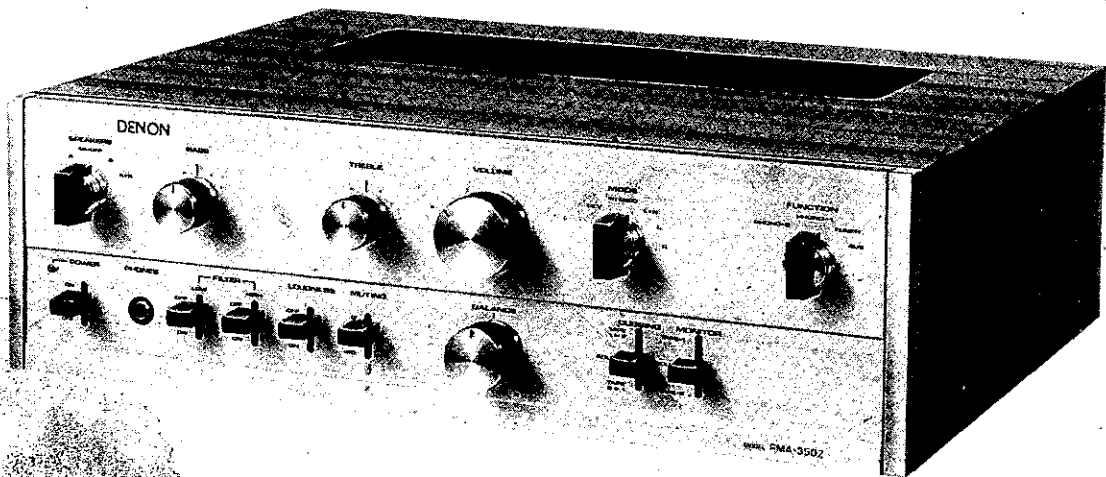


# DENON

Hi-Fi Component / Amplifier

**SERVICE MANUAL**  
**MODEL PMA-350Z**  
**SOLID STATE STEREO**  
**INTEGRATED AMPLIFIER**



**NIPPON COLUMBIA CO., LTD**

## TABLE OF CONTENTS

SPECIFICATIONS .....	1
APPELLATIONS AND FUNCTIONS OF PARTS (FRONT PANEL) .....	2
APPELLATIONS AND FUNCTIONS OF PARTS (BACK PANEL) .....	4
DISASSEMBLY INSTRUCTIONS .....	5
ASSEMBLY UNIT AND MAIN PARTS LOCATION .....	6
CHASSIS BOTTOM VIEW .....	6
CHASSIS TOP VIEW .....	7
CIRCUIT DIAGRAMS, PRINTED CIRCUIT BOARD PATTERNS AND PARTS LIST .....	8
ETC-54 Equalizer Amplifier Unit .....	8
ETC-53 Tone Amplifier Unit .....	10
ETC-52 Filter Amplifier Unit .....	12
ETC-51B Power Amplifier Unit .....	14
ETC-50 Power Source Unit .....	16
ETC-55 Tape Monitor Unit .....	17
ADJUSTMENTS AND MEASUREMENTS PROCÉDURES .....	19
Adjustment for midpoint electric potential and idling electric current of power amplifier .....	19
Testing of the power amplifier Unit .....	20
Testing of the sensitivity of each input jacks .....	21
Testing of the frequency characteristic .....	22
Frequency characteristic from AUX input jack .....	22
PHONO RIAA characteristic from PHONO-1 input jack .....	23
Testing of crosstalk, residual noise and inductive noise .....	24
Residual noise .....	24
Inductive noise .....	24
PHONO crosstalk .....	24
COMPLETE CIRCUIT DIAGRAM .....	25

# MAIN SPECIFICATIONS, PMA-350Z

TYPE: All silicon transistor integrated stereo amplifier

SEMICONDUCTORS: NPN transistor 15 pcs.  
 PNP transistor 4 "  
 FET 2 "  
 Diode 10 "  
 Varistor 2 "

## POWER AMPLIFIER SECTION

Music Power: 70 W (at 8  $\Omega$  load)  
 Rated Output (W/one channel driven): 31 W/31 W (at 8  $\Omega$  load) at T.H.D below 0.1%  
 Rated Output (W/ both channels driven): 27 W + 27 W (at 8  $\Omega$  load) at T.H.D below 0.1%  
 Harmonic Distortion: T.H.D, 0.1% or less (at rated output)  
 Inter Modulation Distortion: 0.1% or less (60 Hz/7 kHz = 4/1)  
 Power Band Width: 30 Hz — 30 kHz ( $\pm 1$  dB) THD 0.1%  
 Frequency Response: 8 Hz — 150 kHz  $\pm 0.5$  dB  
 Input Impedance: 90 k $\Omega$   $\pm 10\%$   
 Input Sensitivity: 1 Vrms 90 k $\Omega$  (at rated output)  
 Residual Noise: Less than 0.5 mV rms (Input terminals shorted)  
 Output Impedance: Less than 0.15  $\Omega$

## PREAMPLIFIER SECTION

Maximum Output: More than 4 V rms  
 Harmonic Distortion (at Max. Output): T.H.D, less than 0.1%  
 Rated Output: 1 V rms  
 Harmonic Distortion (at Rated Output): T.H.D, less than 0.08%  
 Input Sensitivity/Input Impedance: (at 20 Hz — 20 kHz)  
 PHONO-1 2 mV rms 60 k $\Omega$   $\pm 20\%$   
 PHONO-2 2 mV rms 60 k $\Omega$   $\pm 20\%$   
 TUNER 100 mV rms 100 k $\Omega$   $\pm 20\%$   
 AUX 100 mV rms 100 k $\Omega$   $\pm 20\%$   
 TAPE PB 320 mV rms 100 k $\Omega$   $\pm 20\%$   
 Max. Input Capacity: PHONO-1 & 2 40 mV rms (at 100 Hz)  
 180 mV rms (at 1 kHz)  
 600 mV rms (at 10 kHz)  
 Equalizer Characteristic, RIAA Deviation:  $\pm 0.5$  dB (at 30 Hz — 15 kHz)  
 S/N Ratio: PHONO-1 & 2 Better than 62 dB  
 TUNER Better than 73 dB  
 AUX Better than 73 dB  
 TAPE Better than 73 dB

Audio Muting: -20 dB

Tone Control: BASS +10 dB ~ -10.5 dB (at 80 Hz)  
 TREBLE +10 dB ~ -9 dB (at 12 kHz)

High Filter Cut-off Frequency: 9 kHz (12 dB/oct)

Low Filter Cut-off Frequency: 40 Hz (12 dB/oct)

Record Terminal Output/Output Impedance: TAPE REC, 100 mV rms/1 k $\Omega$

TERMINALS: PHONO-1  
 PHONO-2  
 TAPE-1 (REC & PB)  
 TAPE-2 (REC & PB)  
 AUX  
 TUNER  
 SPEAKERS (A & B)  
 HEADPHONE JACK  
 AC OUTLET, SWITCHED 2 pcs (250 W)  
 AC OUTLET, UNSWITCHED 1 pce (150 W)

POWER SOURCE: AC 100/120/200/220/240 V, 50/60 Hz

POWER CONSUMPTION: 60 W

WEIGHT: 10.5 kg, 23.1 lbs.

DIMENSIONS: 430 (W)  $\times$  140 (H)  $\times$  350 (D) mm, 16<sup>-15</sup>/<sub>16</sub>"(W)  $\times$  5<sup>-1</sup>/<sub>2</sub>"(H)  $\times$  13<sup>-25</sup>/<sub>32</sub>"(D).

# APPELLATIONS AND FUNCTIONS OF PARTS (FRONT PANEL)

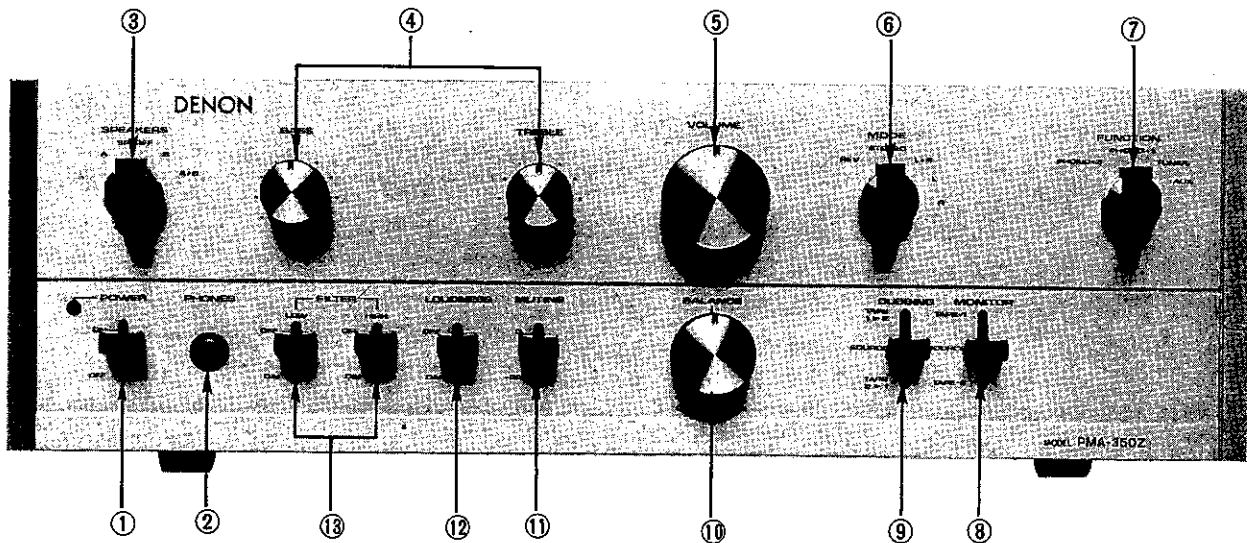


Fig. 1

## ① POWER (Power On-Off Switch)

This lever switch serves as the power switch to turn on and off the set. Move the lever upward to turn on the set with the power-on indicator lamp lighting up at the same time. Note that the two AC power plug receptacles marked SWITCHED on the back panel are interlocked with this lever switch, thus automatically turned on or off together with this POWER lever switch.

## ② PHONES (Headphone Jack)

Permits use of a stereo headphone of 8 ohms or higher input impedance. For your listening through a headphone only, set SPEAKERS (Speaker Selector) Switch to "SP-OFF" position.

## ③ SPEAKERS (Speaker Selector Switch)

This set permits connections of two speaker systems, A and B, either one of which can be used as the main speaker system. Set the SPEAKERS switch as indicated below:

- Set it to "A" to operate A speaker system only;
- Set it to "B" to operate B speaker system only;

Set it to "A + B" to operate both A and B speaker systems simultaneously; and set it to "SP-OFF" for headphone listening.

Note: Before proceeding to turn on the set with the POWER switch, set this selector switch to "SP-OFF" position. Then, set it to "A" or "B" position a few seconds after the set is turned on. This eliminates all unwanted noise that may otherwise occur with the switch-on action of the POWER switch.

## ④ BASS. TREBLE (Bass & Treble Controls)

When BASS or TREBLE control is set to its center position, bass or treble remains flat. Turn BASS or TREBLE control knob clockwise to emphasize bass or treble. With BASS or TREBLE knob turned counter-clockwise, bass or treble is de-emphasized. Both controls click as they are turned, the bass varying up to  $\pm 10$  dB at approx. 80 Hz and the treble up to  $\pm 10$  dB at 12 kHz. Each click represents variation amounting to approx. 2 dB. Nevertheless, since they are equipped with the specially designed click-stop type volume control, they permit continuous adjustment of tone even between each two clicks, thus enabling you to make the finest tone adjustment.

**⑤ VOLUME (Master Volume Control)**

Use to adjust overall volume level. Turn it clockwise to increase volume and counter-clockwise to decrease it.

**⑥ MODE (Mode Selector)**

This Mode selector knob is set to "STEREO" position for normal use. It selects five positions as indicated below:

- REV: Reverses signals between left and right channels for reproduction.
- STEREO: Use this position for normal stereophonic reproduction.
- L+R: Mixes left and right channel signals together for monophonic reproduction.
- L: Reproduces left channel signal through both left and right speaker systems.
- R: Reproduces right channel signal through both left and right speaker systems.

**⑦ FUNCTION (Input Program Source Selector Switch)**

Use to select input program source as indicated below:

- PHONO-2: To use a record player connected to PHONO-2 terminals.
- PHONO-1: To use a record player connected to PHONO-1 terminals.
- TUNER: To reproduce FM/AM broadcasting when combined with an FM/AM tuner.
- AUX: To reproduce other program source.

**⑧ MONITOR (Monitor Switch)**

When a tape deck is connected to TAPE terminals (pin jacks) for recording, this MONITOR switch should be set to "SOURCE" position. For reproduction of input taken in from a tape deck connected to TAPE-1 or TAPE-2 terminals, set this lever switch to "TAPE-1" or "TAPE-2."

When this set is combined with a 3-head tape deck for recording and playback, sound that is to be recorded will be monitored with this switch set to "SOURCE" and sound that has been recorded will be monitored with switch set to "TAPE-1" or "TAPE-2."

**⑨ DUBBING (Tape Dubbing Switch)**

Use when transcribing from one tape to another, using two tape decks. When transcribing or dubbing from tape deck "1" to tape deck "2", using the TAPE-1, 2 terminals for the tape deck connections, set this DUBBING switch to "1 ▶ 2" position. When transcribing the other way, set it to "2 ▶ 1" position.

**⑩ BALANCE (Balance Control)**

Volume level may differ somewhat between left and right speaker systems due to possible gain differences for which cartridge or other program sources are responsible. To adjust volume level balance between the two channels while consulting your acoustic sense, turn this control knob clockwise or counterclockwise to obtain the best two-channel volume balance. Turn this knob counterclockwise to increase volume of the left speaker system and clockwise to increase that of the right speaker system.

**⑪ MUTING (Muting Switch)**

Set this switch to "-20 dB" and volume level will be reduced at once to -20 dB level (1/10). To eliminate unwanted noise that often occur, for example, when a record is being replaced, set this switch to "-20 dB" position before proceeding to replace the record. Then, set it back to "O" position immediately before starting to play a new record, so that you will be able to continue the play with the same volume level as before.

**⑫ LOUDNESS (Loudness Control Switch)**

Both bass and treble are heard as if greatly reduced at low listening levels due to the sensitivity of human hearing. This switch is provided to compensate for this apparent loss. When listening at low volume level, set LOUDNESS to "ON" and both bass and treble will be boosted to provide more natural listening enjoyment.

**⑬ FILTER (High & Low Filter Switches)**

Used to eliminate or reduce noise caused by turntable rumble of the record player's motor or high-frequency noise often noted during tape playback of FM reception. Turn them on only when needed.

With the LOW FILTER switch set to "ON", unwanted low-frequency sound of 40 Hz or lower is cut by 12 dB/oct without degrading the low-frequency characteristic. With the HIGH FILTER switch set to "ON", high-frequency sound of 9 kHz or higher is cut by 12 dB/oct.

# APPELLATIONS AND FUNCTIONS OF PARTS (BACK PANEL)

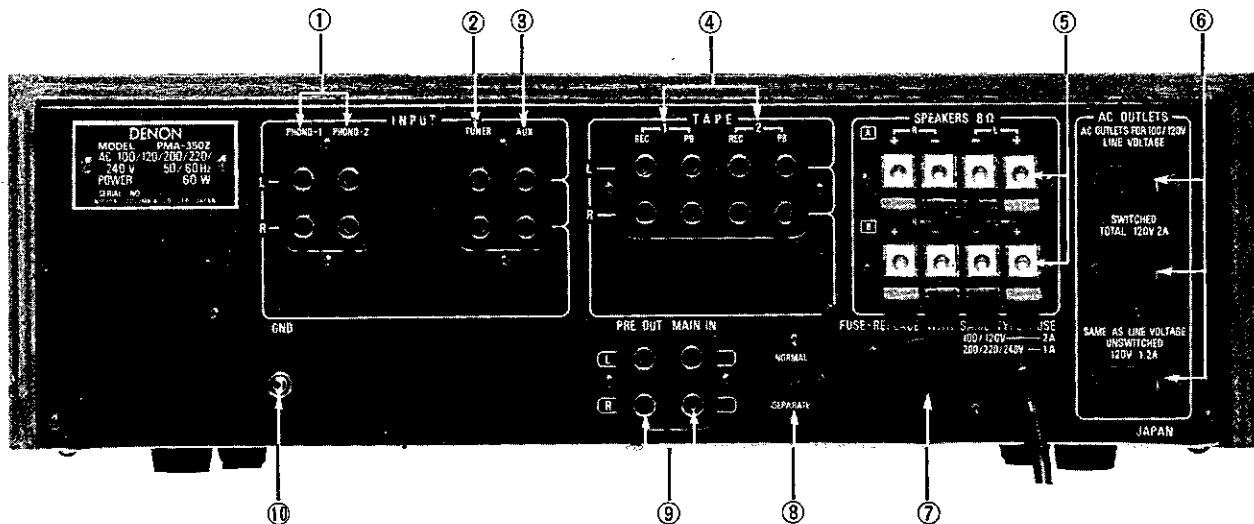


Fig. 2

## ① PHONO-1, 2 (Phono Input Terminals)

Use either PHONO-1 or PHONO-2 input terminals to connect a record player equipped with an MM, VM or IM type cartridge.

For use with a record player equipped with an MC type cartridge, the connection requires use of a step-up transformer.

## ② TUNER (Tuner Input Terminals)

Connect output terminals of a tuner to these TUNER input terminals.

## ③ AUX (Auxiliary Input Terminals)

Use to connect a tuner or other program source.

## ④ TAPE-1, 2 (Tape Record and Playback Pin Jacks)

Use to connect up to two tape decks by means of connection cords with pin plugs. Those marked REC are for recording use and those marked PB are for playback, each type allowing for connections of up to two tape decks.

PB-1, 2: Input sensitivity, 320 mV/100 kΩ.

REC-1, 2: Output, 100 mV/1 kΩ.

## ⑤ SPEAKERS (Speaker Output Terminals)

Use to connect up to two speaker systems, A and B. For use with this amplifier, a speaker system with 4-16 ohms impedance is generally preferred. Avoid connecting two 4-ohms speaker systems to both A and B speaker output terminals for simultaneous play (A + B), whenever possible.

## ⑥ AC OUTLET (AC Power Receptacles)

Two receptacles marked SWITCHED are AC power

outlets interlocked with the POWER switch on the front panel, thus switched on or off therewith. They have a combined load capacity of 250 watts. The third AC receptacle marked UNSWITCHED is always "ON" whether the POWER switch is "ON" or "OFF". Its load capacity is 150 watts.

## ⑦ FUSE (Fuse Holder)

A line power fuse is contained in this fuse holder. The fuse blows out to protect the set when abnormality occurs in the line power supply circuit. Replace it with one of the same type and same rating when blown.

## ⑧ NORMAL-SEPARATE (Pre-amp./Main Amp. Selector Switch)

When the preamplifier and main amplifier sections of this set are to be separated from each other and used independently, loosen the screw on the right and set this switch to "SEPARATE" position.

## ⑨ PRE OUT, MAIN IN (Pre-amp. Output & Main Amp. Input Terminals)

PRE OUT: Use when this amplifier is used as a component of a multi-channel system or when connected to other main amplifier.

MAIN IN: Use when the main amplifier section of this amplifier is independently used as a component of a multi-channel system or connected to other pre-amplifier.

## ⑩ GND (Earth Terminal)

If hum or other noise occurs when your amplifier is connected to a tuner or record player, connect this earth terminal to that of the tuner or record player for common earth, thereby eliminating the noise.

## DISASSEMBLY INSTRUCTIONS

1. To remove the top cabinet, first remove the screws in each side of the cabinet, then lift up the top cabinet by its rear edge.
2. For removal of the bottom cover, a total of six screws have to be removed.
3. For removal of the shield cover, take off three screws for front shield cover and two screws for back shield cover. (Fig. 4)
4. To remove the knobs, pull off all lever switch knobs and BASS, TREBLE, VOLUME and BALANCE knobs, for the other control knobs (SPEAKERS, MODE and FUNCTION), first loosen the two knob fixing screws using a small screw driver, then remove the knob.

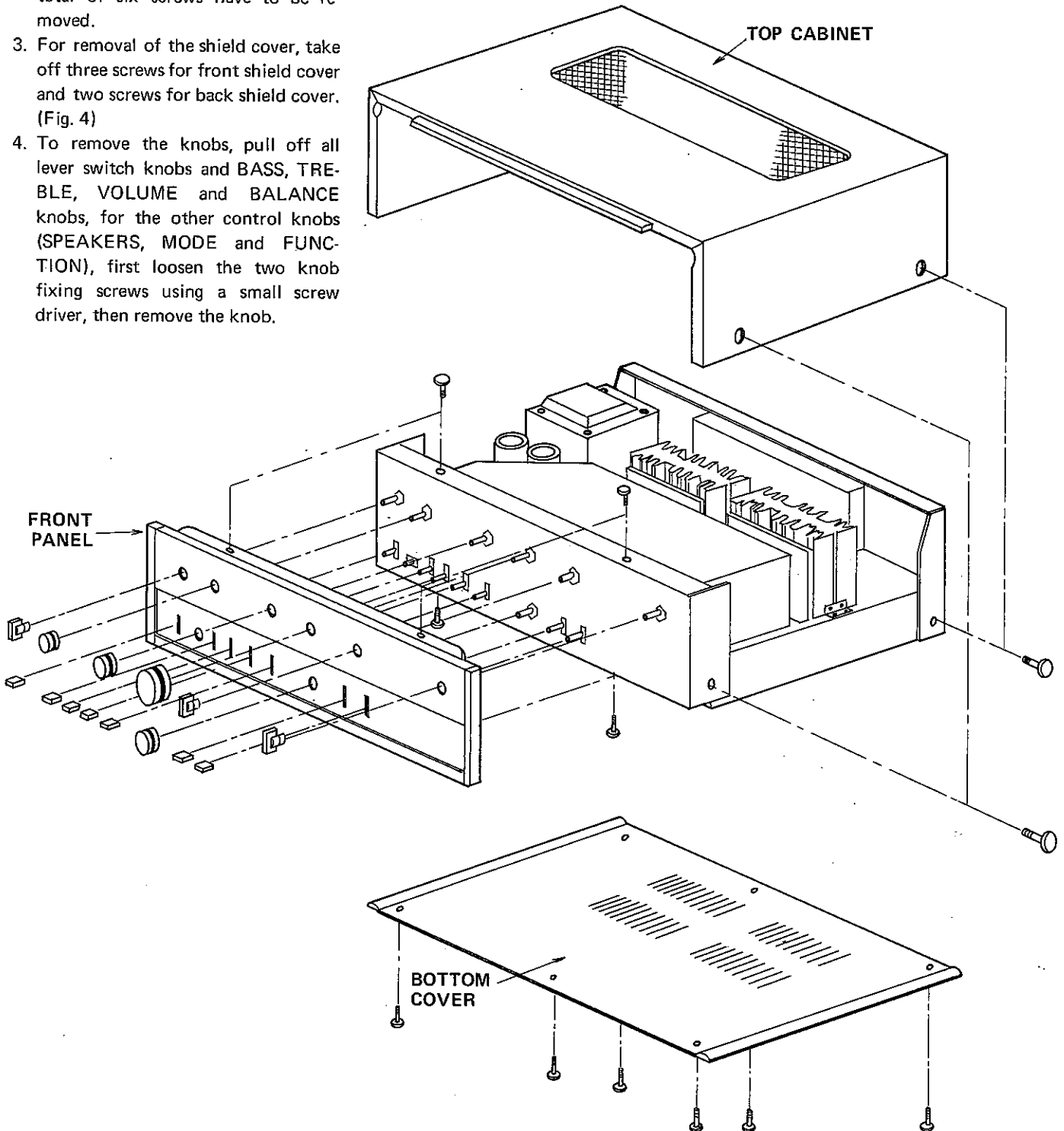


Fig. 3

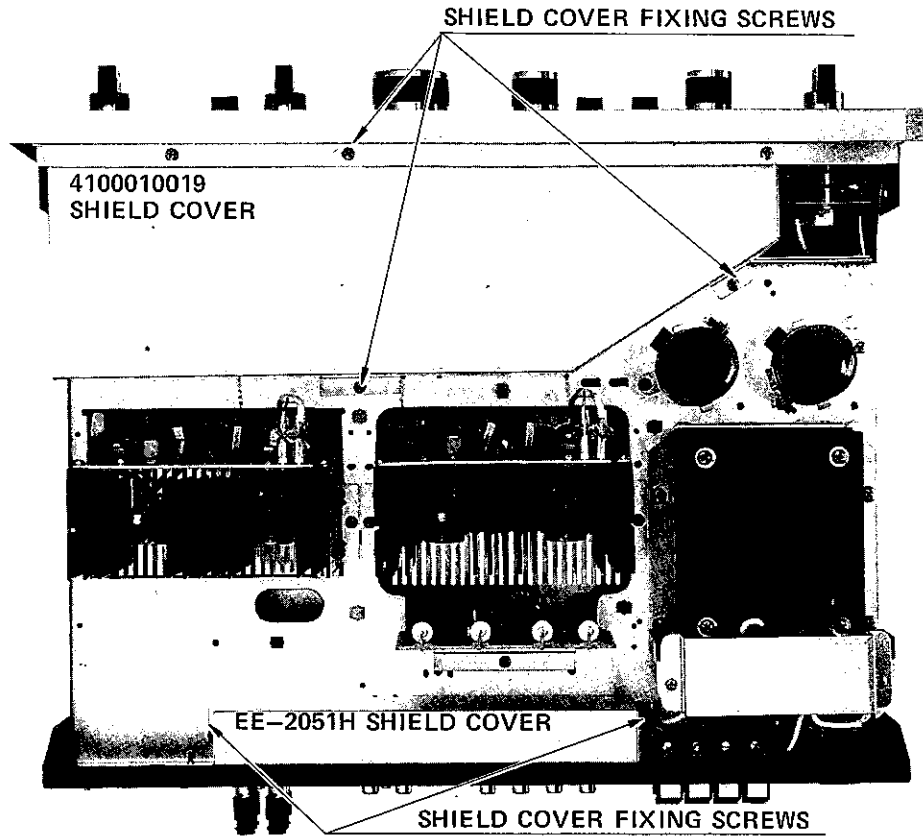


Fig. 4

ASSEMBLY UNIT AND MAIN PARTS LOCATION

PMA-350Z CHASSIS BOTTOM VIEW

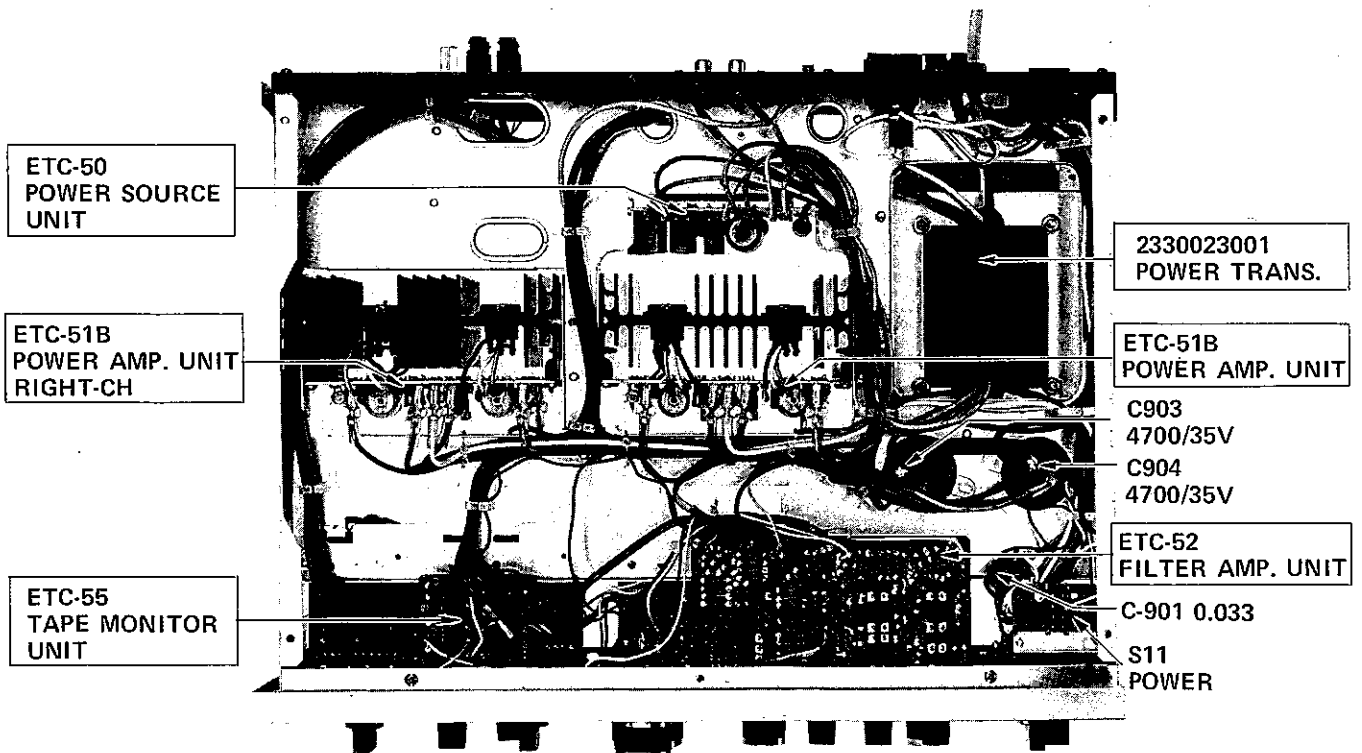


Fig. 5



PMA-350Z CHASSIS BOTTOM VIEW

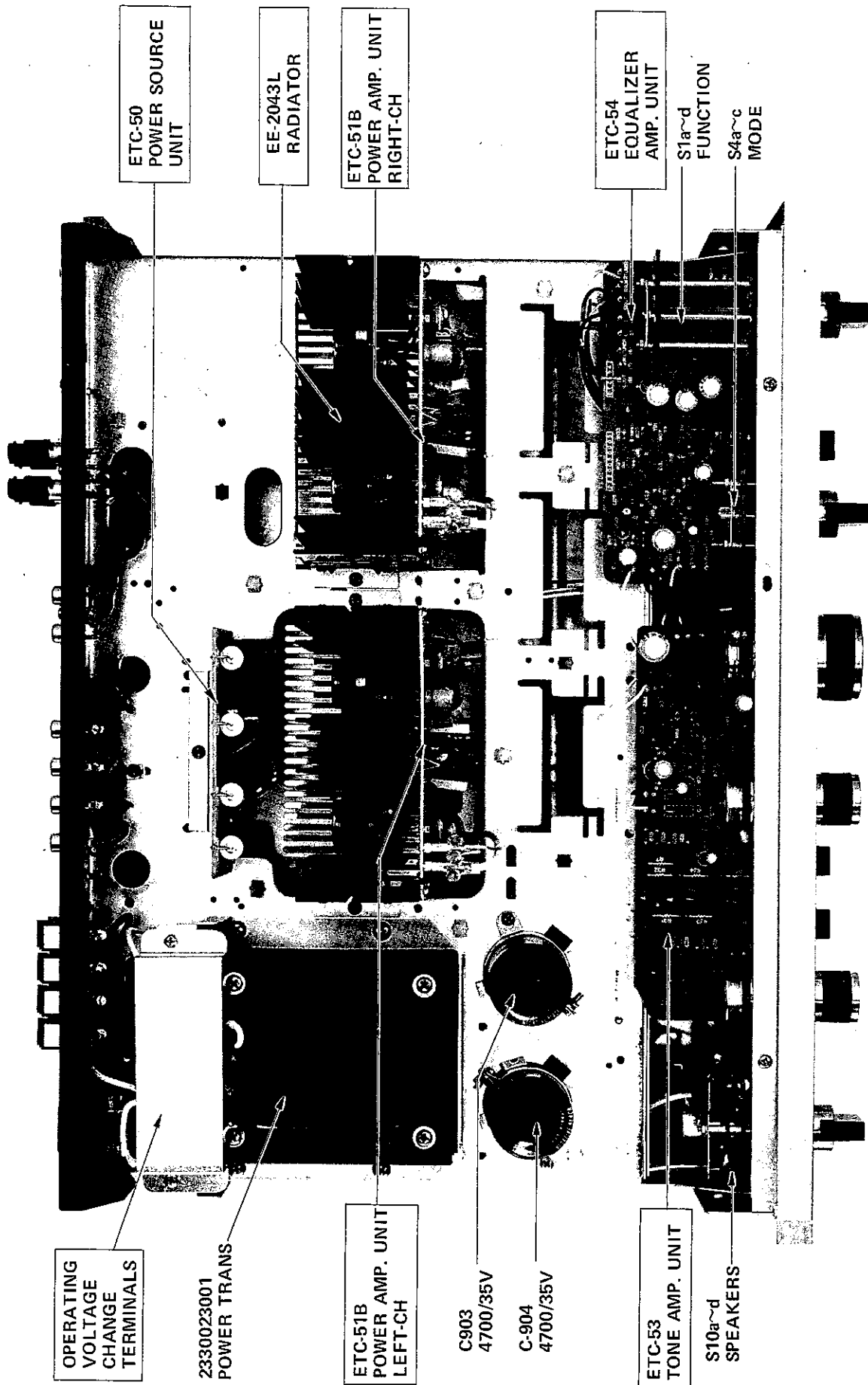


Fig. 6

# CIRCUIT DIAGRAMS, PRINTED CIRCUIT BOARD PATTERNS AND PARTS LIST (The board diagram represents the view from the copper foil side)

## ETC-54 EQUALIZER AMP. UNIT

TR1~6 2SC1345 ①

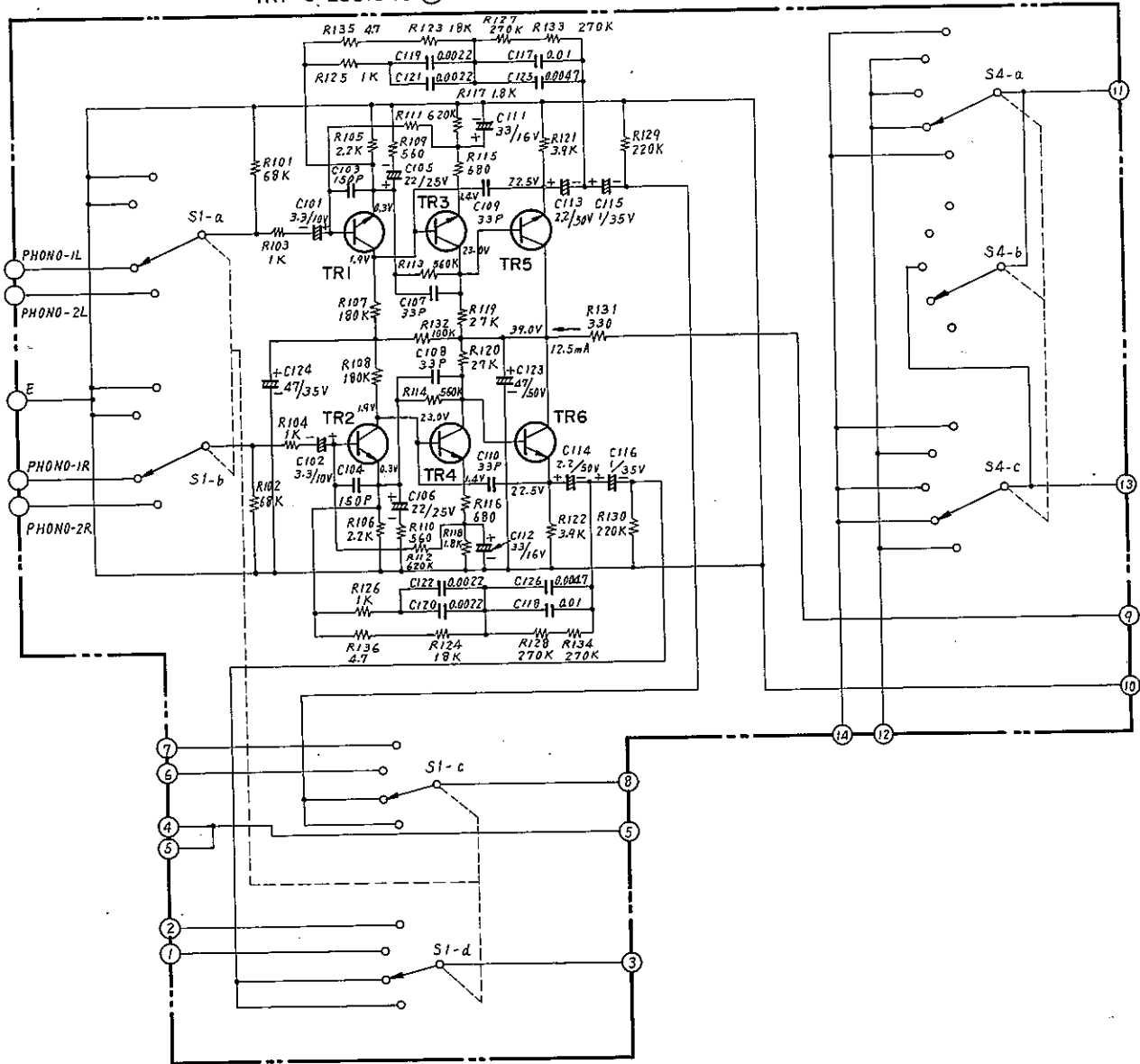


Fig. 7

Ref. No.	Part No.	Part Name	Descriptions
C101, 102	2541007007	CS45E1A3R3M	3.3μF ±20% 10V SOLID TANTALUM CAPACITOR
C103, 104	2533659007	CC45SL1H151K	150pF ±10% 50V CERAMIC CAPACITOR
C105, 106	2549005027	CE04=1E220MHS	22μF ±20% 25V ELECTROLYTIC CAPACITOR
C107, 108	2533651005	CC45SL1H330K	33pF ±10% 50V CERAMIC CAPACITOR
C109, 110	2533651005	CC45SL1H330K	33pF ±10% 50V CERAMIC CAPACITOR
C111, 112	2544016008	CE04W1C330	33μF 16V ELECTROLYTIC CAPACITOR
C113, 114	2544055001	CE04W1H2R2=F	2.2μF 50V ELECTROLYTIC CAPACITOR
C115, 116	2541029001	CS45E1V010M	1μF ±20% 35V SOLID TANTALUM CAPACITOR
C117, 118	2551134025	CQ92M1H103J	0.01μF ±5% 50V PLASTIC FILM CAPACITOR
C119, 120	2551134009	CQ92M1H222J	0.0022μF ±5% 50V PLASTIC FILM CAPACITOR
C121, 122	2551134009	CQ92M1H222J	0.0022μF ±5% 50V PLASTIC FILM CAPACITOR
C123	2544049004	CE04W1H470	47μF 50V ELECTROLYTIC CAPACITOR
C124	2544037003	CE04W1V470	47μF 50V ELECTROLYTIC CAPACITOR
C125, 126	2551120084	CQ93M1H472J	0.0047μF ±5% PLASTIC FILM CAPACITOR

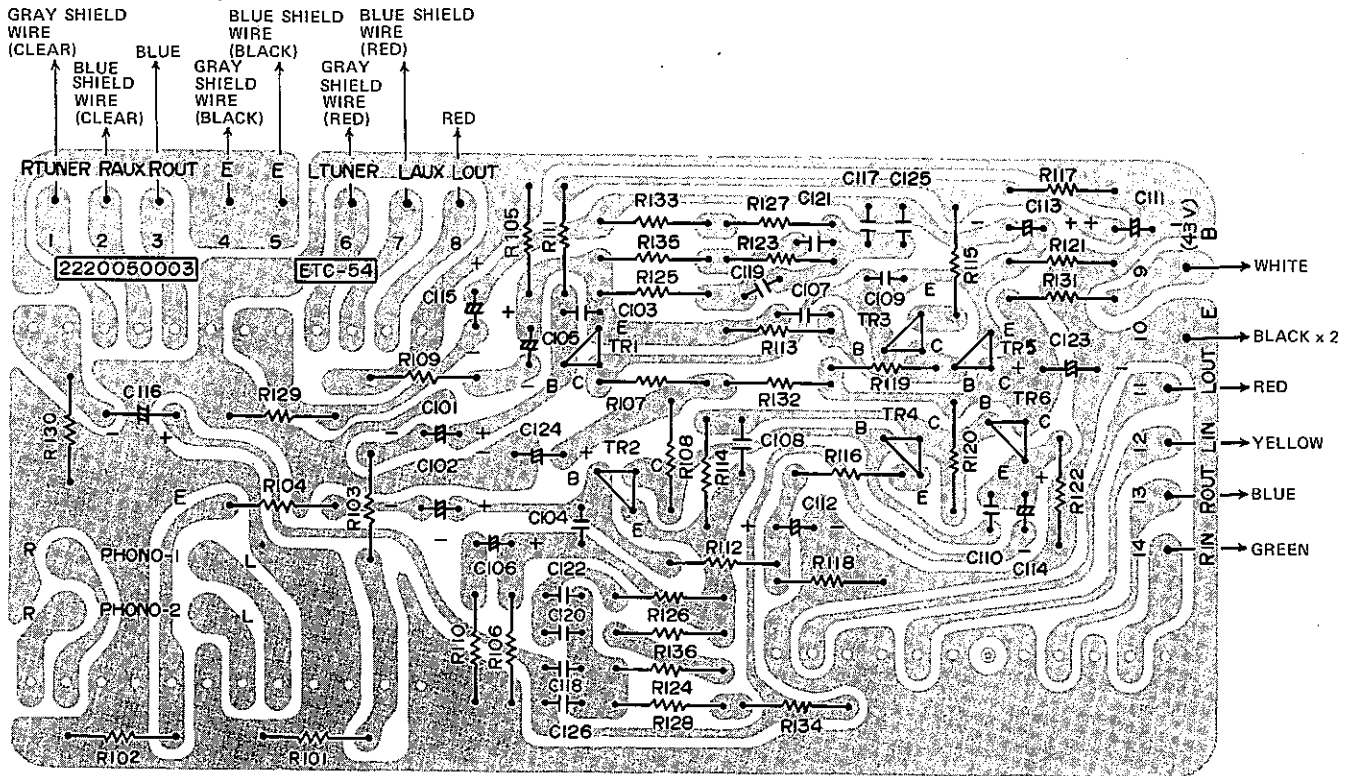


Fig. 8

Ref. No.	Part No.	Part Name	Descriptions
R101, 102	2410358010	RD14B2E683JF	1/4W 68kΩ ±5% CARBON FILM RESISTOR
R103, 104	2410314012	RD14B2E102JF	1/4W 1kΩ ±5% CARBON FILM RESISTOR
R105, 106	2410322017	RD14B2E222JF	1/4W 2.2kΩ ±5% CARBON FILM RESISTOR
R107, 108	2410368013	RD14B2E184JF	1/4W 180kΩ ±5% CARBON FILM RESISTOR
R109, 110	2410308015	RD14B2E561JF	1/4W 560Ω ±5% CARBON FILM RESISTOR
R111, 112	2410749001	RD05A2H624G	1/2W 620kΩ ±2% CARBON FILM RESISTOR
R113, 114	2410748002	RD05A2H564G	1/2W 560kΩ ±2% CARBON FILM RESISTOR
R115, 116	2410310016	RD14B2E681JF	1/4W 680Ω ±5% CARBON FILM RESISTOR
R117, 118	2410320019	RD14B2E182JF	1/4W 1.8kΩ ±5% CARBON FILM RESISTOR
R119, 120	2410348017	RD14B2E273JF	1/4W 27kΩ ±5% CARBON FILM RESISTOR
R121, 122	2410328011	RD14B2E392JF	1/4W 3.9kΩ ±5% CARBON FILM RESISTOR
R123, 124	2410344011	RD14B2E183JF	1/4W 18kΩ ±5% CARBON FILM RESISTOR
R125, 126	2410314012	RD14B2E102JF	1/4W 1kΩ ±5% CARBON FILM RESISTOR
R127, 128	2412012082	RD14B2E274G	1/4W 270kΩ ±2% CARBON FILM RESISTOR
R129, 130	2410370014	RD14B2E224JF	1/4W 220kΩ ±5% CARBON FILM RESISTOR
R131	2410302011	RD14B2E331JF	1/4W 330Ω ±5% CARBON FILM RESISTOR
R132	2410362019	RD14B2E104JF	1/4W 100kΩ ±5% CARBON FILM RESISTOR
R133, 134	2412012082	RD14B2E274G	1/4W 270kΩ ±2% CARBON FILM RESISTOR
R135, 136	2410258013	RD14B2E4R7JF	1/4W 4.7Ω ±5% CARBON FILM RESISTOR
TR1, 2	2730116039	2SC1345 Ⓣ	TRANSISTOR
TR3, 4	2730116039	2SC1345 Ⓣ	TRANSISTOR
TR5, 6	2730116039	2SC1345 Ⓣ	TRANSISTOR
S1a~d	EP-5815J	FUNCTION SWITCH	
S4a~c	EP-7263H	MODE SWITCH	
	2220050003	PRINTED CIRCUIT BOARD	

ETC-53 TONE AMP. UNIT

TR1~2, 5~6 2SC458A (LG) (B) OR (C) TR3~4 2SK40 (C) (D)

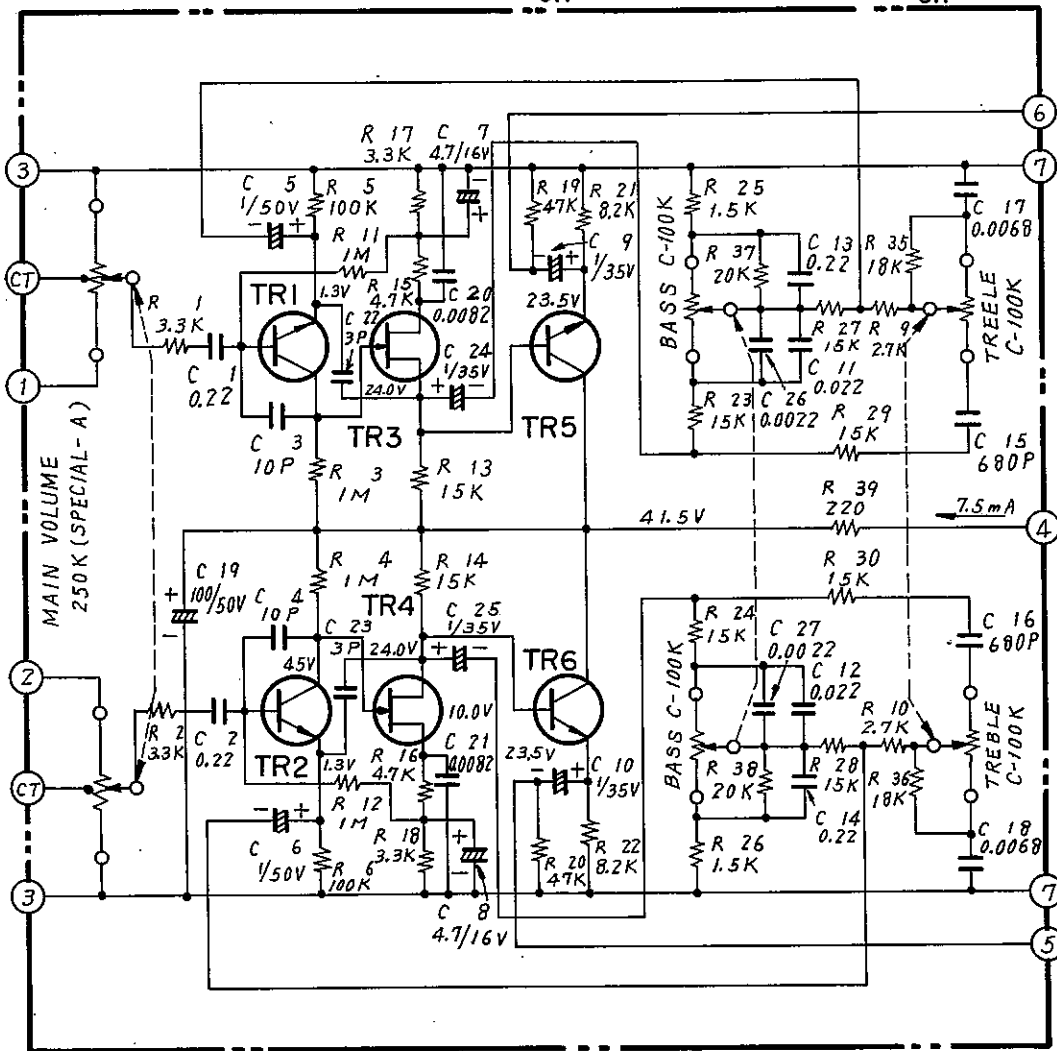


Fig. 9

Ref. No.	Part No.	Part Name	Descriptions
C1, 2	2551134070	CQ92M1H224J	0.22μF ±5% 50V PLASTIC FILM CAPACITOR
C3, 4	2533603008	CC45SL1H100D	10pF ±0.5pF 50V CERAMIC CAPACITOR
C5, 6	2544044009	CE04W1H010	1μF 50V ELECTROLYTIC CAPACITOR
C7, 8	2543014001	CE04D1C4R7MBP	4.7μF ±20% 16V ELECTROLYTIC CAPACITOR
C9, 10	2541029001	CS45E1V010M	1μF ±20% 35V SOLID TANTALUM CAPACITOR
C11, 12	2551134038	CQ92M1H223J	0.022μF ±5% 50V PLASTIC FILM CAPACITOR
C13, 14	2551134070	CQ92M1H224J	0.22μF ±5% 50V PLASTIC FILM CAPACITOR
C15, 16	2556021007	CQ08S1H681J	0.00068μF ±5% 50V PLASTIC FILM CAPACITOR
C17, 18	2551135066	CQ92M1H682J	0.0068μF ±5% 50V PLASTIC FILM CAPACITOR
C19	2544050006	CE04W1H101	100μF 50V ELECTROLYTIC CAPACITOR
C20, 21	2551135008	CQ92M1H822J	0.0082μF ±5% 50V PLASTIC FILM CAPACITOR
C22, 23	2533596005	CC45SL1H030C	3pF ±0.25pF 50V CERAMIC CAPACITOR
C24, 25	2541029001	CS45E1V010M	1μF ±20% 35V SOLID TANTALUM CAPACITOR
C26, 27	2551134009	CQ92M1H222J	0.0022μF ±5% 50V PLASTIC FILM CAPACITOR
R1, 2	2410326013	RD14B2E332JF	1/4W 3.3kΩ ±5% CARBON FILM RESISTOR
R3, 4	2410257001	RD14B2H105J	1/2W 1MΩ ±5% CARBON FILM RESISTOR
R5, 6	2410362019	RD14B2E104JF	1/4W 100kΩ ±5% CARBON FILM RESISTOR
R7, 8			MISSING RESISTOR
R9, 10	2410324015	RD14B2E272JF	1/4W 2.7kΩ ±5% CARBON FILM RESISTOR
R11, 12	2420191018	RC05GF2E105KF	1/4W 1MΩ ±10% CARBON COMPOSITE RESISTOR
R13, 14	2410342013	RD14B2E153JF	1/4W 15kΩ ±5% CARBON FILM RESISTOR
R15, 16	2410330012	RD14B2E472JF	1/4W 4.7kΩ ±5% CARBON FILM RESISTOR

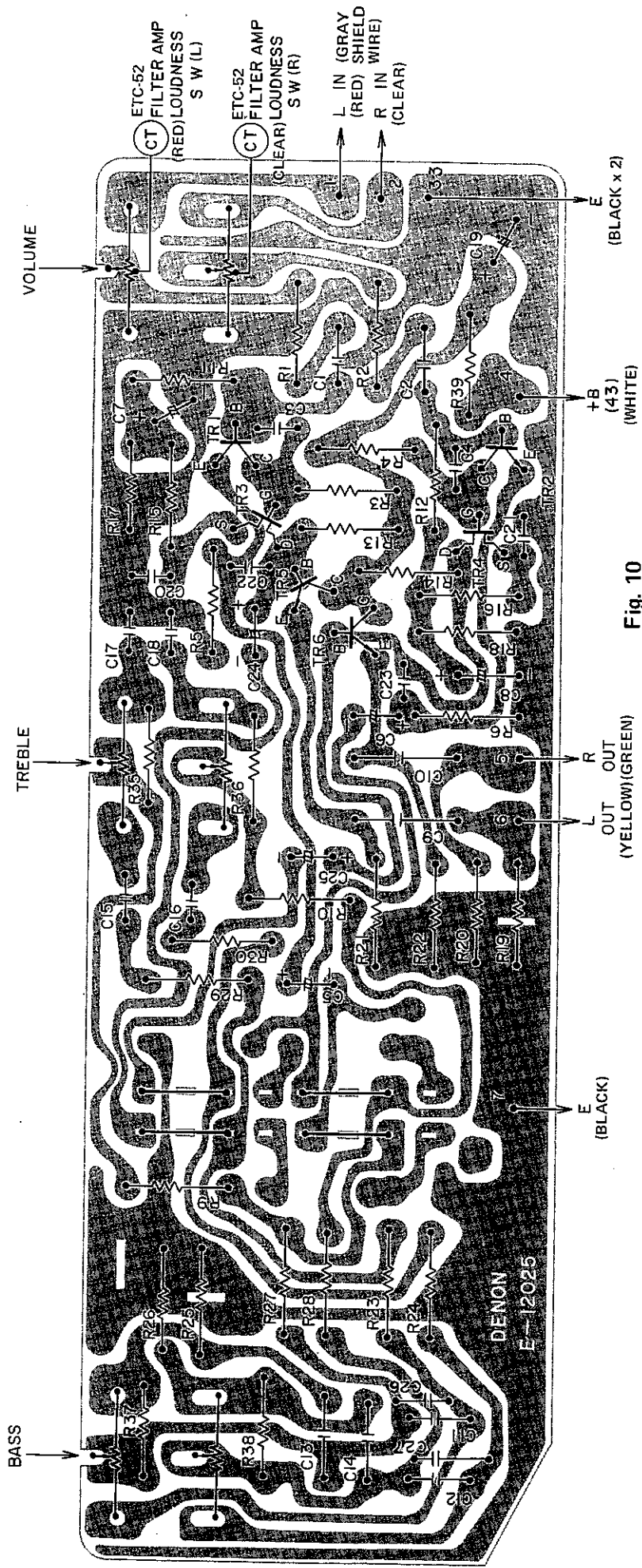


Fig. 10

Ref. No.	Part No.	Part Name	Descriptions	Ref. No.	Part No.	Part Name	Descriptions
R17, 18	2410326013	RD14B2E332JF	1/4W 3.3kΩ ±5% CARBON FILM RESISTOR	TR1, 2	2730022039	2SC458ALG (B) or (C)	TRANSISTOR
R19, 20	2410354014	RD14B2E473JF	1/4W 47kΩ ±5% CARBON FILM RESISTOR	TR3, 4	2750007021	2SK40 (C) or (D)	TRANSISTOR (FET)
R21, 22	2410336016	RD14B2E822JF	1/4W 8.2kΩ ±5% CARBON FILM RESISTOR	TR5, 6	2730022039	2SC458ALG (B) or (C)	TRANSISTOR
R23, 24	2410342013	RD14B2E153JF	1/4W 15kΩ ±5% CARBON FILM RESISTOR		EE-2025	PRINTED CIRCUIT BOARD	
R25, 26	2410318018	RD14B2E152JF	1/4W 1.5kΩ ±5% CARBON FILM RESISTOR				
R27, 28	2410342013	RD14B2E153JF	1/4W 15kΩ ±5% CARBON FILM RESISTOR				
R29, 30	2410342013	RD14B2E153JF	1/4W 15kΩ ±5% CARBON FILM RESISTOR				
R31, 32			MISSING RESISTOR				
R33, 34			MISSING RESISTOR				
R35, 36	2410344011	RD14B2E183JF	1/4W 18kΩ ±5% CARBON FILM RESISTOR				
R37, 38	2410345010	RD14B2E203JF	1/4W 20kΩ ±5% CARBON FILM RESISTOR				
R39	2410298015	RD14B2E221JF	1/4W 220Ω ±5% CARBON FILM RESISTOR				

ETC-52 FILTER AMP. UNIT

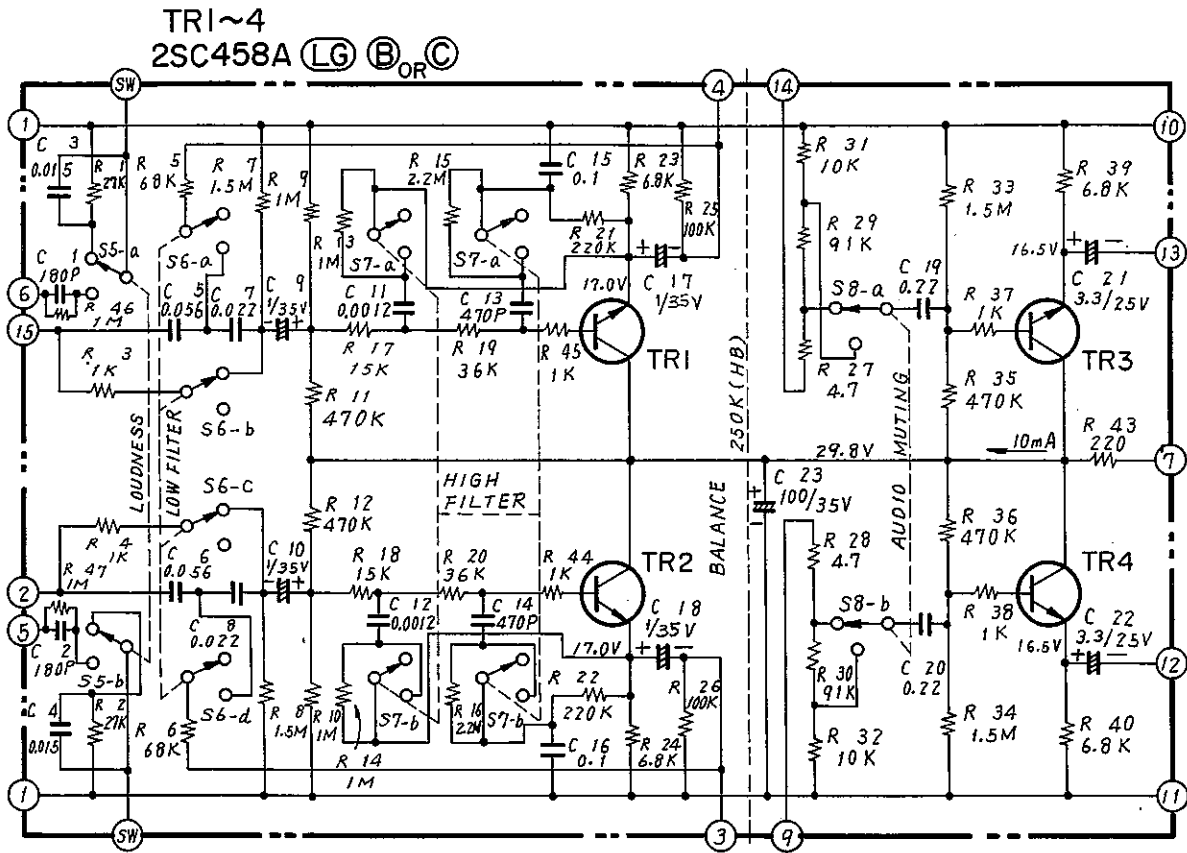


Fig. 11

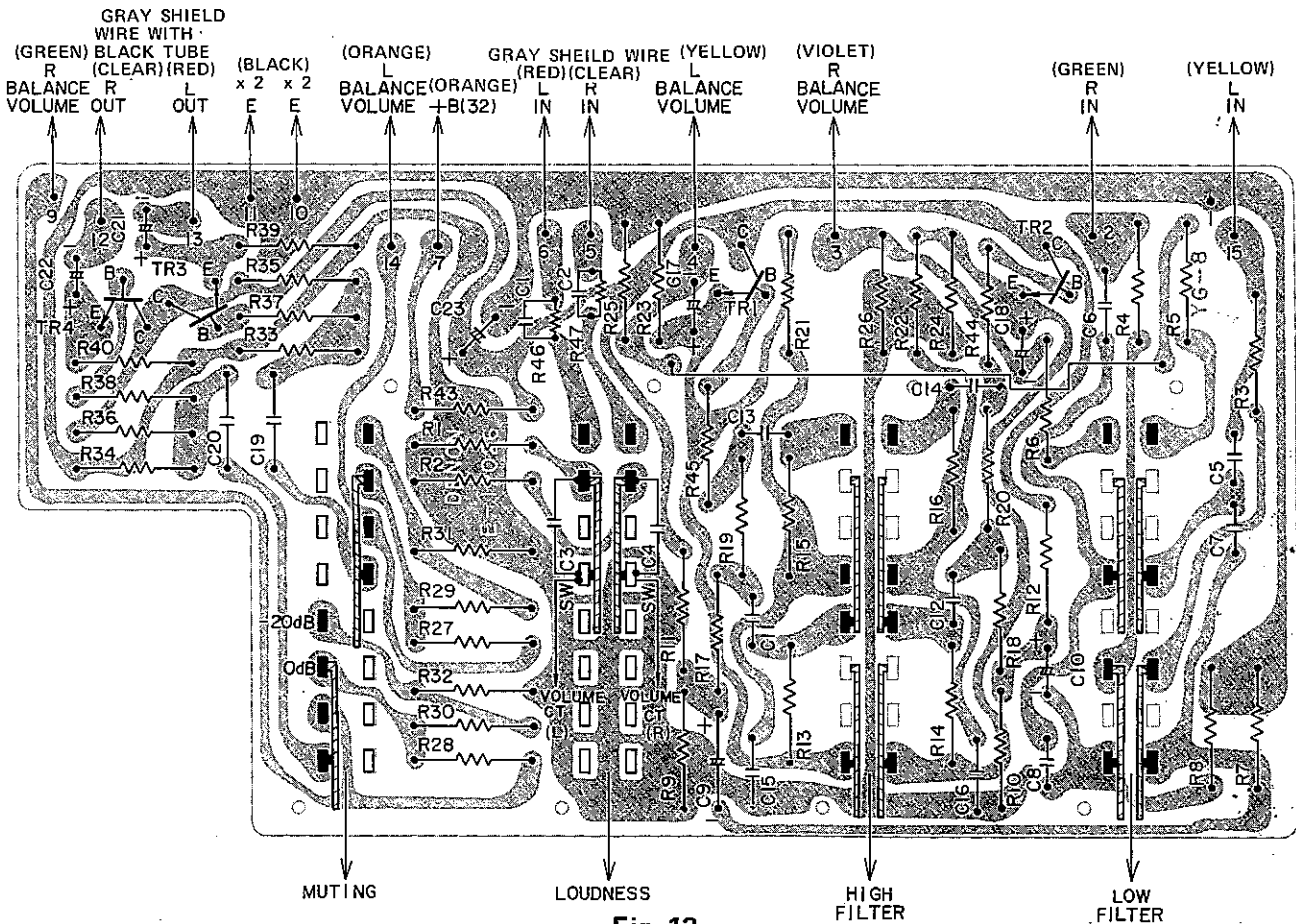


Fig. 12

Ref. No.	Part No.	Part Name	Descriptions	
C1, 2	2533660009	CC45SL1H181K	180pF ±10% 50V	CERAMIC CAPACITOR
C3, 4	2551135011	CQ92M1H153J	0.015μF ±5% 50V	PLASTIC FILM CAPACITOR
C5, 6	2551135095	CQ92M1H563J	0.056μF ±5% 50V	PLASTIC FILM CAPACITOR
C7, 8	2551134038	CQ92M1H223J	0.022μF ±5% 50V	PLASTIC FILM CAPACITOR
C9, 10	2541029001	CS45E1V010M	1μF ±20% 35V	SOLID TANTALUM CAPACITOR
C11, 12	2551135037	CQ92M1H122J	0.0012μF ±5% 50V	PLASTIC FILM CAPACITOR
C13, 14	2556017008	CQ08S1H471J	0.00047μF ±5% 50V	PLASTIC FILM CAPACITOR
C15, 16	2551025008	CQ92M1H104K	0.1μF ±10% 50V	PLASTIC FILM CAPACITOR
C17, 18	2541029001	CS45E1V010M	1μF ±20% 35V	SOLID TANTALUM CAPACITOR
C19, 20	2545016007	CA92F1ER22M	0.22μF ±20% 25V	SOLID ALUMINUM CAPACITOR
C21, 22	2544023004	CE04W1E3R3	3.3μF 25V	ELECTROLYTIC CAPACITOR
C23	2544038002	CE04W1V101	100μF 35V	ELECTROLYTIC CAPACITOR
R1, 2	2410348017	RD14B2E273JF	1/4W 27kΩ ±5%	CARBON FILM RESISTOR
R3, 4	2410314012	RD14B2E102JF	1/4W 1kΩ ±5%	CARBON FILM RESISTOR
R5, 6	2410358010	RD14B2E683JF	1/4W 68kΩ ±5%	CARBON FILM RESISTOR
R7, 8	2420193016	RC05GF2E155KF	1/4W 1.5MΩ ±10%	CARBON COMPOSITE RESISTOR
R9, 10	2420191018	RC05GF2E105KF	1/4W 1MΩ ±10%	CARBON COMPOSITE RESISTOR
R11, 12	2410378016	RD14B2E474JF	1/4W 470kΩ ±5%	CARBON FILM RESISTOR
R13, 14	2420191018	RC05GF2E105KF	1/4W 1MΩ ±10%	CARBON COMPOSITE RESISTOR
R15, 16	2420195014	RC05GF2E225KF	1/4W 2.2MΩ ±10%	CARBON COMPOSITE RESISTOR
R17, 18	2410342013	RD14B2E153JF	1/4W 15kΩ ±5%	CARBON FILM RESISTOR
R19, 20	2410351017	RD14B2E363JF	1/4W 36kΩ ±5%	CARBON FILM RESISTOR
R21, 22	2410370014	RD14B2E224JF	1/4W 220kΩ ±5%	CARBON FILM RESISTOR
R23, 24	2410334018	RD14B2E682JF	1/4W 6.8kΩ ±5%	CARBON FILM RESISTOR
R25, 26	2410362019	RD14B2E104JF	1/4W 100kΩ ±5%	CARBON FILM RESISTOR
R27, 28	2410258013	RD14B2E4R7JF	1/4W 4.7Ω ±5%	CARBON FILM RESISTOR
R29, 30	2410360010	RD14B2E913JF	1/4W 91kΩ ±5%	CARBON FILM RESISTOR
R31, 32	2410338014	RD14B2E103JF	1/4W 10kΩ ±5%	CARBON FILM RESISTOR
R33, 34	2420193016	RC05GF2E155KF	1/4W 1.5MΩ ±10%	CARBON COMPOSITE RESISTOR
R35, 36	2410378016	RD14B2E474JF	1/4W 470kΩ ±5%	CARBON FILM RESISTOR
R37, 38	2410314012	RD14B2E102JF	1/4W 1kΩ ±5%	CARBON FILM RESISTOR
R39, 40	2410334018	RD14B2E682JF	1/4W 6.8kΩ ±5%	CARBON FILM RESISTOR
R41, 42				MISSING RESISTOR
R43	2410298015	RD14B2E221JF	1/4W 220Ω ±5%	CARBON FILM RESISTOR
R44, 45	2410314012	RD14B2E102JF	1/4W 1kΩ ±5%	CARBON FILM RESISTOR
R46, 47	2420191005	RC05GF2E105K	1/4W 1MΩ ±10%	CARBON COMPOSITE RESISOTR
TR1, 2	2730022039	2SC458ALG Ⓟ	TRANSISTOR	
TR3, 4	2730022039	2SC458ALG Ⓟ	TRANSISTOR	
S5, 6, 7, 8	EP-7099H	LEVER SWITCH	FOR HI, LOW, LOUDNESS, AND MUTING SWITCH	
	EE-2026	PRINTED CIRCUIT BOARD		

MEMO:

ETC-51B POWER AMP. UNIT

TR1~2 2SC1345 (E) TR3 2SA537A (B) TR4 2SC458 (B)

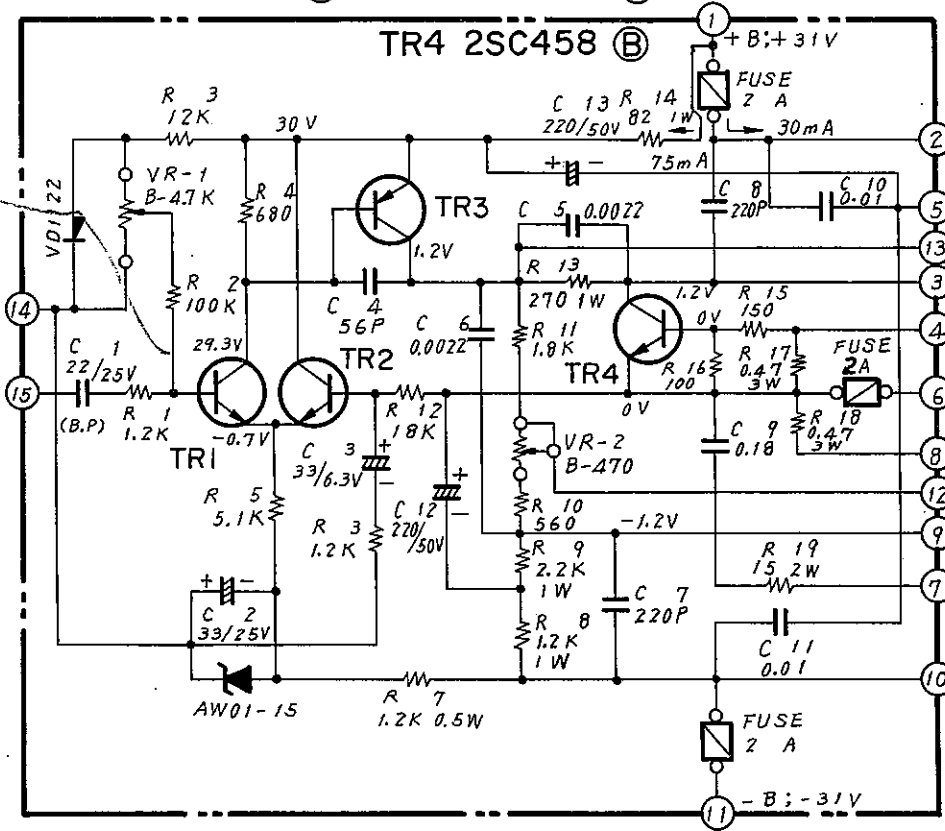


Fig. 13

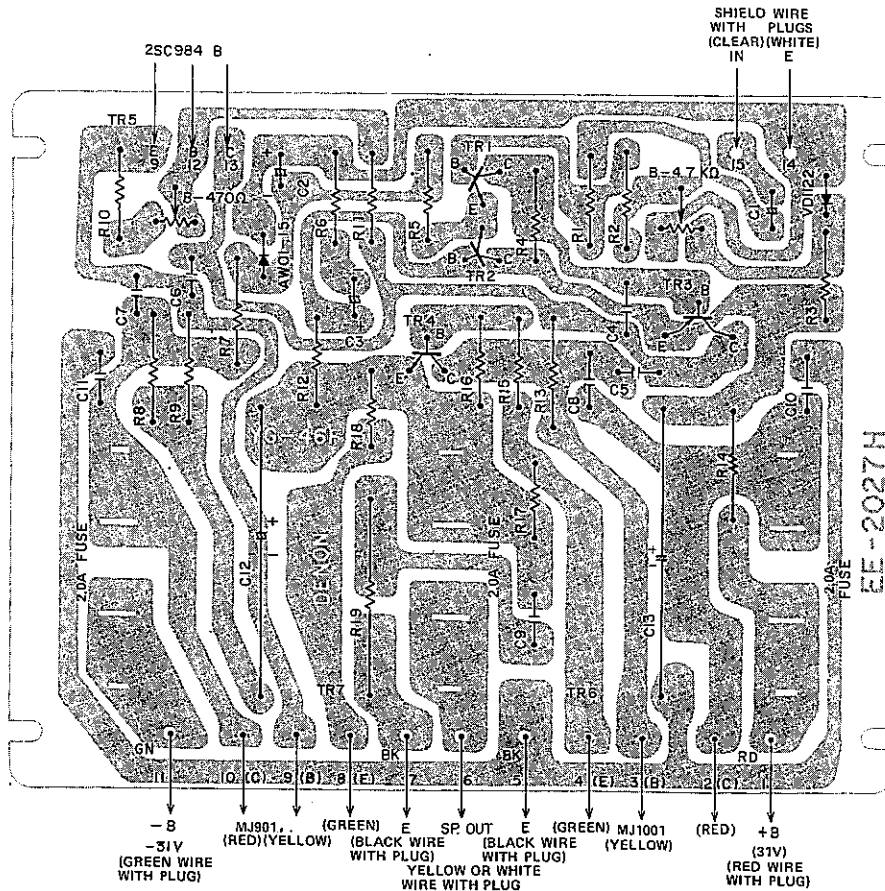


Fig. 14



Ref. No.	Part No.	Part Name	Description	
C1	2543015000	CE04D1E2R2MBP	2.2 $\mu$ F $\pm$ 20% 25V	ELECTROLYTIC CAPACITOR
C2	2544026001	CE04W1E330	33 $\mu$ F 25V	ELECTROLYTIC CAPACITOR
C3	2544001000	CE04W0J330	33 $\mu$ F 6.3V	ELECTROLYTIC CAPACITOR
C4	2533654002	CC45SL1H560K	56pF $\pm$ 10% 50V	CERAMIC CAPACITOR
C5, 6	2551032004	CQ92M1H222M	0.0022 $\mu$ F $\pm$ 20% 50V	PLASTIC FILM CAPACITOR
C7, 8	2531028009	CK45B2H221K	220pF $\pm$ 10% 500V	CERAMIC CAPACITOR
C9	2551028005	CQ92M1H184K	0.18 $\mu$ F $\pm$ 10% 50V	PLASTIC FILM CAPACITOR
C10, 11	2531010004	CK45B1H103K	0.01 $\mu$ F $\pm$ 10% 50V	CERAMIC CAPACITOR
C12, 13	2542056002	CE02W1H221	220 $\mu$ F 50V	ELECTROLYTIC CAPACITOR
R1	2410316010	RD14B2E122JF	1/4W 1.2k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R2	2410362019	RD14B2E104JF	1/4W 100k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R3	2410340015	RD14B2E123JF	1/4W 12k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R4	2410310016	RD14B2E681JF	1/4W 680 $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R5	2410331011	RD14B2E512JF	1/4W 5.1k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R6	2410316010	RD14B2E122JF	1/4W 1.2k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R7	2420034010	RC05GF2H122KF	1/2W 1.2k $\Omega$ $\pm$ 10%	CARBON COMPOSITE RESISTOR
R8	2440042008	RS14B3A122JNB	1W 1.2k $\Omega$ $\pm$ 5%	METAL OXIDE FILM RESISTOR
R9	2440045005	RS14B3A222JNB	1W 2.2k $\Omega$ $\pm$ 5%	METAL OXIDE FILM RESISTOR
R10	2410308015	RD14B2E561JF	1/4W 560 $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R11	2410320019	RD14B2E182JF	1/4W 1.8k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R12	2410344011	RD14B2E183JF	1/4W 18k $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R13	2440034003	RS14B3A271JNB	1W 270 $\Omega$ $\pm$ 5%	METAL OXIDE FILM RESISTOR
R14	2440028006	RS14B3A820JNB	1W 82 $\Omega$ $\pm$ 5%	METAL OXIDE FILM RESISTOR
R15	2410294019	RD14B2E151JF	1/4W 150 $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R16	2410290013	RD14B2E101JF	1/4W 100 $\Omega$ $\pm$ 5%	CARBON FILM RESISTOR
R17, 18	2430032002	RW99=3FR47K	3.15W 0.47 $\Omega$ $\pm$ 10%	WIRE WOUND RESISTOR
R19	2440076003	RS14B3D150JNB	2W 15 $\Omega$ $\pm$ 5%	METAL OXIDE FILM RESISTOR
VR1	EP-72232	SOLID VOLUME	B-4.7k $\Omega$ VARIABLE RESISTOR	
VR2	EP-72231	SOLID VOLUME	B-470 $\Omega$ VARIABLE RESISTOR	
TR1	2730116013	2SC1345 (E)	TRANSISTOR	
TR2	2730116013	2SC1345 (E)	TRANSISTOR	
TR3	2710050018	2SA537A (B)	TRANSISTOR	
TR4	2730021027	2SC458 (B)	TRANSISTOR	
TR5	2730096010	2SC984 (B)	TRANSISTOR	
TR6	2730128001	MJ1001	TRANSISTOR	
TR7	2710048004	MJ901	TRANSISTOR	
	2760155028	VD1122	VARISTER	
	2760067006	AW01-15	ZENNER DIODE	
	EP-71326	FUSE (2A)	FOR "+B", "-B" AND "OUTPUT"	
	EP-5870	FUSE HOLDER		
	EE-2043L	RADIATOR	HEAT SINK FOR POWER TRANSISTOR (TR6, 7)	
	EP-7127	TR SOCKET	SOCKET FOR POWER TRANSISTOR (TR6, 7)	
	EP-6733	INSULATING SHEET	FOR POWER TRANSISTOR (TR6, 7)	
	EE-2027H1	PRINTED CIRCUIT BOARD		

MEMO:

ETC-50 POWER SUPPLY UNIT

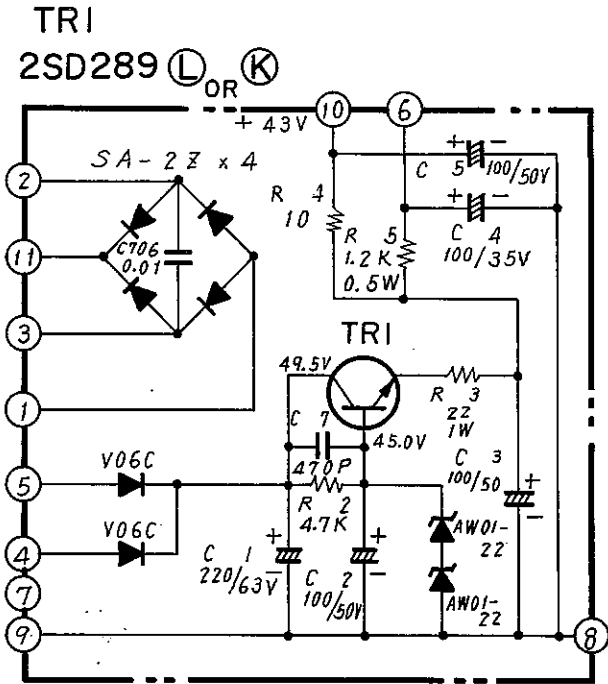


Fig. 15

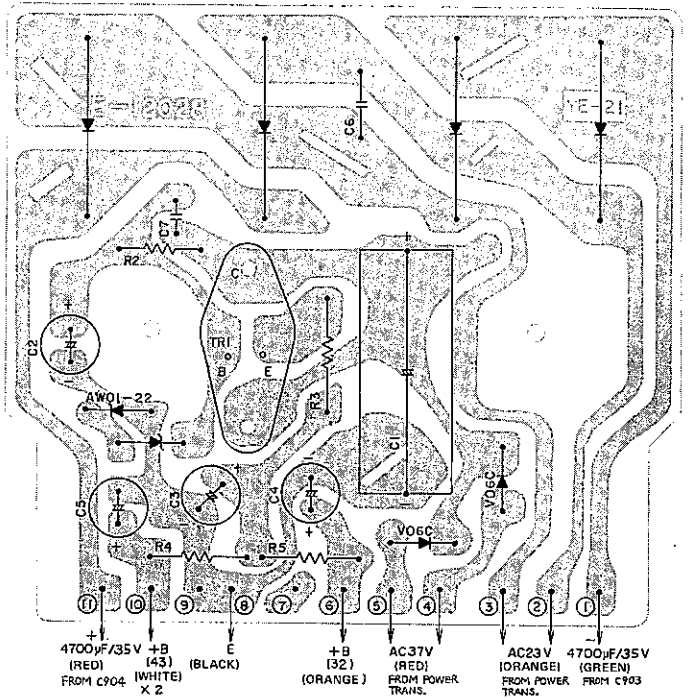


Fig. 16

Ref. No.	Part No.	Part Name	Descriptions
C1	EP-7160	CE02W1J221	220µF 63V ELECTROLYTIC CAPACITOR
C2	2544050006	CE04W1H101	100µF 50V ELECTROLYTIC CAPACITOR
C3	2544050006	CE04W1H101	100µF 50V ELECTROLYTIC CAPACITOR
C4	2544038002	CE04W1V101	100µF 35V ELECTROLYTIC CAPACITOR
C5	2544050006	CE04W1H101	100µF 50V ELECTROLYTIC CAPACITOR
C6	2531038002	CK45B2H103K	0.01µF ±10% 500V CERAMIC CAPACITOR
C7	2531002009	CK45B1H471K	470pF ±10% 50V CERAMIC CAPACITOR
R1			MISSING RESISTOR
R2	2410330012	RD14B2E472JF	1/4W 4.7kΩ ±5% CARBON FILM RESISTOR
R3	2440021003	RS14B3A220JNB	1W 22Ω ±5% METAL OXIDE FILM RESISTOR
R4	2410266005	RD14B2E100J	1/4W 10Ω ±5% CARBON FILM RESISTOR
R5	2420034010	RC05GF2H122KF	1/2W 1.2kΩ ±10% CARBON COMPOSITE RESISTOR
TR1	2740031010	2SD289 Ⓛ	TRANSISTOR
	2760080009	SA-2Z	RECTIFIER
	2760057016	V06C	RECTIFIER
	2760071005	AW01-22	ZENER DIODE
	EE-2028H	PRINTED CIRCUIT BOARD	

ETC-55 TAPE MONITOR UNIT

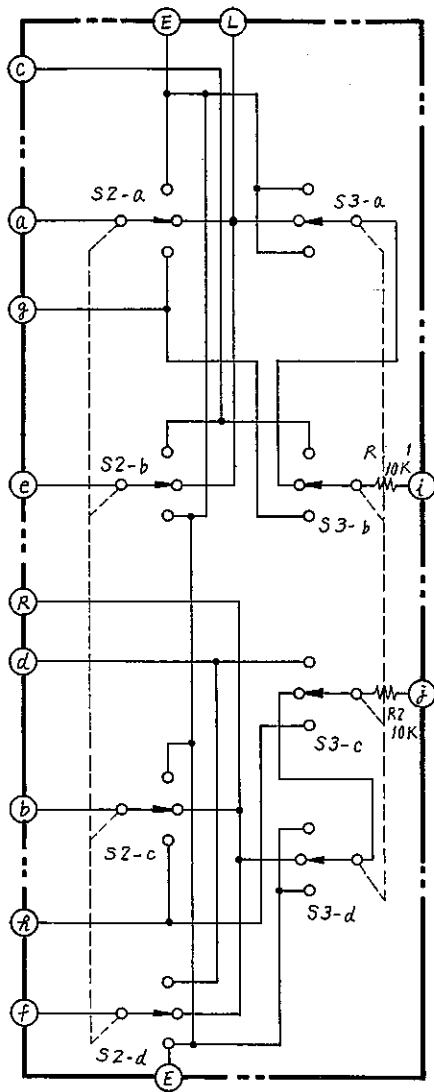


Fig. 17

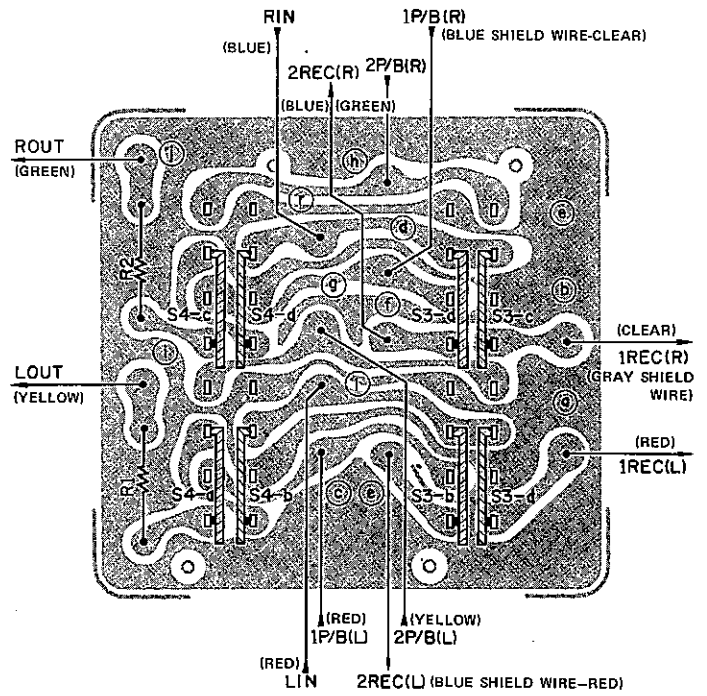


Fig. 18

Ref. No.	Part No.	Part Name	Descriptions
R1	2410338014	RD14B2E103JF	1/4W 10kΩ ± 5% CARBON FILM RESISTOR
R2	2410338014	RD14B2E103JF	1/4W 10kΩ ± 5% CARBON FILM RESISTOR
S-2	EP-7101H2	LEVER SWITCH	TAPE DUBBING SWITCH
S-3	EP-7101H2	LEVER SWITCH	TAPE MONITOR SWITCH
	EE-2089	PRINTED CIRCUIT BOARD	

## GE-3001-1, GX-3001-1 CHASSIS &amp; CABINET GROUP (See Complete Circuit Diagram on page 25)

Ref. No.	Part No.	Part Name	Descriptions
C901	2568003039	CF93B==AC333M	0.033 $\mu$ F $\pm$ 20% 250VAC METALLIZED-PLASTIC FILM CAPACITOR
C902	2568003055	CF93B==AC563M	0.056 $\mu$ F $\pm$ 20% 250VAC METALLIZED-PLASTIC FILM CAPACITOR
C903	2546005004	CE64W1V472=HR	4700 $\mu$ F 35V ELECTROLYTIC CAPACITOR
C904	2546005004	CE64W1V472=HR	4700 $\mu$ F 35V ELECTROLYTIC CAPACITOR
R901	2410357008	RD14B2E623J	1/4W 62k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R902	2410360008	RD14B2E823J	1/4W 82k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R903	2410357008	RD14B2E623J	1/4W 62k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R904	2410360008	RD14B2E823J	1/4W 82k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R905	2410357008	RD14B2E623J	1/4W 62k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R906	2410360008	RD14B2E823J	1/4W 82k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R907	2410357008	RD14B2E623J	1/4W 62k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R908	2410360008	RD14B2E823J	1/4W 82k $\Omega$ $\pm$ 5% CARBON FILM RESISTOR
R909	2440090005	RS14B3D221JNB	2W 220 $\Omega$ $\pm$ 5% METAL OXIDE FILM RESISTOR
R910	2440090005	RS14B3D221JNB	2W 220 $\Omega$ $\pm$ 5% METAL OXIDE FILM RESISTOR
S11	EP-7100J	LEVER SWITCH	POWER ON-OFF SWITCH
S10a~b	EP-7106H	SPEAKER SWITCH	SPEAKER SELECT SWITCH
	EP-7112	RV24G25KHB25KX2	VARIABLE RESISTOR - BALANCE
	3930004005	LAMP ASS'Y	PILOT LAMP
	EP-5941	HEAD PHONE JACK	
	EP-71141	PUSH TERMINAL	SPEAKER CONNECTING TERMINAL
	EP-6762	4P CONNECTOR BASE	PHONE 1-2, AUX-TUNER, PRE OUT-MAIN IN JACK
	EP-6764	8P CONNECTOR BASE	TAPE 1, 2 JACK
	EP-7174	PIN PLUG	PHONO 1-2 SHORT PLUG
	EP-5116	AC SOCKET	AC OUTLET
S9a~b	2120017007	6P SLIDE SWITCH	PRE-MAIN COUPLER
	CF-8576H	SWITCH STOPPER	FOR PRE-MAIN SELECT SWITCH
	2120003108	FUSE HOLDER	FOR MAIN FUSE
	2061014004	FUSE (1A)	MAIN FUSE
	EP-5055L	AC CORD WITH PLUG	FOR EUROPE
	2006018007	AC CORD WITH PLUG	FOR AUSTRALIA
	MD-2982H	BUSHING	AC CORD BUSH
	EP-7130	TERMINAL	GND. TERMINAL
	2330023001	POWER TRANSFORMER	
	2050011005	TERMINAL	FOR AC VOLTAGE CHANGE
	4140024007	TERMINAL COVER	FOR AC VOLTAGE CHANGE TERMINAL
	4110015004	FRONT CHASSIS	
	4100018309	CHASSIS FRAME ASS'Y	
	1050034203	BACK PANEL	
	EE-2051H1	SHIELD COVER (B)	FOR BACK PANEL
	4100010019	SHIELD COVER ASS'Y	FOR FRONT CHASSIS
	1400009008	FRONT PANEL ASS'Y	
	DL-7281J	VOLUME KNOB ASS'Y	MAIN VOLUME
	DL-7282K2	KNOB ASS'Y	BALANCE
	DL-7282K1	KNOB ASS'Y	BASS, TREBLE
	DL-7284J	FUNCTION KNOB ASS'Y	FUNCTION, SPEAKER, MODE
	MD-5167H	LEVER KNOB (A)	POWER, FILTER, LOUDNESS, MUTING
	MD-5221	LEVER KNOB (B)	DUBBING, MONITOR
	1000004102	BOTTOM COVER	
	1000005101	TOP CABINET	
	SC-1162	SPECIAL SCREW	FIXING SCREW FOR TOP CABINET

## ADJUSTMENTS AND MEASUREMENTS PROCEDURES

### INSTRUCTIONS FOR ADJUSTING MIDPOINT ELECTRIC POTENTIAL AND IDLING ELECTRIC CURRENT OF POWER AMPLIFIER UNIT.

To ensure accurate adjustment of the midpoint electric potential and idling electric current of the PMA-500's Power Amplifier Unit (ETC-26B), and PMA-350Z's (ETC-51B) adjustment should be performed in the manner indicated below:

#### 1. MEASURING INSTRUMENTS

A. DC Voltmeter (200mV)

B. DC Ammeter (100mA)

Note: One each of the above mentioned instruments will suffice if a test is conducted on only one channel at a time.

#### 2. CONNECTION

A. Connect one DC voltmeter to the left and one to the right channel of the SPEAKER terminals. (See Fig. 19)

B. Remove the plug (red wire) from the No. 1 terminal (+B) of the Power Amplifier Unit (ETC-26B/ETC-51B) and connect the DC ammeter to each channel. (See Fig. 20)

#### 3. PROCEDURES

A. Set the power supply at pre-set voltages of the PMA-500/PMA-350Z. (AC 100, 120, 200, 220 or 240 volts)

B. Wait three minutes after Power switch is ON.

C. For adjusting midpoint voltage, turn the VR-1 (4.7 Kohm) so that voltage reading on the DC voltmeter (V) becomes 0 (zero):  $V=0$ . The condition is abnormal if the value exceeds 100 mV.

D. Following adjustment of the midpoint voltage potential, adjust the idling electric current to 45 mA on the DC ammeter by rotating the VR-2 (470 ohm).  $I=45\text{mA}$ .

Lock it with paint after adjustment is completed.

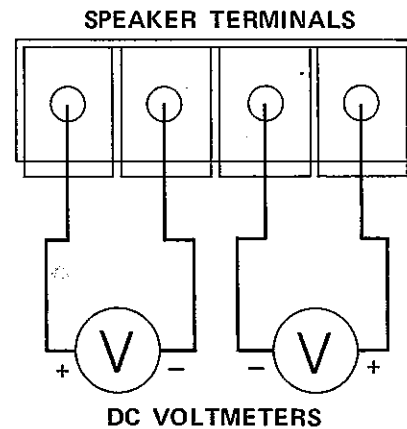


Fig. 19

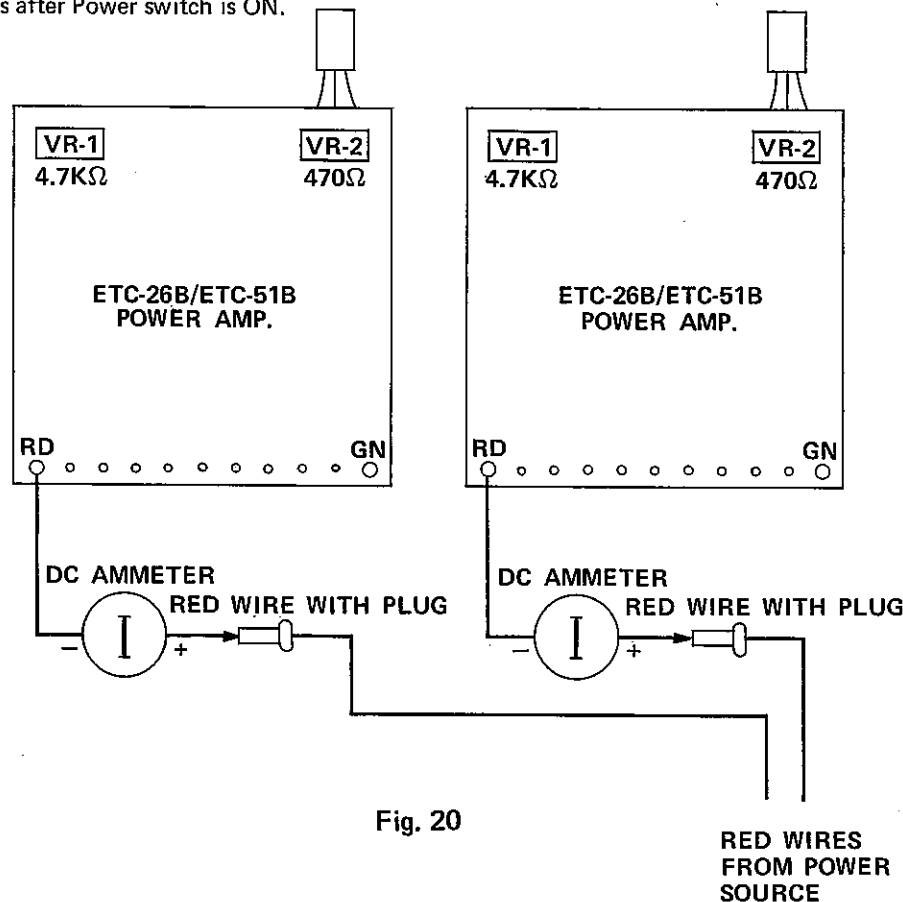


Fig. 20

INSTRUCTIONS FOR TESTING THE POWER AMPLIFIER UNIT.

To ensure accurate testing of the PMA-500/PMA-350z's power amplifier, a test should be conducted in the manner indicated below:

1. MEASURING INSTRUMENTS

- A. Low-distortion audio frequency oscillator 1 set
- B. High-performance distortion meter 1 set
- C. AC Voltmeter (V.T.V.M.) 2 sets
- D. Oscilloscope 1 set
- E. 8 ohms noninductive resistor 2 pcs.
- F. Variable transformer 1 set

2. CONNECTION (SEE FIG. 21)

- A. Connect one 8 ohms noninductive resistor to the left and one to the right channel of the SPEAKER terminals, using a separate ground lead.
- B. Set the NORMAL-SEPARATE selector switch to the "SEPARATE" position and apply input signal to the MAIN-IN jack.

3. PROCEDURES

- A. Set the power supply at pre-set voltages of the PMA-500/PMA-350Z. (AC 100, 120, 200, 220 or 240 volts).
- B. Supply the power only upon completion of connection.
- C. Gradually increase the 1 KHz. input signal level until the distortion meter registers 0.1% distortion. Voltage of the SPEAKER terminals then becomes the output voltage (V2) and the read-off from V1 becomes the input voltage. Be sure to apply input signal one channel at a time.

4. STANDARD VALUES

- A. Input Voltage (V1) 0.89 volts – 1.19 volts
- B. Output Voltage (V2)
  - PMA-500: 38 watts (17.4 volts) or more.
  - PMA-350Z: 31 watts (15.7 volts) or more.

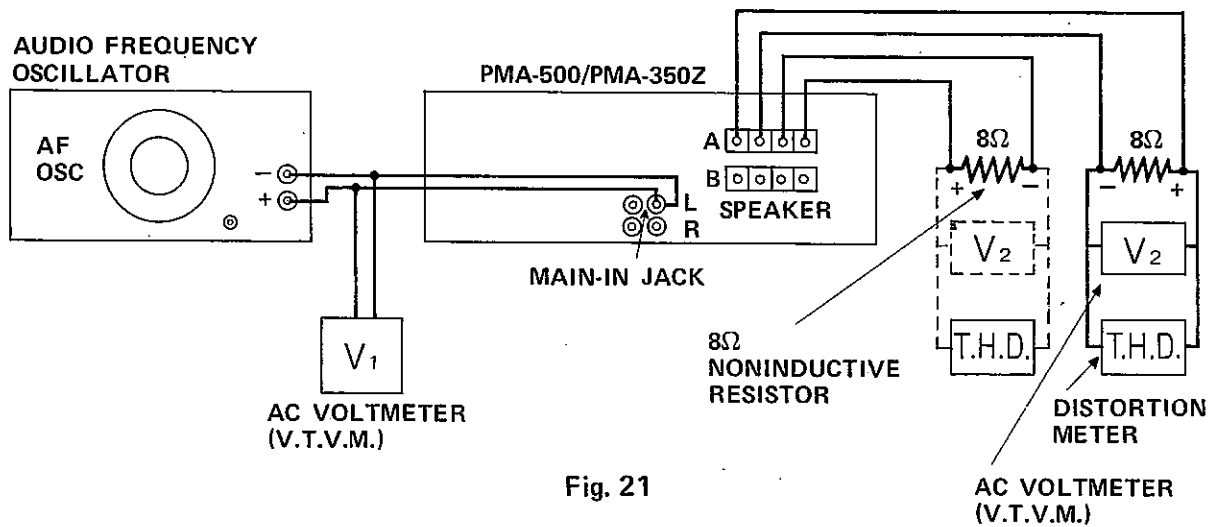


Fig. 21

**INSTRUCTION FOR TESTING THE SENSITIVITY OF EACH INPUT JACK.**

To ensure accurate testing of the sensitivity of each input jack, a test should be conducted in the manner indicated below:

**1. MEASURING INSTRUMENTS**

- A. Low-distortion Audio frequency oscillator 1 set
- B. High-performance distortion meter 1 set
- C. Oscilloscope 1 set
- D. 8 ohms noninductive resistor 2 pcs.
- E. AC voltmeter (V.T.V.M.) 2 sets

**2. CONNECTION**

- A. Connect one 8 ohms noninductive resistor to the left and one to the right channel of the SPEAKER terminals, using a separate ground lead.
- B. Connection of other instrument refer Fig. 22.

**3. PROCEDURES**

- A. Set the power supply at pre-set voltages of the PMA-500/PMA-350Z. (AC 100, 120, 200, 220 or 240 volts).
- B. Apply 1 KHz. input signal to AUX-1 jack so that output of the SPEAKER terminals becomes THD = 0.1%. The input voltage (V1) then becomes the input sensitivity of the AUX-1. Note the output voltage (V2).

- C. Change over to another input jack and adjust the input voltage so that it becomes equal to the output voltage (V2) of AUX-1. The input voltage then becomes the input sensitivity of the each jack.

**4. STANDARD VALUES**

4-1 For PMA-500

- A. PHONO-1,2 ..... 2 mV ± 1.5 dB
- B. MIC ..... 1 mV ± 1.5 dB
- C. TUNER ..... 100 mV ± 1.5 dB
- D. AUX-1,2 ..... 100 mV ± 1.5 dB
- E. TAPE P.B. (DIN) ..... 500 mV ± 1.5 dB
- F. TAPE P.B. (RCA PIN) ..... 500 mV ± 1.5 dB

4-2 For PMA-350Z

- A. PHONO-1, 2 ..... 2 mV ± 1.5 dB
- B. AUX ..... 100 mV ± 1.5 dB
- C. TUNER ..... 100 mV ± 1.5 dB
- D. TAPE P.B. (RCA PIN). ..... 320 mV ± 1.5 dB

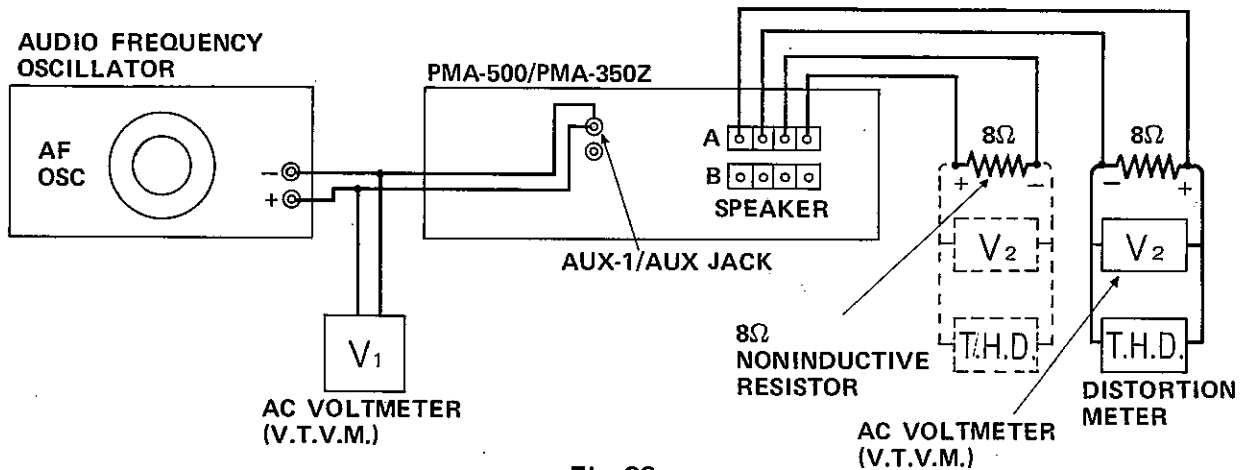


Fig. 22

**INSTRUCTIONS FOR TESTING AUX, PHONO RIAA CHARACTERISTIC**

To ensure accurate testing of the PMA-350Z's frequency characteristic, a test should be conducted in the manner indicated below:

**1. MEASURING INSTRUMENTS**

- A. AC voltmeter (V.T.V.M.) 2 sets
- B. Oscilloscope 1 set
- C. CR oscillator 1 set
- D. 8 ohms noninductive resistor 2 pcs.
- E. Variable transformer 1 set
- F. Low frequency direct-viewing apparatus 1 set
- G. Audio frequency sweep generator 1 set

**2. CONNECTION**

- A. Connect one 8 ohms noninductive resistor to the left and one to the right channel of the SPEAKER terminals, using a separate ground lead.
- B. Figure 23 shows for testing AUX frequency characteristic.
- C. Figure 24 shows for testing PHONO-1 RIAA characteristic.

**3. PROCEDURES**

**3-1. FREQUENCY CHARACTERISTIC FROM AUX INPUT JACK**

- A. Set the power supply at pre-set voltages of the PMA-350Z (AC 100, 120, 200, 220 or 240 volts).
- B. Supply power upon completion of wiring.
- C. Set the MAIN VOLUME control to the maximum and BASS and TREBLE controls to it's center (Flat) position.
- D. Apply 1 KHz. input signal from the audio frequency sweep generator (or CR oscillator) and adjust the output level of the generator so that the power output (V) becomes 5 watts (6.3 volts). The level of the low frequency direct-viewing apparatus must be adjusted to 20 dB (When using V.T.V.M., 0 dB is set at 6.3 volts). Then set the sweep generator to AUTO. Be sure that level variation while sweeping at 30Hz. - 15KHz. is within  $\pm 1$  dB.
- E. Set the BASS control at the maximum position.

- F. When sweep is performed in a manner similar to item "E", the level at 80Hz. should be  $+10 \pm 1.5$  dB.
- G. When the BASS control is set at the minimum position, the level must be  $-10.5 \pm 1.5$  dB at 80Hz.
- H. When the TREBLE control is set at the maximum position and sweep is performed in a manner similar to item "E", the level should be  $+10 \pm 1.5$  dB at 12KHz.
- I. Likewise, when TREBLE control is set at the minimum position, the level at 12KHz. should be  $-9 \pm 1.5$  dB.
- J. Set the BASS and TREBLE controls to center (Flat) position.
- K. When the HIGH FILTER switch is set at the "ON" position and sweep is performed in a manner similar to item "E", the level should be  $-3 \pm 1.5$  dB,  $-2.5$  dB at 9KHz. and  $-14 \pm 4$  dB at 20KHz.
- L. When LOW FILTER switch is set at "ON" position, and sweep is performed in a manner similar to item "E", the level should be  $-14 \pm 4$  dB at 20Hz. and  $-3 \pm 1.5$  dB,  $-2.5$  dB at 40Hz.

**3-2. STANDARD VALUES FOR FREQUENCY CHARACTERISTIC FROM AUX INPUT JACK.**

ITEM	CONDITION	STANDARD VALUES
A. AUX	$\pm 1$ dB.	Less than 30Hz.- more than 15,000 Hz.
B. BASS MAX.	at 80Hz.	$+10 \pm 1.5$ dB.
C. BASS MIN.	at 80Hz.	$-10.5 \pm 1.5$ dB.
D. TREBLE MAX.	at 12KHz.	$+10 \pm 1.5$ dB.
E. TREBLE MIN.	at 12KHz.	$-9 \pm 1.5$ dB. $+1.5$ dB.
F. HIGH FILTER	at 9KHz.	$-3 -2.5$ dB.
G. " "	at 20KHz.	$-14 \pm 4$ dB. $+1.5$ dB.
H. LOW FILTER	at 40Hz.	$-3 -2.5$ dB.
I. " "	at 20Hz.	$-14 \pm 4$ dB.



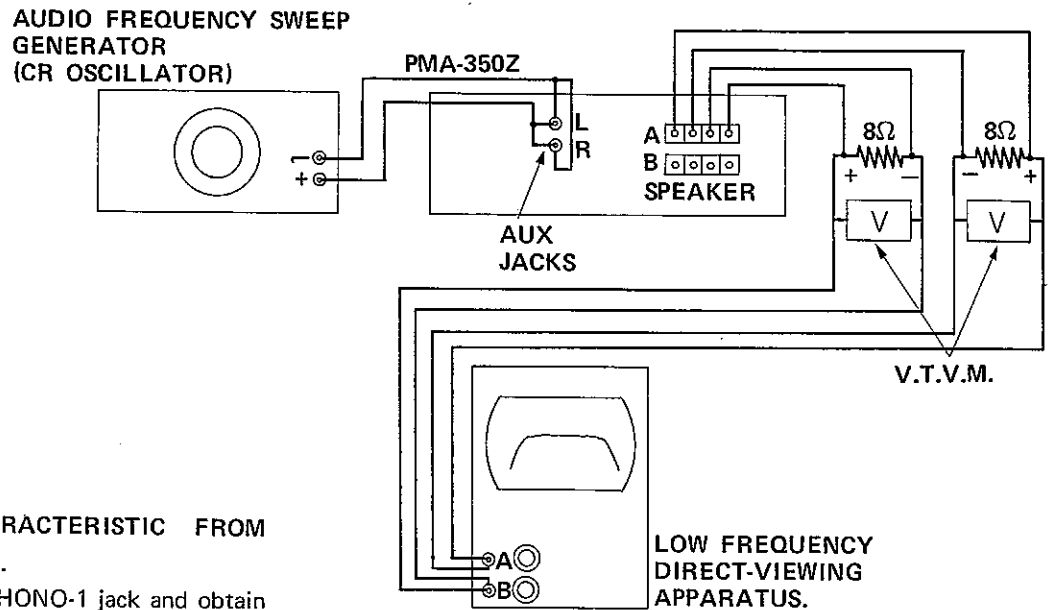


Fig. 23

**3-3 PHONO RIAA CHARACTERISTIC FROM PHONO-1 INPUT JACK.**

- A. Apply input signal to PHONO-1 jack and obtain the output from REC-1 jack.
- B. Apply 1 KHz. input signal from the audio frequency oscillator and adjust the attenuator (ATT) so that the output level of REC-1 becomes -5 dBm (140 mV).

**3-4 STANDARD VALUES FOR PHONO RIAA CHARACTERISTIC.**

CONDITION	STANDARD VALUES	CALIBRATION VALUES
30Hz.	+18.61dB.	38.6dB.
100Hz.	+13.11dB.	33.1dB.
400Hz.	+ 3.81dB.	23.8dB.
5,000Hz.	- 8.23dB.	11.8dB.
10,000Hz.	-13.75dB.	6.3dB.
15,000Hz.	-17.17dB.	2.8dB.

Less than 1dB. within limits of the frequencies indicated.

**NOTES:**

- A. The stray capacitance of the input lead should be set at less than 100pF, and the lead length should be shortened as much as possible to minimize the effect of external hum.
- B. Frequency characteristic of the V.T.V.M. should be checked and calibrated in advance.
- C. Remember that an alteration of frequency may cause a variation of input voltage.

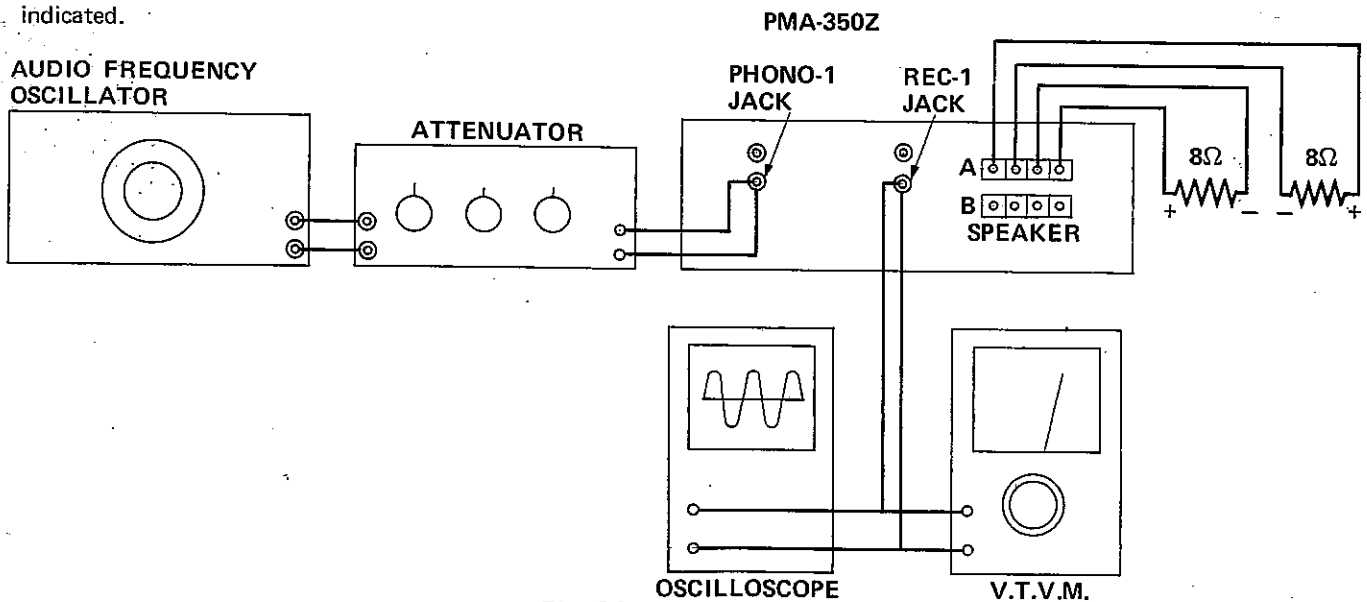


Fig. 24

**INSTRUCTIONS FOR TESTING CROSSTALK, RESIDUAL NOISE AND INDUCTIVE NOISE.**

To ensure accurate testing of the PMA-350Z's cross-talk, residual noise and inductive noise, a test should be performed in the manner indicated below:

**1. MEASURING INSTRUMENTS**

- A. AC voltmeter (V.T.V.M.) (capable of measuring up to 3 mV at full range) 2 set
- B. Oscilloscope 1 set
- C. CR oscillator 1 set
- D. 8 ohms noninductive resistor 2 pcs.
- E. Variable transformer 1 set
- F. Input terminate resistor (4.7 Kohm): Be sure to completely shield off the resistor 14 pcs.

**2. CONNECTION**

- A. Connect one 8 ohms noninductive resistor to the left and one to the right channel of the SPEAKER terminals, using a separate ground lead.
- B. Connection of other instrument refer Fig. 25.

**3. PROCEDURES**

**3-1 RESIDUAL NOISE**

- A. Set the power supply at pre-set voltage of the PMA-350Z (AC 100, 120, 200, 220 or 240 volts).
- B. Supply power upon completion of wiring.
- C. Set the BASS and TREBLE controls to center (Flat), FUNCTION SWITCH to PHONO-1 position and terminate the PHONO-1 input jacks, both right and left channels with 4.7 Kohm resistor.
- D. Read the output voltage when the MAIN VOLUME control is at its minimum, which becomes the residual noise.  
Be sure to change the power source plug and use smaller value.
- E. Standard values is less than 3mV.

**3-2 INDUCTIVE NOISE**

- A. Terminate each input jack (PHONO-1,2, AUX, TUNER, TAPE-1,2) with 4.7 Kohm resistor. Set the MAIN VOLUME control at the maximum. The noise then obtained becomes the inductive noise of each terminal. Confirm that measuring is not affected by external noise.
- B. Standard values  
PHONO: Less than 16mV, TUNER & TAPE: 4mV.

**3-3 PHONO CROSSTALK**

- A. Set the MUTING switch at 0 dB position and MAIN VOLUME control at the maximum. Apply 1 KHz. input signal to PHONO-1(R) jack from the oscillator, set the right channel of the SPEAKER terminal at +10 dBm, and terminate the PHONO-1(L) with 4.7 Kohm resistor. (See Fig. 25)  
Then check the output leakage from the right channel to the left channel. The obtained ratio becomes crosstalk for the right channel. Perform a similar procedure for the left channel to determine its crosstalk.
- B. Standard values is more than 49 dB.

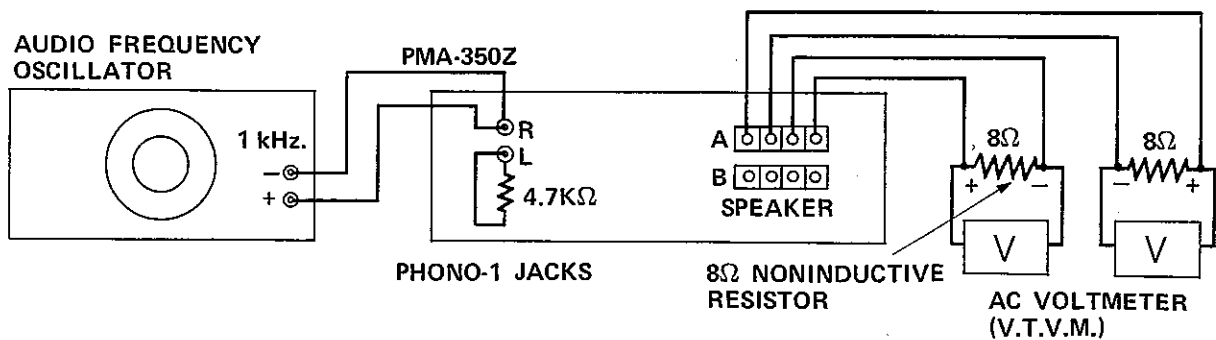
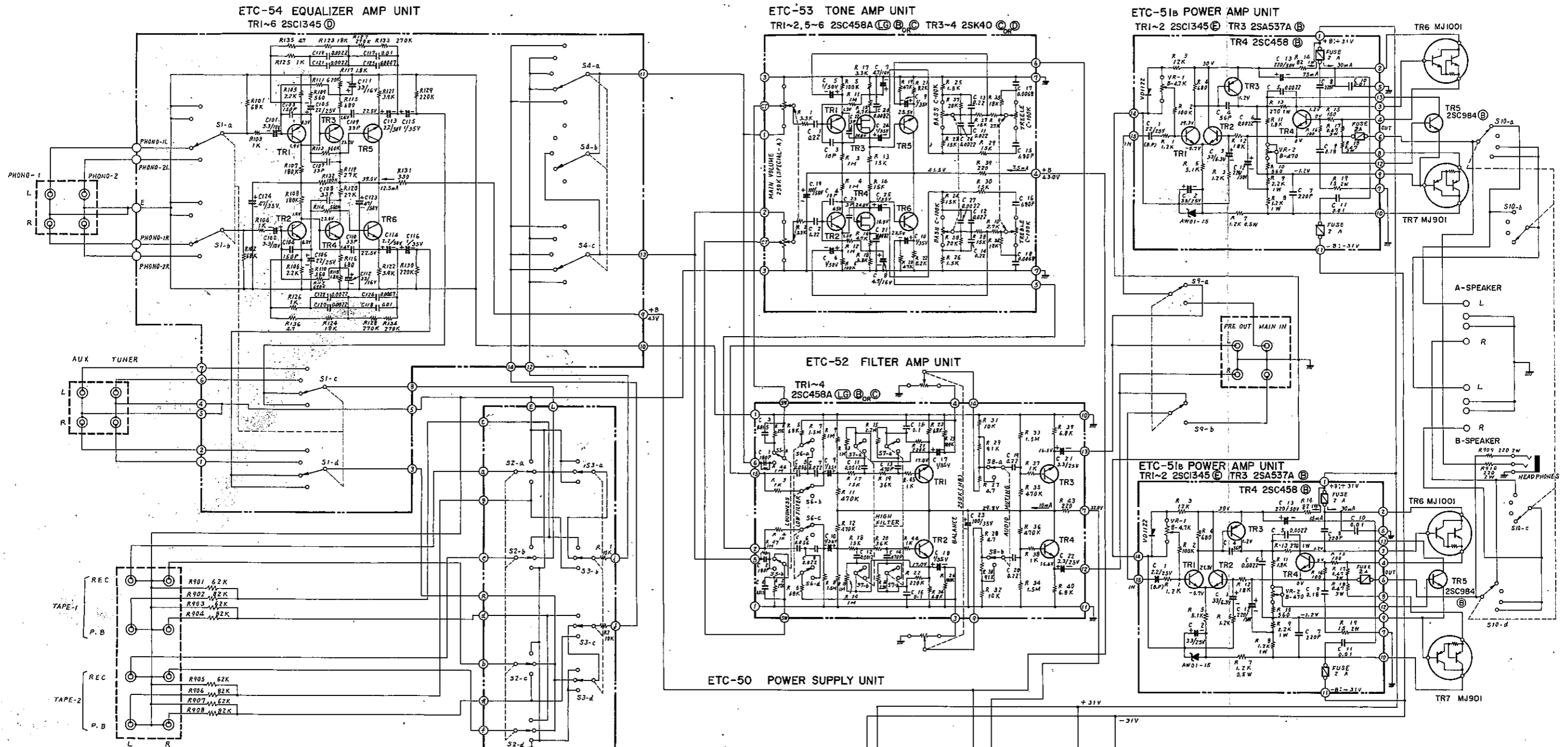


Fig. 25

# DENON MODEL PMA-350Z WIRING DIAGRAM



- NOTES:**
- ALL RESISTANCE VALUES IN OHM (S), K=1000 OHMS, M=1000000 OHMS.
  - ALL CAPACITANCE VALUES IN MICRO FARAD (S) P=MICRO-MICRO, FARADS.
  - EVERY VOLTAGES AND CURRENTS IS MEASURED AT NO SIGNAL INPUT CONDITION.
  - S1-a-d, FUNCTION (PHONO-2, PHONO-1, TUNER, AUX)
  - S2-a-d, TAPE TO TAPE (TAPE-1→TAPE-2, SOURCE, TAPE-2→TAPE-1)
  - S3-a-b, TAPE MONITOR (TAPE-1, SOURCE, TAPE-2)
  - S4-a-c, MODE (REVERSE, STEREO, L+R, L, R)
  - S5-a-b, LOUDNESS (ON, OFF)
  - S6-a-d, LOW FILTER (ON, OFF)
  - S7-a-d, HIGH FILTER (ON, OFF)
  - S8-a-b, AUDIO MUTING (0, -20)
  - S9-a-b, PRE MAIN COUPLER (NORMAL, SEPARATE)
  - S10-a-d, SPEAKERS (A, OFF, B, A+B)
  - S11, POWER (ON, OFF)
  - EVERY FUNCTION SWITCH IS SET UP AT UNDERLINED POSITION IN THIS DIAGRAM.
  - SOME TRANSISTOR CAN BE USED TWO KIND OF hfe RANK, HOWEVER BOTH RIGHT AND LEFT CHANNEL OF SAME CIRCUIT MUST BE USED SAME hfe RANK TRANSISTOR.

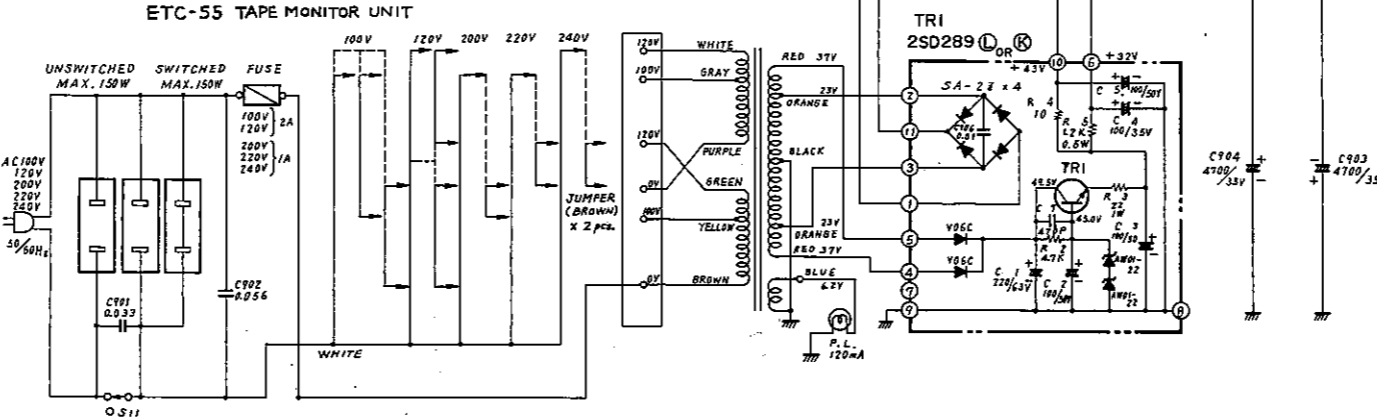


Fig. 26