

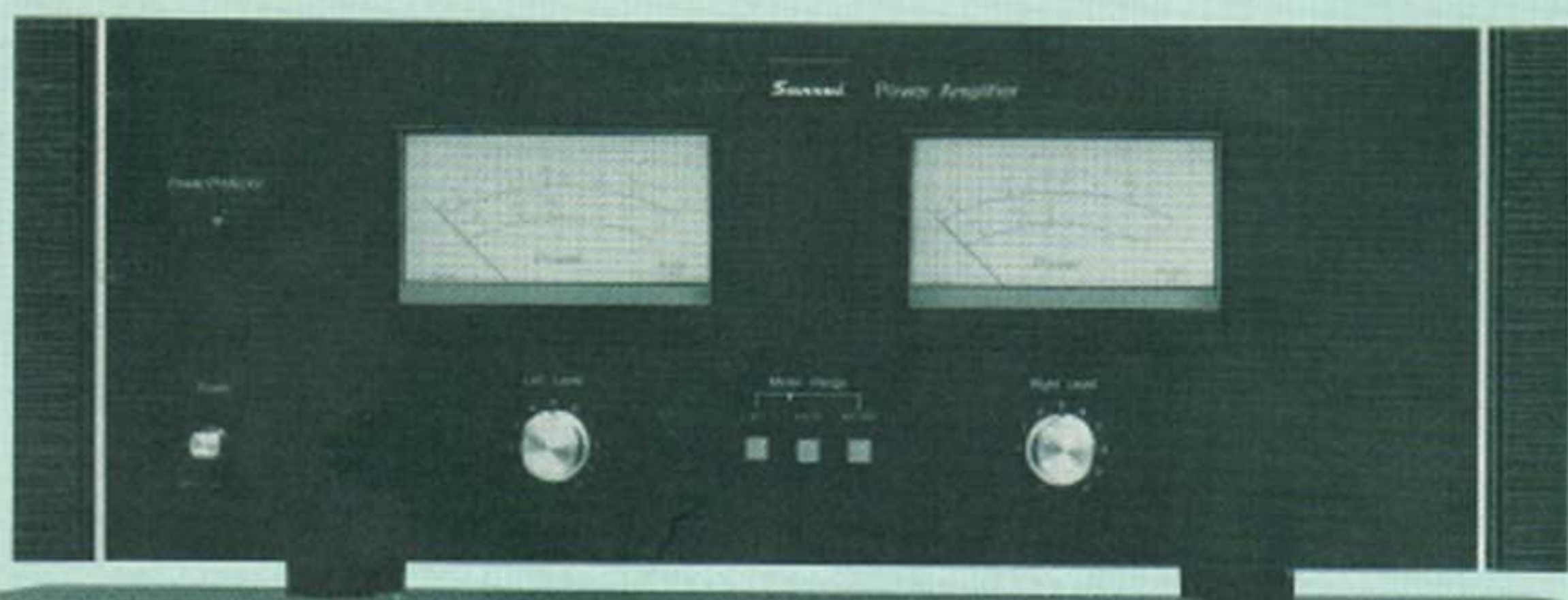


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SERVICE MANUAL

POWER AMPLIFIER

SANSUI BA-2000



Sansui

SANSUI ELECTRIC CO., LTD.

1. SPECIFICATIONS

POWER OUTPUT

Min. RMS, both channels driven, from 10 to 20,000Hz, with no more than 0.03% total harmonic distortion.

110 watts per channel into 8 ohms

Min. RMS, both channels driven, at 1,000Hz, with no more than 0.03% total harmonic distortion in stereo operation.

115 watts per channel into 8 ohms

LOAD IMPEDANCE8 ohms

POWER BANDWIDTH10 to 20,000Hz at or below rated min. RMS power output and total harmonic distortion

TOTAL HARMONIC DISTORTION

.....less than 0.03% at or below rated min. RMS power output

INTERMODULATION DISTORTION

(70Hz:7,000Hz=4:1 SMPTE method)

.....less than 0.03%

FREQUENCY RESPONSE (at 1 watt)

.....5Hz to 100kHz ± 1 dB

DAMPING FACTORapproximately 70 at 8 ohms load

CHANNEL SEPARATION (at rated output, 1kHz)

.....better than 75dB

HUM AND NOISE (IHF)better than 115dB

INPUT SENSITIVITY AND IMPEDANCE

(1kHz, for rated power output)

.....1,000mV 50k Ω

GENERAL

POWER VOLTAGE.....100, 120, 220, 240V 50/60Hz

(U.S.A & Canada)120V (Usable 110-130V) 60Hz

POWER CONSUMPTION..910 watts (max.)

480 watts 595VA (rated)

DIMENSIONS460 mm (18-1/8") W

160 mm (6-5/16") H

375 mm (14-13/16") D

WEIGHT18.3 kg (40.3 lbs) net

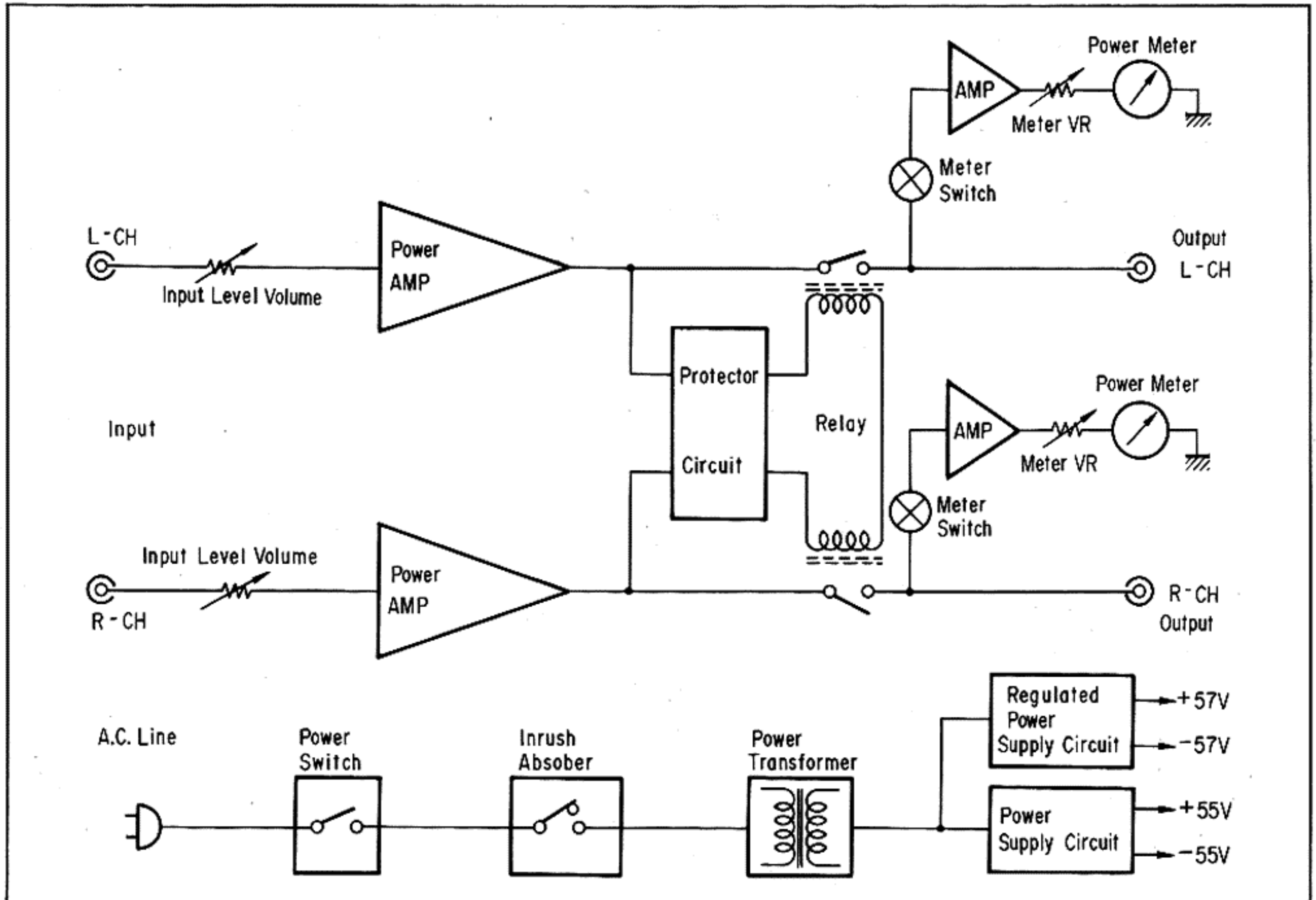
20.8 kg (45.0 lbs) packed

* Design and specifications subject to change without notice for improvements.

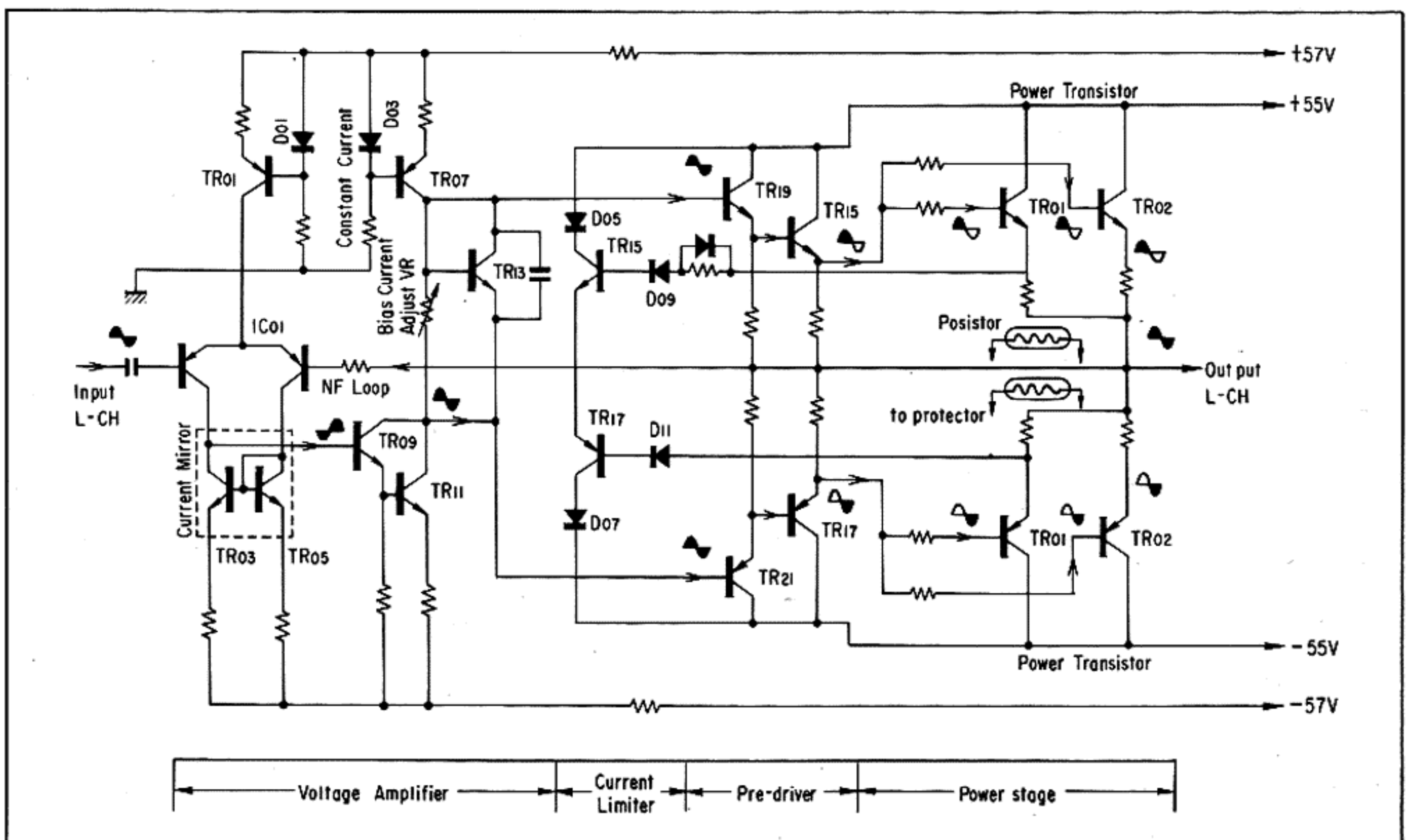
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2. BLOCK DIAGRAM



3. OPERATING DIAGRAM



4. OPERATION OF NEW CIRCUIT

4-1. Current Mirror Circuit

◆ Purpose of use in # BA-2000

By adding current mirror section to balanced-type signal amplifier as Fig., the current mirror circuit is effective to improve signal to noise ratio, distortion factor and direct current stability.

◆ Advantages

1. By operation of differential amplification in this driver stage, the current mirror circuit is efficient to reduce the influence of the power line voltage deviation and *Common Mode Rejection Ratio (C.M.R.R.).
* C.M.R.R. = $\frac{\text{Differential Gain}}{\text{Common Mode Gain}}$
2. By basic functions of push-pull amplifier in this circuit, lower distortion factor is obtained.
3. Since the output impedance of this circuit can be kept extremely high, considerable high gain is obtained.

◆ Operation

This Current Mirror Circuit is composed of two transistors, TR03 & TR05 as the current mirror section and a IC01 as the balanced-typed signal amplifier as shown in Fig. The transistor, TR03, and transistor A of first stage built in the IC operate as a push-pull amplifier.

◆ Phase Characteristics

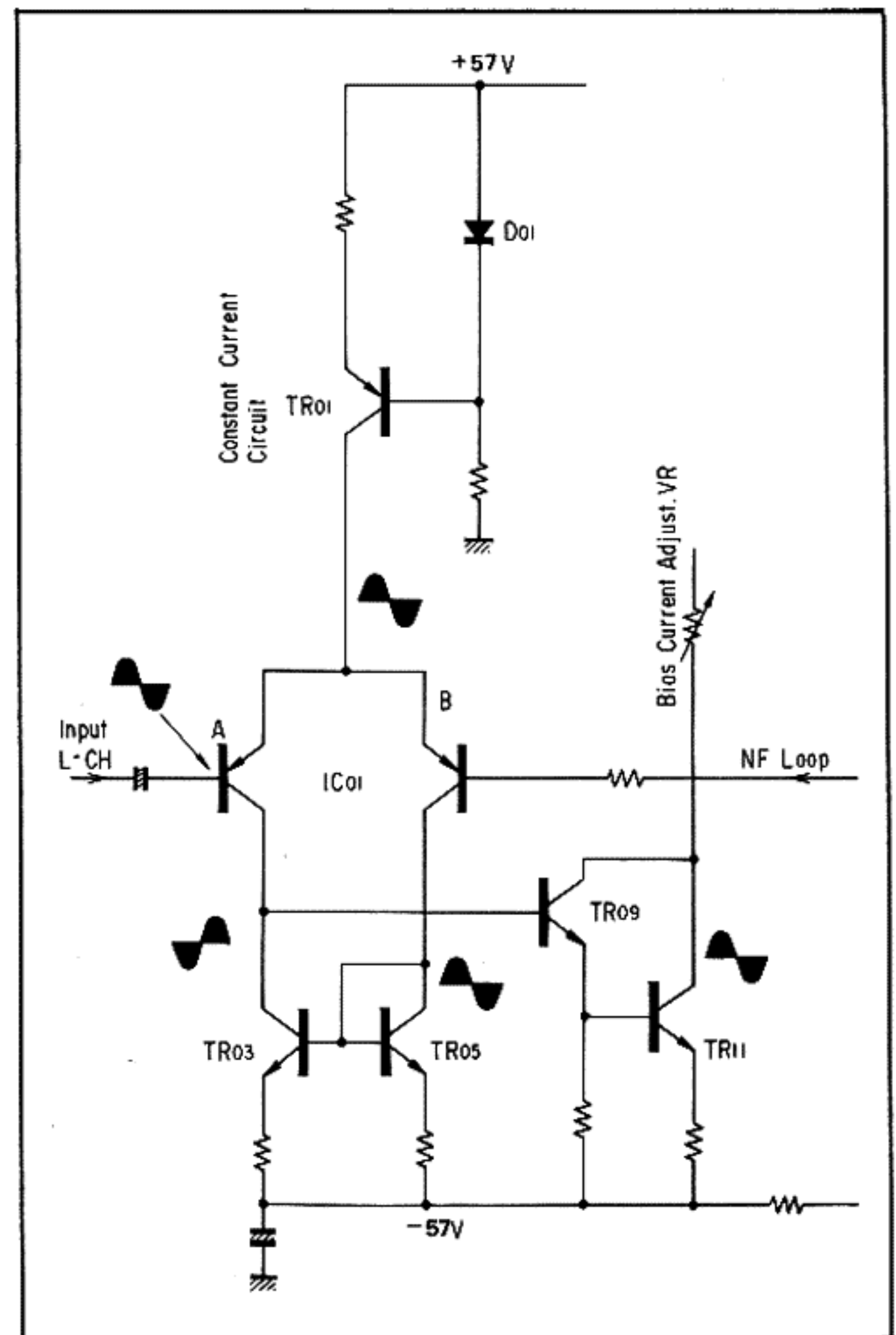
When input signal shown in Fig. is supplied to the base of the transistor A in the IC,

1. Out-of phase signal against the input signal appears at the collector of transistor A.
2. In-phase output signal against the input one appears at the emitter of transistor A.
3. Since the base of transistor B built in the IC is grounded in AC equivalent circuit, transistor B operates as the function of common -base circuit; therefore, the signal at collector of transistor B is in-phase signal against signal appeared at emitter of transistor B.
4. The signal appeared at collector of transistor B is given to the base of TR03. The signal appeared at collector of TR03 is out-of phase to the signal at collector of transistor B and is in-phase signal at collector of transistor A.

Thus, the combination of transistor A and TR03 is used as operation of push-pull amplifier.

◆ Open Loop Gain

The open loop gain of conventional differential amplifier itself is approximately 30dB to 35dB in normal operation; furthermore, by adding the current mirror circuit in series to conventional differential amplifier, it is possible to obtain high open loop gain, approximately 70dB to 80dB. Consequently, the gain 40dB to 50dB, is able to add to negative feedback loop by using the current mirror circuit in order to improve distortion factors.



5. ADJUSTMENTS

5-1. Bias Current Adjustment (See Fig. 5-1, 5-2)

Condition:

1. Room Temperature $18^{\circ}\text{C} \sim 28^{\circ}\text{C}$ ($65^{\circ}\text{F} \sim 83^{\circ}\text{F}$)
2. Output Load (Speaker) 8 ohms
3. A.C. Supply Voltage Rated Voltage $\pm 2\%$
4. Turn down the volumes, VR01, VR02 on F-2661 till minimum (counterclockwise)
5. Level Volume Maximum
6. For this adjustment, run this unit for more than 3 minutes after turning on the power switch.

STEP	SUBJECTS	AUDIO OSCILLATOR		OUTPUT TERMINAL	ADJUST	ADJUST FOR	REMARKS
		OUTPUT	CONNECTING POINT				
1	Distortion factors & Switching distortion adjustment	At 40kHz, Set the amplifier-output to 15V on both Channels by adjusting O.S.C. output level	Input terminal of amplifier	Speaker terminal 8 Ω Oscilloscope Distortion Meter VTVM	VR01 (L-CH) VR02 (R-CH) on F-2661	Minimum point of Distortion factors & Switching distortion	To avoid temperature rise, complete the adjustment in a short time
2	Bias Current confirmation (no input signal)			D.C. Milliammeter	VR01 (L-CH) VR02 (R-CH) on F-2661	Confirm bias current to be within 100mA	Only being it over 100mA, Set it to 100mA

Note: After proceeding with Step 1, have a cooling off period, 5 to 10 minutes, to confirm the bias current.
In case of not having a distortion meter, complete the adjustment by Step 2 to obtain bias current 100mA.

Fig. 5-1

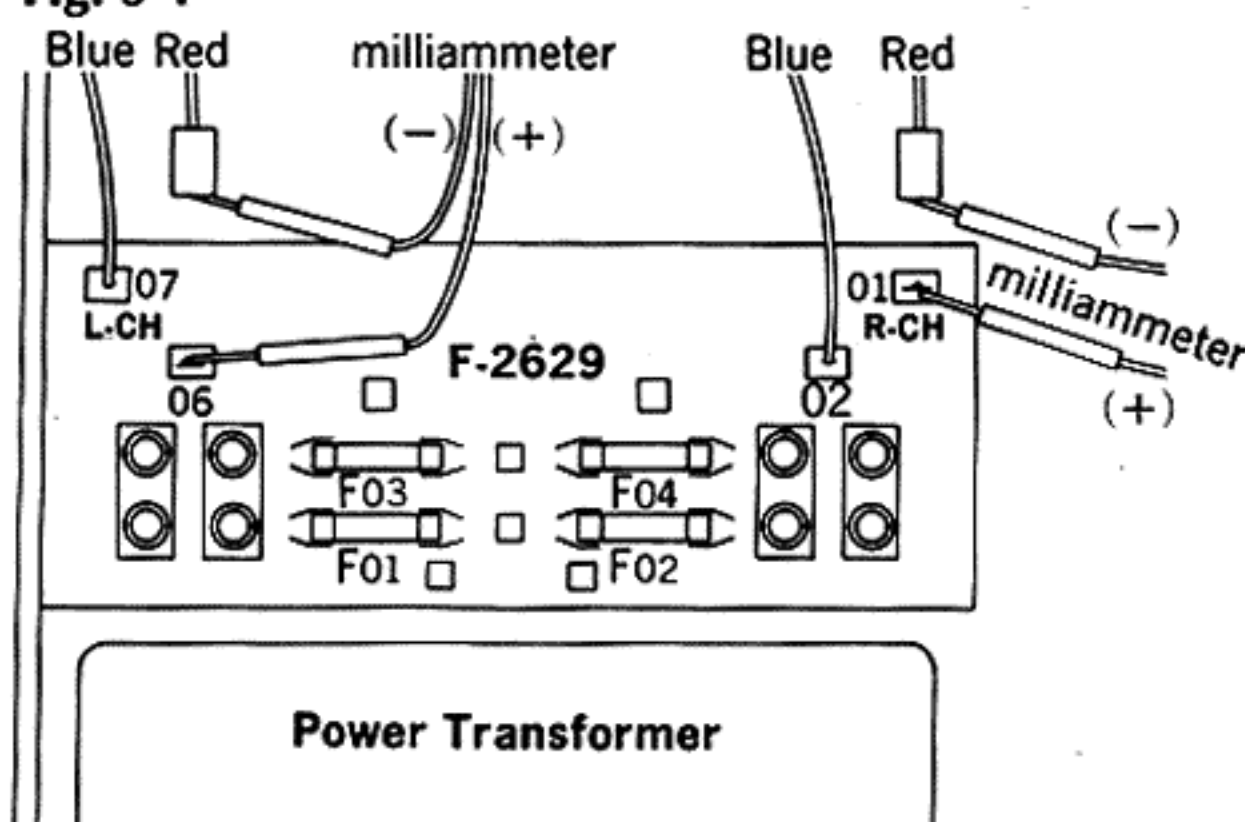
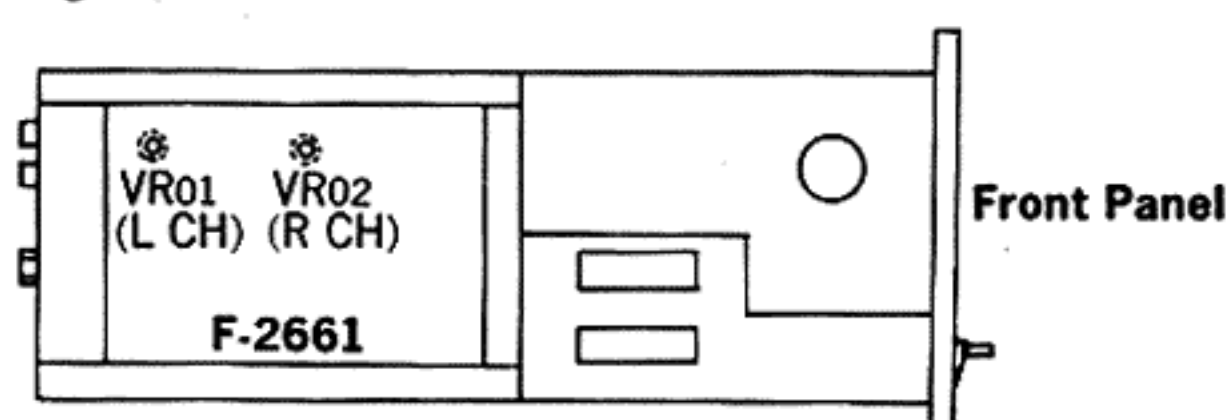


Fig. 5-2



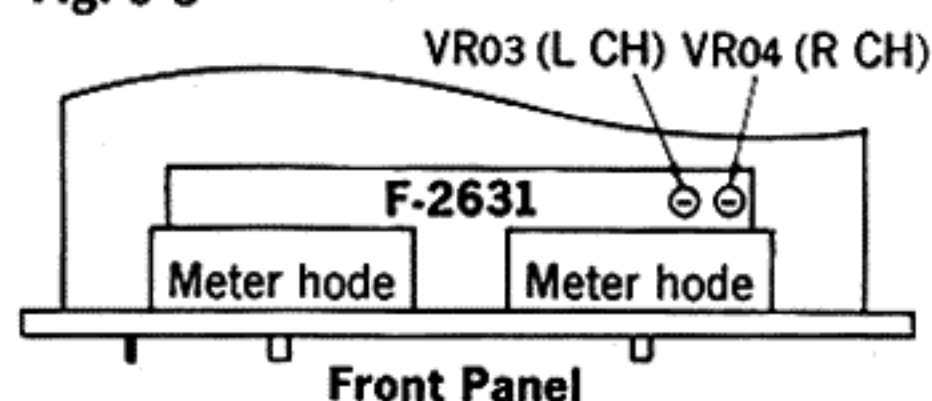
5-2. Power Meter Adjustments (See Fig. 5-3)

Condition:

1. Level Volume Maximum
2. For this adjustment, run the unit for more than 2 minutes after turning on the power switch.

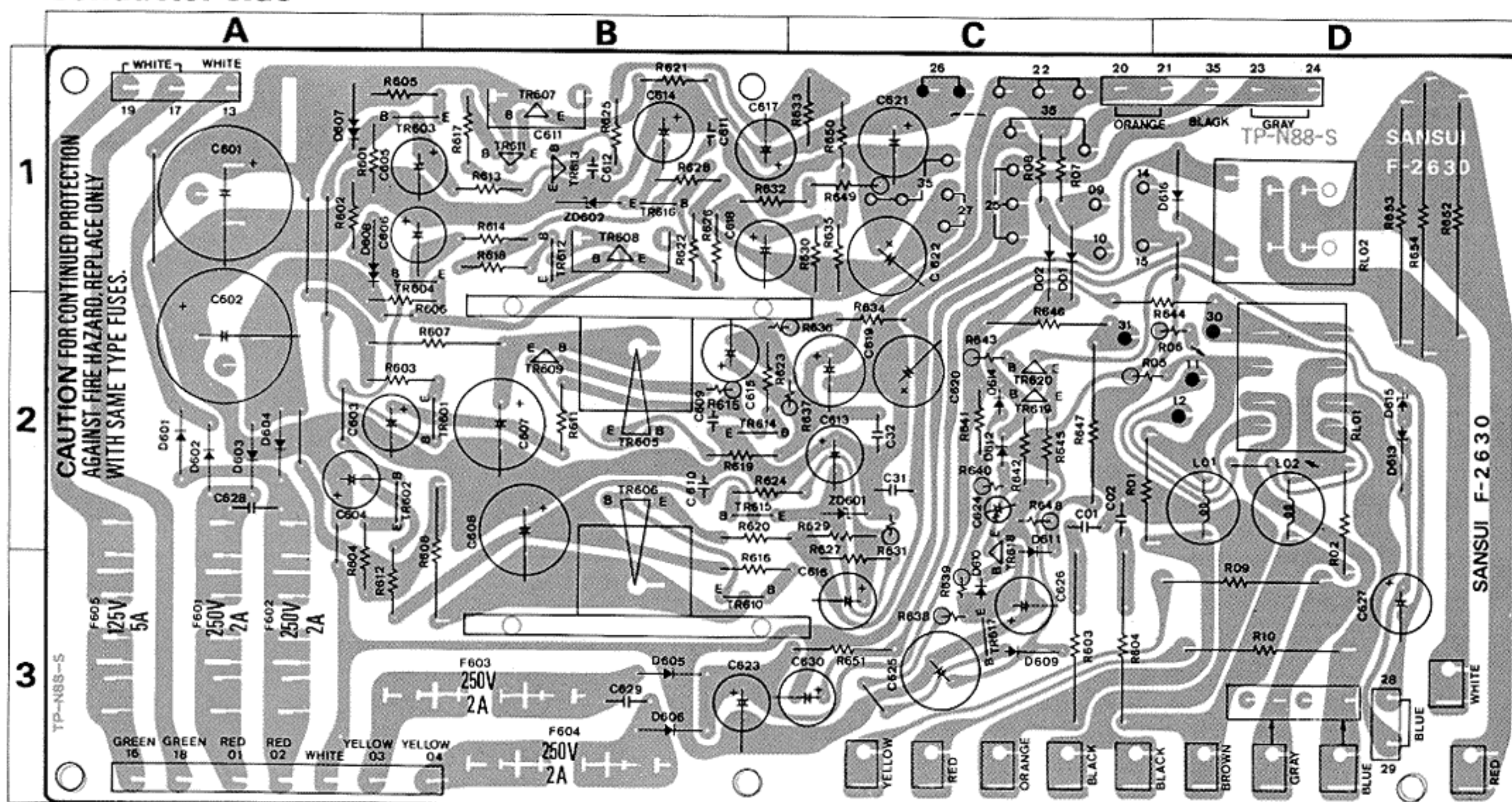
AUDIO OSCILLATOR		OUTPUT TERMINAL	ADJUST	ADJUST FOR
OUTPUT	CONNECTING POINT			
At 1kHz Sine wave, set the amplifier-output to 29.7V on both channels by adjusting O.S.C.-output level	Input terminal of Amplifier	Speaker terminal 8 Ω VTVM Oscilloscope	VR03 (L-CH) VR04 (R-CH) on F-2631	Set the pointer of power meter to 0dB (110W) on both channels

Fig. 5-3



6-2. F-2630 Power Supply Circuit Board for Driver Stage (Stock No. 7502091)

Conductor Side

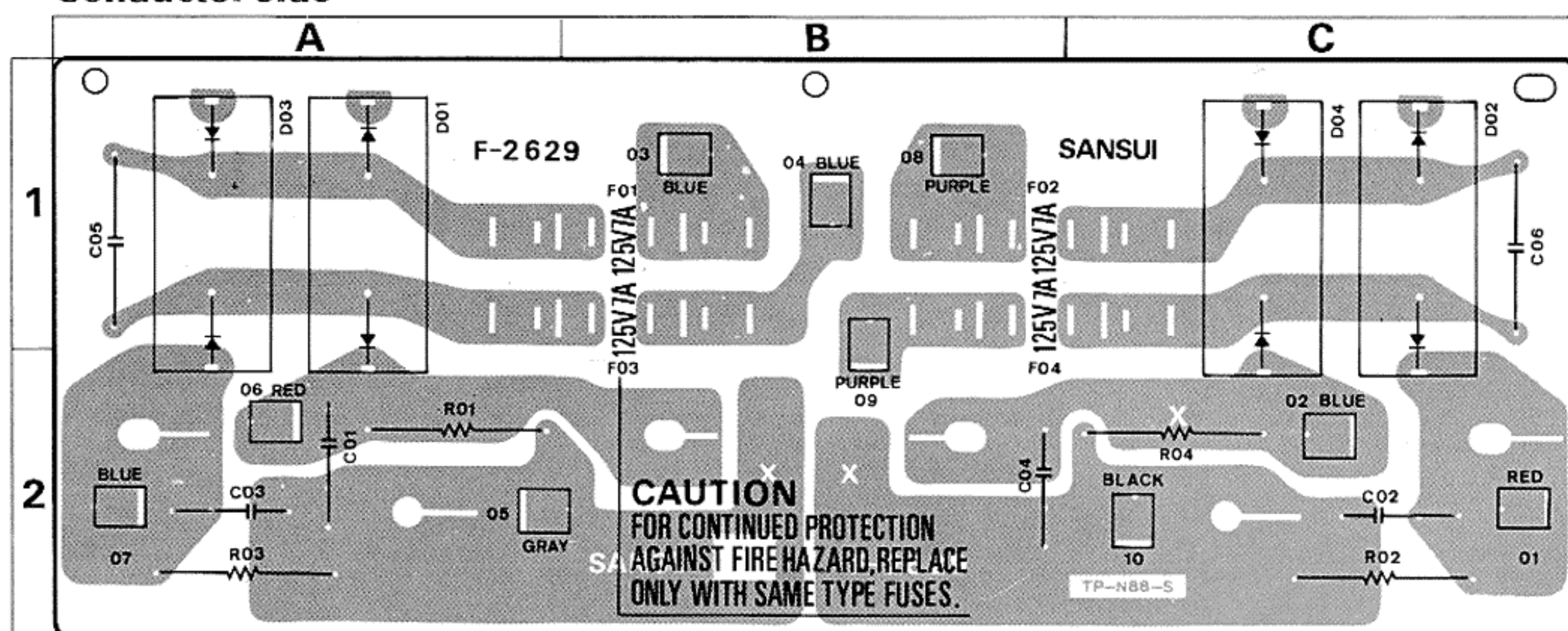


Parts List

Parts No.	Stock No.	Description	Position	Parts No.	Stock No.	Description	Position
TR603	0300720, 1	2SA850 (C, D)	1 A, B	D612	{0311160 0311180	1S2473D 1S1588	2 C
TR604	0306280, 1	2SC1735 (C, D)	1 A, B	D613	0310340	10D1	2 D
TR607	{0308450, 1 0308611, 2	2SD356 (C, D) 2SD357 (D, E)	1 B	D614	{0311160 0311180	1S2473D 1S1588	2 C
TR608	{0303280, 1 0303441, 2	2SB526 (C, D) 2SB527 (D, E)	1 B	D615	0316530	RD27E (B)	2 D
TR611	0306280, 1	2SC1735 (C, D)	1 B	D616	0310340	10D1	1 D
TR612	0300720, 1	2SA850 (C, D)	1 B	ZD602	0316310	RD-13E (B) Zener Diode	1 B
TR613	0306290, 1	2SC1400 (E, U)	1 B	C601	0549301	470 μ F	1 A
TR616	0300470, 1	2SA726 (F, G)	1 B	C602	0549301	470 μ F	1, 2 A
TR617	0300511, 2	2SA733 (Q, R)	3 C	C628	0655103	10000 pF	2 A
TR618	0306131, 2	2SC1364 (6, 7)	2, 3 C	C629	0655472	4700 pF	3 B
TR619	0306131, 2	2SC1364 (6, 7)	2 C	R01, 02	0104479	4.7 Ω 1 W C.R.	2 C, 2 D
TR620	0306131, 2	2SC1364 (6, 7)	2 C	R03, 04	0203100	10 Ω 3 W M.R.	3 C
D01, 02	{0311160 0311180	1S2473D 1S1588	1 C	R605, 606	0191471	10 Ω	1 A, 2 A
D601	0310350	10D2	2 A	R621, 622	0191100	470 Ω	1 B
D602	0310350	10D2	2 A	R644	0211471	470 Ω 1 W M.R.	2 C, D
D603	0310350	10D2	2 A	R646	0202151	150 Ω 2 W M.R.	2 C
D604	0310350	10D2	2 A	R647	0183471	470 Ω 3 W Ce.R.	2 C
D605	0310340	10D1	3 B	R651	0211391	390 Ω 1 W M.R.	3 C
D606	0310340	10D1	3 B	R652, 653	0137829	8.2 Ω 7 W Ce.R.	1 D
D607	0340120	VD1212	1 A	R655	0103182	1.8k Ω 1/2 W C.R.	
D608	0340120	VD1212	1 A	L01, 02	4210290	Filter Coil	2 D
D609	0310490	SV-02	3 C	RL01	1150310	Relay	2 D
D610	{0311160 0311180	1S2473D 1S1588	3 C	RL02	1150310	Relay	1 D
D611	{0311160 0311180	1S2473D 1S1588	2 C	F601-604	0432240	A.C. Fuse	3 A, B
				F605	0432290	A.C. Fuse	3 A
					2410590	4P Pin Ass'y Tpey D	

6-3. F-2629 Power Supply Circuit Board (Stock No. 7502081)

Conductor Side



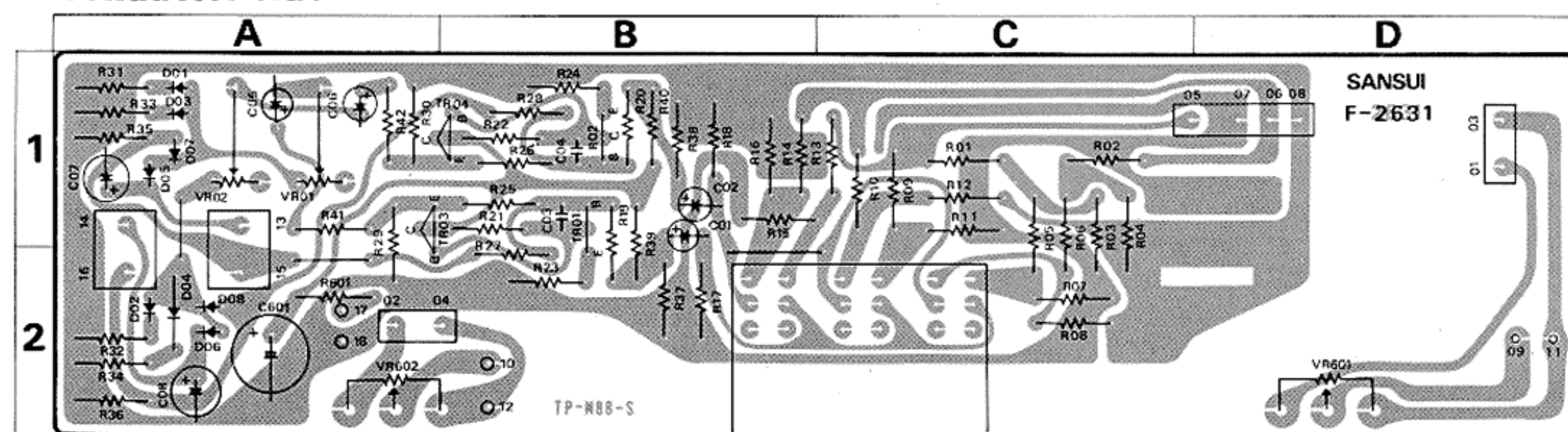
Parts List

Parts No.	Stock No.	Description	Position
D01	0311310	SS-5	1 A
	0311540	S5151	
D02	0311310	SS-5	1 C
	0311540	S5151	
D03	0311320	SS-5R	1 A
	0311550	S5151R	
D04	0311320	SS-5R	1 C
	0311550	S5151R	

Parts No.	Stock No.	Description	Position
C01, 02	0602109	1.0 μ F	2 A, 2 C
C03, 04	0602109	1.0 μ F	2 A, 2 B
C05, 06	0605477	0.047 μ F 250V	1 A, 1 C
R01, 02	0202332	3.3k Ω	1 A, 1 C
R03, 04	0202332	3.3k Ω	1 A, 1 C
F01~04	0432500	AC Fuse	1, 2 B

6-4. F-2631 Level Volume & Meter Circuit Board (Stock No. 7594521)

Conductor Side



Parts List

Parts No.	Stock No.	Description	Position
TR01, 02	0306070, 1	2SC1313 (F, G) }	1 B
TR03, 04	0306070, 1	2SC1313 (F, G) }	1 A, 1 B
D01, 02	0311160	1S2473D }	1 A, 2 A
D03, 04	0311160	1S2473D }	1 A, 2 A
D05, 06	0311160	1S2473D }	1 A, 2 A
D07, 08	0311160	1S2473D }	1 A, 2 A

Parts No.	Stock No.	Description	Position
R601	0210102	1.0k Ω $\frac{1}{2}$ W M.R.	2 A
VR01, 02	1000330	100k Ω (B) }	1 A
VR03, 04	1032410	200 Ω (B) }	
S01	1131390	Push Switch	
	2410910	2P Pin Ass'y Type E	

6-5. F-2514 Meter Lamp Circuit Board (Stock No. 7594531)

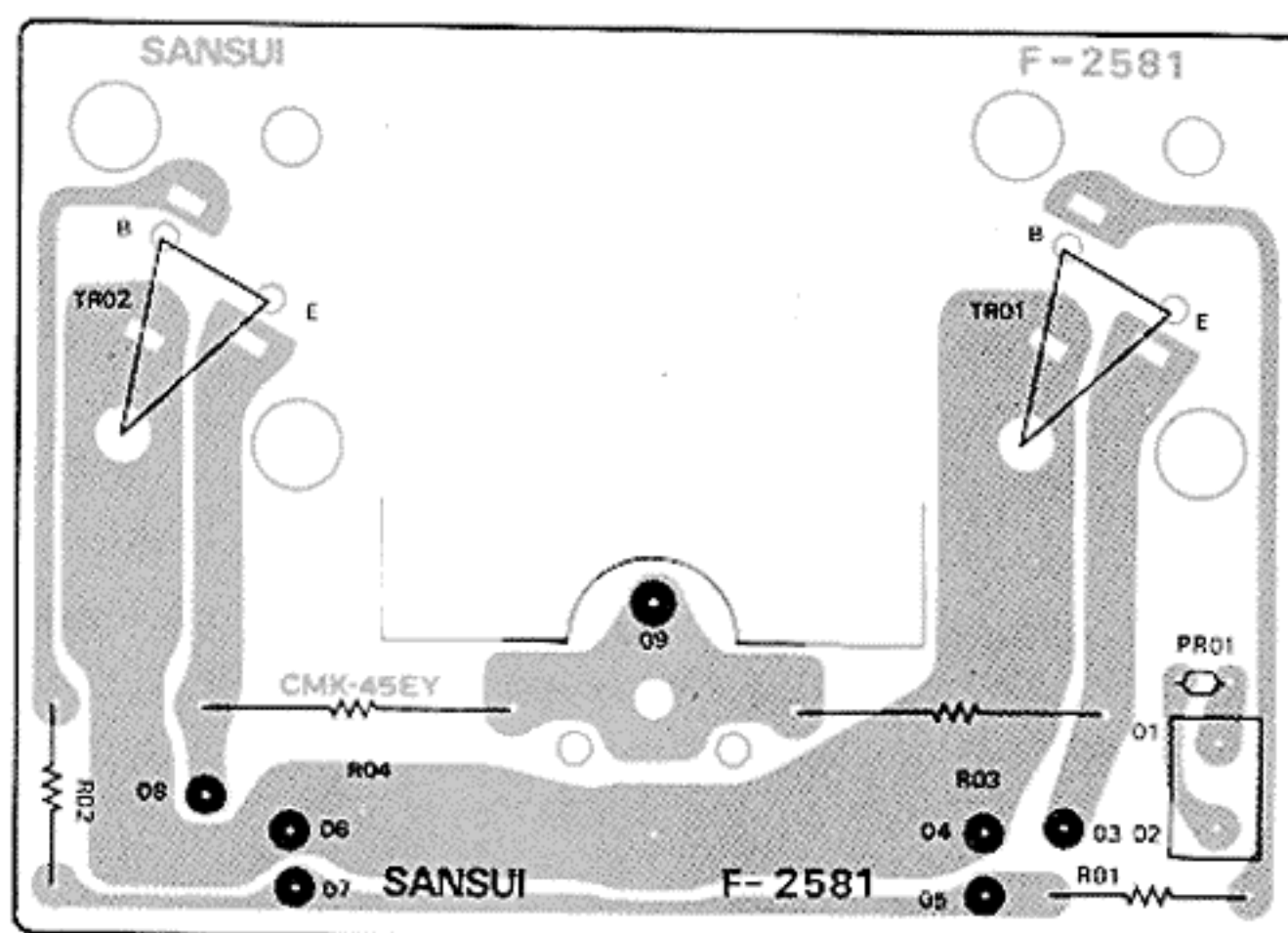
Conductor Side



Parts No.	Stock No.	Description
PL01-03	0420050	7V 0.3MA Lamp

6-6. F-2581 Final Stage Circuit Board (Stock No. (+) Side 7571491) (Stock No. (-) Side 7571511)

Conductor Side



Parts List <+ Side>

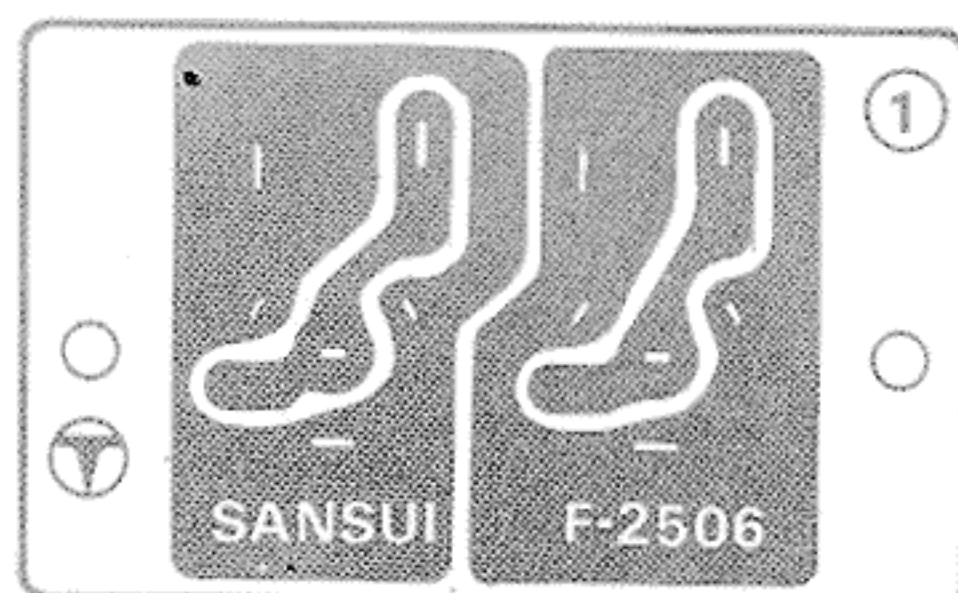
Parts No.	Stock No.	Description
TR01	0306451, 2	2SC1403A (O, Y) } Transistor
TR02	0306451, 2	2SC1403A (O, Y) }
R01	0103829	8.2Ω } 1/2W C.R.
R02	0103829	8.2Ω }
R03	0135338	0.33Ω } 5W Ce.R.
R04	0135338	0.33Ω }
	2030040	Transistor Socket
	2030040	Transistor Socket

Parts List <- Side>

Parts No.	Stock No.	Description
TR01	0300831, 2	2SA745A (O, Y) } Transistor
TR02	0300831, 2	2SA745A (O, Y) }
PR01	0320130	Thermistor
R01	0103829	8.2Ω } 1/2W C.R.
R02	0103829	8.2Ω }
R03	0135338	0.33Ω } 5W Ce.R.
R04	0135338	0.33Ω }
	2030040	Transistor Socket
	2030040	Transistor Socket
	2410910	2P Pin Ass'y Type E

6-7. F-2506 Input Terminal Circuit Board (Stock No. 7594511)

Conductor Side



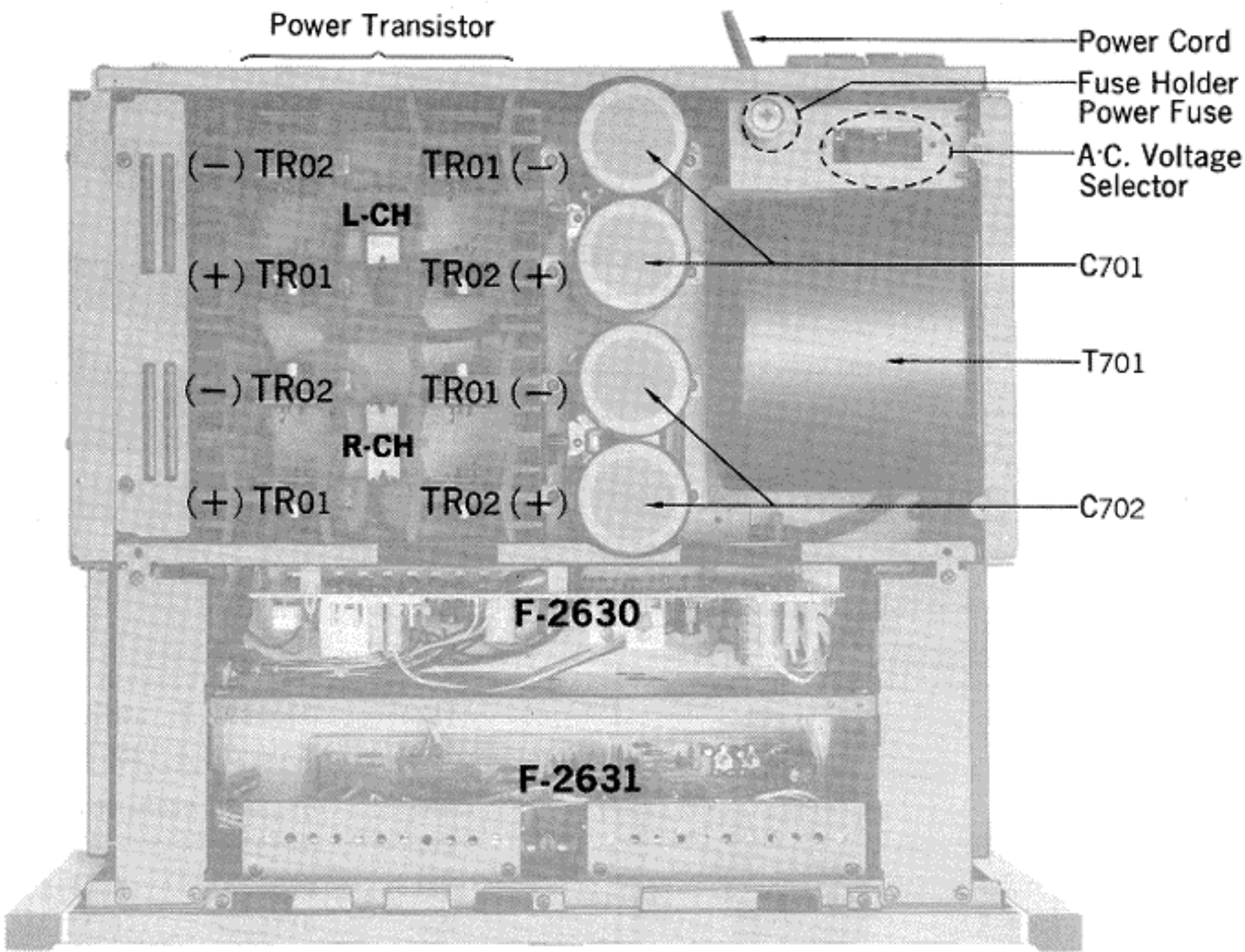
Parts List

Parts No.	Stock No.	Description
	2430260	Jack
	2430270	Jack

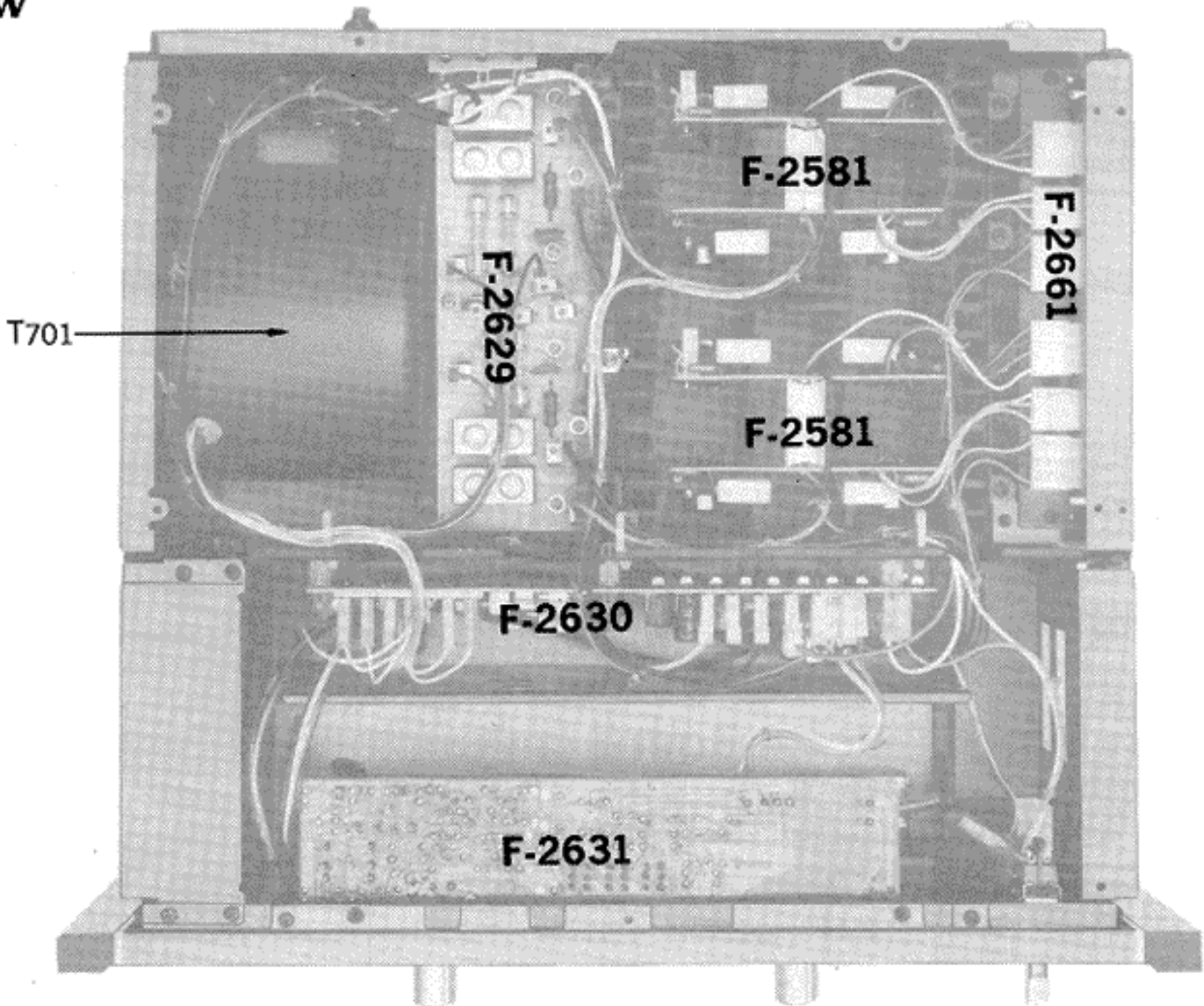
7. OTHER PARTS

7-1. Top & Bottom View

Top View



Bottom View

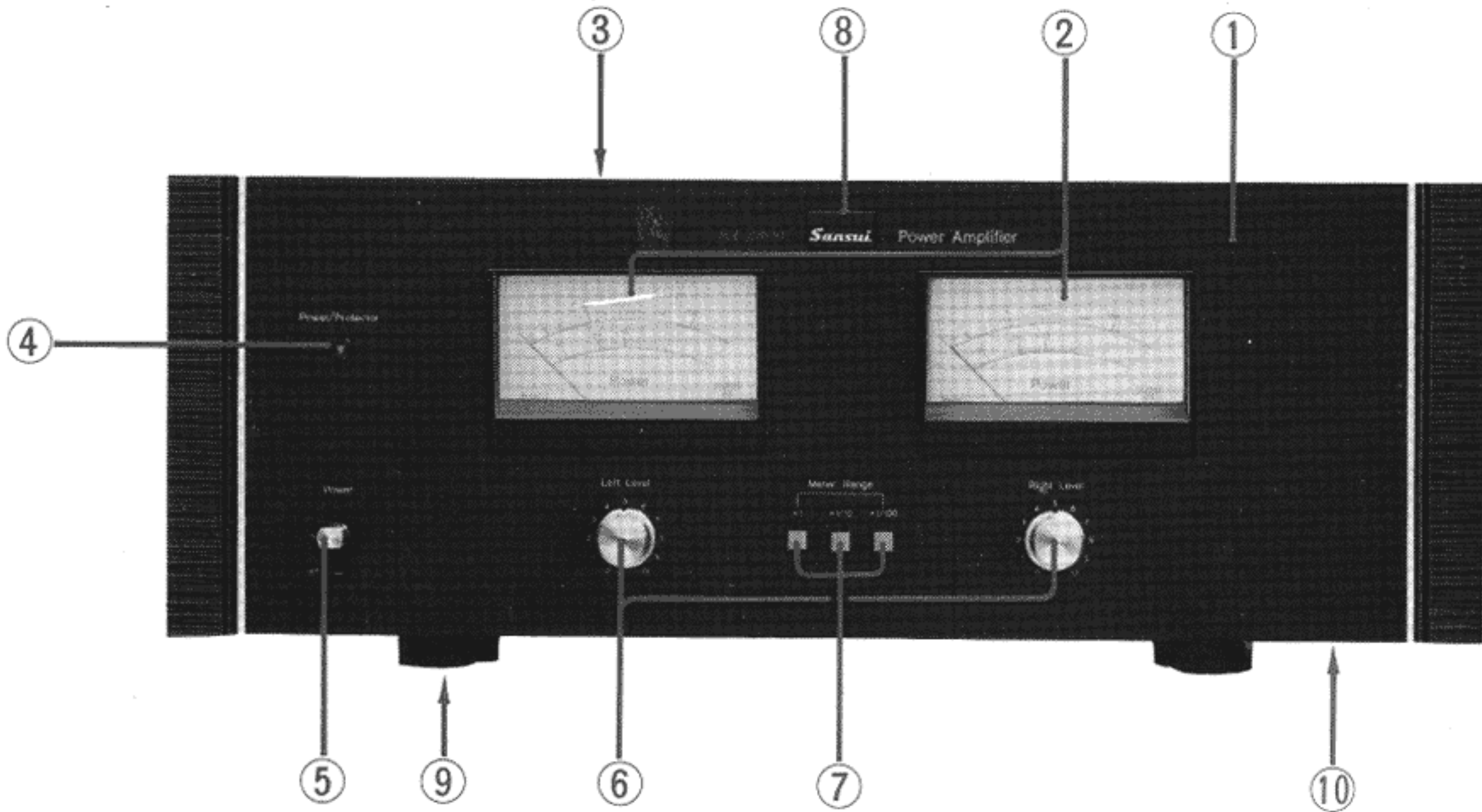


Parts List

Parts No.	Stock No.	Description
C701,702	0559519	E.C. 12000 μ F 63V
C703	0659801	C.C. 0.01 μ F 150V
R701	0203100	M.R. 10 Ω 3W
R702	0203100	
T701	4002520	Power Transformer

Parts No.	Stock No.	Description
F701	0434060	Fuse 10A (100V/120V)
	0432290	Fuse 5A (220V/240V)
	2300060	Fuse Holder
	2410091	6P, AC Voltage Selector Plug
	2410830	10P, AC Voltage Selector Socket
	5268601	A.C. Voltage Adaptor Cover
	3800240	A.C. Power Cord

7-2. Front View



Parts No.	Stock No.	Description
1	7007410	Panel Ass'y
2 M701, 702	4301040	Power Meter
	5446230	Illumination Plate
	5496030	Meter glass
	5496040	Meter hode
3	5006620	Bonnet
4 LD701	7726140	LED Ass'y Power protector Indicator
5 S701	1170510	Lever Switch, power
	5326510	Knob Type E, Power Switch
	5286731	Lever Guide, Power

Parts No.	Stock No.	Description
6 VR01, 02	1000330	Level Volume 100k Ω (B)
	5318253	Knob Type B, Level volume
	1131390	Push Switch
7 S06	5326531	Push Knob
	5286721	Knob Guide, Push Switch
	6906480	Spring
8	5336581	SANSUI Mark
9	5517050	Leg
10	5058492	Bottom Plate

7-3. Figures

Connectors & Pin Ass'y

Connectors

Type A (3~10 pins)	Type B (2~6 pins)	Stock No.
		2 Pins 2420450
		3 Pins 2420460
		3 Pins (RED) 2420650
		4 Pins 2420470
		5 Pins 2420480
		6 Pins 2420490

NOTE: Since stock number of female connectors (type B) with wires are not shown in each parts list of Complete circuit board, please refer to the above parts list when ordering the connector.

Pin Ass'y

Type A (3~10 pins)	Type B (3~10 pins)	Type C (3~10 pins)
Type D (2~6 pins)	Type E (2~6 pins)	Type F (2~6 pins)

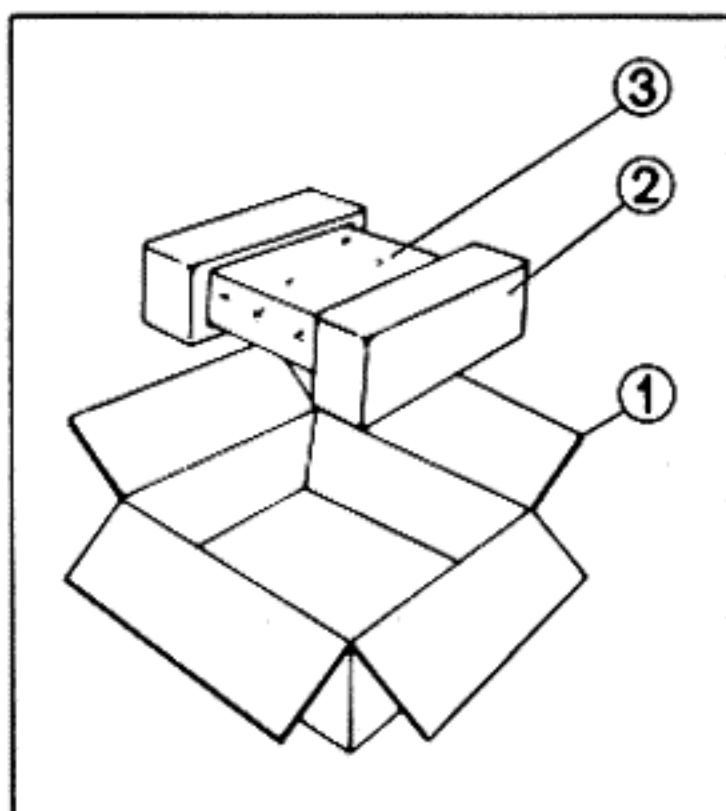
Abbreviations

C.R. : Carbon Resistor	E.C. : Electrolytic Capacitor
S.R. : Solid Resistor	BP.E.C. : Bi-Polar Electrolytic Capacitor
Ce.R. : Cement Resistor	C.C. : Ceramic Capacitor
M.R. : Metallized Film Resistor	Mi.C. : Mica Capacitor
F.R. : Fusing Resistor	O.C. : Oil Capacitor
N.I.R. : Non-Inflammable Resistor	P.C. : Polystyrene Capacitor
M.C. : Mylar Capacitor	T.C. : Tantalum Capacitor

[illegible]

9. PACKING LIST

Parts No.	Stock No.	Description
1	9009300	Carton Case
2	9027911	Styrofoam Packing
3	9116051	Vinyl Cover



10. ACCESSORY PARTS LIST

Stock No.	Description
9202240	Operating Instruction
9237470	Schematic Diagram



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