<ART-084-0>

SERVICE MANUAL

MIXING AMPLIFIER

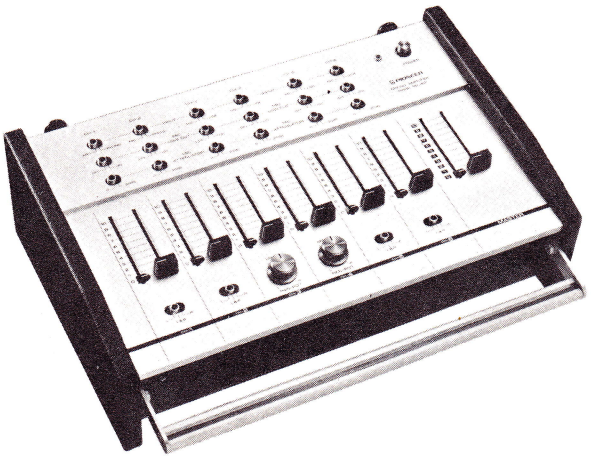
MA-62

KL

<74102Y11D>

PIONEER®

CONTENTS



1. SPECIFICATIONS

SEMICONDUCTORS

ICs	2
Transistors	22
Diodes	3
Input Select:	
CH1, CH2:	MIC / PHONO
CH3, CH4, CH5, CH6:	MIC / LINE
Output Channel Select:	
CH1, CH2, CH5, CH6:	L / L & R / R
CH3, CH4 (PAN-POT):	L ~ R (Panoramic Potentiometer)
Input (Sensitivity/Impedance):	
MIC:	0.25mV / 4.7kΩ
PHONO:	2.5mV / 50kΩ
LINE:	50mV / 50kΩ
MIC Attenuator:	0dB, −20dB
MIC Overload Level:	250mV rms (at attenuator −20dB)
PHONO Overload Level:	250mV rms (at 1kHz)
Output:	Stereo x 2 (parallel)
Rated Output Level:	330mV
Harmonic Distortion	Less than 0.2% (at 1V output)
Maximum Output:	5V (T.H.D.= 0.5%, 50kΩ load)
Channel Separation:	More than 70dB (at 1kHz)
Cross-talk:	More than 70dB (at 1kHz)
Frequency Response:	
MIC:	20Hz to 15kHz ($^{+0}_{-3}$ dB)
PHONO:	RIAA Equalization: ±0.5dB
LINE:	20Hz to 25kHz ($^{+0}_{-1}$ dB)
MIC Low Cut:	fc = 200Hz (6dB/oct.)
Channel Interference:	Less than 1dB
Residual Hum & Noise:	Less than 0.05mV
S/N (IHF, Short-Circuited, A Network)	
MIC:	52dB
PHONO:	60dB
LINE:	67dB
Headphone Output:	Maximum 260mV (8Ω)

MISCELLANEOUS

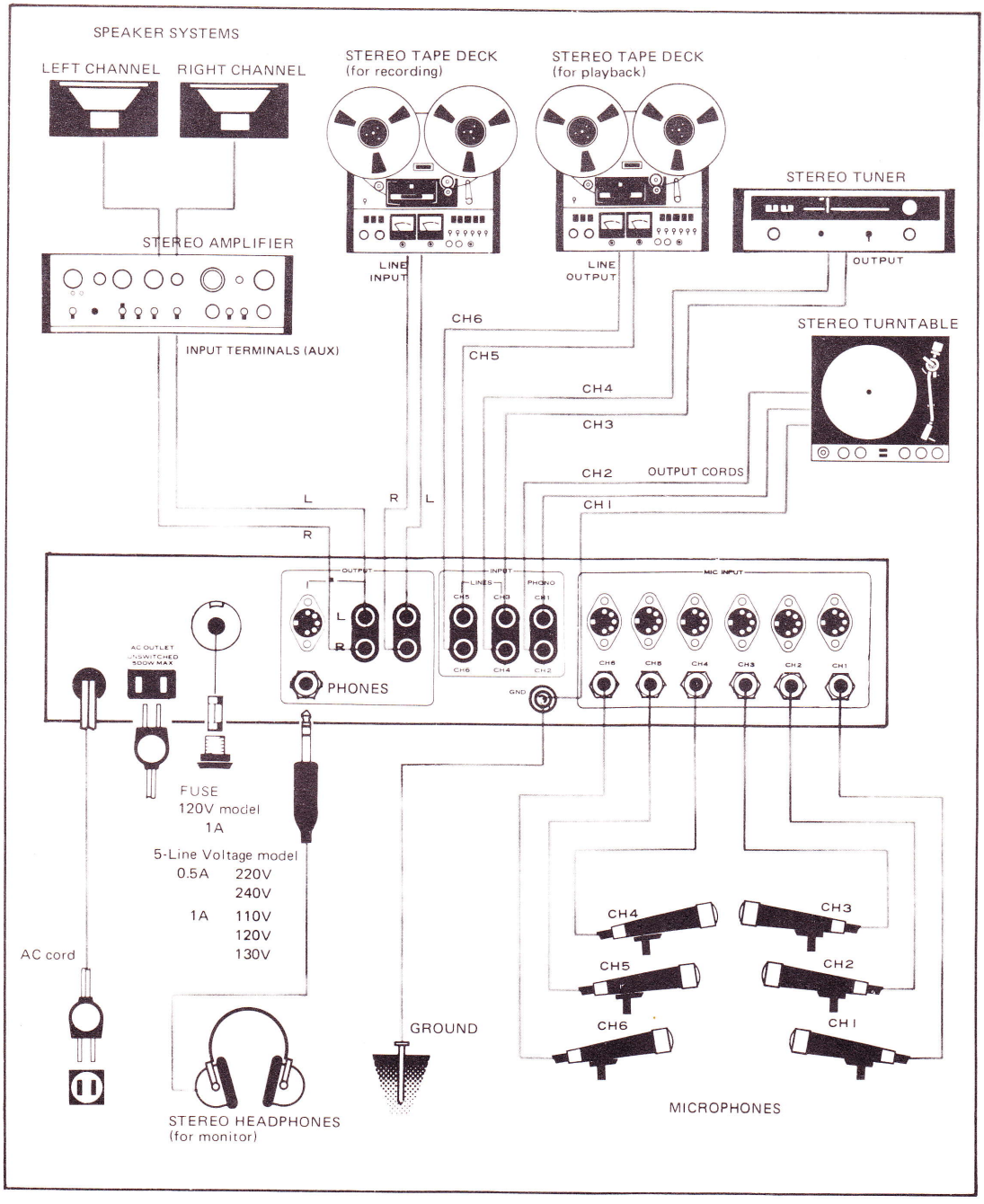
Power Requirements:	AC 120V, 60Hz
Power Consumption:	5W
Dimensions:	400(W) x 132(H) x 264(D) mm (15-3/4 x 5-3/16 x 10-3/8 in.)
Weight: Without Package:	5.8kg, 13 lb
With Package	7.3kg, 16 lb

FURNISHED PARTS

Connection Cord with Pin Plus	1
Operating Instructions	1

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

2. CONNECTION DIAGRAM



3. NAMES OF CONNECTORS ON THE BACK PANEL

LINE INPUT TERMINALS (CH 3, 4, 5, 6)

Outputs from stereo tuners, from the recording output of a power amplifier, or from tape decks, are connected to these inputs.

OUTPUT TERMINALS (1, 2)

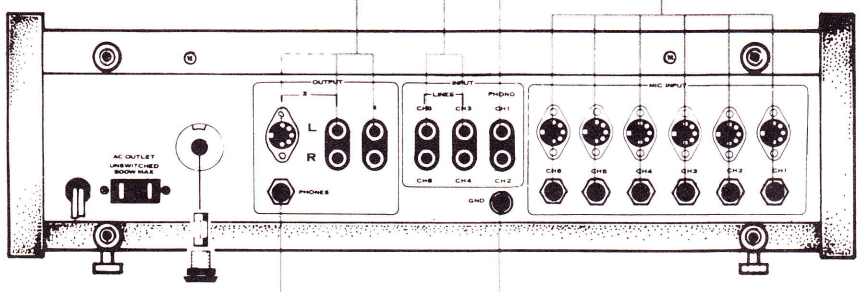
These outputs are for connecting to the inputs of a tape deck or the auxiliary terminals of an amplifier.
There are two kinds of OUTPUT 2 terminals; the 5-pin DIN type connector may be connected to a DIN plug of tape deck for recording.
At the same time, the input terminals of pre-amplifier may be connected to phono type terminals.

PHONO INPUT TERMINALS (CH 1, CH 2)

This set of terminals is for connecting a stereo turntable. You should use a moving magnet type phono cartridge.

MICROPHONE INPUT TERMINALS

Microphones should be connected to these jacks.
The MA-62 functions superbly whether you use low or high impedance microphones.
The upper jacks are used to connect 5-pin DIN-type plugs and the lower to connect usual phone type plugs. When in simultaneous connections to both terminal sets only the phone type jacks are operative.



PHONES JACK

This jack is for stereo headphone connection. The monitor function of the headphone will enable you to set a good balance between the input sources distributed to both stereo output channels.

NOTE:
We recommend the use of tightly fitting headphones such as Pioneer model SE-305 effective in sealing out the outside sound.

GROUND TERMINAL

If the turntable used has a ground wire, it should be connected to this terminal.

4. FRONT PANEL FACILITIES

INPUT SELECTOR SWITCHES

These switches are to select the various program sources connected to the terminals on the back panel of the MA-62.
CH 1 and CH 2.
MIC: When microphones are being used as a source.
PHONO: When a turntable is being used as a source.
CH3, CH4, CH5 and CH6
MIC: When microphones are used as a source.
LINE: When tape decks, tuners and suchlike are used as sources.

MIC LOW CUT SWITCHES

When you wish to cut unwanted low frequency portions of the signal, flip the MIC LOW CUT switch on.
When you are feeding in a signal from a microphone and the sound source just exceeds the range of the microphone, the MIC LOW CUT switch serves to cut the bass part of the sound so that its clarity is improved considerably.

MIC ATTENUATOR SWITCHES

When these switches are put into the 20dB position, they reduce the microphone input level by 20dB.
Naturally if the loudness of the source is too great for the level setting or for the microphone, distortion may occur in the amplifier section of the MA-62 mixer, so you should estimate the maximum level and set the controls for that maximum in order to obtain optimum results.

PILOT LAMP...POWER SWITCH

When the power switch is pushed, the power comes on, and the pilot lamp is illuminated. To turn off, push the power switch again — the power will be shut off and the lamp will go out.

MEMORY MARKERS

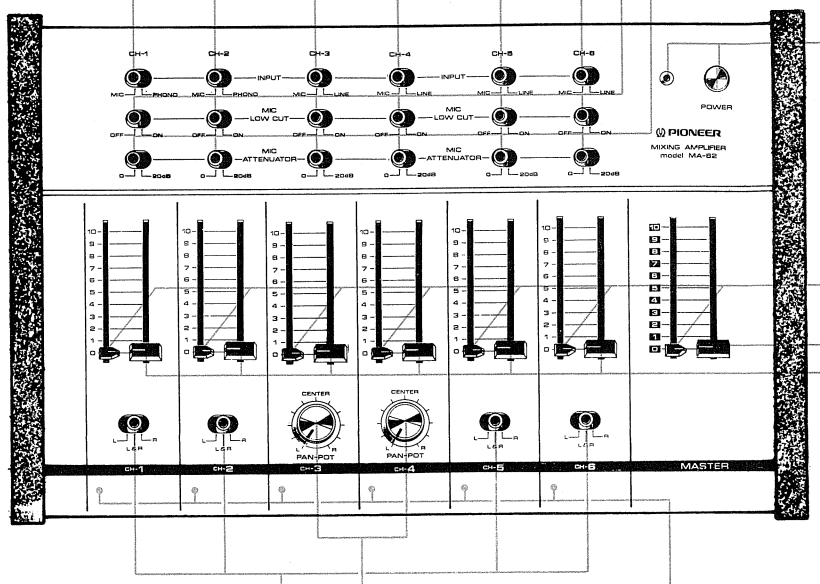
Setting the MEMORY MARKERs to which the MASTER VOLUME and INPUT LEVEL control settings correspond can easily remind you of the level positions later. Also convenient for memorizing optimum levels even if the levels are changed by these controls.

MASTER VOLUME CONTROL

The MASTER VOLUME control sets the level of the output volume.
It is advisable to usually set the control at about 6~7 on the scale.
With the level controls of the MA-62, properly adjust each of inputs of tape deck and pre-amplifier to which the MA-62 is connected.

INPUT LEVEL CONTROLS

These controls are used to adjust each of inputs from input terminals.
When the input level is low, the INPUT LEVEL controls should be raised and when the input is high, it should be lowered.



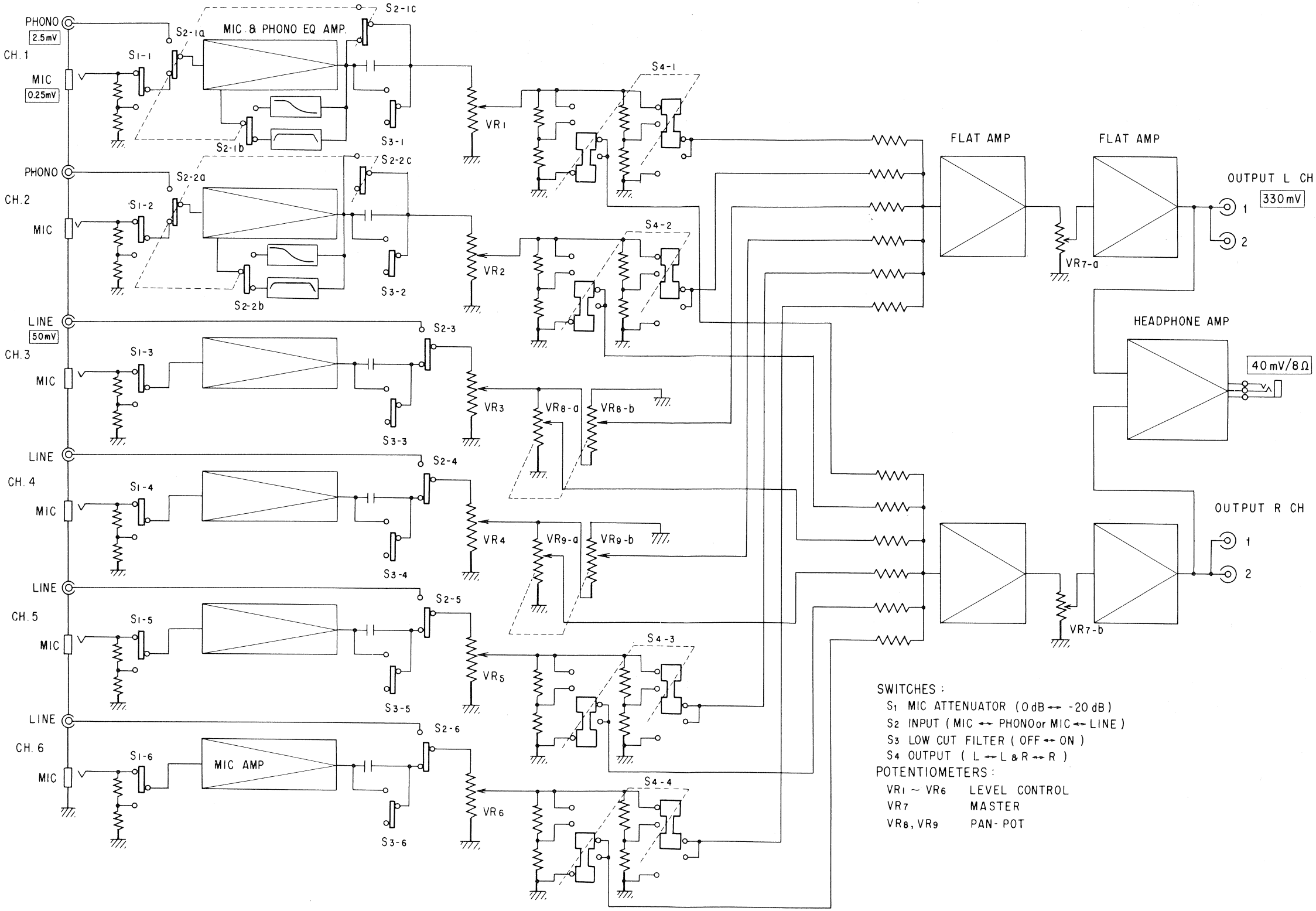
OUTPUT CHANNEL SELECTOR SWITCHES (CH 1, CH 2, CH 5, CH 6)

These switches select the output channels for each input.
L: The input source appears at the left output terminals.
R: The input source appears at the right output terminals.
L & R: The input source appears at both the left and right output terminals.

THE PAN-POT (PANORAMIC POTENTIOMETER) CONTROLS

The PAN-POTs adjust the output from input sources CH 3 and CH 4.
They continuously change the distribution of sound volume appearing at the output terminals.

5. BLOCK DIAGRAM



SWITCHES :

- S_1 MIC ATTENUATOR (0 dB ↔ -20 dB)
- S_2 INPUT (MIC ↔ PHONO or MIC ↔ LINE)
- S_3 LOW CUT FILTER (OFF ↔ ON)
- S_4 OUTPUT (L ↔ L & R ↔ R)

POTENTIOMETERS :

- $VR_1 \sim VR_6$ LEVEL CONTROL
- VR_7 MASTER
- VR_8, VR_9 PAN-POT

6. CIRCUIT DESCRIPTION

Signal Path

1. The signals from the microphone terminals and the phono terminals (of channels 1 and 2 only) are amplified by the two NPN transistors in the direct coupled NFB-type amplifier after selection with the input switches.
2. Both the standard jacks and the DIN type connectors can be used for the microphone inputs, but as the standard jacks defeat the DIN connector, it is not possible to use the standard jacks when a microphone is connected to the DIN type connector for the same channel.
   If two microphones are plugged into the same channel at the same time, only the one plugged into the standard jack can be used.
3. The amplified signals from the microphone or turntable are next fed to the resistors in the mixing stage through the slider type level controls of each channel (except 3 and 4, which have pan-pots) and the output channel selector switch.
4. The signals mixed by the resistors in the mixing stage are then amplified in the direct coupled amplifier, by the PNP and the NPN transistors (2 transistors in all).
5. The signal taken from the NPN transistor emitter (emitter follower) passes through the MASTER VOLUME potentiometer to be amplified in another two-transistor direct coupled amplifier and then sent to the output terminals from the emitter follower.
6. The output terminals have both phono jacks and a DIN type connector. The two pairs of phono jacks and DIN type connector are wired in parallel, so they can be used simultaneously, if necessary.
7. The headphone output signal (for monitoring purposes) is a portion of the output which appears at the output terminals, amplified by an integrated circuit.

The Microphone and Equalizer Amplifier Stage

Figure 1 is a simplified circuit diagram of the microphone/equalizer amplifier for channels 1 and 2. The switching between the equalizer function and the mike amp function is effected by the switch marked S.
The microphone input terminal has a sensitivity of 0.25 mV while the phono input sensitivity is 2.5 mV at 1kHz in each case, so altering the gain by merely switching the CR element of the closed loop NFB would cause instability, which would lead to distortion and noise.
Therefore, the amount of the current NFB from first stage transistor Q1 is changed by Sa, and the CR element is switched, to determine the frequency characteristics, by Sb.

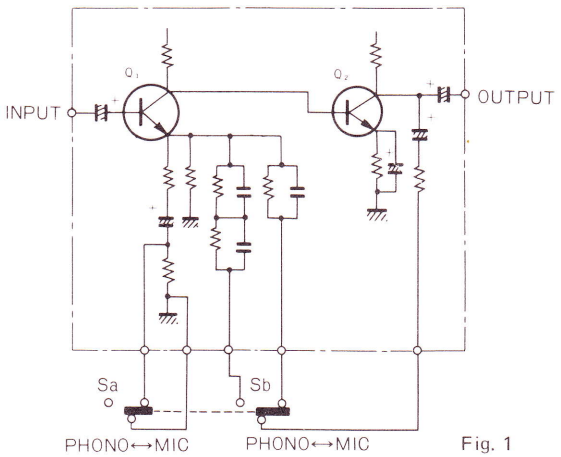
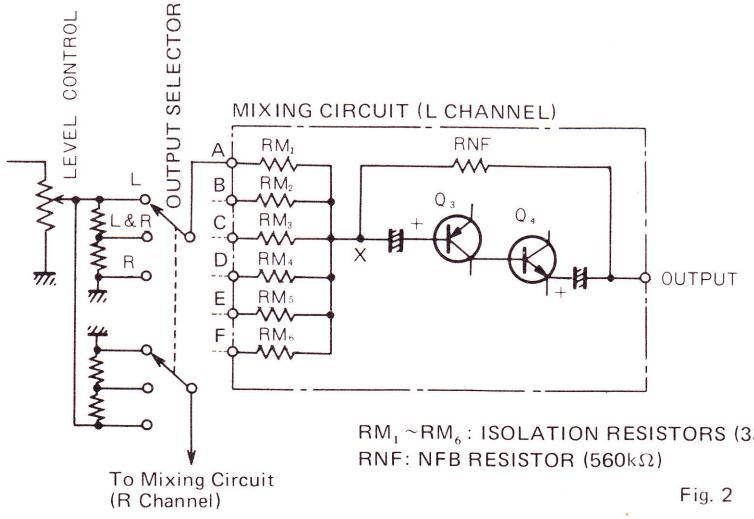


Fig. 1

Mixing Stage

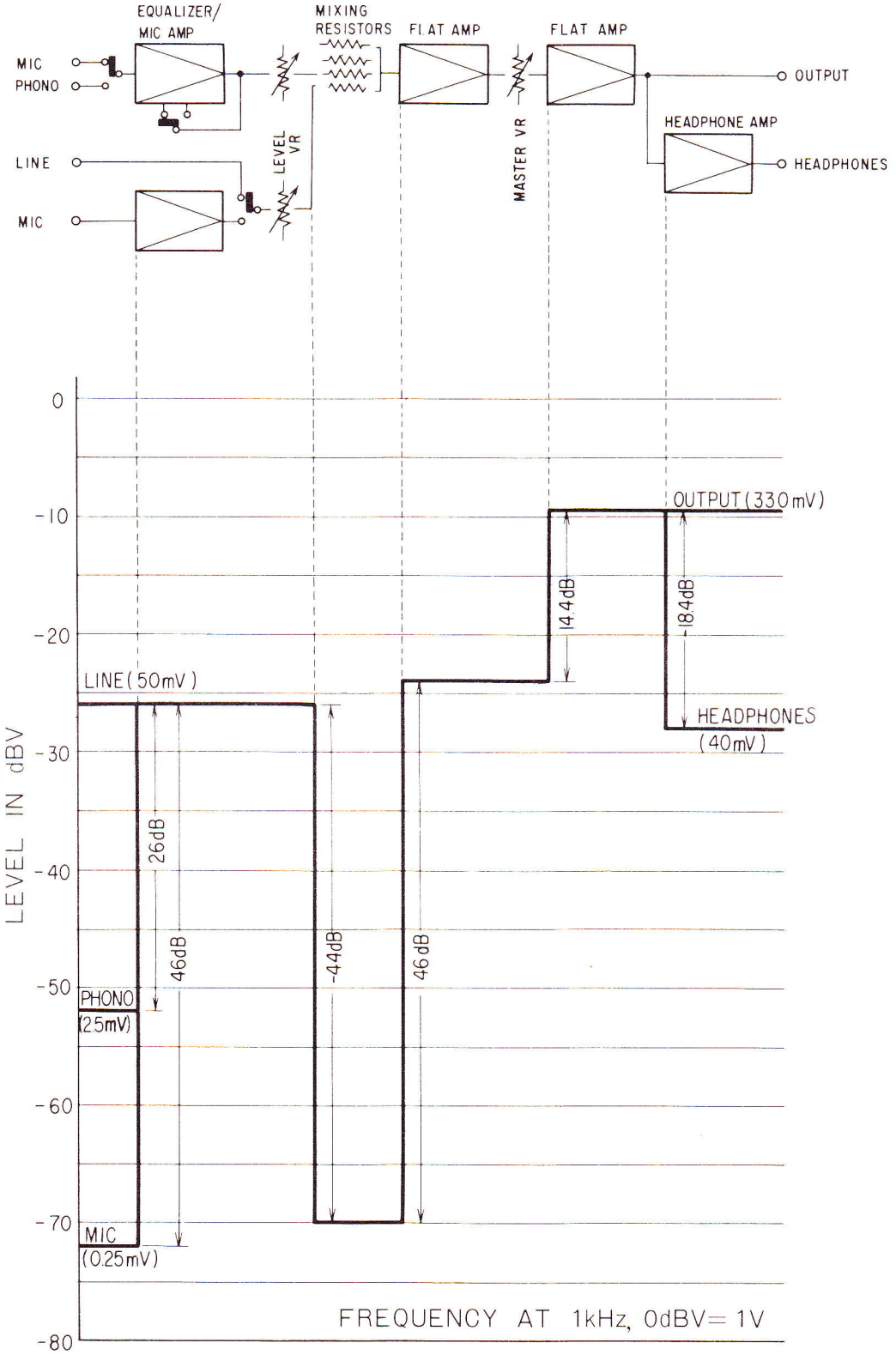
The mixing circuit of this unit is a very orthodox and highly stable series resistance circuit using isolation resistors. Resistors RM_1 thru RM_6 in the diagram are such isolation resistors. The signals to be mixed are fed to terminals A thru F, and perfect mixing is obtained at point X in the diagram. If low resistance values are used as RM's, changes in the signal levels from each source may occur due to the different output impedances of the sources connected to A thru F. To prevent this, resistances of 330kΩ are used as RM's in this unit—differences due to output impedance are negligible. To prevent interference between the various signals, the impedance at point X (the mixing point) must be kept quite low in relation to the RM values. To fulfill this condition, parallel feed-type NFB is applied from the emitter of Q_4 to the base of Q_3 in the mixing amplifier. This not only helps to reduce distortion and noise (the effect of NFB), but also keeps the input impedance of Q_3 very low, maintaining stable operation.



RM_1 ~RM_6 : ISOLATION RESISTORS (330kΩ)
RNF: NFB RESISTOR (560kΩ)

Fig. 2

7. LEVEL DIAGRAM



8. DISASSEMBLY

Removal of Side Panels (See Exploded View.)

1. To remove the left and right side panels take out the three securing screws as illustrated, being careful not to lose the washers.

Removing the Bottom Cover

2. After the side panels have been removed, there are only two screws to take out before the bottom cover can be detached. Please refer to the exploded view below.

Removing the Front Panel

3. First, take off all the control knobs and slider caps, taking care not to lose the springs from inside the individual level controls and the master volume control.
4. Next, remove the two fixing screws at the front of the front panel, and the four at the back. Do not forget to take off the rubber feet at the back of the panel, as these two are attached with screws also.

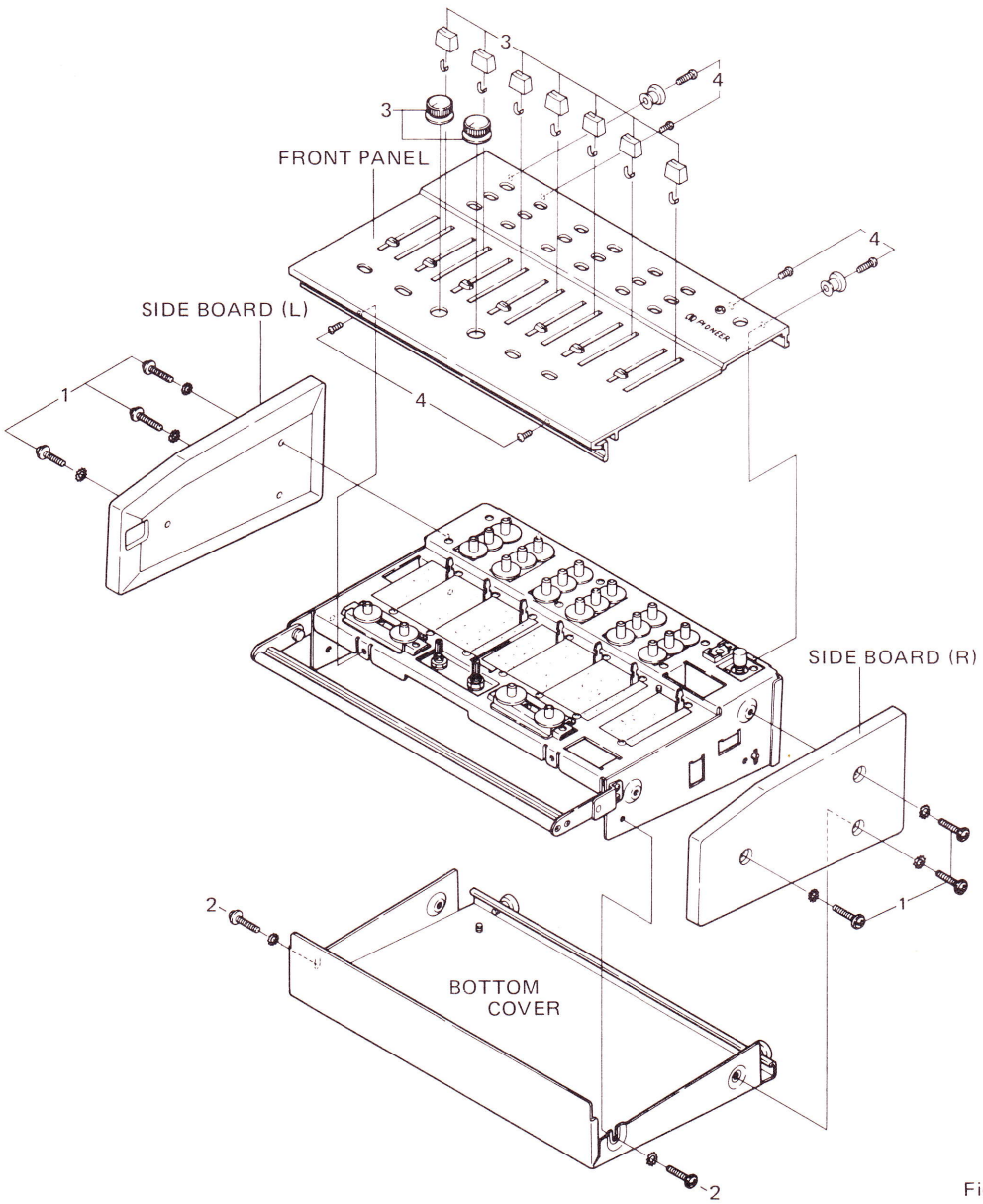


Fig. 3

The Microphone Amplifier Assembly

5. This assembly is removed by taking out the six fixing screws as shown in the diagram (Figure 4).

The Switch Assembly (A)

6. After the mike amp ass'y has been removed, the switch assembly (A) may be taken off. Again, the six fixing screws must be removed first.

The Switch Assembly (B)

7. Switch B ass'y may be removed once the four fixing screws have been taken out.

The Volume Controls

8. The two-ganged volume controls and the slider volume controls may be removed individually, after the microphone amplifier assembly has been taken off, by unscrewing the securing nuts and setscrews in each case.

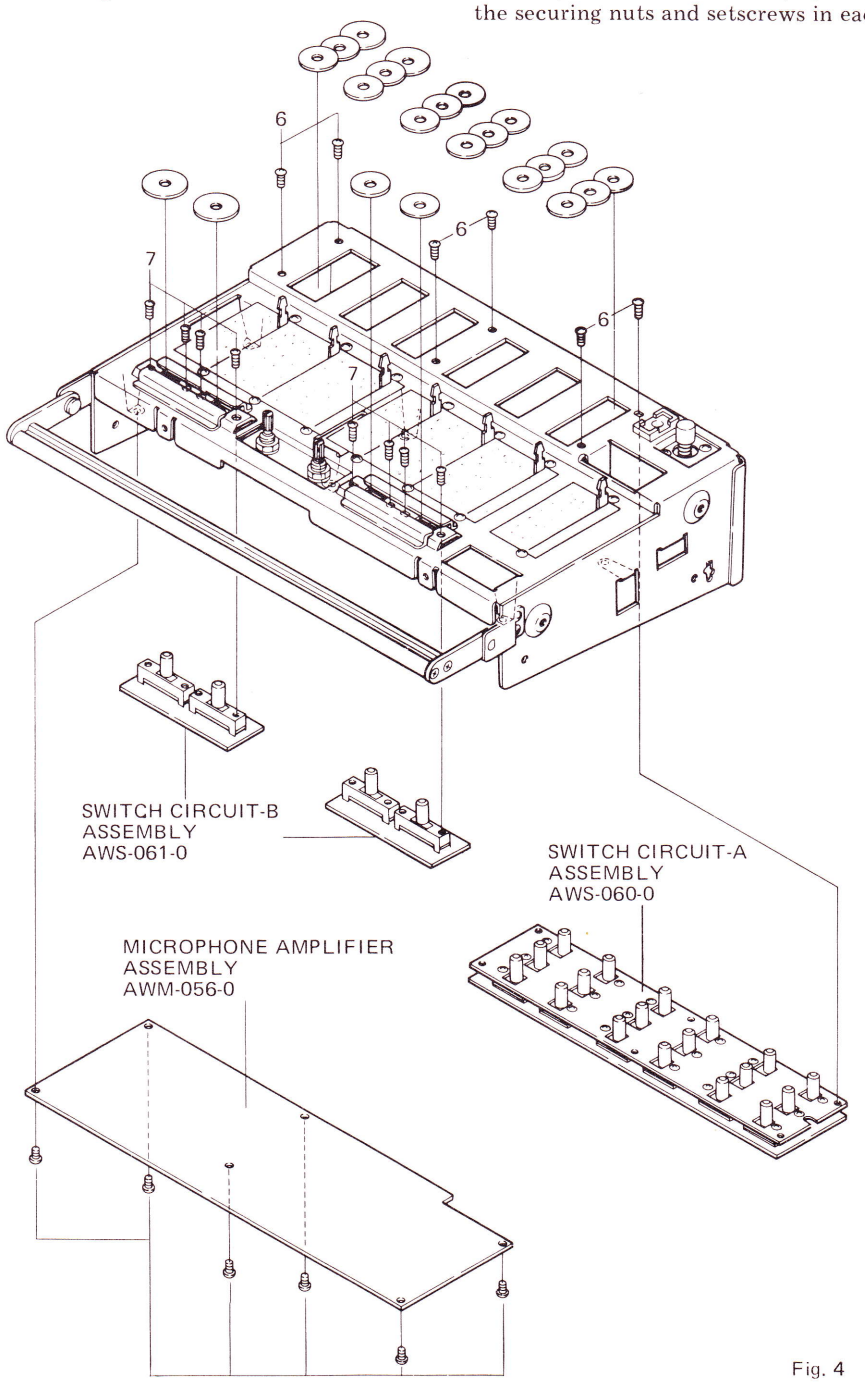
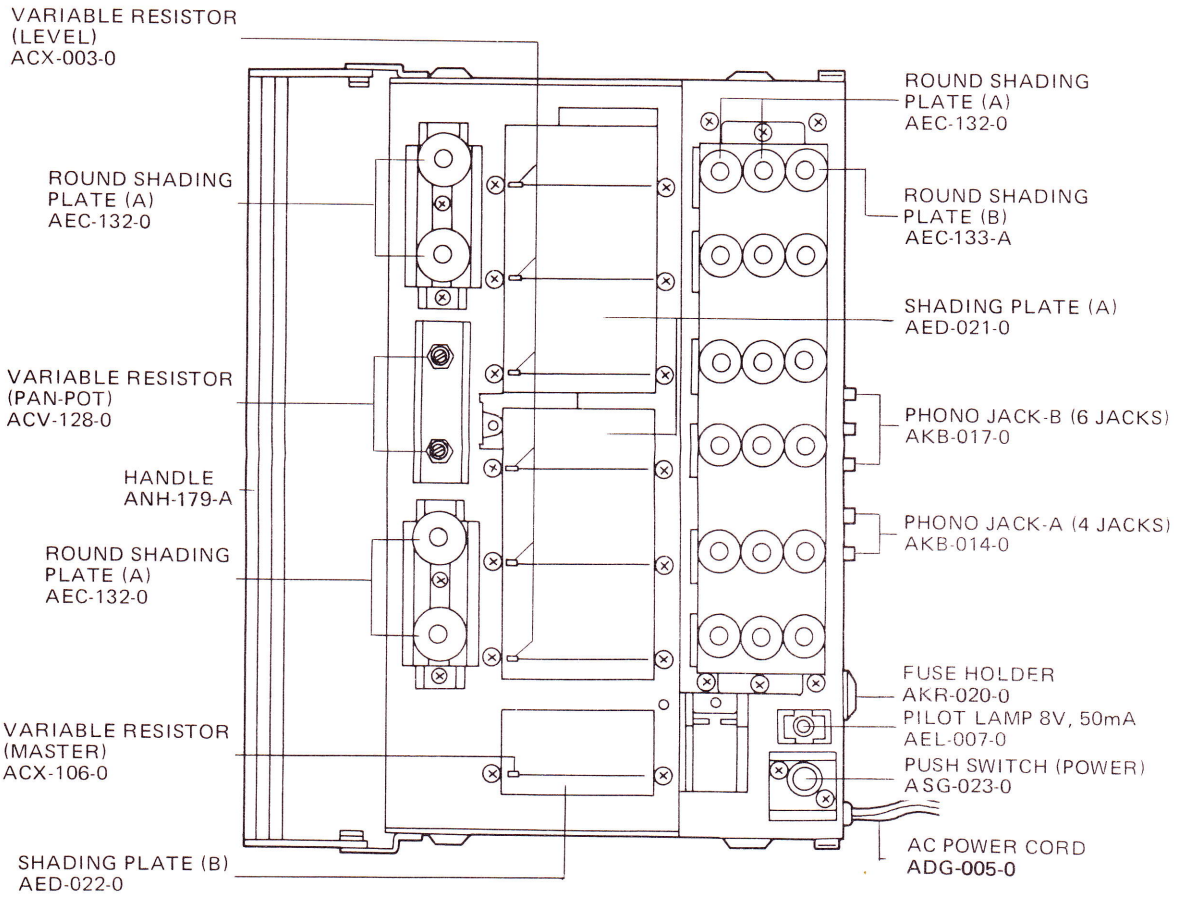


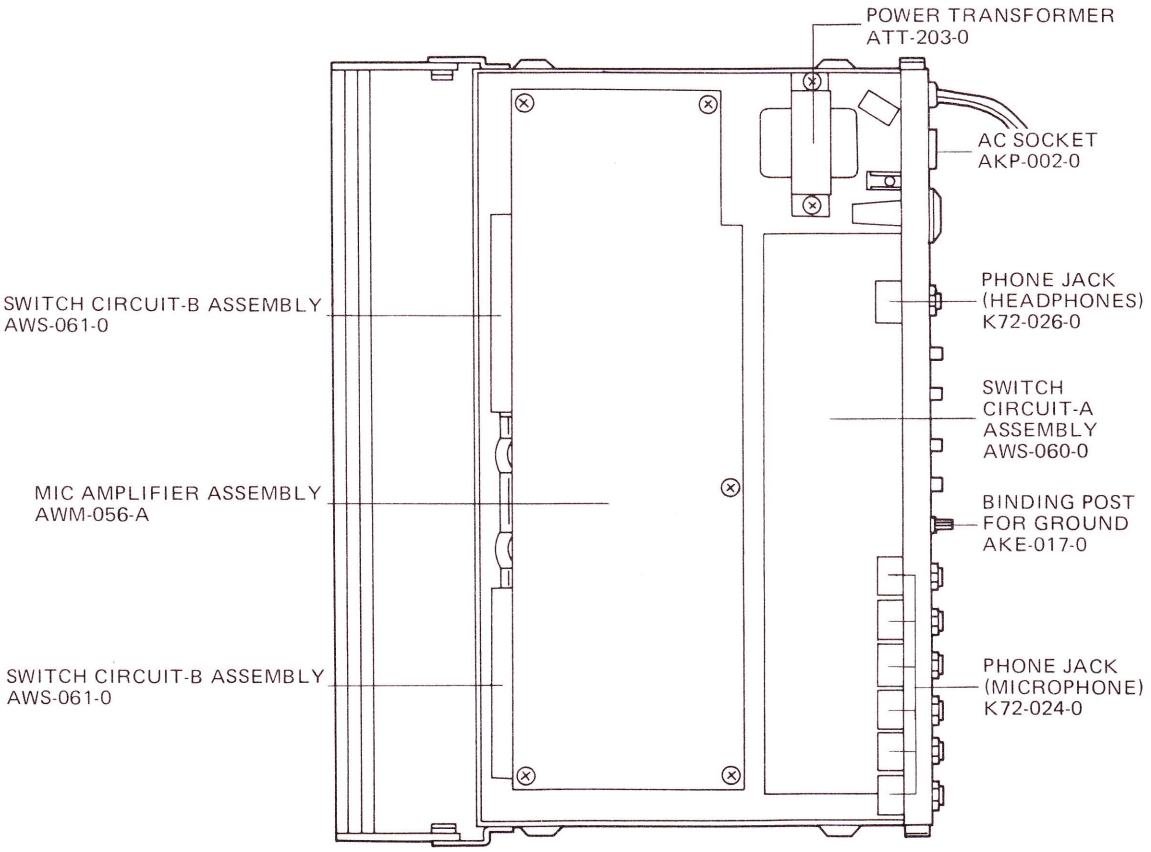
Fig. 4

9. PARTS AND P.C. BOARD LOCATION

Top View



Bottom View

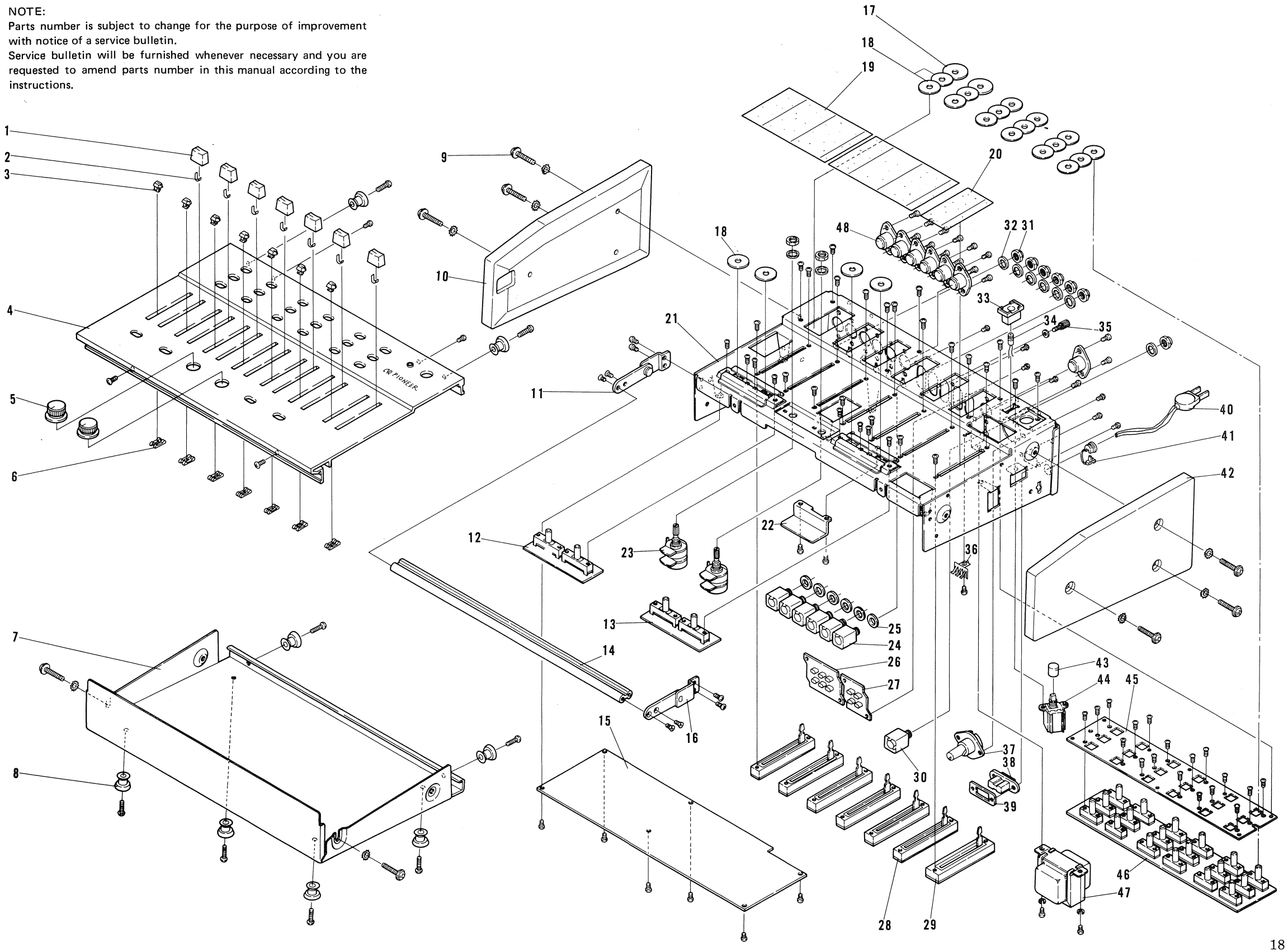

POWER TRANSFORMER
ATT-203-0
AC SOCKET
AKP-002-0
PHONE JACK
(HEADPHONES)
K72-026-0
SWITCH
CIRCUIT-A
ASSEMBLY
AWS-060-0
BINDING POST
FOR GROUND
AKE-017-0
PHONE JACK
(MICROPHONE)
K72-024-0
SWITCH CIRCUIT-B ASSEMBLY
AWS-061-0
MIC AMPLIFIER ASSEMBLY
AWM-056-A
SWITCH CIRCUIT-B ASSEMBLY
AWS-061-0

10. EXPLODED VIEW AND PARTS LIST

NOTE: Any parts asterisked(*) are subject to being not supplied.

Key No.	Description	Part No.	
1	Knob (LEVEL, MASTER)	RAA-095-0	
2	Spring	RBK-042-B	
3	Knob (memory marker)	RNK-042-A	
4	Front panel assembly	ANB-234-A	
5	Knob (PAN-POT)	AAB-072-0	
6*	Knob supporter	AEC-136-A	
7	Bottom cover	ANE-041-A	
8	Foot	AEC-135-A	
9	Screw M4 x 26	ABA-011-A	
10	Side board (L)	AMS-005-A	
11	Handle stay assembly (L)	ANG-094-A	
12	Switch circuit-B assembly	AWS-061-0	
13	Switch circuit-B assembly	AWS-061-0	
14	Handle	ANH-179-A	
15	Mic amplifier assembly	AWM-056-A	
16	Handle stay assembly (R)	ANG-094-0	
17	Round shading plate (B)	AEC-133-A	
18	Round shading plate (A)	AEC-132-0	
19	Shading plate (A)	AED-021-0	
20	Shading plate (B)	AED-022-0	
21*	Chassis	ANA-059-C	
22*	Shield plate	ANH-181-0	
23	Variable resistor 250kΩ-AC (PAN-POT)	ACV-128-0	
24	Phone jack (MICROPHONE)	K72-024-0	
25	Insulator (washer)	E32-045-A	
26	Phono jack-B (6 jacks)	AKB-017-0	
27	Phono jack-A (4 jacks)	AKB-014-0	
28	Variable resistor 100kΩ-A2 (LEVEL)	ACX-003-0	
29	Variable resistor 100kΩ-A2 (MASTER)	ACX-106-0	
30	Phone jack (HEADPHONES)	K72-026-0	
31	Nut (insulator)	B71-031-0	
32	Washer (insulator)	E34-014-0	
33	Rubber gromnet	AEB-034-A	
34	Pilot lamp 8V, 50mA	AEL-007-0	
35	Binding post for ground	AKE-017-0	
36	Ground terminal strip (4P)	K13-047-0	
37	Fuse holder (AC power)	AKR-020-0	
38	AC socket	AKP-002-0	
39	AC socket-held metal	M49-127-A	
40	AC power cord	ADG-005-0	
41	AC cord grommet	AEC-079-0	
42	Side board (R)	AMS-006-A	
43	Knob (POWER)	AAD-045-0	
44	Push switch (POWER)	ASG-023-0	
45*	P.C. board holder	ANF-177-0	
46	Switch circuit-A assembly	AWS-060-0	
47	Power transformer	ATT-203-0	
48	Connector (DIN type 5P)	K93-003-B	

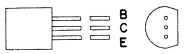
NOTE:
Parts number is subject to change for the purpose of improvement with notice of a service bulletin.
Service bulletin will be furnished whenever necessary and you are requested to amend parts number in this manual according to the instructions.



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

11.1 CIRCUIT CONNECTION DIAGRAM AND MISCELLANEOUS PARTS

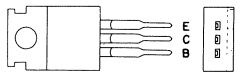
2SC1312
2SA725



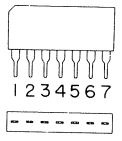
2SC1344

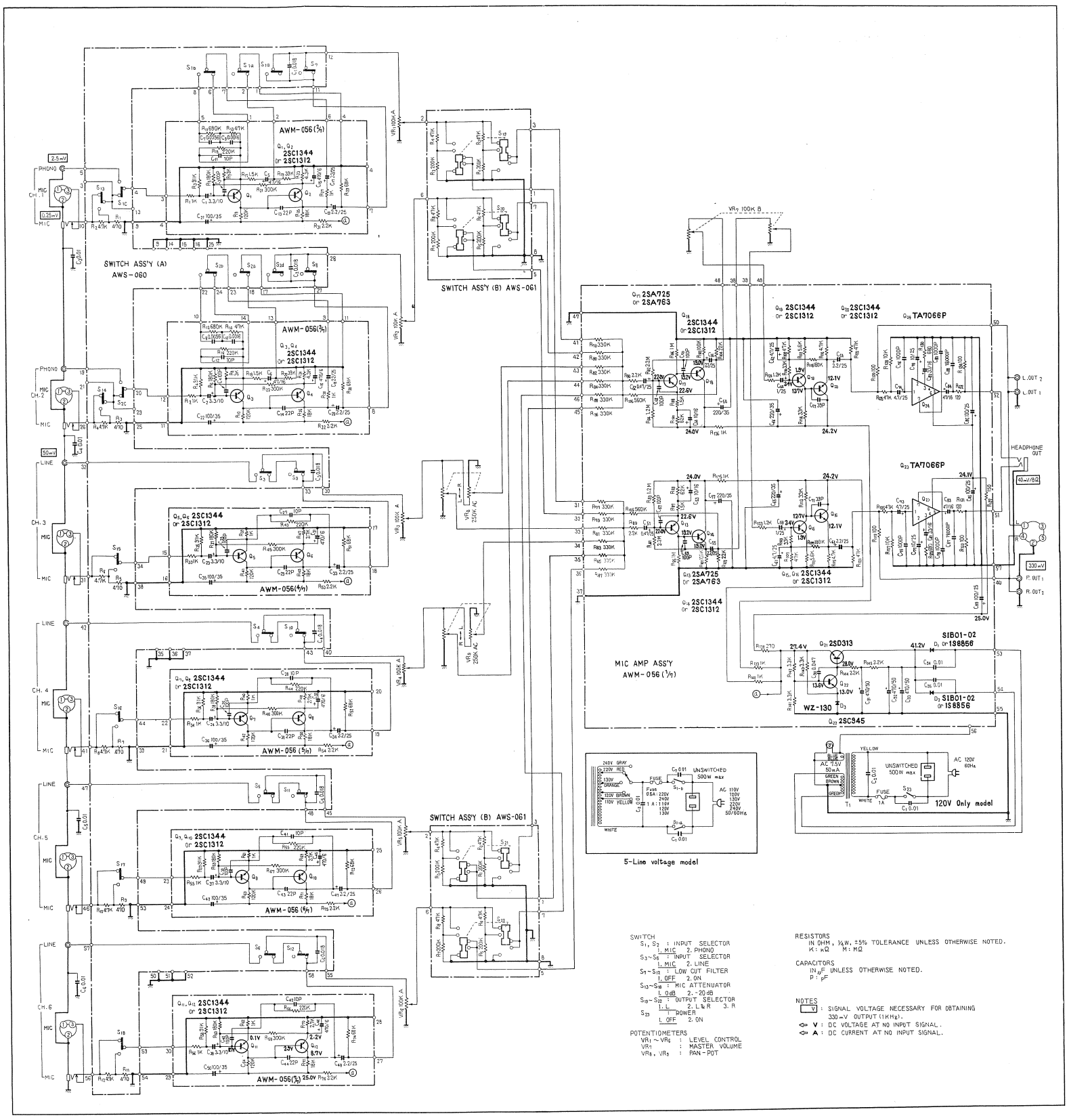
2SC945
2SA763P

2SD313



TA7066P





Miscellaneous Parts

- CAPACITORS: IN μF UNLESS OTHERWISE NOTED p: pF
- RESISTORS: IN Ω, ¼W UNLESS OTHERWISE NOTED k: kΩ, M: MΩ.

CAPACITORS

Symbol	Description	Part No.	
C1	Ceramic 0.01 250V	ACG001-0	
C2	Ceramic 0.01 250V	ACG-003-0	
C3	Ceramic 0.01 50V	CKDYF 103Z 50	
C4	Ceramic 0.01 50V	CKDYF 103Z 50	
C5	Ceramic 0.01 50V	CKDYF 103Z 50	
C6	Ceramic 0.01 50V	CKDYF 103Z 50	

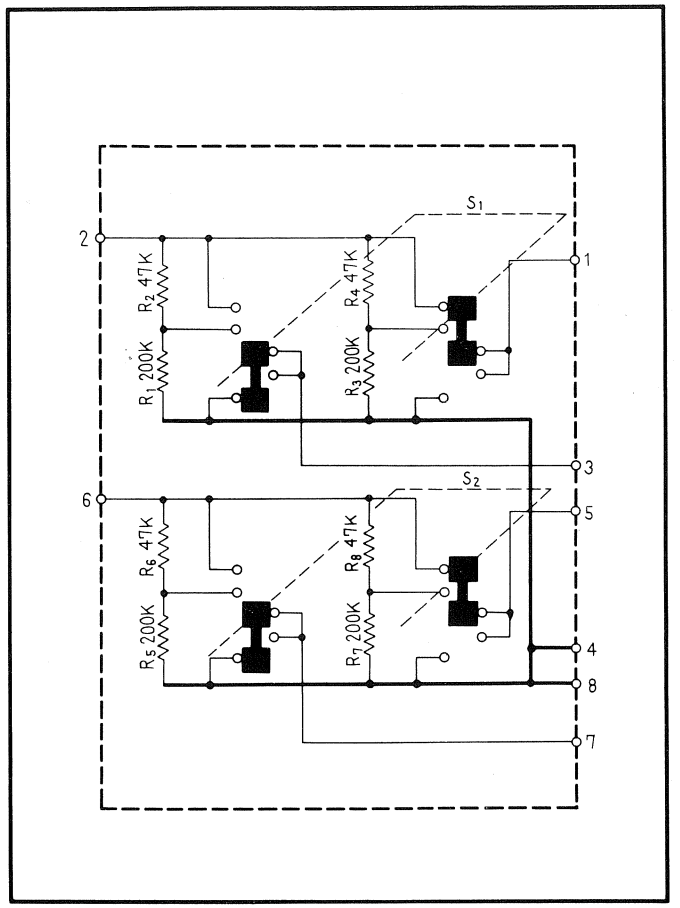
POTENTIOMETERS

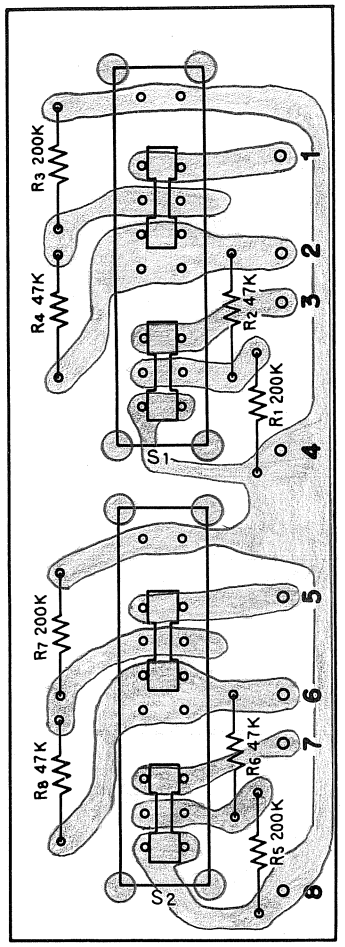
Symbol	Description	Part No.	
VR1	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR2	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR3	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR4	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR5	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR6	Variable resistor 100k-A2(LEVEL)	ACX-003-0	
VR7	Variable resistor 100k-A2(MASTER)	ACX-106-0	
VR8	Variable resistor 250k-AC (PAN-POT)	ACV-128-0	
VR9	Variable resistor 250k-AC (PAN-POT)	ACV-128-0	

OTHERS

Symbol	Description	Part No.	
	Microphone amplifier assembly	AWM-056-A	
	Switch circuit-A assembly	AWS-060-0	
	Switch circuit-B assembly	AWS-061-0	
	Phono Jack-A (4 jacks)	AKB-014-0	
	Phono Jack-B (6 jacks)	AKB-017-0	
	Binding post for ground	AKE-017-0	
	Power transformer	ATT-203-0	
	Pilot lamp 8V, 50mA	AEL-018-0	
	Fuse 1A (AC power)	AEK-106-0	
	Push switch (POWER)	ASG-023-0	
	AC socket	AKP-002-0	
	Fuse holder (AC power)	AKR-020-0	
	Phone jack (HEADPHONE)	K72-026-0	
	Phone jack (MICROPHONE)	K72-024-0	
	Connector (DIN type 5P)	K93-003-B	
	AC power cord	ADG-005-0	
	Operating instructions	ARB-098-A	
	Connection cord	ADE-005-0	

11.2 SWITCH CIRCUIT-B ASSEMBLY (AWS-061-0)





Foil Side (AWS-061-0)

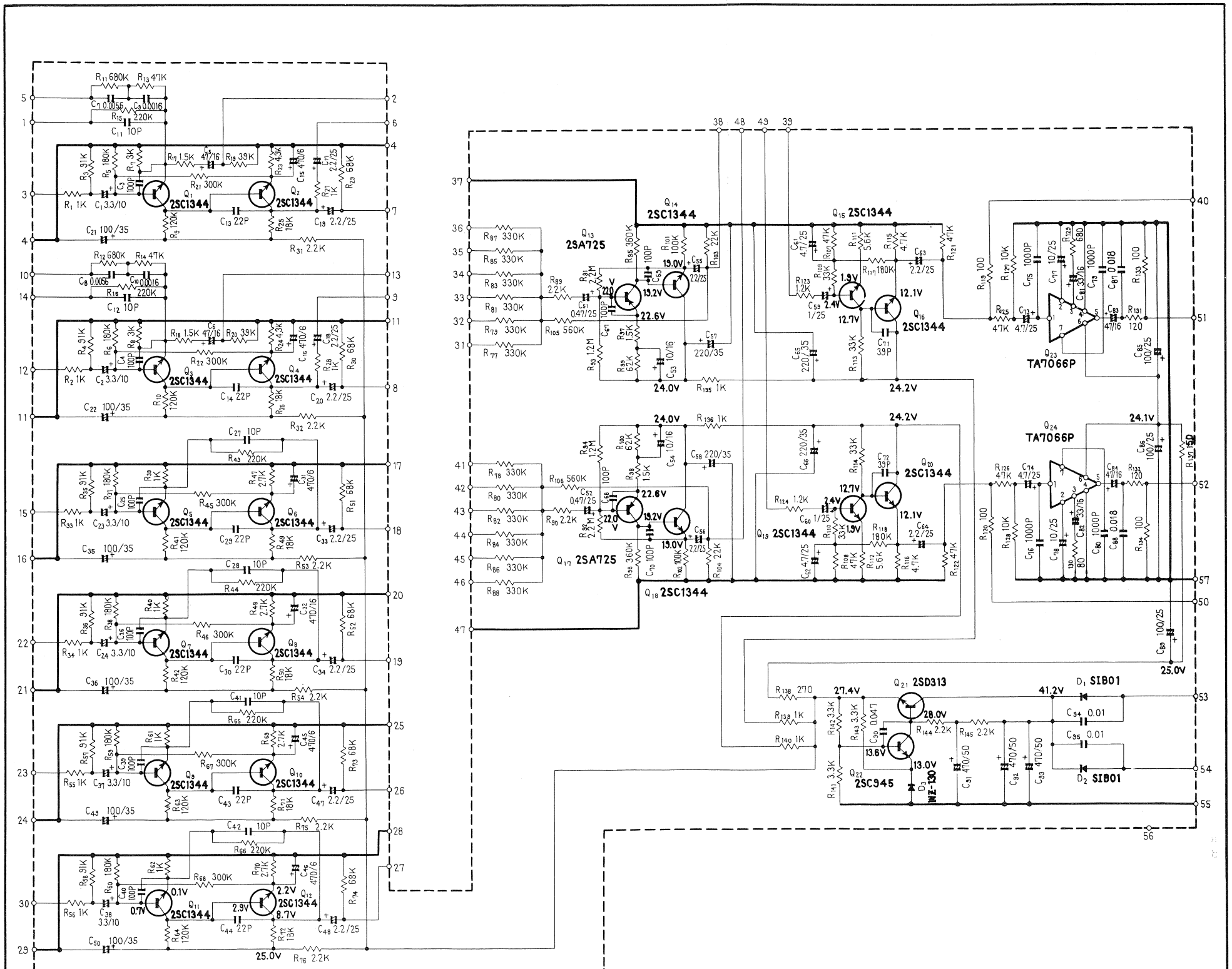
RESISTORS

Symbol	Description	Part No.	
R1	Carbon film 200k	RD¼PS 204J	
R2	Carbon film 47k	RD¼PS 473J	
R3	Carbon film 200k	RD¼PS 204J	
R4	Carbon film 47k	RD¼PS 473J	
R5	Carbon film 200k	RD¼PS 204J	
R6	Carbon film 47k	RD¼PS 473J	
R7	Carbon film 200k	RD¼PS 204J	
R8	Carbon film 47k	RD¼PS 473J	

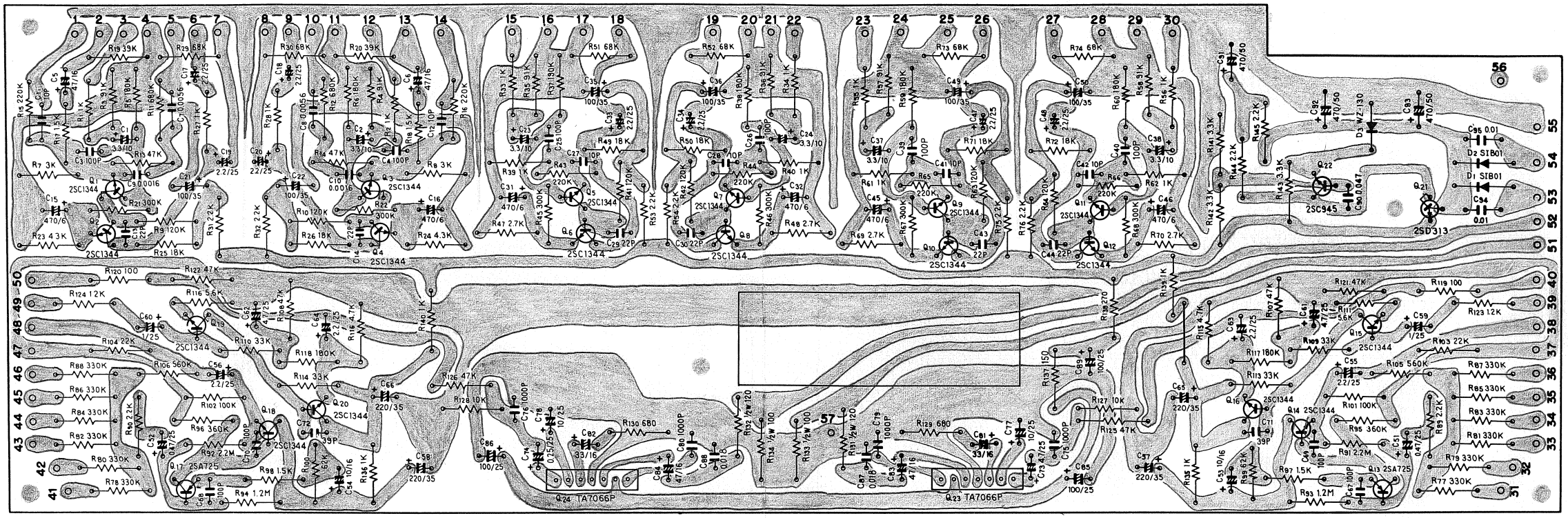
SWITCHES

Symbol	Description	Part No.	
S1	Slide switch (OUTPUT)	ASH-011-0	
S2	Slide switch (OUTPUT)	ASH-011-0	

11.3 MICROPHONE AMPLIFIER ASSEMBLY (AWM-056-A)



Foil Side (AWM-056-A)



Parts List of Microphone Amplifier Assembly (AWM-056-A)

CAPACITORS

Symbol	Description			Part No.	
C1	Electrolytic	3.3	10V	CSSA 3R3X 10	
C2	Electrolytic	3.3	10V	CSSA 3R3X 10	
C3	Ceramic	100p	50V	CCDSL 101K 50	
C4	Ceramic	100p	50V	CCDSL 101K 50	
C5	Electrolytic	47	16V	CEA 470P 16	
C6	Electrolytic	47	16V	CEA 470P 16	
C7	Styrol	5600p	50V	CQSA 562G 50	
C8	Styrol	5600p	50V	CQSA 562G 50	
C9	Styrol	1600p	50V	CQSA 162G 50	
C10	Styrol	1600p	50V	CQSA 162G 50	
C11	Ceramic	10p	50V	CCDSL 100F 50	
C12	Ceramic	10p	50V	CCDSL 100F 50	
C13	Ceramic	22p	50V	CCDSL 220K 50	
C14	Ceramic	22p	50V	CCDSL 220K 50	
C15	Electrolytic	470	6V	CEA 471P 6	
C16	Electrolytic	470	6V	CEA 471P 6	
C17	Electrolytic	2.2	25V	CSSA 2R2X 25	
C18	Electrolytic	2.2	25V	CSSA 2R2X 25	
C19	Electrolytic	2.2	25V	CSSA 2R2X 25	
C20	Electrolytic	2.2	35V	CSSA 2R2X 25	
C21	Electrolytic	100	35V	CEA 101P 35	
C22	Electrolytic	100	35V	CEA 101P 35	
C23	Electrolytic	3.3	10V	CSSA 3R3X 10	
C24	Electrolytic	3.3	10V	CSSA 3R3X 10	
C25	Ceramic	100p	50V	CCDSL 101K 50	
C26	Ceramic	100p	50V	CCDSL 101K 50	
C27	Ceramic	10p	50V	CCDSL 100F 50	
C28	Ceramic	10p	50V	CCDSL 100F 50	
C29	Ceramic	22p	50V	CCDSL 220K 50	
C30	Ceramic	22p	50V	CCDSL 220K 50	
C31	Electrolytic	470	6V	CEA 471P 6	
C32	Electrolytic	470	6V	CEA 471P 6	
C33	Electrolytic	2.2	25V	CSSA 2R2X 25	
C34	Electrolytic	2.2	25V	CSSA 2R2X 25	
C35	Electrolytic	100	35V	CEA 101P 35	
C36	Electrolytic	100	35V	CEA 101P 35	
C37	Electrolytic	3.3	10V	CSSA 3R3X 10	
C38	Electrolytic	3.3	10V	CSSA 3R3X 10	
C39	Ceramic	100p	50V	CCDSL 101K 50	
C40	Ceramic	100p	50V	CCDSL 101K 50	
C41	Ceramic	10p	50V	CCDSL 100F 50	
C42	Ceramic	10p	50V	CCDSL 100F 50	
C43	Ceramic	22p	50V	CCDSL 220K 50	
C44	Ceramic	22p	50V	CCDSL 220K 50	
C45	Electrolytic	470	6V	CEA 471P 6	

Symbol	Description			Part No.	
C46	Electrolytic	470	6V	CEA 471P 6	
C47	Electrolytic	2.2	25V	CSSA 2R2X 25	
C48	Electrolytic	2.2	25V	CSSA 2R2X 25	
C49	Electrolytic	100	35V	CEA 101P 35	
C50	Electrolytic	100	35V	CEA 101P 35	
C51	Electrolytic	0.47	25V	CSSA R47X 25	
C52	Electrolytic	0.47	25V	CSSA R47X 25	
C53	Electrolytic	10	16V	CEA 100P 16	
C54	Electrolytic	10	16V	CEA 100P 16	
C55	Electrolytic	2.2	25V	CSSA 2R2X 25	
C56	Electrolytic	2.2	25V	CSSA 2R2X 25	
C57	Electrolytic	220	35V	CEA 221P 35	
C58	Electrolytic	220	35V	CEA 221P 35	
C59	Electrolytic	1	25V	CSSA 010X 25	
C60	Electrolytic	1	25V	CSSA 010X 25	
C61	Electrolytic	4.7	25V	CEA 4R7P 25	
C62	Electrolytic	4.7	25V	CEA 4R7P 25	
C63	Electrolytic	2.2	25V	CSSA 2R2X 25	
C64	Electrolytic	2.2	25V	CSSA 2R2X 25	
C65	Electrolytic	220	35V	CEA 221P 35	
C66	Electrolytic	220	35V	CEA 221P 35	
C67	Ceramic	100p	50V	CCDSL 101K 50	
C68	Ceramic	100p	50V	CCDSL 101K 50	
C69	Ceramic	100p	50V	CCDSL 101K 50	
C70	Ceramic	100p	50V	CCDSL 101K 50	
C71	Ceramic	39p	50V	CCDSL 390K 50	
C72	Ceramic	39p	50V	CCDSL 390K 50	
C73	Electrolytic	4.7	25V	CEA 4R7P 25	
C74	Electrolytic	4.7	25V	CEA 4R7P 25	
C75	Mylar	0.001	50V	CQMA 102K 50	
C76	Mylar	0.001	50V	CQMA 102K 50	
C77	Electrolytic	10	25V	CEA 100P 25	
C78	Electrolytic	10	25V	CEA 100P 25	
C79	Mylar	0.001	50V	CQMA 102K 50	
C80	Mylar	0.001	50V	CQMA 102K 50	
C81	Electrolytic	33	16V	CEA 330P 16	
C82	Electrolytic	33	16V	CEA 330P 16	
C83	Electrolytic	47	16V	CEA 470P 16	
C84	Electrolytic	47	16V	CEA 470P 16	
C85	Electrolytic	100	25V	CEA 101P 25	
C86	Electrolytic	100	25V	CEA 101P 25	
C87	Mylar	0.018	50V	CQMA 183K 50	
C88	Mylar	0.018	50V	CQMA 183K 50	
C89	Electrolytic	100	25V	CEA 101P 25	
C90	Ceramic	0.047	50V	CKDYF 473Z 50	
C91	Electrolytic	470	50V	CEA 471P 50	
C92	Electrolytic	470	50V	CEA 471P 50	
C93	Electrolytic	470	50V	CEA 471P 50	
C94	Ceramic	0.01	150V	ACG-004-0	
C95	Ceramic	0.01	150V	ACG-004-0	

RESISTORS

Symbol	Description	Part No.	
R1	Carbon film 1k	RD¼PS 102J	
R2	Carbon film 1k	RD¼PS 102J	
R3	Carbon film 91k	RD¼PS 913J	
R4	Carbon film 91k	RD¼PS 913J	
R5	Carbon film 180k	RD¼PS 184J	
R6	Carbon film 180k	RD¼PS 184J	
R7	Carbon film 3k	RD¼PS 302J	
R8	Carbon film 3k	RD¼PS 302J	
R9	Carbon film 120k	RD¼PS 124J	
R10	Carbon film 120k	RD¼PS 124J	
R11	Carbon film 680k	RD¼PS 684J	
R12	Carbon film 680k	RD¼PS 684J	
R13	Carbon film 47k	RD¼PS 473J	
R14	Carbon film 47k	RD¼PS 473J	
R15	Carbon film 220k	RD¼PS 224J	
R16	Carbon film 220k	RD¼PS 224J	
R17	Carbon film 1.5k	RD¼PS 152J	
R18	Carbon film 1.5k	RD¼PS 152J	
R19	Carbon film 39k	RD¼PS 393J	
R20	Carbon film 39k	RD¼PS 393J	
R21	Carbon film 300k	RD¼PS 304J	
R22	Carbon film 300k	RD¼PS 304J	
R23	Carbon film 4.3k	RD¼PS 432J	
R24	Carbon film 4.3k	RD¼PS 432J	
R25	Carbon film 18k	RD¼PS 183J	
R26	Carbon film 18k	RD¼PS 183J	
R27	Carbon film 1k	RD¼PS 102J	
R28	Carbon film 1k	RD¼PS 102J	
R29	Carbon film 68k	RD¼PS 683J	
R30	Carbon film 68k	RD¼PS 683J	
R31	Carbon film 2.2k	RD¼PS 222J	
R32	Carbon film 2.2k	RD¼PS 222J	
R33	Carbon film 1k	RD¼PS 102J	
R34	Carbon film 1k	RD¼PS 102J	
R35	Carbon film 91k	RD¼PS 913J	
R36	Carbon film 91k	RD¼PS 913J	
R37	Carbon film 180k	RD¼PS 184J	
R38	Carbon film 180k	RD¼PS 184J	
R39	Carbon film 1k	RD¼PS 102J	
R40	Carbon film 1k	RD¼PS 102J	
R41	Carbon film 120k	RD¼PS 124J	
R42	Carbon film 120k	RD¼PS 124J	
R43	Carbon film 220k	RD¼PS 224J	
R44	Carbon film 220k	RD¼PS 224J	
R45	Carbon film 300k	RD¼PS 304J	
R46	Carbon film 300k	RD¼PS 304J	
R47	Carbon film 2.7k	RD¼PS 272J	
R48	Carbon film 2.7k	RD¼PS 272J	
R49	Carbon film 18k	RD¼PS 183J	
R50	Carbon film 18k	RD¼PS 183J	

Continued on the Next Page

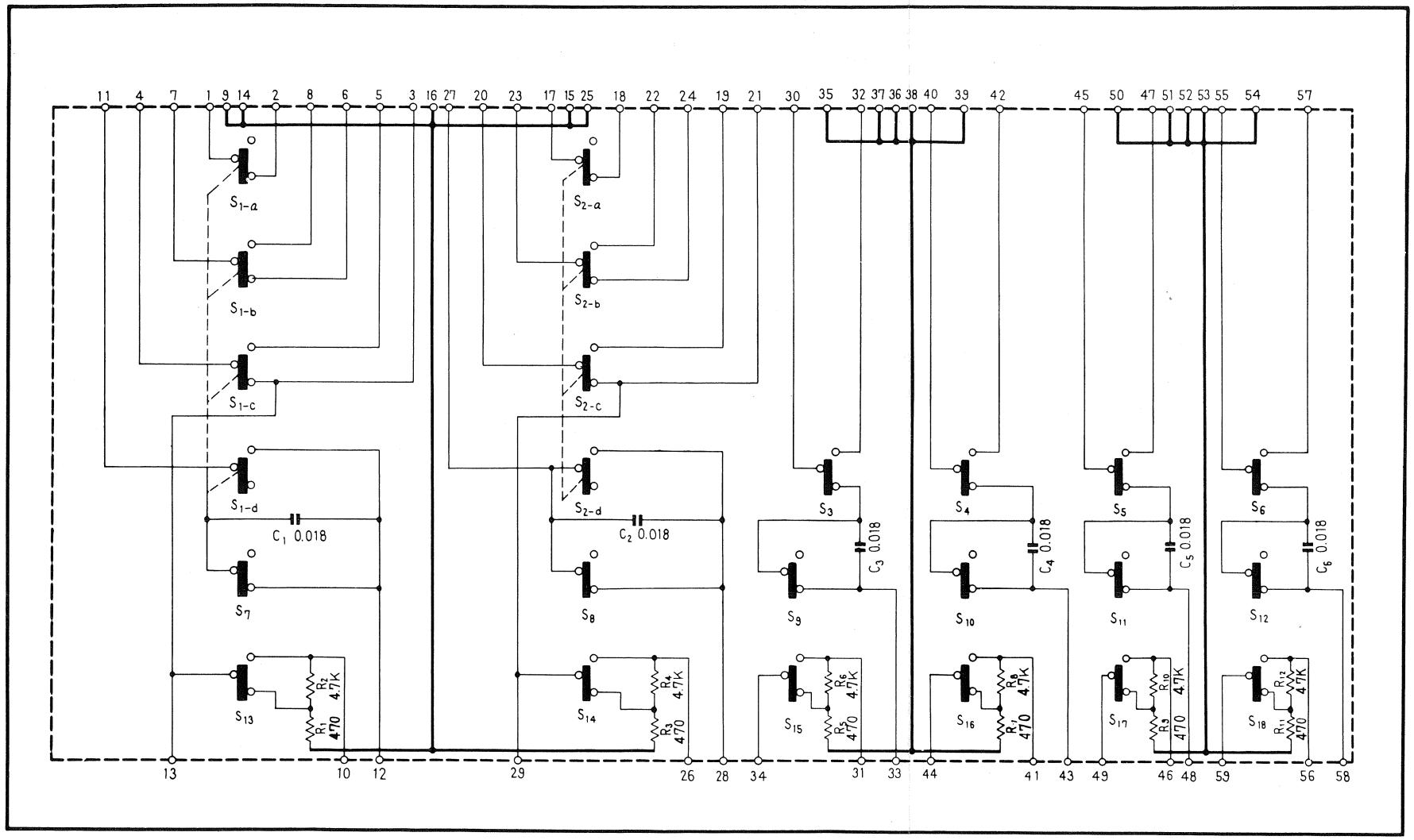
Symbol	Description	Part No.	
R51	Carbon film 68k	RD¼PS 683J	
R52	Carbon film 68k	RD¼PS 683J	
R53	Carbon film 2.2k	RD¼PS 222J	
R54	Carbon film 2.2k	RD¼PS 222J	
R55	Carbon film 1k	RD¼PS 102J	
R56	Carbon film 1k	RD¼PS 102J	
R57	Carbon film 91k	RD¼PS 913J	
R58	Carbon film 91k	RD¼PS 913J	
R59	Carbon film 180k	RD¼PS 184J	
R60	Carbon film 180k	RD¼PS 184J	
R61	Carbon film 1k	RD¼PS 102J	
R62	Carbon film 1k	RD¼PS 102J	
R63	Carbon film 120k	RD¼PS 124J	
R64	Carbon film 120k	RD¼PS 124J	
R65	Carbon film 220k	RD¼PS 224J	
R66	Carbon film 220k	RD¼PS 224J	
R67	Carbon film 300k	RD¼PS 304J	
R68	Carbon film 300k	RD¼PS 304J	
R69	Carbon film 2.7k	RD¼PS 272J	
R70	Carbon film 2.7k	RD¼PS 272J	
R71	Carbon film 18k	RD¼PS 183J	
R72	Carbon film 18k	RD¼PS 183J	
R73	Carbon film 68k	RD¼PS 683J	
R74	Carbon film 68k	RD¼PS 683J	
R75	Carbon film 2.2k	RD¼PS 222J	
R76	Carbon film 2.2k	RD¼PS 222J	
R77	Carbon film 330k	RD¼PS 334J	
R78	Carbon film 330k	RD¼PS 334J	
R79	Carbon film 330k	RD¼PS 334J	
R80	Carbon film 330k	RD¼PS 334J	
R81	Carbon film 330k	RD¼PS 334J	
R82	Carbon film 330k	RD¼PS 334J	
R83	Carbon film 330k	RD¼PS 334J	
R84	Carbon film 330k	RD¼PS 334J	
R85	Carbon film 330k	RD¼PS 334J	
R86	Carbon film 330k	RD¼PS 334J	
R87	Carbon film 330k	RD¼PS 334J	
R88	Carbon film 330k	RD¼PS 334J	
R89	Carbon film 2.2k	RD¼PS 222J	
R90	Carbon film 2.2k	RD¼PS 222J	
R91	Carbon film 2.2M	RD¼PS 225J	
R92	Carbon film 2.2M	RD¼PS 225J	
R93	Carbon film 1.2M	RD¼PS 125J	
R94	Carbon film 1.2M	RD¼PS 125J	
R95	Carbon film 360k	RD¼PS 364J	
R96	Carbon film 360k	RD¼PS 364J	
R97	Carbon film 1.5k	RD¼PS 152J	
R98	Carbon film 1.5k	RD¼PS 152J	
R99	Carbon film 62k	RD¼PS 623J	
R100	Carbon film 62k	RD¼PS 623J	

Symbol	Description	Part No.	
R101	Carbon film 100k	RD¼PS 104J	
R102	Carbon film 100k	RD¼PS 104J	
R103	Carbon film 22k	RD¼PS 223J	
R104	Carbon film 22k	RD¼PS 223J	
R105	Carbon film 560k	RD¼PS 564J	
R106	Carbon film 560k	RD¼PS 564J	
R107	Carbon film 47k	RD¼PS 473J	
R108	Carbon film 47k	RD¼PS 473J	
R109	Carbon film 33k	RD¼PS 333J	
R110	Carbon film 33k	RD¼PS 333J	
R111	Carbon film 5.6k	RD¼PS 562J	
R112	Carbon film 5.6k	RD¼PS 562J	
R113	Carbon film 33k	RD¼PS 333J	
R114	Carbon film 33k	RD¼PS 333J	
R115	Carbon film 4.7k	RD¼PS 472J	
R116	Carbon film 4.7k	RD¼PS 472J	
R117	Carbon film 180k	RD¼PS 184J	
R118	Carbon film 180k	RD¼PS 184J	
R119	Carbon film 100	RD¼PS 101J	
R120	Carbon film 100	RD¼PS 101J	
R121	Carbon film 47k	RD¼PS 473J	
R122	Carbon film 47k	RD¼PS 473J	
R123	Carbon film 1.2k	RD¼PS 122J	
R124	Carbon film 1.2k	RD¼PS 122J	
R125	Carbon film 47k	RD¼PS 473J	
R126	Carbon film 47k	RD¼PS 473J	
R127	Carbon film 10k	RD¼PS 103J	
R128	Carbon film 10k	RD¼PS 103J	
R129	Carbon film 680	RD¼PS 681J	
R130	Carbon film 680	RD¼PS 681J	
R131	Carbon film 120	RD¼PS 121J	
R132	Carbon film 120	RD¼PS 121J	
R133	Carbon film 100	RD¼PS 101J	
R134	Carbon film 100	RD¼PS 101J	
R135	Carbon film 1k	RD¼PS 102J	
R136	Carbon film 1k	RD¼PS 102J	
R137	Carbon film 150	RD¼PS 151J	
R138	Carbon film 270	RD¼PS 271J	
R139	Carbon film 1k	RD¼PS 102J	
R140	Carbon film 1k	RD¼PS 102J	
R141	Carbon film 3.3k	RD¼PS 332J	
R142	Carbon film 3.3k	RD¼PS 332J	
R143	Carbon film 3.3k	RD¼PS 332J	
R144	Carbon film 2.2k	RD¼PS 222J	
R145	Carbon film 2.2k	RD¼PS 222J	

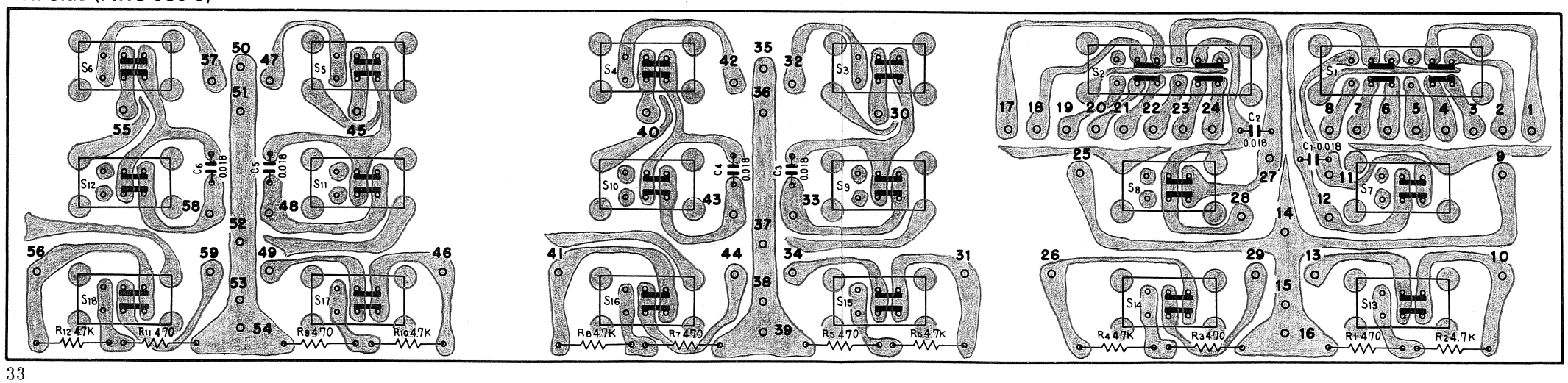
SEMICONDUCTORS

Symbol	Description	Part No.	
Q1	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q2	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q3	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q4	Transistor 2SC1344-E or D) (2SC1312-G or F)		
Q5	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q6	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q7	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q8	Transistor 2SC1344-G or F (2SC1312-G or F)		
Q9	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q10	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q11	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q12	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q13	Transistor 2SA725-G or F (2SA763P-5 or 6)		
Q14	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q15	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q16	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q17	Transistor 2SA725-G or F) (2SA763P-5 or 6)		
Q18	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q19	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q20	Transistor 2SC1344-E or D (2SC1312-G or F)		
Q21	Transistor 2SD313-D or E		
Q22	Transistor 2SC945-Q or R		
Q23	IC TA7066P		
Q24	IC TA7066P		
D1	Diode SIB01-02 (1S1886)		
D2	Diode SIB01-02 (1S1886)		
D3	Zener diode WZ-130		

11.4 SWITCH CIRCUIT-A ASSEMBLY (AWS-060-0)



Foil Side (AWS-060-0)



Parts List of Switch Circuit-A Assembly (AWS-060-0)

CAPACITORS

Symbol	Description			Part No.	
C1	Mylar	0.018	50V	CQMA183K 50	
C2	Mylar	0.018	50V	CQMA183K 50	
C3	Mylar	0.018	50V	CQMA183K 50	
C4	Mylar	0.018	50V	CQMA183K 50	
C5	Mylar	0.018	50V	CQMA183K 50	
C6	Mylar	0.018	50V	CQMA183K 50	

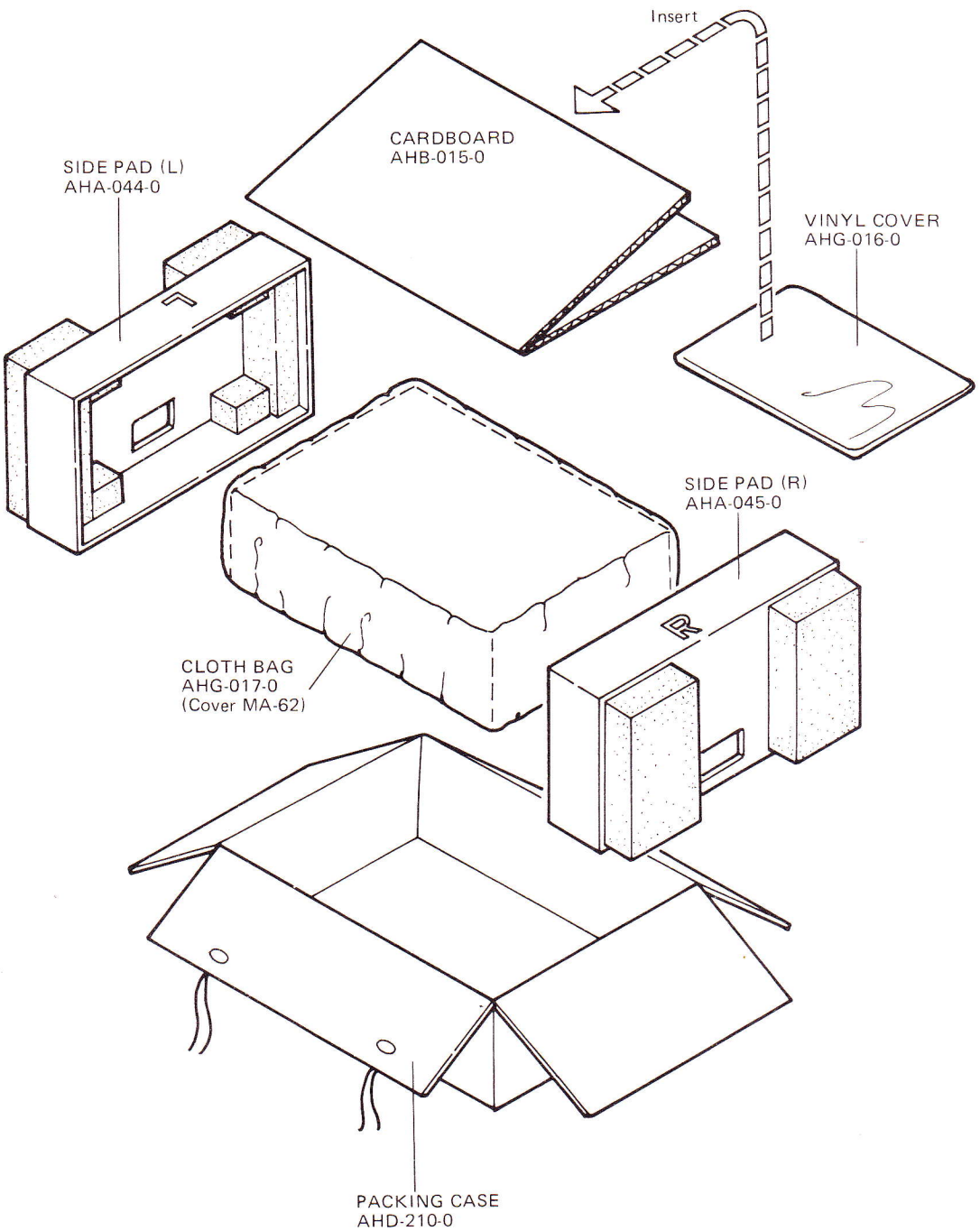
RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	470	RD¼PS 471J	
R2	Carbon film	4.7k	RD¼PS 472J	
R3	Carbon film	470	RD¼PS 471J	
R4	Carbon film	4.7k	RD¼PS 472J	
R5	Carbon film	470	RD¼PS 471J	
R6	Carbon film	4.7k	RD¼PS 472J	
R7	Carbon film	470	RD¼PS 471J	
R8	Carbon film	4.7k	RD¼PS 472J	
R9	Carbon film	470	RD¼PS 471J	
R10	Carbon film	4.7k	RD¼PS 472J	
R11	Carbon film	470	RD¼PS 471J	
R12	Carbon film	4.7k	RD¼PS 472J	

SWITCHES

Symbol	Description	Part No.	
S1	Slide switch (INPUT)	ASH-010-0	
S2	Slide switch (INPUT)	ASH-010-0	
S3	Slide switch (INPUT)	ASH-009-0	
S4	Slide switch (INPUT)	ASH-009-0	
S5	Slide switch (INPUT)	ASH-009-0	
S6	Slide switch (INPUT)	ASH-009-0	
S7	Slide switch (MIC LOW-CUT)	ASH-009-0	
S8	Slide switch (MIC LOW-CUT)	ASH-009-0	
S9	Slide switch (MIC LOW-CUT)	ASH-009-0	
S10	Slide switch (MIC LOW-CUT)	ASH-009-0	
S11	Slide switch (MIC LOW-CUT)	ASH-009-0	
S12	Slide switch (MIC LOW-CUT)	ASH-009-0	
S13	Slide switch (MIC ATTENUATOR)	ASH-009-0	
S14	Slide switch (MIC ATTENUATOR)	ASH-009-0	
S15	Slide switch (MIC ATTENUATOR)	ASH-009-0	
S16	Slide switch (MIC ATTENUATOR)	ASH-009-0	
S17	Slide switch (MIC ATTENUATOR)	ASH-009-0	
S18	Slide switch (MIC ATTENUATOR)	ASH-009-0	

12. PACKING METHOD AND PART NUMBERS



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