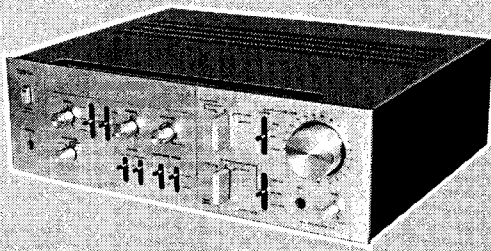


# TOSHIBA

## STEREO AMPLIFIER

# SB-420



### SPECIFICATIONS

#### ■ Main-Amplifier

Continuous Output: (Both Channel Driven)	20 Hz ~ 20 kHz (8Ω) 42W + 42W (4Ω) 50W + 50W 1 kHz (8Ω) 45W + 45W (4Ω) 55W + 55W
Distortion Factor:	Full Higher Harmonic Distortion 0.3% (at rated output) 0.05% (at 1W output) Cross Modulation Distortion 0.3% (at rated output) 0.05% (at 1W output)
Frequency Characteristic:	10 Hz ~ 80 kHz +0 dB -1 dB
Output Band Width:	5 ~ 40 kHz 8Ω IHF 0.3% Both Channel Driven
Impedance:	1 V (50 kΩ)
Residual Noise:	Max. 1 mV (8Ω)
Damping Factor:	Min. 25
Speaker Impedance:	4Ω ~ 16Ω (8Ω ~ 16Ω for A + B only)

#### ■ Pre-Amplifier

Impedance:	PHONO 1	2.5 mV	(50 kΩ)
	PHONO 2	2.5 mV	(50 kΩ)
	TUNER	150 mV	(50 kΩ)
	AUX	150 mV	(50 kΩ)
Recording Output:	TAPE REC.	150 mV	
	DIN	30 mV	
Rated Output:	PRE OUT	1 V	
Frequency Characteristic:	10 Hz ~ 50 kHz	+0 dB (AUX)	-1 dB
Full Higher Harmonic Distortion Factor:	0.05%		

#### Tone Control:

BASS (100 Hz) ±10 dB, ±7 dB  
(Turnover frequency: 400 Hz, 200 Hz)  
TREBLE (10 kHz) ±10 dB, ±7 dB  
(Turnover frequency: 2.5 kHz, 5 kHz)

#### Filter:

LOW 20 Hz (6 dB/oct.)  
HIGH 8 kHz (6 dB/oct.)

#### Muting:

-10 dB, -20 dB

#### Loudness Control:

8.5 dB (100 Hz) 3.5 dB (10 kHz)

#### Equalizer Deviation:

(30 ~ 15 kHz) ±0.3 dB

#### PHONO Max. Allowable

#### Input:

(1 kHz) 350 mV

(Higher harmonic distortion factor:  
0.1%)

#### SN Ratio:

PHONO 70 dB (1HF, short circuit,  
A network)

AUX 90 dB (1HF, short circuit,  
A network)

#### ■ Mic-Amplifier

#### Impedance:

4 mV (20 kΩ)

#### Full Higher Harmonic

Distortion Factor: 0.35% (1 kHz)

#### Rated Output:

MIC MIX REC. OUT 1 V

#### Power Source Voltage:

AC 120 V 60 Hz (USA/Canada)  
AC 220/240 V, 50 Hz (Europe/  
England/Sweden)

#### Power Consumption:

200 W (AC 120 V, 60 Hz)

#### Applied Semiconductor:

340 W (220/240 V ~ 50 Hz)

#### Dimensions (m/m):

43 Transistors, 16 Diodes

#### Weight:

450 x 148 x 375

11.5 kg

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# 1. TECHNICAL POINTS

## PARALLEL PUSH-PULL

Figure 1 shows common pure complementary output circuit. Connecting these circuit in parallel composes such a circuit as shown in figure 2. This circuit is called parallel push-pull.

Para-push provides a necessary output signal using a transistor which has not enough collector loss to obtain a necessary output signal. Resistors R1 to R4 in figure 2 rectify unevenness of each transistor's  $V_{be}$  and adjust a slight unbalance of characteristics between transistors. TR1 and TR2 provide amplifier with linearity and TR3 and TR4 unify the linearity effectively, thereby providing products which have a definite linearity to some extent.

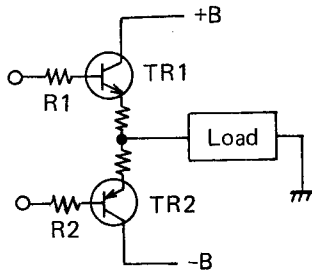


Figure 1

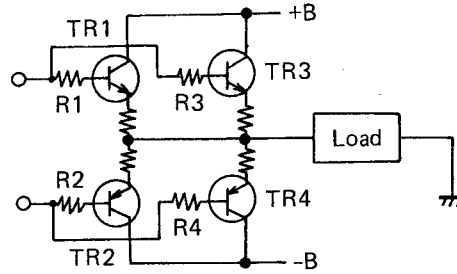


Figure 2

## EQUALIZER AMPLIFIER USING BIPOLAR POWER

Use of bipolar power allows A to C points in figure 3 to be kept at 0V (Same potential as ground) and prevents the leakage of capacitor C1 in figure 3, thereby preventing the damage by current leakage.

(For example: switch shock noise of selector switch.)

By combining high metal film fixed resistors and polypropylene capacitors for RIAA element, RIAA difference is reduced within  $\pm 3\text{dB}$ .

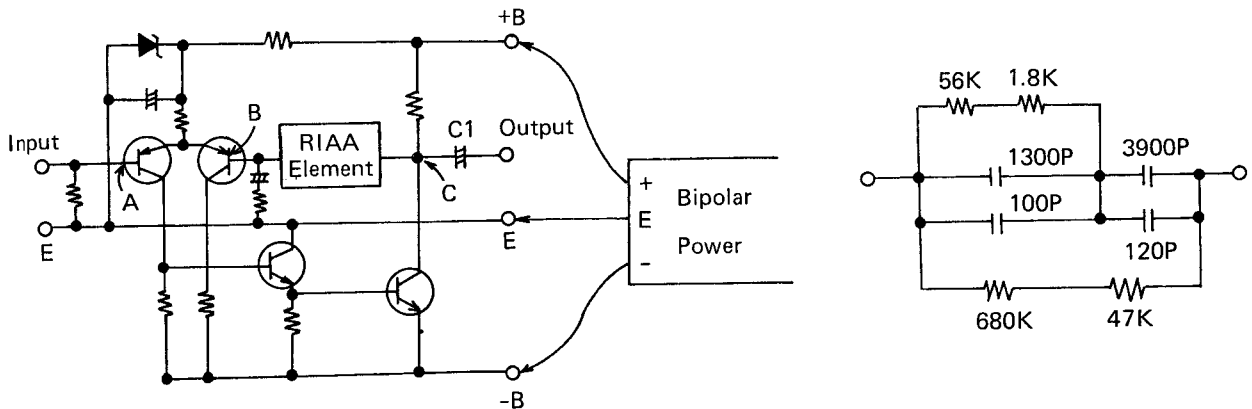
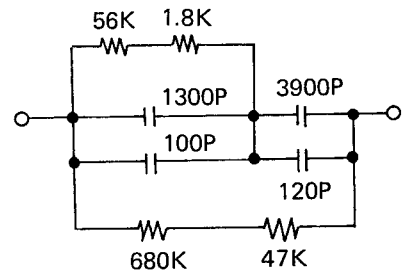


Figure 3



### POWER ON-OFF SHOCK NOISE MUTING CIRCUIT

This circuit mutes the amplifier when the power switch is turned ON and protects the speaker from click noise. Capacitor C1 starts charging by the current flowing through resistor R4 immediately after the power switch is turned ON, and transistors TR3 and TR4 are turned ON by the current passing through resistor R3. Input signal (Click noise) is divided by internal resistance of R1 and TR4, and of R2 and TR3 to lower the output level. The internal resistance of transistor which is turned ON is too weak as compared with R1 and R2 to obtain output signal. When the voltage at both terminals of C1 comes to a certain level after a few seconds, TR2 is turned ON and the voltage of negative power which consists of D2, R7 and C2 is applied to the bases of TR3 and TR4 to turn OFF the TR3 and TR4, thereby increasing the internal resistance of TR3 and TR4, and consequently output signal can be obtained without reduction. Any click noise which enters the input signal for these seconds does not present in output signal.

When power switch is turned OFF, the negative power reduces to 0V preceding to +B, emitter potential of TR1 is increased by potential of C1, TR1 is turned ON and C1 is discharged promptly. Then TR2 is turned OFF and +B voltage is applied to TR3 and TR4 through TR3.

As +B voltage reduces slowly even after the power is turned OFF, TR3 and TR4 can be kept to be ON for a certain time during which muting circuit can be activated and click noise that occurs when power is turned OFF can be eliminated.

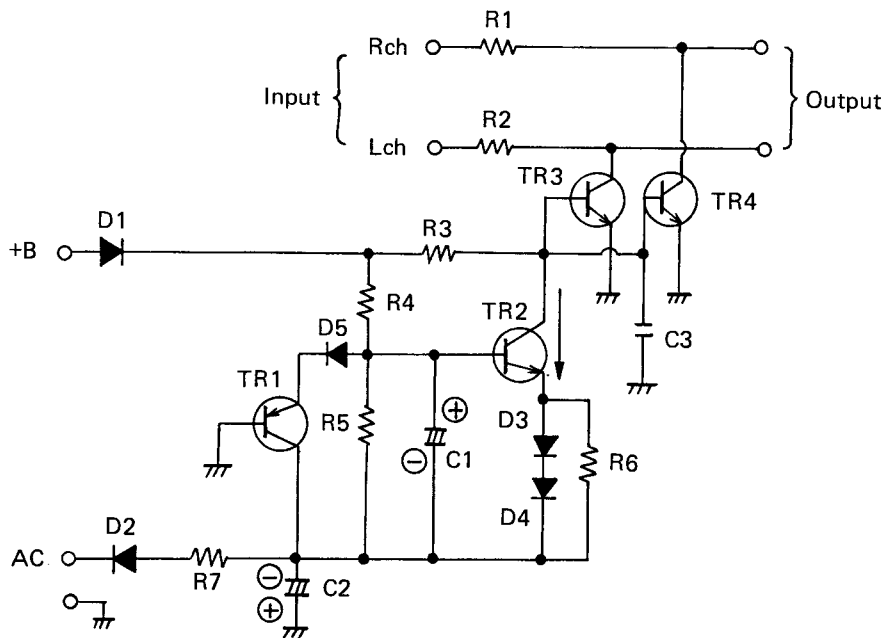


Figure 4

## 2. OPERATING CONTROLS

### FRONT VIEW

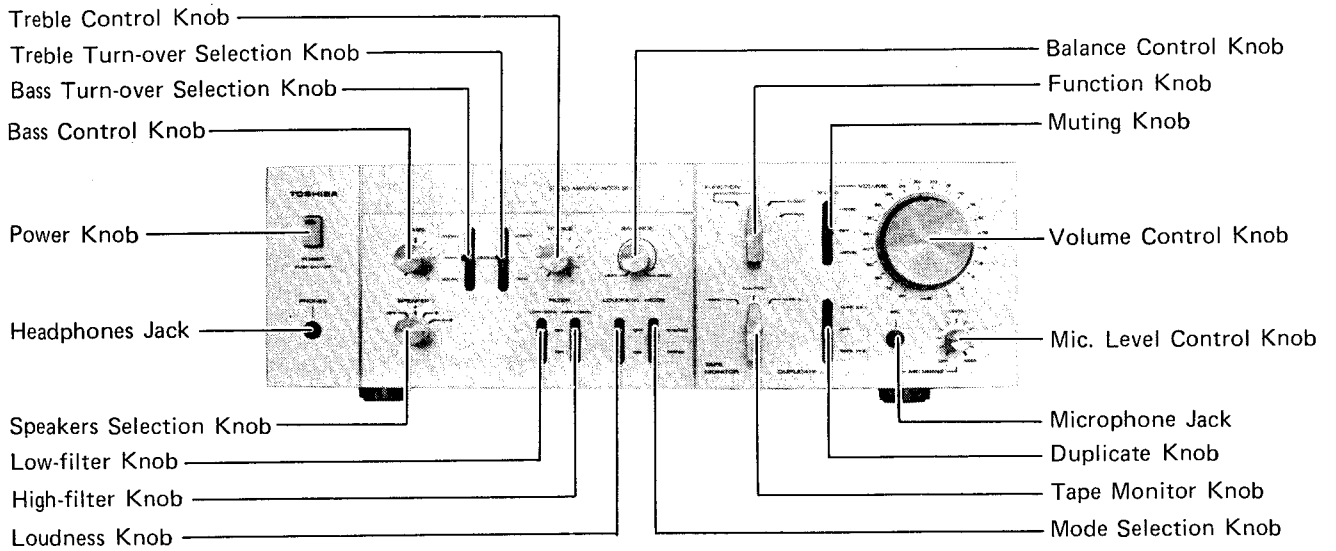


Figure 5

### REAR VIEW

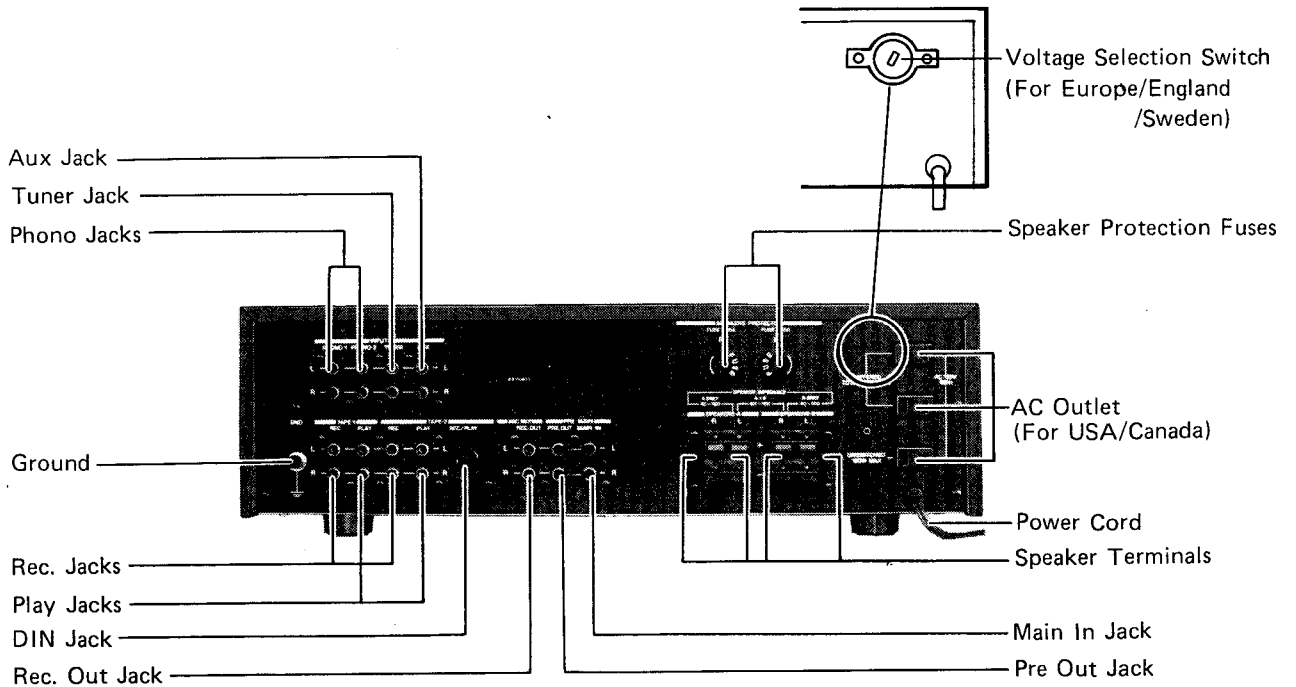


Figure 6

### 3. DISASSEMBLY INSTRUCTIONS

#### TOP COVER REMOVAL

1. Remove four screws (①).  
See figure 7.

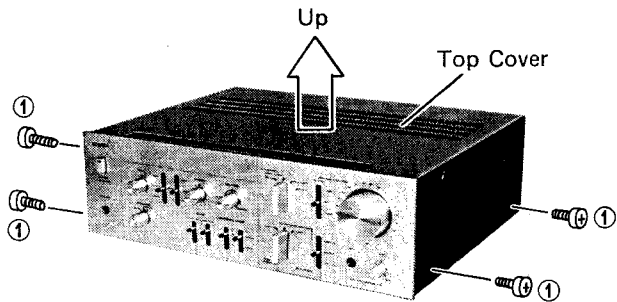


Figure 7

#### BOTTOM COVER REMOVAL

1. Remove five screws (②).  
See figure 8.

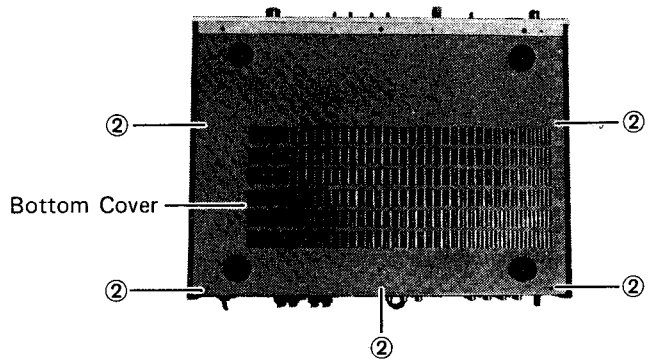


Figure 8

#### FRONT PANEL REMOVAL

1. Pull out the seven knobs (③). See figure 9.

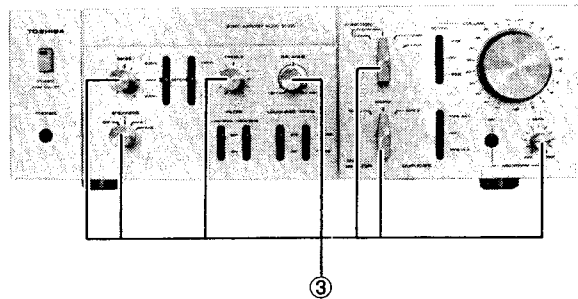


Figure 9

2. Remove two screws (④).  
See figure 10.

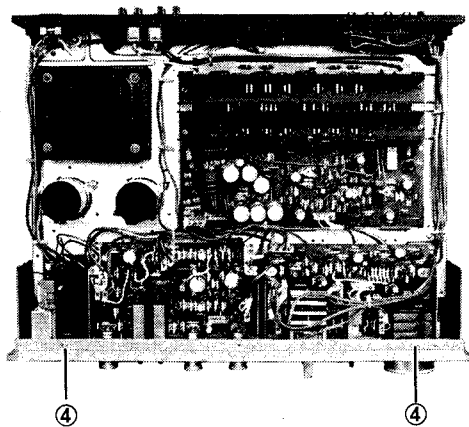


Figure 10

3. Remove two screws (⑤).  
See figure 11.

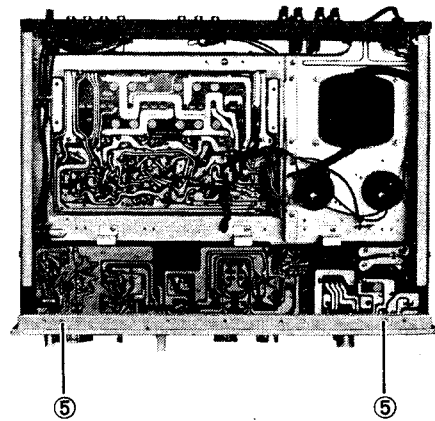


Figure 11

## 4. CIRCUIT ADJUSTMENTS

### POWER TRANSISTOR IDLING CURRENT ADJUSTMENT

While there is no signal (Connect 8 ohm when loading), connect tester to TP001 and TP002 on power amp. P.C. Board and rotate and adjust semi-fixed resistors VR005 and VR006 so that the readings on tester is values described below.

		Reading on tester
R channel TP001	VR005 adjustment	When radiator is warmed 0.015V
L channel TP002	VR006 adjustment	When radiator is cold 0.008V

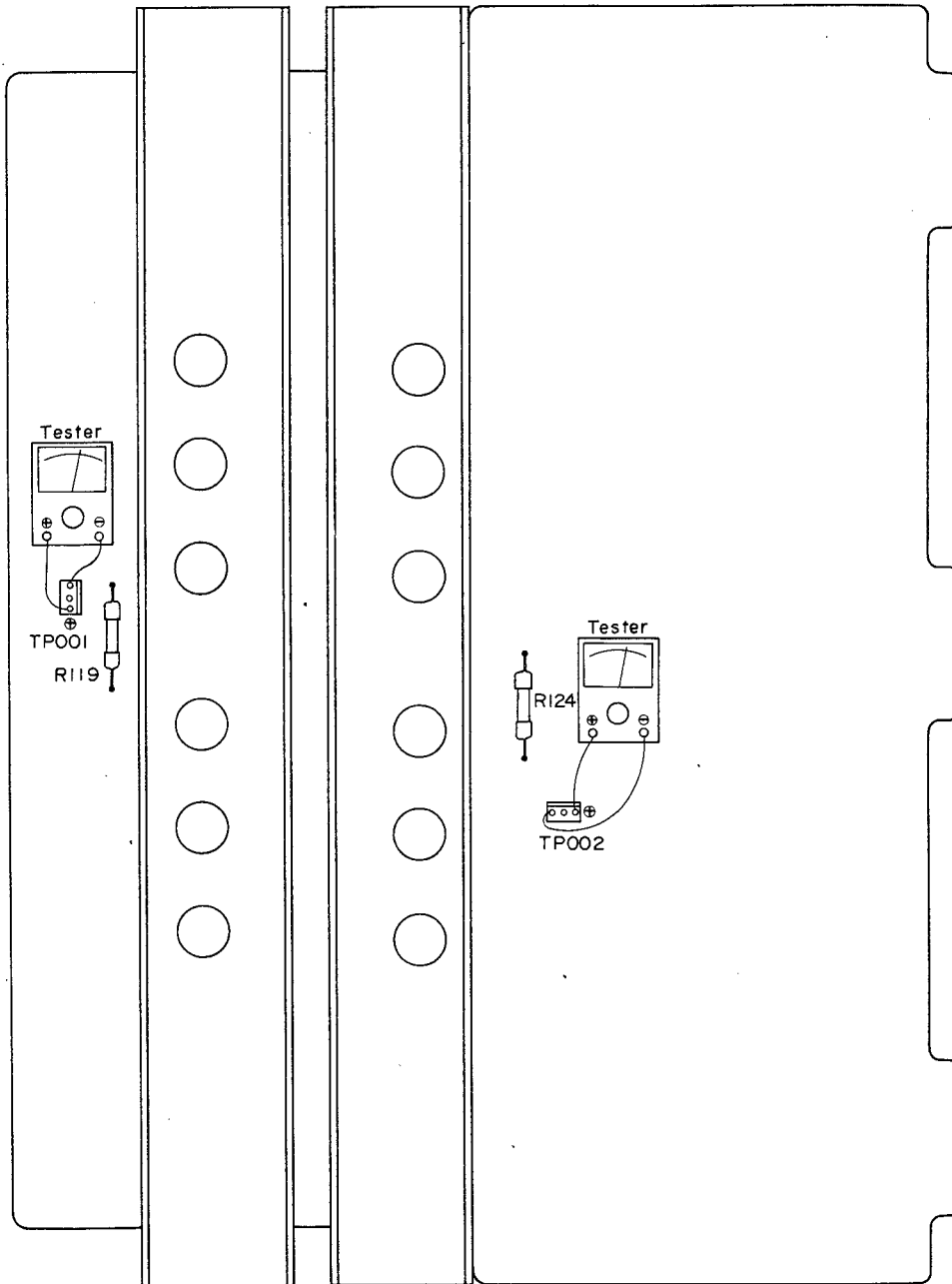


Figure 12. Top View of Power Amp. P.C. Board

5. LEVEL DIAGRAM

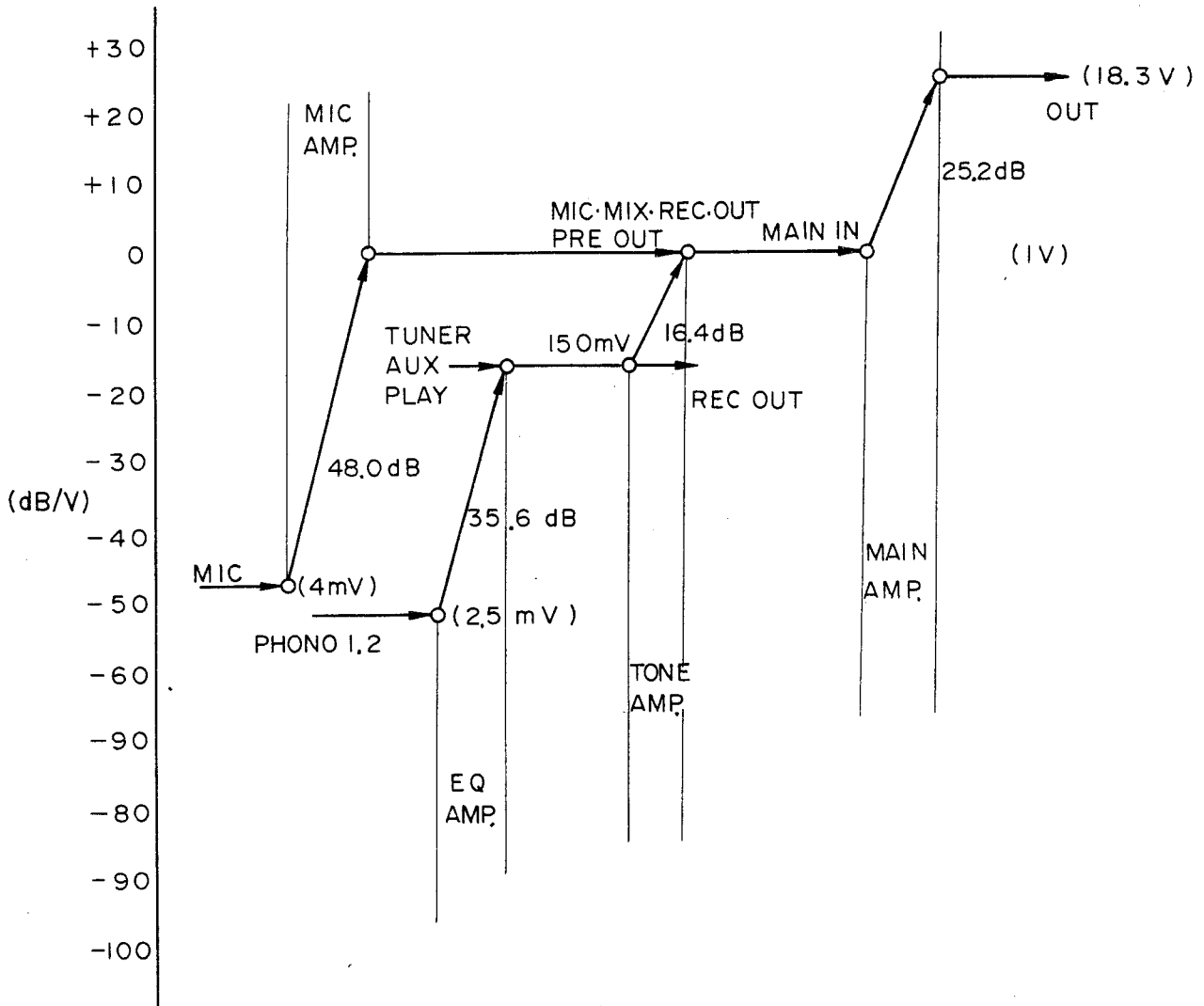


Figure 13



## 6. BLOCK DIAGRAM

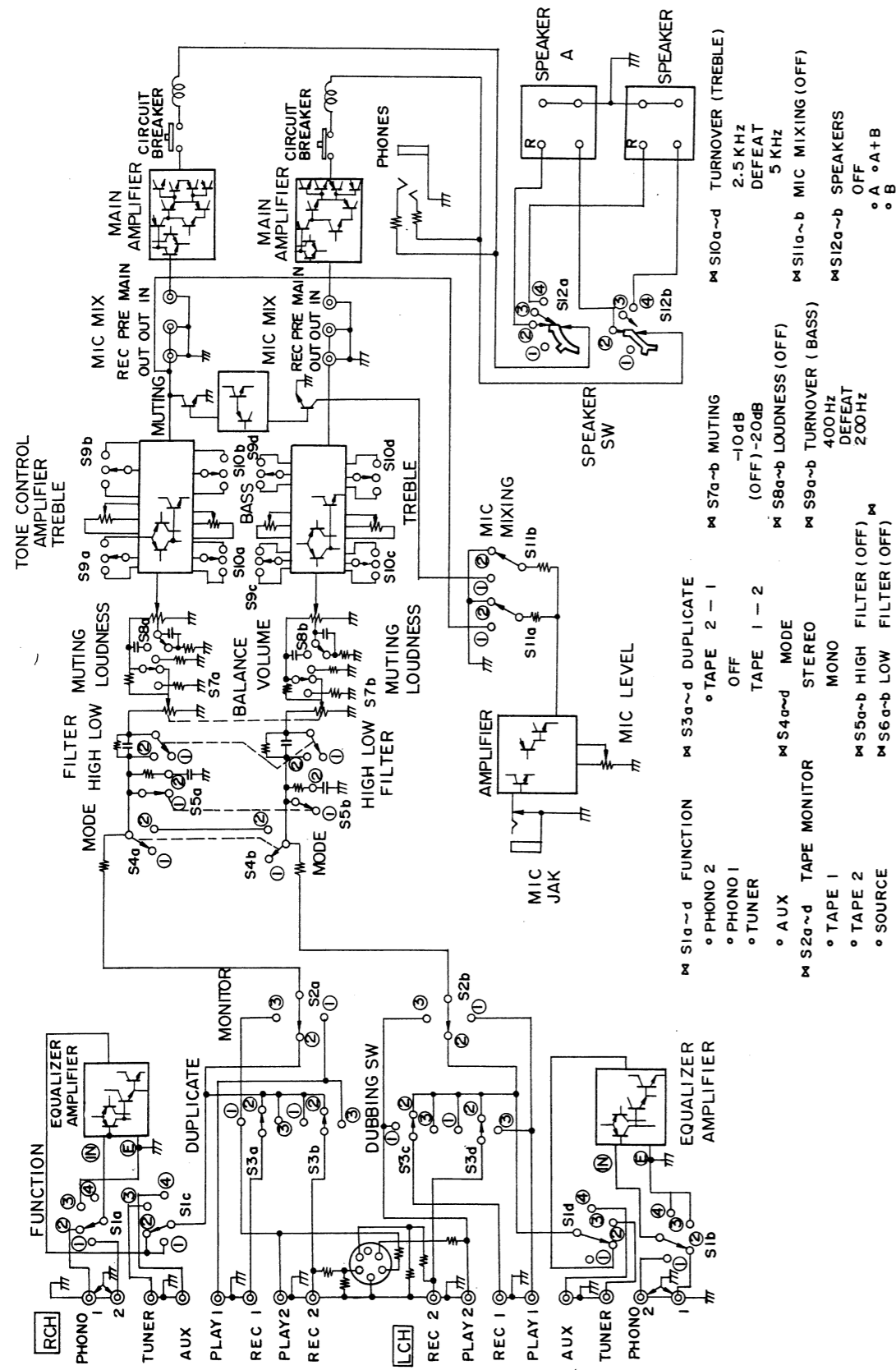


Figure 14.

## 7. EXPLODED VIEW (CABINET)

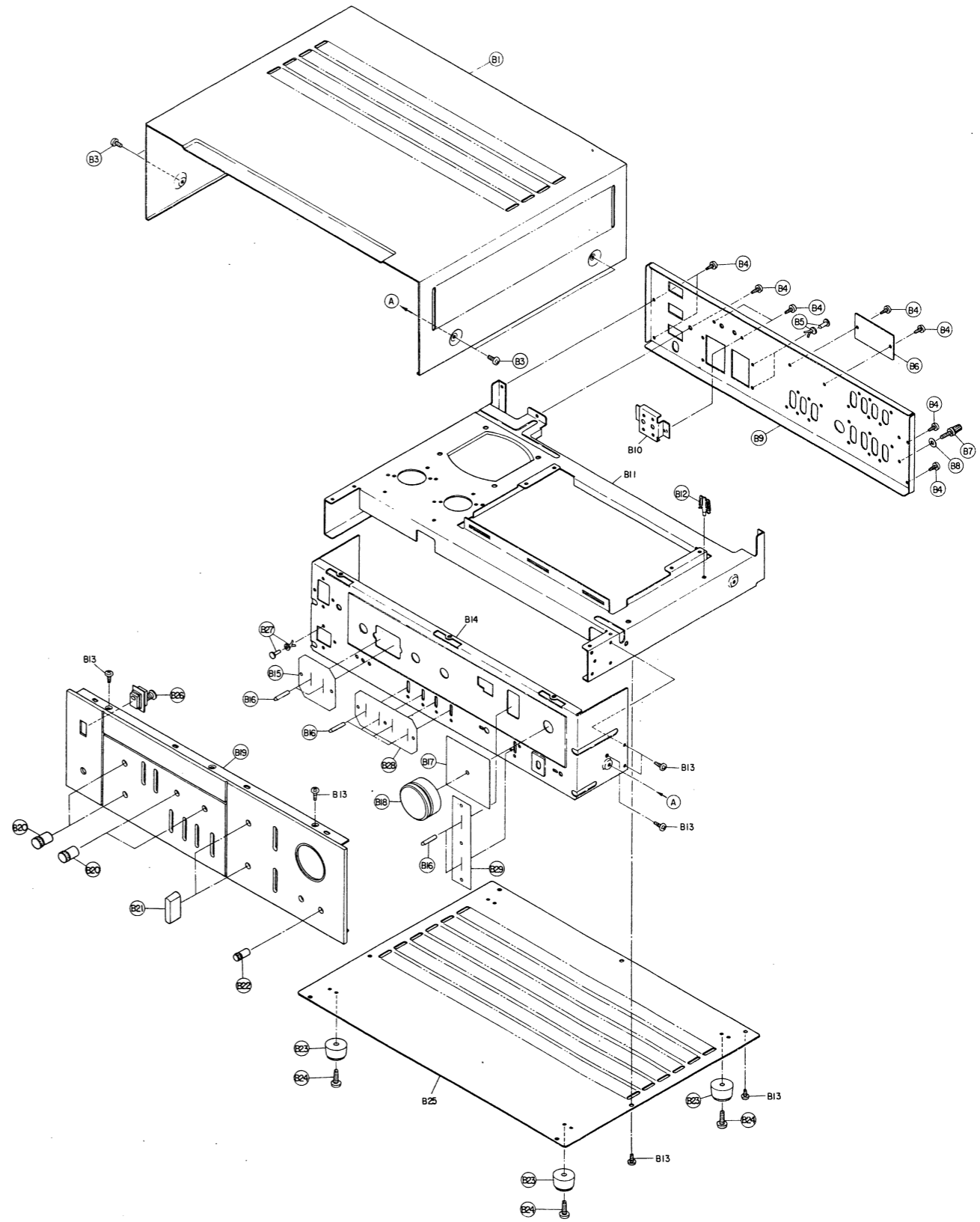


Figure 15

8. P.C. BOARD PARTS LOCATIONS

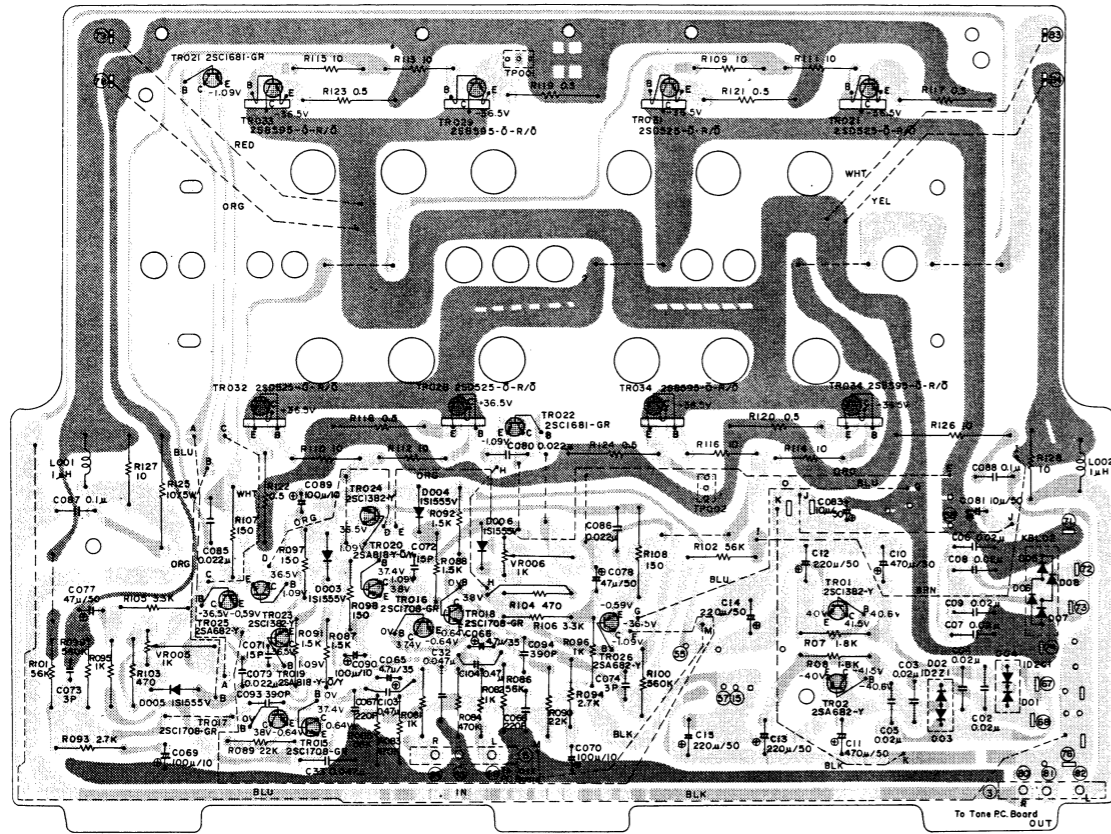


Figure 16. Bottom View of Power Amp. P.C. Board (CCT-PA-C16).

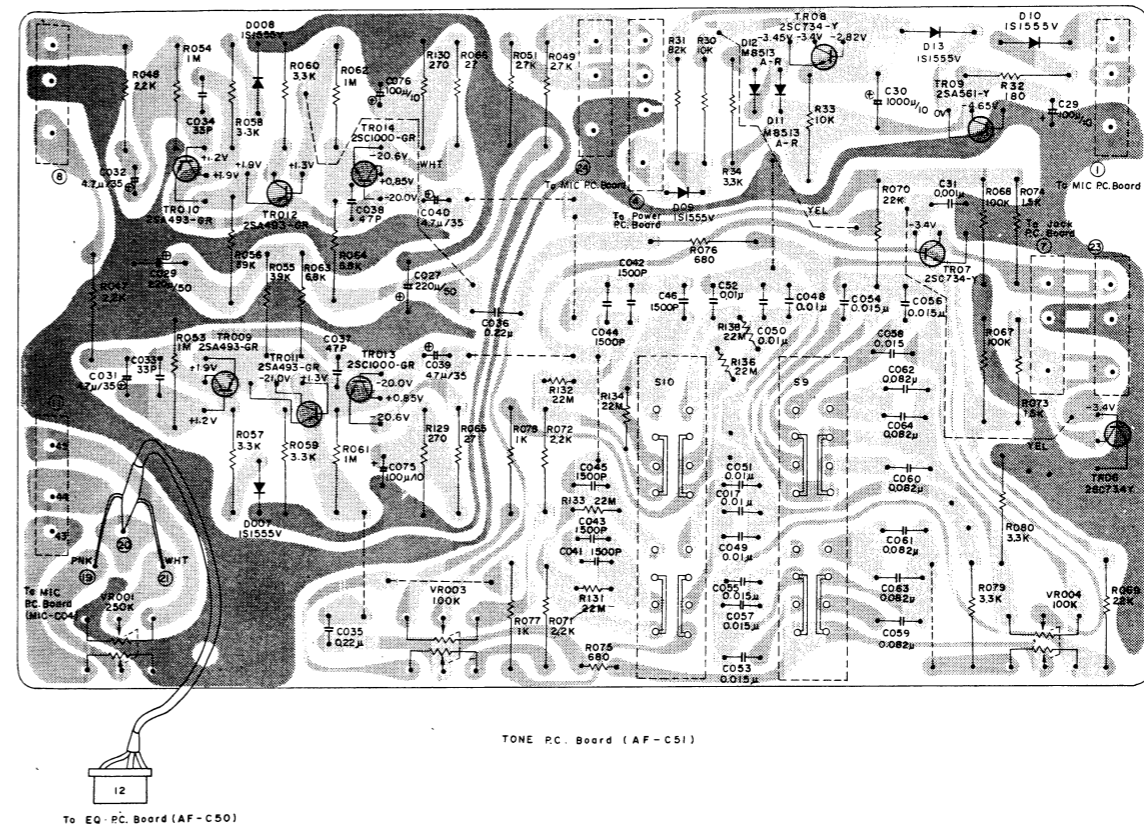


Figure 18. Bottom View of Tone Amp. P.C. Board (CCT-AF-C51).

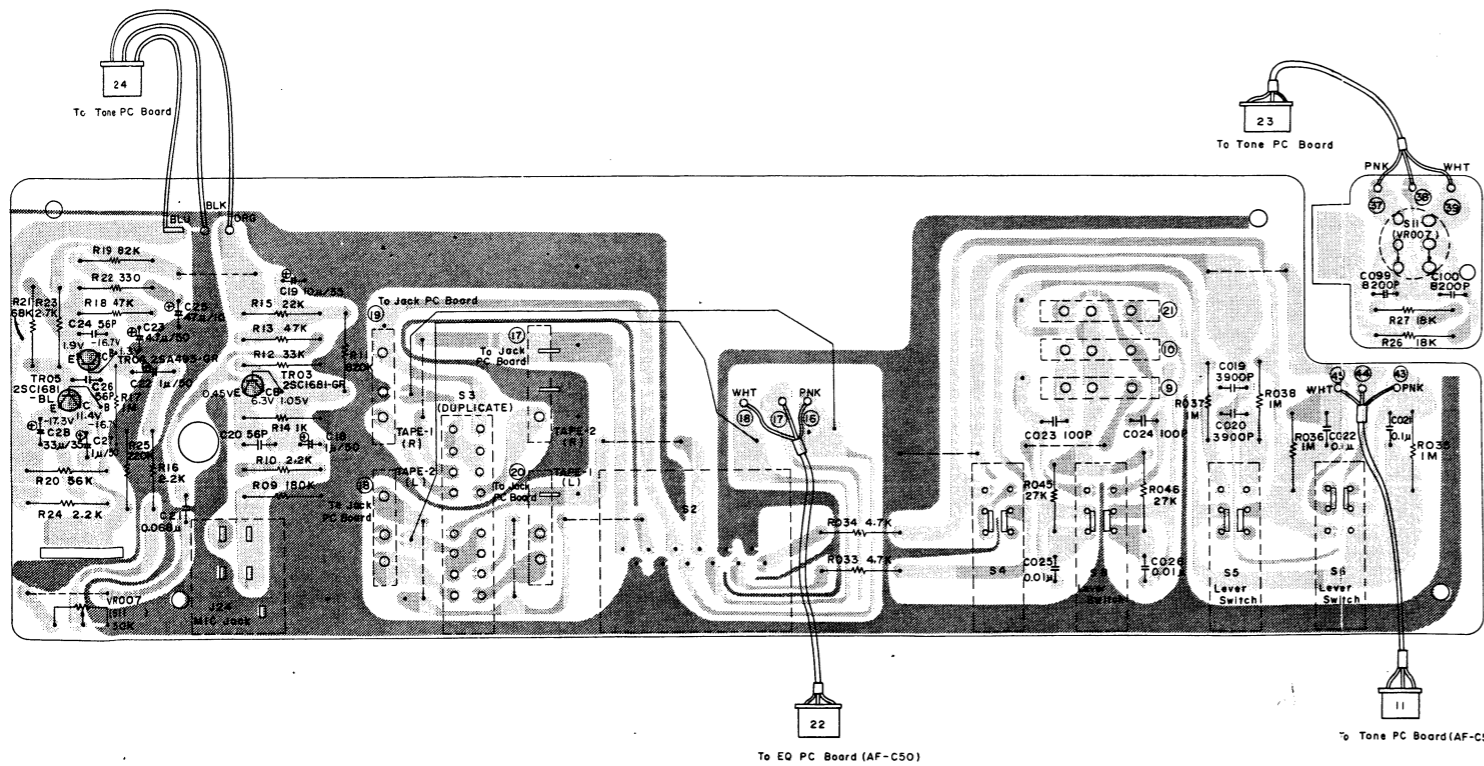


Figure 17. Bottom View of Mic. Amp. P.C. Board (MIC-C04).

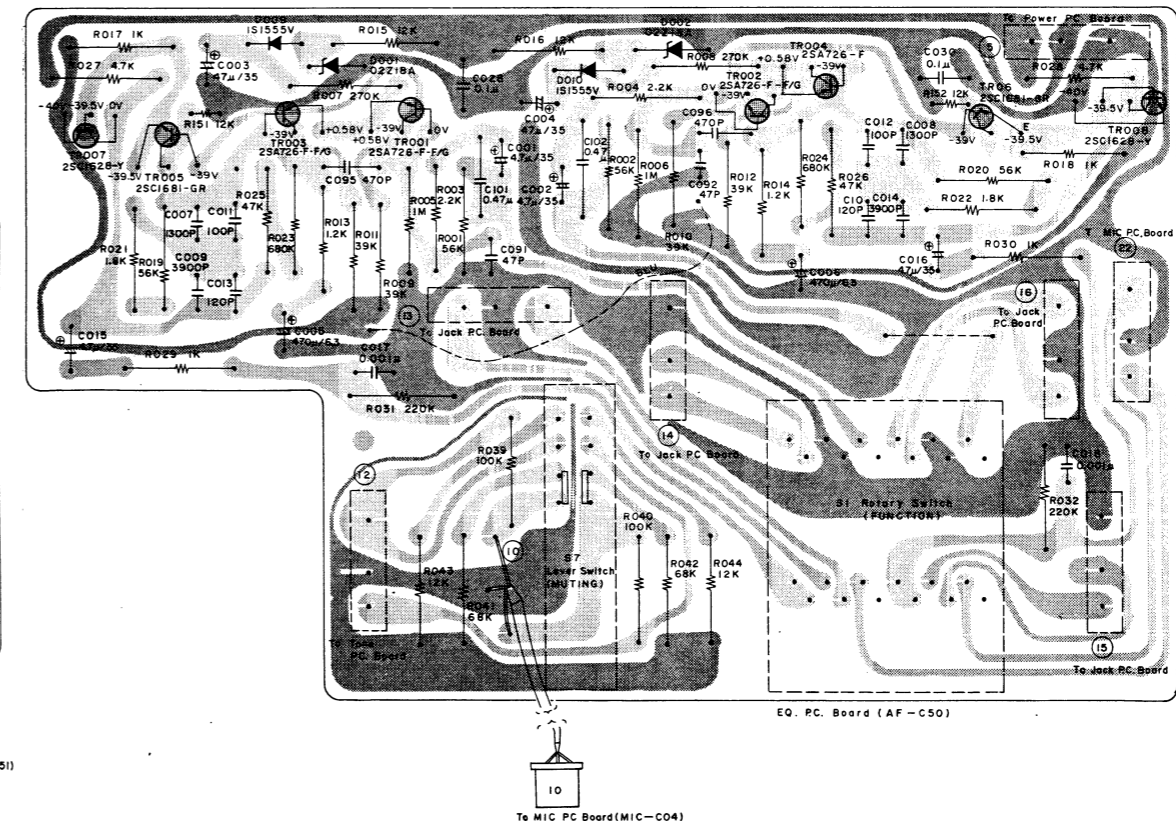
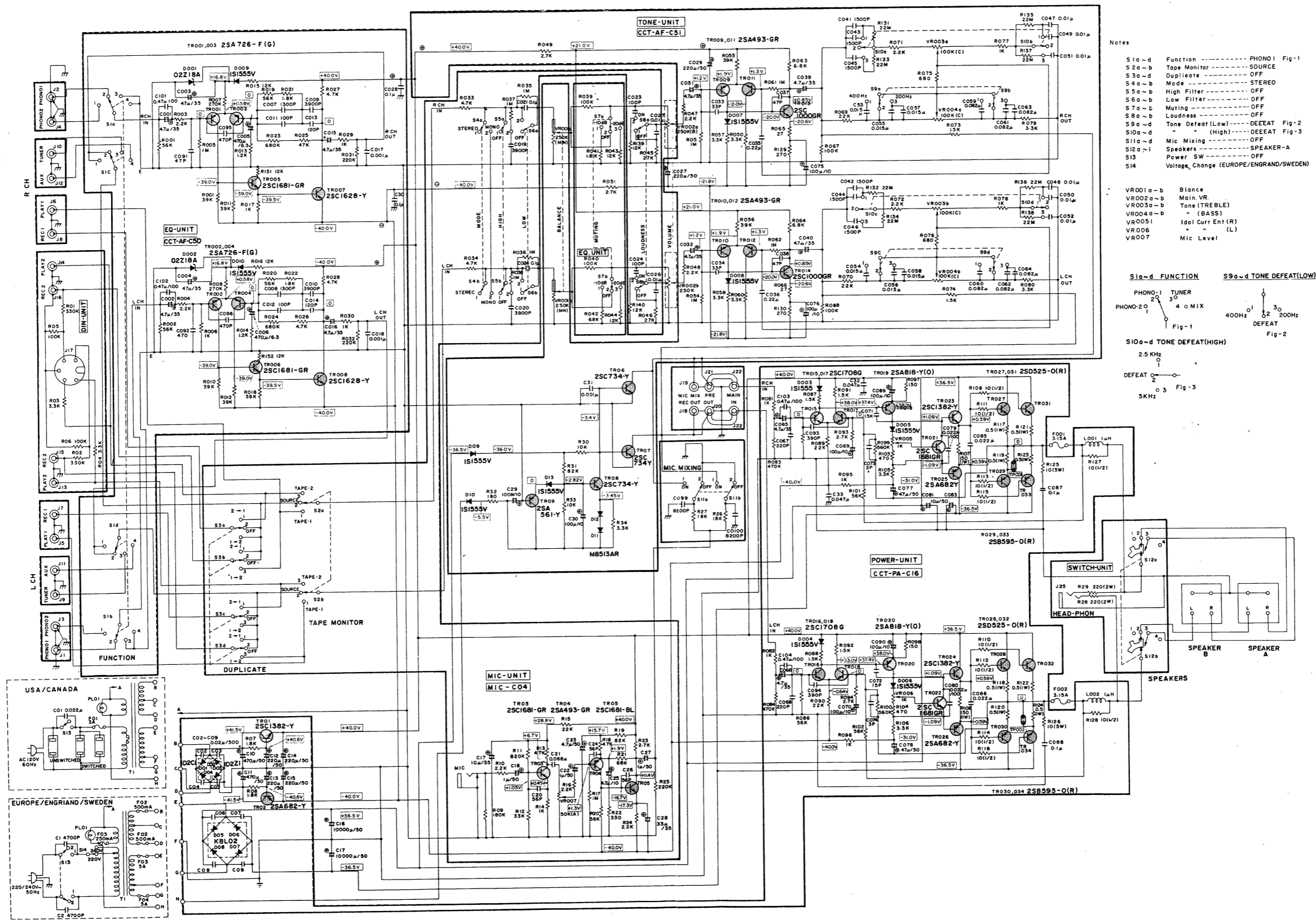


Figure 19. Bottom View of EQ. Amp. P.C. Board (CCT-AF-C50).

# 9. SCHEMATIC DIAGRAM



- Notes**
- S1a-d Function ----- PHONO1 Fig-1
  - S2a-b Tape Monitor ----- SOURCE
  - S3a-b Duplicate ----- OFF
  - S4a-b Mode ----- STEREO
  - S5a-b High Filter ----- OFF
  - S6a-b Low Filter ----- OFF
  - S7a-b Muting ----- OFF
  - S8a-b Loudness ----- OFF
  - S9a-d Tone Defeat(Low) ----- DEEAT Fig-2
  - S10a-d " " (High) ----- DEEAT Fig-3
  - S11a-d Mic Mixing ----- OFF
  - S12a-i Speakers ----- SPEAKER-A
  - S13 Power SW ----- OFF
  - S14 Voltage Change (EUROPE/ENGRAND/SWEDEN)
- 
- VRO01a-b Blance
  - VRO02a-b Main.VR
  - VRO03a-b Tone (TREBLE)
  - VRO04a-b " (BASS)
  - VRO05I Idol Curr Ent (R)
  - VRO06 " " (L)
  - VRO07 Mic Level
- 
- S1a-d FUNCTION**
- PHONO-1 TUNER 3 0  
 PHONO-2 1 4 0 MIX
- S9a-d TONE DEFEAT(LOW)**
- 400Hz 1 3 0  
 DEFEAT 2 200Hz
- S10a-d TONE DEFEAT(HIGH)**
- 2.5 KHz 1 0 3  
 DEFEAT 2 5 KHz

Figure 20

## 10. PARTS LIST

Symbol No.	Part No.	Description	Symbol No.	Part No.	Description	Symbol No.	Part No.	Description	Symbol No.	Part No.	Description
<b>TRANSISTORS AND DIODES</b>			<b>ELECTRICAL PARTS</b>			<b>CAPACITORS</b>			<b>RESISTORS</b>		
						G=±2%, J=±5%, K=±10%, M=±20%, Z=-20+80%, D=±0.5pF			All resistors are 1/4W, 5% carbon film resistor unless otherwise noted. K=±10%, F=±1%		
<b>CCT-PA-C16</b>		Transistor, 2SC1382-Y	S1	22146757	Switch, Rotary, Function	<b>CCT-PA-C16</b>			<b>CCT-PA-C16</b>		1.8K ohm
TR01		Transistor, 2SA682-Y	S2	22146758	Switch, Rotary, Monitor	C02, 03, 04, 05	22340032	Ceramic, 0.02mfd, 500V, Z	R07, 08	22545182	1K ohm
TR02		Transistor, 2SC1708-GR	S3	22146763	Switch, Lever, Duplicate	C06, 07, 08, 09	22340032	Ceramic, 0.02mfd, 500V, Z	R081, 082	22545102	470K ohm
TR015, 016	22114438	Transistor, 2SC1708-GR	S4, 5, 6, 8	22146762	Switch, Lever	C10, 11	22448471	Electrolytic, 470mfd, 50V	R083, 084	22545474	56K ohm
TR017, 018	22114438	Transistor, 2SC1708-GR	S7	22146764	Switch, Lever, Muting	C12, 13	22448221	Electrolytic, 220mfd, 50V	R085, 086	22545563	56K ohm
TR019, 020		Transistor, 2SA818-Y-O/Y	S9, 10	22146767	Switch, Lever, Tone	C14, 15	22448221	Electrolytic, 220mfd, 50V	R087, 088	22545152	1.5K ohm
TR021, 022		Transistor, 2SC1681-GR	S12	22146727	Switch, Rotary, Speaker	C32	22342473	Ceramic, 0.047mfd, 50V, Z			
TR023, 024		Transistor, 2SC1382-Y-O/Y	S13	22146759	Switch, Push, Power (USA/Canada)	C33	22342473	Ceramic, 0.047mfd, 50V, Z			
TR025, 026		Transistor, 2SA682-Y-O/Y		22146204	Switch, Push, Power (Europe/England/Sweden)	C065, 066	22440052	Electrolytic, 4.7mfd, 35V			
TR027, 028		Transistor, 2SD525-O-R/O	S14	22146707	Switch, Rotary, Voltage (Europe/England/Sweden)	C067, 068	22382221	Polystyrene, 220pF, 50V, K			
TR029, 030		Transistor, 2SB595-O-R/O	L001, 002	22210107	Coil, Trap, 1μH	C069, 070	22443101	Electrolytic, 100mfd, 10V			
TR031, 032		Transistor, 2SD525-O-R/O	J1, 2, 3, 4	22163446	Jack, US4P	C071, 072	22362150	Ceramic, 15pF, 50V, K			
TR033, 034		Transistor, 2SB595-O-R/O	J5, 6, 7, 8	22163443	Jack, US4P	C073, 074	22361309	Ceramic, 3pF, 50V, D			
<b>MIC-C04</b>		Transistor, 2SC1681-GR	J9, 10, 11, 12	22163443	Jack, US4P	C077, 078	22448470	Electrolytic, 47mfd, 50V			
TR03		Transistor, 2SA841-GR	J13, 14, 15, 16, 17	22163445	Jack, US4P, DIN	C079, 080	22321128	Polypropylene, 0.022mfd, 100V, J			
TR04		Transistor, 2SC1681-BL	J18, 19, 20, 21, 22, 23	22163444	Jack, US6P						
TR05		Transistor, 2SC1681-BL	J24	22163517	Jack, Microphone						
<b>CCT-AF-C50</b>		Transistor, 2SA726-F-F/G	J25	22163519	Jack, Headphones						
TR001, 002	22114405	Transistor, 2SA726-F-F/G	F01	22144235	Fuse, 3A/250V (USA/Canada)	<b>MIC-C04</b>					
TR003, 004	22114405	Transistor, 2SA726-F-F/G	F01, 02	22144295	Fuse, 500mA/250V (Europe/England/Sweden)	C18	22440060	Electrolytic, 1mfd, 50V			
TR005, 006		Transistor, 2SC1681-GR	F03, 04	22144335	Fuse, 5A/250V (Europe/England/Sweden)	C19	22447100	Electrolytic, 10mfd, 35V			
TR007, 008		Transistor, 2SC1628-Y	F05	22144289	Fuse, 250mA/250V (Europe/England/Sweden)	C20	22362560	Ceramic, 56pF, 50V, K			
<b>CCT-AF-C51</b>		Transistor, 2SC734-Y	F001, 002	22144332	Fuse, 3.15A/125V (USA/Canada)	C21	22372683	Mylar, 0.068mfd, 50V, K			
TR06		Transistor, 2SC734-Y	F001, 002	22144310	Fuse, 3.15A/250V (Europe/England/Sweden)	C22	22440060	Electrolytic, 1mfd, 50V			
TR07		Transistor, 2SC734-Y		22165063	Holder, Fuse (USA/Canada)	C23	22448479	Electrolytic, 4.7mfd, 50V			
TR08		Transistor, 2SC734-Y		22165075	Holder, Fuse (England/Europe/Sweden)	C24	22362560	Ceramic, 56pF, 50V, K			
TR09		Transistor, 2SA561-Y		22176221	Cord, Power (USA/Canada)	C25	22443470	Electrolytic, 47mfd, 10V			
TR009, 010		Transistor, 2SA841-GR		22176286	Cord, Power (Europe)	C26	22362560	Ceramic, 56pF, 50V, K			
TR011, 012		Transistor, 2SA841-GR		22176547	Cord, Power (England)	C27	22440060	Electrolytic, 1mfd, 50V			
TR013, 014		Transistor, 2SC1000-GR		22176540	Cord, Power (Sweden)	C28	22447330	Electrolytic, 33mfd, 35V			
<b>CCT-PA-C16</b>		Diode, 1D2C1	T1	22223067	Transformer, Power (USA)	C019, 020	22372392	Mylar, 3900pF, 50V, K			
D01, 04		Diode, 1D2Z1		22223068	Transformer, Power (Europe/Sweden)	C021, 022	22372104	Mylar, 0.1mfd, 50V, K			
D02, 03		Diode, 1D2Z1		22213502	Transformer, Power (England)	C023, 024	22382101	Polystyrene, 100pF, 50V, K			
D05, 06, 07, 08	22115293	Diode, KBL02		22213517	Transformer, Power (Canada)	C025, 026	22372103	Mylar, 0.01mfd, 50V, K			
D003, 004		Diode, 1S1555V				C099, 100	22372822	Mylar, 8200pF, 50V, K			
D005, 006		Diode, 1S1555V				<b>CCT-AF-C50</b>					
<b>CCT-AF-C50</b>		Diode, 02Z18A				C001, 002	22440052	Electrolytic, 4.7mfd, 35V			
D001, 002		Diode, 1S1555V				C003, 004	22447470	Electrolytic, 47mfd, 35V			
D009, 010		Diode, 1S1555V				C005, 006	22440114	Electrolytic, 470mfd, 6.3V			
<b>CCT-AF-C51</b>		Diode, M8513A-R				C007, 008	22321076	Polypropylene, 1300pF, 100V, G			
D09		Diode, 1S1555V									
D10		Diode, 1S1555V									
D11		Diode, M8513A-R									
D12		Diode, M8513A-R									



Symbol No.	Part No.	Description
VR002	22651429	250K ohm, Variable
VR003	22651431	100K ohm, Variable
VR004	22651431	100K ohm, Variable
VR005, 006	22658186	1K ohm, Semi-fixed
VR007	22624400	50K ohm, Variable (With S11)
<b>CABINET PARTS</b>		
B1	22841124	Cover
B3	22707040	Screw, M4 x 6mm
B4	22701326	Tapping Screw, M3 x 8mm
B5	22705022	Rivet, 3 $\phi$ x 55mm
B6	22863866	Nameplate (USA/Canada)
	22863872	Nameplate (Europe/England/ Sweden)
B7	22162338	Terminal, Ground
B8	22703091	Washer
B9	22711434	Plate, Jack (USA/Canada)
	22711457	Plate, Jack (Europe)
	22711398	Plate, Jack (Sweden/England)
B15	22756462	Sheet, Lever Knob
B16	22845211	Knob, Lever
B17	22756445	Sheet, Volume Knob
B18	22834848	Knob, Volume
B19	22843509	Panel
B20	22834842	Knob Ass'y
B21	22834851	Knob, Selector
B22	22834845	Knob, Mic Level
B23	22874032	Leg
B24	22701437	Tapping Screw, M4 x 16mm
B26	22834849	Knob, Power
B27	22705020	Rivet, 3 $\phi$ x 45mm
B28	22756463	Sheet, Lever Knob
B29	22756464	Sheet, Lever Knob
<b>ACCESSORIES</b>		
	22952524	Instruction Book
	22954336	Owner's Manual (USA/England)
	22954338	Owner's Manual (Canada)
	22954320	Owner's Manual (Europe/Sweden)