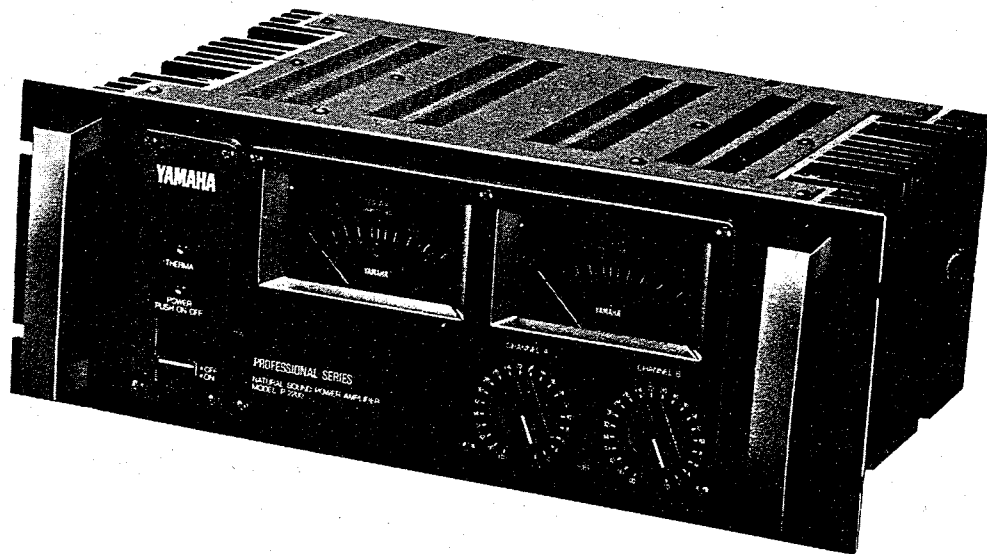


SERVICE MANUAL

P-2200

PA POWER AMPLIFIER



SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

006346



Printed in Japan 9.7

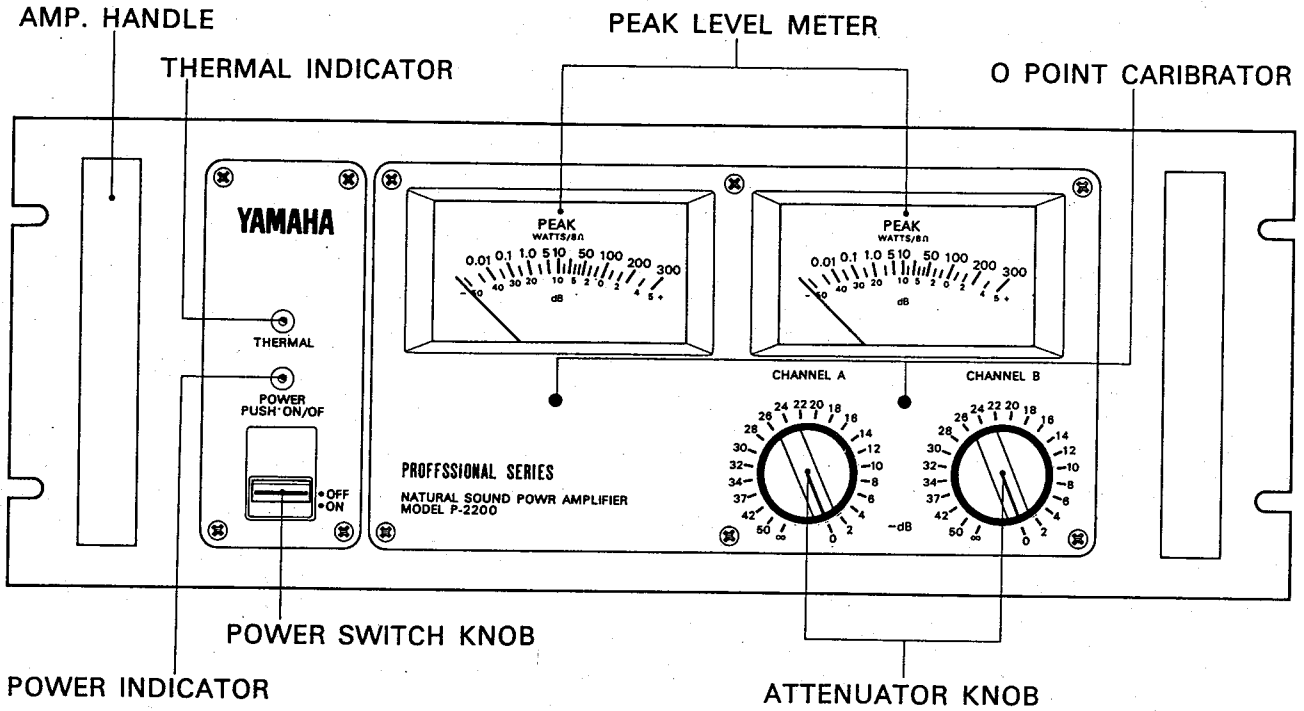


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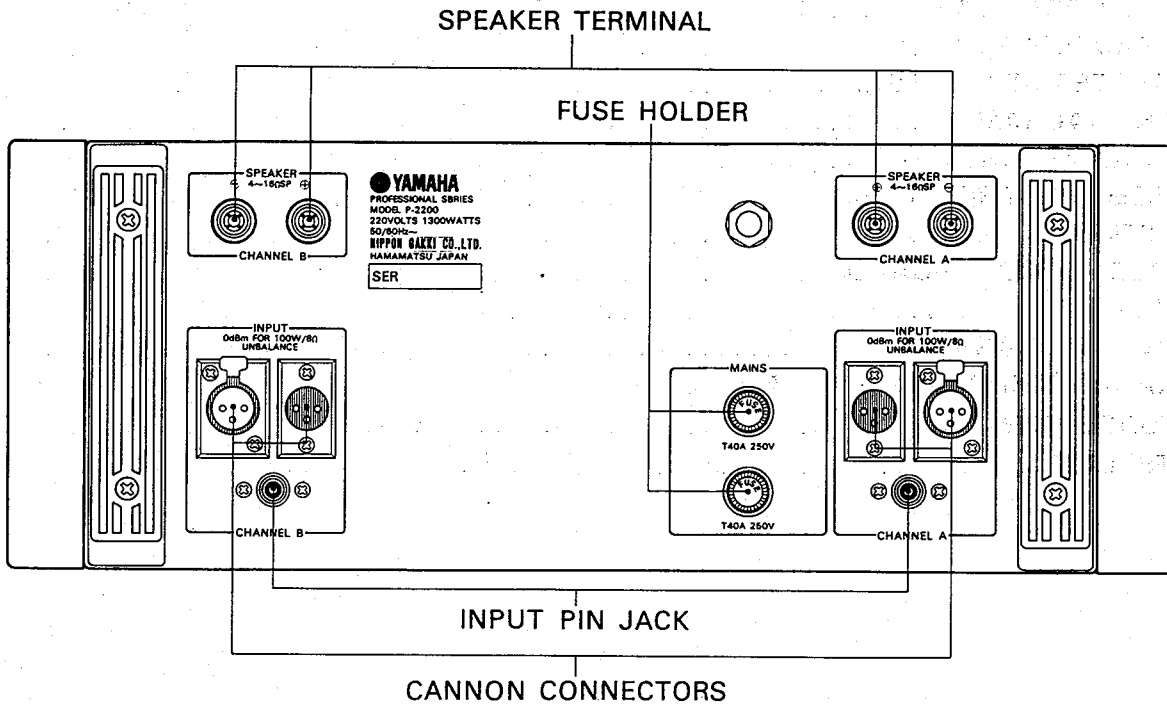
PANEL OPERATION

FRONT PANEL



REAR PANEL

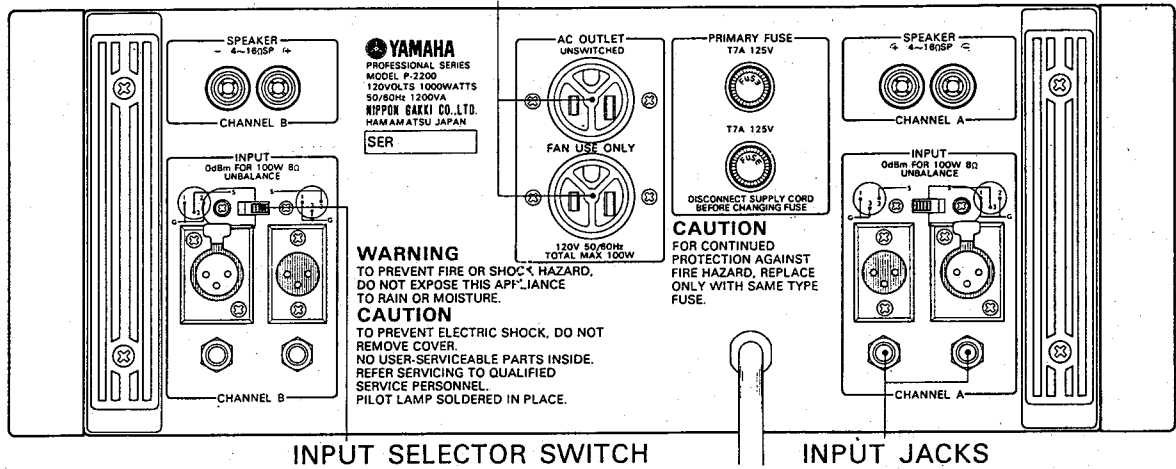
GENERAL, U.K. & AUSTRIAN MODEL



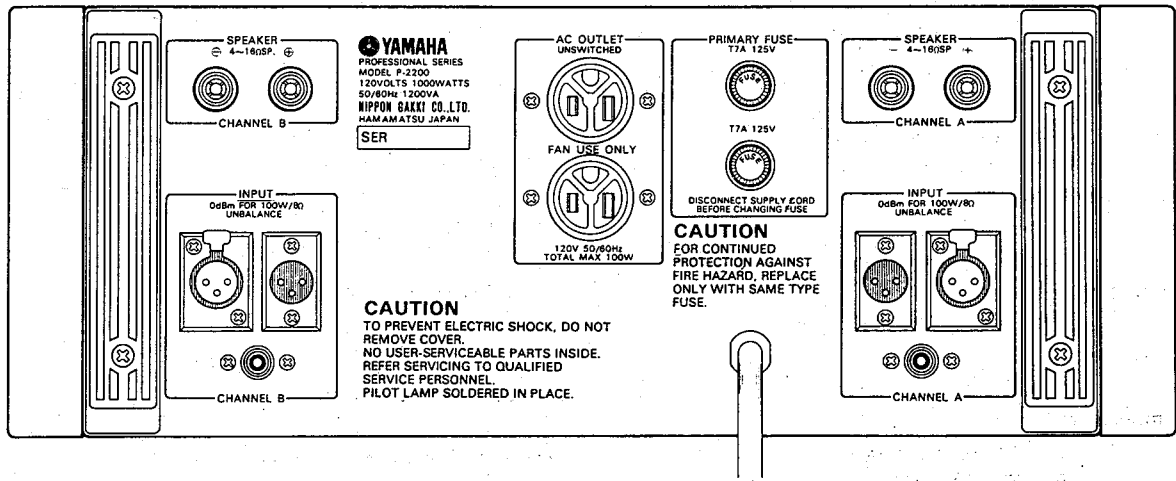
PANEL OPERATION

REAR PANEL U.S. MODEL

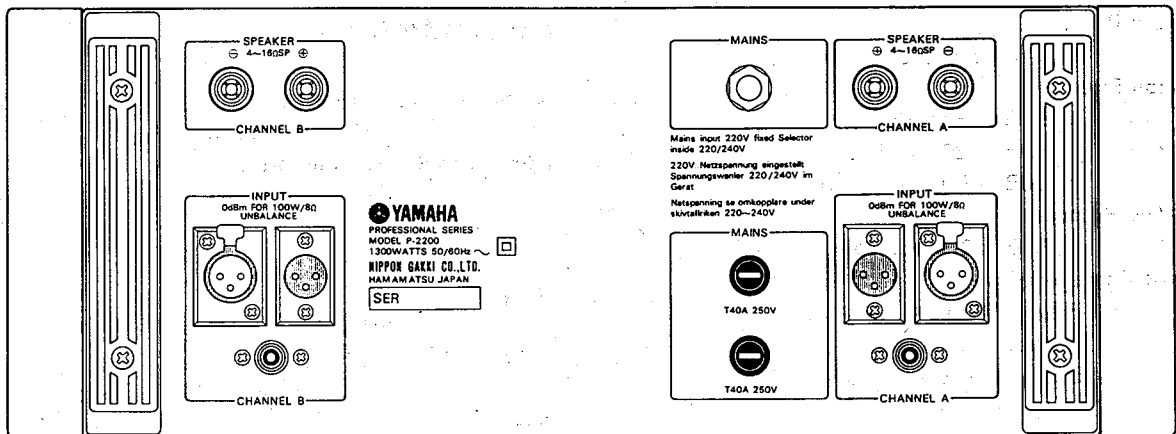
AC OUTLET FAN USE ONLY



CANADIAN MODEL



EUROPEAN MODEL



SPECIFICATIONS

AMPLIFIER SECTION

Circuit System	All-stage direct-coupled complementary OCL triple push-pull circuit.
Dynamic Power	340W + 340W (8Ω 1KHz THD 0.1%)
Continuous Output	240W + 240W (8Ω 20Hz – 20KHz THD 0.05%) (both channels driven)
Frequency Characteristics	5Hz – 100KHz (+0 –1dB at 8Ω 1W)
Power Band Width	10Hz or less, 100KHz or more (4Ω 175W THD 0.5%)
Total Harmonic Distortion	0.01% or less (8Ω 1W – 200W, 20Hz – 20KHz)
Crosstalk	75dB (20KHz)
Cross Modulation Distortion	0.01% or less (8Ω 100W 70Hz: 7KHz = 4 : 1) 0.1% or less (16Ω 100W)
Damping Factor	350 or more (8Ω 1KHz) 150 or more (8Ω 20KHz)
Signal-to-Noise Ratio	105dB (input 4.7K short-circuited) 115dB (input 4.7K short-circuited IHFA)
Input Sensitivity	0dBm + 0.5dBm (8Ω 100W)
Voltage Gain	31.2dB (volume max.)
Input Impedance	25KΩ (volume max.) 25 – 33KΩ (volume max. to min.)

Peak METER SECTION

Indication Range	-50 to +5dB (0dB = 100W/8Ω)
Indication Error	±0.5dB (-5 to +5dB) ±1.0dB (-20 to -5dB) ±2.0dB (-50 to -20dB)
Frequency Response	±1.0dB (40Hz to 20KHz)
Response Characteristics	Rising 10msec (1KHz 0dB 10msec – 1 ± 0.5dB indicated) Dropping 0.8sec (0dB – -20dB returning time)

POWER SUPPLY

GENERAL MODEL

Rated Voltage	220V 50/60Hz
Rated Power Consumption	1300W
Primary Current at Rated Operation	6.0A
Primary Fuse	T4.0A 125V x 2

U.S. & CANADIAN MODEL

Rated Voltage	120V 50/60Hz
Rated Power Consumption	1000W, 1200VA
Primary Current at Rated Operation	11.5A
Primary Fuse	T7.0A 125V x 2

U.K. & AUSTRIAN MODEL

Rated Voltage	240V 50/60Hz
Rated Power Consumption	1300W
Primary Current at Rated Operation	6.0A
Primary Fuse	T4.0A 250V x 2

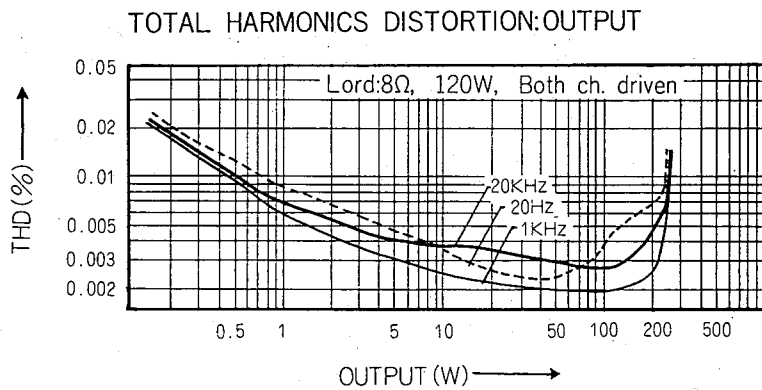
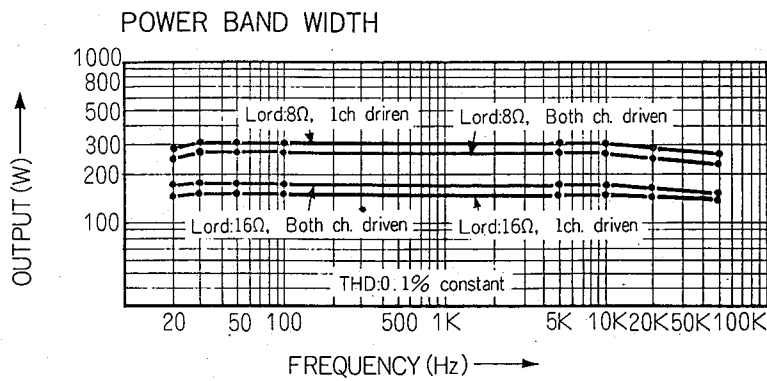
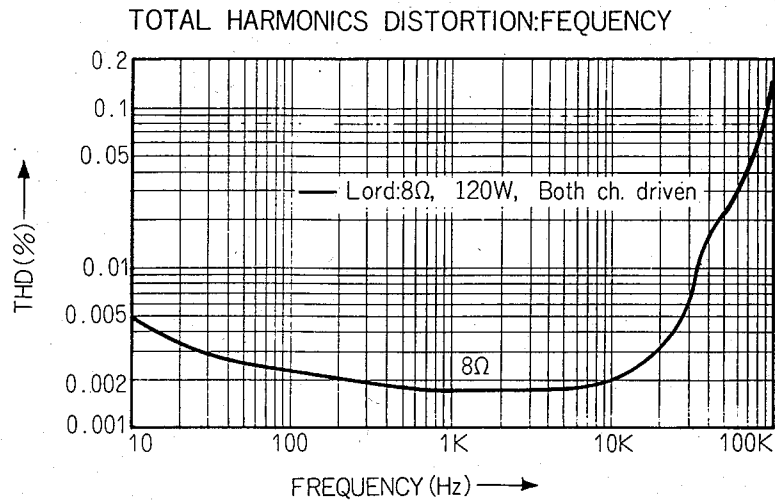
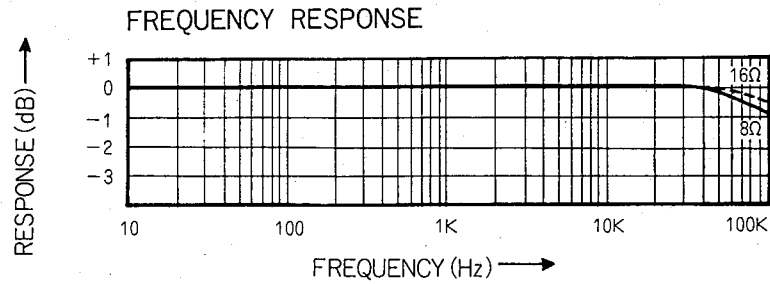
EUROPEAN MODEL

Rated Voltage	220/240V 50/60Hz
Rated Power Consumption	1300W
Primary Current at Rated Operation	6.0A
Primary Fuse	T4.0A 250V x 2

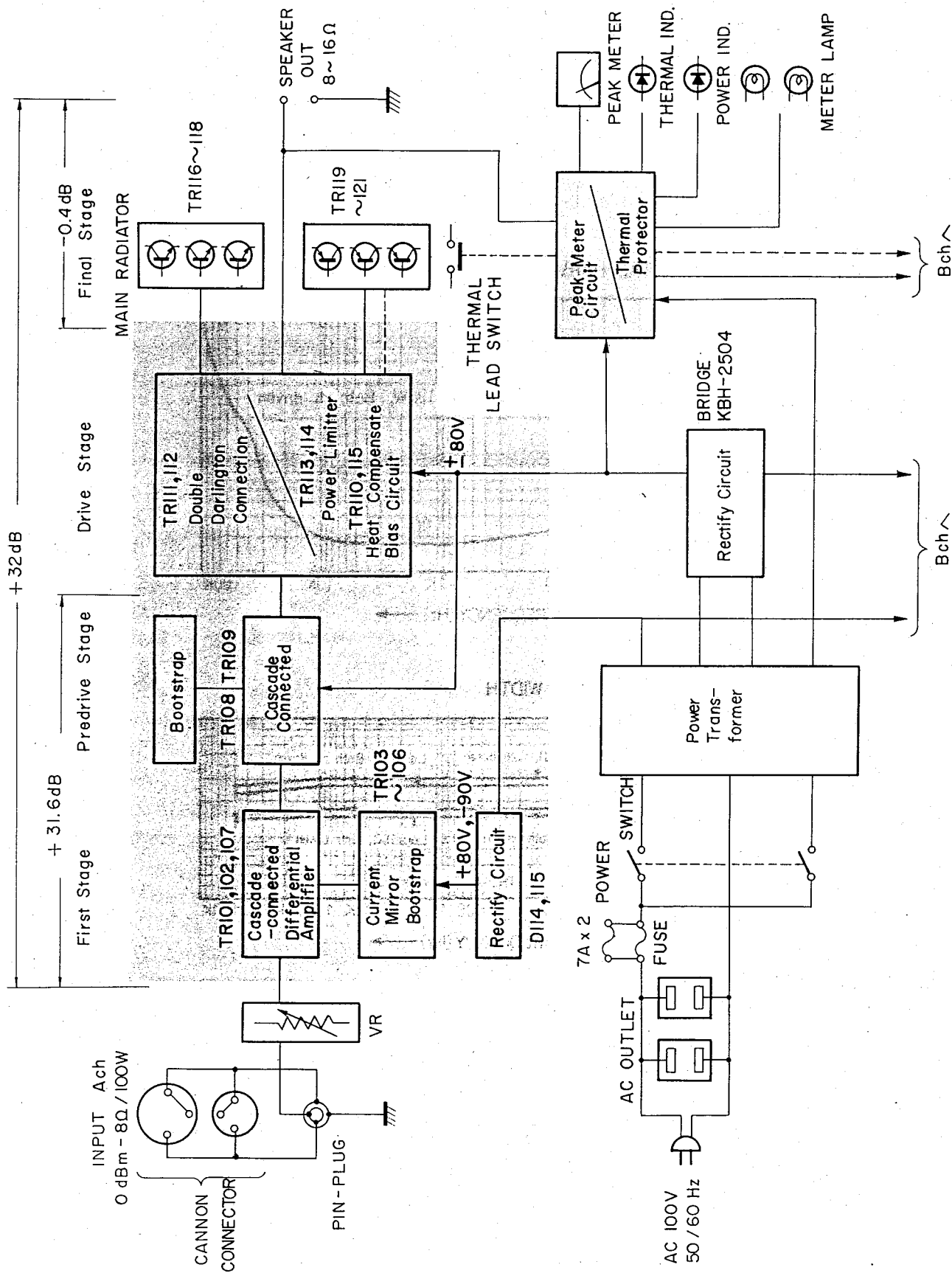
MISCELLANEOUS

Ambient Temperature	-20°C to +50°C
Number of Semiconductors Used	42 (transistors) 41 (diodes) 1 (IC)
Dimensions	480(W) x 376(D) x 183(H)mm
Panel Size	480(W) x 176(H)mm
Rack Mount	19" standard rack mount attachable
Weight	19.5kg

CHARACTERISTIC DIAGRAM



BLOCK DIAGRAM



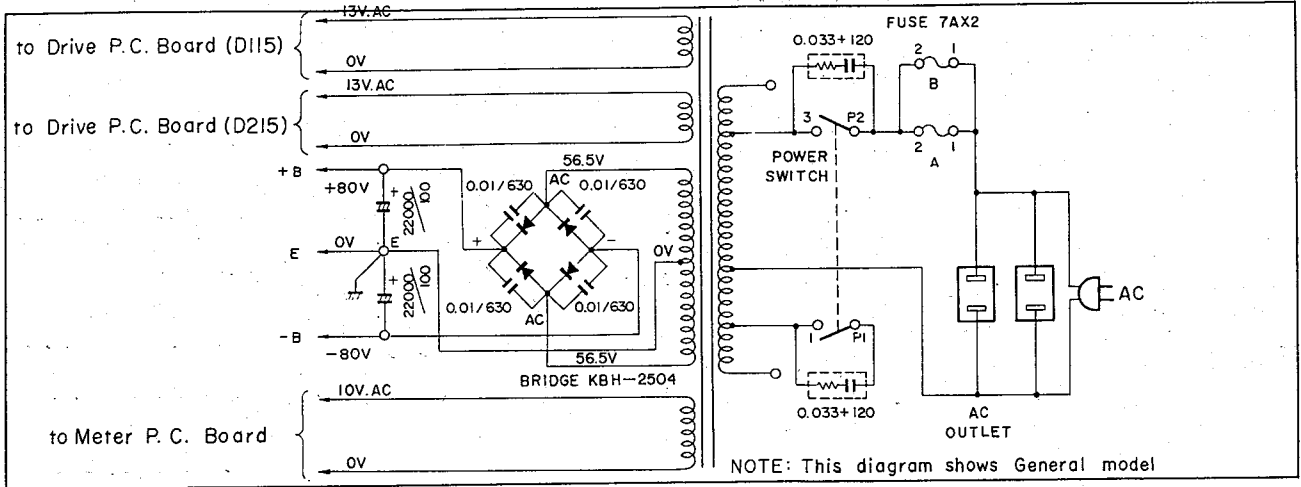
OUTLINE OF CIRCUITS

5. Power Supply Circuit

The power supply transformer uses a toroidal iron core which is half the size and weight of the EI type core with the same capacity, thus significantly reducing in dimension and weight. Moreover, the capacity used is twice that of the conventional transformer. For other features, the primary winding is parallel wound, with a power switch provided on either side. Thus rush current, when the power switch is turned on, may be reduced to 73% of that of the ordinary transformer,

The power supply section employs a large capacity 22,000 μ F electrolytic condenser on each of the plus and minus sides, providing generous capacity power supply.

To the power stage, high voltage of +80V is supplied. To the first stage differential amplifier, predrive stage and driver stage, +80V and -32V are supplied, which are previously rectified and smoothed by the separate winding on the driver circuit board, and combined at the power stage.

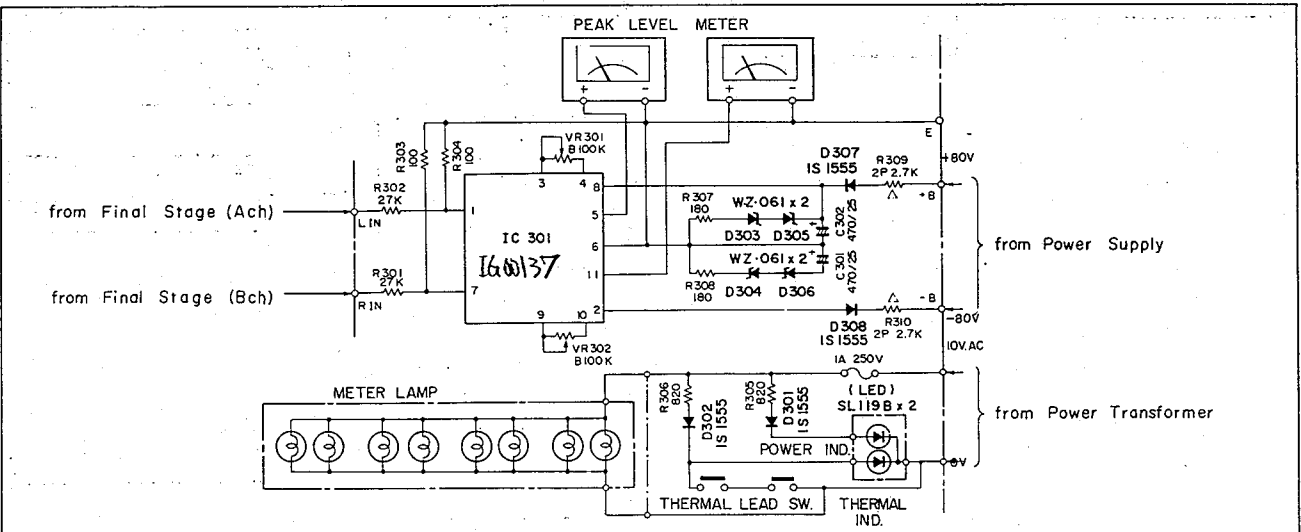


6. Peak Meter Circuit

The use of high brid IC incorporating logarithmic compression, full-wave rectifying and peak detecting functions offer high stability and reliability of the peak meter. The response characteristics conform to DIN Standard; rise by the sue of the meter is -0.5dB at 1kHz for .10msec, and -1dB for 5msec. Necessary adjustment is a mere sensitivity adjustment of the meter that is adjusted to 0dB. $\pm 15V$ of the IC power

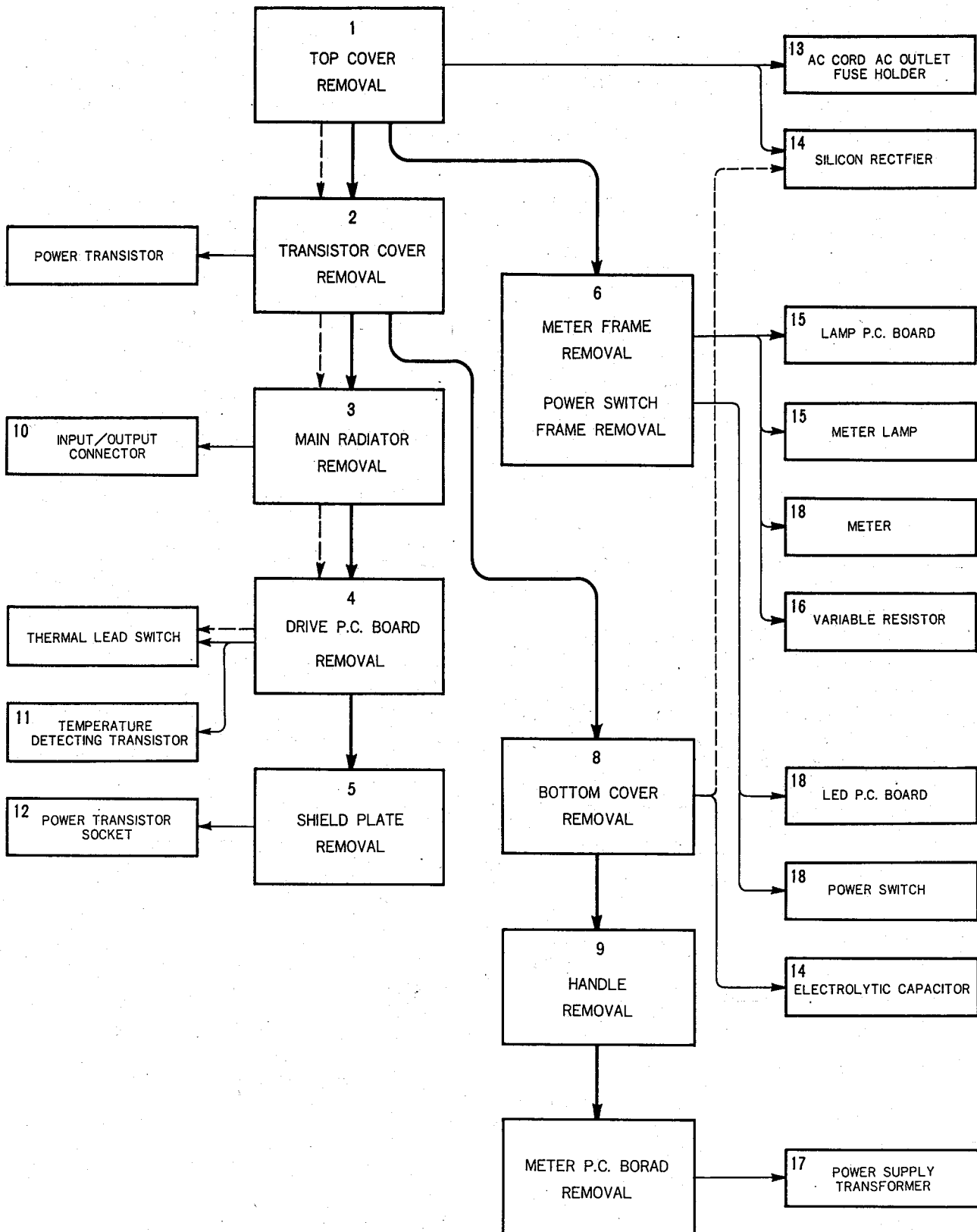
source is achieved by dropping +B by temporary constant voltage, since the allowable voltage range is wide from ± 12 to $\pm 18V$.

The thermal lead switch, which is wired to the meter circuit board, is heat connected to the main radiator for the power transistor. When the radiator reaches 100 $^{\circ}$ C, the LED at the front panel lights to tell overheat.



DISASSEMBLY PROCEDURE

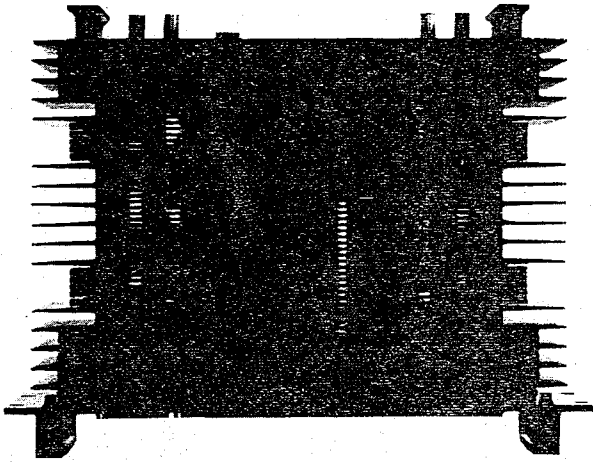
- Disassembly is performed in accordance with the Flow chart.
- When thermal lead switch is removed, follow the red-arrowed flow.



DISASSEMBLY PROCEDURE

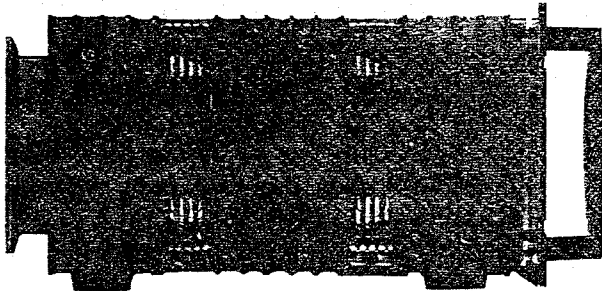
1. TOP COVER REMOVAL

13 screws



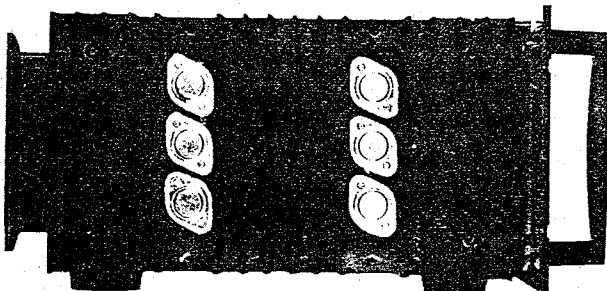
2. TRANSISTOR COVER REMOVAL

2 screws x 2



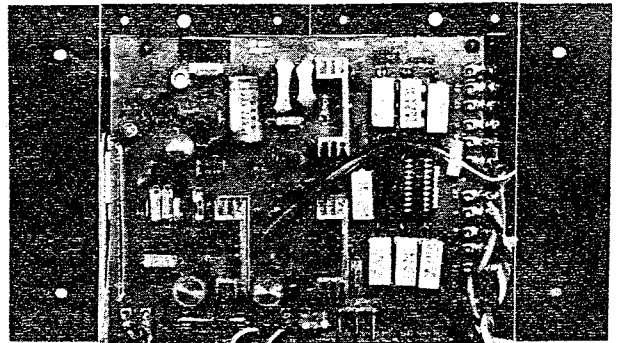
3. MAIN RADIATOR REMOVAL

Remove 4 plus screws between fins, and 4 plus screws fixing transistor cover. All those screws are threaded to bottom cover.



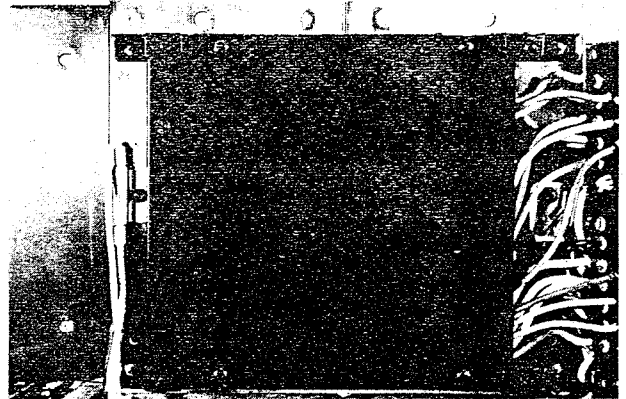
4. DRIVE P.C. BOARD REMOVAL

4 screws



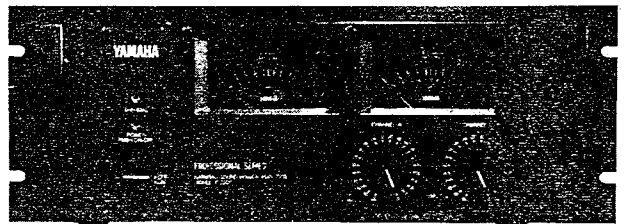
5. SHIELD PLATE REMOVAL

Remove drive P.C. board, then remove 4 plus binding screws. By removing input cord of drive P.C. board, the drive board may be opened on one side.



6. POWER SWITCH & METER FRAME REMOVAL

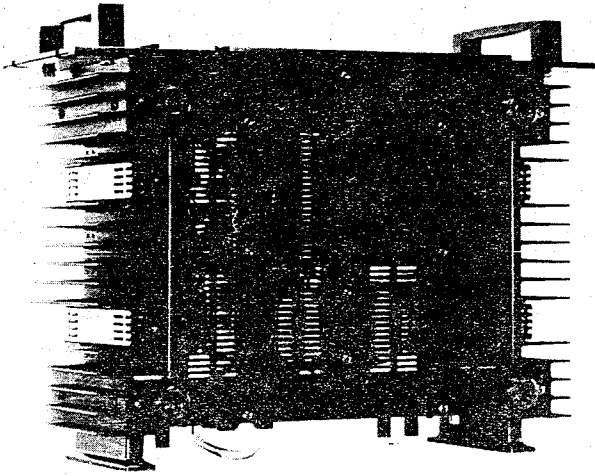
4 screws in Power switch frame.
6 screws in Meter frame.



DISASSEMBLY PROCEDURE

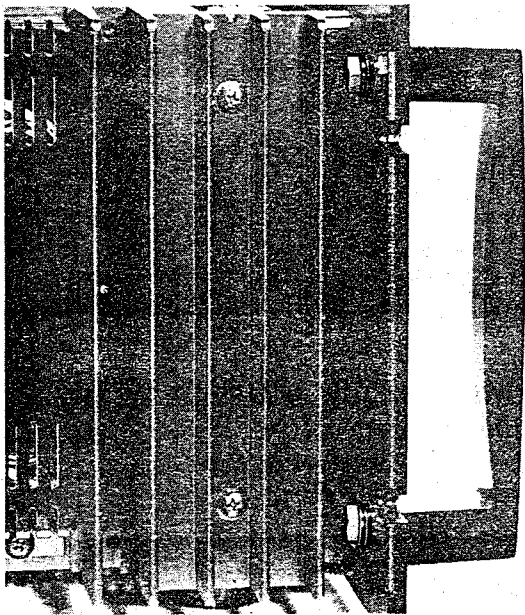
7. BOTTOM COVER REMOVAL

Remove 12 plus screws and 4 screws fixing power transistor cover.



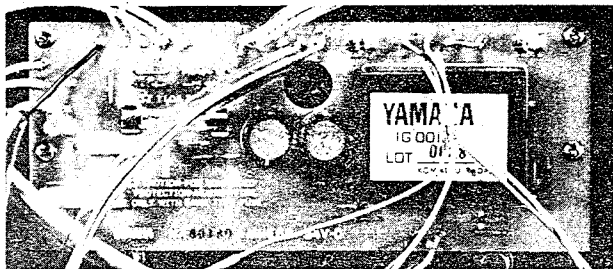
8. HANDLE REMOVAL

2 bolts x 2

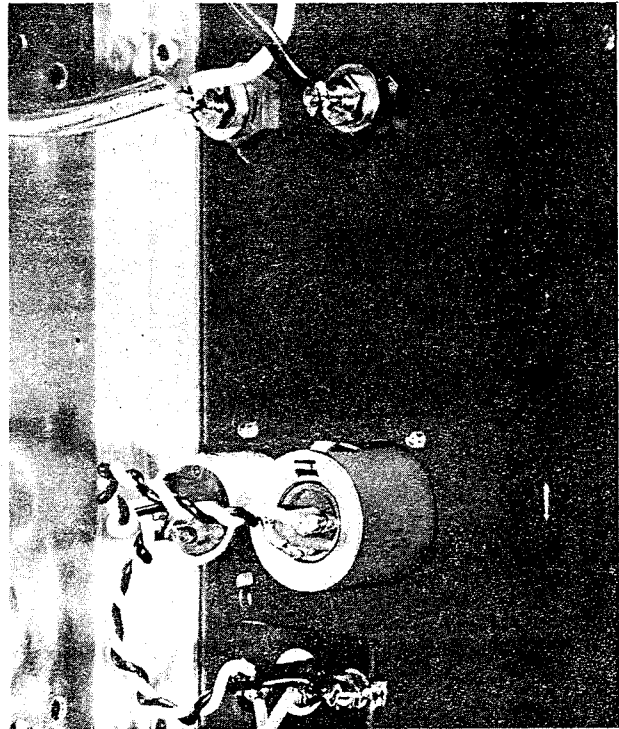


9. METER P.C. BOARD REMOVAL

4 binding screws.

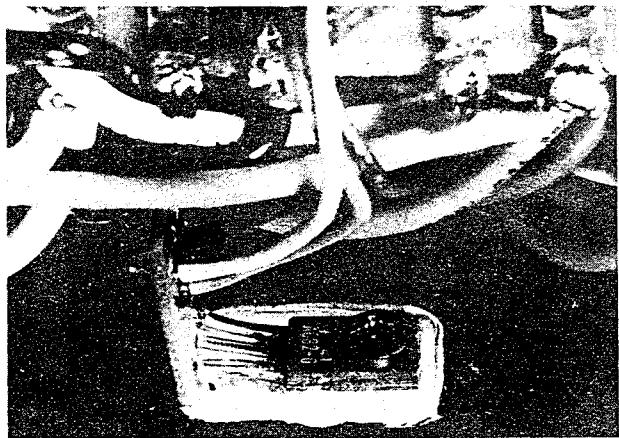


10. INPUT/OUTPUT CONNECTOR REMOVAL



11. TEMPERATURE DETECTING TRANSISTOR REMOVAL

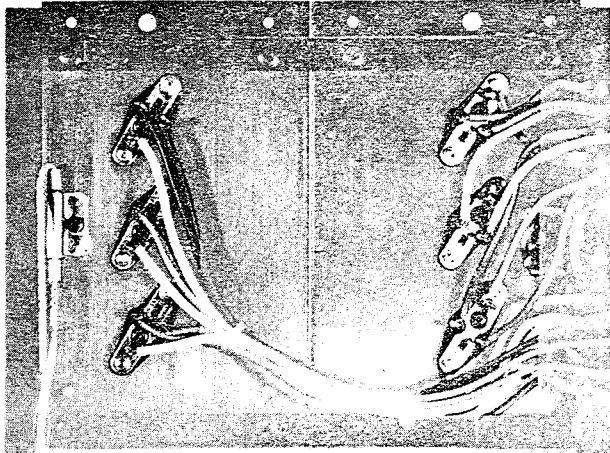
In case of renewal, make sure that new transistor is insulated from radiator, avoiding heat-coupling between them.



DISASSEMBLY PROCEDURE

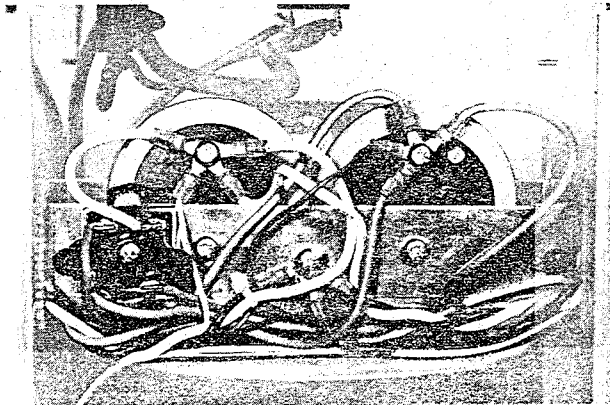
12. POWER TRANSISTOR SOCKET

Remove drive P.C. board first, then remove power transistor. Lead wire is wired to meter P.C. board.

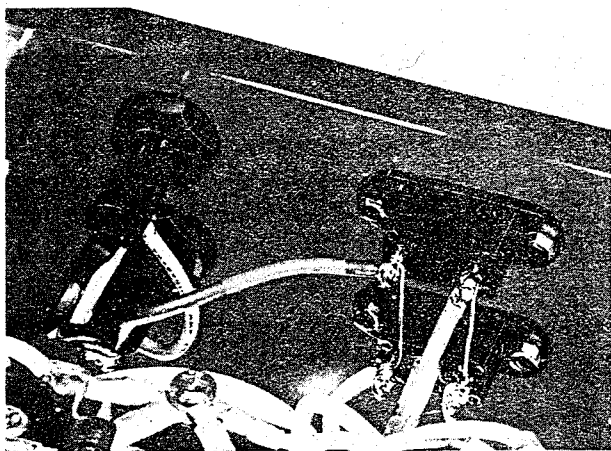


14. SILICON RECTIFIER

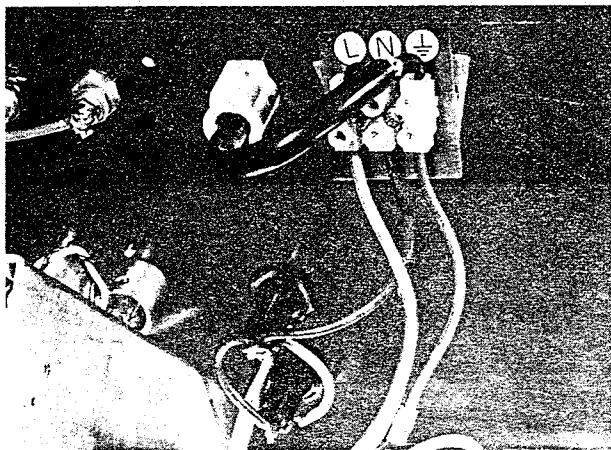
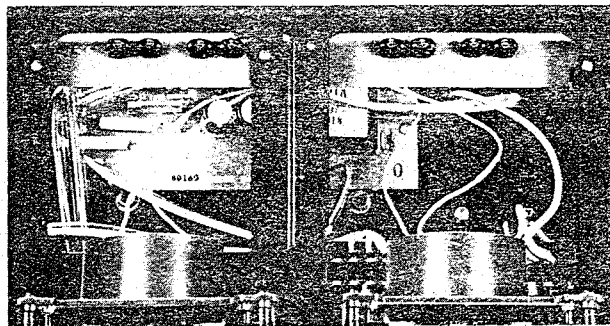
- * Discharge electric capacitor by resistor about 8Ω 100W.
- * 2 electric capacitors are fixed by metal band.
- * In case of renewal electric capacitors, confirm its pole of + -



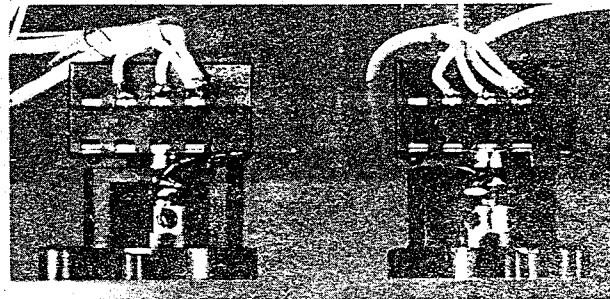
13. AC. CORD, AC. OUTLET, FUSE HOLDER



15. METER LAMP P.C. BOARD & LAMP

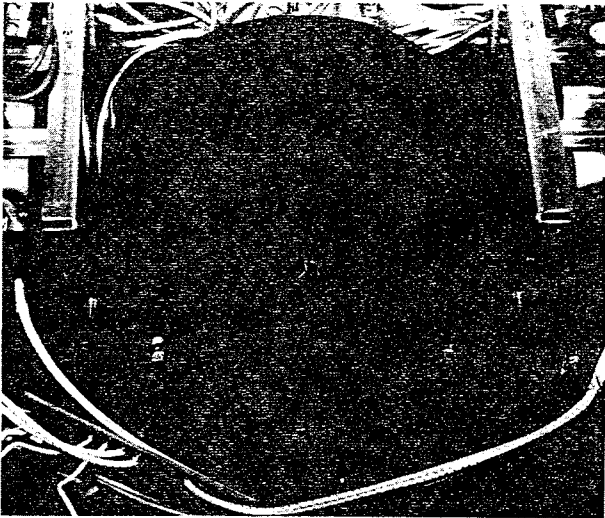


16. VARIABLE RESISTOR (ATTENUATOR)

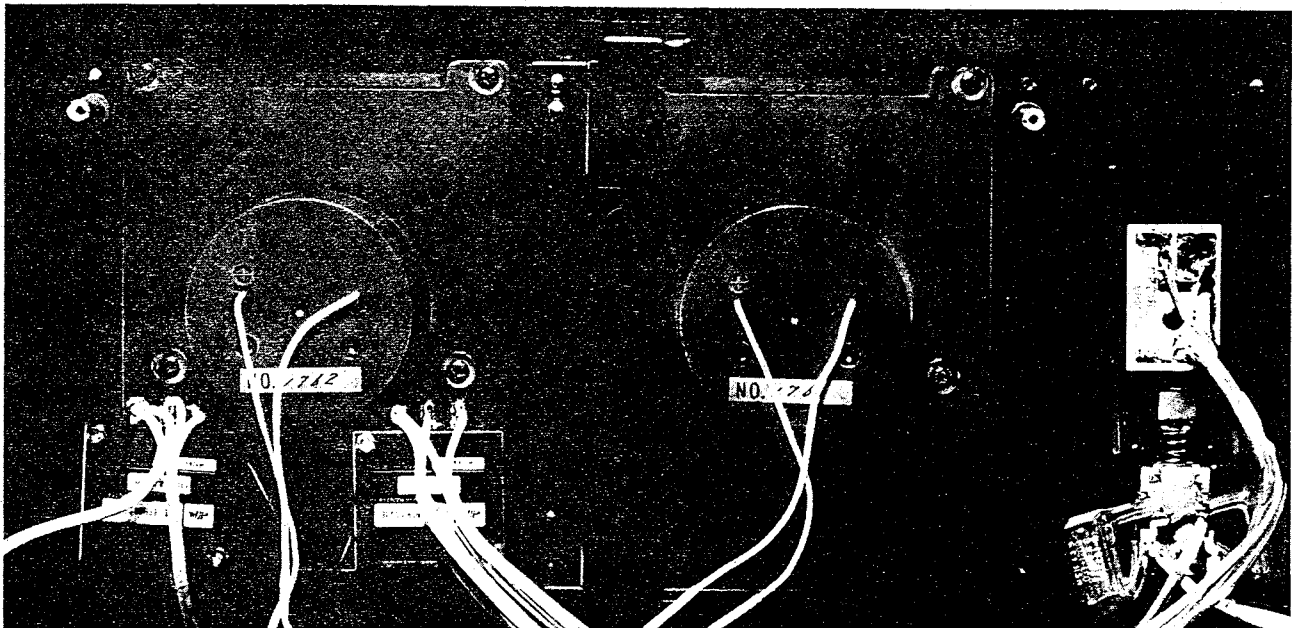


DISASSEMBLY PROCEDURE

17. POWER TRANSFORMER



18. METER, POWER SWITCH, LED P.C. BOARD



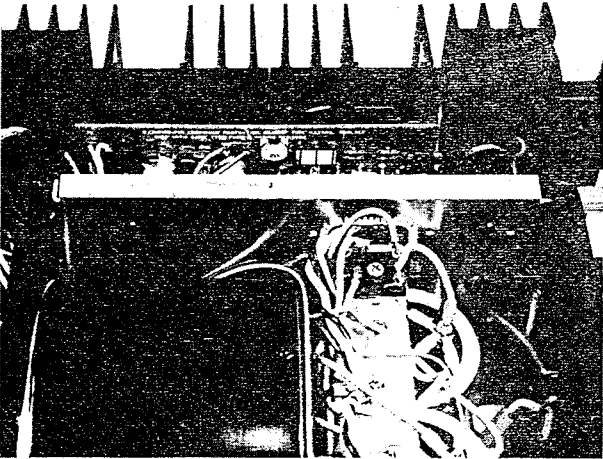
ADJUSTMENT

Before adjusting

- Before adjusting, wait a few minutes after turning-on of the power switch.
- In case of exchanging parts, make discharging by short-circuiting between terminals of the electrolytic condenser by means of a resistance of about 8Ω 100W, since electric charge often remains at the electrolytic condenser in the power supply section.

Adjusting Driver Circuit Board

The driver circuit board is adjusted with respect to only idling current at the output stage of VR101. V101(A) and VR201(B) are adjusted so that voltage between test terminals CT and PE becomes 10mV when no signal is present. The idling current is 21.2mA per power transistor. At this time, confirm that voltage between E and CT is 0V (confirmation of midpoint voltage).



In case of exchanging parts in the driver circuit board, or in case of measuring voltage, remove the main radiator, and mount it on the body after turning it 180°.

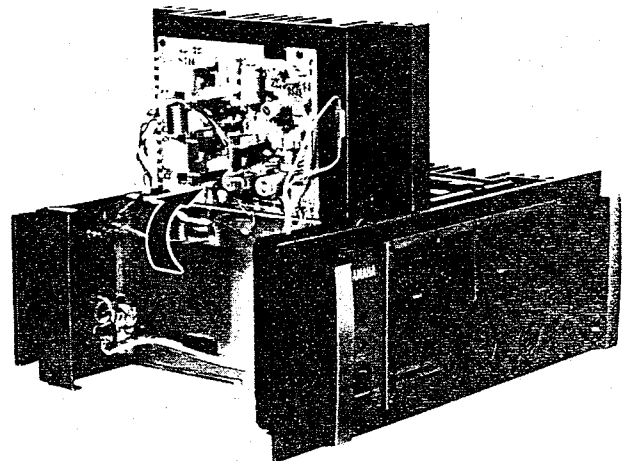
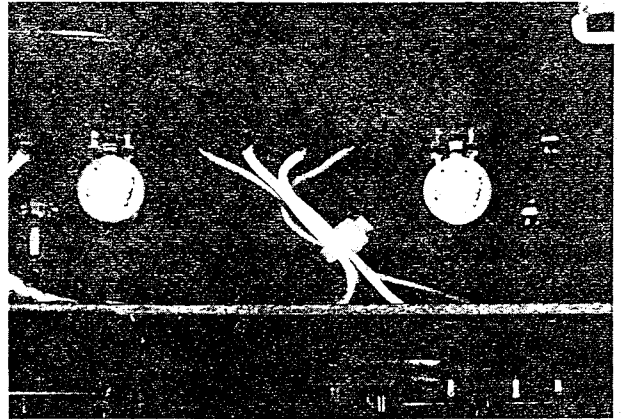
Adjusting Meter P.C. Board

Zero Adjusting

The zero-adjusting screws, each in a hole positioned below the respective meter on the front panel, are adjusted so that the meter reads zero when no signal is present.

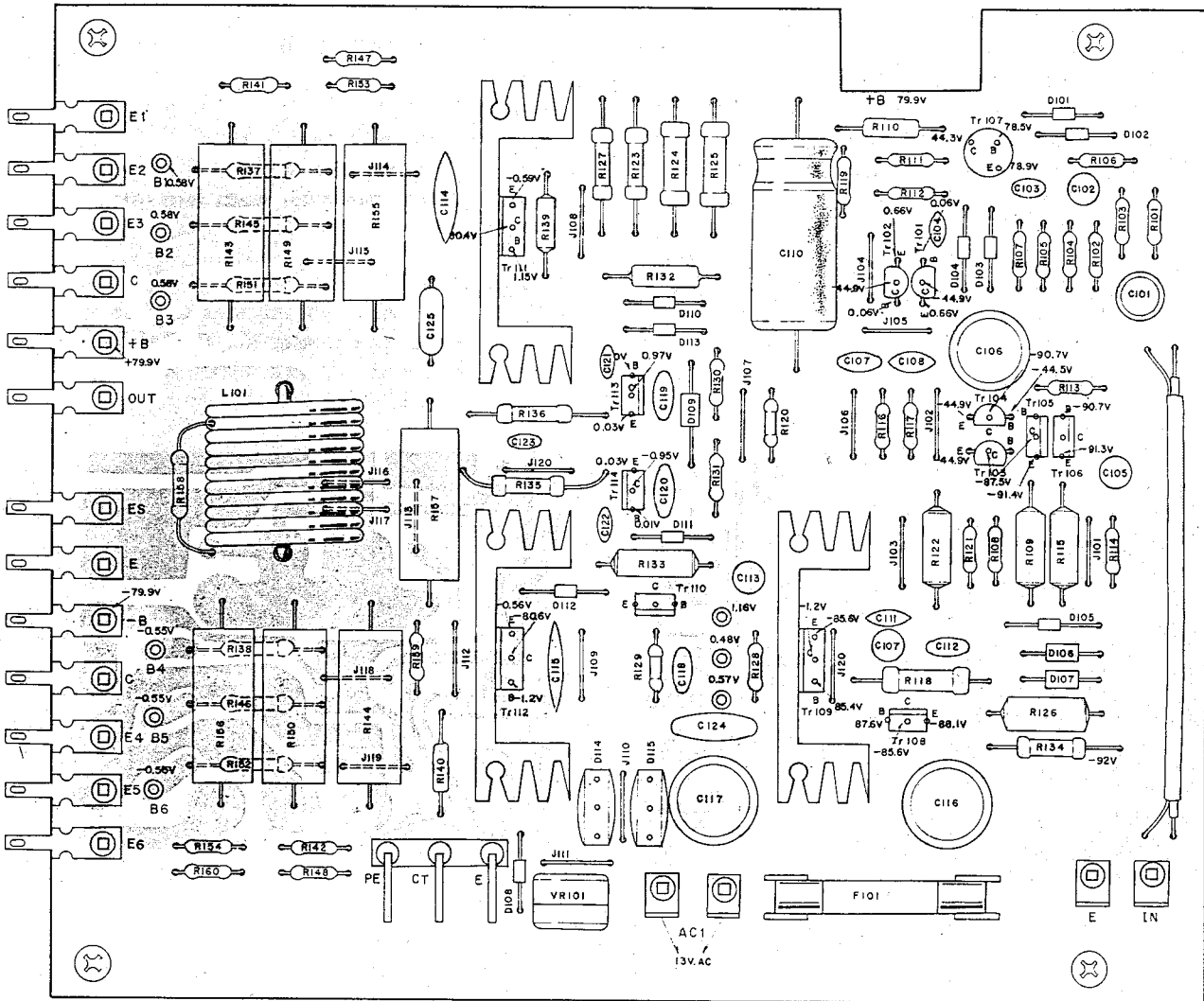
0dB Adjusting

VR301 and VR302 are adjusted so that the meter reads 0dB when operating at 8Ω 100W by connecting a dummy resistance of 8Ω 100W or more to the speaker terminal.



PRINTED CIRCUIT BOARD

DRIVE STAGE P.C. BOARD



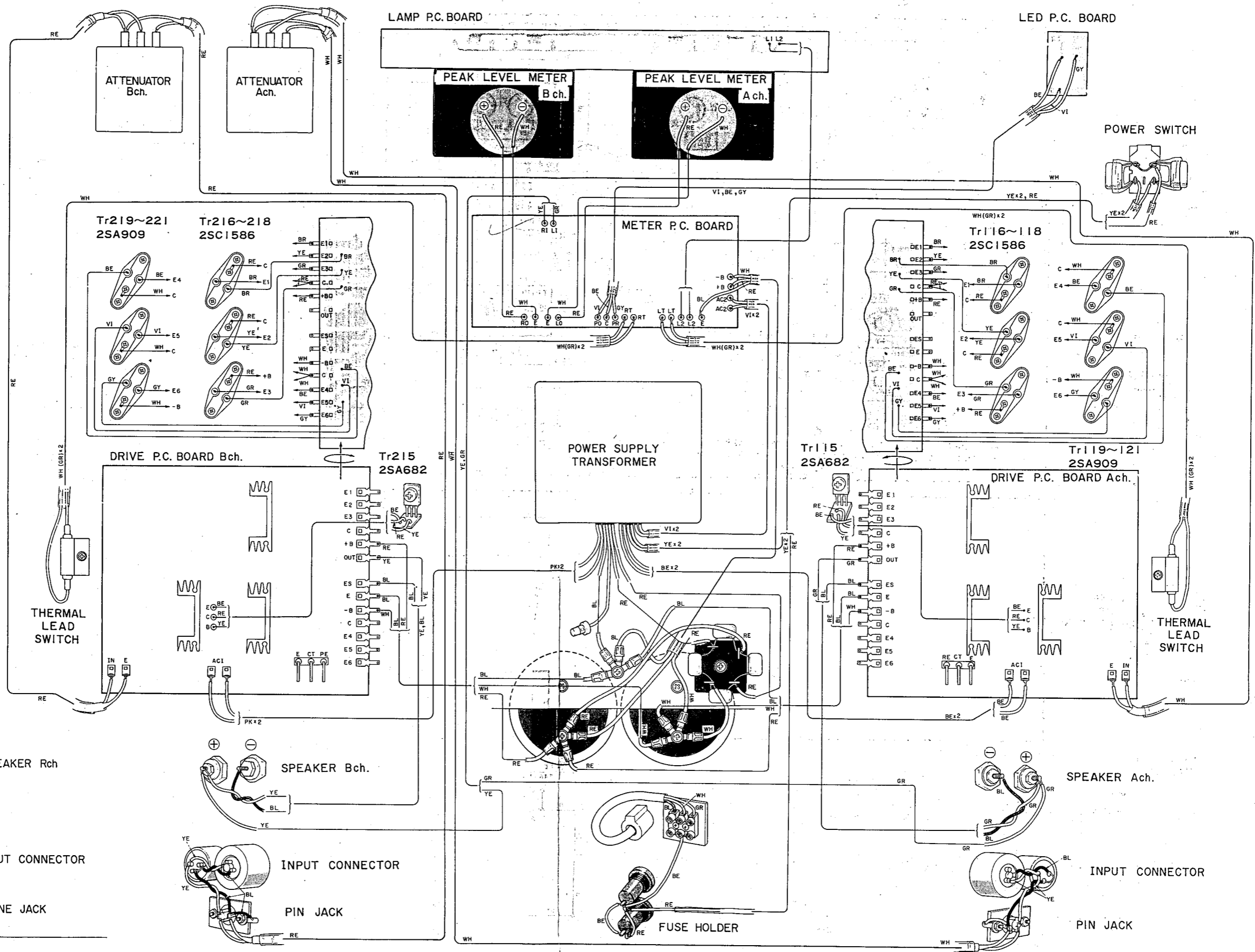
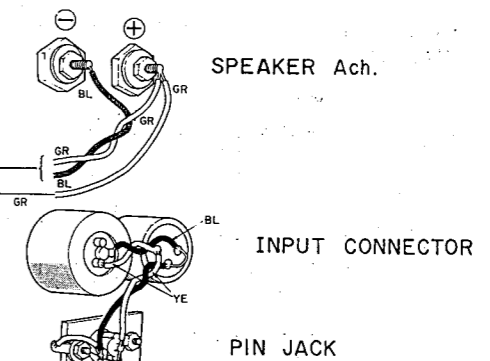
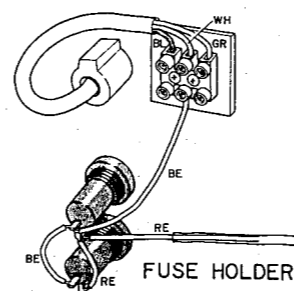
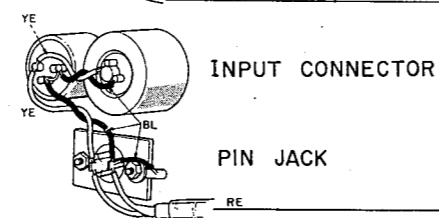
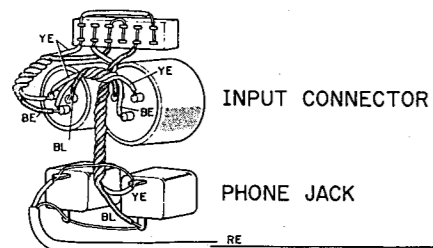
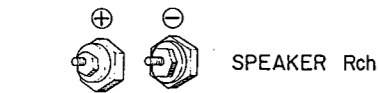
WIRING

WIRING COLOR CODE

- BL BLACK
- BR BROWN
- RE RED
- OR ORANGE
- YE YELLOW
- GR GREEN
- BE BLUE
- VI VIOLET
- GY GRAY
- WH WHITE
- PK PINK

Note: This wiring diagram is shown accordant with general export model. Refer to the schematic diagram each variation by export zone.

US MODEL



SCHEMATIC DIAGRAM

