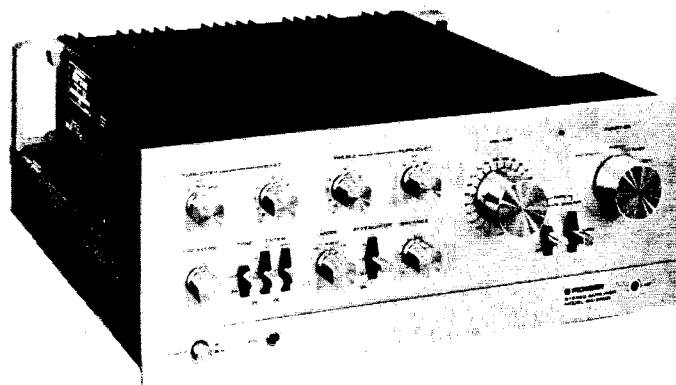


STEREO AMPLIFIER
SA-9500
KCU, D, GN

<ART-124-0>



CONTENTS

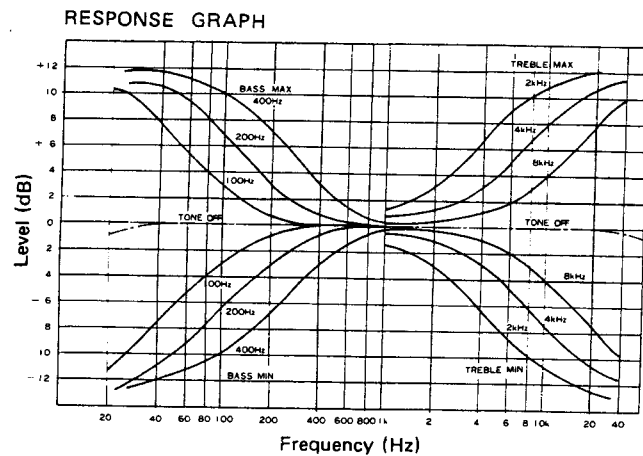
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NOTE:

THE MODEL SA-9500 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:

Round label on rear panel	Voltage	Type
KCU	120V only	UL (U.S.A.), CSA (Canada) approved.
D	120V, 220V, and 240V (switchable)	General export model.
GN	220V only	SEMKO (Sweden), DEMKO (Denmark), NEMKO (Norway) and EI (Finland) approved.

2. FRONT PANEL FACILITIES



BASS TURN OVER SWITCH

As shown in the response graph, this switch selects the frequency at which the BASS control takes effect. Set the switch to 100Hz, 200Hz, or 400Hz according to listening room and speaker characteristics, or personal preference.

BASS CONTROL

Control for adjusting low frequency sound. When turned clockwise from center, frequencies below the value selected by the BASS TURN OVER switch are enhanced, while counter-clockwise rotation attenuates these frequencies. The control functions in 2dB steps.

TREBLE CONTROL

Control for adjusting high frequency sound. When turned clockwise from center, frequencies above the value selected by the TREBLE TURN OVER switch are enhanced, while counter-clockwise rotation attenuates these frequencies. The control functions in 2dB steps.

TREBLE TURN OVER SWITCH

As shown in the response graph, this switch selects the frequency at which the TREBLE control takes effect. Set the switch to 2kHz, 4kHz, or 8kHz according to listening room and speaker characteristics, or personal preference.

VOLUME CONTROL

Adjusts output level to speakers and headphones. Scale is graduated in dB with 0dB at maximum level. When employed in combination with the ATTENUATOR switch, finer and wider range attenuation can be performed.

PILOT LAMP

Lights when AC power is turned on.

FUNCTION SWITCH

PHONO 1: For playing records on a turntable connected to the PHONO 1 jacks.

MIC/PHONO 2: Same as above, for PHONO 2 jacks, or for reproduction through a microphone connected to the MIC jack on the front panel. Note, when the microphone is connected to the jack, the turntable connected to the PHONO 2 jacks cannot be used.

TUNER: For listening to broadcasts through the tuner.

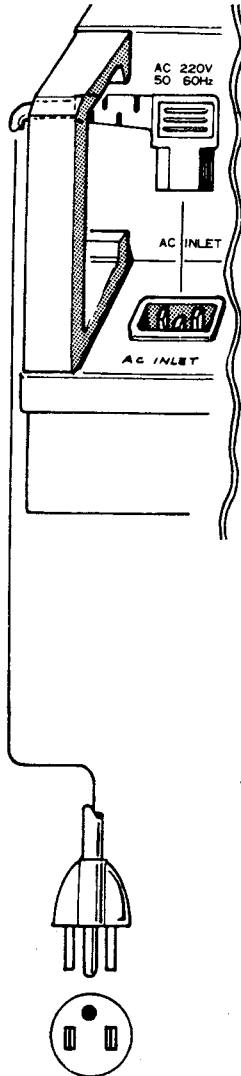
AUX 1: For

3. CONNECTION DIAGRAM

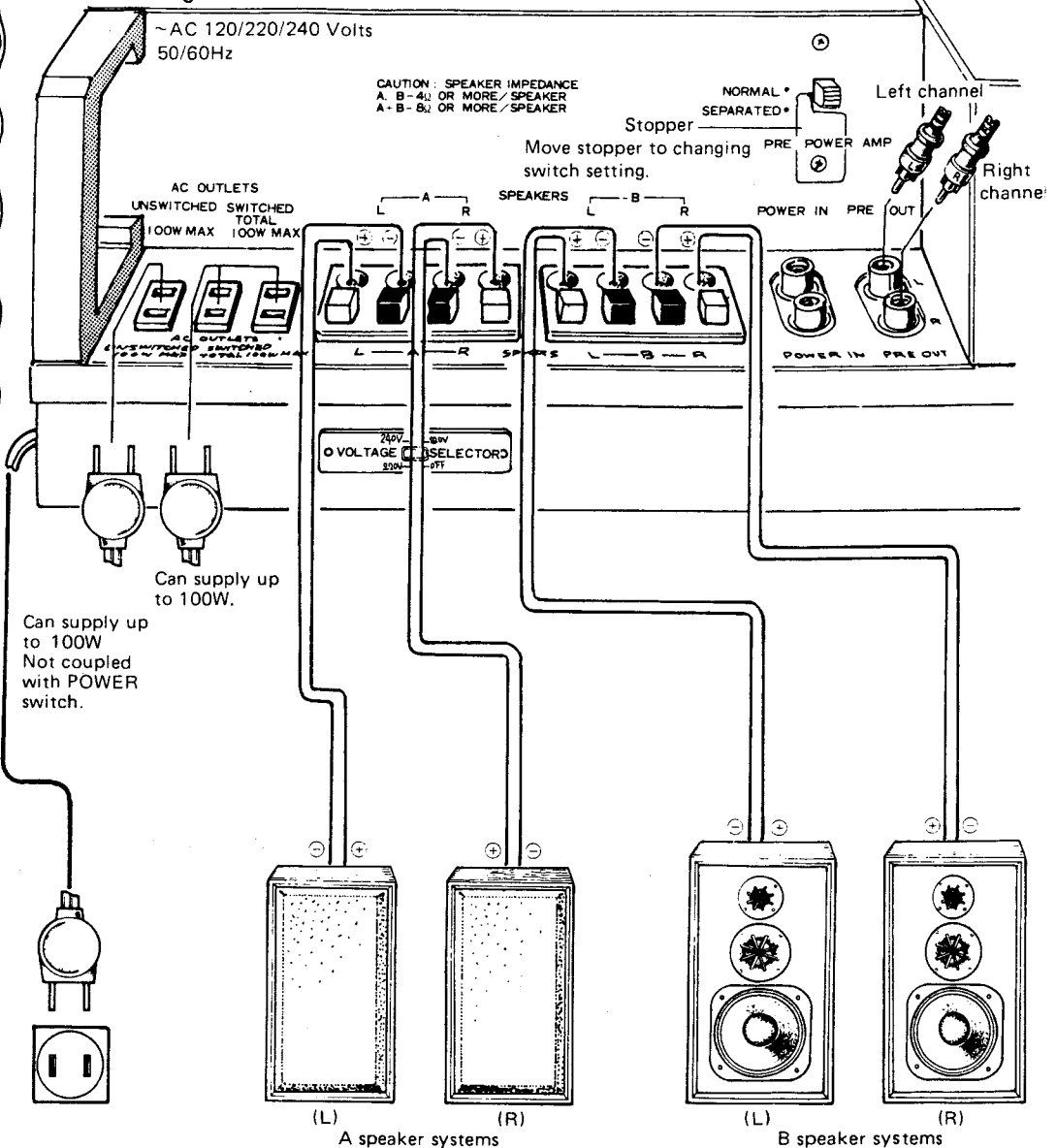
NOTE:

Line voltage selector is not equipped in 120V model.

220V model



3 Line Voltage model

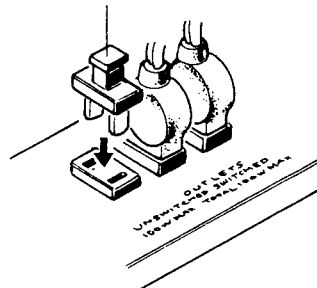


Cautions When Connecting

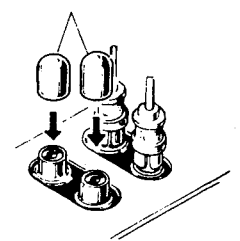
- Observe both the channels and polarities of the inputs and outputs of the components connected to the SA-9500. Be sure to connect L to L, R to R, + to +, and - to -.
- Make all connections securely.
Loose connections can cause absence of sound or noise.

Install furnished covers on unused AC outlets, and input and output to protect from dust.

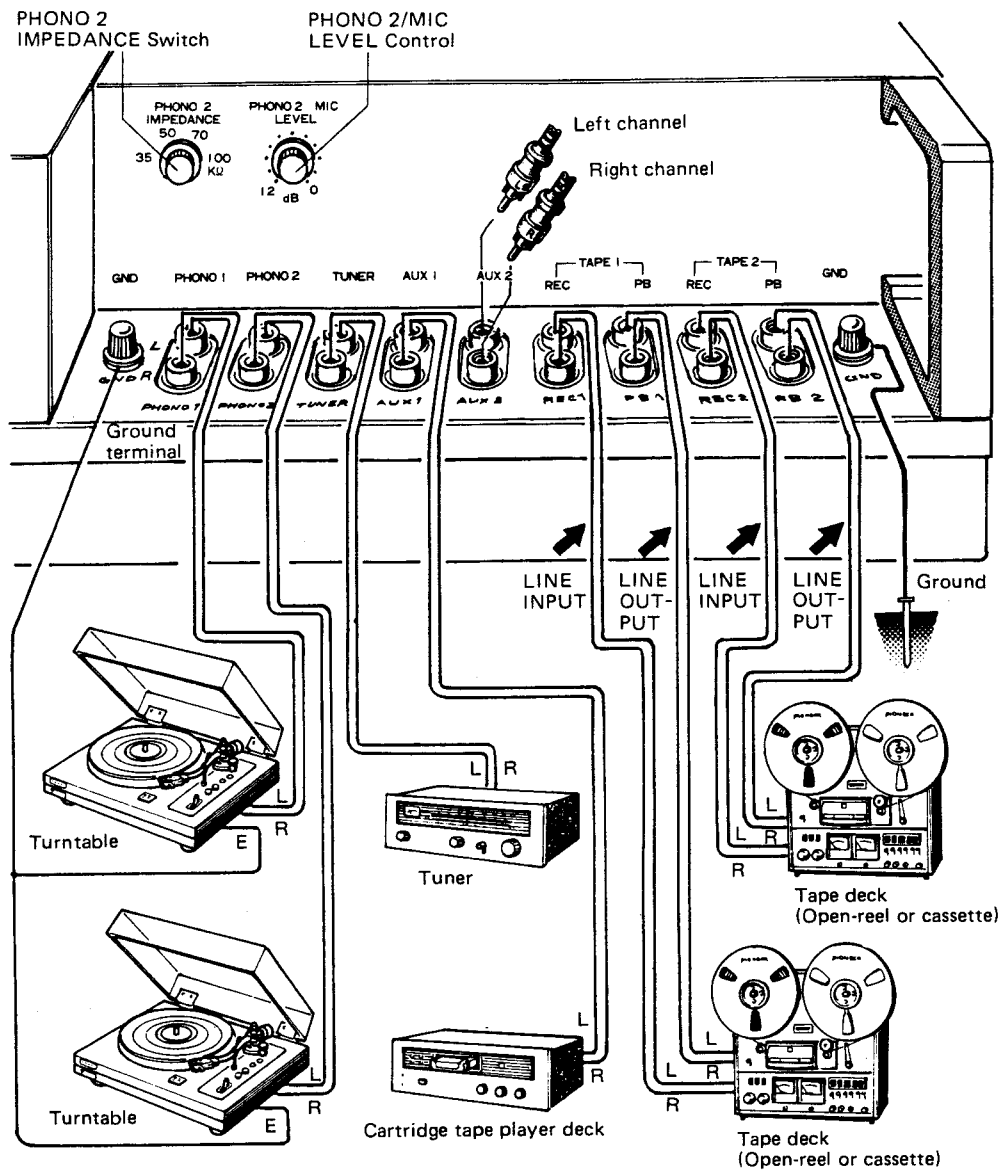
AC outlet covers



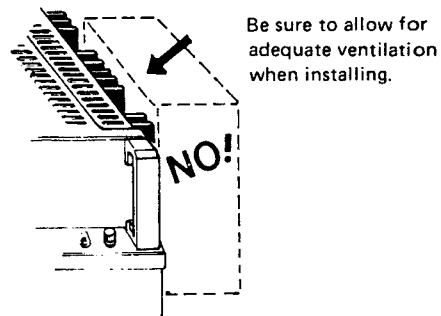
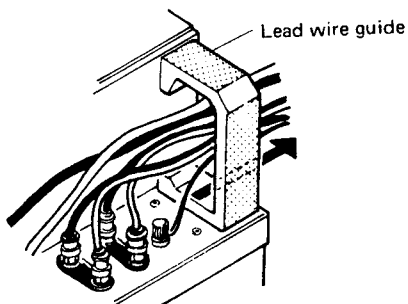
Jack covers



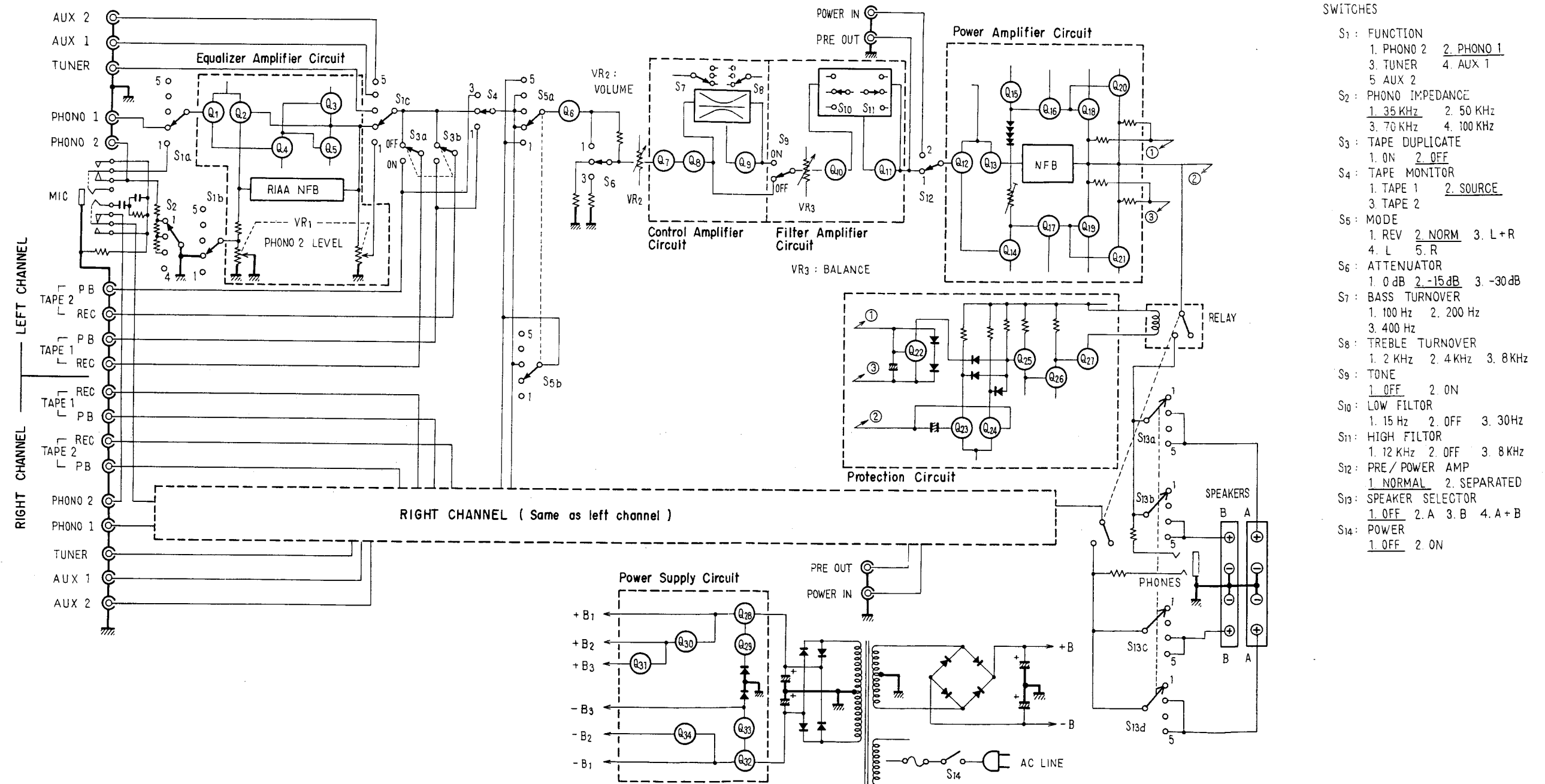
ADV-146



Get connecting cords through lead wire guide.



4. BLOCK DIAGRAM



5. CIRCUIT DESCRIPTION

The SA-9500 is a 2-channel integrated stereo amplifier.

The descriptions given here refer mainly to the left channel. Please refer to the block diagram on pages 7 to 8.

EQUALIZER AMPLIFIER CIRCUIT (Q1 – Q5)

This is a three stage, direct-coupled NFB (negative feedback) type consisting of five transistors; employing a differential amplifier in the first stage and a SEPP (single ended push-pull) in the final stage.

By using the differential amplifier in the first stage, the DC feedback becomes 100% thus considerably improving the stability of the direct current. This produces very low noise and very small distortion so that there can be a large AC feedback—regardless of the high-gain circuit.

In addition, the SEPP circuit at the final stage can effectively utilize the voltage of the power source, and produce a high output of small distortion, while at the same time the overload level and the dynamic margin are both increased. The equalizer amplifier circuit is shown in Fig. 1. Signals, from the PHONO input terminal, are fed to the differential amplifiers Q1, Q2, through R1. R1 is the resistance which determines the input impedance of the PHONO terminal. Without R1 the input impedance of the circuit, is designed to be 125k Ω . By selecting R1 as 48.6k Ω , 131k Ω , 291k Ω or 791k Ω , the input impedance of this circuit can be set to 35k Ω , 50k Ω , 70k Ω or 100k Ω respectively.

Signals amplified by Q1 are further amplified by the class-A SEPP circuit, consisting of Q4 and Q5.

Due to the boot-strap circuits of R9, R10 and C7, inserted in the load to Q3, the AC load impedance and the voltage gain are both enlarged. The NFB is applied from the output to the base of Q2.

The entire DC feedback is applied through R13, and the level of the NFB of AC is determined by C12, R16, C11, R15, C10 and VR1a.

The NFB element of this AC provides the frequency selectivity and the RIAA regenerative compensation characteristic. Stable RIAA equalization is achieved by metal film resistors R13, R14 and R16, having an error of no more than 1%, combined with high accuracy polystyrene film capacitors C11 and C12 with a tolerance of 2%, which provide high reliability and fidelity, and are not affected by temperature variations or ageing.

When the function switch is turned to PHONO 2, the gain of the equalizer amplifier can be adjusted. The variable range is 0 – -12dB. 6dB out of this range results from changing the level of AC NFB by means of VR1a, which is inserted in the NFB element in series with R14. The remaining 6dB's are controlled by VR1b in the output circuit. The adjustment of gain by changing the level of the NFB is an effective method for raising the overload level.

Moreover, the adjustment of gain in the output circuit is an effective method of increasing the SN ratio. By combining their methods, a low distortion factor is also obtained with a cartridge having a high output voltage.

CONTROL AMPLIFIER CIRCUIT (Q7 – Q9)

The control amplifier circuit of the SA-9500 is the NFB type, using a FET (field effect transistor) in the first stage.

The FET amplifier being a controllable voltage type, which holds the input impedance constant, even if the level of the NFB changes, and has additional advantage as a coupled circuit, as the input impedance can be raised, as shown in Fig. 2.

1. Low Frequency Control

The low frequency control circuit is shown in Fig. 3-a, and the equivalent circuit, when boosting low frequency, is shown in Fig. 3-b.

As the parallel impedance of VR1 and C11, in Fig. 3-b, is high at low frequency, the volume of the NFB decreases and the gain in the low frequency range increases.

The equivalent circuit, when cutting out low frequencies, is shown in Fig. 3-c. In this case, the input signal is applied to Q9, through the parallel impedance of VR1 and C10, which is high in the low frequency range and suppresses the lower frequency signals.

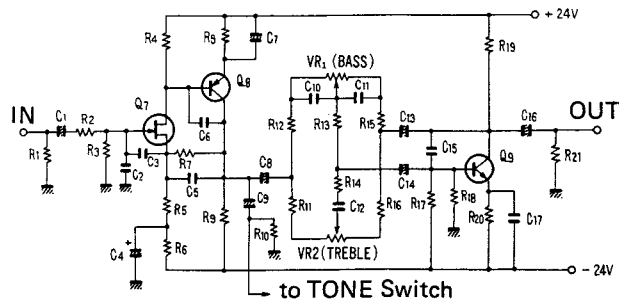
2. High Frequency Control

The high frequency control circuit is shown in Fig. 4-a, and the equivalent circuit, when boosting high frequencies, is shown in Fig. 4-b.

In this circuit, the input signal is applied to Q9 through the parallel impedance circuit. This impedance is small in the high frequency range and produces a signal with an enhanced high range. Fig. 4-c shows the equivalent circuit when cutting out high frequencies. As the impedance of R13, R15 and C12 of the circuit becomes small, the level of the NFB increases and the gain of the circuit decreases.

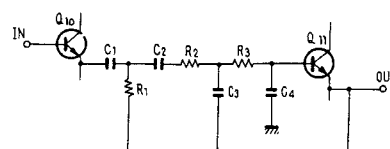
3. Adjustment of Turnover Frequency

Turnover frequency is adjusted by selecting C10 and C11 as shown in Fig. 3-a, using the TURN-OVER switch. By changing the values of C10 and C11, the time constants of the input circuit and the NFB are altered and the upper and lower limits of the low frequency curves are adjusted. In the case of the high frequency, by changing C12, as shown in Fig. 4-a, the upper and lower limits of the high frequency are also controlled.



FILTER CIRCUIT (Q10, Q11)

The circuit shown in Fig. 5 has a steep characteristic of 12dB/oct, and is effective in removing noise. The low cutout filter can be switched to the three positions of 15Hz, OFF and 30Hz. Change-over of this cut-off frequency is achieved by changing over C1 and C2. The high cutout filter can be switched to the three positions of 12kHz, OFF and 8kHz, and this is achieved by the change-over of C3 and C4.



Circuit Diagram of Filter Amplifier

Fig. 5

POWER AMPLIFIER (Q12 – Q21)

The power amplifier of the SA-9500, is a direct-coupled, pure complementary parallel push pull circuit, which uses a differential amplifier stage and a constant current circuit, consisting of 10 transistors.

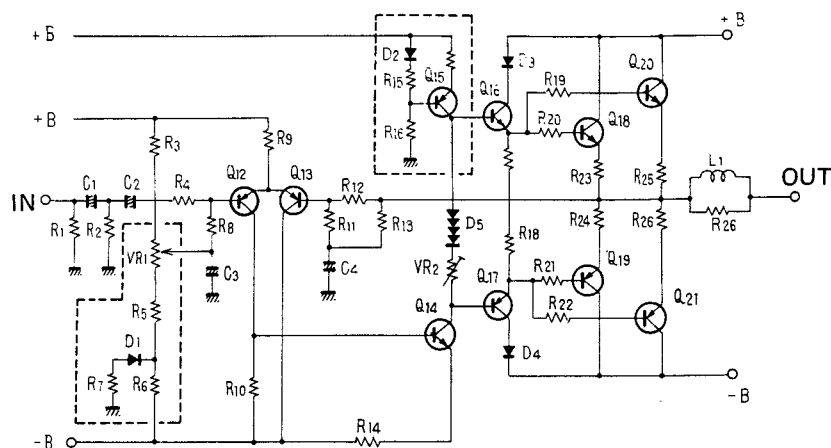
The power amplifier circuit is shown in Fig. 6.

Q12 and Q13, in the first stage, form a differential amplifier to stabilize the output mid-point potential and amplify the input signal. As the potential on the base of Q12 becomes the standard potential, the bias stabilization circuit is provided by D1, R5, R6, R7 and VR1, to be used in the base circuit of Q12. D1 is used to compensate for temperature, while VR1 is used to adjust the output junction point potential. The signal amplified by the differential amplifier is fed to Q14. The load of Q14 becomes a constant current circuit by Q15.

By using the constant current circuit for the load of Q14, the collector current of Q14 can be designed to be small to improve noise characteristics. Moreover, the AC load becomes extremely large. Accordingly, a large gain is obtainable. The output of Q14 drives the output circuit after Q16 and Q17. The NFB is applied to the base of Q13 by R11, R12, R13 and C4. The entire DC is also applied to the base of Q13 through R11, R12 and R13. Thus, stabilization of the output potential is secured. The AC NFB is determined by the split circuit of R12 and R11 to improve the characteristics.

PROTECTION CIRCUIT (Q22 – Q27)

This protection circuit functions to protect the speakers from damage due to short-circuit of the load, etc, and performs a muting operation to cut noise and distortion which occur when switching the power on and off. The circuit is



1. Relay Driving Circuit

Q26 — Q28, in Fig. 7, comprise the relay driving circuit.

In the normal condition reverse bias is applied to the base of Q26, and Q26 is in a cutout condition. When one of the above mentioned detection circuits goes on, current flows through R18, the base potential falls and Q26 is turned on. Consequently Q27 comes on and Q28 goes off. When Q28 goes off, the current of the relay circuit is cut, to release the switch of the output circuit.

When the power switch is turned on, a delay operation occurs in this circuit. R25, R26 and C6, in the base circuit of Q28, are the time constant elements which determine the delay time. When the power switch is switched on, C6 charges to a potential of +35 volts through R25 and R26, and Q28 is kept in the OFF condition during this time. When the power source is switched off the muting operation of Q27 prevents shock noise. In the normal condition, the potentials of +35 volts and -5.1 volts are applied to Q27 through R21 and R22. The resultant potential at the base of Q27 is -1 volt in the cutout condition. When the power supply is turned off, the potential of -5.1 volts disappears immediately, due to the small time constant of the power circuit. Thus a positive base potential remains, switching Q27 on, which in turn switches off Q28 and hence the relay.

2. Over-current and Overload Detection

The equivalent circuit of this detector section is shown in Fig. 8-a, and Fig. 8-b shows the equivalent circuit at the time of a positive half cycle. When this equivalent circuit is overloaded, the balance of the bridge, formed by RE1, R1, R5 and RL, is disturbed, and a potential is produced between b and a in such a direction that Q22 is turned on. When Q22 is turned on, the collector current increases, the relay driving circuit functions and the relay switch of the output circuit is turned off.

After the cause of the overload is removed, the bias of Q22 is reduced and the relay switch turns on to automatically restore normal operation, Fig. 8-c shows the equivalent circuit at the time of a negative half cycle. In this circuit a potential is produced between b and e as above, and Q22 is turned on.

3. Detection of DC Voltage

This is a differential amplifier consisting of Q24 and Q25, as shown in Fig. 9. The bases of Q24 and Q25 are connected to the junction-points of

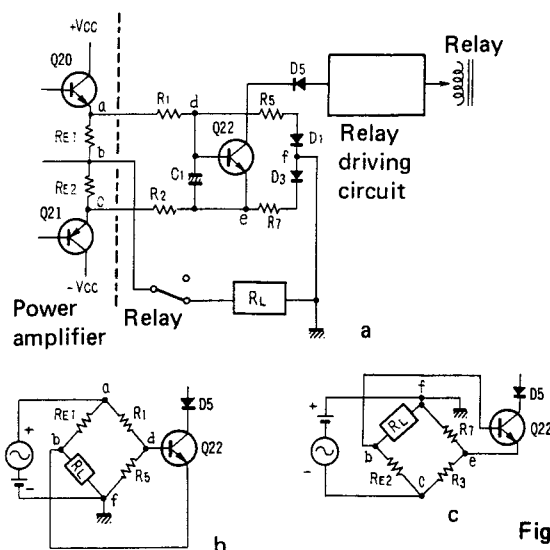
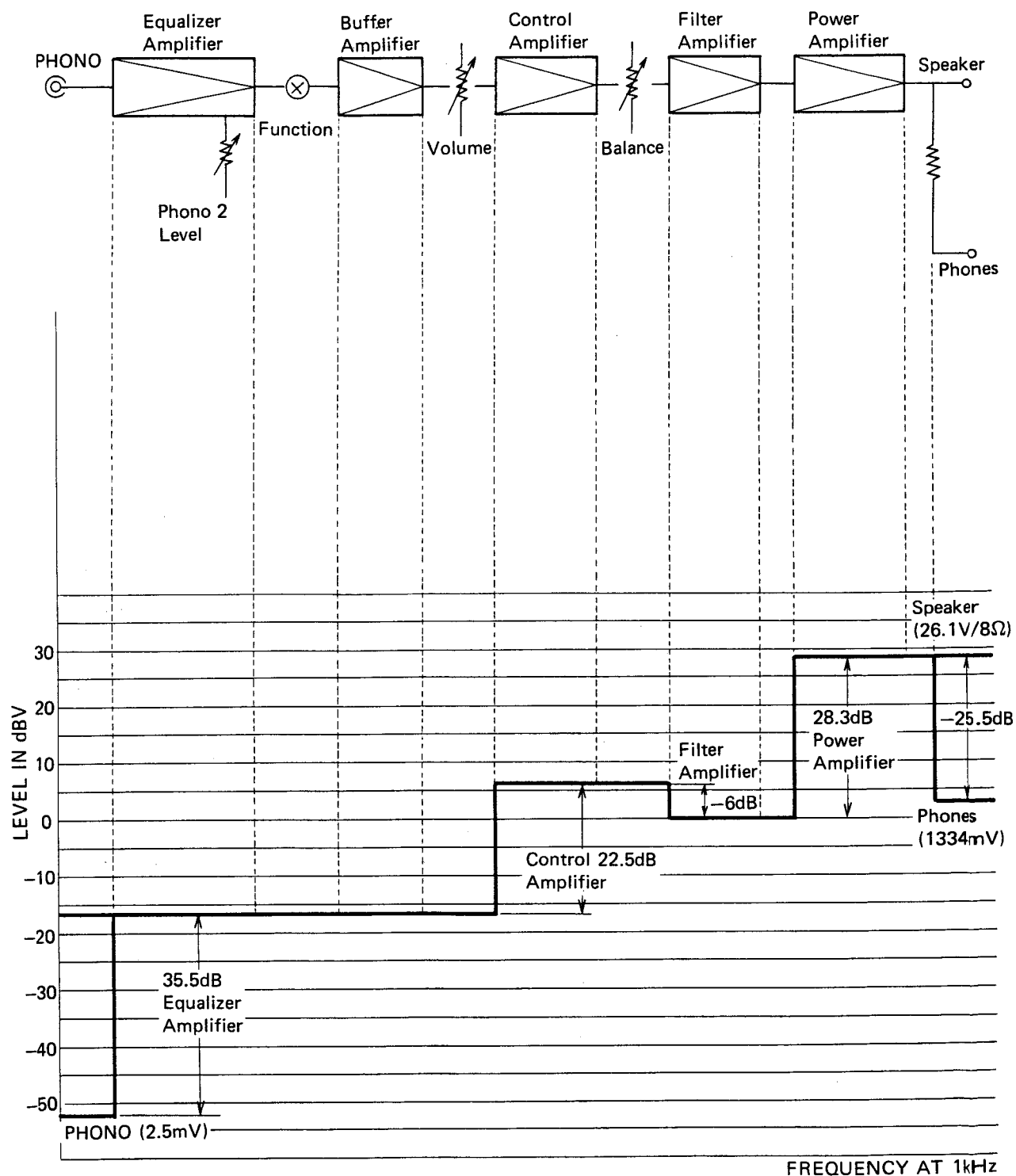


Fig. 8

6. LEVEL DIAGRAM



7. DISASSEMBLY

Disassembly Cautions

- (1) Great care should be taken in handling the SA-9500 since it is very heavy and the front panel and heat sink fins are exposed.
- (2) When replacing components, be sure to disassemble them in the correct order and to identify the disassembly positions.
- (3) Most of the printed circuit boards cannot be checked unless they are removed from the chassis. When removing them, great care should be taken not to touch them against any other components nor to short any circuit.
- (4) Do not exert excessive force on the side panel stays as they may be bent.
- (5) There are many screws of different types. It is recommended therefore that you make a note of the positions from which they are removed.

Removing the Top Cover

Unscrew the six screws (A) on the top cover. Lift up the top cover.

Removing the Front Shield Cover

After removing the top cover, unscrew the two screws (B) on the front shield cover. Lift up the front shield cover.

Removing the Front Panel

Remove all front panel knobs (C) except the POWER switch knob. For the VOLUME control knob, loosen the set screws with a hexagonal wrench before removing it. Remove the BASS TURNOVER, SPEAKERS, and FUNCTION switch shaft nuts and washers. The front panel is ready for removal.

Removing the Bottom Plate

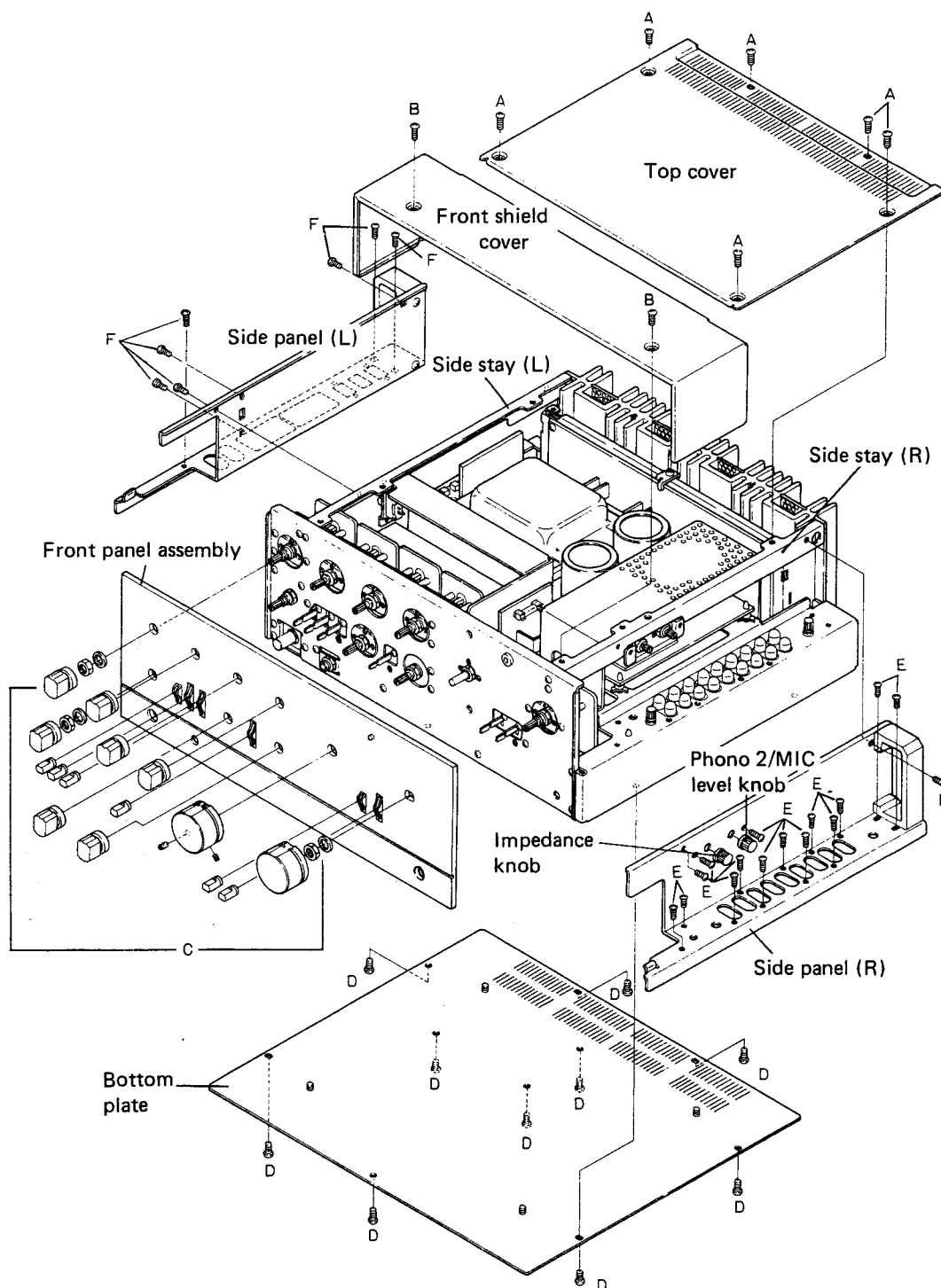
Stand the main body with the heat sink down. Unscrew the ten (10) screws (D). Remove the bottom plate.

Removing the Side Panel (R) (input terminal side)

After removing the top cover and front shield cover, pull out the PHONO 2/MIC LEVEL and IMPEDANCE control knobs. Unscrew the sixteen screws (E). Remove the side panel (R).

Removing the Side Panel (L) (output terminal side)

After removing the top cover and front shield cover, unscrew the seven screws (F). Remove the side panel (L).



Removing the Protection Circuit Assembly (Fig. 10)

- (1) Remove the top cover, front shield cover, bottom plate, and left side panel.
- (2) Unscrew the two screws (A) mounting the printed circuit board fixing brackets on the chassis. This permits the printed circuit board to be inclined to an angle depending on the length of the lead wires.

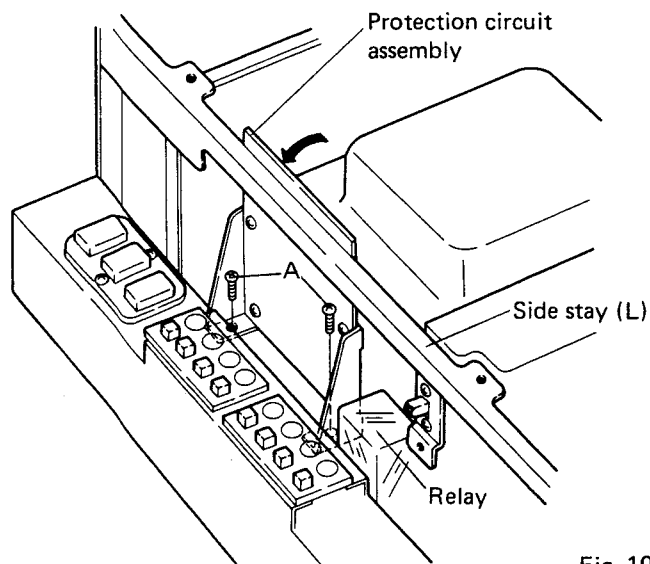


Fig. 10

Removing the Power Amplifier Assembly (Fig. 11)

- (1) After the top cover and bottom plate have been removed, the power amplifier can be adjusted.
- (2) The power transistors can be replaced by pulling the transistor covers out of the heat sink guides and unscrewing their two screws (B).
- (3) Unscrew the varistor fixing screw at the upper part of the center of the heat sink. Remove the varistor.
- (4) Stand the main body on the bottom plate so it is not touching the bench. Unscrew the eight screws (C) at both sides of the heat sink. This allows the power amplifier printed circuit board to be turned forward.
- (5) Unscrew the four printed circuit board fixing screws (D) and screws (A) and (B). This allows the printed circuit board to be removed from the heat sink. After this has been done amplifier can be checked.

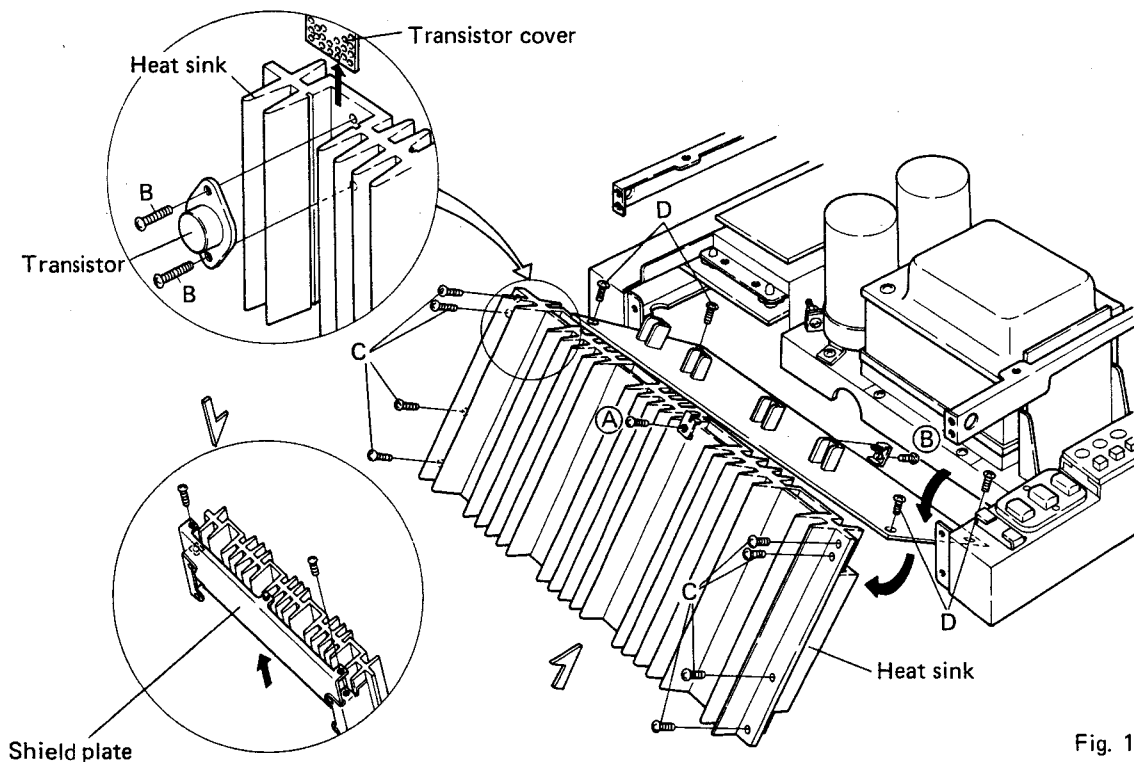


Fig. 11

Removing the Power Supply Circuit Assembly-1 (Fig. 12)

- (1) Remove the top cover, front shield cover, and bottom plate. This allows the 1A protection fuse (FU₄) in the pilot lamp system to be replaced.
- (2) Unscrew the two screws (E) which mount the printed circuit board on the chassis. This allows the printed circuit board to be moved, though the distance is limited by the length of its lead wire.

Removing the Power Supply Circuit Assembly-2 (Fig. 12)

- (1) Remove the top cover, front shield cover, and right side panel.
- (2) Unscrew the four screws (F) which mount the shield case on the chassis.
- (3) Be careful not to touch the volume assembly against any other part.
- (4) Pull up the power supply circuit assembly-2 from the bosses.

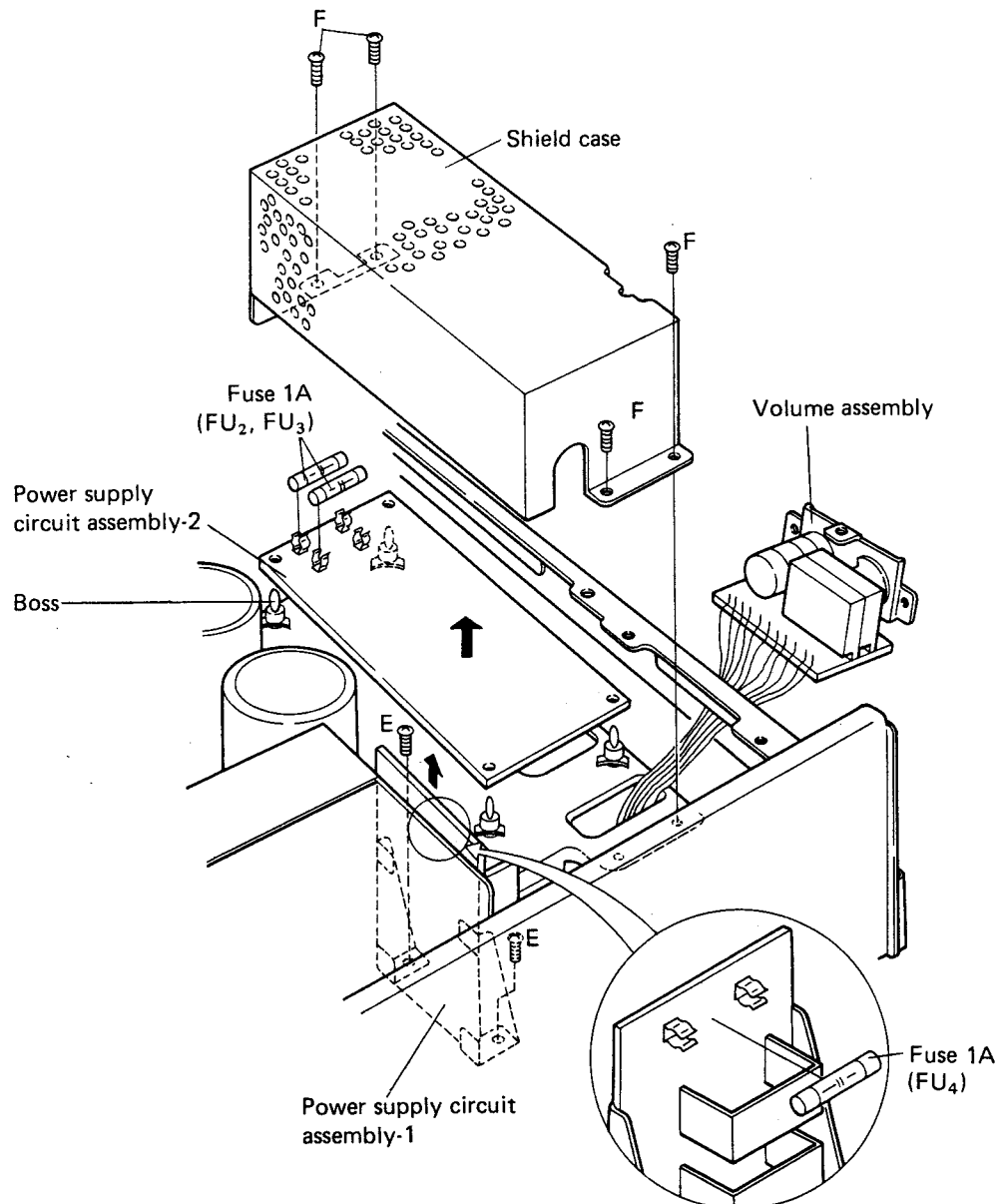


Fig. 12

Removing the Control Amplifier Assembly, Switch Circuit Assembly (Fig. 13)

- (1) Remove the top cover, front shield cover, front panel, and left side panel.
- (2) Unscrew the three screws (G) which mount the control amplifier assembly shield plate on the chassis. Pull up the shield plate.
- (3) Unscrew the heat sink top screws (H) and two panel stay screws (I). Remove the left side stay.
- (4) Unscrew the five screws (J) of the panel stay. Remove the control amplifier assembly by moving it forward.
- (5) Unscrew the twenty-seven screws of the panel stay and PHONES jack, SPEAKERS selector switch shaft and VOLUME control shaft nuts and washers. Remove the switch circuit assembly by inclining the panel stay.

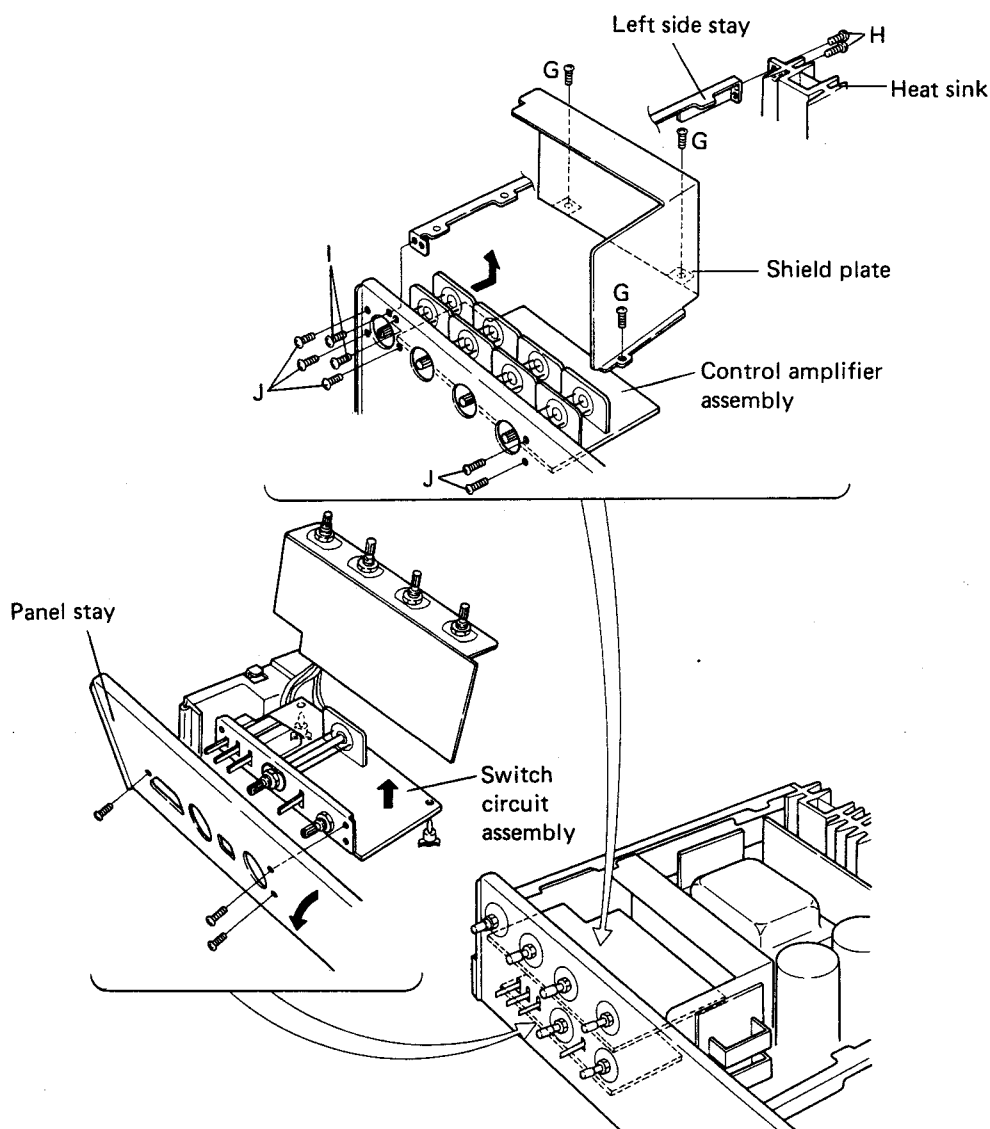


Fig. 13

Removing the Input Circuit Assembly (Fig. 14)

The PHONO jacks, TAPE MONITOR and DUPLICATE lever switches, and FUNCTION rotary switch are installed on the input circuit assembly printed circuit board.

- (1) Remove the top cover, front shield cover, front panel, bottom plate, and right side panel.
- (2) Remove the shield case and power supply circuit assembly-2.
- (3) Unscrew the twenty-seven screws of the panel stay and PHONES jack and SPEAKERS selector switch shaft and VOLUME control shaft nuts and washers. Incline the panel stay.
- (4) Pull out the input circuit assembly from the bosses.

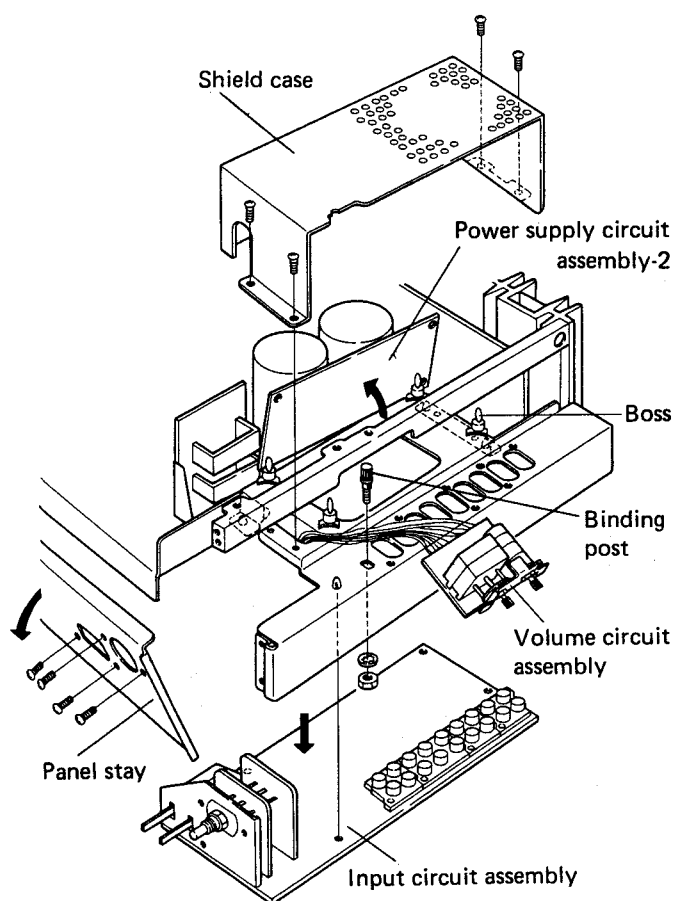


Fig. 14

Removing the Fuse Assembly (Fig. 15)

- (1) Remove the bottom plate.
- (2) Pull out the Fuse assembly from the bosses.

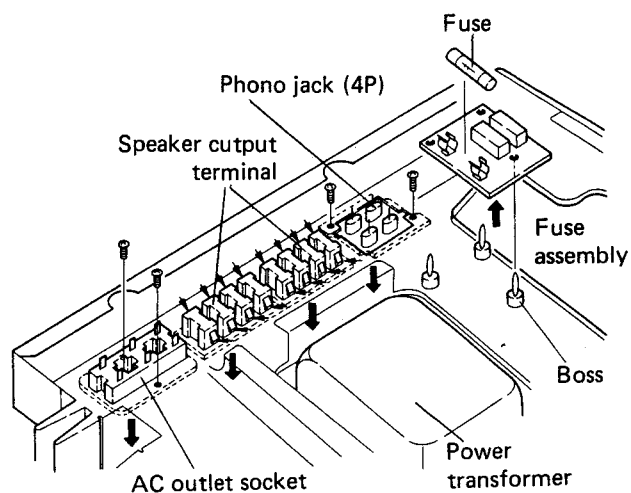
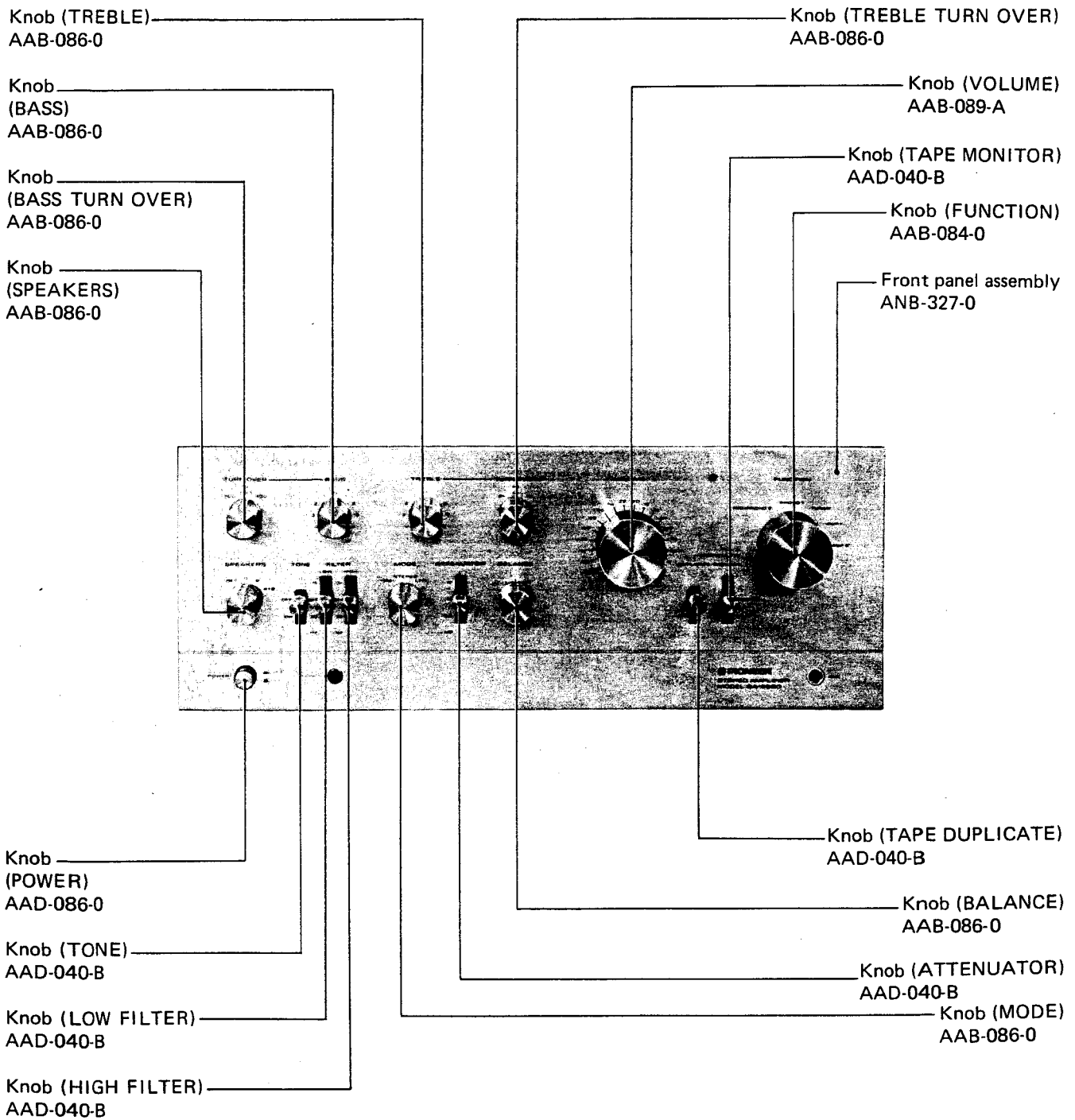


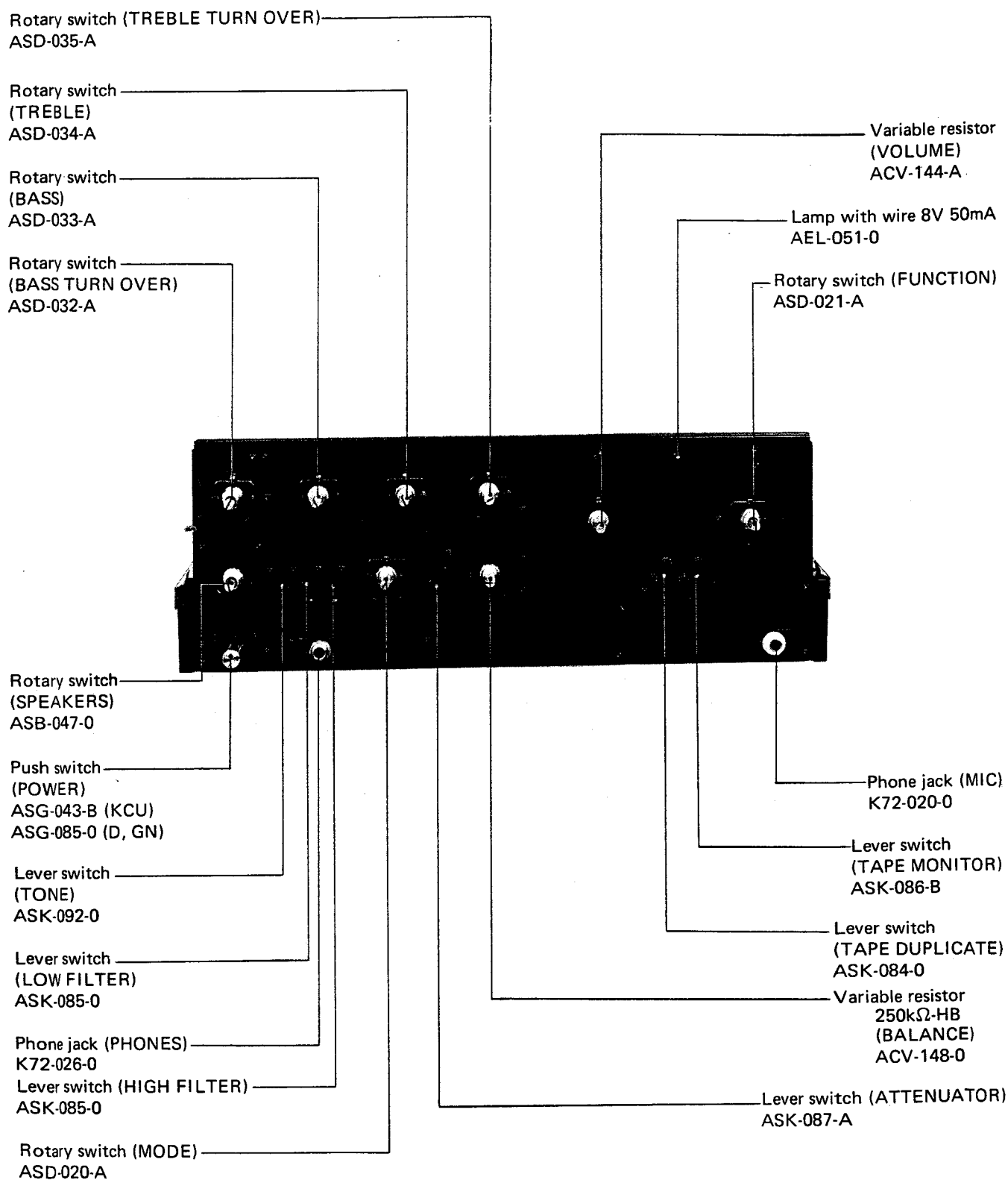
Fig. 15

8. PARTS LOCATIONS

FRONT PANEL VIEW

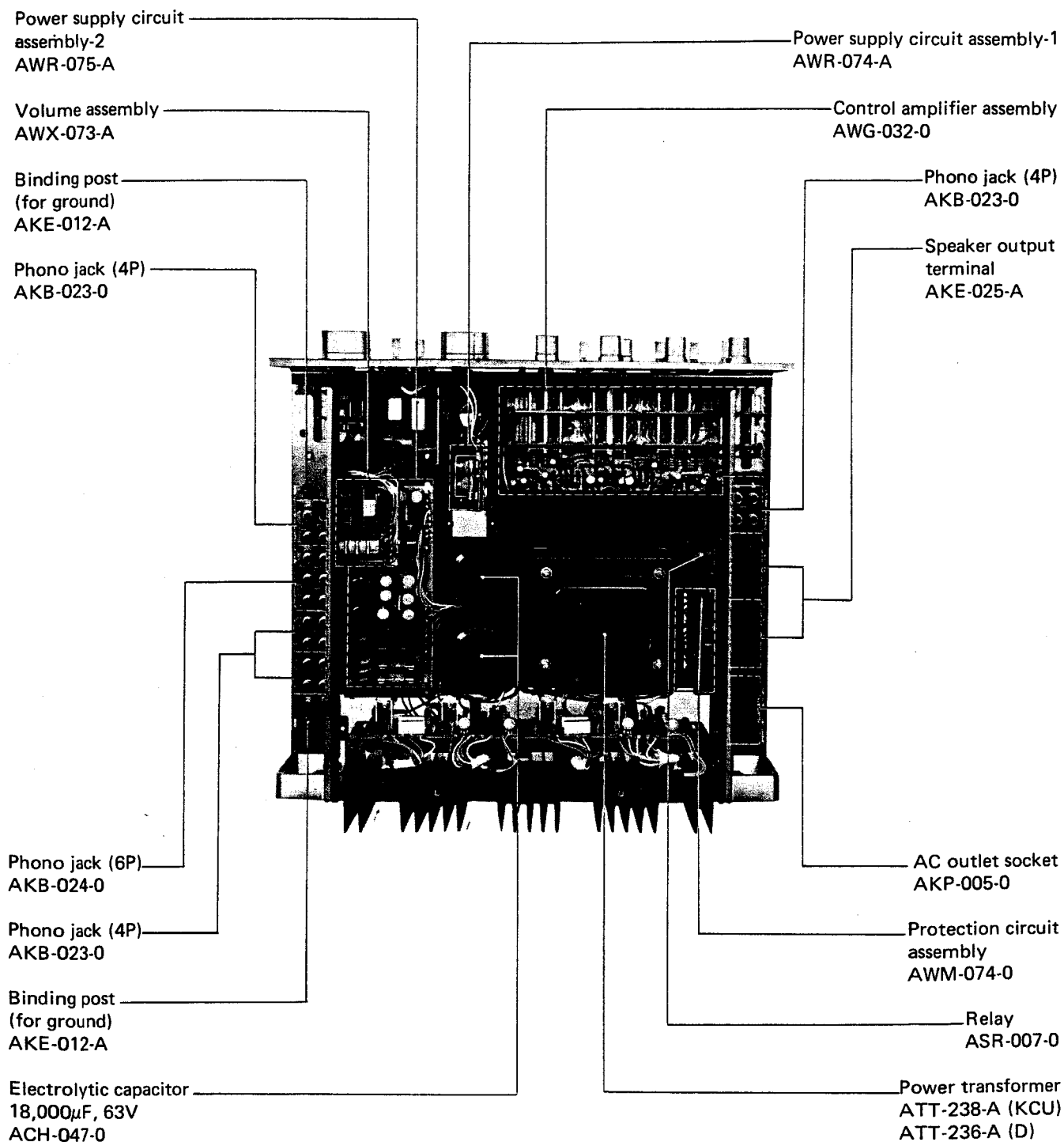


FRONT VIEW WITH PANEL REMOVED

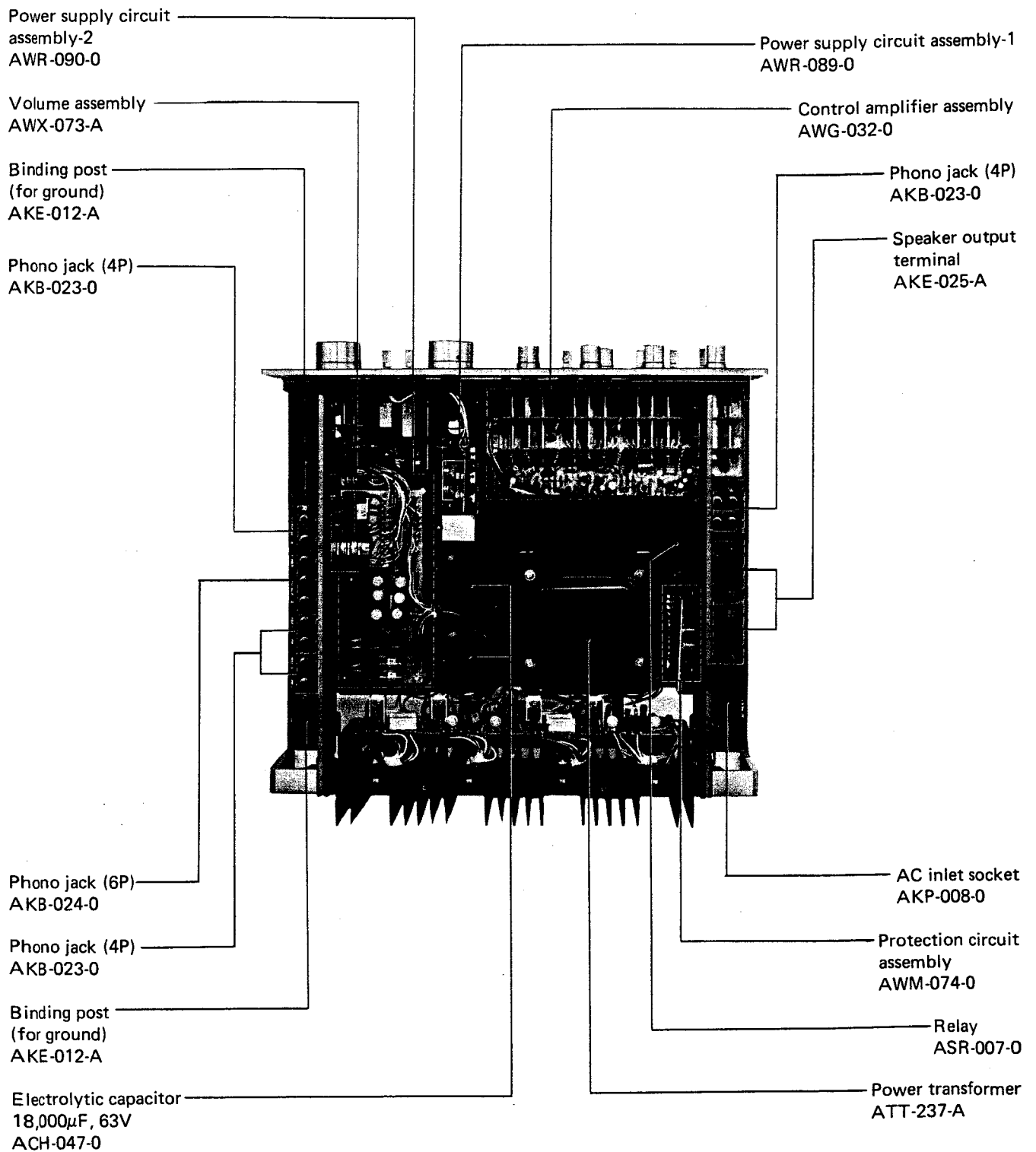


TOP VIEW

For "KCU, D" Types (120V model and 3-line voltage model)

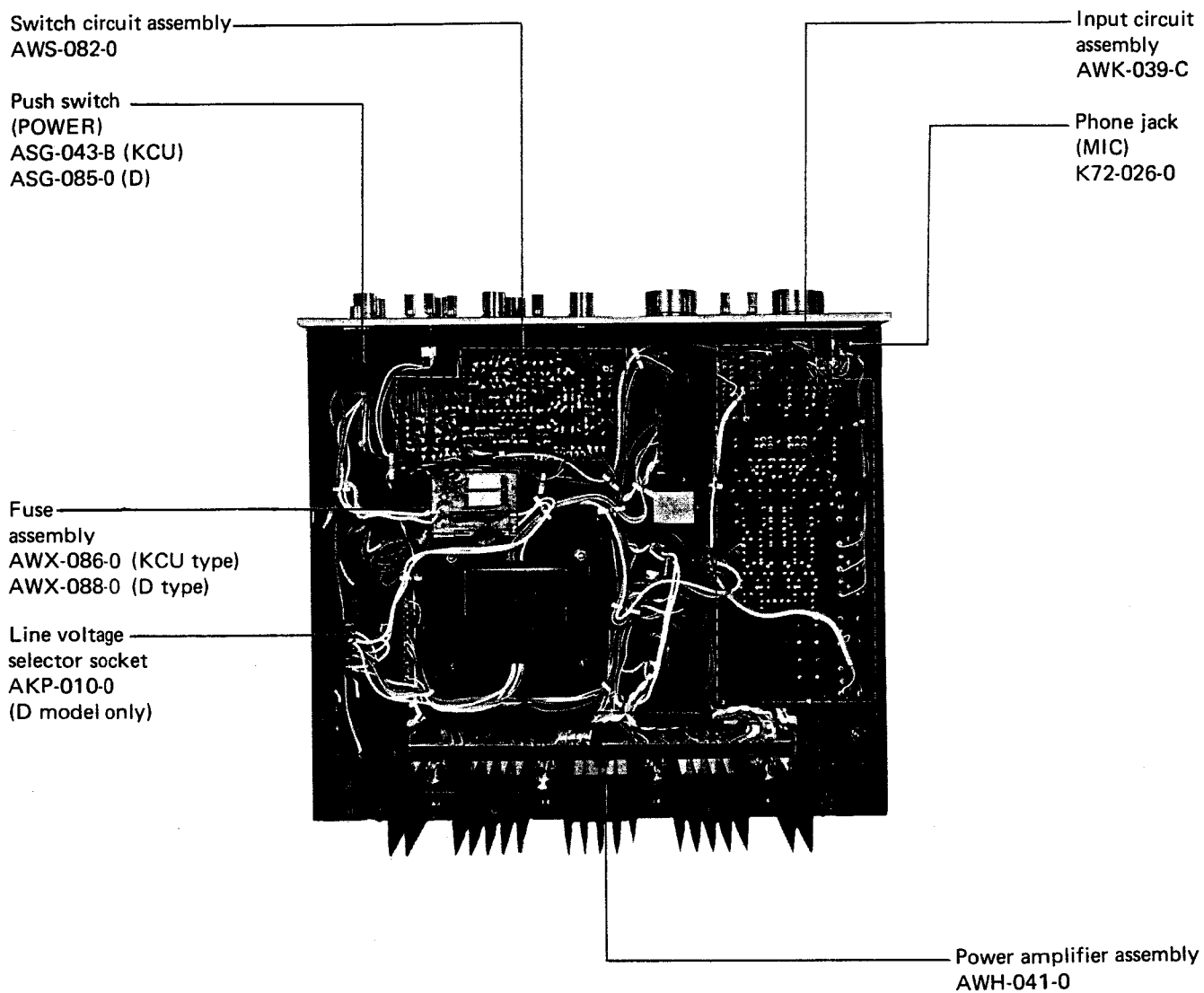


For "GN" Type (220V model)

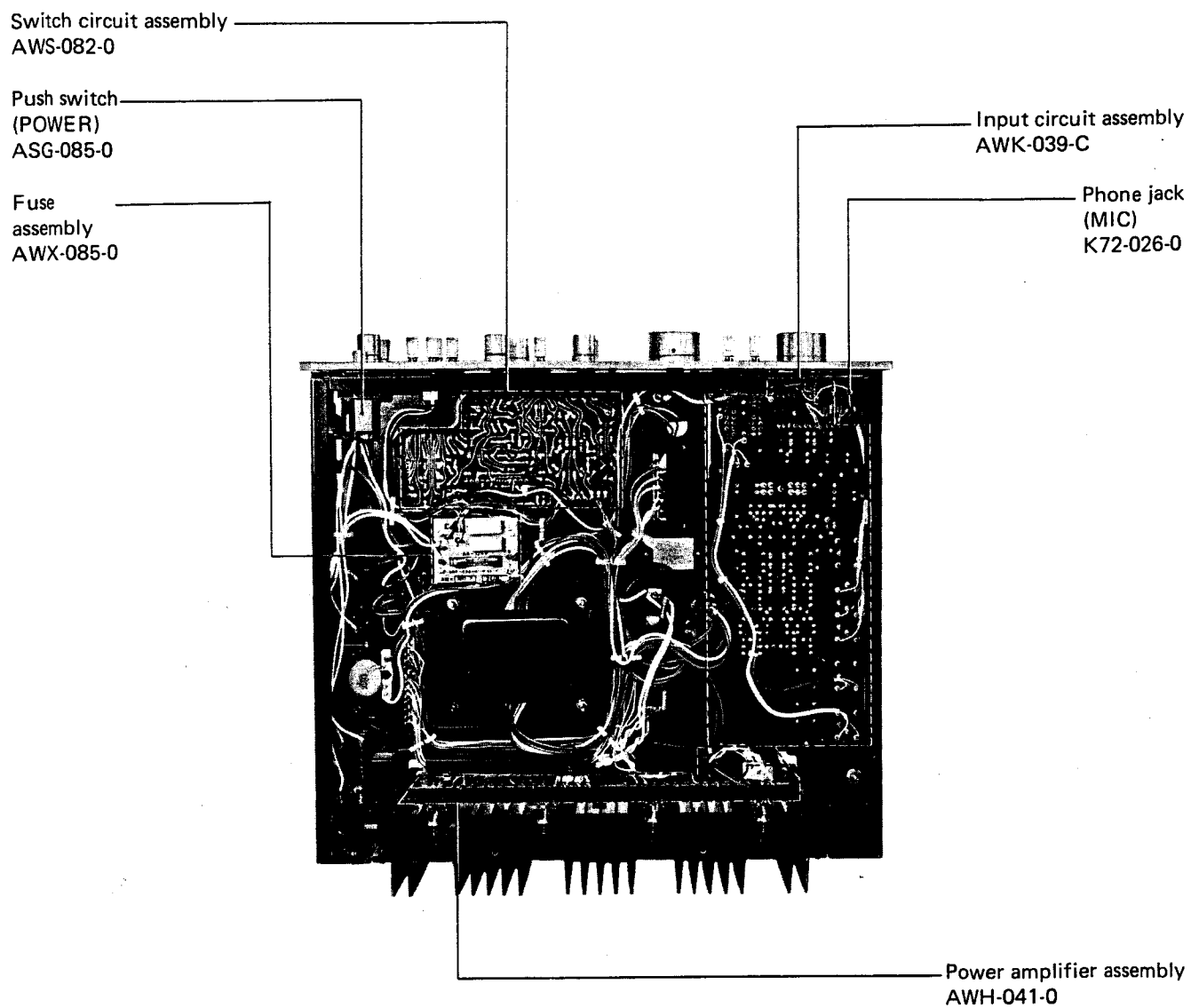


BOTTOM VIEW

For "KCU, D" Type (120V model and 3-line voltage model)



For "GN" Type (220V model)



9. ADJUSTING PROCEDURES

Set-up

- Remove the top cover and bottom plate, and stand the main body with the heat sinks down.
- Before turning on the POWER switch, turn VR3 and VR4 all the way to the left (counterclockwise).
- For adjustment, wait 10 minutes after the POWER switch is turned on.

Adjusting procedures

- Set the PRE/POWER AMP switch to the SEPARATED (lower) position.
- Fit $5.1\text{k}\Omega$ resistors to the POWER IN terminals as shown in Fig. 16.
- Connect 8Ω dummy loads between the SPEAKER A terminals as shown in Fig. 16.
- Set the SPEAKERS switch to position A. Turn on the POWER switch.
- Connect a DC voltmeter (100mV/full scale) between pins 10 and 9. Adjust VR1 until the voltmeter indicates 0V.
- Connect the DC voltmeter between pins 25 and 24. Adjust VR2 until the voltmeter indicates 0V.

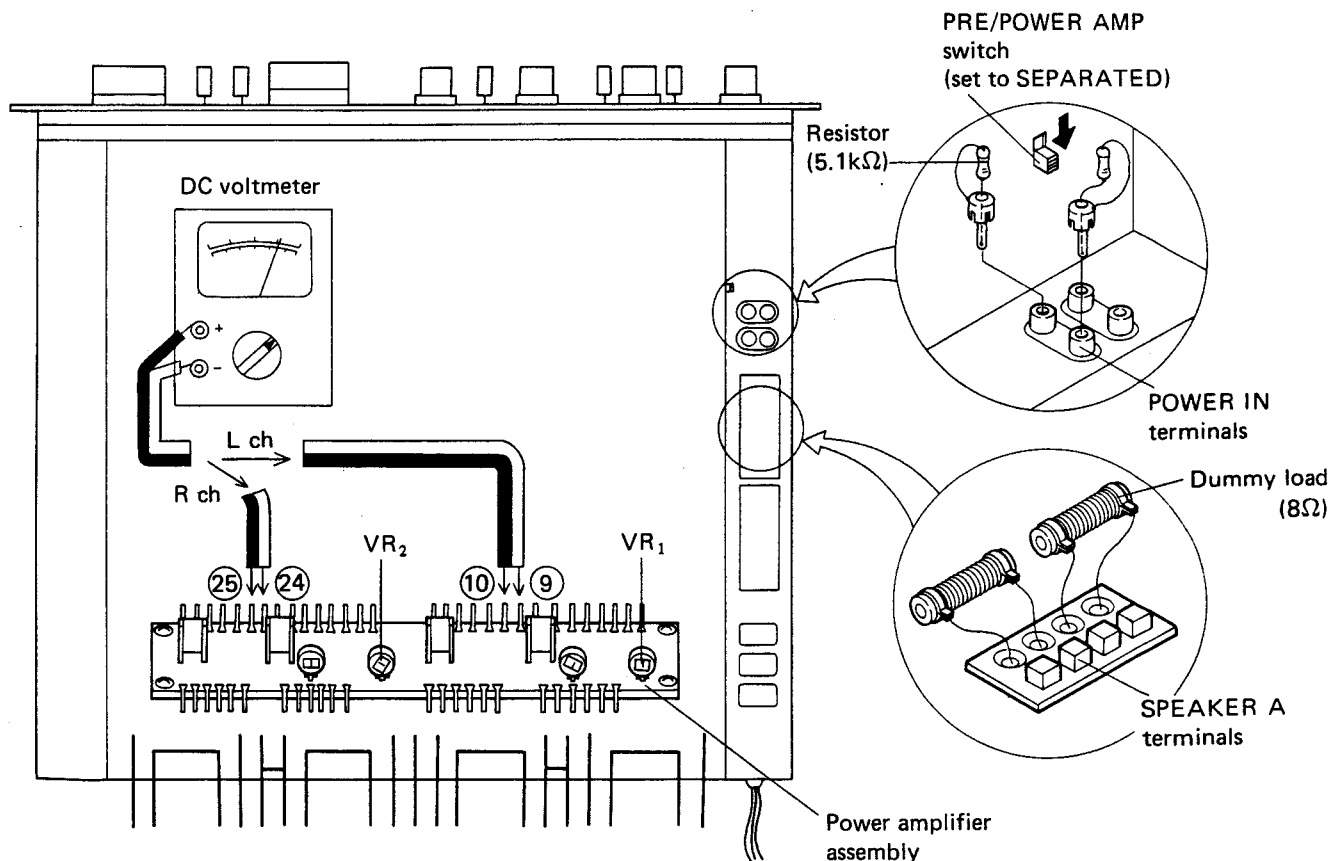


Fig. 16

- (7) Connect the DC voltmeter between pins 12 and 13. Adjust VR3 until the voltmeter indicates 20mV.
- (8) Connect the DC voltmeter between pins 27 and 28. Adjust VR4 until the voltmeter indicates 20mV.

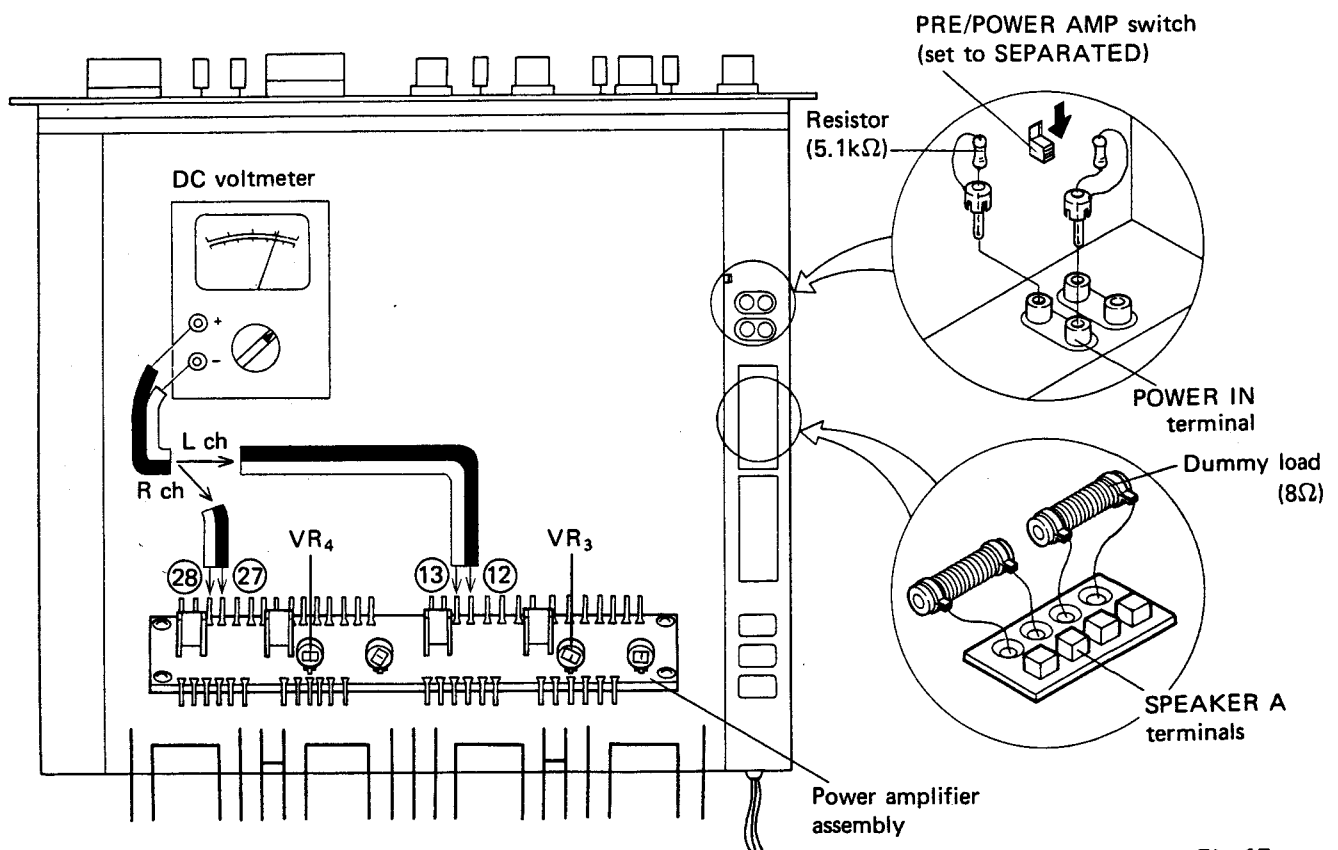


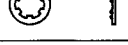
Fig. 17

10. EXPLODED VIEW

NOMENCLATURE OF SCREWS, WASHERS AND NUTS

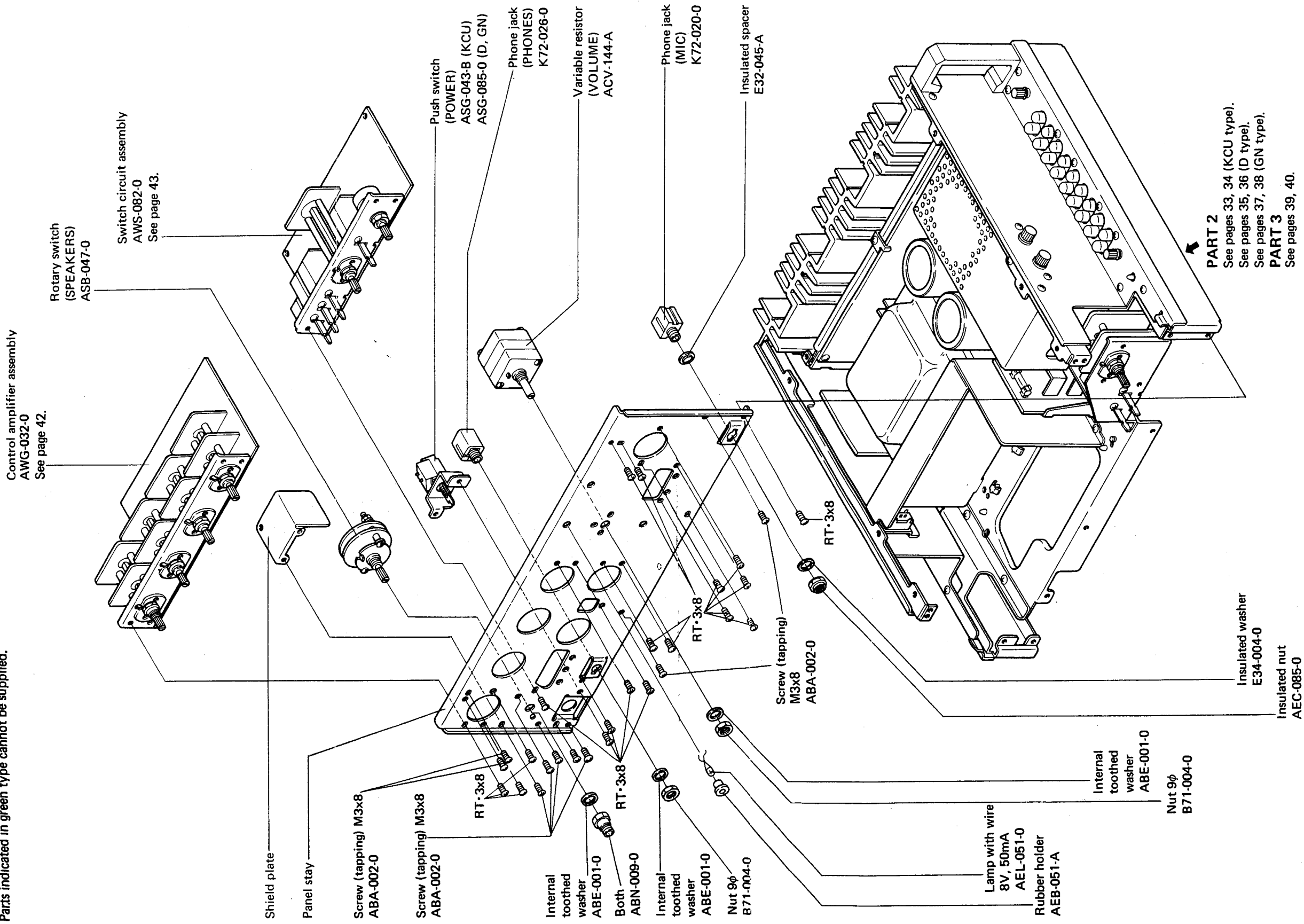
The following symbols stand for screws, washers and nuts as shown in exploded view.

Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
BT	Binding head tapping screw	
CT	Countersunk head tapping screw	
TT	Truss head tapping screw	
OCT	Oval countersunk head tapping screw	
PM	Pan head machine screw	
CM	Countersunk head machine screw	
OCM	Oval countersunk head machine screw	
TM	Truss head machine screw	
BM	Binding head machine screw	
PSA	Pan head screw with spring lock washer	
PSB	Pan head screw with spring lock washer and flat washer	
PSF	Pan head screw with flat washer	

Symbol	Description	Shape
EW	E type washer	
FW	Flat washer	
SW	Spring lock washer	
N	Nut	
WN	Washer faced nut	
ITW	Internal toothed lock washer	
OTW	Outernal toothed lock washer	

PART 1

NOTE:
Parts indicated in green type cannot be supplied.

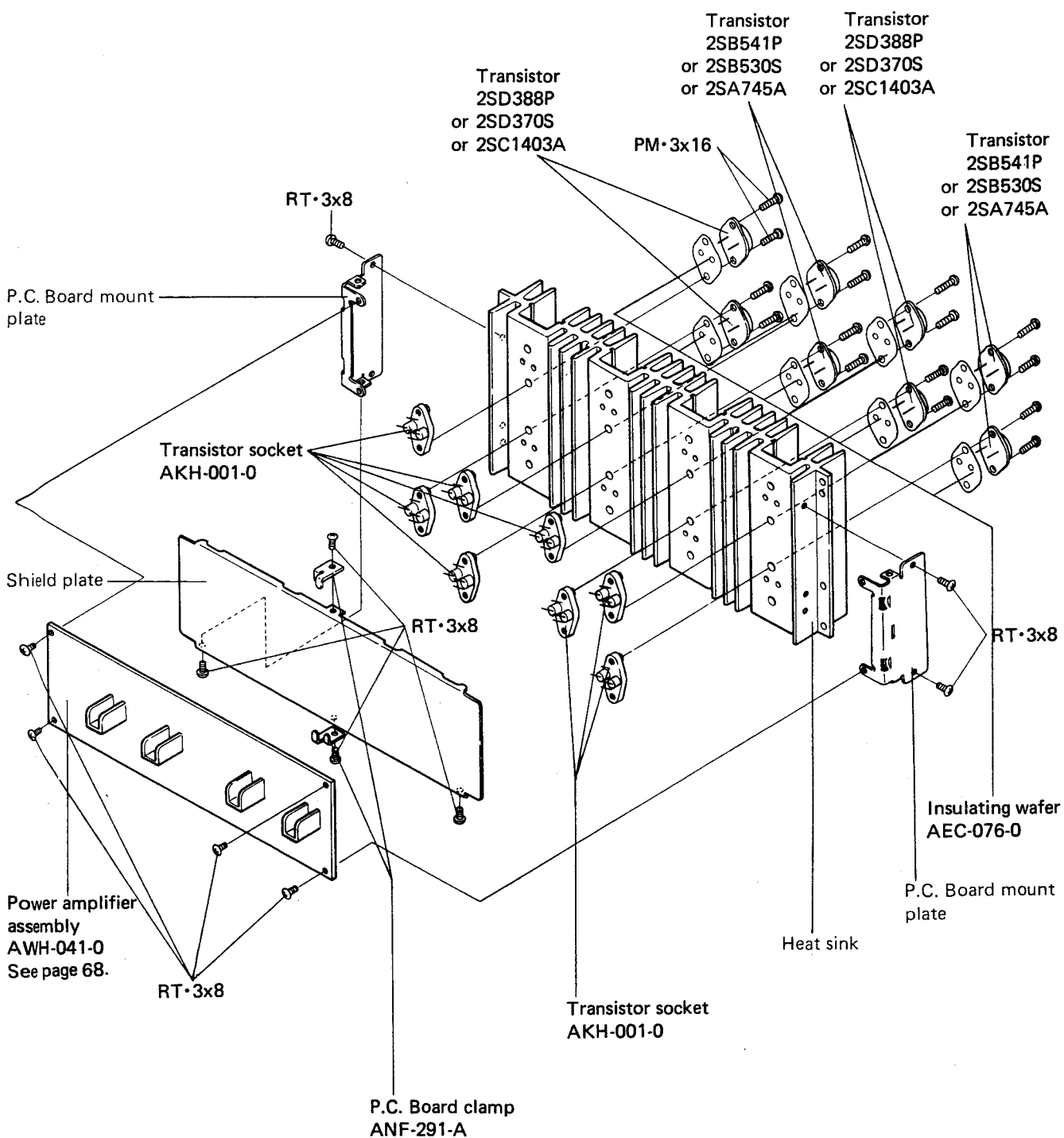


PART 2
See pages 33, 34 (KCU type).
See pages 35, 36 (D type).
See pages 37, 38 (GN type).
PART 3
See pages 39, 40.

POWER AMPLIFIER

NOTE:

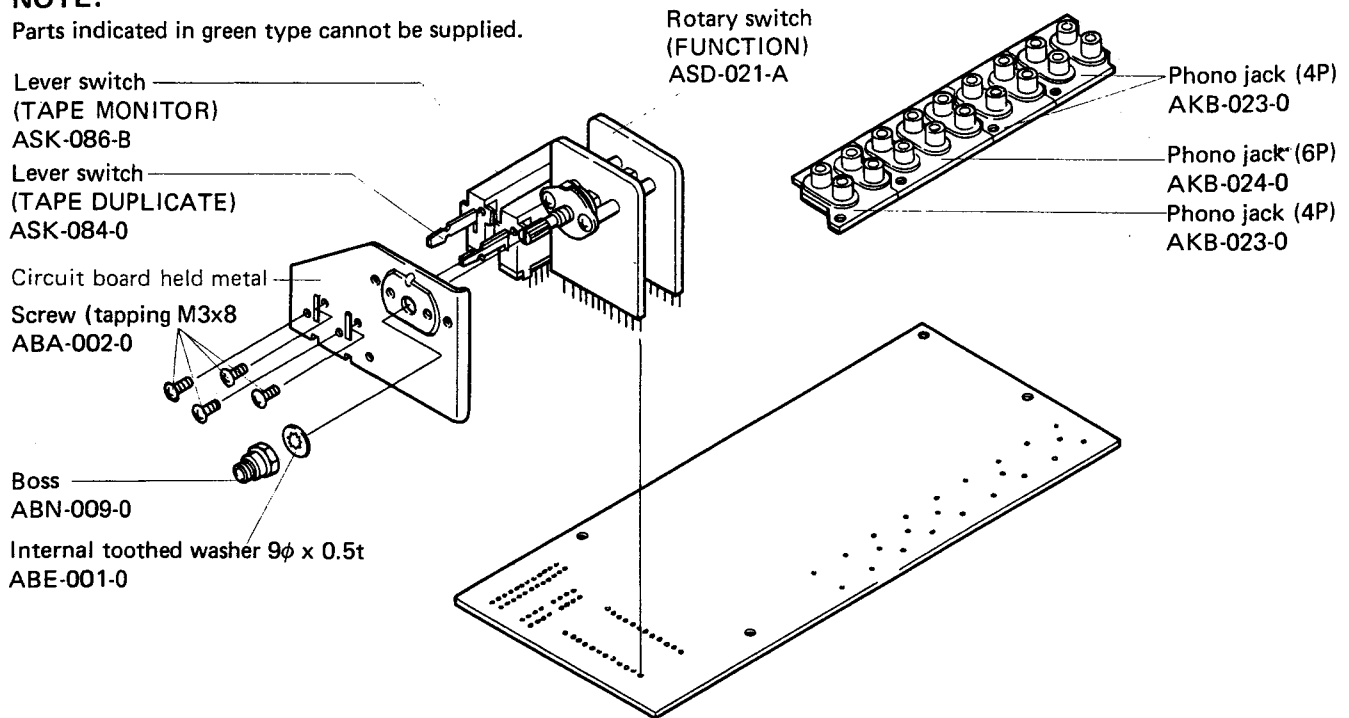
Parts indicated in green type cannot be supplied.



INPUT CIRCUIT ASSEMBLY (AWK-039-C)

NOTE:

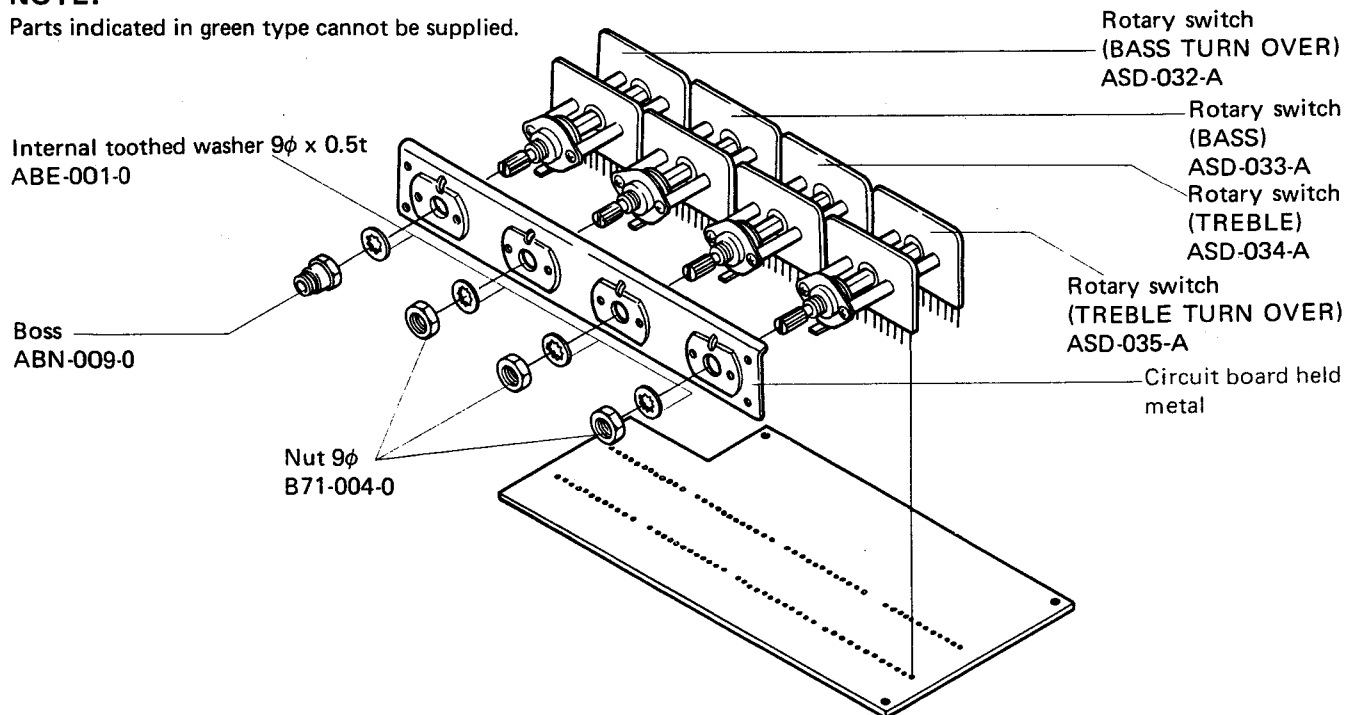
Parts indicated in green type cannot be supplied.



CONTROL AMPLIFIER ASSEMBLY (AWG-032-0)

NOTE:

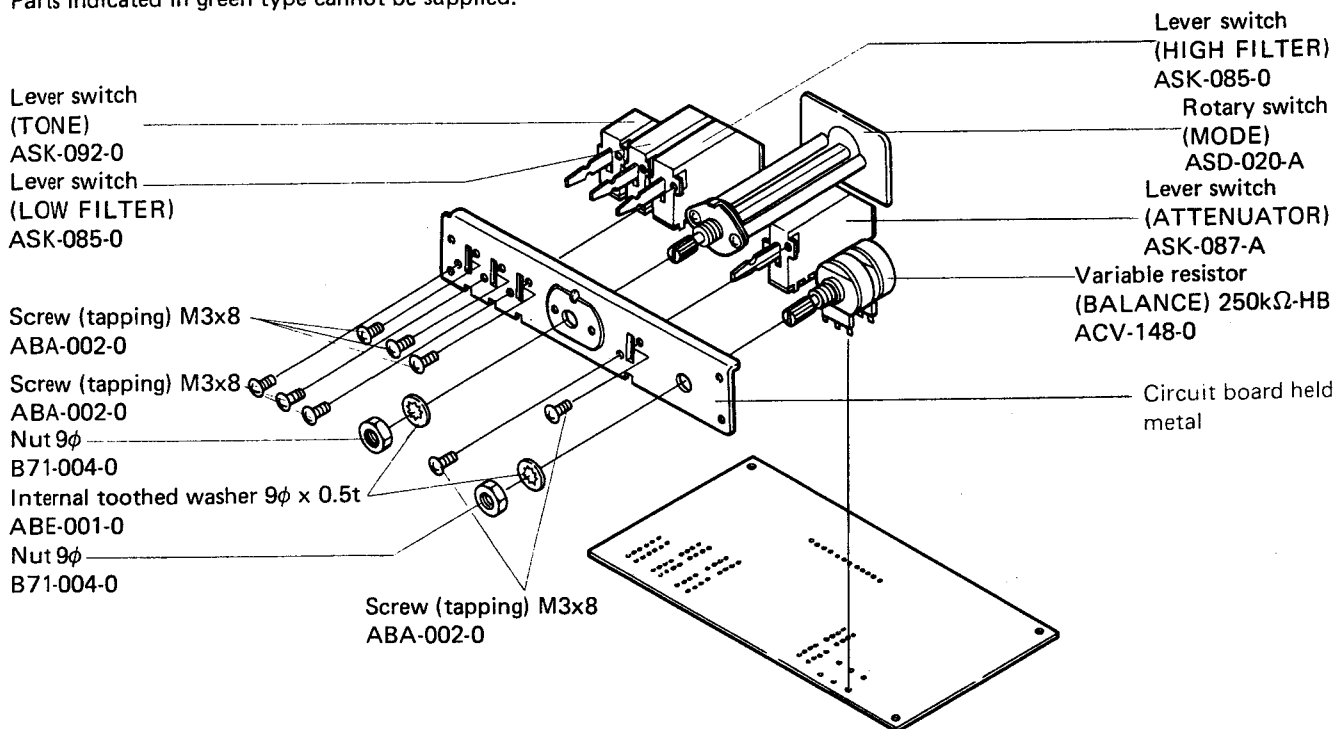
Parts indicated in green type cannot be supplied.



SWITCH CIRCUIT ASSEMBLY (AWS-082-0)

NOTE:

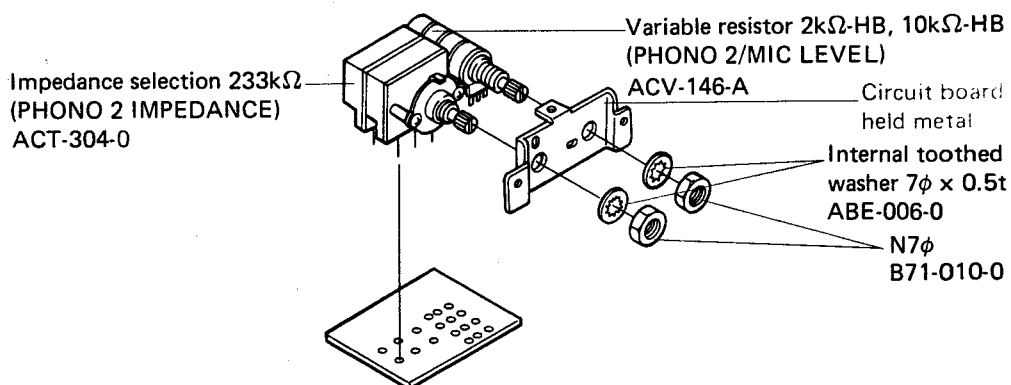
Parts indicated in green type cannot be supplied.



VOLUME ASSEMBLY (AWX-073-A)

NOTE:

Parts indicated in green type cannot be supplied.



11. SCHEMATIC DIAGRAMS, P.C. BOARD PATTERNS AND PARTS LIST

11.1 SCHEMATIC DIAGRAMS AND MISCELLANEOUS PARTS.

Miscellaneous Parts List For "KCU" Type (120V model)

NOTES:

- Capacitors: in μF unless otherwise noted p:pF
- Resistors: in Ω , $\frac{1}{4}W$ unless otherwise noted k:k Ω , M:M Ω

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 18,000 63V	ACH-047-0
C2	Electrolytic 18,000 63V	ACH-047-0
C3	Ceramic 0.01 250V	ACG-001-0
C4	Ceramic 0.01 150V	ACG-003-0
C5	Mylar 4700p 50V	CQMA 472K 50
C6	Mylar 2700p 50V	CQMA 272k 50

SWITCHES

Symbol	Description	Part No.
S14	Slide switch (PRE/POWER)	ASH-012-0
S15	Rotary switch (SPEAKERS)	ASB-047-0
S16	Relay	ARS-007-0
S17	Push switch (POWER)	ASG-043-B

RESISTORS AND POTENTIOMETER

Symbol	Description	Part No.
R1	Metal oxide 4.7k 2W	RS2P 472J
R2	Metal oxide 4.7k 2W	RS2P 472J
R3	Carbon film 39k	RD4PS 393J
R4	Carbon film 82k	RD4PS 823J
VR2	Variable resistor (VOLUME)	ACV-144-A

FUSES AND LAMP

Symbol	Description	Part No.
FU1	Fuse 6A	AEK

For "D" Type (3-line voltage model)

CAPACITOR

Symbol	Description	Part No.
C1	Electrolytic 18,000 63V	ACH-047-0
C2	Electrolytic 18,000 63V	ACH-047-0
C3	Ceramic 0.01 250V	ACG-001-0
C4	Ceramic 0.01 250V	ACG-001-0
C5	Mylar 4700p 50V	CQMA 472K 50
C6	Mylar 2700p 50V	CQMA 272K 50

RESISTORS AND POTENTIOMETER

Symbol	Description	Part No.
R1	Metal oxide 4.7k 2W	RS2P 472J
R2	Metal oxide 4.7k 2W	RS2P 472J
R3	Carbon film 39k	RD4PS 393J
R4	Carbon film 82k	RD4PS 823J
VR2	Variable resistor (VOLUME)	ACV-144-A

SEMICONDUCTORS

Symbol	Description	Part No.
Q13	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q14	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q15	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q16	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q17	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	
Q18	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	
Q19	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	
Q20	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	

SWITCHES

Symbol	Description	Part No.
S1		

For "GN" Type (220V model)

CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 18,000 63V	ACH-047-0
C2	Electrolytic 18,000 63V	ACH-047-0
C3		
C4		
C5	Mylar 47000p 50V	CQMA 472K 50
C6	Mylar 2700p 50V	CQMA 272K 50
C7	Ceramic 0.047 25V	CKDBC 473Z 50
C8	Ceramic 0.047 25V	CKDBC 473Z 50

RESISTORS AND POTENTIOMETER

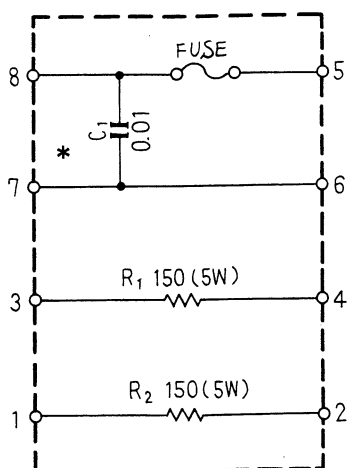
Symbol	Description	Part No.
R1	Metal oxide 4.7k 2W	RS2P 472J
R2	Metal oxide 4.7k 2W	RS2P 472J
R3	Carbon film 39k	RD4PS 393J
R4	Carbon film 82k	RD4PS 823J
VR2	Variable resistor (VOLUME)	ACV-144-A

SEMICONDUCTORS

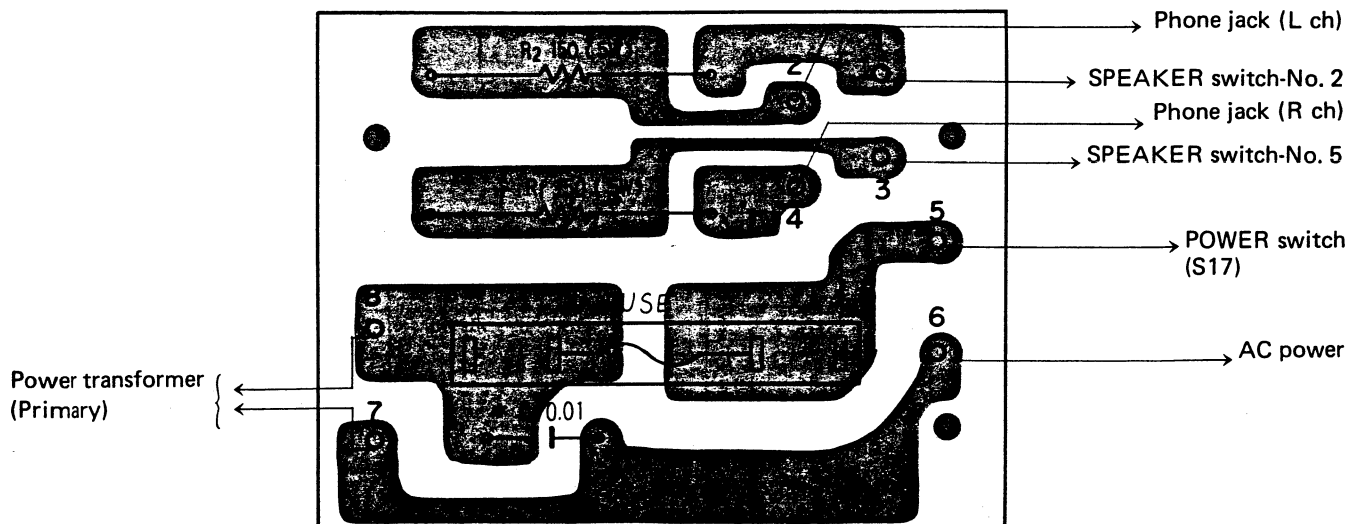
Symbol	Description	Part No.
Q13	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q14	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q15	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q16	Transistor 2SD388P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q17	Transistor 2SB541P-S or R (2SD370S-R, O or Y) (2SC1403A-R, O or Y)	
Q18	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	
Q19	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	
Q20	Transistor 2SB541P-S or R (2SB530S-R, O or Y) (2SA745A-R, O or Y)	

SWITCHES

11.6 FUSE ASSEMBLY (AWX-088-0), (AWX-085-0) or (AWX-086-0)



NOTE:
C1 is not equipped in
AWX-086.



Parts List of Fuse Assembly (AWX-088-0) or (AWX-085-0)

CAPACITOR

Symbol	Description	Part No.
C1	Ceramic 0.01 250V	ACG-001-0

RESISTORS

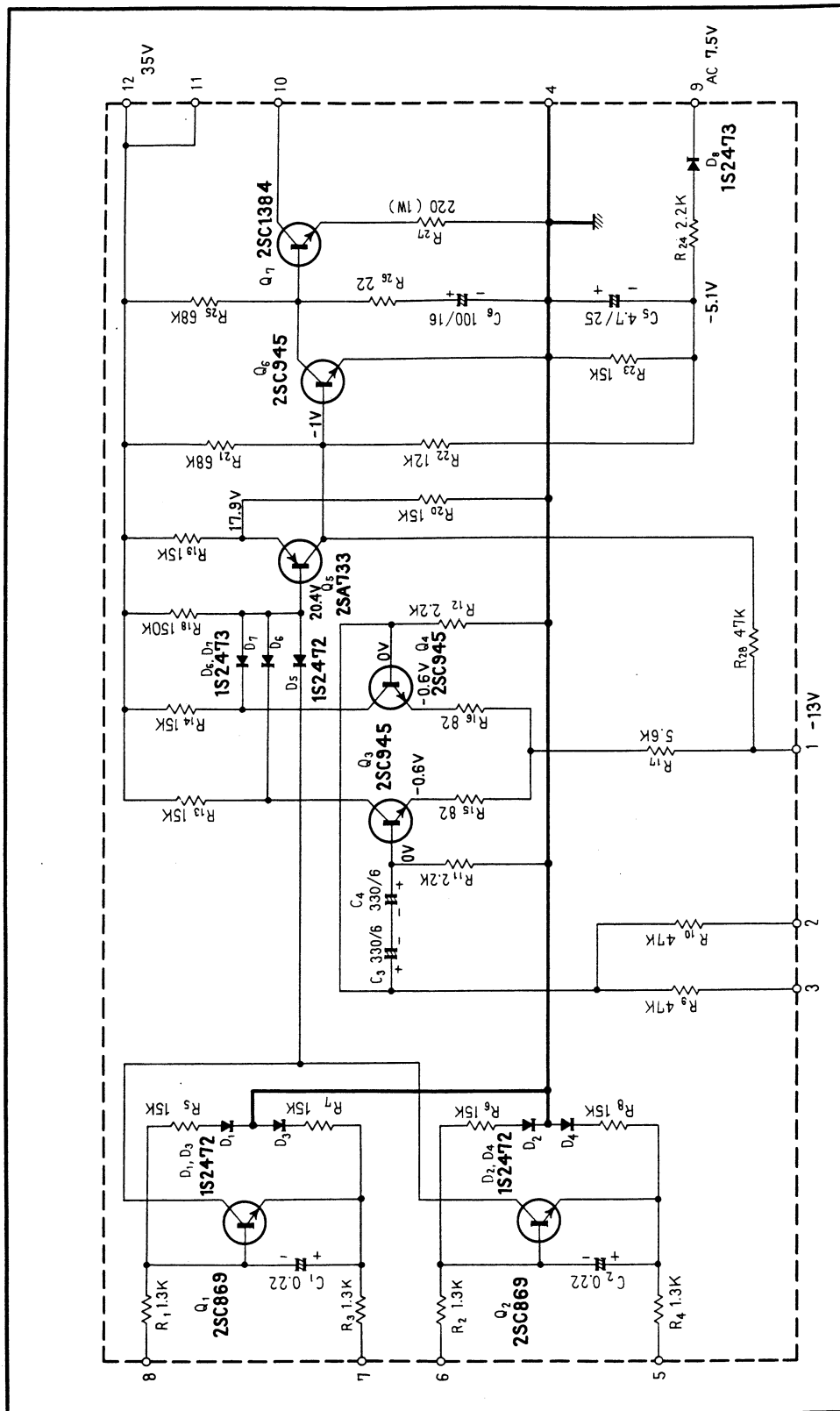
Symbol	Description	Part No.
R1	Wire wound 150 5W	RT5B 151K
R2	Wire wound 150 5W	RT5B 151K

Parts List of Fuse Assembly (AWX-086-0)

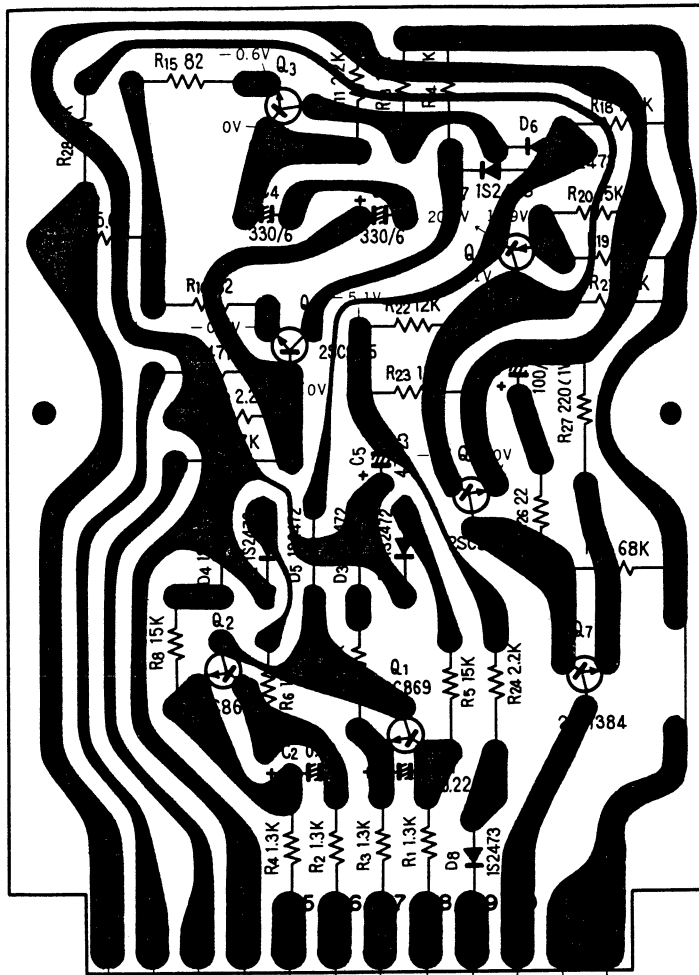
RESISTORS

Symbol	Description	Part No.
R1	Wire wound 150 5W	RT5B 151K
R2	Wire wound 150 5W	RT5B 151K

11.8 PROTECTION CIRCUIT ASSEMBLY (AWM-074-0)



Foil side



Power supply circuit assembly-2-No. 11

Power amplifier assembly-No. 26

Power amplifier assembly-No. 11

Power amplifier assembly-No. 28

Power amplifier assembly-No. 27

Power supply circuit assembly-2-No. 16

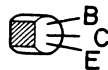
Relay coil

Power supply circuit assembly-2-No. 8

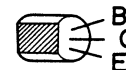
Power amplifier assembly-No. 12

Power amplifier assembly-No. 13

2SC869

2SC945
2SA733

2SC1384



Parts List of Protection Circuit Assembly (AWM-074-0)

CAPACITORS

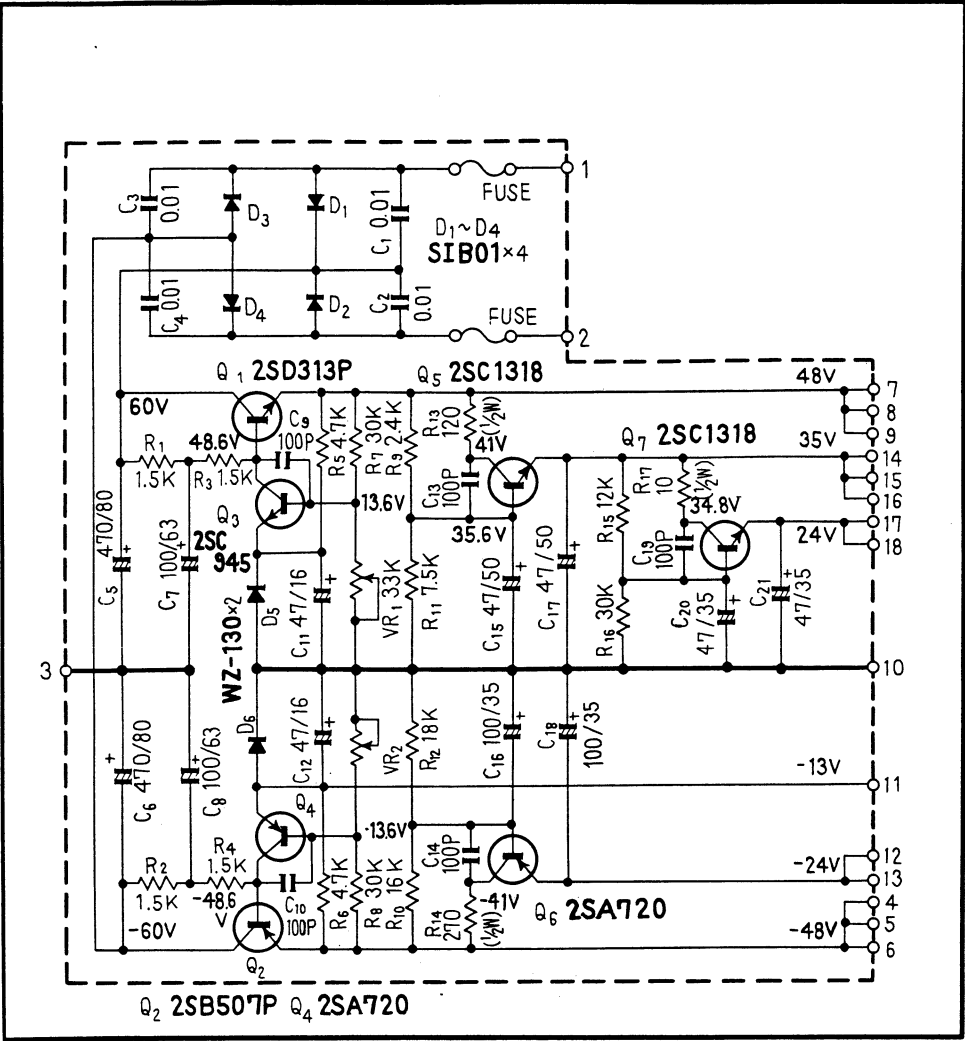
Symbol	Description			Part No.
C1	Electrolytic	0.22	10V	CSSA R22M 10
C2	Electrolytic	0.22	10V	CSSA R22M 10
C3	Electrolytic	330	6V	CEA 331P 6
C4	Electrolytic	330	6V	CEA 331P 6
C5	Electrolytic	4.7	25V	CEA 4R7P 25
C6	Electrolytic	4.7	25V	CEA 4R7P 25

Symbol	Description		Part No.
Q7	Transistor	2SC1384-R or Q	
D1	Diode	1S2472	
D2	Diode	1S2472	
D3	Diode	1S2472	
D4	Diode	1S2472	
D5	Diode	1S2472	
D6	Diode	1S2473	
D7	Diode	1S2473	
D8	Diode	1S2473	

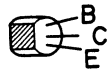
RESISTORS

Symbol	Description			Part No.
R1	Carbon film	1.3k		RD%PS 132J
R2	Carbon film	1.3k		RD%PS 132J
R3	Carbon film	1.3k		RD%PS 132J
R4	Carbon film	1.3k		RD%PS 132J
R5	Carbon film	15k		RD%PS 153J
R6	Carbon film	15k		RD%PS 153J
R7	Carbon film	15k		RD%PS 153J
R8	Carbon film	15k		RD%PS 153J
R9	Carbon film	47k		RD%PS 473J
R10	Carbon film	47k		RD%PS 4

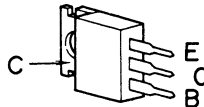
11.9 POWER SUPPLY CIRCUIT ASSEMBLY-2 (AWR-075-A) or (AWR-090-0)



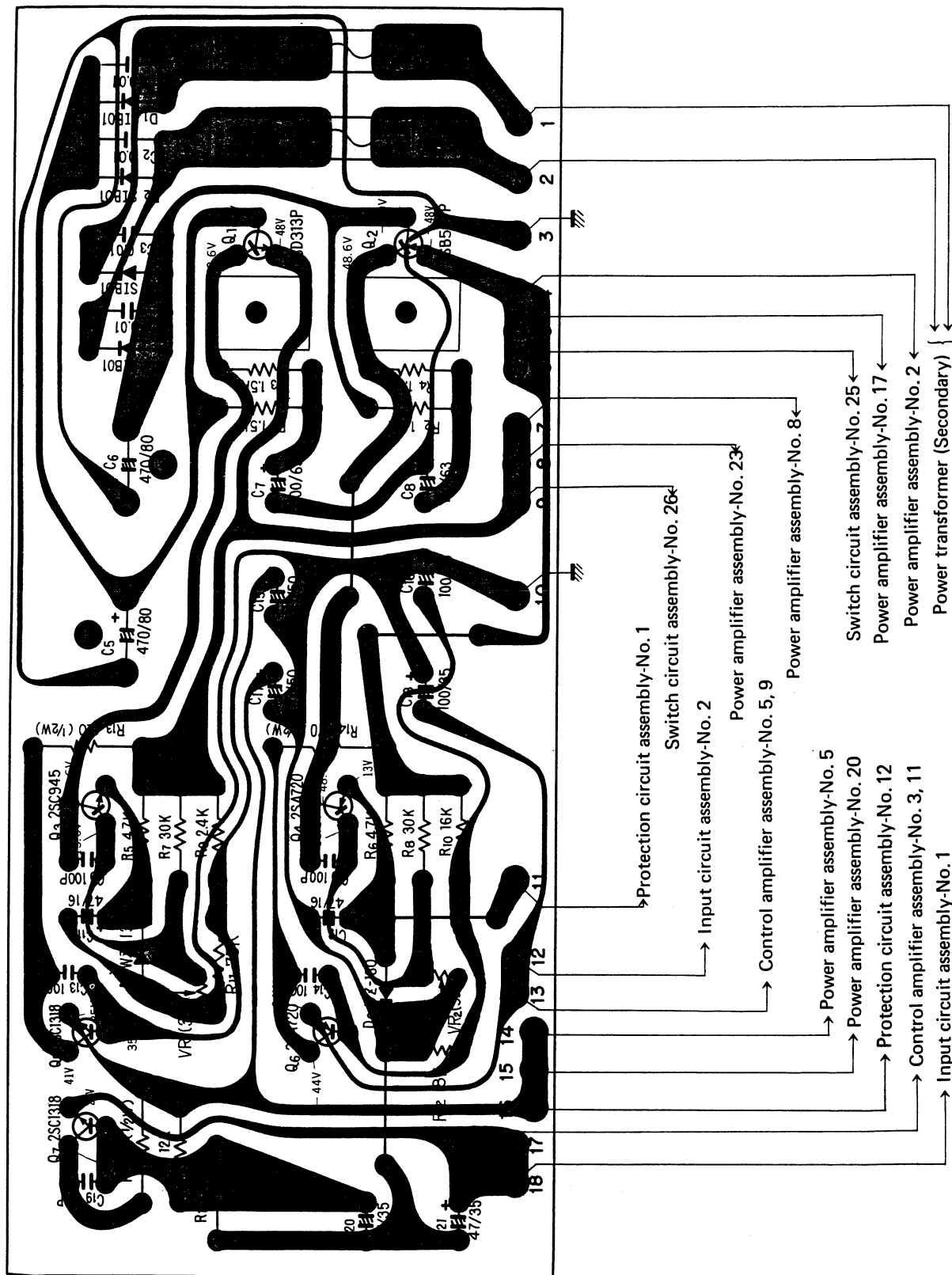
2SC945
2SA720
2SC1318



2SD313P
2SB507



Foil side



Parts List of Power Supply Circuit Assembly-2 (AWR-075-A) or (AWR-090-0)

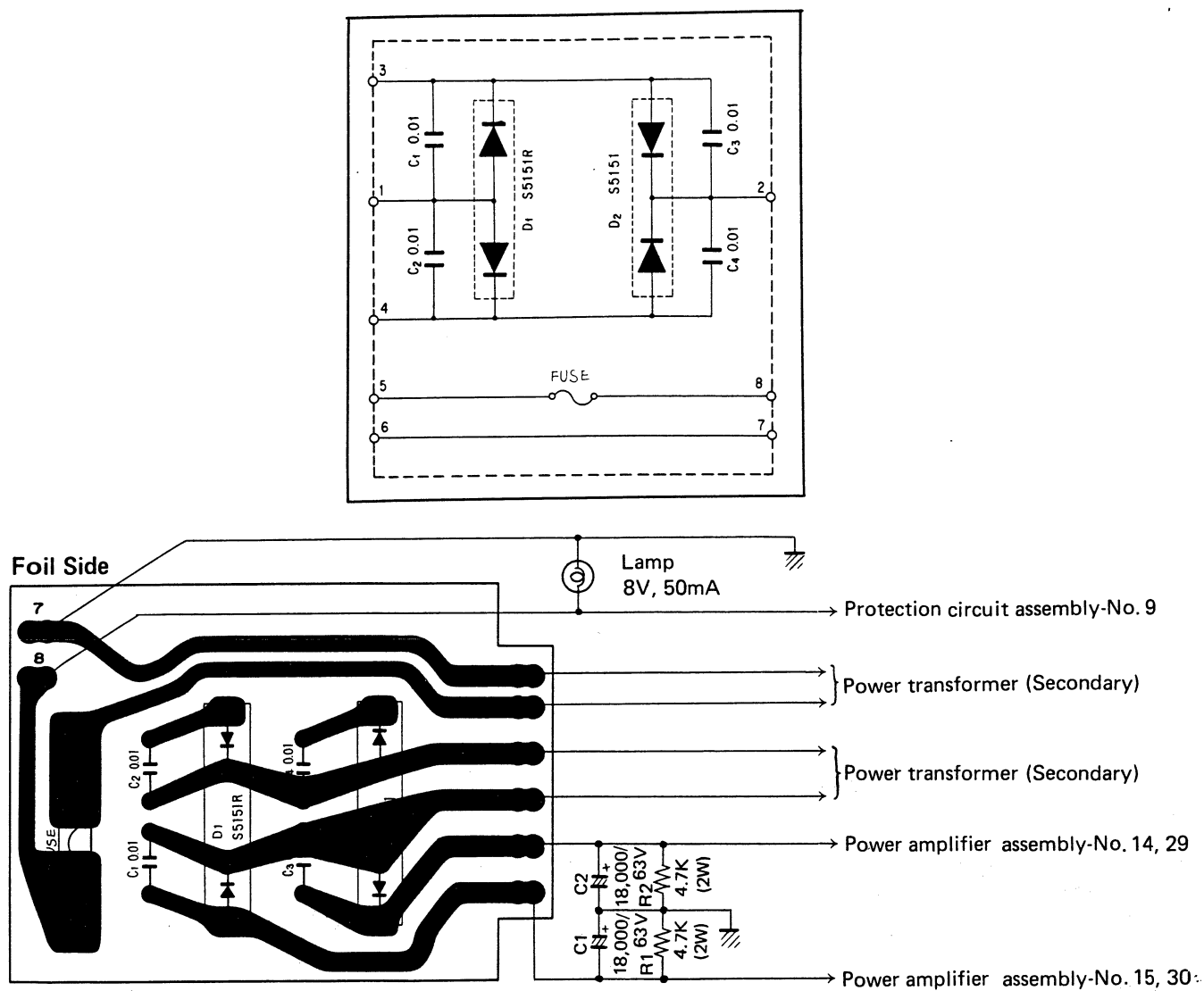
CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.01	150V	ACG-004-0
C2	Ceramic	0.01	150V	ACG-004-0
C3	Ceramic	0.01	150V	ACG-004-0
C4	Ceramic	0.01	150V	ACG-004-0
C5	Electrolytic	470	80V	ACH-038-0
C6	Electrolytic	470	80V	ACH-038-0
C7	Electrolytic	100	63V	CEA 101P 63
C8	Electrolytic	100	63V	CEA 101P 63
C9	Ceramic	100p	50V	CCDSL 101K 50
C10	Ceramic	100p	50V	CCDSL 101K 50
C11	Electrolytic	47	16V	CEA 470P 16
C12	Electrolytic	47	16V	CEA 470P 16
C13	Ceramic	100p	50V	CCDSL 101K 50
C14	Ceramic	100p	50V	CCDSL 101K 50
C15	Electrolytic	47	50V	CEA 470P 50
C16	Electrolytic	100	35V	CEA 101P 35
C17	Electrolytic	47	50V	CEA 470P 50
C18	Electrolytic	100	35V	CEA 101P 35
C19	Ceramic	100p	50V	CCDSL 101K 50
C20	Electrolytic	47	35V	CEA 470P 35
C21	Electrolytic	47	35V	CEA 470P 35

SEMICONDUCTORS

Symbol	Description		Part No.
Q1	Transistor	2SD313P-D or E	
Q2	Transistor	2SB50P-D or E	

11.10 POWER SUPPLY CIRCUIT ASSEMBLY-1 (AWR-074-A) or (AWR-089-0)



Parts List of Power Supply Circuit Assembly-1 (AWR-074-A) or (AWR-089-0)

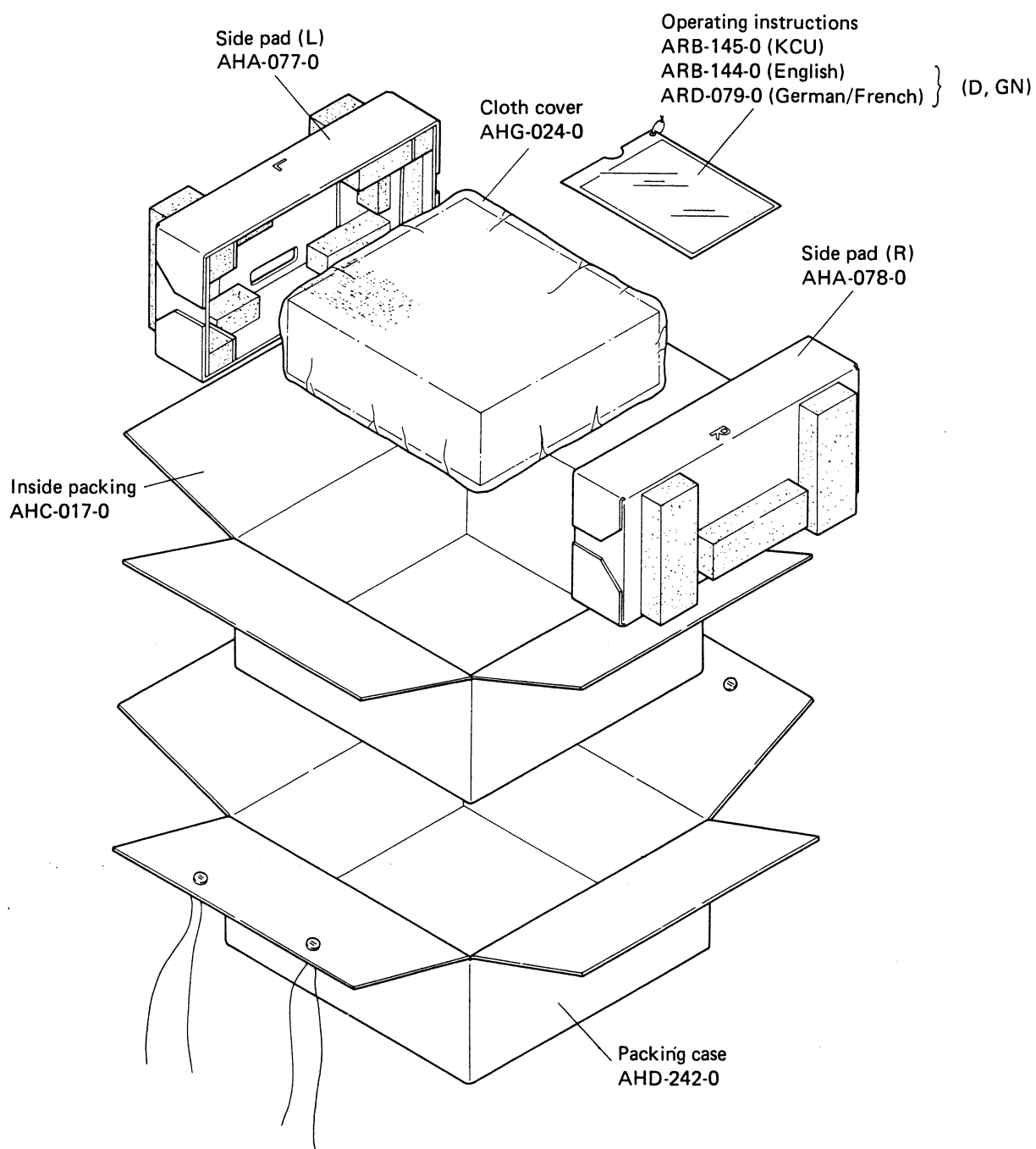
CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.01	150V	ACG-004-0
C2	Ceramic	0.01	150V	ACG-004-0
C3	Ceramic	0.01	150V	ACG-004-0
C4	Ceramic	0.01	150V	ACG-004-0

SEMICONDUCTORS

Symbol	Description		Part No.
D1	Diode	S5151R	
D2	Diode	S5151	

12. PACKING



13. PARTS LIST OF EXPLODED VIEW

Parts No.	Parts Name	Parts No.	Parts Name
AAB-046	Knob	ASG-085	Push switch (D, GN)
AAB-084	Knob	ASH-012	Slide switch
AAB-086	Knob	ASK-084	Lever switch
AAB-089	Knob	ASK-085	Lever switch
AAD-040	Knob	ASK-086	Lever switch
AAD-086	Knob	ASK-087	Lever switch
ABA-002	Screw M3x8	ASK-092	Lever switch
ABA-012	Screw M4x8	ASR-007	Relay
ABA-079	Screw M4x8	ATT-236	Power transformer (D)
ABA-083	Screw M4x12	ATT-237	Power transformer (GN)
ABE-001	Internal toothed washer	ATT-238	Power transformer (KCU)
ABE-006	Internal toothed washer	AWG-032	Control amplifier assembly
ABN-009	Both	AWH-041	Power amplifier assembly
ACH-047	Electrolytic capacitor	AWK-039	Input circuit assembly
ACV-144	Variable resistor	AWM-074	Protection circuit assembly
ACV-146	Variable resistor	AWR-074	Power supply circuit assembly
ACV-148	Variable resistor	AWR-075	Power supply circuit assembly-2 (KCU, D)
ADG-010	AC Power cord (D)	AWR-089	Power supply circuit assembly-1 (GN)
ADG-011	AC Power cord (KCU)	AWR-090	Power supply circuit assembly-1 (GN)
AEB-051	Rubber holder	AWS-082	Switch circuit assembly
AEC-076	Insulating wafer	AWX-073	Volume circuit assembly
AEC-079	AC Power cord stopper (D, KCU)	AWX-073	Volume circuit assembly (KCU)
AEC-085	Insulated nut	AWX-085	Fuse assembly (GN)
AEC-178	Foot assembly	AWX-086	Fuse assembly (KCU)
AEC-182	Phono jack cover	AWX-088	Fuse assembly (D)
AEC-209	AC outlet cover (D, KCU)	B22-016	Washer 9mm
AEL-051	Lamp with wire 8V 50mA	B71-004	Nut 9mm
AKB-023	Phone jack 4P	B71-010	Nut 7

