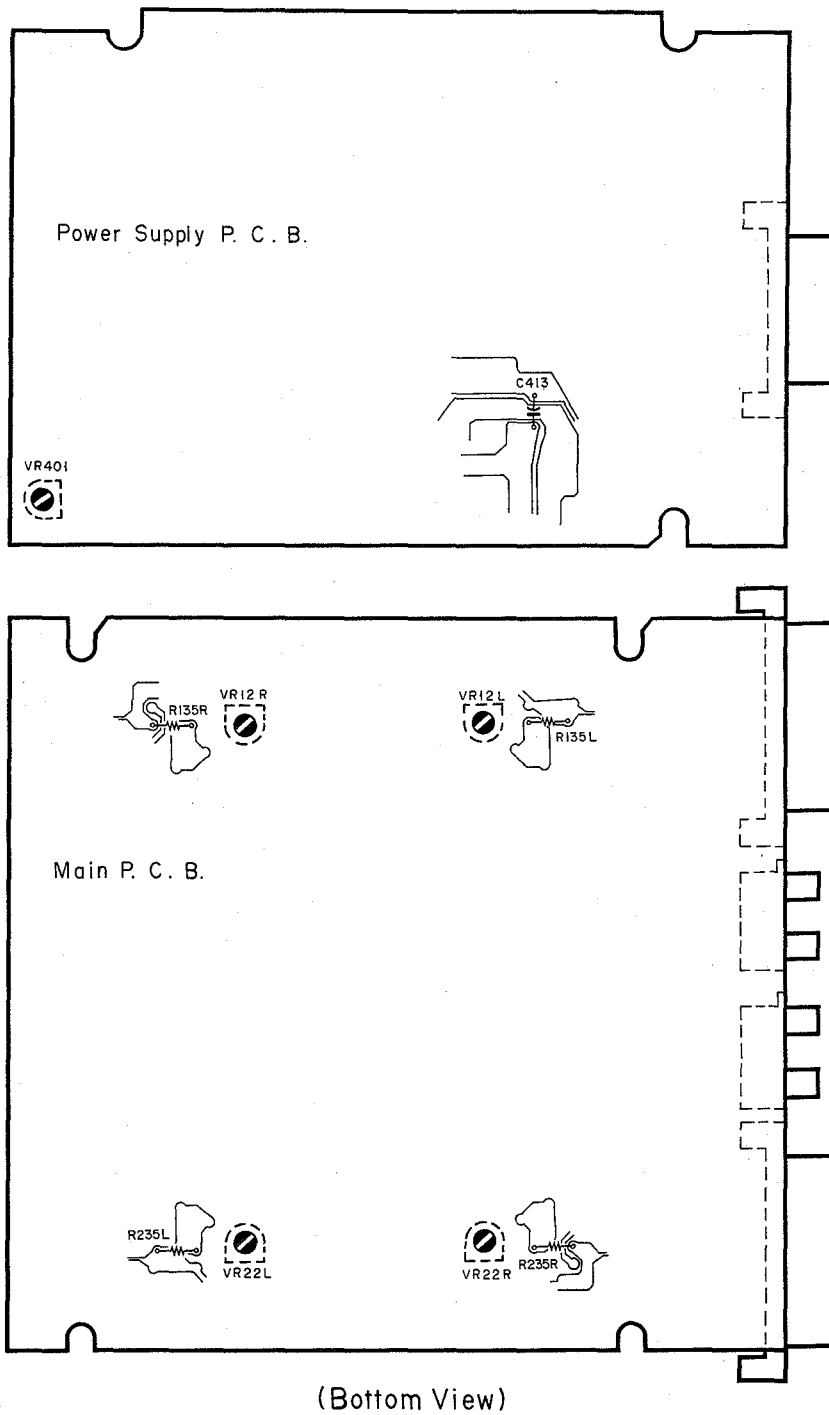


Fig. 2 Rear View

3. ADJUSTMENTS

3.1. Parts Location for Adjustment



(Bottom View)

Fig. 3

3.2. Adjustment Procedures

Note: Perform adjustment from the bottom of the PA-304.

3.2.1. Power Supply Output Voltage (Power Supply P.C.B. Ass'y)

- (1) Connect a DC voltmeter across C413.
- (2) Supply 14.4 VDC to +14.4 V Terminal and Remote Terminal of the PA-304.
- (3) Adjust VR401 to obtain +24.0 V 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 R135L (R135R).
- (3) Adjust VR12L (VR12R) to obtain 6 mV (approx. 27 mA) on the DC millivoltmeter.
- (4) Connect a DC millivoltmeter across R235L (R235R).
- (5) Adjust VR22L (VR22R) to obtain 6 mV (approx. 27 mA) on the DC millivoltmeter.
- (6) Remove the shoring pins.

4. MECHANISM ASS'Y AND PARTS LIST

4.1. Synthesis

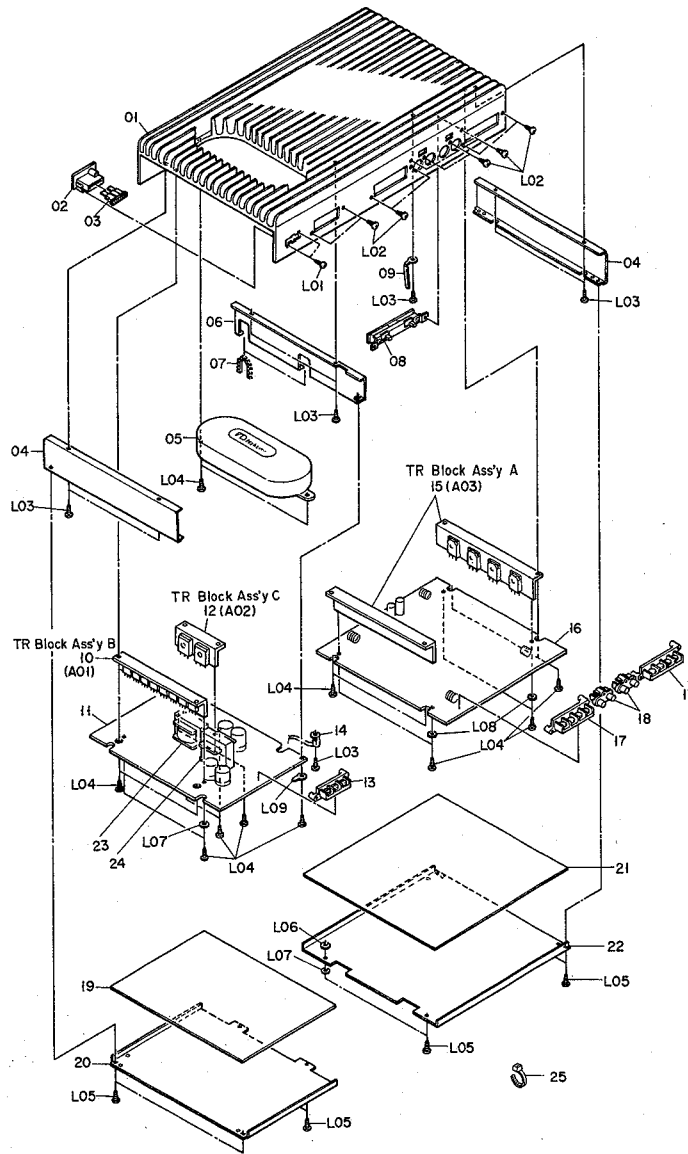


Fig. 4.1

Schematic Ref. No.	Part No.	Description	Q'ty	Schematic Ref. No.	Part No.	Description	Q'ty
4.1. Synthesis					OB84153A	Terminal 4P (Gold) (Other/Europe/Japan) (TM101, TM201)	2
	Synthesis			18	OB81630A	Pin Jack 2P (Gold) (PJ101, PJ201)	2
01	OH05571A	Heat Sink B317	1	19	OJ05923A	Bottom Sheet A	1
02	BA07655A	Fuse P.C.B. Ass'y	1	20	OH05575A	Bottom Cover A	1
03	OB90403A	Fuse 30A	1	21	OJ05924A	Bottom Sheet B	1
04	OH05573A	Side Chassis A	2	22	OH05576A	Bottom Cover B	1
05	HA05715A	Transformer Cover Ass'y	1	23	OB50158A	Converter Transformer (T401 on Power Supply P.C.B. Ass'y)	1
06	OJ05919B	Center Chassis	1	24	OB51314A	Choke Coil (L401 on Power Supply P.C.B. Ass'y)	1
07	OJ05966A	Free Bushing	2	25	OB08515A	Insu-Lock	7
08	BA07654A	BTL Switch P.C.B. Ass'y	1	L01	OE00974A	BT2x8 ⊕ Binding (Black Chromate)	2
09	OE03145A	Clip CS-9	1	L02	OE00921A	BT3x8 ⊕ Binding (Black Chromate)	10
10	BA07657A	TR Block Ass'y B	1	L03	OE03013A	BT3x5 ⊕ Binding	8
11	BA07653A*	Power Supply P.C.B. Ass'y	1	L04	OE00868A	BT3x8 ⊕ Binding	19
12	BA07658A	TR Block Ass'y C	1	L05	OE00860A	BT3x6 ⊕ Binding (Black chromate)	8
13	OB84106A	Terminal 3P (U.S.A.) (TM401)	1	L06	OJ05057A	Washer 3.4x7x0.5	1
	OB84152A	Terminal 3P (Gold) (Other/Europe/Japan) (TM401)	1	L07	OJ06007A	Fiber Washer 8x3.1x0.5T	3
14	OB19013A	Thermistor PTH487A01BE471 (TH401)	1	L08	OE00172A	Washer 3mm Toothed Lock	2
15	BA07656A	TR Block Ass'y A	2	L09	OE00174A	Earth Lug B-4	1
16	BA07652A*	Main P.C.B. Ass'y	1				
17	OB84107A	Terminal 4P (U.S.A.) (TM101, TM201)	2				

*: See item 1.1.

4.2. TR Block Ass'y B (A01)

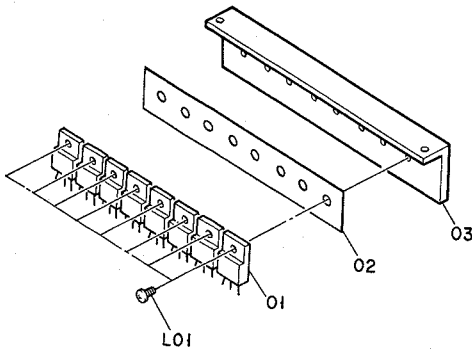


Fig. 4.2

4.4. TR Block Ass'y A (A03)

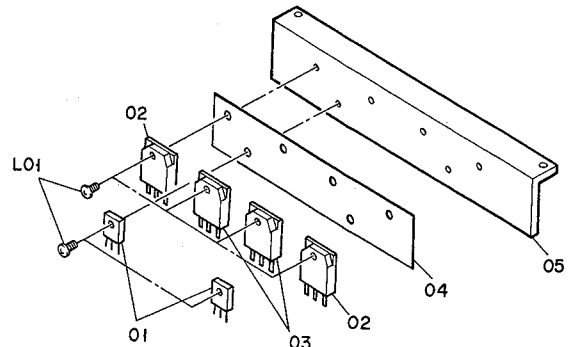


Fig. 4.4

4.3. TR Block Ass'y C (A02)

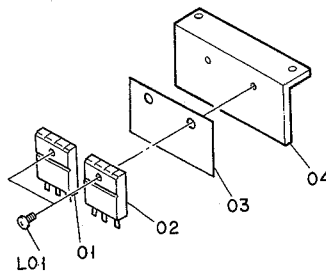


Fig. 4.3

Schematic Ref. No.	Part No.	Description	Qty
4.2. TR Block Ass'y B (A01)			
A01	BA07657A	TR Block Ass'y B	1
01	0B10315A	TR 2SD1445A (Q401-Q408)	8
02	0J05946A	Transistor Sheet B	1
03	0J05921A	Heat Sink B	1
L01	0E03319A	M3x8 @ Binding	8
4.3. TR Block Ass'y C (A02)			
A02	BA07658A	TR Block Ass'y C	1
01	0B12612A	FMU-32R (D405)	1
02	0B12611A	FMU-32S (D404)	1
03	0J05947A	Transistor Sheet C	1
04	0J05922A	Heat Sink C	1
L01	0E03319A	M3x8 @ Binding	2
4.4. TR Block Ass'y A (A03)			
A03	BA07656A	TR Block Ass'y A	1
01	0B10199A	TR 2SC3421 (Q104L,R or Q204L,R)	2
02	0B10312A	TR 2SC4467 (Q110L,R or Q210L,R)	2
03	0B10313A	TR 2SA1694 (Q111L,R or Q211L,R)	2
04	0J05945A	Transistor Sheet A	1
05	0J05920A	Heat Sink A	1
L01	0E03319A	M3x8 @ Binding	6

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, CML — Mylar Capacitor, CC — Ceramic Capacitor, CPP — PP Capacitor,

CMM — Metalized Mylar Capacitor, CSP — Polystyrene Capacitor, C — Mica Capacitor

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

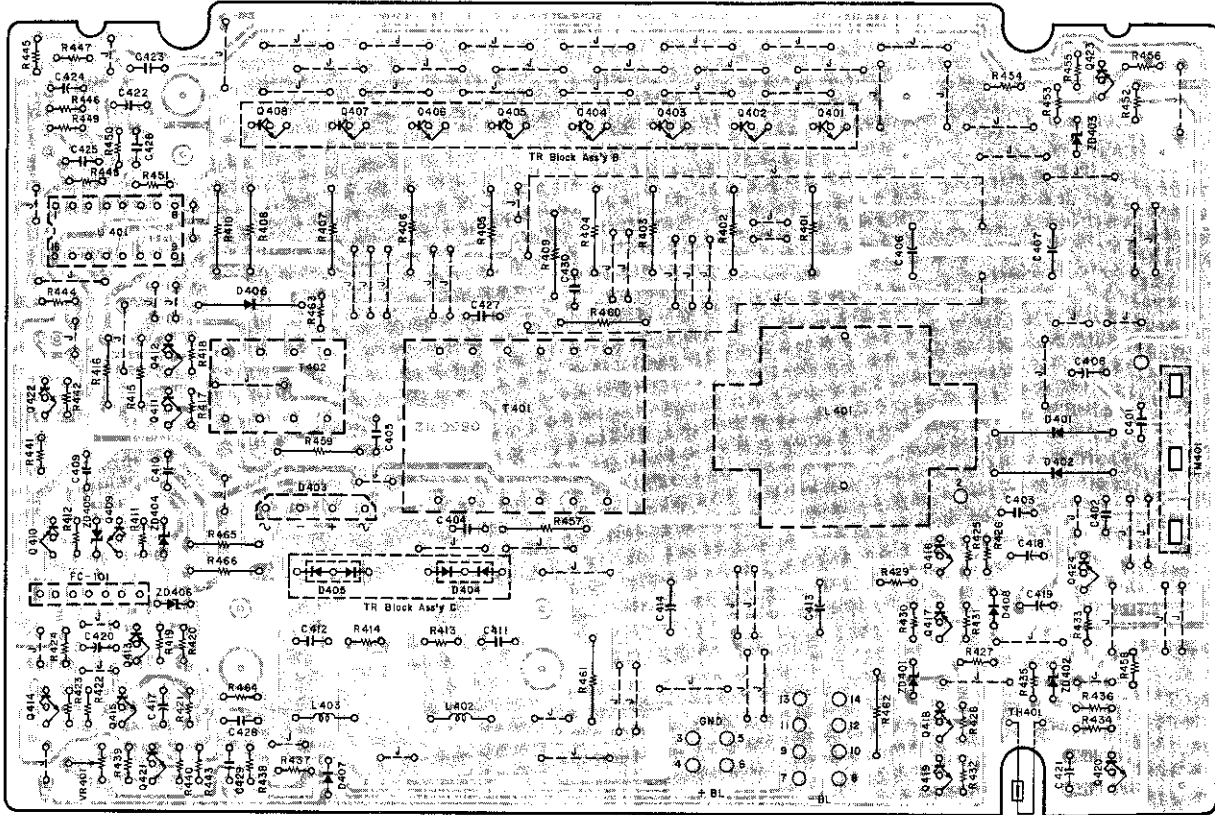


Fig. 5.1

Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description	Schematic Ref. No.	Part No.	Description
5.1. Power Supply P.C.B. Ass'y								
	BA07653A (Note)	Power Supply P.C.B. Ass'y	R413,414	OB09665A	RK 330 1/6W J	C402,403	OB41917A	CC 0.10μ 50V Z
	OB60712A	Power Supply P.C.B.	R415,416	OB01680A	RK 820 1/4W J	C404	OB41084A	CML 1500P 50V J
			R417,418	OB09665A	RK 330 1/6W J	C405	OB09854A	CML 6800P 50V J
U401	OB06427A	IC μPC494C	R419	OB09677A	RK 1.0K 1/6W J	C406,407	OB40615A	CE 3300μ 16V
Q409	OB06452A	TR 2SD1406	R420	OB09699A	RK 8.2K 1/6W J	C408	OB40079A	CE 220μ 16V
Q410	OB06451A	TR 2SB1015	R421,422	OB09709A	RK 22K 1/6W J	C409	OB40617A	CE 180μ 50V
Q411,412	OB10046A	TR 2SD1347	R423	OB09697A	RK 6.8K 1/6W J	C410	OB40636A	CE 330μ 63V
Q413	OB06013A	TR 2SA733 (P,Q)	R424	OB09701A	RK 10K 1/6W J	C411,412	OB41082A	CML 1000P 50V J
Q414,415	OB06100A	TR 2SC945	R425,426	OB09669A	RK 470 1/6W J	C413,414	OB40616A	CE 1800μ 35V
		(K,P,Q)	R427	OB09701A	RK 10K 1/6W J	C417	OB40206A	CE 100μ 16V
Q416	OB06100A	TR 2SC945 (K,P,Q)	R428	OB09697A	RK 6.8K 1/6W J	C418,419	OB40077A	CE 47μ 16V
Q417	OB06013A	TR 2SA733 (P,Q)	R429,430	OB09677A	RK 1.0K 1/6W J	C420	OB40206A	CE 100μ 16V
Q418,419	OB06100A	TR 2SC945 (K,P,Q)	R431	OB09721A	RK 68K 1/6W J	C421	OB40113A	CE 2.2μ 50V
Q420,421	OB06100A	TR 2SC945 (K,P,Q)	R432	OB09685A	RK 2.2K 1/6W J	C422	OB40077A	CE 47μ 16V
Q422	OB06100A	TR 2SC945 (K,P,Q)	R433	OB09689A	RK 3.3K 1/6W J	C423	OB41917A	CC 0.10μ 50V Z
Q423	OB06013A	TR 2SA733 (P,Q)	R434	OB09701A	RK 10K 1/6W J	C424	OB40052A	CE 470μ 6.3V
Q424	OB10058A	TR DTA114ES	R435,436	OB09693A	RK 4.7K 1/6W J	C425	OB41298A	CML 0.10μ 50V J
ZD401	OB12144A	ZD 4.7V RD4.7JSB2	R437,438	OB09725A	RK 100K 1/6W J	C426	OB41082A	CML 1000P 50V J
ZD402	OB12186A	ZD 18V RD18JSB2	R439	OB09709A	RK 22K 1/6W J	C427	OB09860A	CML 0.022μ 50V J
ZD403	OB12623A	ZD 11V RD11ESB2	R440	OB09677A	RK 1.0K 1/6W J	C428	OB41088A	CML 3300P 50V J
ZD404,405	OB12204A	ZD 33V RD33JSB2	R441,442	OB09709A	RK 22K 1/6W J	C429	OB41082A	CML 1000P 50V J
ZD406	OB12623A	ZD 11V RD11ESB2	R443	OB09689A	RK 3.3K 1/6W J	C430	OB41298A	CML 0.1μ 50V J
D401,402	OB06458A	SiD 30D-2	R444	OB09709A	RK 22K 1/6W J	FC101	OB83748A	Ribbon Cable 7P 210mm
D403	OB12418A	SiD UB-151	R445	OB09701A	RK 10K 1/6W J			
D406	OB12665A	SiD RU4YX	R446	OB09694A	RK 5.1K 1/6W J	FC102	OB83749A	Ribbon Cable 2P 250mm
D407,408	OB06398A	SiD 1SS176	R447	OB09701A	RK 10K 1/6W J	FC103	OB83750A	Ribbon Cable 2P 310mm
T402	OB50159A	Drive Transformer (EI19)	R448	OB09733A	RK 220K 1/6W J	FC104	OB83752A	Ribbon Cable 2P 400mm
L402,403	OB51313A	Choke Coil	R449	OB09677A	RK 1.0K 1/6W J	FC105	OB83753A	Ribbon Cable 2P 460mm
VR401	OB32080A	Semi VR 10K (B)	R450	OB09685A	RK 2.2K 1/6W J	FC106	OB83751A	Ribbon Cable 2P 370mm
R401,402	OB24170A	RF 0.47 1W J	R451	OB09701A	RK 10K 1/6W J	FC107	OB83753A	Ribbon Cable 2P 460mm
R403,404	OB24170A	RF 0.47 1W J	R452	OB09669A	RK 470 1/6W J			
R405,406	OB24170A	RF 0.47 1W J	R453	OB09701A	RK 10K 1/6W J			
R407,408	OB24170A	RF 0.47 1W J	R454	OB09700A	RK 9.1K 1/6W J			
R409,410	OB24230A	RF 6.8 1W J	R455	OB09741A	RK 470K 1/6W J			
R411,412	OB09673A	RK 680 1/6W J	R456	OB09693A	RK 4.7K 1/6W J			
			R457	OB24231A	RF 100 1W J			
			R458	OB09629A	RK 10 1/6W J			
			R459	OB24231A	RF 100 1W J			
			R460	OB24122A	RF 10 2W J			
			R461,462	OB24232A	RF 820 1W J			
			R463	OB09625A	RK 6.8 1/6W J			
			R464	OB09677A	RK 1.0K 1/6W J			
			R465,466	OB09753A	RK 4.7 1/4W J			
			C401	OB41822A	CML 0.47μ 50V J			
							OB80237A	Wire RED 130mm(1)
							OB80238A	Wire BLK 130mm(1)
							OE00868A	BT3x8 ⊕ Binding (4)
							OJ06007A	Washer 8x3.1x0.5T (Fiber) (1)

Note: TR Block Ass'y B, TR Block Ass'y C, T401, and L401 are not included in the Power Supply P.C.B. Ass'y. (See item 1.1.)

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

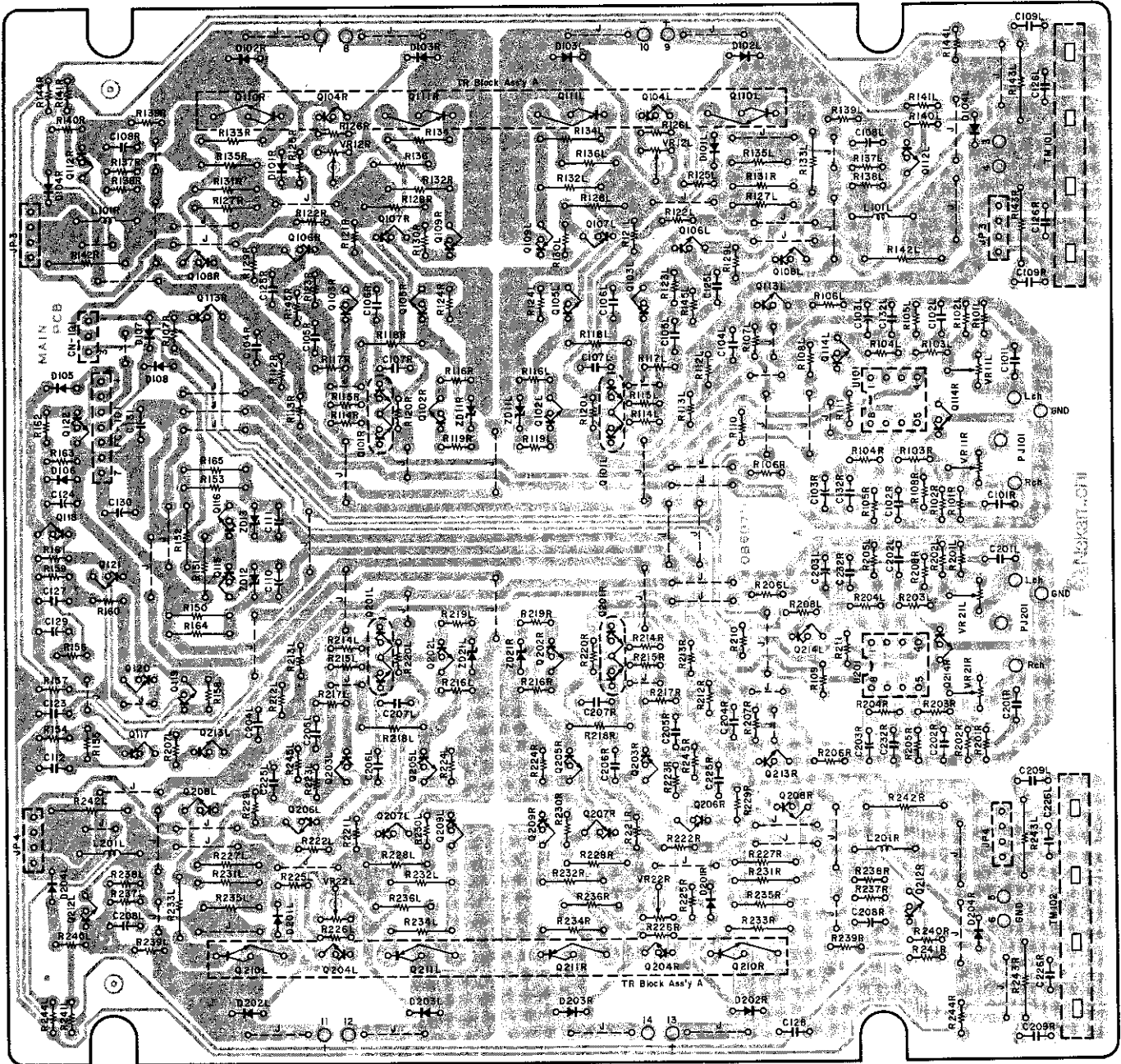


Fig. 5.2

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

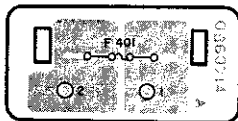


Fig. 5.3

5.4. BTL Switch P.C.B. Ass'y



Fig. 5.4

6. WIRING DIAGRAM

a 1.1.)

Schematic Ref. No.	Part No.	Description
C126L,R	OB41294A	CML 0.047μ 50V J
C127	OB41298A	CML 0.1μ 50V J
C128	OB09880A	CML 1μ 50V J
C129	OB40075A	CE 22μ 16V
C130	OB40639A	CE 470μ 35V (LN)
C131	OB40637A	CE 220μ 35V (LN)
C132L,R	OB41291A	CML 0.027μ 50V J
C201L,R	OB09249A	C 33P 50V J
C202L,R	OB09322A	CPP 330P 100V J
C203L,R	OB09933A	CE 2.2μ 50V (LN)
C204L,R	OB41119A	CPP 560P 100V G
C205L,R	OB05653A	CML 1500P 50V J
C206L,R	OB09249A	C 33P 50V J
C207L,R	OB09242A	C 47P 50V J
C208L,R	OB40027A	CE 2.2μ 50V
C209L,R	OB41302A	CML 0.22μ 50V J
C225L,R	OB41292A	CML 0.033μ 50V J
C226L,R	OB41294A	CML 0.047μ 50V J
C232L,R	OB41291A	CML 0.027μ 50V J
CN101	OB81760A	3P-T Post
	OB83747A	Ribbon Cable 4P 210mm (2)
	OE00868A	BT3x8 ⊕ Binding (4)
	OE00172A	Washer 3mm Toothed Lock (2)
5.3. Fuse P.C.B. Ass'y		
	BA07655A	Fuse P.C.B. Ass'y
	OB60714A	Fuse P.C.B.
	OB84108A	Auto Fuse Holder (1)
	OB80235A	Wire RED 90mm (1)
	OB80236A	Wire RED 120mm (1)
5.4. BTL Switch P.C.B. Ass'y		
	BA07654A	BTL Switch P.C.B. Ass'y
S101,102 CN101	OB60713A	BTL Switch P.C.B.
	OB70137A	Slide Switch
	OB83746A	Wire Ass'y 3P 210mm M2.6x5 ⊕ Binding (2)
	OE00791A	M2.6x5 ⊕ Binding (2)
	OJ05926A	Slide Switch Holder (1)

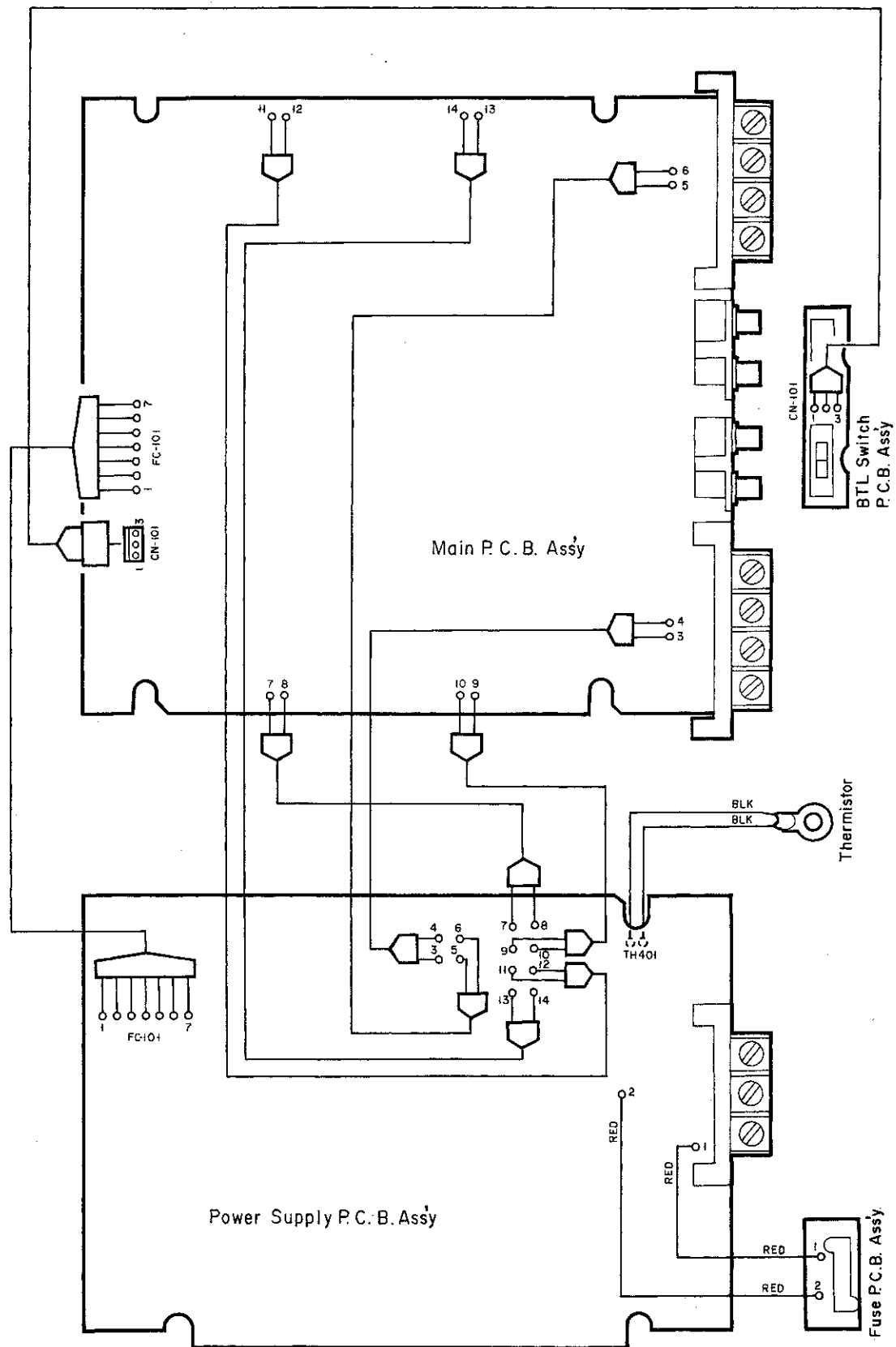


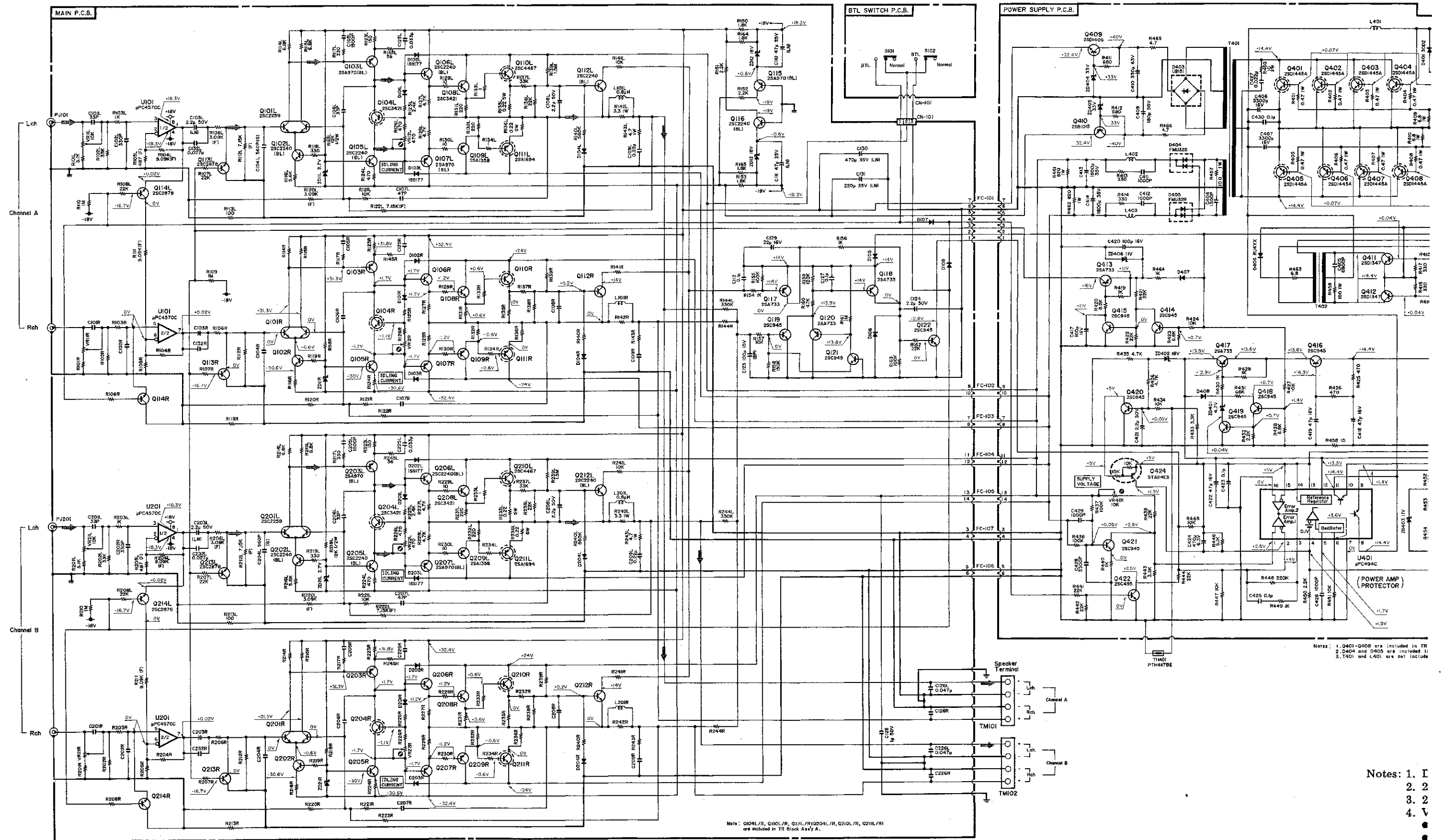
Fig. 6

Notes: 1. Table of wire colors

- BRN - Brown
- RED - Red
- ORN - Orange
- YEL - Yellow
- GRN - Green
- BLU - Blue
- VIO - Violet
- GRY - Gray
- WHT - White
- BLK - Black

2. Component side view of the P.C.B. is illustrated unless otherwise specified.

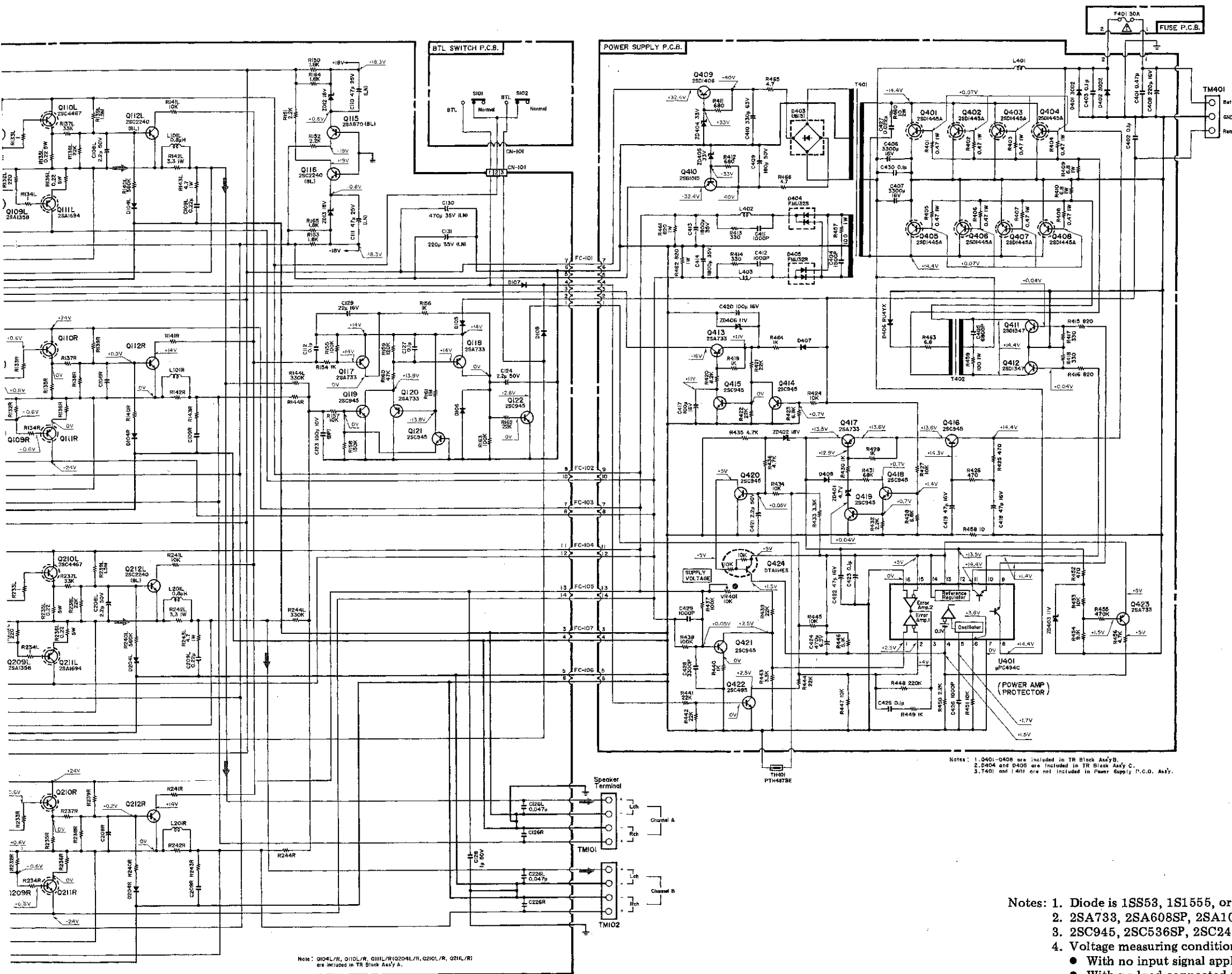
7. SCHEMATIC DIAGRAM



Notes: 1. Q401-Q408 are included in TR
 2. D404 and D405 are included in
 3. T401 and L401 are not include

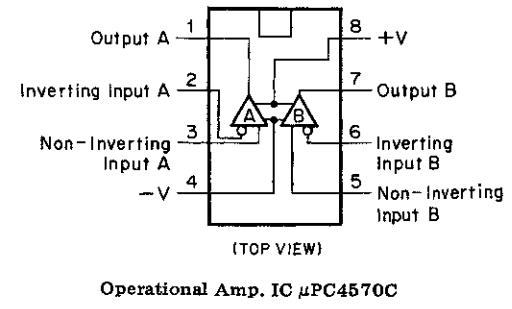
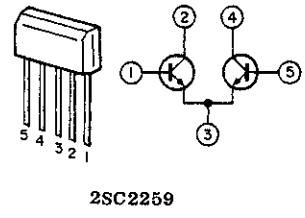
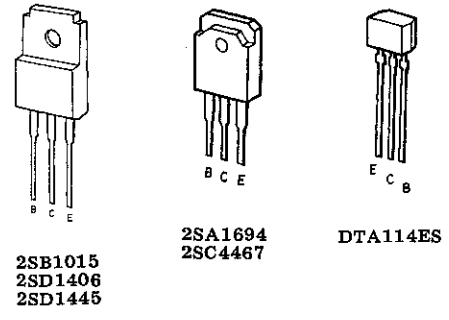
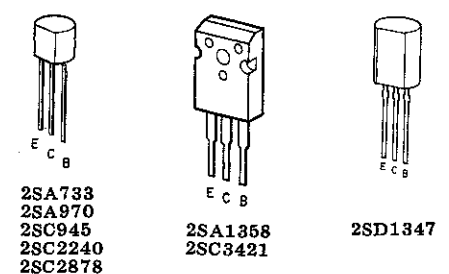
- Notes: 1. I
 2. 2
 3. 2
 4. V

Fig. 7



Note: Q104L/R, Q101L/R, Q111L/R, Q120L/R, Q210L/R, Q211L/R are included in TR Block Assy A.

Notes: 1. Q401-Q408 are included in TR Block Assy B.
 2. D404 and D405 are included in TR Block Assy C.
 3. T401 and L401 are not included in Power Supply P.C.B. Assy.



- Notes: 1. Diode is 1SS53, 1S1555, or 1SS176 unless otherwise specified.
 2. 2SA733, 2SA608SP, 2SA1048 and 2SA1175 are interchangeable with each other.
 3. 2SC945, 2SC536SP, 2SC2458 and 2SC2785 are interchangeable with each other.
 4. Voltage measuring conditions
 ● With no input signal applied to the input jacks.
 ● With no load connected to the speaker terminals.

Fig. 7

8. BLOCK DIAGRAM

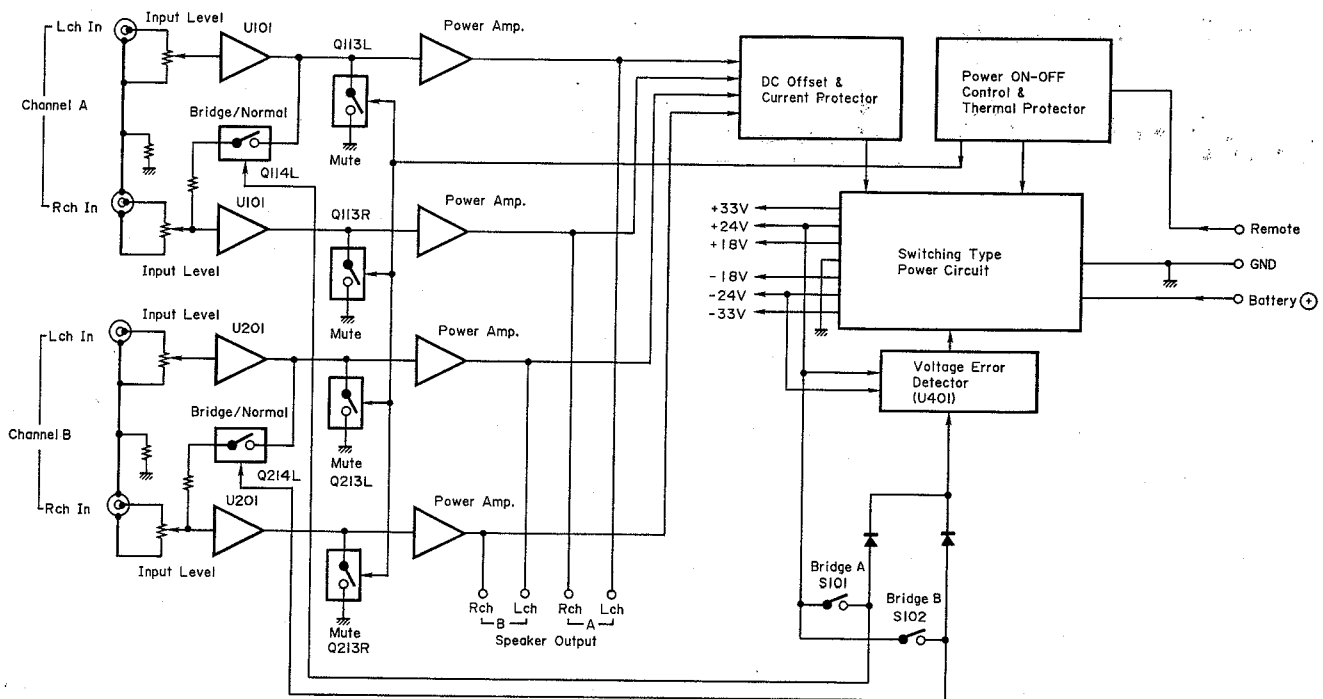


Fig. 8

9. SPECIFICATIONS

Continuous Power Output	45 W x 4 RMS (four channels driven, 4 ohms, 1 kHz, 0.005% THD) 30 W x 2 + 90 W x 1 RMS (three channels driven, 4 ohms, 1 kHz, 0.01% THD) 90 W x 2 RMS (two channels driven, 4 ohms, 1 kHz, 0.01% THD)
Power Bandwidth	10–50,000 Hz (4 ohms, 0.1% THD)
Total Harmonic Distortion	0.005% (4 ohms, 1 kHz, 45 W)
Frequency Response	10–50,000 Hz +1, –3 dB (with input sensitivity control at max.) 20–20,000 Hz ±1 dB (with input sensitivity control at max.)
Signal to Noise Ratio	Better than 110 dB (IHF A-WTD, at rated power, with input sensitivity control at max.)
Damping Factor	Greater 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 Separation	Better than 80 dB (4 ohms, 1 kHz)
Power Source	14.4 V DC negative ground (10.8–15.6 V allowable)
Current Consumption	
Max.	29 A (four channels driven, 4 ohms, 45 W x 4) 36 A (two channels driven, 4 ohms, 90 W x 2)
Music	Approx. 10 A (4 ohms)
Min.	Approx. 2 A (Idling)
Load Impedance	Above 4 ohms
Dimensions*	320 (W) x 56 (H) x 190 (D) mm 12-5/8 (W) x 2-3/16 (H) x 7-1/2 (D) inches
Approximate Weight	3.8 kg/8 lbs. 6 oz.

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

- Unless otherwise noted, all measurements are with four channels driven (“Normal” position).
- Specifications and design are subject to change for further improvement without notice.