

STEREO AMPLIFIER

SA-7500II

SERVICE MANUAL



 PIONEER

MODEL SA7500II COMES IN FOUR VERSIONS DISTINGUISHED AS FOLLOWS:

| Type | Voltage | Remarks |
|------|--|---|
| KU | 120V only | UL (U.S.A.) approved |
| KC | 120V only | CSA (Canada) approved |
| HG | 220V and 240V (Switchable) | SEMKO (Sweden), NEMKO (Norway), DEMKO (Denmark) and EI (Finland) approved |
| S | 110V, 120V, 220V and 240V (Switchable) | General export model |

This service manual is applicable to the KU-type. When repairing the KC-type, HG-type or S-type, please see the additional service manual.

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1. SPECIFICATIONS

Semiconductors

| | |
|-------------|----|
| ICs | 2 |
| Transistors | 26 |
| Diodes | 17 |

Power Amplifier Section

Circuitry 2-stage differential amplifier Parallel
PP direct-coupled OCL

Continuous Power Output from 20 Hertz to 20,000 Hertz
(Both channels driven) . . . 45 watts per channel (8 ohms)
50 watts per channel (4 ohms)

Total Harmonic Distortion at 20 Hertz to 20,000 Hertz from
AUX

| | |
|---|-------|
| Continuous rated power output | 0.1% |
| 25 watts per channel power output, 8 ohms | 0.05% |
| 1 watt per channel power output, 8 ohms | 0.05% |

Intermodulation Distortion

| | |
|---|-------|
| Continuous rated power output | 0.1% |
| 25 watts per channel power output, 8 ohms | 0.05% |
| 1 watt per channel power output, 8 ohms | 0.05% |

Speakers A, B, A + B

Headphones Low impedance

Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms) . . . 30

Input (Sensitivity/Impedance)

| | |
|-------------|---------------|
| PHONO | 2.5mV/50kohms |
| TUNER | 150mV/50kohms |
| AUX | 150mV/50kohms |
| TAPE PLAY 1 | 150mV/50kohms |
| TAPE PLAY 2 | 150mV/50kohms |

PHONO Overload Level (T.H.D. : 0.1%) : 200mV (1kHz)

Output (Level/Impedance)

| | |
|------------|-------|
| TAPE REC 1 | 150mV |
| TAPE REC 2 | 150mV |

Frequency Response

| | |
|---------------------------|----------------------------|
| PHONO (RIAA Equalization) | 20Hz to 20,000Hz ±0.3dB |
| TUNER, AUX, TAPE PLAY | 10Hz to 40,000Hz ±1dB |

Tone Control

| | |
|--------|--------------------|
| BASS | +9dB, -8dB (100Hz) |
| TREBLE | +8dB, -6dB (10kHz) |

Filter

LOW 15Hz (6dB/oct.)

Loudness Contour (Volume control set at -40dB position)
. +6dB (100Hz), +3dB (10kHz)

Hum and Noise (IHF, short-circuited, A network, rated
power)

| | |
|-----------------------|------|
| PHONO | 73dB |
| TUNER, AUX, TAPE PLAY | 95dB |

Miscellaneous

Power Requirements 120V 60Hz only

Power Consumption 135watts (UL)
290VA (CSA), 400watts (Max.)

Dimensions 380(W) x 139(H) x 308(D)mm
15(W) x 5-1/2(H) x 12-1/8(D)in.

Weight Without Package: 9.1kg (20lb 1oz)
With Package: 10.1kg (22lb 4oz)

Furnished Parts

| | |
|--|---|
| Operating Instructions | 1 |
| Connection Cord with Pin Plugs | 1 |
| Hex. Wrench (Used for fastening Volume knob) | 1 |

NOTE:

Specifications and the design subject to possible modification without notice due to improvements.

2. FRONT PANEL FACILITIES

LOW FILTER SWITCH

When set to 15Hz (lower) position, frequencies below 15Hertz are attenuated by 6dB/octave. This permits reduction of ultra low frequency noise due to physical distortion of the record disc or other causes. Although such noise is inaudible to the human ear, it can be both detrimental to the speaker systems and contribute to intermodulation distortion. Setting the switch to 15Hz position is an effective measure if the record contains cutting noise.

POWER SWITCH

Set to ON position to energize SA-7500II. After setting to ON, there is a brief delay before sound is obtained. This is due to the operation of the muting circuit which prevents noise when the POWER is switched. This function does not indicate difficulty and normal operation condition is attained in a few seconds. The POWER switch also controls the rear panel SWITCHED convenience outlets.

PHONES JACK

When listening with stereo headphones, connect them to this jack.

NOTE:

Set **SPEAKERS** switch to OFF when listening only with headphones.

TONE SWITCH

In the ON position, tone adjustments can be performed with the BASS and TREBLE controls. When set to the upper (OFF) position, the tone control circuits are disengaged and frequency response is flat. This function is convenient for checking cartridge and speaker tone quality and listening room acoustics.

BASS AND TREBLE CONTROLS

Controls for adjusting low and high frequency tone. With the TONE switch in the ON position, turn controls clockwise to enhance low or high frequencies and counter-clockwise to attenuate their respective frequency ranges.

SPEAKERS SWITCH

Selects speaker system operation.

OFF: Sound not obtained from speakers (when using headphones).

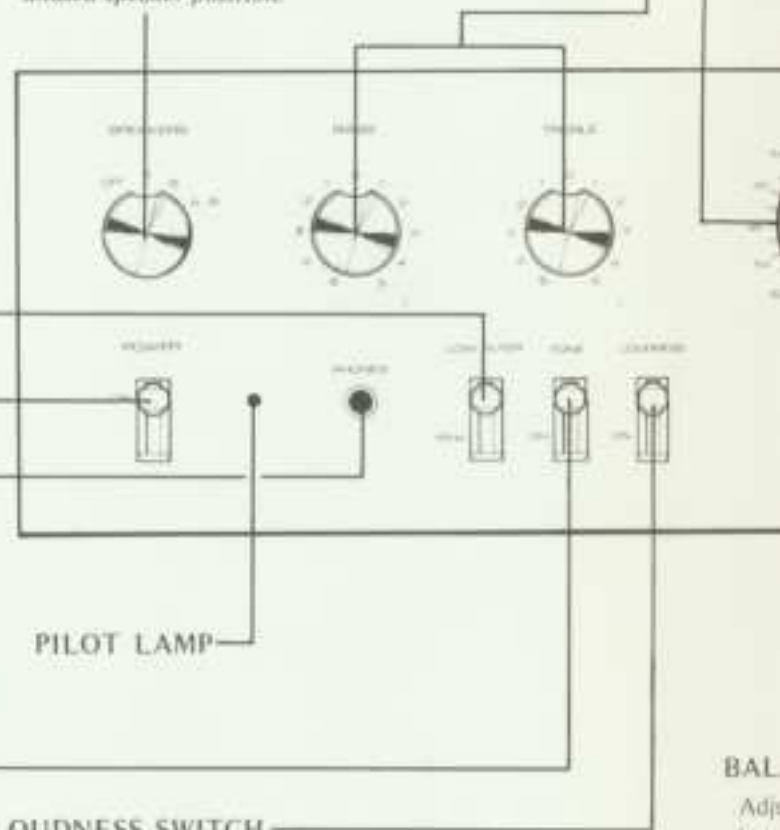
A: Sound obtained from speakers connected to A speaker terminals.

B: Sound obtained from speakers connected to B speakers terminals.

A + B: Sound obtained from speakers connected to both A and B speaker terminals.

NOTE:

When listening with headphones or to temporarily interrupt the speaker sound, set switch to OFF or to an unused speaker position.



LOUDNESS SWITCH

When listening at low volume settings, set switch to ON to enhance low and high frequencies. The response of the human ear to sound differs according to loudness. This switch compensates for this effect at low volumes.

VOL

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quency ranges.

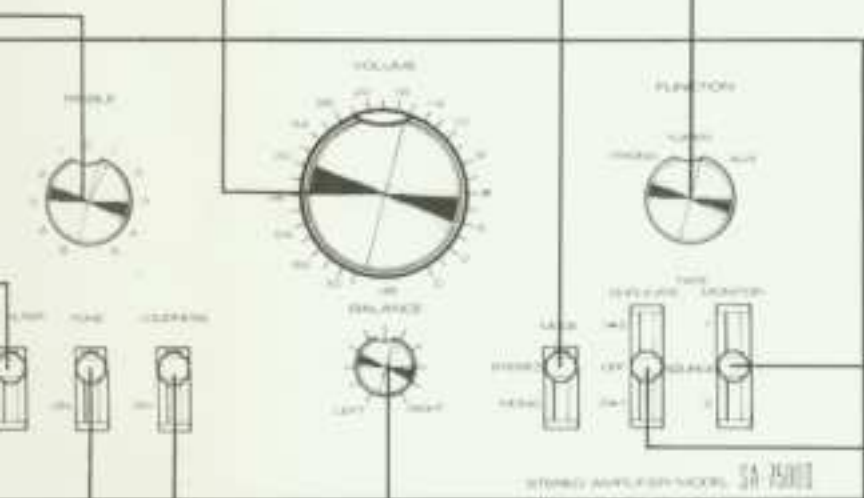
rs (when using

connected to A

connected to B

connected to

mparily inter-
OFF or to an



VOLUME CONTROL

Adjusts speaker and headphone volume. Scale indicates attenuation in dB with maximum volume assigned an arbitrary value of 0dB. Clockwise rotation increases volume.

MODE SWITCH

Selects stereo or mono playback modes.

STEREO: Stereo reproduction

MONO: Left and right channel signals are mixed and reproduced monophonically.

FUNCTION SWITCH

Selects desired playback program source.

PHONO: To play records on a turntable connected to the PHONO jacks.

TUNER: To listen to broadcasts with a tuner connected to the TUNER jacks.

AUX: To play a component connected to the AUX jacks.

TAPE MONITOR SWITCH

Employ for tape playback or to monitor a recording in progress.

1: Playback or monitoring of a tape deck connected to the TAPE 1 jacks.

SOURCE: Be sure to set to this position when not using the tape deck for playback.

2: Playback or monitoring of a tape deck connected to the TAPE 2 jacks.

NOTE:

When listening to records or broadcasts, be sure to set this switch to SOURCE. Sound will not be obtained from speakers if set to 1 or 2.

BALANCE CONTROL

Adjusts relative left and right channel volume balance between speaker systems and headphones. If the right channel volume is insufficient, turn the control clockwise from center. Conversely, if the left channel volume is insufficient, turn the control counter-clockwise from center.

TAPE DUPLICATE SWITCH

Employ when using two tape decks for duplication or editing. Be sure to set to OFF position at other times.

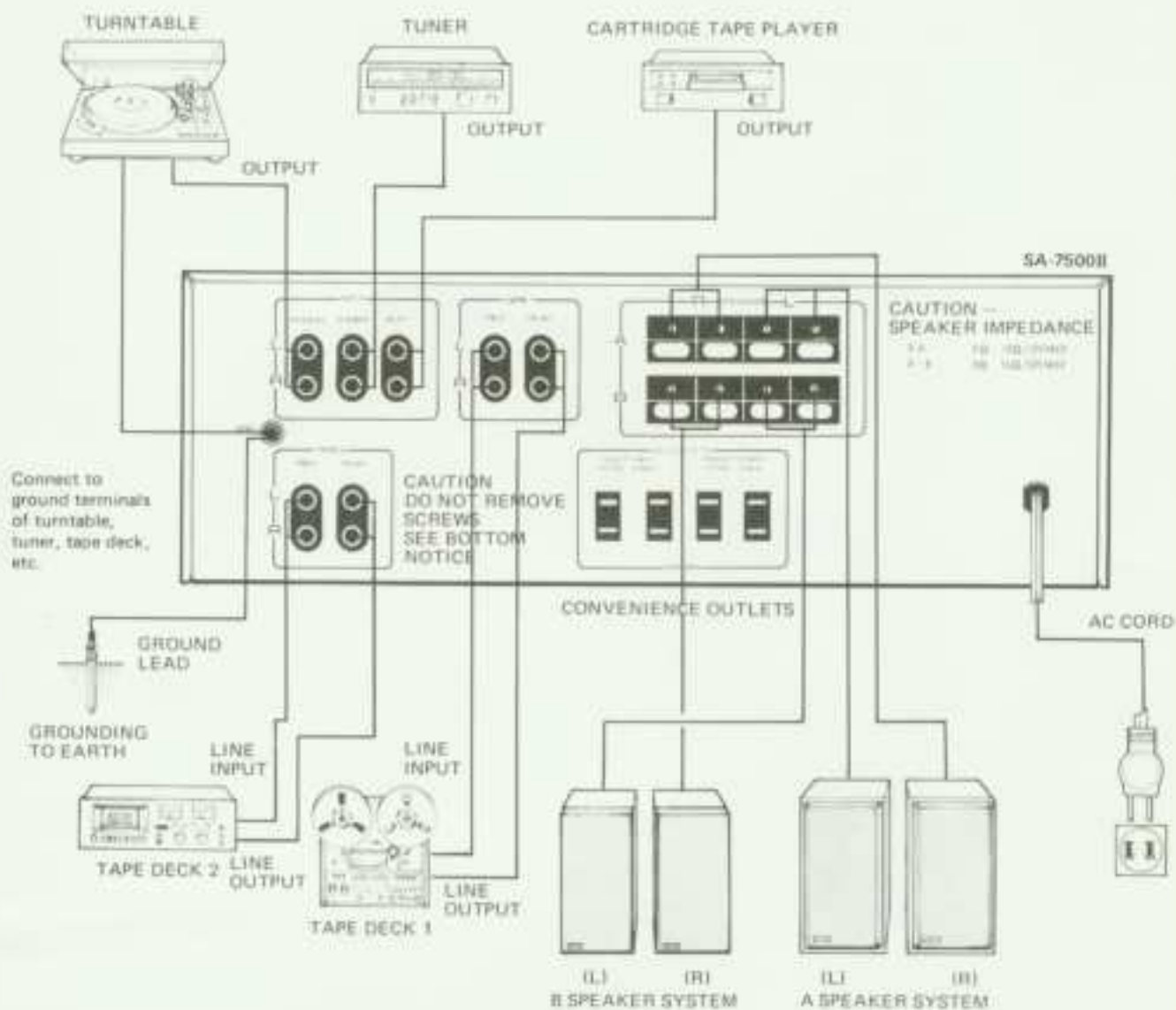
1 → 2: Duplication of tape from TAPE 1 (playback mode) to TAPE 2 (recording mode).

OFF: Set to this position when not using the duplication feature (this includes simultaneous recording with two tape decks and tape playback).

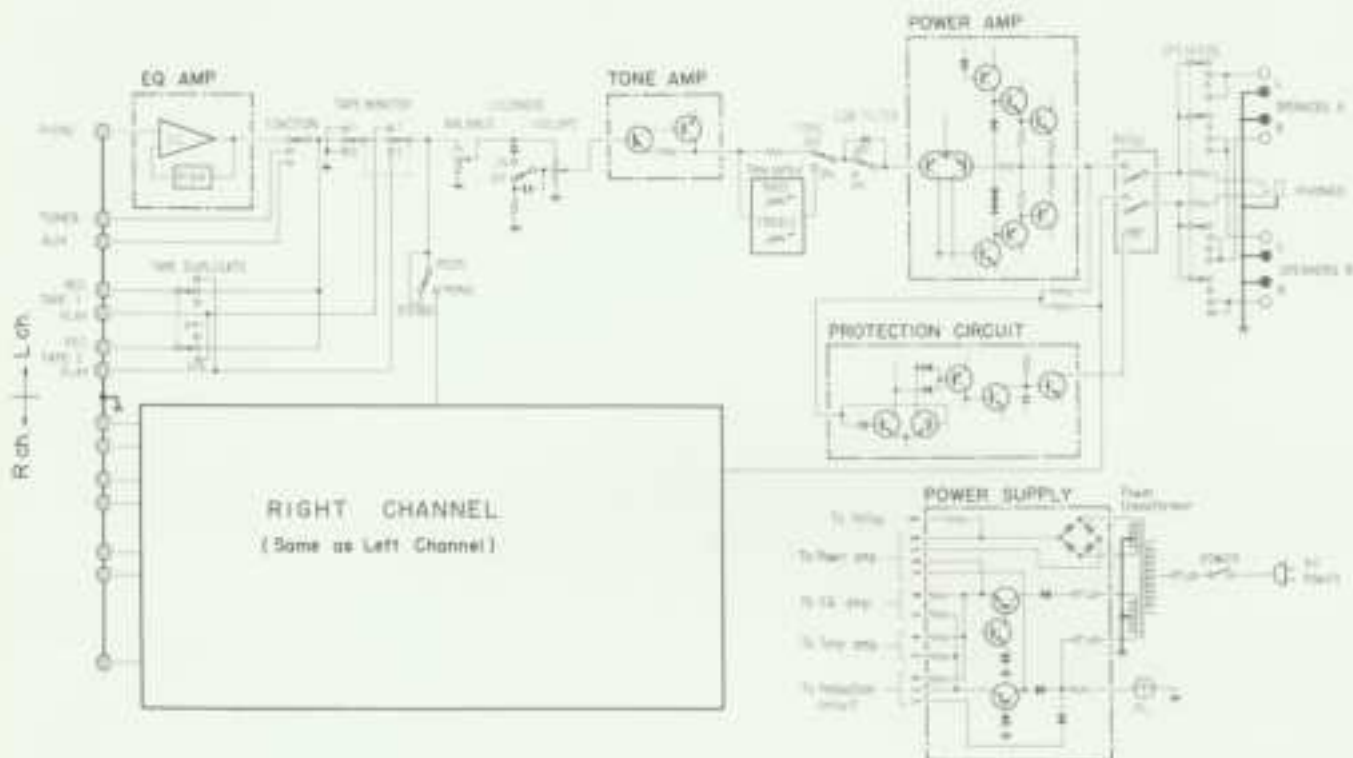
2 → 1: Duplication of tape from TAPE 2 (playback mode) to TAPE 1 (recording mode).

switch to ON to
response of the
loudness. This
tunes.

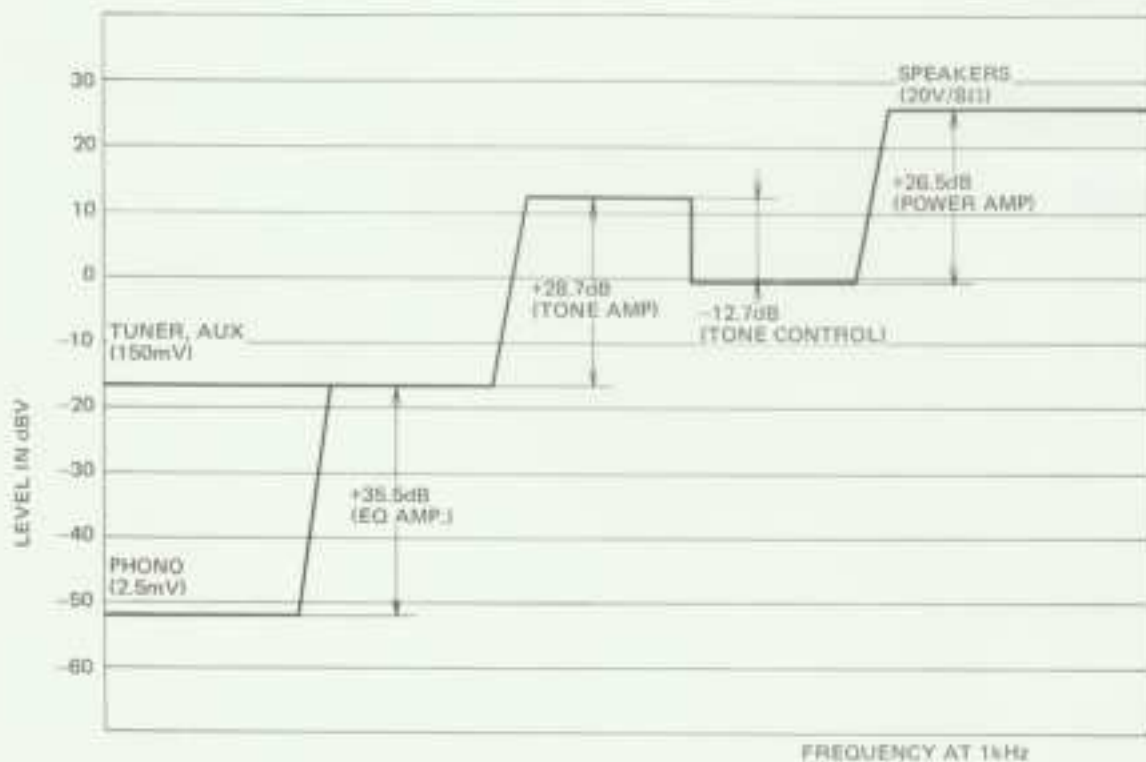
3. CONNECTION DIAGRAM



4. BLOCK DIAGRAM



5. LEVEL DIAGRAM



6. CIRCUIT DESCRIPTIONS

6.1 AF SECTION

Phono Equalizer Amplifier

This circuit is an NFB type equalizer, with one IC (M5211L-P) in both L and R channels. This IC is a low noise type, and gives an open loop gain of 86dB. It requires a dual positive and negative supply two power lines (+21V, -20V). In this application, 50.5dB of negative feedback is applied at 1kHz. The main performance specifications for this circuit include a voltage gain of 35.5dB (at 1kHz) a phono dynamic margin or overload level of 200mV (RMS, at 1kHz, with 0.1% total harmonic distortion), and RIAA equalization within ± 0.3 dB (20Hz-20,000Hz).

Tone Control Circuit

A CR-type tone control circuit is used in this unit. The signal is amplified to the necessary level by a two-stage direct-coupled amplifier with a voltage gain of about 28.7dB in front of the control circuit.

Figure 1 shows the basic circuit for the CR-type tone controls. This circuit consists of a combination of CR passive filters. VR1 is the treble control, and VR2 is the bass control, and both of them are continuously variable potentiometers.

The Mid-Range

The reactances of C_3 and C_4 are sufficiently small with respect to the resistance of VR_2 to ensure that VR_2 is shorted. The reactances of C_1 and C_2 , on the other hand, are large enough to ensure that the VR_1 circuit is open circuited. Therefore, the circuit in Figure 1, for mid-range frequencies, resolves into the attenuator network shown in Figure 2 which consists of R_1 and R_2 (in this unit, approximately -12.7dB).

High Frequency Region

The reactances of C_3 and C_4 are sufficiently small compared with the resistance of VR_2 , for VR_2 to be effectively shorted. The reactances of C_1 and C_2 become small, and the circuit in Figure 1 becomes equivalent to the circuit in Figure 3. Therefore, VR_1 (treble) is able to provide control of the high frequencies by changing the attenuation.

Low Frequency Region

The reactances of C_1 and C_2 are large, and the VR_1 circuit becomes open circuited. The reactances of C_3 and C_4 become large, and the circuit of Figure 1 becomes equivalent to the circuit in Figure 4. Therefore, VR_2 (bass) is able to provide control of

the low frequency regions by varying the attenuation.

Further, note that the range of treble and bass boost and cut is as follows: bass; +9dB, to -8dB (at 100Hz), treble; +8dB, to -6dB (at 10kHz).

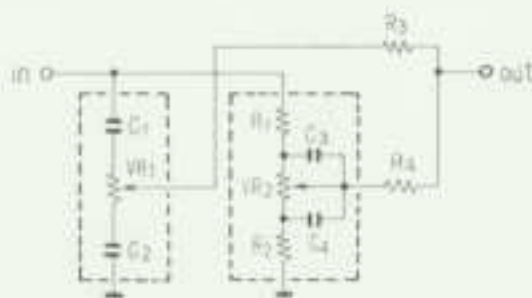


Fig. 1 Basic circuitry of CR-type tone control circuit

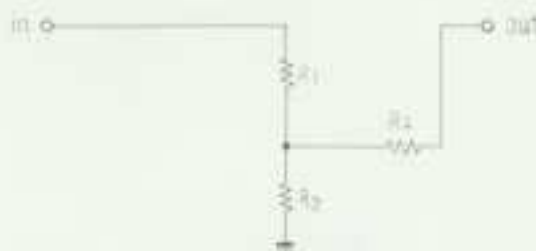


Fig. 2 Midrange operation of CR-type tone control circuit

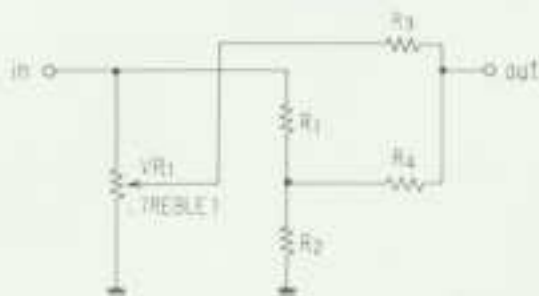


Fig. 3 High frequency operation of CR-type tone control circuit

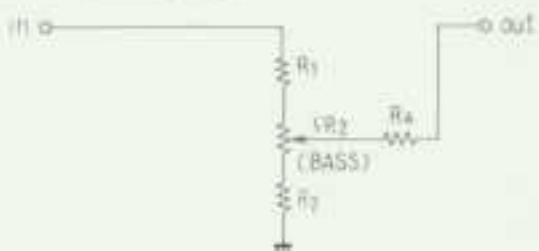


Fig. 4 Low frequency operation of CR-type tone control circuit

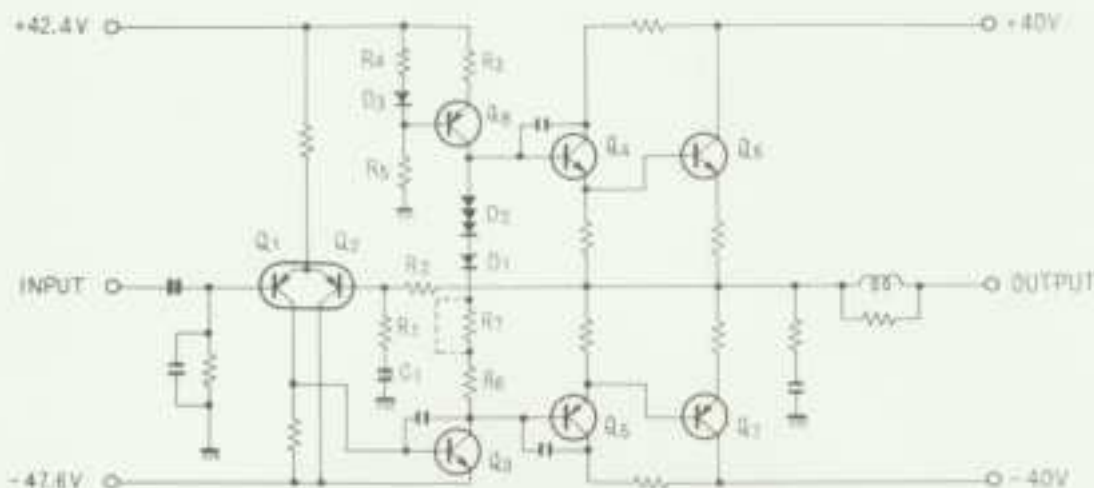


Fig. 5 Schematic diagram of power amplifier

Power Amplifier

The power amplifier of this set is, as shown in Fig. 5, a typical OCL amplifier.

The input stage, Q_1 and Q_2 , consists of a dual transistor package of two PNP transistors with closely matched characteristics, forming a differential amplifier. As the input signal is amplified, this circuit also serves to maintain the output midpoint DC potential at zero volts. Since C_1 represents an open circuit to DC, the output midpoint DC potential is applied to the base of Q_1 through R_2 . Since Q_1 and Q_2 form a differential amplifier, changes in the base potential of Q_2 are equivalent to the effect of an opposite change in the base potential of Q_1 , so that the output midpoint potential is changed in the opposite sense. It follows, therefore, that this arrangement serves to cancel out any movement in the output midpoint potential level.

The pre-driver (Q_3) requires a high voltage gain (since the power stage has no voltage gain). For this reason the constant current circuit formed by Q_3 , R_3 , R_4 and D_3 is used as the load circuit, so that the AC load impedance is increased, and the necessary high voltage gain achieved.

The power stage (Q_4 - Q_7) is a symmetrical complementary Darlington-connected circuit, in which R_5 (R_7), D_1 and D_2 supply the power stage bias.

6.2 PROTECTION CIRCUIT

This circuit protects the speakers in case of power amplifier malfunction, and also performs a muting function when the power supply is turned ON or OFF. The protection circuit is composed of two sections (Fig. 6).

1. Relay Driver Circuit

The relay which connects the output circuits is driven by this circuit. It also performs a muting function to prevent unpleasant noise during ON-OFF operation of the power supply as well as opening the output circuit on command from the detector circuits.

Muting Operation

When the power supply is turned ON, Q_4 base is reverse biased through D_3 , R_4 and R_3 , turning Q_4 OFF. Q_4 base potential rises as C_1 charges through R_7 & R_5 , and Q_4 turns ON several seconds later. The collector current of Q_4 then flows through the relay coil, operating the relay to turn on the power amplifier output circuit. The reverse bias of Q_4 base from D_3 , R_4 and R_3 disappears when the power supply is set from ON to OFF.

Q_4 remains ON however, due to the residual power supply voltage. C_1 very rapidly discharges, Q_4 base potential drops and Q_4 turns OFF. The relay releases and the power amplifier output circuit turns OFF.

Note:

Q_4 is normally OFF due to base bias and does not participate in the muting operation.

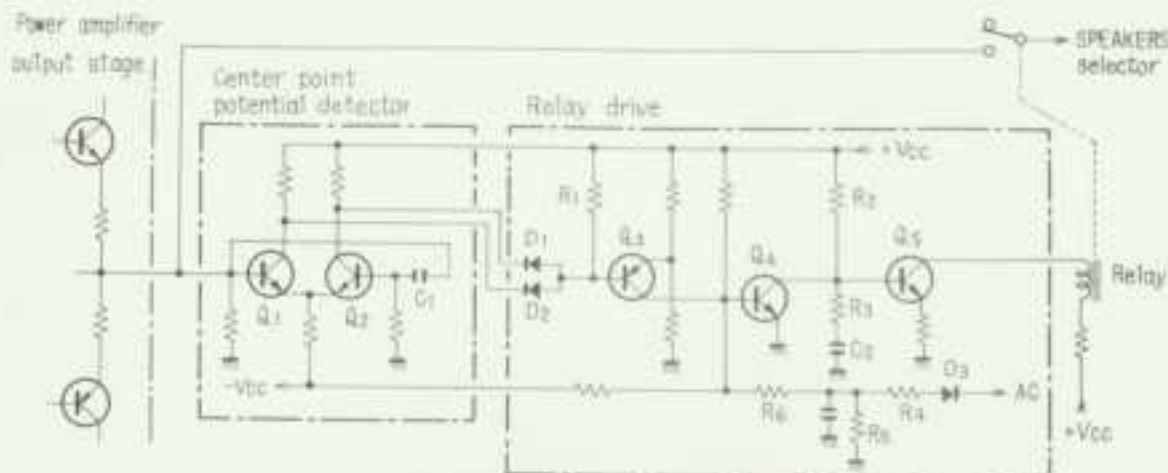


Fig. 6 Basic circuitry of protection circuit

Operation by Detector Circuit Command

Command from the detector circuits pass through one of D_1 or D_2 and are applied in the form of a current flow. Q_1 is normally reverse biased through R_1 , but when a large current flows through one of these diodes, Q_1 base potential declines according to the voltage drop at R_1 . Q_2 then becomes ON, Q_4 base potential rises and Q_4 becomes ON. C_1 rapidly discharges and Q_1 base potential drops, turning Q_1 OFF. The relay releases and the power amplifier output circuit becomes cut off.

2. Center Point Potential Detector Circuit

If a DC potential is produced at the junction point of the power amplifier, a command is sent to the relay drive circuit.

Q_1 and Q_2 compose a differential amplifier. When the same input is applied to both input terminals (Q_1 and Q_2 bases), no output is present. However, if there is a difference between the terminal inputs, the difference is amplified and becomes the output between the two collectors. During normal operation, an AC signal only is present at the junction point. As C_1 reactance is sufficiently low, the same signal is applied to Q_1 and Q_2 bases, resulting in an absence of output at the collector sides.

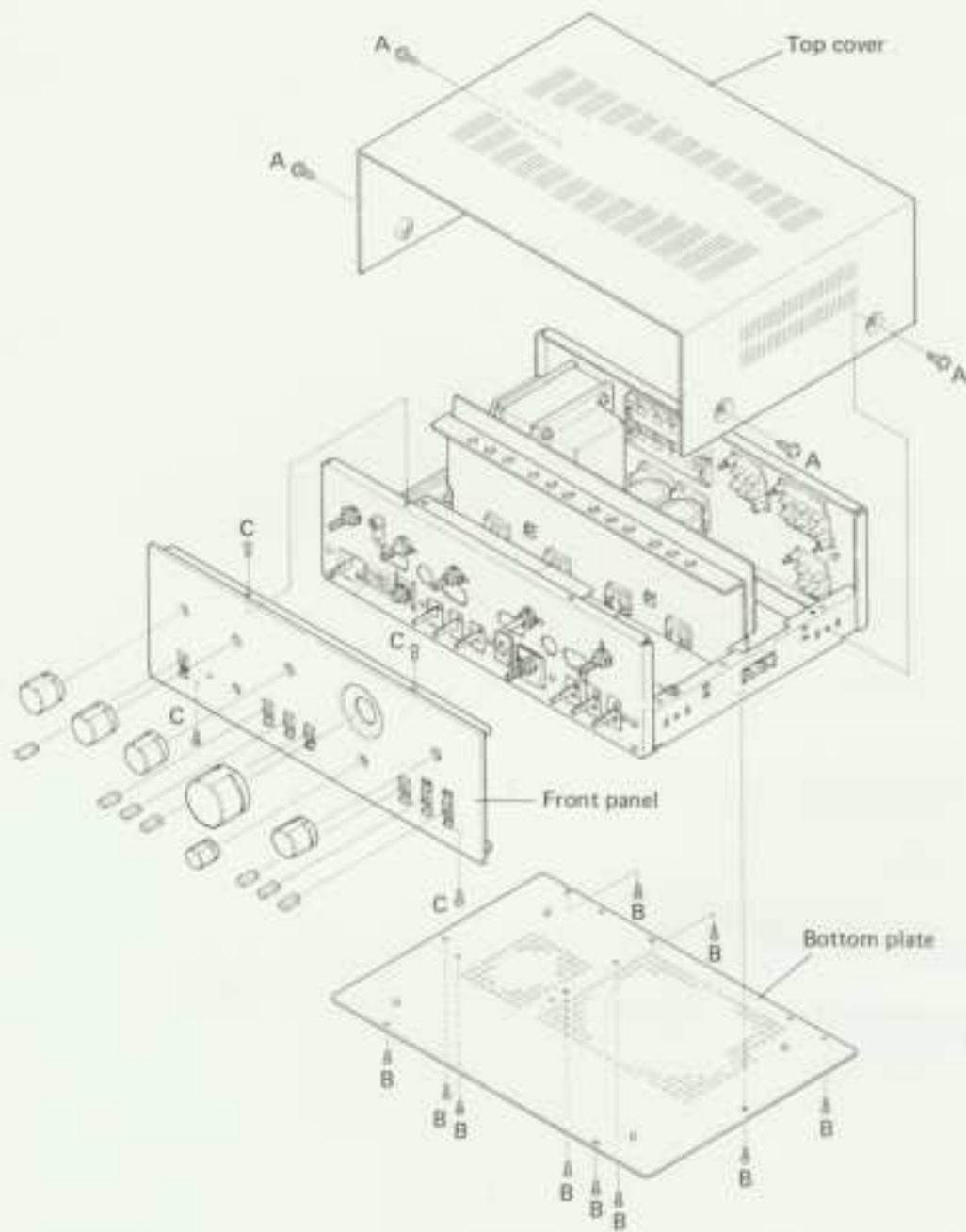
When a DC potential is produced at the junction point, it becomes the input of Q_1 only. If the voltage is negative, Q_1 collector current declines and at Q_2 the collector current increases and the potential drops, causing current to flow through D_1 .

If the DC voltage is positive, Q_1 collector current increases and the potential drops, while at Q_2 the collector current decreases and the potential rises. Current therefore flows through D_2 .

6.3 POWER SUPPLY CIRCUIT

The final stage of the power amplifier consists of a $\pm 40V$ balanced power supply using bridge rectification and two 10,000 μF electrolytic capacitors. Separate transformer windings are used to supply the other stages, together with half-wave rectification and regulatory circuits using transistors and Zener diodes to deliver the necessary electrical power.

7. DISASSEMBLY



Top Cover

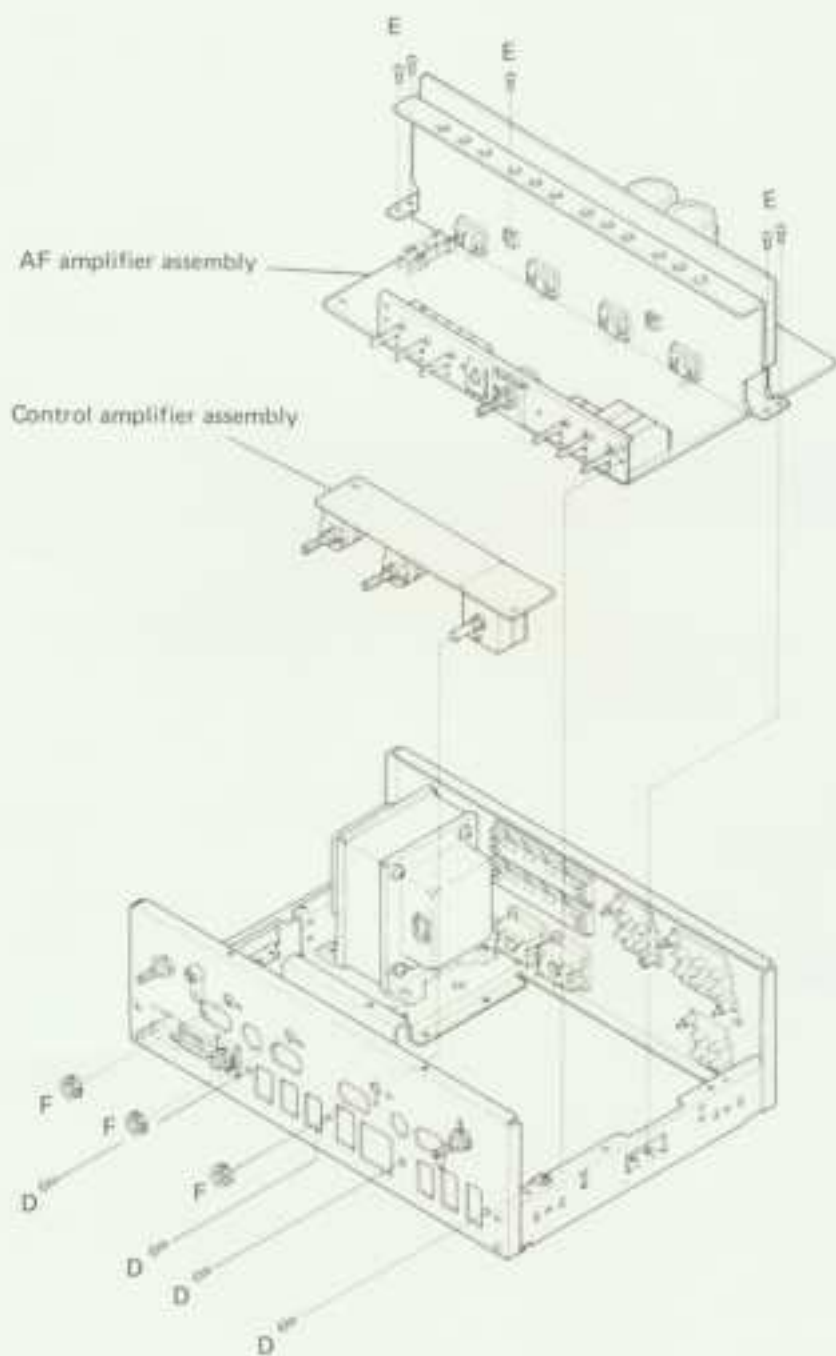
Remove screws A (two each, on left and right-hand sides).

Bottom Plate

Remove screws B (ten in all).

Front Panel

Pull off all the knobs (loose the set screws of VOLUME knob), and remove the upper and lower retaining screws C (a total of four screws).

**AF Amplifier Assembly**

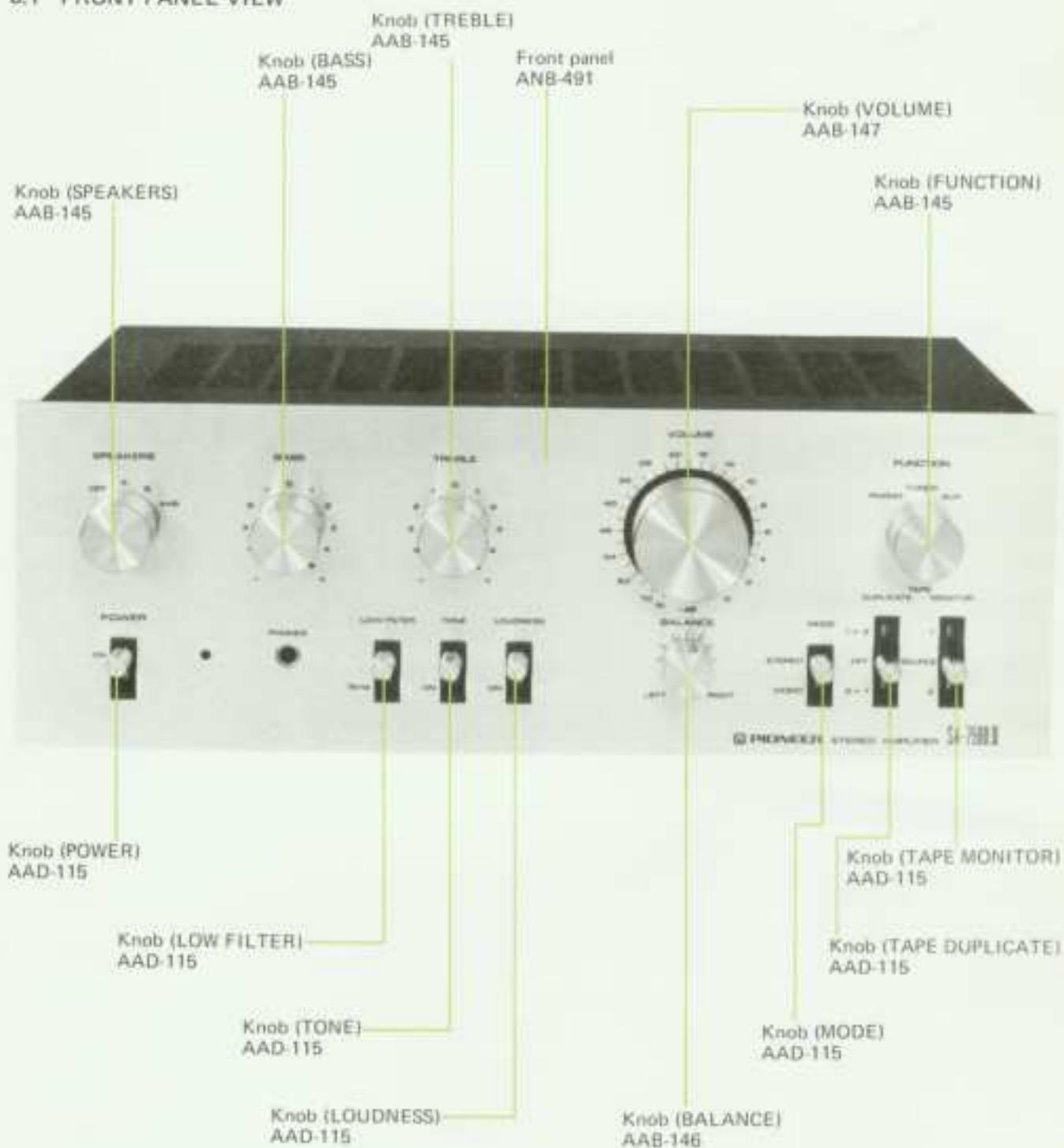
Remove the front side retaining screws D (four in all) and top side retaining screws E (five in all).

Control Amplifier Assembly

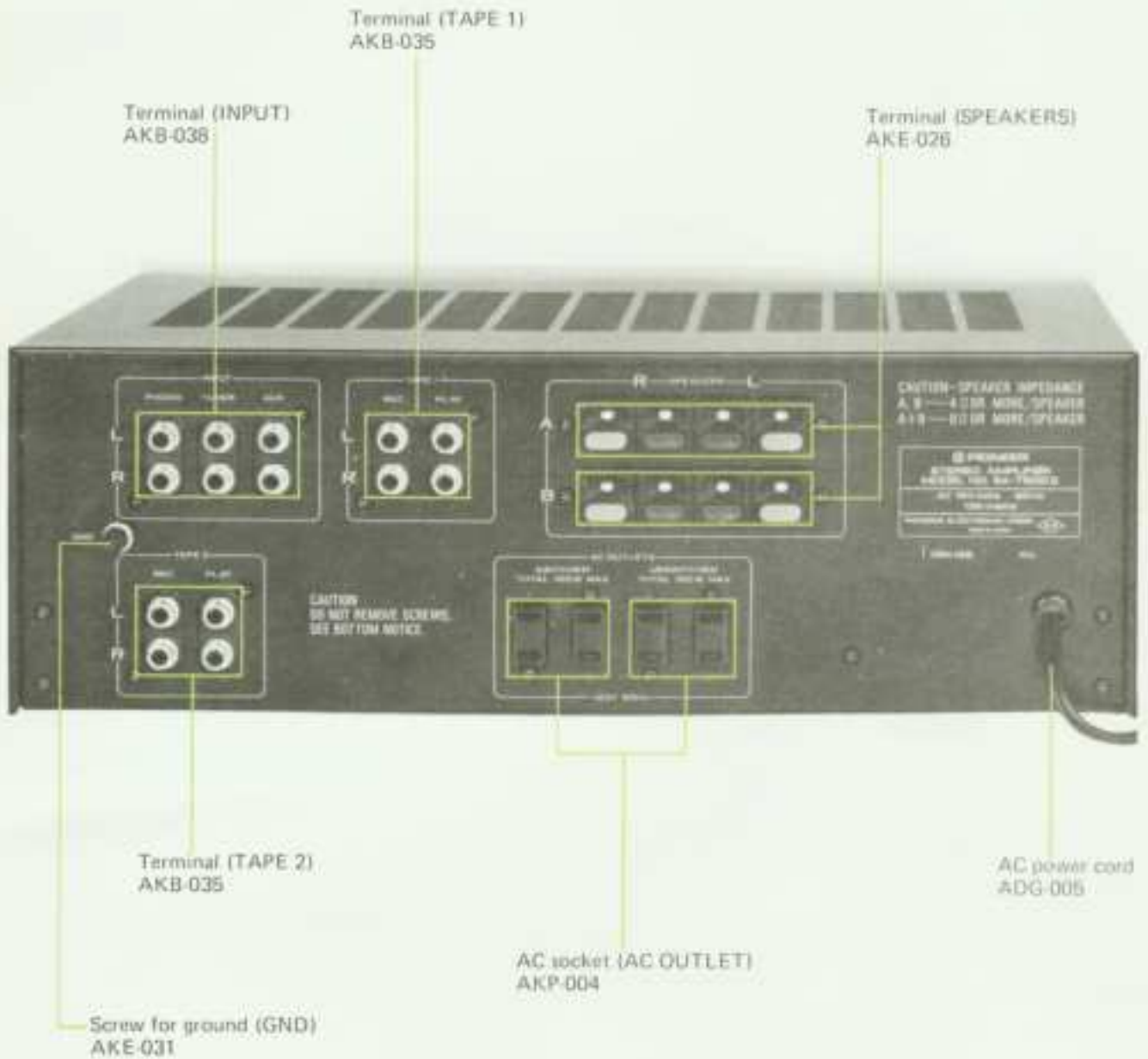
Remove nuts F (three in all).

8. PARTS LOCATION

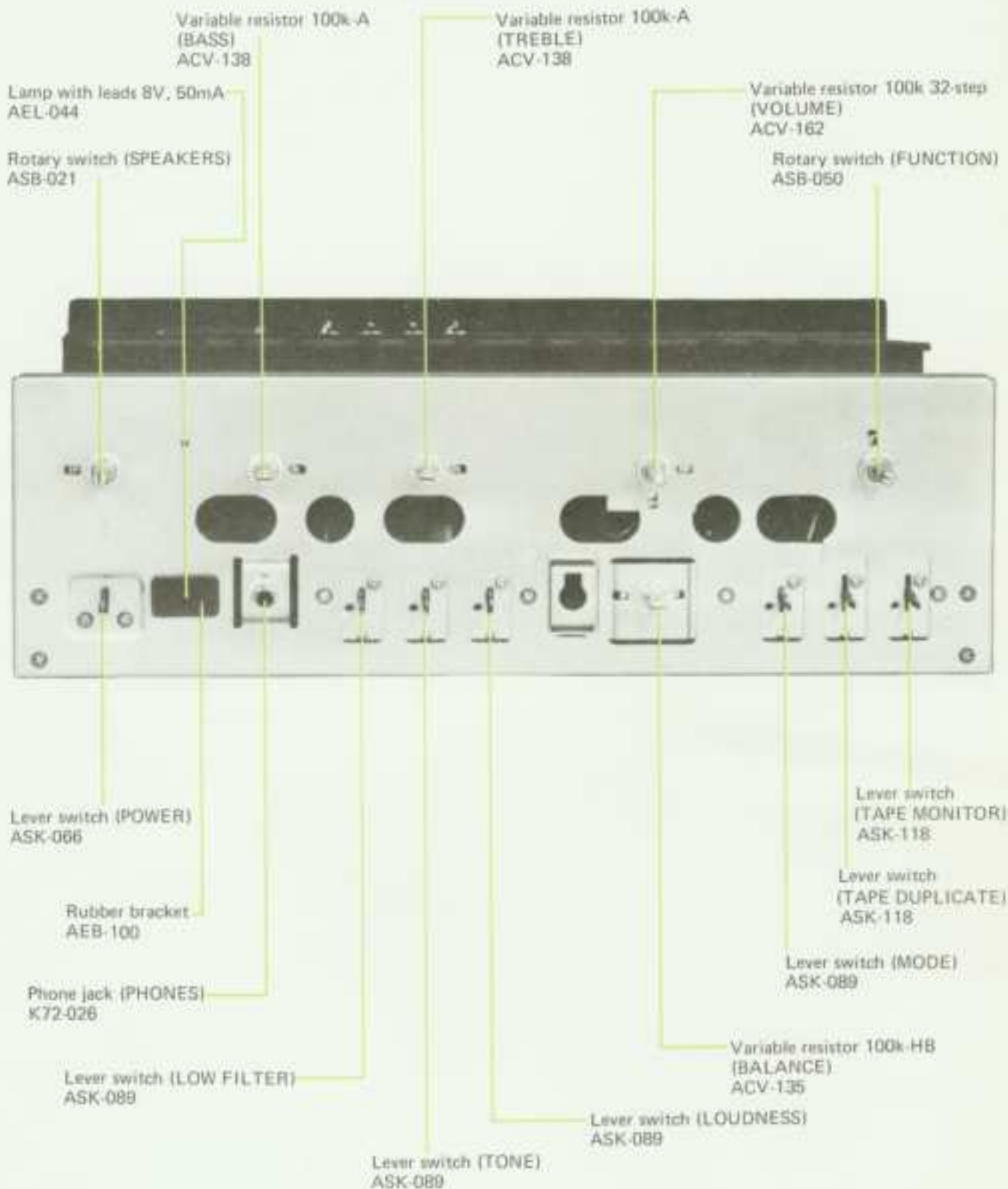
8.1 FRONT PANEL VIEW



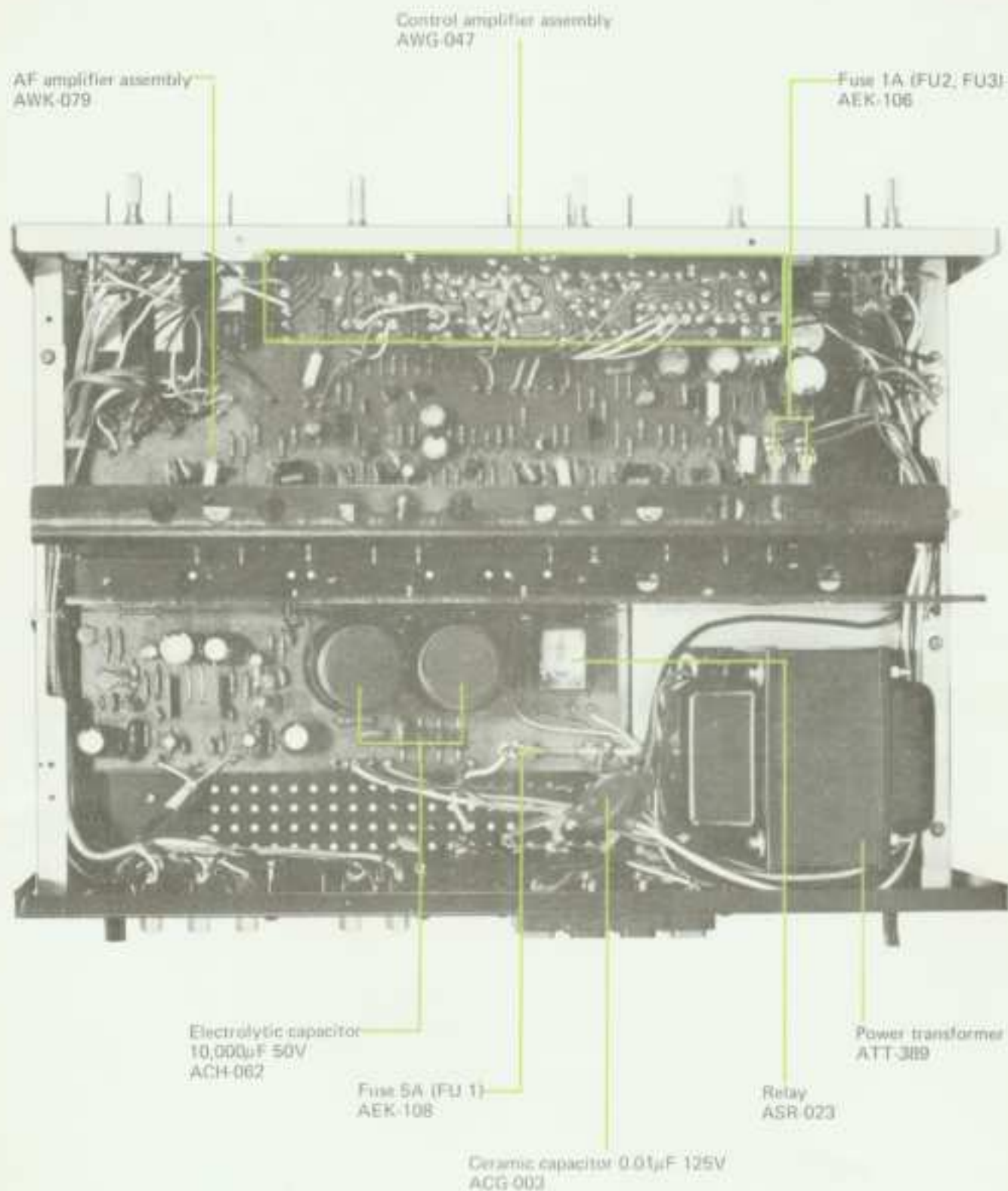
8.2 REAR PANEL VIEW



8.3 FRONT VIEW WITH PANEL REMOVED

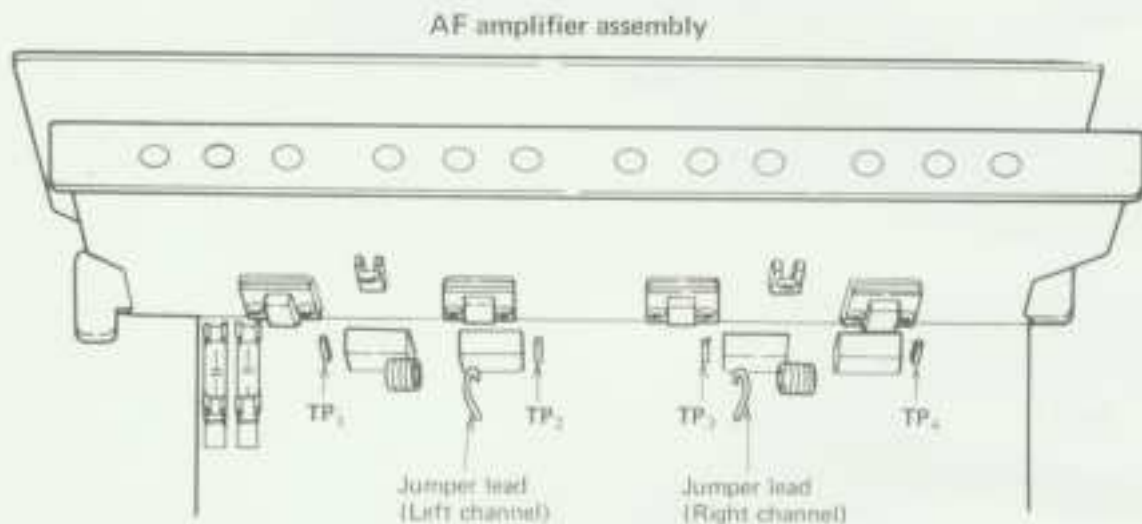


8.4 TOP VIEW



9. ADJUSTMENT

1. 8 ohms dummy loads should be connected across the SPEAKERS A terminals.
2. Set the SPEAKERS switch to A position.
3. Set the TONE switch to OFF position.
4. Set the VOLUME control to minimum.
5. A DC voltmeter should be connect across between TP terminals 1(+), 2(-) for Left channel and 4(+), 3(-) for Right channel.
6. DC voltmeter reading tolerance is from 10mV to 70mV. Cut the jumper lead, if the voltage less then 10mV. Check the circuit, if the voltage more than 70mV.
7. Finally, apply an actual signal, and check for no crossover distortion.



10. EXPLODED VIEW

A

Screw 4x8
ABA-079

Top cover
ANE 127

B

Screw 4x8
ABA-079

C

Knob (SPEAKERS)
AAB-145

Knob (POWER)
AAD-115

Knob (BASS, TREBLE)
AAB-145

Knob (TONE, LOUDNESS, LOW FILTER)
AAD-115

Knob (VOLUME)
AAB-147

Knob (BALANCE)
AAB-148

Knob (MODE, DUPLICATE, MONITOR)
AAD-115

Knob (FUNCTION)
AAB-145

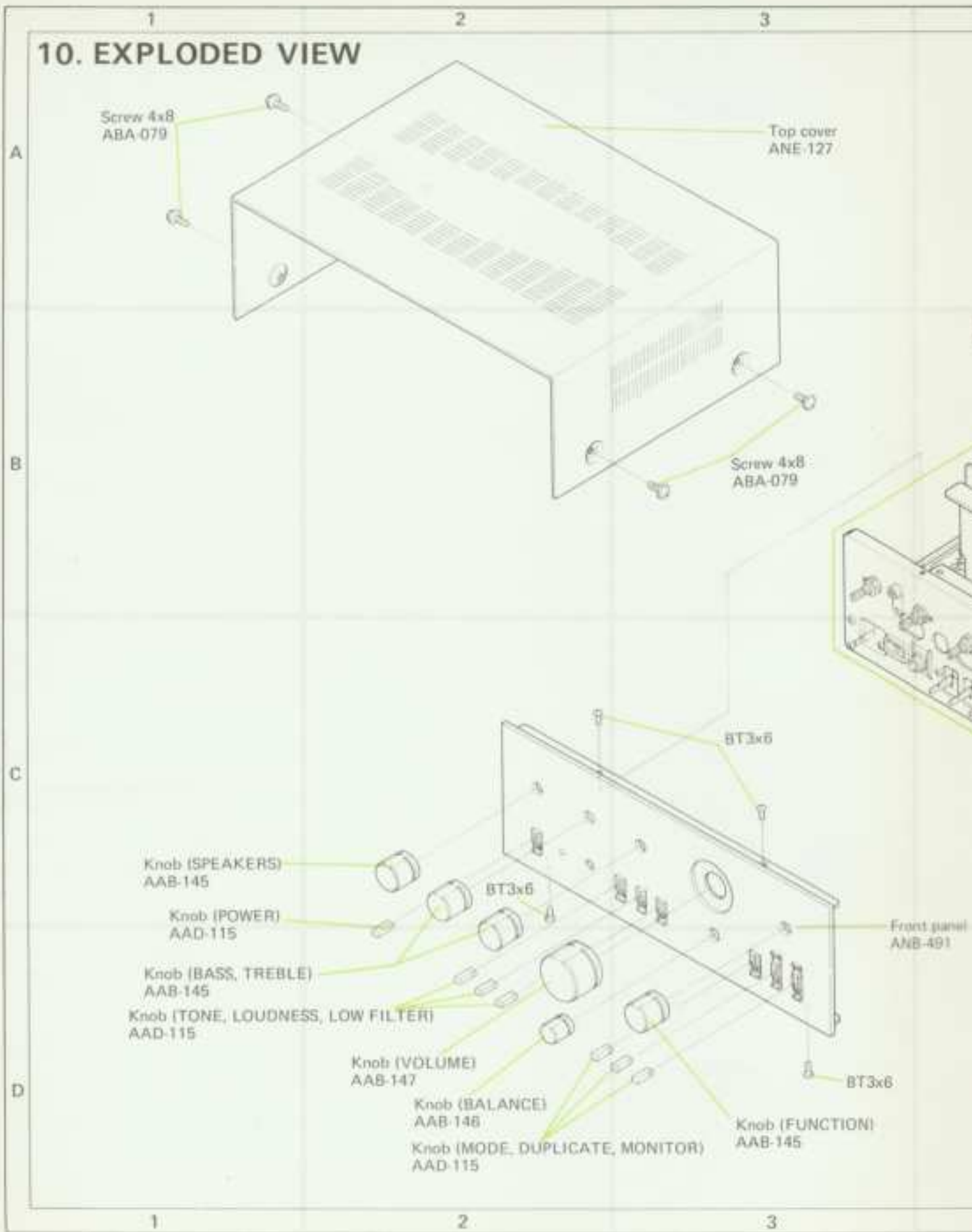
Front panel
ANB-491

D

1

2

3



4

5

6

NOTE:

Parts indicated in green type cannot be supplied.

Top cover
ANE-127Screw 3x8
ABA-002PART 2
See Page 21.PART 1
See Pages 19–20.Screw 3x8
ABA-002Screw 3x8
ABA-002

A

B

C

D

Front panel
ANB-491Screw 3x8
ABA-002Screw 3x8
ABA-002Foot
AEC-083

RT4x10

Screw 3x8
ABA-002Foot
AEC-083

RT4x10

Foot
AEC-083Screw 3x8
ABA-002Foot
AEC-083

RT4x10

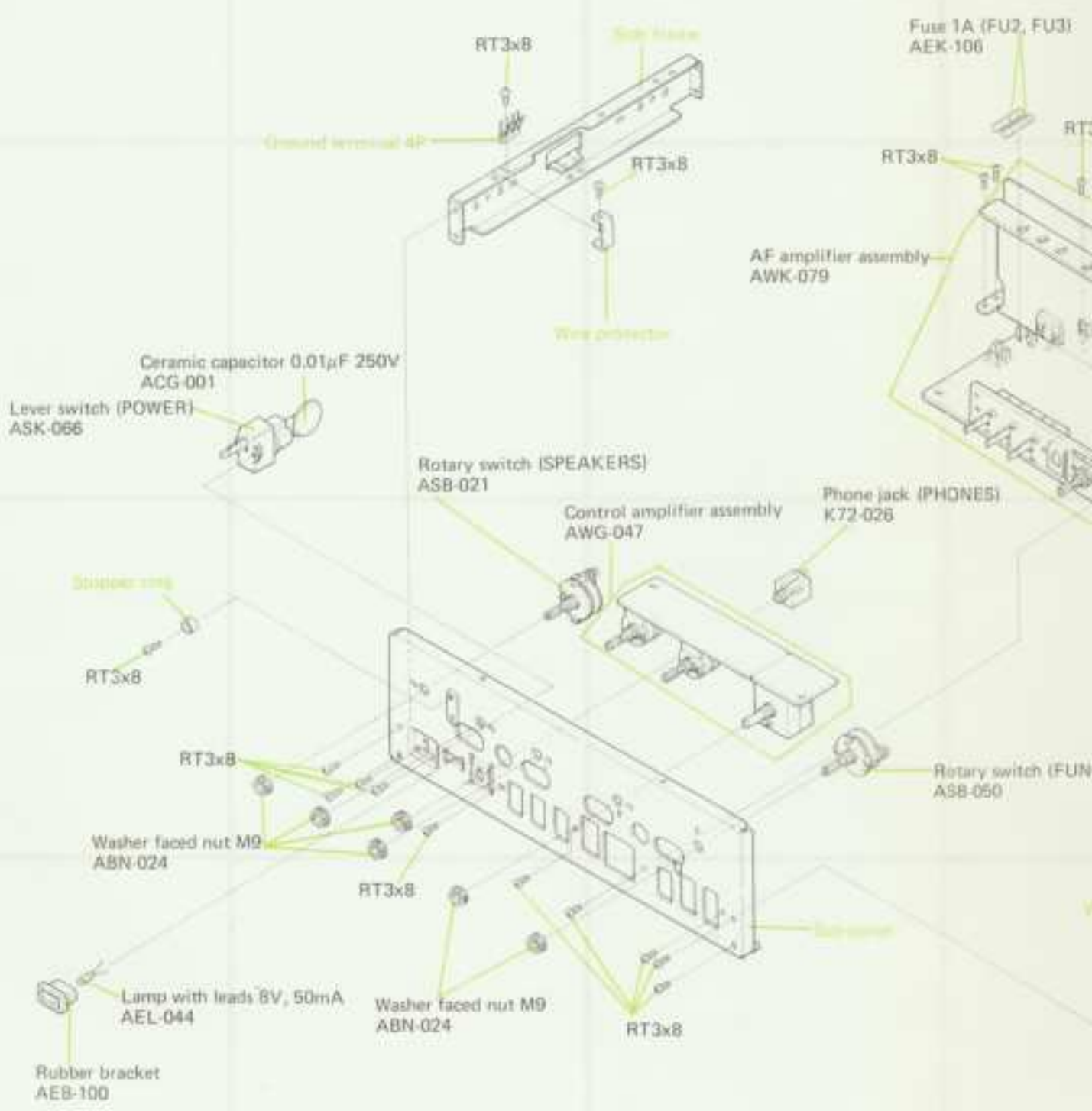
(FUNCTION)
45

4

5

6

Part 1



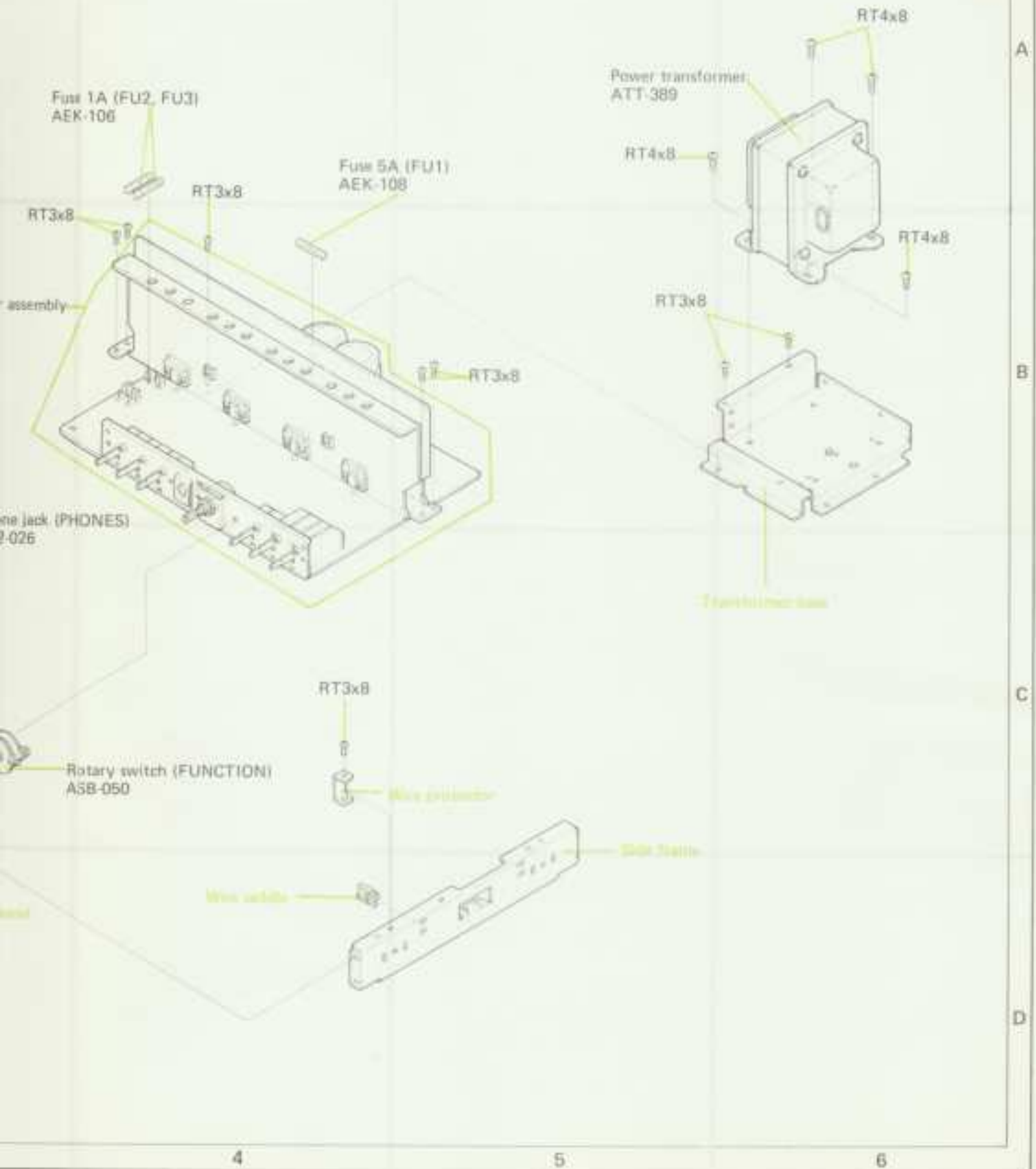
4

5

6

NOTE:

Parts indicated in green type cannot be supplied.



4

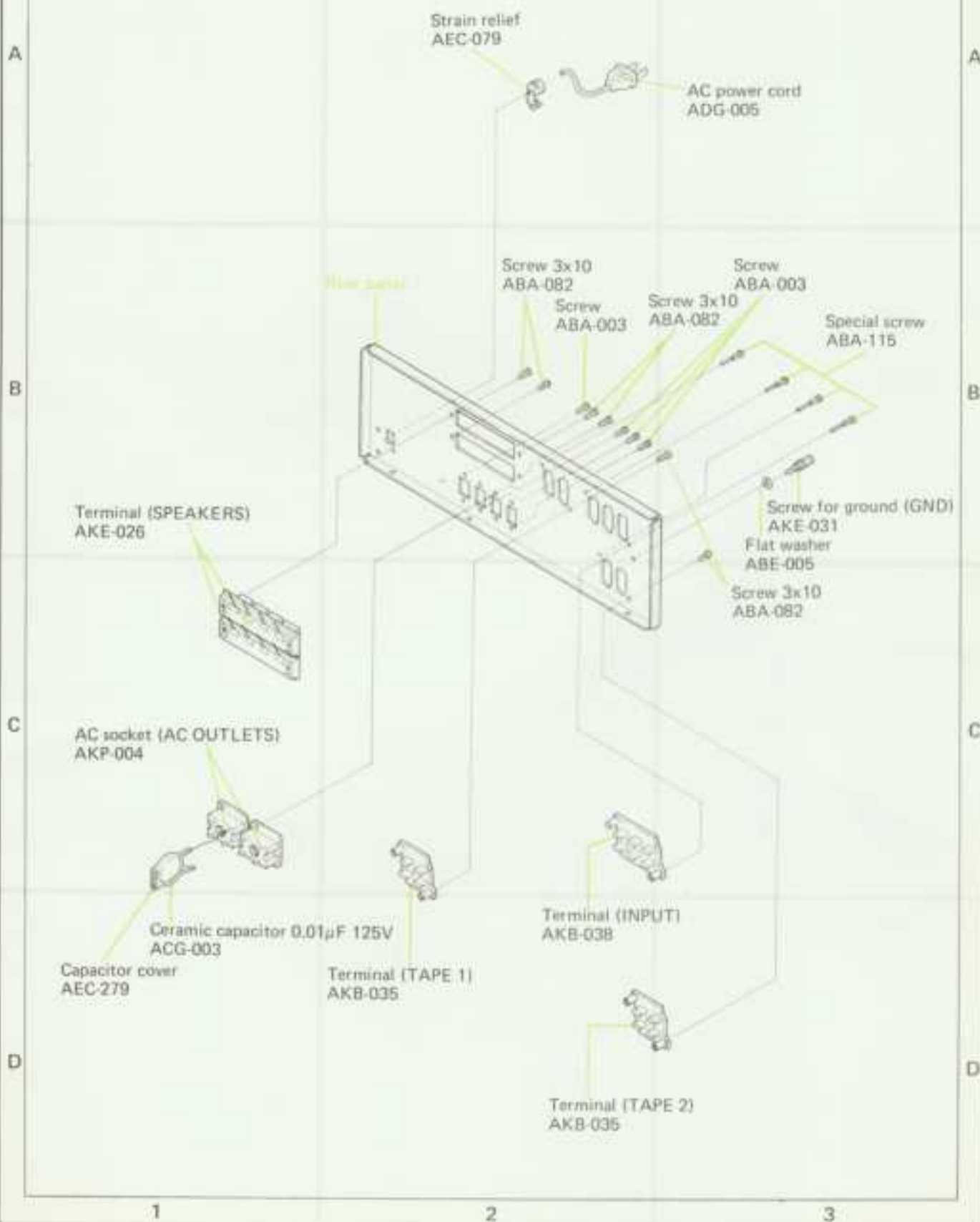
5

6

Part 2

NOTE:

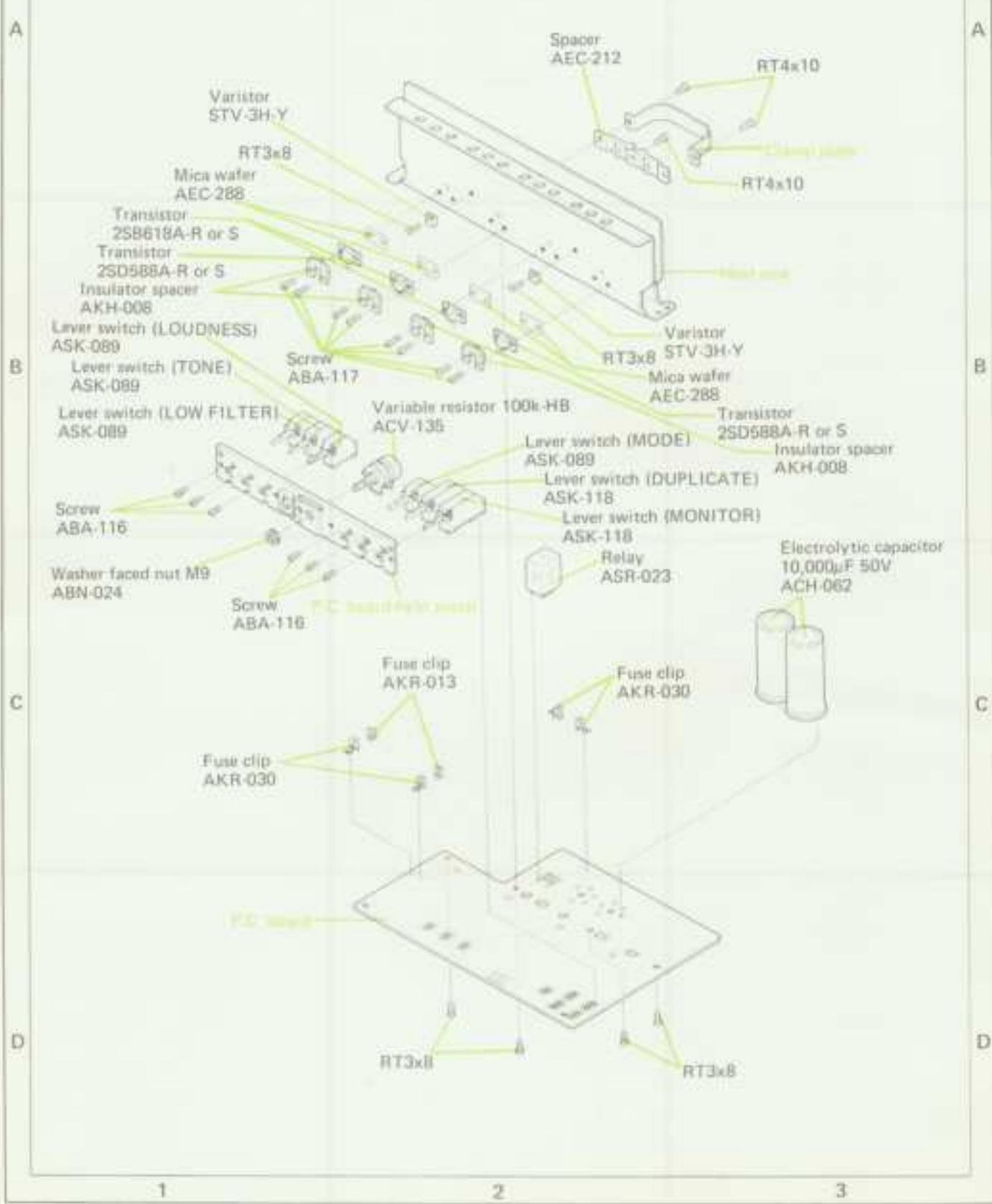
Parts indicated in green type cannot be supplied.



AF Amplifier Assembly (AWK-079)

NOTE:

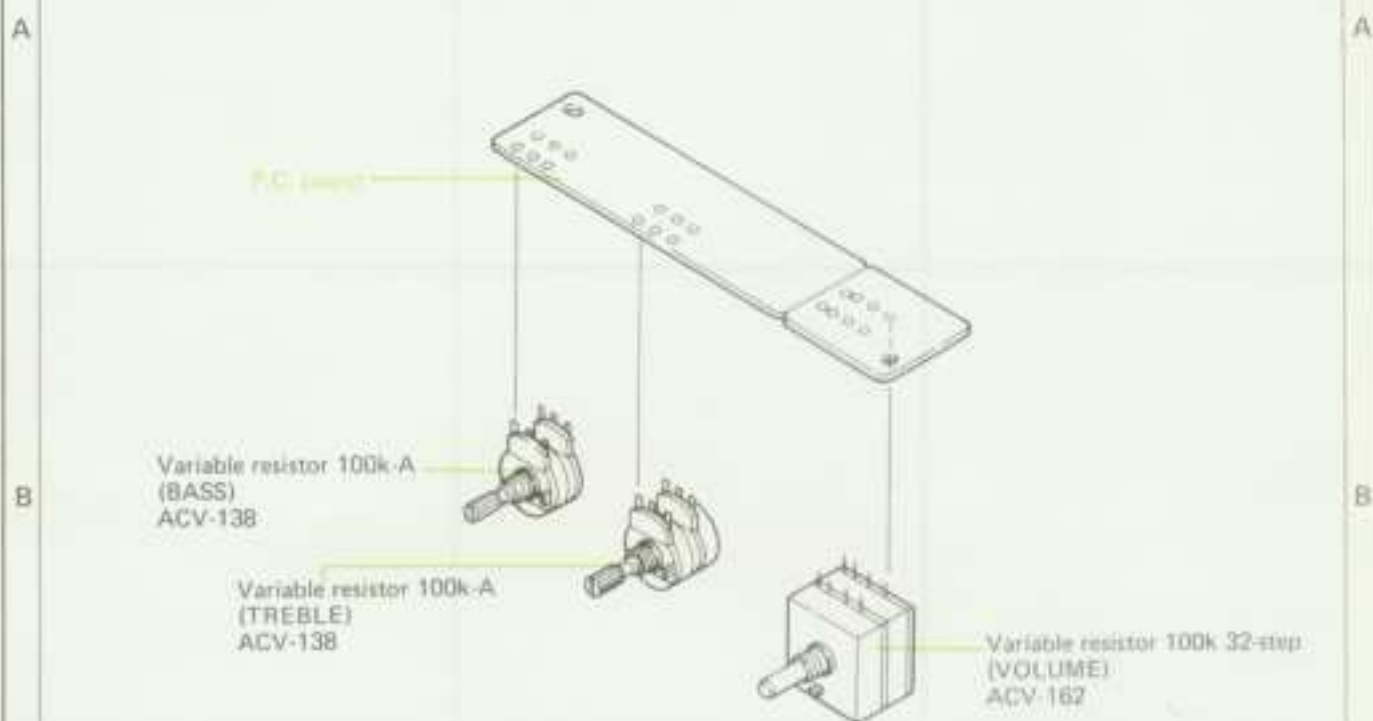
Parts indicated in green type cannot be supplied.



Control Amplifier Assembly (AWG-047)




NOTE:

Parts indicated in green type cannot be supplied.



NOMENCLATURE OF SCREWS

The following symbols stand for screws

| Symbol | Description | Shape |
|--------|----------------------------|---|
| RT | Brazier head tapping screw |  |
| PT | Flat head tapping screw |  |
| BT | Binding head tapping screw |  |

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

11.1 MISCELLANEA

NOTE:

- Capacitors: in μF unless otherwise noted $p.pF$
- Resistors: in Ω , $\%W$ unless otherwise noted $k:k\Omega$, $M:M\Omega$

Miscellaneous Parts List

SWITCHES

| Symbol | Description | Part No. |
|--------|--------------------------|----------|
| S1 | Rotary switch (FUNCTION) | ASB-050 |
| S9 | Rotary switch (SPEAKERS) | ASB-021 |
| S10 | Lever switch (POWER) | ASK-066 |

TRANSFORMER

| Symbol | Description | Part No. |
|--------|-------------------|----------|
| T1 | Power transformer | ATT-389 |

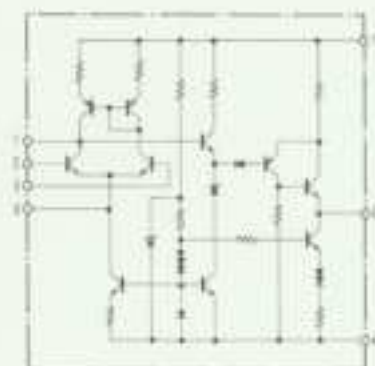
LAMP AND FUSES

| Symbol | Description | Part No. |
|--------|--------------------------|----------|
| PL1 | Lamp with leads 8V, 50mA | AEL-044 |
| FU1 | Fuse 5A | AEK-108 |
| FU2 | Fuse 1A | AEK-106 |
| FU3 | Fuse 1A | AEK-106 |

CAPACITORS

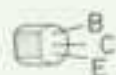
| Symbol | Description | Part No. |
|--------|-------------------|---------------|
| C1 | Ceramic 0.01 250V | ACG-001 |
| C2 | Ceramic 0.01 125V | ACG-003 |
| C3 | Ceramic 0.047 50V | CKDYF 4732 50 |
| C4 | Ceramic 0.047 50V | CKDYF 4732 50 |
| C5 | Ceramic 0.047 50V | CKDYF 4732 50 |
| C6 | Ceramic 0.047 50V | CKDYF 4732 50 |
| C7 | Ceramic 0.047 50V | CKDYF 4732 50 |

Circuit Diagram of IC (M5211L-P)

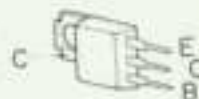


External Appearance of Transistors and IC

25A640
25A733
25A857
25C945A
25C1222
25C1438



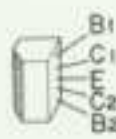
25B526
25B527
25D357



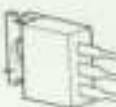
25B816A
25D686A



25A798



25D325



25C1166

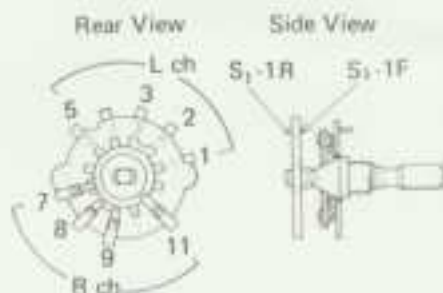


M5211L-P

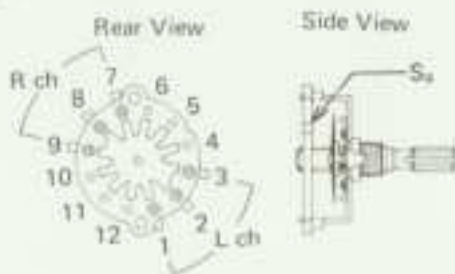


Diagram of Rotary Switches

S₁: FUNCTION switch

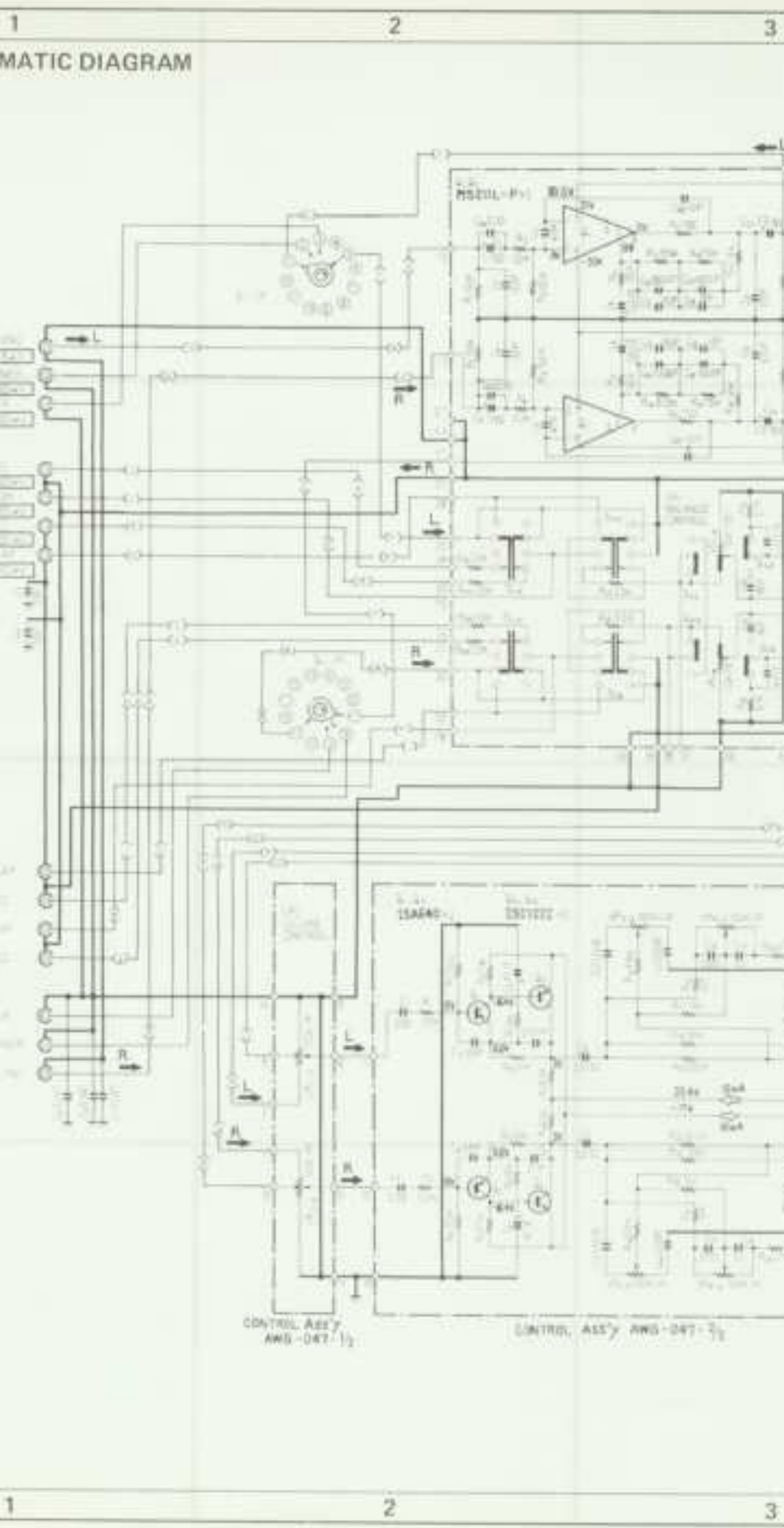


S₉: SPEAKERS switch



11.2 SCHEMATIC DIAGRAM

A
B
C
D



4

5

6

NOTE:

The indicated semiconductors are representative units only. Other alternative semiconductors may be used and are listed in the parts list.

SWITCHES:

1. FUNCTION
2. POWER
3. A/B

4. VAC RELAY
5. 2-22-1-1

6. VAC RELAY
7. 2-22-1-2

8. RELAY
9. 2-22-1-3

10. RELAY
11. 2-22-1-4

12. RELAY
13. 2-22-1-5

14. RELAY
15. 2-22-1-6

16. RELAY
17. 2-22-1-7

18. RELAY
19. 2-22-1-8

20. RELAY
21. 2-22-1-9

22. RELAY
23. 2-22-1-10

24. RELAY
25. 2-22-1-11

26. RELAY
27. 2-22-1-12

28. RELAY
29. 2-22-1-13

30. RELAY
31. 2-22-1-14

RESISTORS:

1. 100-144-100 20% TOL
2. 100-144-100 20% TOL

CAPACITORS:

1. 100-144-100 20% TOL

NOTES:

1. 100-144-100 20% TOL

2. 100-144-100 20% TOL

3. 100-144-100 20% TOL

4. 100-144-100 20% TOL

5. 100-144-100 20% TOL

| | | | | | | | | | | | | | | | | | | | | | | | | |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 25A70B | 25A70C | 25A70D | 25A70E | 25A70F | 25A70G | 25A70H | 25A70I | 25A70J | 25A70K | 25A70L | 25A70M | 25A70N | 25A70O | 25A70P | 25A70Q | 25A70R | 25A70S | 25A70T | 25A70U | 25A70V | 25A70W | 25A70X | 25A70Y | 25A70Z |
| 25A70B | 25A70C | 25A70D | 25A70E | 25A70F | 25A70G | 25A70H | 25A70I | 25A70J | 25A70K | 25A70L | 25A70M | 25A70N | 25A70O | 25A70P | 25A70Q | 25A70R | 25A70S | 25A70T | 25A70U | 25A70V | 25A70W | 25A70X | 25A70Y | 25A70Z |

AF ASS'y ANK-010

4

5

6

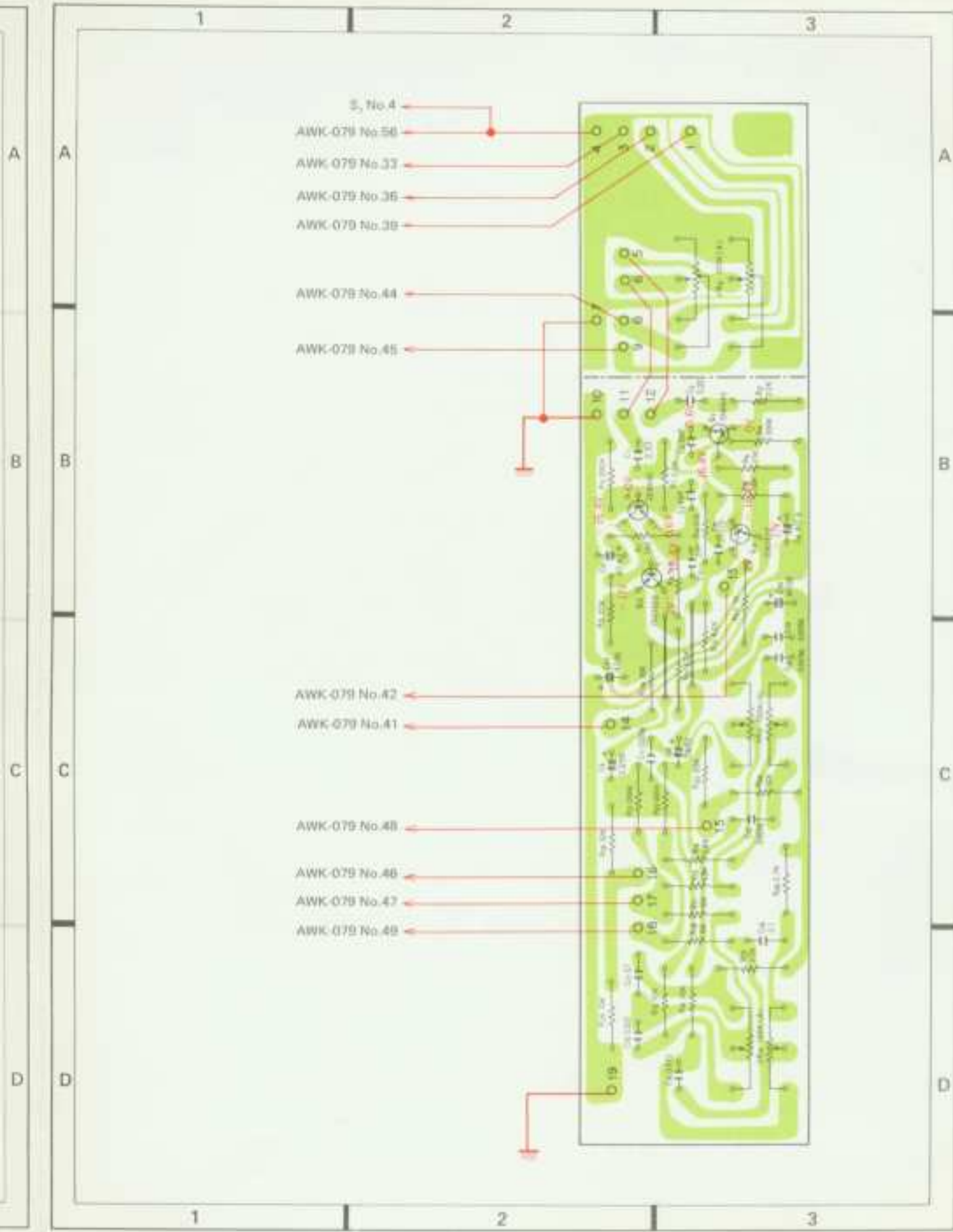
A

B

C

D

100



S, No 4

AWK-079 No 38

AWK-079 No 33

AWK-079 No 36

AWK-079 No 39

AWK-079 No 44

AWK-079 No 45

AWK-079 No 42

AWK-079 No 41

AWK-079 No 48

AWK-079 No 46

AWK-079 No 47

AWK-079 No 49

Parts List of Control Amplifier Assembly (AWG-047)

SEMICONDUCTORS

| Symbol | Description | Part No. |
|--------|-------------|----------------|
| Q1 | Transistor | 2SA640-E or F |
| Q2 | Transistor | 2SA640-E or F |
| Q3 | Transistor | 2SC1222-E or F |
| Q4 | Transistor | 2SC1222-E or F |

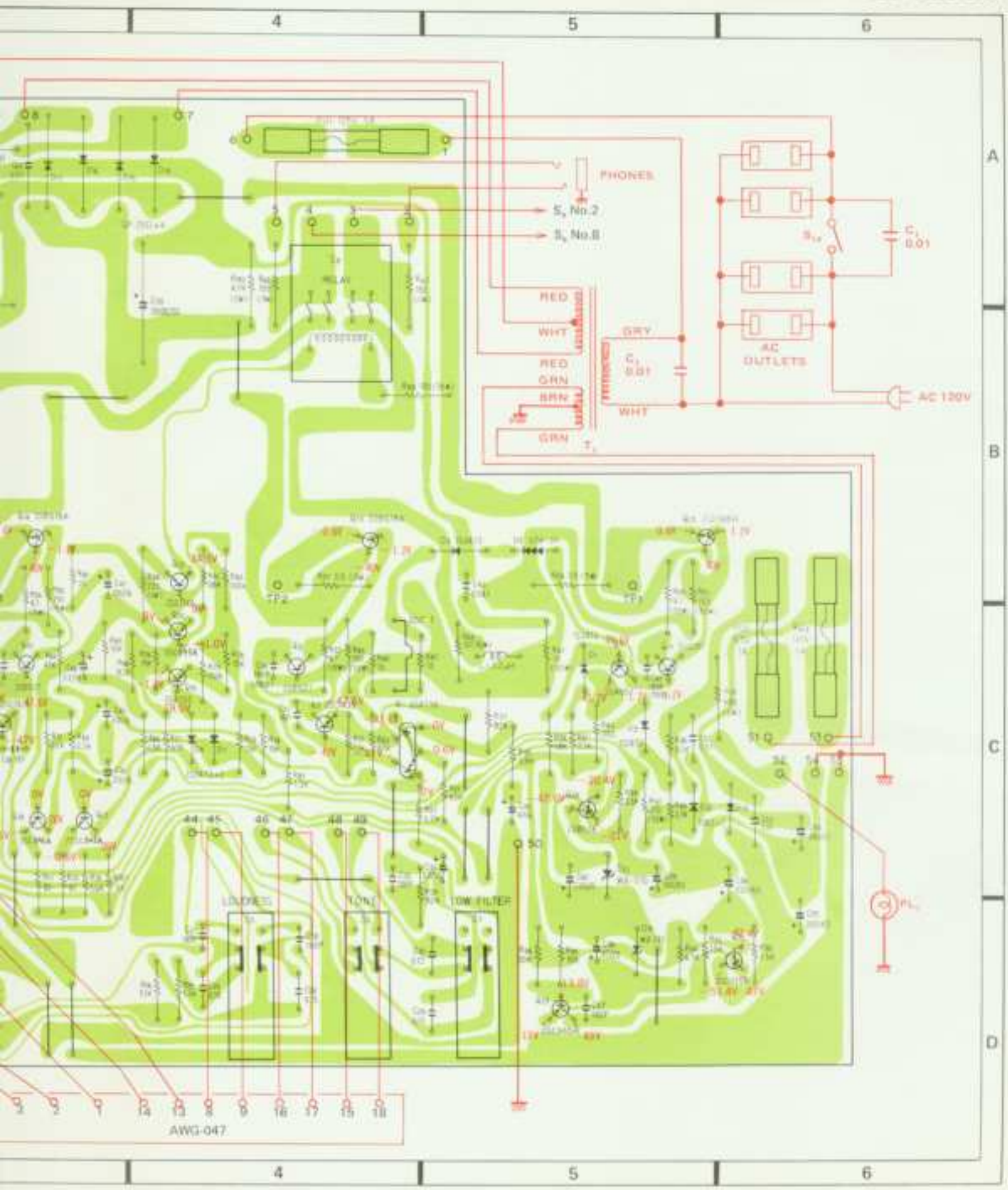
RESISTORS

| Symbol | Description | Part No. |
|--------|--------------------------------|---------------|
| VR2 | Variable 100k 32-step (VOLUME) | ACV-162 |
| VR3 | Variable 100k-A (BASS) | ACV-138 |
| VR4 | Variable 100k-A (TREBLE) | ACV-138 |
| R1 | Carbon film 2.2k | RD1PS 222J |
| R2 | Carbon film 2.2k | RD1PS 222J |
| R3 | Carbon film 200k | RD1PS 204J NL |
| R4 | Carbon film 200k | RD1PS 204J NL |
| R5 | Carbon film 27k | RD1PS 273J |
| R6 | Carbon film 27k | RD1PS 273J |
| R7 | Carbon film 1.6k | RD1PS 162J |
| R8 | Carbon film 1.6k | RD1PS 162J |
| R9 | Carbon film 51k | RD1PS 513J NL |
| R10 | Carbon film 51k | RD1PS 513J NL |
| R11 | Carbon film 6.2k | RD1PS 622J |
| R12 | Carbon film 6.2k | RD1PS 622J |
| R13 | Carbon film 6.8k | RD1PS 682J |
| R14 | Carbon film 6.8k | RD1PS 682J |
| R15 | Carbon film 10k | RD1PS 103J |
| R16 | Carbon film 10k | RD1PS 103J |
| R17 | Carbon film 10k | RD1PS 103J |
| R18 | Carbon film 10k | RD1PS 103J |
| R19 | Carbon film 33k | RD1PS 333J |
| R20 | Carbon film 33k | RD1PS 333J |
| R21 | Carbon film 200k | RD1PS 204J |
| R22 | Carbon film 200k | RD1PS 204J |
| R23 | Carbon film 2.7k | RD1PS 272J |
| R24 | Carbon film 2.7k | RD1PS 272J |
| R25 | Carbon film 10k | RD1PS 103J |
| R26 | Carbon film 10k | RD1PS 103J |
| R27 | Carbon film 1k | RD1PS 102J |
| R28 | Carbon film 300 | RD1PS 301J |

CAPACITORS

| Symbol | Description | Part No. |
|--------|----------------------------|---------------|
| C1 | Metallized mylar 0.33 100V | ACE-009 |
| C2 | Metallized mylar 0.33 100V | ACE-009 |
| C3 | Ceramic 39p 50V | CC05L 390K 50 |
| C4 | Ceramic 39p 50V | CC05L 390K 50 |
| C5 | Electrolytic 47 6V | CEANL 470P 6 |

| Symbol | Description | Part No. |
|--------|----------------------|---------------|
| C6 | Electrolytic 47 6V | CEANL 470P 6 |
| C7 | Ceramic 27p 50V | CC05L 270K 50 |
| C8 | Ceramic 27p 50V | CC05L 270K 50 |
| C9 | Electrolytic 3.3 50V | CEANL 3R3P 50 |
| C10 | Electrolytic 3.3 50V | CEANL 3R3P 50 |
| C11 | Ceramic 1800p 50V | CKDYB 182K 50 |
| C12 | Ceramic 1800p 50V | CKDYB 182K 50 |
| C13 | Ceramic 5600p 50V | CKDYB 562K 50 |
| C14 | Ceramic 5600p 50V | CKDYB 562K 50 |
| C15 | Mylar 0.022 50V | COMA 222K 50 |
| C16 | Mylar 0.022 50V | COMA 222K 50 |
| C17 | Mylar 0.1 50V | COMA 104K 50 |
| C18 | Mylar 0.1 50V | COMA 104K 50 |
| C19 | Electrolytic 47 25V | CEA 470P 25 |
| C20 | Electrolytic 47 25V | CEA 470P 25 |



Parts List of AF Amplifier Assembly (AWK-079)

SEMICONDUCTORS

| Symbol | Description | Part No. |
|--------|-------------|----------------------------------|
| Q1 | IC | M5211L-P |
| Q2 | IC | M5211L-P |
| Q3 | Transistor | 2SA798-F or G |
| Q4 | Transistor | 2SA798-F or G |
| Q5 | Transistor | 2SC1438-V or B |
| Q6 | Transistor | 2SC1438-V or B |
| Q7 | Transistor | 2SA857-V or B |
| Q8 | Transistor | 2SA857-V or B |
| Q9 | Transistor | 2SB527-D or C |
| Q10 | Transistor | 2SB527-D or C |
| Q11 | Transistor | 2SD357-D or C |
| Q12 | Transistor | 2SD357-D or C |
| Q13 | Transistor | 2SB618A-R or S |
| Q14 | Transistor | 2SB618A-R or S |
| Q15 | Transistor | 2SD589A-R or S |
| Q16 | Transistor | 2SD589A-R or S |
| Q17 | Transistor | 2SC945A-Q or R |
| Q18 | Transistor | 2SC945A-Q or R |
| Q19 | Transistor | 2SA733-Q or R |
| Q20 | Transistor | 2SC945A-Q or R |
| Q21 | Transistor | 2SC1166-Y or D 2SC1384-R or S |
| Q22 | Transistor | 2SD325R-D or E |
| Q23 | Transistor | 2SC945A-Q or R |
| Q24 | Transistor | 2SB526-C or D |
| D1 | Diode | 1S2473 |
| D2 | Diode | 1S2473 |
| D3 | Diode | 1S2473 |
| D4 | Diode | 1S2473 |
| D5 | Varistor | STV-3H-Y |
| D6 | Varistor | STV-3H-Y |
| D7 | Diode | 1S2473 |
| D8 | Diode | 1S2473 |
| D9 | Diode | 1S2473 |
| D10 | Zener diode | WZ-130 |
| D11 | Zener diode | WZ-210 |
| D12 | Diode | 10E2 (1S1886) (S1801-02) |
| D13 | Diode | 10E2 (1S1886) (S1801-02) |
| D14 | Diode | GP-25D (3002) (ERC01-02) |
| D15 | Diode | GP-25D (3002) (ERC01-02) |
| D16 | Diode | GP-25D (3002) (ERC01-02) |

| Symbol | Description | Part No. |
|--------|-------------|--------------------------------|
| D17 | Diode | GP-25D (3002) (ERC01-02) |

SWITCHES

| Symbol | Description | Part No. |
|--------|--------------------------------|----------|
| S2 | Lever switch (TAPE MONITOR) | ASK-118 |
| S3 | Lever switch (TAPE DUPLICATOR) | ASK-118 |
| S4 | Lever switch (MODE) | ASK-089 |
| S5 | Lever switch (LOUDNESS) | ASK-089 |
| S6 | Lever switch (TONE) | ASK-089 |
| S7 | Lever switch (LOW FILTER) | ASK-089 |
| S8 | Relay | ASR-023 |

COILS

| Symbol | Description | Part No. |
|--------|------------------------|----------|
| L1 | Choke coil 2.2 μ H | T63-009 |
| L2 | Choke coil 2.2 μ H | T63-009 |

RESISTORS

| Symbol | Description | Part No. |
|--------|------------------------------------|---------------|
| VR1 | Variable resistor 100k-HS (VOLUME) | ACV-135 |
| R1 | Carbon film 100k | RD%PS 104J NL |
| R2 | Carbon film 100k | RD%PS 104J NL |
| R3 | Carbon film 2.2k | RD%PS 222J |
| R4 | Carbon film 2.2k | RD%PS 222J |
| R5 | Carbon film 100k | RD%PS 104J NL |
| R6 | Carbon film 100k | RD%PS 104J NL |
| R7 | Vacancy | |
| R8 | Vacancy | |
| R9 | Metal film 1.62k 1/2W | RN%SQ 1621F |
| R10 | Metal film 1.62k 1/2W | RN%SQ 1621F |
| R11 | Carbon film 750 | RD%PS 751J |
| R12 | Carbon film 750 | RD%PS 751J |
| R13 | Metal film 910k 1/2W | RN%PT 9103F |
| R14 | Metal film 910k 1/2W | RN%PT 9103F |
| R15 | Metal film 75k 1/2W | RN%SQ 7502F |
| R16 | Metal film 75k 1/2W | RN%SQ 7502F |
| R17 | Carbon film 1.6k | RD%PS 162J |
| R18 | Carbon film 1.6k | RD%PS 162J |
| R19 | Vacancy | |
| R20 | Vacancy | |
| R21 | Carbon film 100k | RD%PS 104J |
| R22 | Carbon film 100k | RD%PS 104J |

| Symbol | Description |
|--------|-------------|
| R23 | Carb |
| R24 | Carb |
| R25 | Carb |
| R26 | Carb |
| R27 | Carb |
| R28 | Carb |
| R29 | Carb |
| R30 | Carb |
| R31 | Carb |
| R32 | Carb |
| R33 | Carb |
| R34 | Carb |
| R35 | Carb |
| R36 | Carb |
| R37 | Carb |
| R38 | Carb |
| R39 | Carb |
| R40 | Carb |
| R41 | Carb |
| R42 | Carb |
| R43 | Carb |
| R44 | Carb |
| R45 | Carb |
| R46 | Carb |
| R47 | Carb |
| R48 | Carb |
| R49 | Carb |
| R50 | Carb |
| R51 | Carb |
| R52 | Carb |
| R53 | Carb |
| R54 | Carb |
| R55 | Carb |
| R56 | Carb |
| R57 | Wire |
| R58 | Wire |
| R59 | Wire |
| R60 | Wire |
| R61 | Carb |
| R62 | Carb |
| R63 | Carb |
| R64 | Carb |
| R65 | Carb |
| R66 | Carb |
| R67 | Met |
| R68 | Met |
| R69 | Carb |
| R70 | Carb |
| R71 | Carb |
| R72 | Carb |
| R73 | Carb |

| Symbol | Description | Part No. |
|--------|----------------------|-------------|
| R23 | Carbon film 3.3k | RD%PS 332J |
| R24 | Carbon film 3.3k | RD%PS 332J |
| R25 | Carbon film 5.1k | RD%PS 512J |
| R26 | Carbon film 5.1k | RD%PS 512J |
| R27 | Carbon film 2.2k | RD%PS 222J |
| R28 | Carbon film 2.2k | RD%PS 222J |
| R29 | Carbon film 82k | RD%PS 823J |
| R30 | Carbon film 82k | RD%PS 823J |
| R31 | Carbon film 1.1k | RD%PS 112J |
| R32 | Carbon film 1.1k | RD%PS 112J |
| R33 | Carbon film 43k | RD%PS 433J |
| R34 | Carbon film 43k | RD%PS 433J |
| R35 | Carbon film 3.9k | RD%PS 392J |
| R36 | Carbon film 3.9k | RD%PS 392J |
| R37 | Carbon film 82k | RD%PS 823J |
| R38 | Carbon film 82k | RD%PS 823J |
| R39 | Carbon film 68k | RD%PS 683J |
| R40 | Carbon film 68k | RD%PS 683J |
| R41 | Carbon film 2.2k | RD%PS 222J |
| R42 | Carbon film 2.2k | RD%PS 222J |
| R43 | Carbon film 300 | RD%PS 301J |
| R44 | Carbon film 300 | RD%PS 301J |
| R45 | Carbon film 10 | RD%PS 100J |
| R46 | Carbon film 10 | RD%PS 100J |
| R47 | Carbon film 12 | RD%PS 120J |
| R48 | Carbon film 12 | RD%PS 120J |
| R49 | Carbon film 150 1/2W | RD%PS 151J |
| R50 | Carbon film 150 1/2W | RD%PS 151J |
| R51 | Carbon film 150 1/2W | RD%PS 151J |
| R52 | Carbon film 150 1/2W | RD%PS 151J |
| R53 | Carbon film 4.7 1/2W | RD%PSF 4R7J |
| R54 | Carbon film 4.7 1/2W | RD%PSF 4R7J |
| R55 | Carbon film 4.7 1/2W | RD%PSF 4R7J |
| R56 | Carbon film 4.7 1/2W | RD%PSF 4R7J |
| R57 | Wire wound 0.5 5W | RT58 0R5K |
| R58 | Wire wound 0.5 5W | RT58 0R5K |
| R59 | Wire wound 0.5 5W | RT58 0R5K |
| R60 | Wire wound 0.5 5W | RT58 0R5K |
| R61 | Carbon film 10 1/2W | RD%PSF 100J |
| R62 | Carbon film 10 1/2W | RD%PSF 100J |
| R63 | Carbon film 47k | RD%PS 473J |
| R64 | Carbon film 47k | RD%PS 473J |
| R65 | Carbon film 10 1/2W | RD%PSF 100J |
| R66 | Carbon film 10 1/2W | RD%PSF 100J |
| R67 | Metal oxide 150 1W | RS1P 151K |
| R68 | Metal oxide 150 1W | RS1P 151K |
| R69 | Carbon film 2.2k | RD%PS 222J |
| R70 | Carbon film 82 | RD%PS 820J |
| R71 | Carbon film 82 | RD%PS 820J |
| R72 | Carbon film 2.2k | RD%PS 222J |
| R73 | Carbon film 15k | RD%PS 153J |

| Symbol | Description | Part No. |
|--------|----------------------|-------------|
| R74 | Carbon film 15k | RD%PS 153J |
| R75 | Carbon film 150k | RD%PS 154J |
| R76 | Carbon film 5.6k | RD%PS 562J |
| R77 | Carbon film 4.7k | RD%PS 473J |
| R78 | Carbon film 15k | RD%PS 153J |
| R79 | Carbon film 15k | RD%PS 153J |
| R80 | Carbon film 8.2k | RD%PS 822J |
| R81 | Carbon film 68k | RD%PS 683J |
| R82 | Carbon film 22 | RD%PS 220J |
| R83 | Carbon film 100k | RD%PS 104J |
| R84 | Metal film 220 1W | RS1P 221J |
| R85 | Carbon film 15k | RD%PS 153J |
| R86 | Carbon film 1.5k | RD%PS 152J |
| R87 | Carbon film 1.3k | RD%PS 132J |
| R88 | Carbon film 100 1/2W | RD%PSF 101J |
| R89 | Carbon film 2.7k | RD%PS 272J |
| R90 | Carbon film 5.1k | RD%PS 512J |
| R91 | Metal film 680 2W | RS2P 681J |
| R92 | Carbon film 1.5k | RD%PS 153J |
| R93 | Carbon film 1.5k | RD%PS 153J |
| R94 | Carbon film 4.7k | RD%PS 473J |
| R95 | Carbon film 15k | RD%PS 153J |
| R96 | Carbon film 30k | RD%PS 303J |
| R97 | Carbon film 270 1/2W | RD%PSF 271J |
| R98 | Carbon film 3.9k | RD%PS 392J |
| R99 | Carbon film 2.4k | RD%PS 242J |
| R100 | Carbon film 39 | RD%PS 390J |
| R101 | Metal film 4.7k 2W | RS2P 472J |
| R102 | Metal film 4.7k 2W | RS2P 472J |
| R103 | Carbon film 2.2k | RD%PS 222J |
| R104 | Carbon film 2.2k | RD%PS 222J |
| R105 | Carbon film 2.2k | RD%PS 222J |
| R106 | Carbon film 2.2k | RD%PS 222J |
| R107 | Carbon film 3k | RD%PS 302J |

CAPACITORS

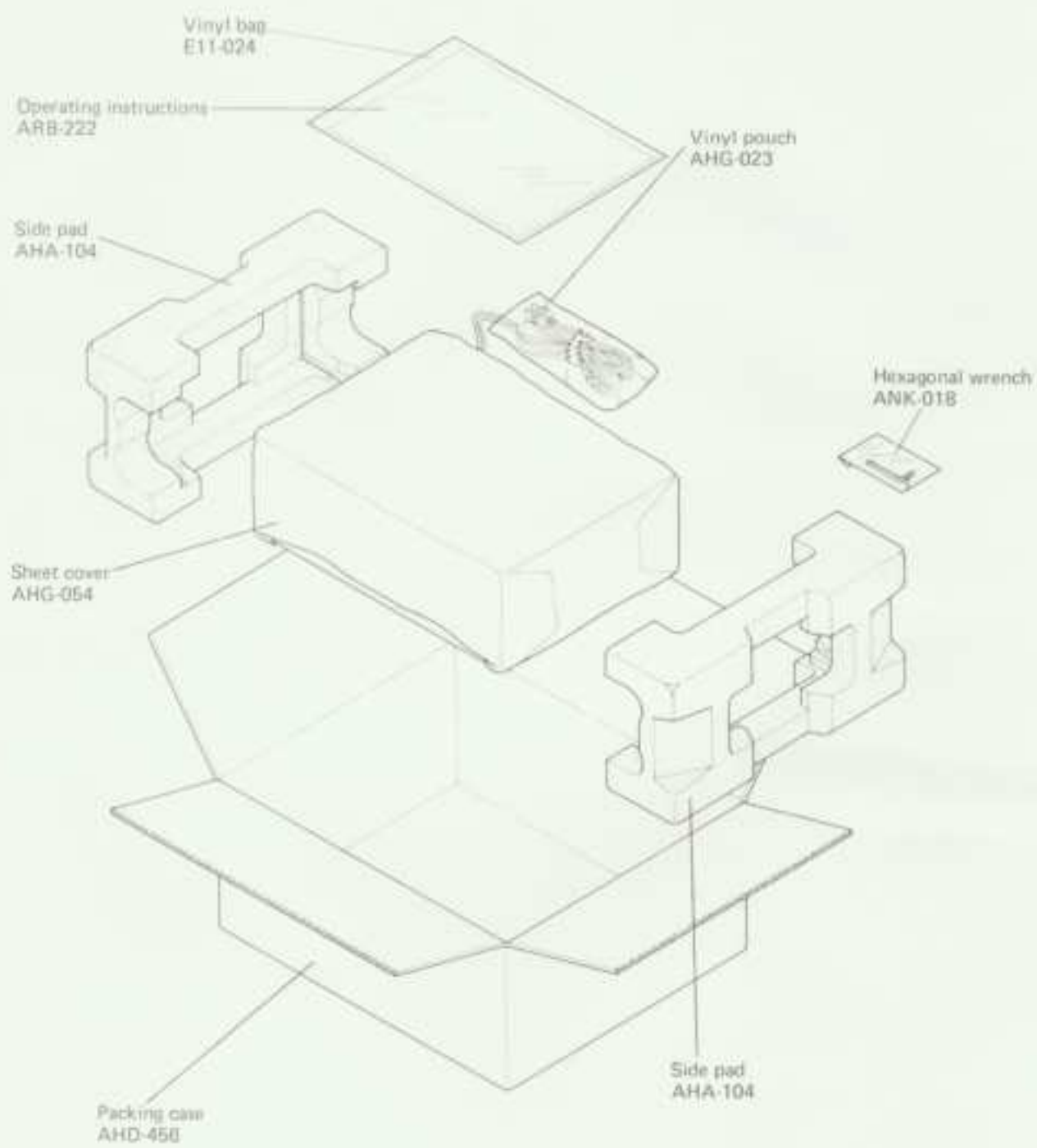
| Symbol | Description | Part No. |
|--------|-----------------------|---------------|
| C1 | Electrolytic 1 50V | CEANL 010P 50 |
| C2 | Electrolytic 1 50V | CEANL 010P 50 |
| C3 | Ceramic 100p 50V | CCDSL 121K 50 |
| C4 | Ceramic 120p 50V | CCDSL 121K 50 |
| C5 | Ceramic 47p 50V | CCDSL 470K 50 |
| C6 | Ceramic 47p 50V | CCDSL 470K 50 |
| C7 | Vacancy | |
| C8 | Vacancy | |
| C9 | Electrolytic 220 25V | CEA 221P 25 |
| C10 | Electrolytic 220 25V | CEA 221P 25 |
| C11 | Vacancy | |
| C12 | Vacancy | |
| C13 | Polystyrene 3300p 50V | COSA 3320 50 |

| Symbol | Description | Part No. |
|--------|----------------------------|----------------|
| C14 | Polystyrene 3300p 50V | CQSA 332G 50 |
| C15 | Ceramic 150p 50V | CCDSL 151K 50 |
| C16 | Ceramic 150p 50V | CCDSL 151K 50 |
| C17 | Polystyrene 1000p 50V | CQSA 102G 50 |
| C18 | Polystyrene 1000p 50V | CQSA 102G 50 |
| C19 | Ceramic 15p 50V | CCDSL 150K 50 |
| C20 | Ceramic 15p 50V | CCDSL 150K 50 |
| C21 | Ceramic 220p 50V | CCDSL 221K 50 |
| C22 | Ceramic 220p 50V | CCDSL 221K 50 |
| C23 | Electrolytic 2.2 50V | CEANL 2R2P 50 |
| C24 | Electrolytic 2.2 50V | CEANL 2R2P 50 |
| C25 | Mylar 0.15 50V | QOMA 154K 50 |
| C26 | Mylar 0.15 50V | QOMA 154K 50 |
| C27 | Ceramic 180p 50V | CCDSL 181K 50 |
| C28 | Ceramic 180p 50V | CCDSL 181K 50 |
| C29 | Mylar 0.12 50V | QOMA 124K 50 |
| C30 | Mylar 0.12 50V | QOMA 124K 50 |
| C31 | Electrolytic 2.2 50V | CEANL 2R2P 50 |
| C32 | Electrolytic 2.2 50V | CEANL 2R2P 50 |
| C33 | Ceramic 100p 50V | CCDSL 101K 50 |
| C34 | Ceramic 100p 50V | CCDSL 101K 50 |
| C35 | Electrolytic 47 6V | CEA 470P 6 |
| C36 | Electrolytic 47 6V | CEA 470P 6 |
| C37 | Ceramic 18p 50V | CCDSL 180K 50 |
| C38 | Ceramic 18p 50V | CCDSL 180K 50 |
| C39 | Ceramic 180p 500V | CCDSL 181K 500 |
| C40 | Ceramic 180p 500V | CCDSL 181K 500 |
| C41 | Ceramic 180p 500V | CCDSL 181K 500 |
| C42 | Ceramic 180p 500V | CCDSL 181K 500 |
| C43 | Ceramic 0.047 50V | CKDYF 473Z 50 |
| C44 | Ceramic 0.047 50V | CKDYF 473Z 50 |
| C45 | Electrolytic 330 6V | CEA 331P 6 |
| C46 | Electrolytic 330 6V | CEA 331P 6 |
| C47 | Electrolytic 100 16V | CEA 101P 16 |
| C48 | Electrolytic 2.2 10V | ACH-317 |
| C49 | Electrolytic 10000 50V | ACH-062 |
| C50 | Electrolytic 10000 50V | ACH-062 |
| C51 | Ceramic 0.01 150V | ACG-004 |
| C52 | Ceramic 0.01 150V | ACG-004 |
| C53 | Ceramic 0.01 150V | ACG-004 |
| C54 | Electrolytic 330 63V | CEA 331P 63 |
| C55 | Electrolytic 330 63V | CEA 331P 63 |
| C56 | Electrolytic 220 63V | CEA 221P 63 |
| C57 | Ceramic 100p 50V | CCDSL 101K 50 |
| C58 | Electrolytic 47 25V | CEA 470P 25 |
| C59 | Electrolytic 100 63V | CEA 101P 63 |
| C60 | Electrolytic 220 25V | CEA 221P 25 |
| C61 | Electrolytic 220 25V | CEA 221P 25 |
| C62 | Electrolytic 220 25V | CEA 221P 25 |
| C63 | Ceramic 0.01 150V | ACG-004 |
| C64 | Metallized mylar 0.33 100V | ACE-009 |
| C65 | Metallized mylar 0.33 100V | ACE-009 |
| C66 | Ceramic 10p 50V | CCDSL 100F 50 |
| C67 | Ceramic 10p 50V | CCDSL 100F 50 |

OTHERS

| Symbol | Description | Part No. |
|--------|---------------------|----------|
| | Spacer | AEC-212 |
| | Micro wafer | AEC-288 |
| | Insulator spacer | AKH-008 |
| | Fuse clip | AKR-013 |
| | Fuse clip | AKR-030 |
| | Screw 2.5x10 | ASA-117 |
| | Washer faced nut M6 | ASN-024 |

12. PACKING



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