

# POWER AMPLIFIERS

# P2350/P2700

## SERVICE MANUAL



● P2350



● P2700

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## IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

**WARNING:** Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

**IMPORTANT:** The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and changes in specification are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

**WARNING:** Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

**IMPORTANT:** Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

## ■ SPECIFICATIONS

P2700	P2350
<b>POWER OUTPUT LEVEL</b> <b>STEREO:</b> 350W + 350W; RL = 8 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 % 500W + 500W; RL = 4 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 % <b>MONO:</b> 1000W; RL = 8 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 %	<b>STEREO:</b> 175W + 175W; RL = 8 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 % 250W + 250W; RL = 4 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 % <b>MONO:</b> 500W; RL = 8 ohms, f = 20 Hz — 20 kHz, THD ≤ 0.1 %
<b>FREQUENCY RESPONSE</b> 0 dB +0.5, -1.5 dB; f = 10 Hz — 50 kHz, RL = 8 ohms, Po = 1 W	
<b>POWER BANDWIDTH</b> <b>STEREO:</b> 10 Hz — 40 kHz; Po = 175 W, RL = 8 ohms, THD = 0.1 % 10 Hz — 40 kHz; Po = 250 W, RL = 4 ohms, THD = 0.1 % <b>MONO:</b> 10 Hz — 40 kHz; Po = 500 W, RL = 8 ohms, THD = 0.1 %	<b>STEREO:</b> 10 Hz — 40 kHz; Po = 88 W, RL = 8 ohms, THD = 0.1 % 10 Hz — 40 kHz; Po = 125 W, RL = 4 ohms, THD = 0.1 % <b>MONO:</b> 10 Hz — 40 kHz; Po = 250 W, RL = 8 ohms, THD = 0.1 %
<b>TOTAL HARMONIC DISTORTION (THD)</b> <b>STEREO:</b> ≤0.05%; Po = 175 W, RL = 8 ohms, f = 20 Hz — 20 kHz ≤0.07%; Po = 250 W, RL = 4 ohms, f = 20 Hz — 20 kHz <b>MONO:</b> ≤0.07%; Po = 500 W, RL = 8 ohms, f = 20 Hz — 20 kHz	<b>STEREO:</b> ≤0.05%; Po = 88 W, RL = 8 ohms, f = 20 Hz — 20 kHz ≤0.07%; Po = 125 W, RL = 4 ohms, f = 20 Hz — 20 kHz <b>MONO:</b> ≤0.07%; Po = 250 W, RL = 8 ohms, f = 20 Hz — 20 kHz
<b>INTERMODULATION DISTORTION (IMD)</b> <b>STEREO:</b> ≤0.03%; Po = 175 W, RL = 8 ohms, f = 60 Hz : 7 kHz, 4 : 1 ≤0.05%; Po = 250 W, RL = 4 ohms, f = 60 Hz : 7 kHz, 4 : 1 <b>MONO:</b> ≤0.05%; Po = 500 W, RL = 8 ohms, f = 60 Hz : 7 kHz, 4 : 1	<b>STEREO:</b> ≤0.03%; Po = 88 W, RL = 8 ohms, f = 60 Hz : 7 kHz, 4 : 1 ≤0.05%; Po = 125 W, RL = 4 ohms, f = 60 Hz : 7 kHz, 4 : 1 <b>MONO:</b> ≤0.05%; Po = 250 W, RL = 8 ohms, f = 60 Hz : 7 kHz, 4 : 1

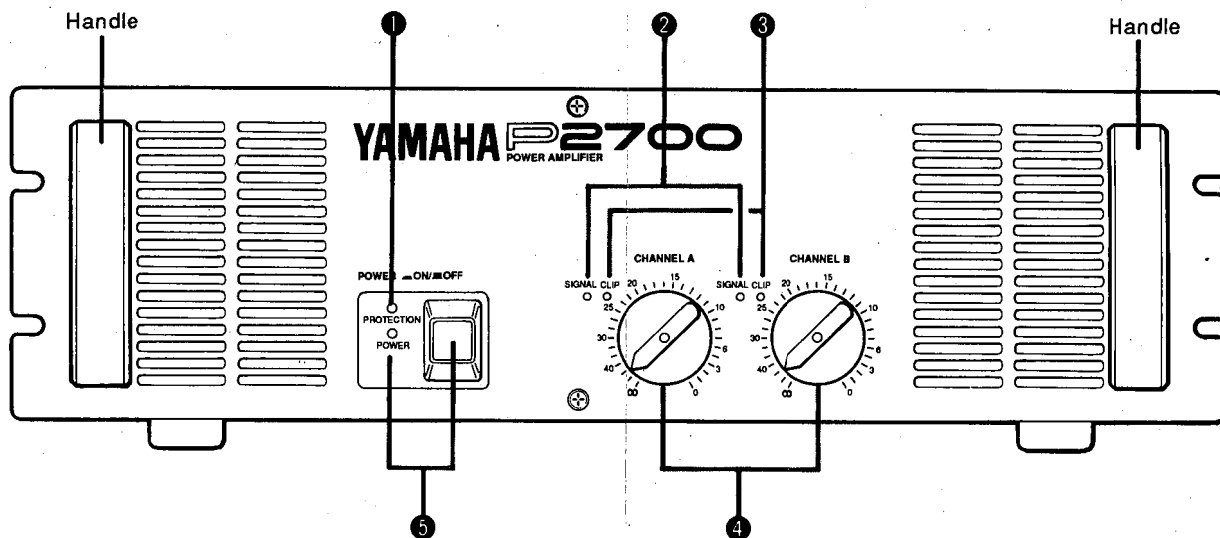
P2700	P2350
<b>CHANNEL SEPARATION</b> ATT max, Input 600 ohms shunt $\geq 70$ dB; $P_o = 175$ W, $R_L = 8$ ohms, $f = 20$ Hz — 20 kHz $\geq 80$ dB; $P_o = 175$ W, $R_L = 8$ ohms, $f = 1$ kHz	
<b>RESIDUAL NOISE</b> $\leq -75$ dBm; ATT min, $f_c = 12.7$ kHz -6 dB/oct LPF $\leq -80$ dBm; ATT min, IHF-A network	
<b>SIGNAL-TO-NOISE RATIO</b> $\geq 100$ dB; Input 600 ohms shunt, $f_c = 12.7$ kHz -6 dB/oct LPF $\geq 110$ dB; Input 600 ohms shunt, IHF-A network	
<b>DAMPING FACTOR</b> $> 100$ ; $R_L = 8$ ohms, $f = 1$ kHz	
<b>SLEW RATE</b> $\pm 40$ V/ $\mu$ sec; Stereo, $R_L = 8$ ohms, Full Swing $\pm 50$ V/ $\mu$ sec; Mono, $R_L = 8$ ohms, Full Swing	$\pm 30$ V/ $\mu$ sec; Stereo, $R_L = 8$ ohms, Full Swing $\pm 40$ V/ $\mu$ sec; Mono, $R_L = 8$ ohms, Full Swing
<b>SENSITIVITY</b> $+4$ dBm; $P_o = 350$ W, 8 ohms, ATT max, $f = 1$ kHz	$+4$ dBm; $P_o = 175$ W, 8 ohms, ATT max, $f = 1$ kHz
<b>VOLTAGE GAIN</b> $32.5$ dB; ATT max, $f = 1$ kHz, $R_L = 8$ ohms	$30.0$ dB; ATT max, $f = 1$ kHz, $R_L = 8$ ohms
<b>INPUT IMPEDANCE</b> $\geq 15$ kohms; Balance or Unbalance, ATT max	
<b>INDICATORS</b> POWER Red LED; turns on when Power is On PROTECTION Red LED; turns on when protection or muting is On CLIPPING Red LED; turns on when THD $\geq 1\%$ SIGNAL Green LED; turns on when Signal output above 4 ohms, 1 W (20 Hz — 20 kHz)	
<b>PROTECTION CIRCUITS</b> OUTPUT MUTING 5 sec. $\pm 3$ sec.; after power is on DC sense DC $\pm 2$ V; output shunt off THERMAL $\geq 100$ degree C.; heat sink temp. PC LIMITER $R_L \leq 2$ ohms	
<b>FAN CIRCUIT</b> FAN HI-SPEED; 70 deg. C. (heat sink temp.) FAN LO-SPEED; 60 deg. C.	
<b>CONTROLS</b> <b>FRONT</b> POWER SWITCH; push on/ push off INPUT ATTENUATOR; 31-position, log-linear, detented and dB-calibrated <b>REAR</b> MODE SWITCH; Stereo/Mono (BTL) (Except for P2700 Canadian model)	
<b>POWER REQUIREMENTS</b> U.S. & Canadian Models; 120 V, 60 Hz General Model; 220/240 V, 50/60 Hz	
<b>POWER CONSUMPTION</b> U.S. Model; 1000 W Canadian Model; 1000 W/1200 VA General Model; 1000 W	U.S. Model; 700 W Canadian Model; 700 W/900 VA General Model; 700 W
<b>DIMENSIONS (W x H x D)</b> 480 x 143.5 x 435.2 mm (18-7/8" x 5-5/8" x 17-1/8")	
<b>WEIGHT</b> 24 kg (52 lbs. 14 oz)	19 kg (41 lbs. 14 oz)

\* 0 dB = 0.775 Vr.m.s.

\* Specifications and appearance subject to change without notice.

## ■ PANEL LAYOUT

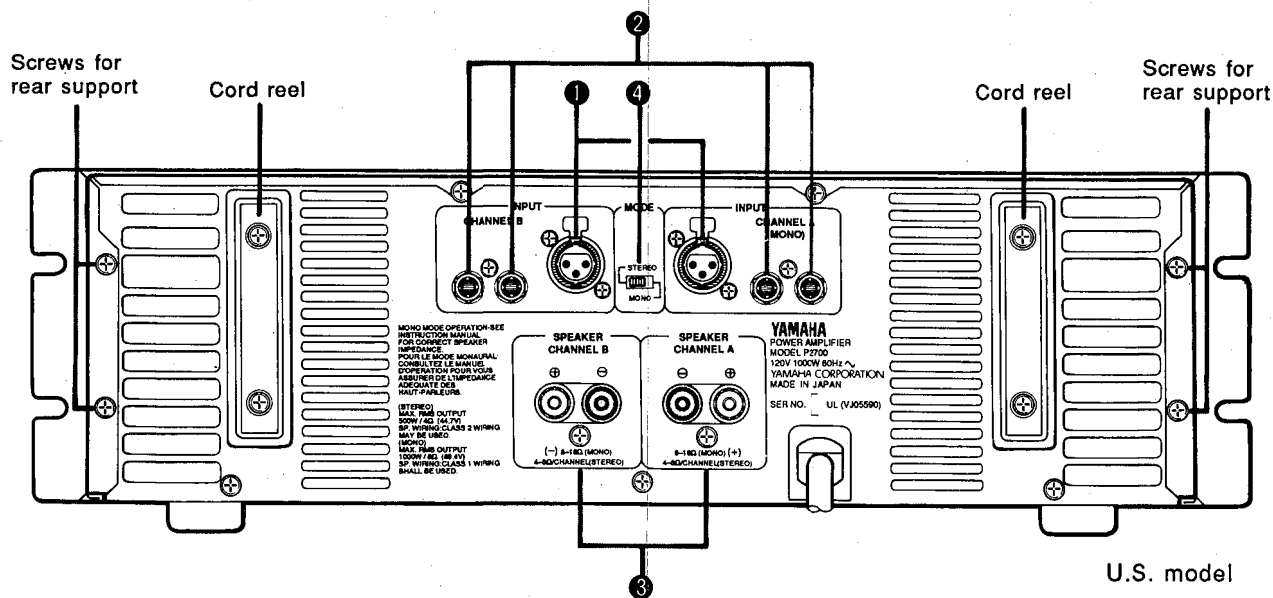
### ● Front Panel



- ① PROTECTION Indicator
- ③ CLIP Indicators
- ⑤ POWER Switch & Indicator

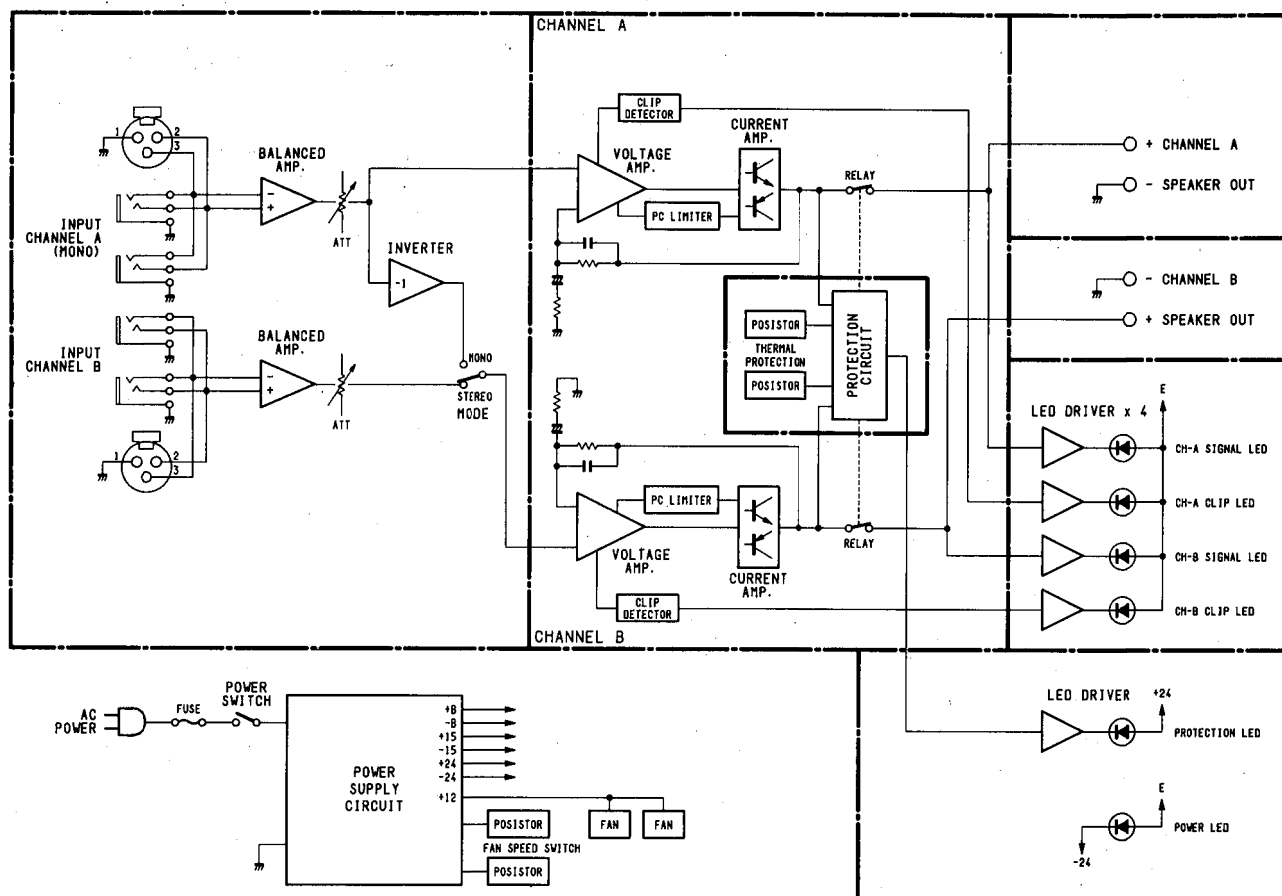
- ② SIGNAL Indicators
- ④ Input Attenuators

### ● Rear Panel



- ① INPUT Connectors (XLR-3-31 type)
- ③ SPEAKER Terminals
- ② INPUT Connectors (TRS Phone type)
- ④ MODE Switch  
(Except for P2700 canadian model)

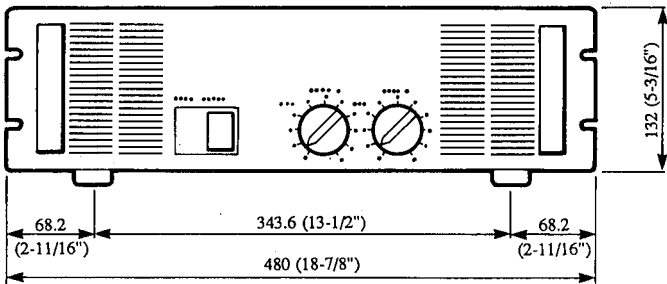
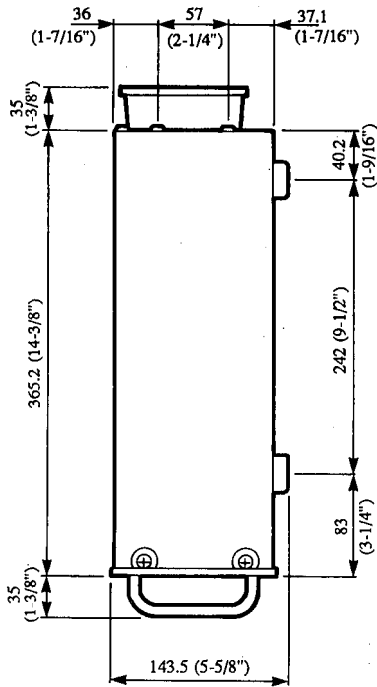
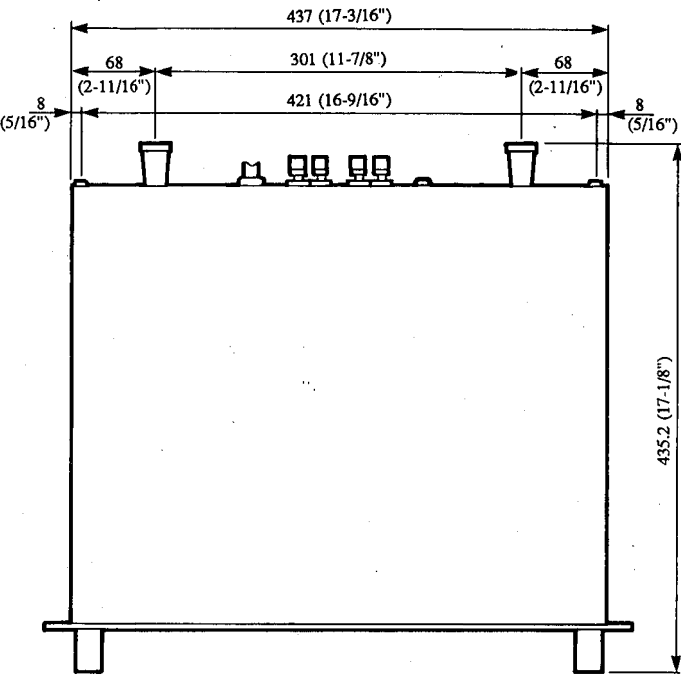
## ■ BLOCK DIAGRAM



## ■ PROTECTIVE CIRCUIT OPERATION

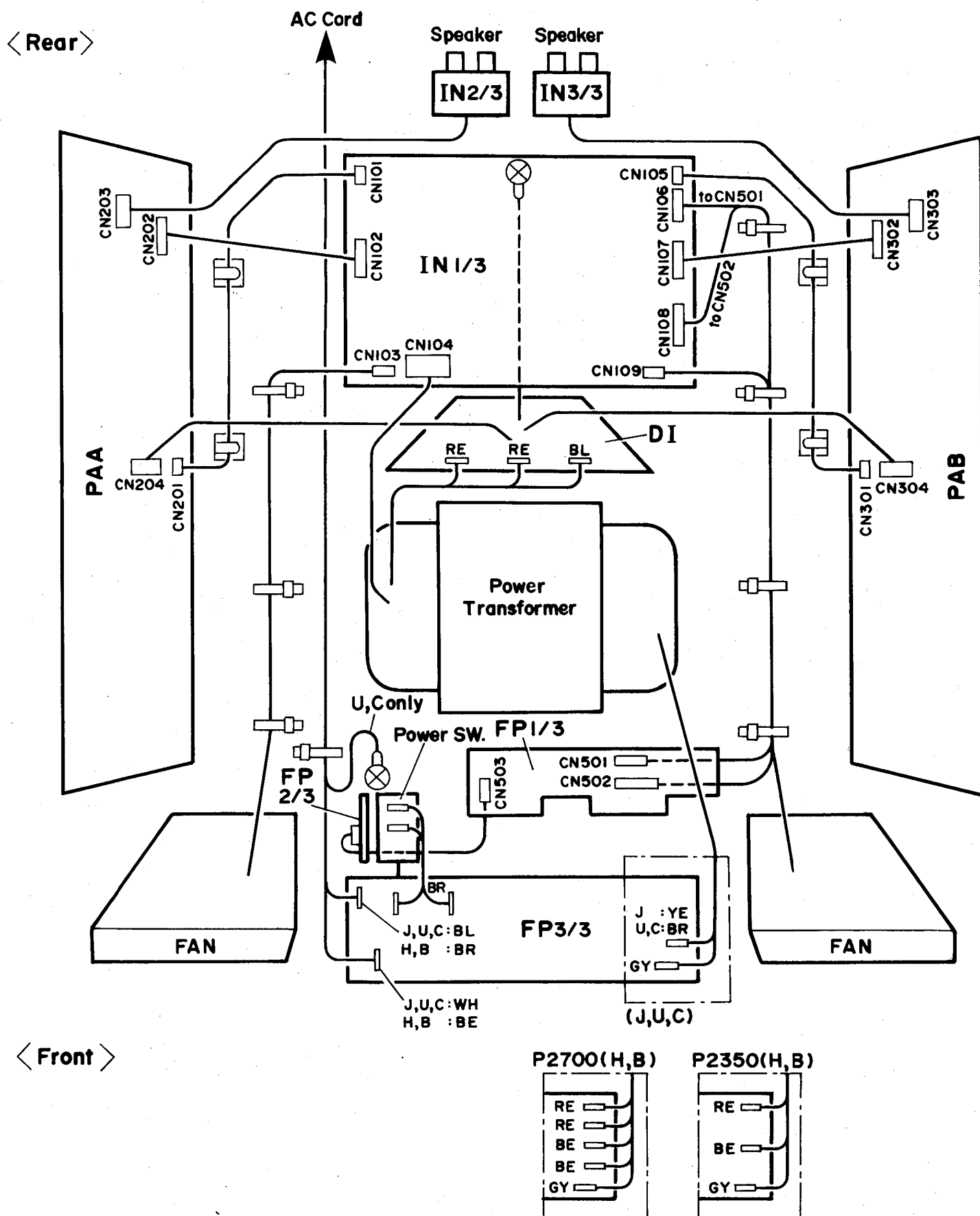
Indicator display	Probable cause	Remedy	Protective circuit operation
CLIP indicator lights.	There is a short at a speaker terminal, amplifier terminal, or wire.	Locate and correct the cause of the short.	The PC limiter circuit operates to protect the power transistors.
	The amplifier load is excessive.	Use a speaker system with an impedance of at least 4 ohms (stereo) or 8 ohms (monaural).	Same as above.
PROTECTION indicator lights.	The heat sink temperature has exceeded 100°C.	Check the amplifier ventilation conditions and take appropriate measures to improve airflow around the amplifier.	The thermal protection circuit operates to protect the power transistors.
	A DC voltage of +/-2V or greater was generated in the power amplifier's output circuit.		The relay operates to protect the speaker system.

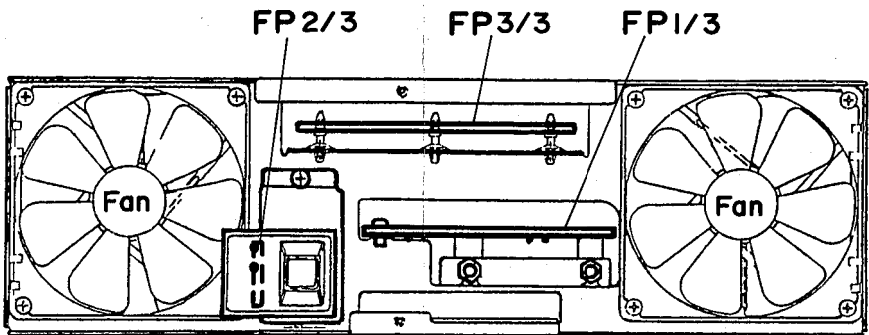
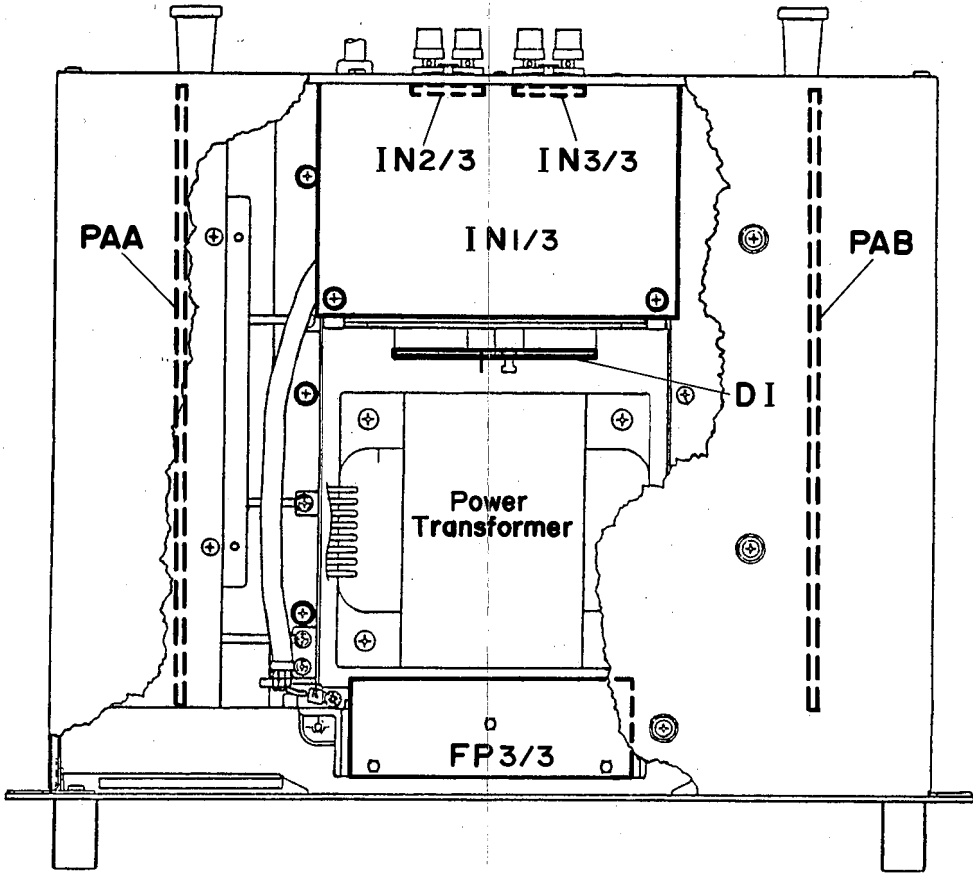
**DIMENSIONS**



Unit: mm (inch)

# CIRCUIT BOARD LAYOUT & WIRING



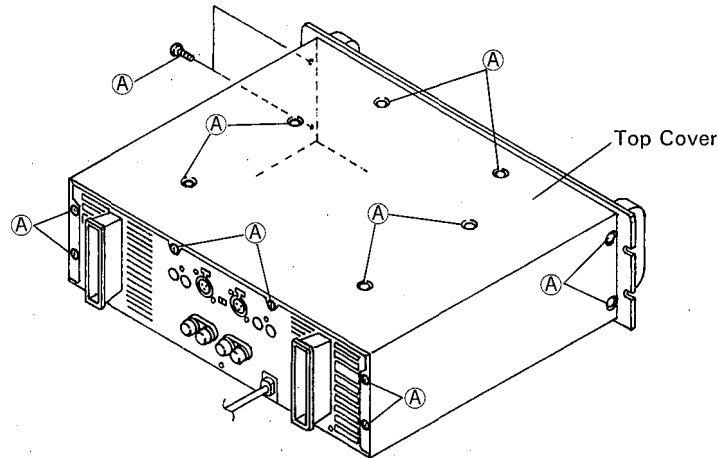




## ■ DISASSEMBLY PROCEDURE

### 1. Top Cover Removal

1-1. Remove the sixteen (16) screws marked in the figure as ① (4 × 8 Bind head tapping screw), then the Top cover can be removed. (Fig. 1)



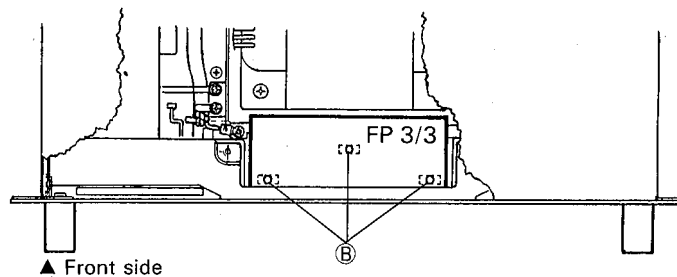
(Fig. 1)

### 2. FP 3/3 Circuit Board Removal

2-1. Remove the Top cover. (see procedure 1 – Top Cover Removal)

2-2. Lift the FP 3/3 circuit board up, while pushing the fin of three (3) PCB supporters marked ②, the FP 3/3 circuit board can be removed. (Fig. 2)

< Top View >



(Fig. 2)

### 3. Front Panel Assembly Removal

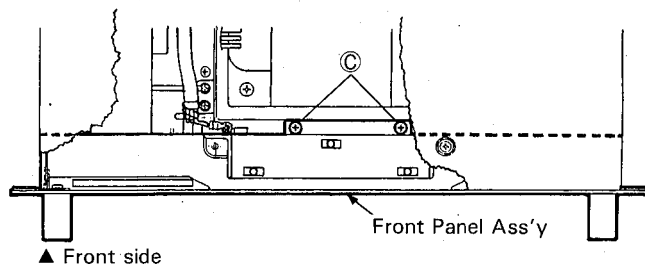
3-1. Remove the Top cover. (see procedure 1.)

3-2. Remove the FP 3/3 circuit board. (see procedure 2.)

3-3. Remove the two (2) screws marked ③ (4 × 8 Bind head screw) and four (4) screws marked ④ (4 × 12 Bind head tapping screw). (Fig. 3 and Fig. 4)

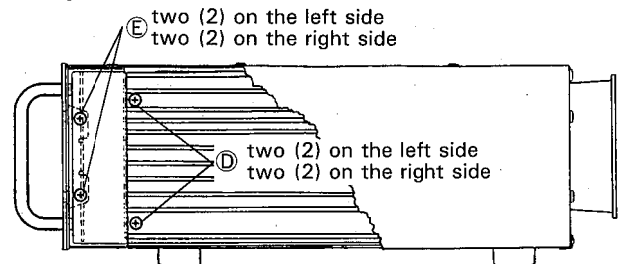
3-4. The Front panel assembly can be removed by disconnecting the wire harnesses.

< Top View >



(Fig. 3)

< Right Side View >

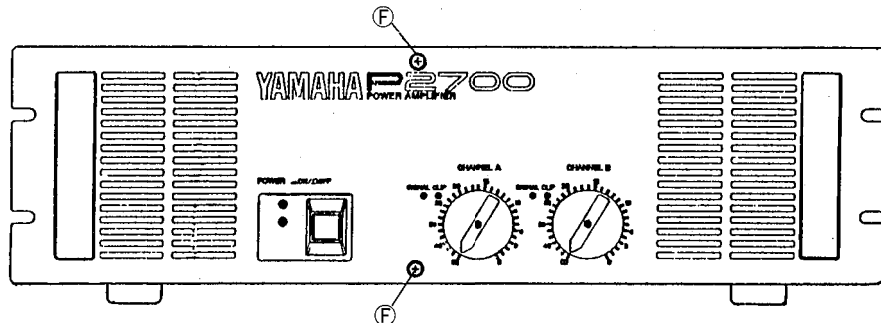


(Fig. 4)

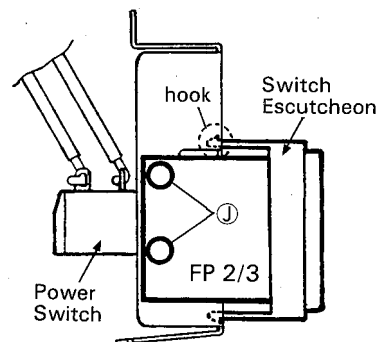
#### 4. FP 1/3, FP 2/3 Circuit Boards and Power Switch Removal

- 4-1. Remove the Top cover. (see procedure 1.)
- 4-2. Remove the FP 3/3 circuit board. (see procedure 2.)
- 4-3. Remove the Front panel assembly. (see procedure 3.)
- 4-4. Remove the four (4) screws marked ⑤ (4 × 8 Bind head screw) and two (2) screws marked ⑥ (3 × 8 Flat head screw) to remove the Front panel. (Fig. 4 and Fig. 5)
- 4-5. Removal of FP 1/3 circuit board
  - 4-5-1. Pull out the two (2) Attenuator knobs.
  - 4-5-2. After the two (2) hex. nuts marked ③ (φ8) and plastic rivet marked ④ have been removed, the FP 1/3 circuit board can be removed. (Fig. 6)
- 4-6. Removal of FP 2/3 circuit board
  - 4-6-1. Remove the screw marked ① (4 × 8 Bind head tapping screw) to remove the switch angle with the Power switch and FP 2/3 circuit board.
  - 4-6-2. Remove the two (2) plastic rivets marked ②, the FP 2/3 circuit board can be removed from the Switch angle. (Fig. 7)
- 4-7. Removal of Power switch
  - 4-7-1. Remove the switch angle. (see procedure 4-6-1.)
  - 4-7-2. Remove the switch escutcheon, while pushing the hooks of the switch escutcheon inward. (Fig. 7)
  - 4-7-3. Pull out the push button and remove the two (2) screws marked ⑦ (3 × 8 Bind head screw), then remove the Power switch from the switch angle. (Fig. 8)

< Front View >

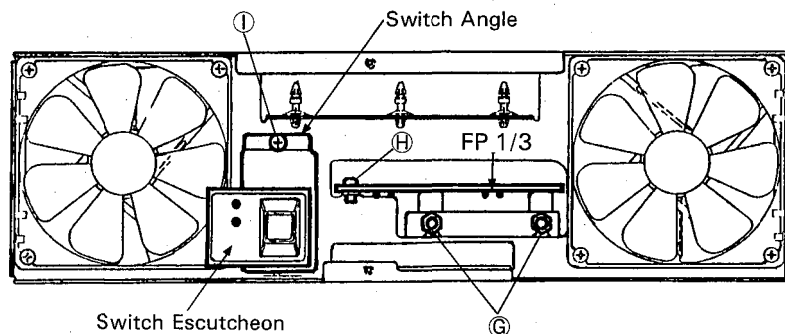


(Fig. 5)

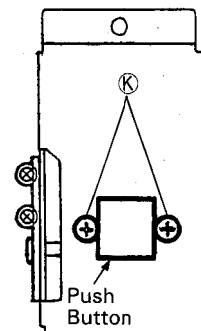


(Fig. 7)

< Front View >



(Fig. 6)



(Fig. 8)

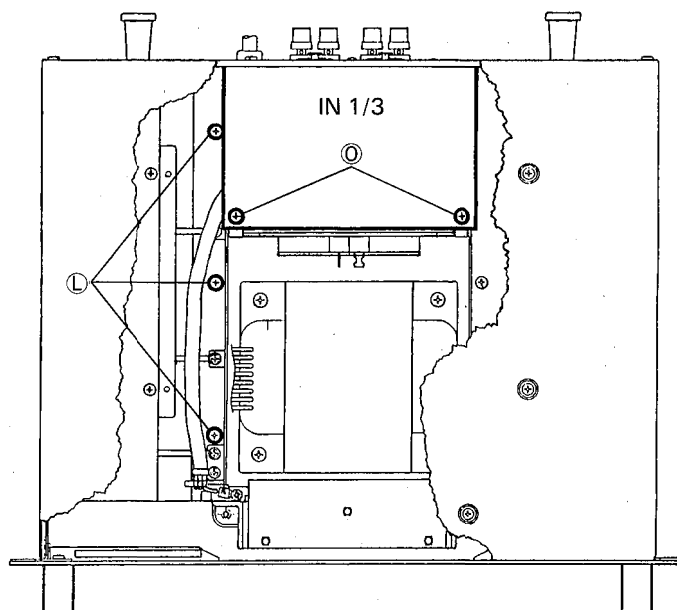
### 5. PAA and PAB Units Removal

- 5-1. Remove the Top cover. (see procedure 1.)
- 5-2. Remove the FP 3/3 circuit board. (see procedure 2.)
- 5-3. Remove the Front panel assembly. (see procedure 3.)
- 5-4. Remove the three (3) screws marked **L** (4 × 8 Bind head screw) and the screw marked **M** (4 × 12 Bind head tapping screw). (Fig. 9 and Fig. 10)
- 5-5. The PAA unit can be removed by disconnecting the wire harnesses.
- 5-6. The PAB unit can be removed by the same way as in the PAA unit removal.

### 6. PAA and PAB Circuit Boards Removal

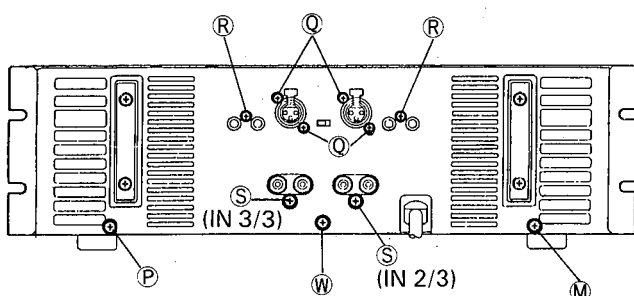
- 6-1. Remove the Top cover. (see procedure 1.)
- 6-2. Remove the FP 3/3 circuit board. (see procedure 2.)
- 6-3. Remove the Front panel assembly. (see procedure 3.)
- 6-4. To remove the PAA circuit board, remove the PAA unit.  
In the case of the PAB circuit board removal, remove the PAB unit.
- 6-5. After the screws marked **N** (3 × 12 Pan head screw P2350: 8 pcs, P2700: 10 pcs) have been removed, the transistor holders and the PAA circuit board can be removed. (Fig. 11)
- 6-6. The PAB circuit board can be removed by the same way as in the PAA circuit board removal.

< Top View >



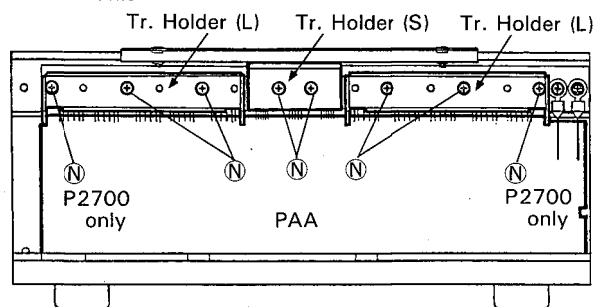
(Fig. 9)

< Rear View >



(Fig. 10)

< PAA Unit >



(Fig. 11)

## 7. Rear Panel Assembly Removal

- 7-1. Remove the Top cover. (see procedure 1.)
- 7-2. Remove the two (2) screws marked ① (3 × 8 Bind head tapping screw), screw marked ② (4 × 12 Bind head tapping screw), screw marked ③ (4 × 12 Bind head tapping screw) and screw marked ④ (4 × 8 Bind head tapping screw). (Fig. 9 and Fig. 10)
- 7-3. The Rear panel assembly can be removed by disconnecting the wire harnesses.

## 8. IN 1/3, IN 2/3 and IN 3/3 Circuit Boards Removal

- 8-1. Remove the Top cover assembly. (see procedure 1.)
- 8-2. Remove the Rear panel assembly. (see procedure 7.)
- 8-3. Removal of IN 1/3 circuit board
  - 8-3-1. Remove the four (4) screws marked ⑤ (3 × 8 Bind head screw) and the two (2) screws marked ⑥ (3 × 8 Bind head tapping screw), then remove the IN 1/3 circuit board. (Fig. 10)
- 8-4. Removal of IN 2/3 and IN 3/3 circuit boards
  - 8-4-1. The IN 2/3 and IN 3/3 circuit boards can be removed by removing the screw marked ⑦ (4 × 10 Bind head tapping screw). (Fig. 10)

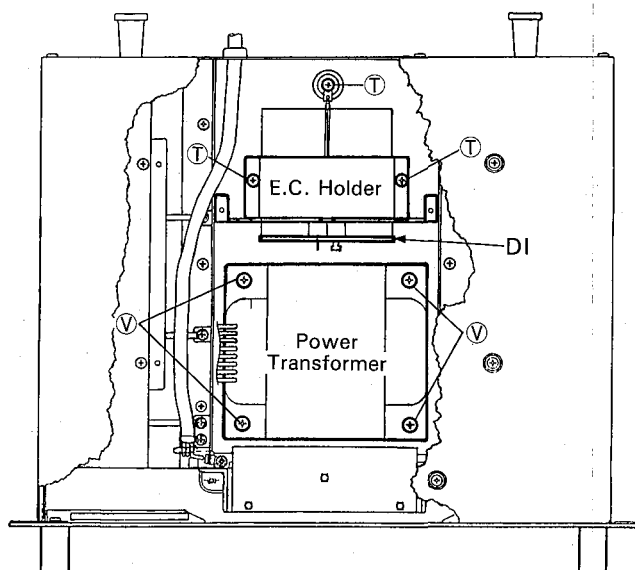
## 9. DI Circuit Board Removal

- 9-1. Remove the Top cover assembly. (see procedure 1.)
- 9-2. Remove the Rear panel assembly. (see procedure 7.)
- 9-3. Remove the three (3) screws marked ⑧ (4 × 8 Bind head screw) to remove the holder retaining the electrolytic cap. with DI circuit board. (Fig. 12)
- 9-4. The DI circuit board can be removed from the holder by removing the screw ⑨ (4 × 16 Bind head screw). (Fig. 13)

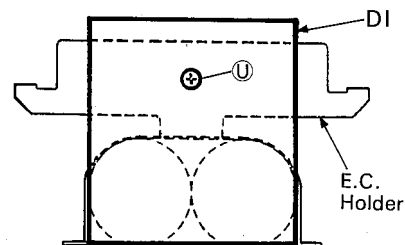
## 10. Power Transformer Removal

- 10-1. Remove the Top cover. (see procedure 1.)
- 10-2. Remove the four (4) screws marked ⑩ (5 × 10 Bind head screw) and disconnect the wire harnesses, the Power transformer can be removed. (Fig. 12)

< Top View >



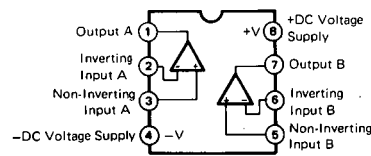
(Fig. 12)



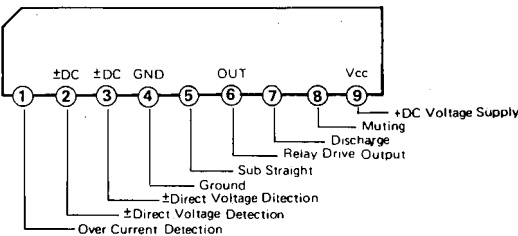
(Fig. 13)

IC BLOCK DIAGRAM

- **M5238P** (XA013001)  
Dual Operational Amplifier



- **TA7317P** (IG034800)  
Relay Driver



ADJUSTMENTS

Before performing any following adjustments, set the unit as follows:

1. Set the ATTENUATIONS at "0".
2. Input terminal: XLR pin 2 is HOT, pins 1 and 3 GROUND.
3. MODE switch: STEREO.
4. Connect 4 ohm across each of the OUTPUT terminals under test.

ADJUSTMENT SPECIFICATIONS

Before testing for specifications, confirm AC line voltage is the rated value  $\pm 10\%$ .

First GROUND the INPUT terminal.

Adjustment item	Adjust	Test Point	Rating	Conditions
IDLE CURRENT	VR201	TP + -	9 mV $\pm$ 1 mV	
	VR301	TP + -	9 mV $\pm$ 1 mV	
	VR201	TP + -	15 mV $\pm$ 2 mV	Unit ON 15 minutes
	VR301	TP + -	15 mV $\pm$ 2 mV	Unit ON 15 minutes
DC OFFSET	OUTPUT terminal A		0 V $\pm$ 0.5 V	
	OUTPUT terminal B		0 V $\pm$ 0.5 V	

\* VR201 and VR202, TP+ and TP- are located on the PAA and PAB circuit boards.

1. MUTING TEST

After applying power to the unit, the PROTECTION indicator should remain ON for  $6 \pm 2$  seconds and then the indicator should go out.

2. GAIN TEST

When a sinewave of 1 kHz at  $-10$  dB is applied to the INPUT, the OUTPUT should be  $+22.3 \pm 1.5$  dB for P2700 or  $+20.0 \pm 1.5$  dB for P2350.

3. FREQUENCY RESPONSE TEST

When a sinewave of 20 Hz, 1 kHz and 20 kHz at  $-10$  dB is applied to the INPUT, the OUTPUT should be as follows: (taking the 1 kHz as reference).

20 Hz:  $0 \text{ dB} \pm 0.5 \text{ dB}$

20 kHz:  $-0.5 \text{ dB} \pm 0.5 \text{ dB}$

4. HARMONIC DISTORTION TEST

When a high quality sinewave is applied at 20 Hz, 1 kHz and 20 kHz, the HARMONIC DISTORTION should be as follows:

Power output level (4 ohm)	T.H.D		
	20 Hz	1 kHz	20 kHz
500W + 500W (P2700)	$\leq 0.1\%$	$\leq 0.01\%$	$\leq 0.1\%$
250W + 250W (P2350)	$\leq 0.1\%$	$\leq 0.01\%$	$\leq 0.1\%$

5. CHANNEL SEPARATION TEST ( $R_L = 8 \text{ ohm}$ )

5-1 Input a sinewave of  $-5$  dB, 20 kHz into channel A.

5-2 Short the INPUT for channel B with a 600 ohm load.

5-3 Set the OUTPUT of channel A at a reference of 0 dB.

5-4 If channel B ATTENUATOR is set to the same as channel A, channel B should be less than  $-70$  dB.

6. RESIDUAL NOISE

6-1 Set the INPUT ATTENUATOR to "0".

6-2 Short the INPUT with a 600 ohm load, OUTPUT load 4 ohm.

6-3 Measure the OUTPUT, RESIDUAL NOISE level should be  $-68$  dB or lower.

6-4 Set the INPUT ATTENUATOR to MINIMUM, the RESIDUAL should be less than  $-75$  dB.

7. SIGNAL INDICATOR TEST

When a sinewave of 1 kHz is input signal level is adjusted to equal to or greater than 2.0 volt output, the SIGNAL INDICATOR should be ON.

8. CLIPPING INDICATOR TEST

When a sinewave of 1 kHz signal is adjusted to produce equal or greater than 1.0% harmonic distortion on the OUTPUT, the CLIP INDICATOR should be ON.