STEREO PRE-AMPLIFIER

SPEC-1

KCU

<ART-142-0>

Service Manual

PIONEER®

CONTENTS

1. SPECIFICATIONS

Semiconductors

Transistors 50
Diodes 33

Pre-amplifier

Circuitry
- Equalizer amplifier . . 3-stage direct-coupled class A SEPP with 1st-stage differential amplifier.
- Control amplifier . . . 3-stage direct-coupled class A SEPP with 1st-stage differential amplifier.

Input (Sensitivity/Impedance)
- PHONO 1 . . . . . 2.5mV/50kohms
- PHONO 2 . . . . . 2.5mV to 10mV/50kohms
- MIC 2.5mV/50kohms
- TUNER 150mV/100kohms
- AUX 1 . . . . . 150mV/100kohms
- AUX 2 . . . . . 150mV/100kohms
- TAPE PLAY 1 . . . . . 150mV/100kohms
- TAPE PLAY 2 . . . . . 150mV/100kohms

PHONO Overload Level (T.H.D.: 0.05%)
- PHONO 1 . . . . . 500mV (1,000Hz)
- PHONO 2 . . . . . 500mV to 1,000mV (1,000Hz)

Output (Level/Impedance)
- TAPE REC 1 . . . . . 150mV/2.2kohms
- TAPE REC 2 . . . . . 150mV/2.2kohms
- OUTPUT 1, 2 (R_L: 50kohms) 2V/600ohms
  7V/600ohms (max.)

Total Harmonic Distortion (20Hz to 20,000Hz)
. . . . . No more than 0.03% (2V output)
No more than 0.05% (7V output)

Frequency Response
- PHONO (RIAA Equalization) . 30Hz to 15,000Hz, ±0.2dB
- TUNER, AUX, TAPE PLAY. . .10Hz to 70,000Hz, $^{+0}_{-0.5}$ dB

Tone Control (1.5dB step)

BASS	MAIN	±7.5dB (100Hz)
	SUB	±4.5dB (50Hz)
TREBLE	MAIN	±7.5dB (10,000Hz)
	SUB	±4.5dB (20,000Hz)

Filter
- LOW 15Hz, 30Hz (12dB/oct.)
- HIGH 12,000Hz, 8,000Hz (12dB/oct.)

Hum and Noise (IHF, short-circuited, A Network)
- PHONO 70dB
- TUNER, AUX, TAPE PLAY 90dB

Attenuator . . . . . −15dB, −30dB

Miscellaneous

Power Requirements . . . . . AC 120V, 60Hz
Power Consumption . . . . . 17 watts
Dimensions . . . . . 480(W) x 186.5(H) x 365(D) mm
18-7/8 x 7-5/16 x 14-3/8 in.
Weight (Without package) . . . . . 11.2kg, 24 lb 10 oz

Furnished Parts

Connection Cord with pin plugs 1
Operating Instructions . . . . . 1 copy
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

POWER SWITCH

Set switch to ON to turn on SPEC-1 power. There is a brief delay before sound is obtained from the speakers. This is due to the internal muting circuit and does not signify malfunction.

SPEAKERS SWITCH

If the power amplifier output (SPEAKER OUTPUT or LINE OUTPUT) is connected to the SPEC-1 FROM POWER AMP terminals, and the speaker systems connected to the SPEC-1 SPEAKERS terminals, desired speaker systems can be selected by this switch.

- OFF: Sound not obtained from speakers. Set to this position if the speakers are not connected through the SPEC-1.
- A: Sound obtained from speaker systems connected to the SPEAKERS A terminals.
- B: Sound obtained from speaker systems connected to the SPEAKERS B terminals.
- A + B: Sound obtained simultaneously from both A and B speaker systems.

PHONES JACK

Output jack for stereo headphones.

NOTE:
This PHONES jacks is only available if the output of the power amplifier is connected to the FROM POWER AMP terminals of the SPEC-1.

LOW FILTER SWITCH

Cuts low frequency noise.

- 15Hz: Attenuates ultra-low frequency noise such as produced by warped records by 12dB/octave. Although inaudible, since this noise can contribute to intermodulation distortion and speaker deterioration, normally set the switch to this position.
- OFF: Set to this position when filter is not required.
- 30Hz: Attenuates frequencies below 30Hz by 12dB/octave.

HIGH FILTER SWITCH

Cuts high frequency noise such as record scratch or tape hiss.

- 12kHz: Attenuates frequencies above 12kHz by 12dB/octave.
- OFF: Set to this position when not employing filter.
- 8kHz: Attenuates frequencies above 8kHz by 12dB/octave.

BASS TWIN CONTROLS

Two controls for adjusting low frequency tone.

- 100Hz: Adjusts frequency band below 100Hz. +7.5dB ~ −7.5dB adjustment can be performed at 100Hz.
- 50Hz: Provides additional adjustment to 100Hz control for frequency band below 200Hz. +4.5dB ~ −4.5dB adjustment can be performed at 50Hz.

PILOT LAMP

Lights when SPEC-1 POWER switch is set to ON.

TONE SWITCH

When set to OFF, BASS and TREBLE twin controls are bypassed and a flat frequency response obtained. Convenient for checking phono cartridge and speaker tone, twin control effectiveness, and listening room acoustics.

TREBLE TWIN CONTROLS

Two controls for adjusting high frequency tone.

- 10kHz: Adjusts frequency band above 2.5kHz. +7.5dB ~ −7.5dB adjustment can be performed at 10kHz.
- 20kHz: Provides additional adjustment to 10kHz control for frequency band above 5kHz. +4.5dB ~ −4.5dB adjustment can be performed at 20kHz.

VOLUME CONTROL

Adjusts output level to the OUTPUT jacks, PHONES jack and SPEAKER output terminals. Scale indicates attenuation in dB with maximum output level taken as 0dB. Can be employed in combination with ATTENUATOR switch to provide fine adjustment of additional attenuation steps.

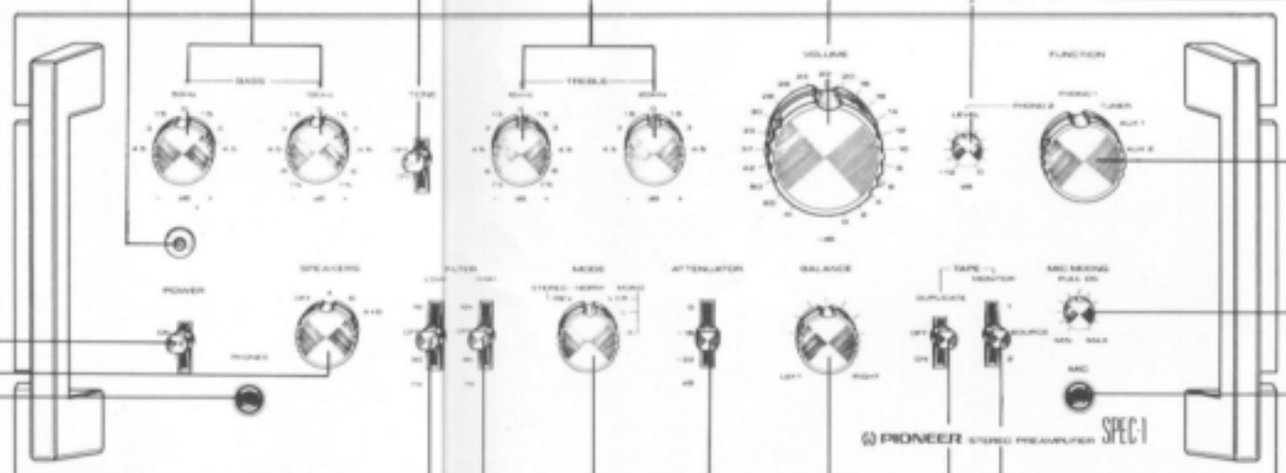
PHONO 2 LEVEL CONTROL

Control operation allows input level of PHONO 2 jacks to be attenuated up to 12dB.

FUNCTION SWITCH

Selects desired program source.

- PHONO 2: To play record on turntable connected to PHONO 2 jacks.
- PHONO 1: To play record on turntable connected to PHONO 1 jacks.
- TUNER: To listen to tuner connected to TUNER jacks.
- AUX 1: To play component connected to AUX 1 jacks.
- AUX 2: To play component connected to AUX 2 jacks.



MODE SWITCH

- STEREO REV: Left and right stereo channels are reversed and presented stereophonically.
- STEREO NORM: Set to this position for normal stereo listening.
- MONO L + R: Left and right stereo channels are mixed and presented monophonically.
- MONO L: Left channel of stereo signal is presented monophonically at both left and right OUTPUT jacks.
- MONO R: Right channel of stereo signal is presented monophonically at both left and right OUTPUT jacks.

BALANCE CONTROL

Control for adjusting volume balance between left (L) and right (R) channels. Clockwise rotation from center increases right channel sound and diminishes the left channel sound. The opposite is obtained with counterclockwise rotation from center.

ATTENUATOR SWITCH

Provides additional attenuation of output level and speaker output signal to the VOLUME control.

Position	Attenuation
0dB	None
−15dB	15dB
−30dB	30dB

Normally set this switch to where comfortable volume is obtained with the VOLUME control near center of rotation. It is also convenient for temporarily reducing the volume when changing records or tapes, etc.

MIC MIXING CONTROL

Pull control outward to ON when using microphone. Turn the control to adjust ratio between another program source and the microphone source.

MIC JACK

Jack for connecting microphone. Set MIC MIXING control to ON when using microphone. Be sure to unplug microphone when not using it.

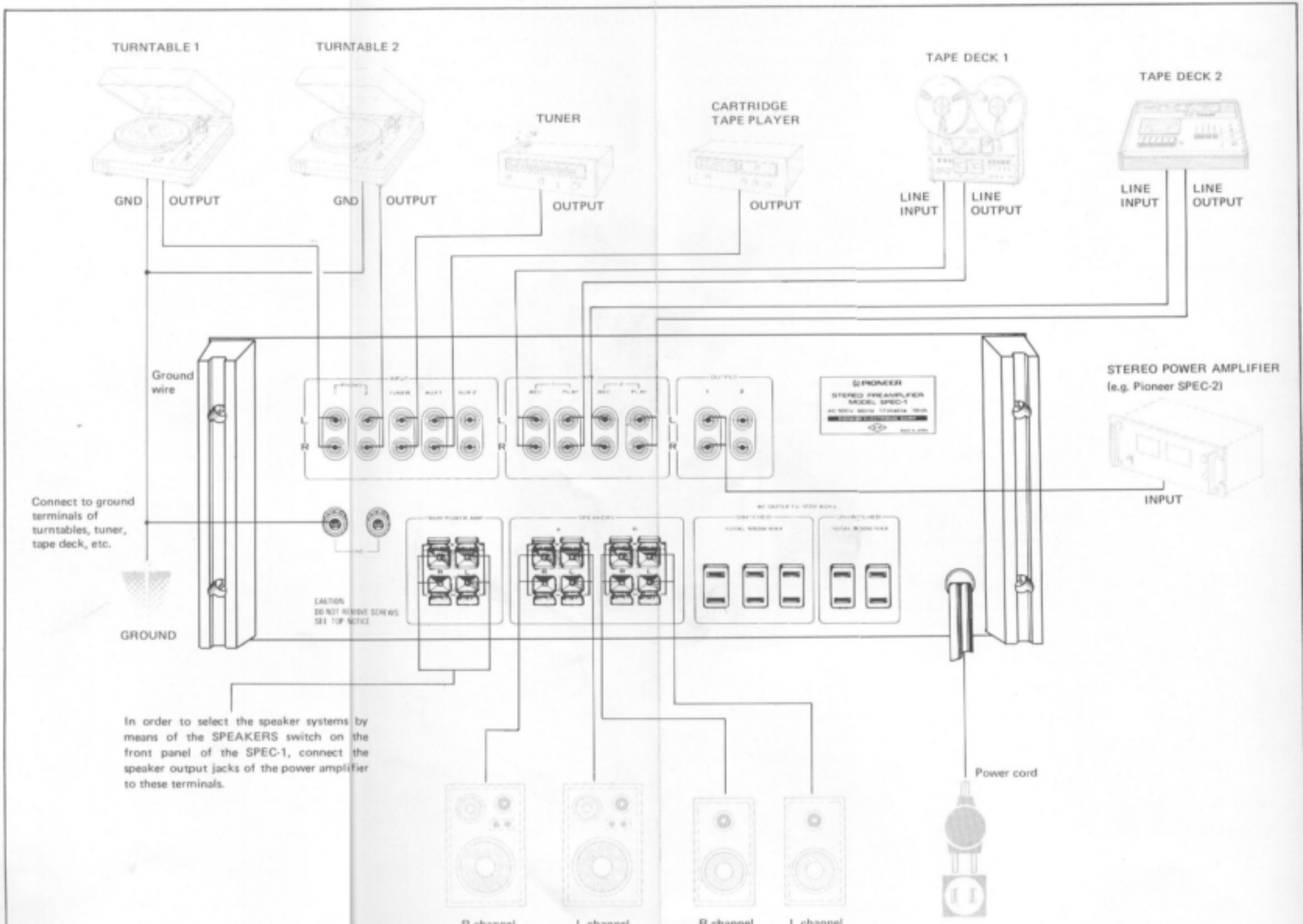
TAPE MONITOR SWITCH

- 1: To monitor or play tape on tape deck connected to TAPE 1 (REC and PLAY) jacks
- SOURCE: Set to this position when not playing tape.
- 2: To monitor or play tape on tape deck connected to TAPE 2 (REC and PLAY) jacks.

TAPE DUPLICATE SWITCH

By employing two tape decks, recorded tape can be duplicated (dubbed) onto new tape. Also set to ON for editing. Normally set this switch to OFF.

3. CONNECTION DIAGRAM



4. CIRCUIT DESCRIPTION

4.1 EQUALIZER AMPLIFIER

The equalizer amplifier circuit employs a differential amplifier first stage, SEPP (single ended push pull) final stage, balanced power supply, 3 stages direct coupled NFB (negative feedback) system. Its circuit diagram is shown in Fig. 1.

Q1 and Q2 compose the differential amplifier. The input signal is fed to Q1 and NFB is applies from the output stage to Q2 base. Q1 output is voltage amplified at Q3 and Q3 dirves the Q4 & Q5 SEPP circuit. Since a bootstrap circuit (R19, R21, C15) is inserted at the Q3 load, its AC load impedance is large and a large voltage gain can be obtained.

Fig. 2 shows an equivalent circuit to this AC bootstrap. In the absence of C15, the load impedance becoems the composite impedance of the Q4 & Q5 SEPP circuit and the parallel R19 & R21.

With C15 inserted, the positive feedback as nearly same as Q3 output is applied to point A from the output terminal through C15. The result in, the potential difference across the resistor R21 becomes small. The Q3 output signal then flows in the Q4 & Q5 SEPP circuit without flowing through R21. This resistor becomes effectively non-existent and consequently, the Q3 load becomes the SEPP circuit input impedance, giving a high load impedance compared to the above case.

R11, R13, R15, C11, C13 and VR1a in Fig. 1 compose the NFB circuit. 100% DC NFB from the output terminal passes through R13 & R15 and is applied to Q2 base; a design which stabilizes DC balance. AC NFB, determined by R13, R15, C11, C13, R11 and VR1a, is applied to Q2 base (VR1a is included only when the FUNCTION switch is in the PHONO 2 position, and is shorted in the PHONO 1 position). The RIAA curve is derived from this AC NFB, and for the elements which govern the RIAA response is obtained (R11, R13, C11, C13), 1% tolerance metallized film resistors and 2% tolerance styrol capacitors are employed. RIAA deviation in the range 30Hz to 15,000Hz is suppressed to within ±0.2dB of the standard value. At the same time, high reliability is obtained with respect to thermal variations and aging.

With the FUNCTION switch in the PHONO 2 position, gain adjustment is available in the range 0 to −12dB. The first 6dB adjustment is performed by varying the amount of NFB in the NFB circuit using VR1a, and the subsequent 6dB by attenuating the output with VR1b in the output circuit. This method possesses the advantage of not impairing high frequency RIAA deviation or stability, while increasing the acceptable input to a maximum of 6dB. Consequently, when the gain is reduced more than 6dB, 1 Vrms (at 1kHz) acceptable input is available.

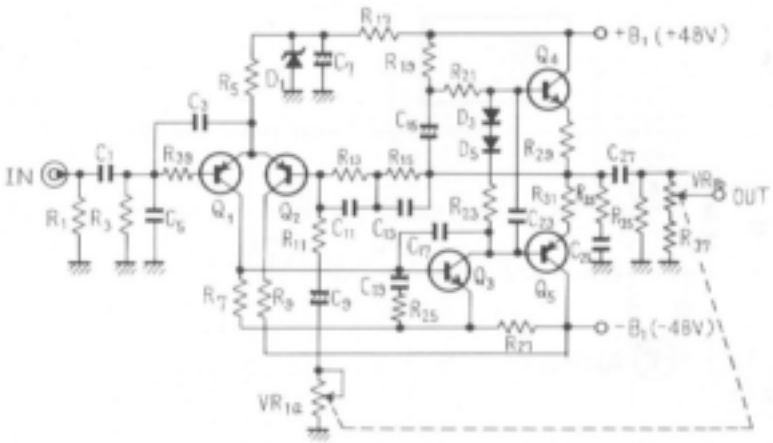


Fig. 1 Circuit Diagram of Equalizer Amplifier

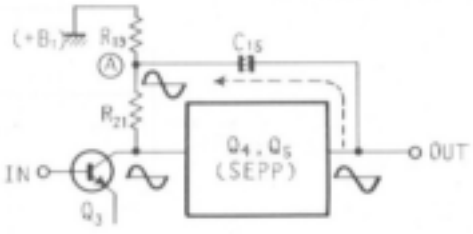


Fig. 2 Equivalent Circuit of Bootstrap

4.2 INPUT BUFFER AMPLIFIER

This is a balanced power supply, pure complementary SEPP Class A operational buffer amplifier. Although the circuit gain is essentially 0dB, high TUNER and AUX jack input impedance can be obtained. The low output impedance permits a low resistance VOLUME control to be employed in the following stage, eliminating observable high frequency deterioration due to VOLUME control position. Since the power supply uses an extremely high ±48V push pull arrangement, inclusion of this circuit does not impair dynamic range. The circuit is shown in Fig. 3.

The input signal passes through C1 & C3 and is applied to both Q10 & Q11.

4.3 TONE AMPLIFIER

The SPEC-1 tone control amplifier employs a twin control system consisting of switch selected NFB type main tone controls and CR network type sub tone controls. The operational section is a differential amplifier and SEPP circuit combination, with a balanced power supply, 3 stage direct coupled amplifier and 1 stage buffer amplifier. The circuit is illustrated in Fig. 4.

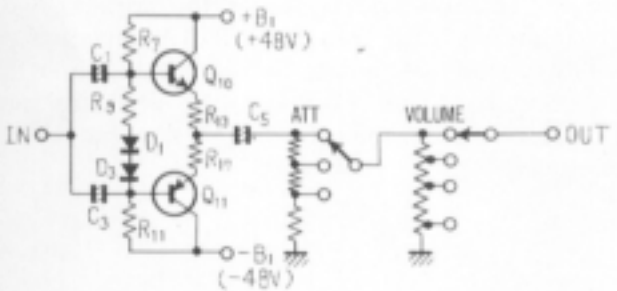


Fig. 3 Circuit Diagram of Input Buffer Amplifier

1. Main Tone Controls

Q12 — Q16 make up the main tone control amplifier. Although the basic operation is the same as the equalizer amplifier, the NFB circuit differs. Fig. 5 shows a simplification of this circuit. S9 is for main bass control and S10 for main treble control. These perform CR selection and control the amplifier frequency response by varying the NFB frequency response.

- Bass Boost and Cut

Fig. 8a shows the equivalent circuit during bass boost. The composite impedance of R25, Ca and Ra in the equivalent circuit becomes high at low frequencies. NFB is therefore reduced and amplifier gain increases at low frequencies.

The equivalent circuit during bass cut is illustrated in Fig. 8b. In this case the composite impedance of Rb, Cb and C75 becomes high at low frequencies, and NFB increases, thereby reducing amplifier gain.

- Treble Boost and Cut

Fig. 9a shows the equivalent circuit during treble boost. The combined impedance of Rc, Cc, Rd and C75 becomes low at high frequencies, reducing NFB and increasing amplifier gain.

The equivalent circuit during treble cut is shown in Fig. 9b. Cd and Re impedance becomes low at high frequencies, increasing NFB and reducing amplifier gain.

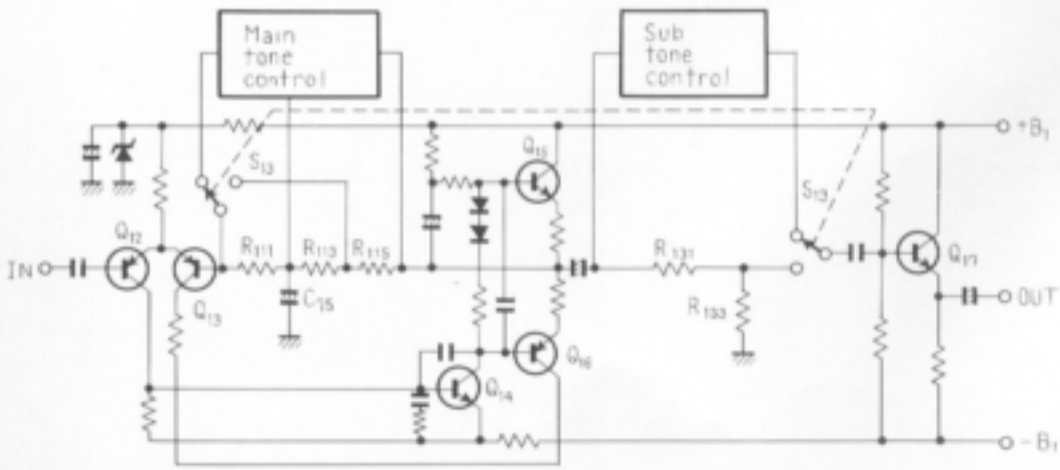


Fig. 4 Circuit Diagram of Tone Amplifier

• Tone Control Flat and TONE Switch Off

The NFB circuit becomes the same during both tone control flat and TONE switch OFF modes. See Fig. 6. It can be therefore seen that level and frequency response differences are absent in both conditions.

2. Sub Tone Controls

In the sub tone control circuit, the signal passes through a CR network, where bass and treble are relatively enhanced or attenuated. Fig. 10 shows a simplification of this circuit.

S11 is for sub treble control and S12 for sub bass control, and these provide CR selection and control circuit frequency response. S13 is the TONE switch. When set to OFF, the output is determined by the dividing ratio between R131 and R133, while with the tone controls flat it is decided by the ratio between R57 and R83. Since the voltage dividing resistors in both these cases have the same values, level and frequency response differences are absent.

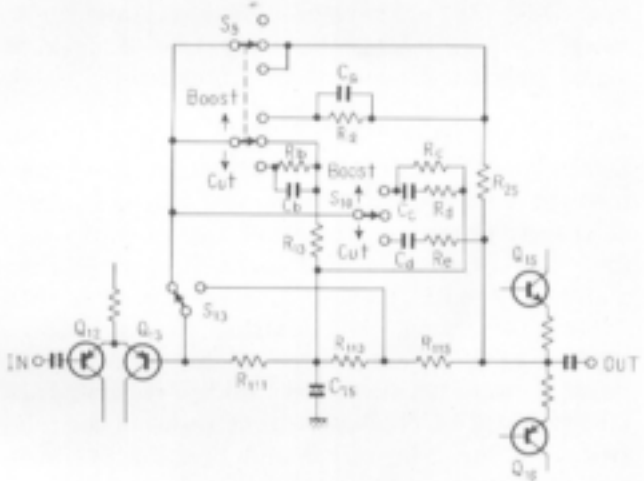


Fig. 5 Circuit Diagram of Main Tone Control

Note:
**R13 and *R25 indicate NFB loop during tone control flat.*

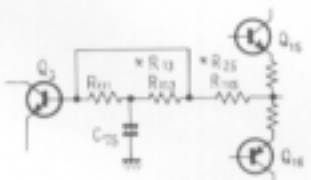


Fig. 6 Equivalent Circuit of Tone Control Flat and TONE Switch Off

4.4 FILTER CIRCUIT

The circuit shown in Fig. 7 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.

Fig. 7 Circuit Diagram of Filter Circuit

Fig. 8 Equivalent Circuit of Bass Boost and Cut

Fig. 9 Equivalent Circuit of Treble Boost and Cut

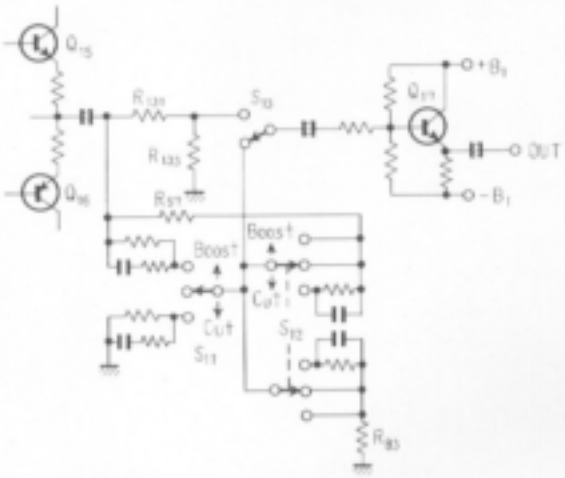


Fig. 10 Circuit Diagram of Sub Tone Control

4.5 OUTPUT BUFFER AMPLIFIER

The output buffer amplifier is of equivalent composition to the input buffer amplifier. As this circuit is intended to reduce output impedance, even when a 600 ohm low impedance circuit is connected, ample output with excellent frequency and distortion response can be assured.

4.6 MIC MIXING CIRCUIT

A 2 stage direct coupled NFB type MIC amplifier is employed, while the mixing amplifier uses a PNP-NPN transistor 2 stage direct coupled circuit. The MIC mixing circuit is indicated in Fig. 11.

When a microphone plug is inserted into the MIC jack, and mixing switch (S2) set to ON, current flows in the mixing relay, connecting the mixing and main circuits. However, with only S2 set to ON, or MIC plug inserted (not both), circuit connection is not completed.

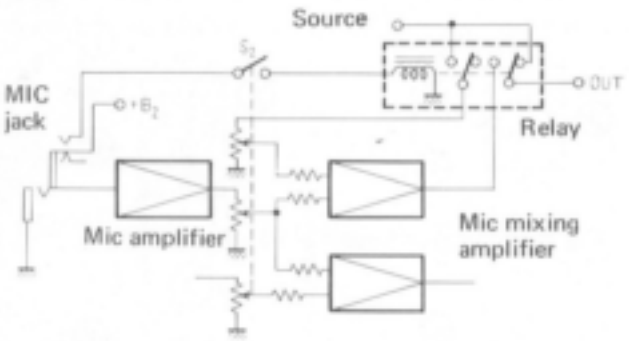


Fig. 11 Block Diagram of MIC Mixing Circuit

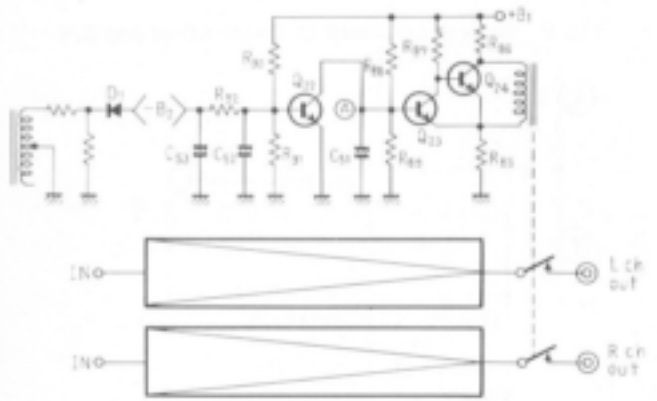


Fig. 12 Circuit Diagram of Muting Circuit

4.7 MUTING CIRCUIT

This opens the output circuit for 6 to 8 seconds after the POWER switch has been set to ON and immediately after the POWER switch is set to OFF, blocking unpleasant noise. The circuit is shown in Fig. 12.

1. POWER Switch ON Muting

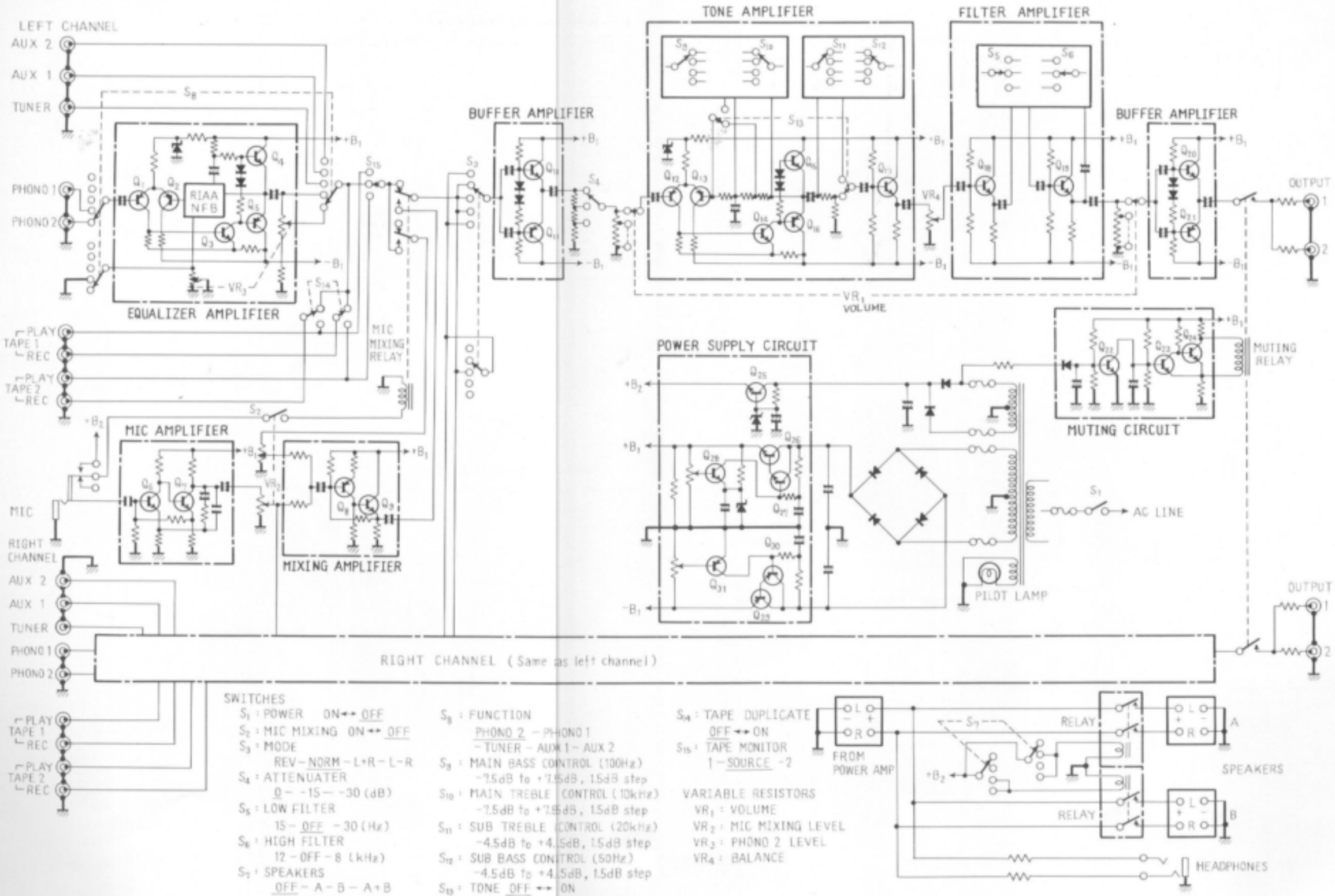
Immediately after the POWER switch is set to ON, delayed operation is provided by R88 and C51 in the Q23 base circuit. The delay time is determined by the time constant of R88 and C51. When the POWER switch is turned ON Q22 is reverse biased by −B2 from D1 and it switches OFF. At this time, +B1 passes through R88 to charge C51. Therefore, point A potential rises as C51 charges.

Q23 is in the OFF state at this time. Q23 & Q24 compose a Schmitt circuit and with Q23 OFF, Q24 maintains the ON condition. Consequently, current does not flow through the relay coil and the relay remains in the OFF position. When C51 is fully charged, point A potential is determined by R88 & R89 voltage dividing ratio. Forward bias is the applied to Q23 base, switching Q23 ON and Q24 OFF. Therefore current flows in the relay coil, switching the relay ON to close the signal circuit and begin normal operation.

2. POWER Switch OFF Muting

During normal operation +B1 from R90 passes through R92. Since it flows to −B2, Q22 base is at cut-off potential. The small capacity of C53 in the −B2 circuit casuses it to be discharged immediately by +B1 passing through R90 & R92. After discharging, +B1 passing through R90 is applied to Q22 base, switching this transistor ON. Point A potential decreases rapidly, switching Q23 OFF and Q24 ON. Bias current flows in the relay, switching the relay OFF and opening the signal output circuit.

5. BLOCK DIAGRAM



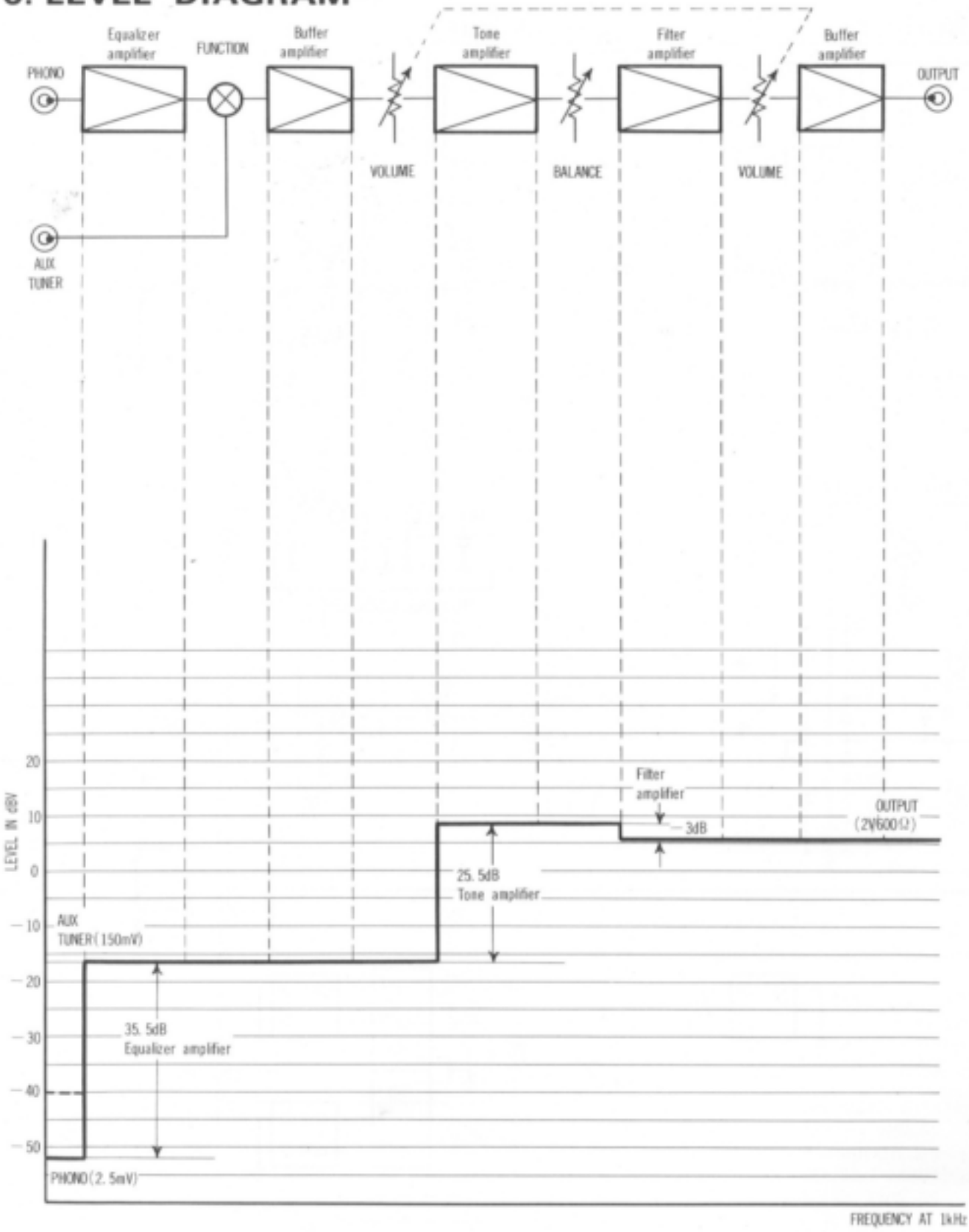
SWITCHES

- S_1 : POWER ON ↔ OFF
- S_2 : MIC MIXING ON ↔ OFF
- S_3 : MODE REV – NORM – L+R – L–R
- S_4 : ATTENUATER 0 – -15 – -30 (dB)
- S_5 : LOW FILTER 15 – OFF – -30 (Hz)
- S_6 : HIGH FILTER 12 – OFF – 8 (kHz)
- S_7 : SPEAKERS OFF – A – B – A+B
- S_8 : FUNCTION PHONO 2 – PHONO 1 – TUNER – AUX 1 – AUX 2
- S_9 : MAIN BASS CONTROL (100Hz) -7.5dB to +7.5dB, 1.5dB step
- S_{10} : MAIN TREBLE CONTROL (10kHz) -7.5dB to +7.5dB, 1.5dB step
- S_{11} : SUB TREBLE CONTROL (20kHz) -4.5dB to +4.5dB, 1.5dB step
- S_{12} : SUB BASS CONTROL (50Hz) -4.5dB to +4.5dB, 1.5dB step
- S_{13} : TONE OFF ↔ ON
- S_{14} : TAPE DUPLICATE OFF ↔ ON
- S_{15} : TAPE MONITOR 1 – SOURCE – 2

VARIABLE RESISTORS

- VR_1 : VOLUME
- VR_2 : MIC MIXING LEVEL
- VR_3 : PHONO 2 LEVEL
- VR_4 : BALANCE

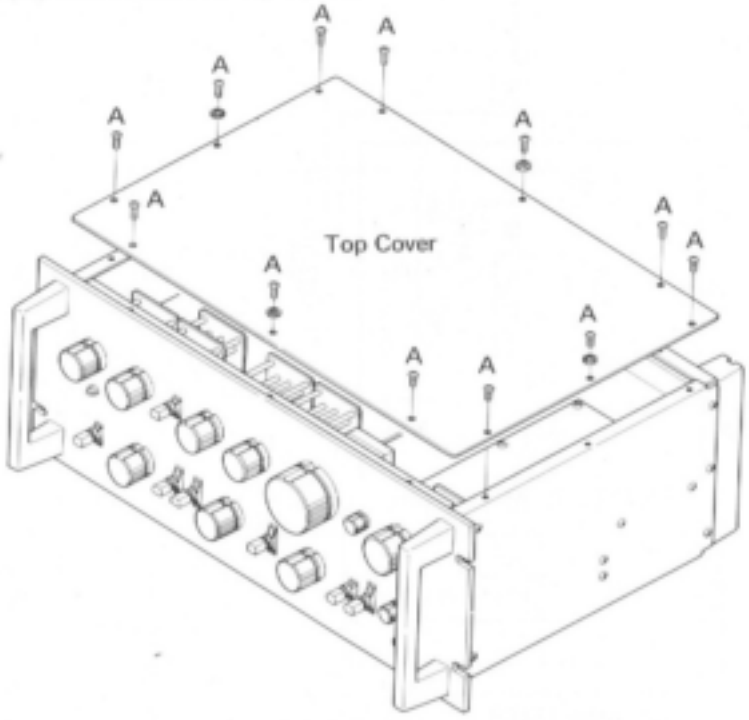
6. LEVEL DIAGRAM



7. DISASSEMBLY

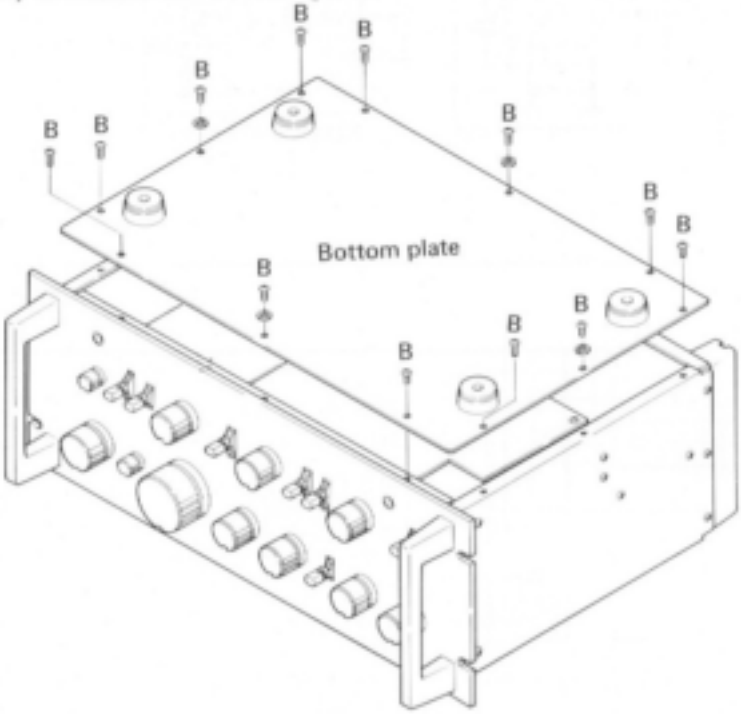
1. Removing the Top Cover

Remove the 12 screws (A) to detach the top cover.



2. Removing the Bottom Plate

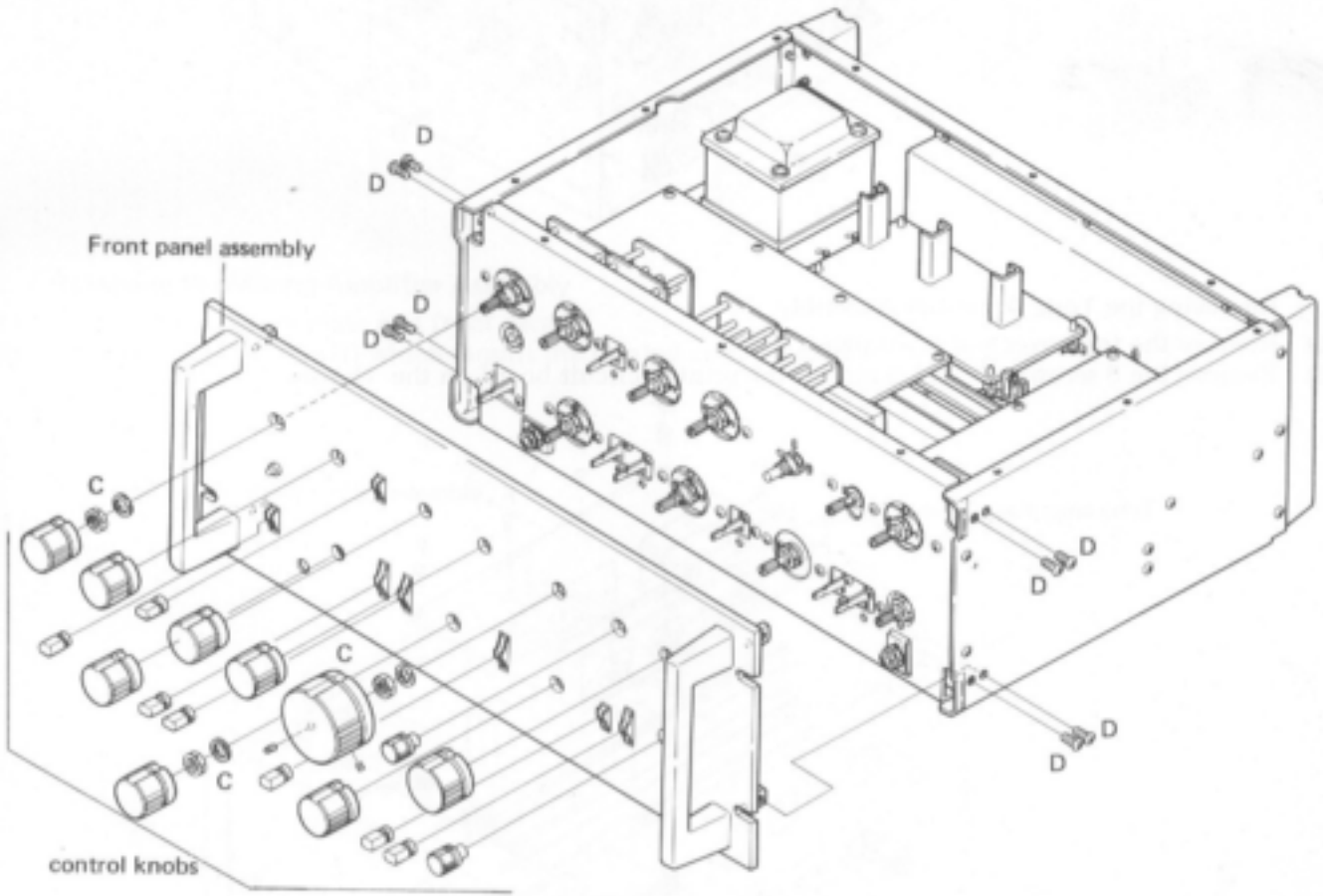
Remove the 12 screws (B) to detach the bottom plate.



3. Removing the Front Panel Assembly

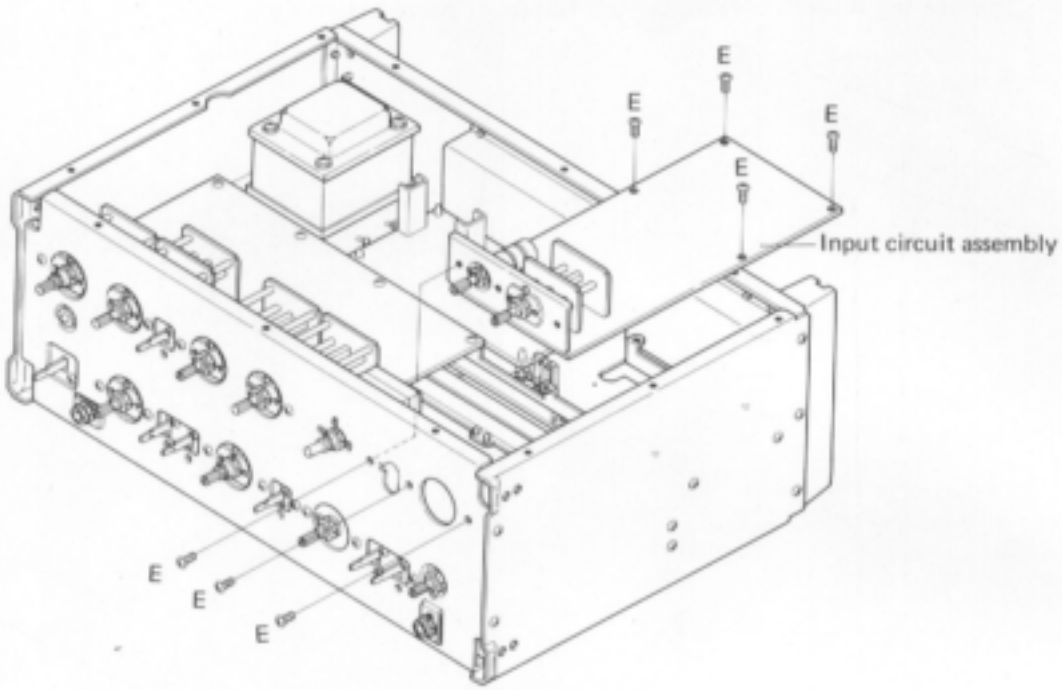
(1) Remove all control knobs by pulling them out. For the VOLUME control knob, loosen the set screws with a hexagonal wrench before removing it. Remove the BASS 50Hz, VOLUME, and MODE switch shafts nuts and washers (C).

(2) Remove the 8 screws (D) to detach the front panel assembly.



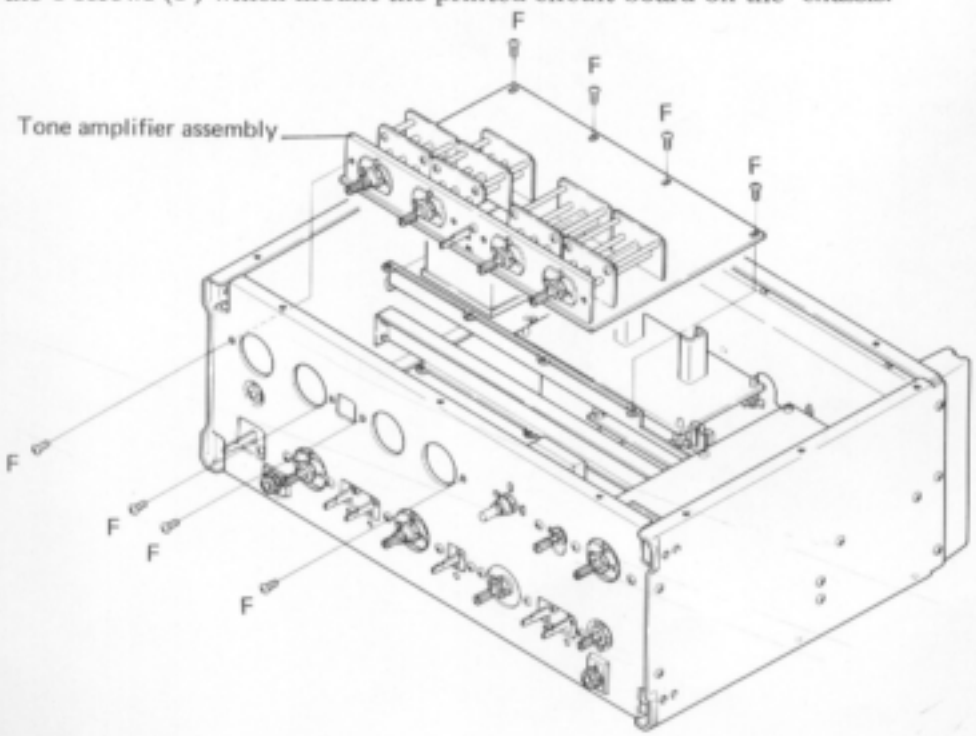
4. Removing the Input Circuit Assembly

(1) Remove the top cover and front panel.
(2) Remove the 7 screws (E) which mount the printed circuit board on the chassis.



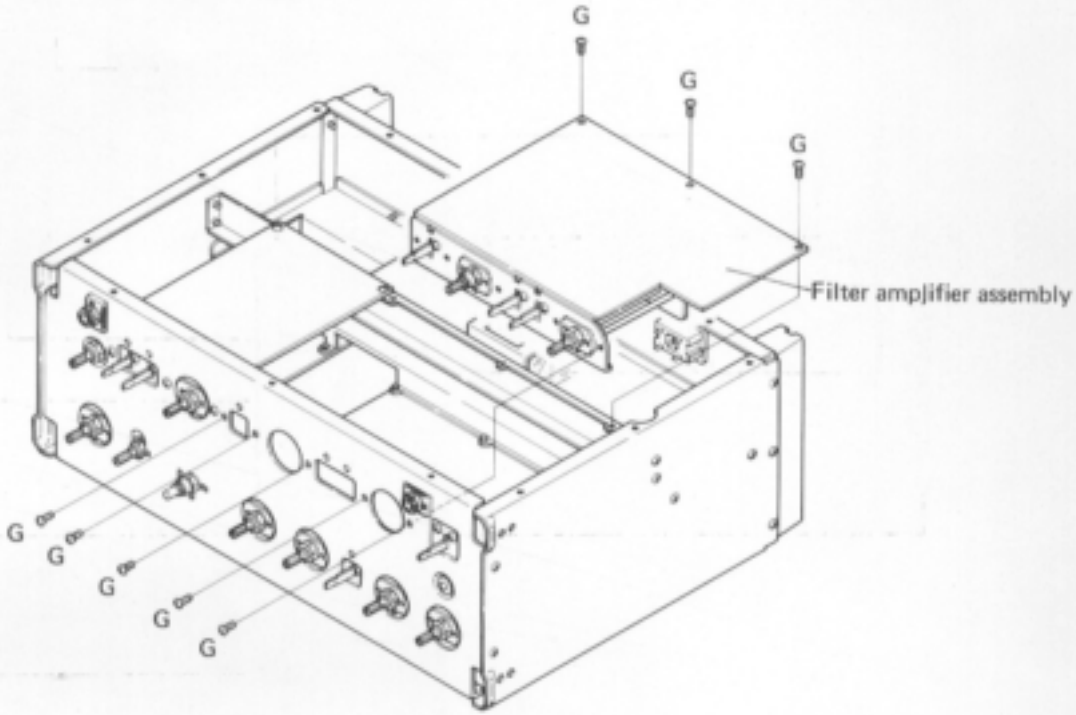
5. Removing the Tone Amplifier Assembly

(1) Remove the top cover and front panel.
(2) Remove the 8 screws (F) which mount the printed circuit board on the chassis.



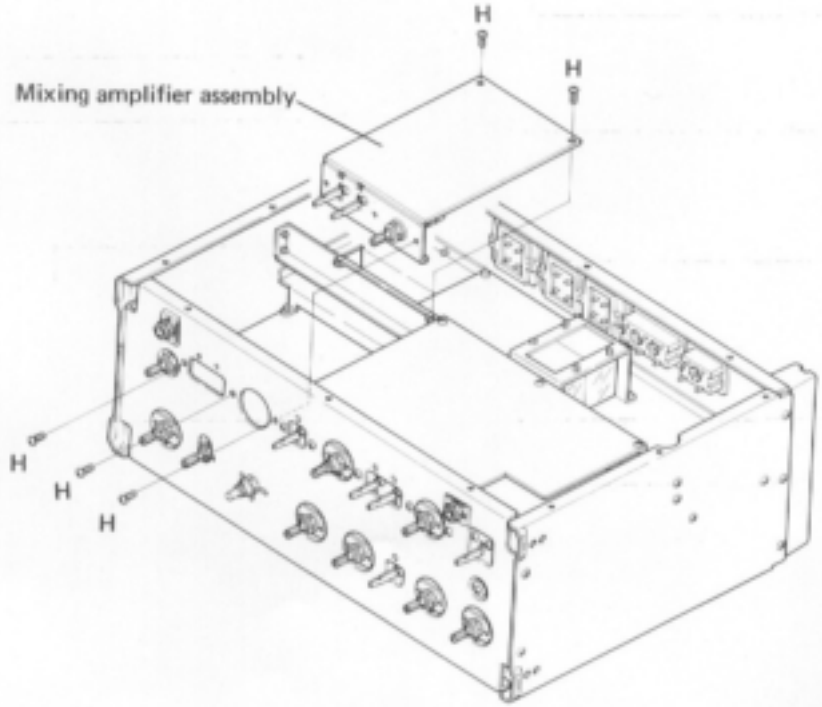
6. Removing the Filter Amplifier Assembly

(1) Remove the bottom plate and front panel.
(2) Remove the 8 screws (G) which mount the printed circuit board on the chassis.



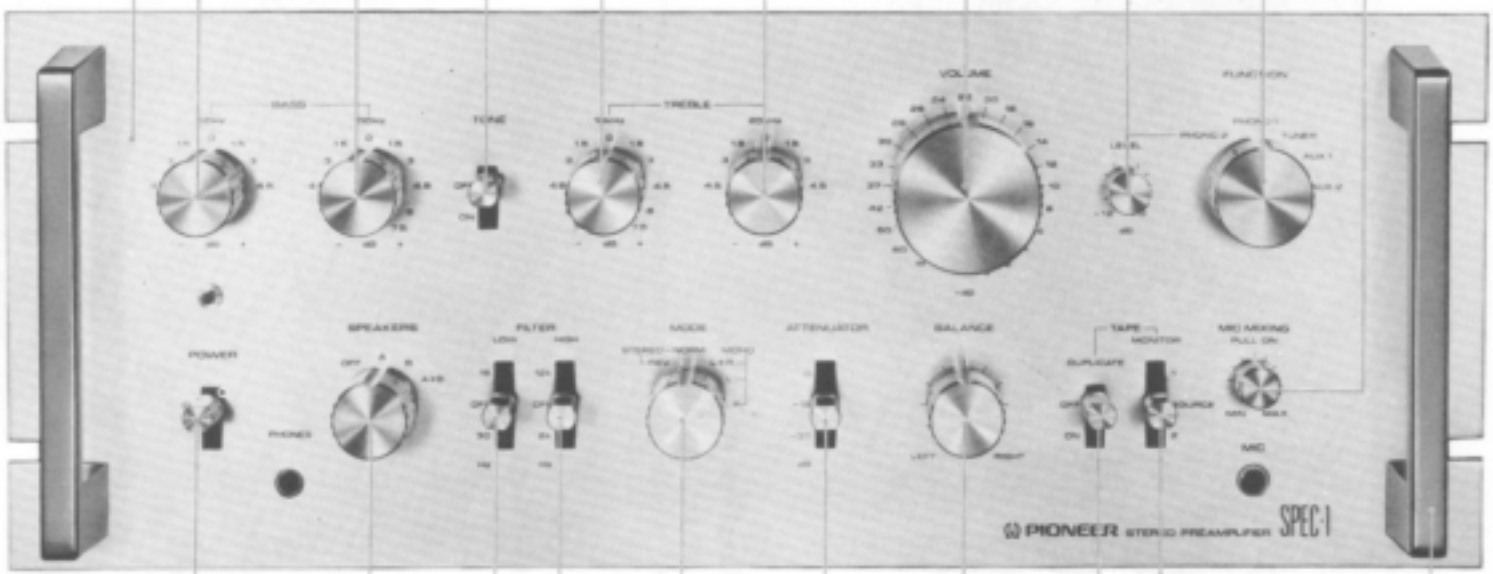
7. Removing the Mixing Amplifier Assembly

(1) Remove the bottom plate and front panel.
(2) Remove the 5 screws (H) which mount the printed circuit board on the chassis.

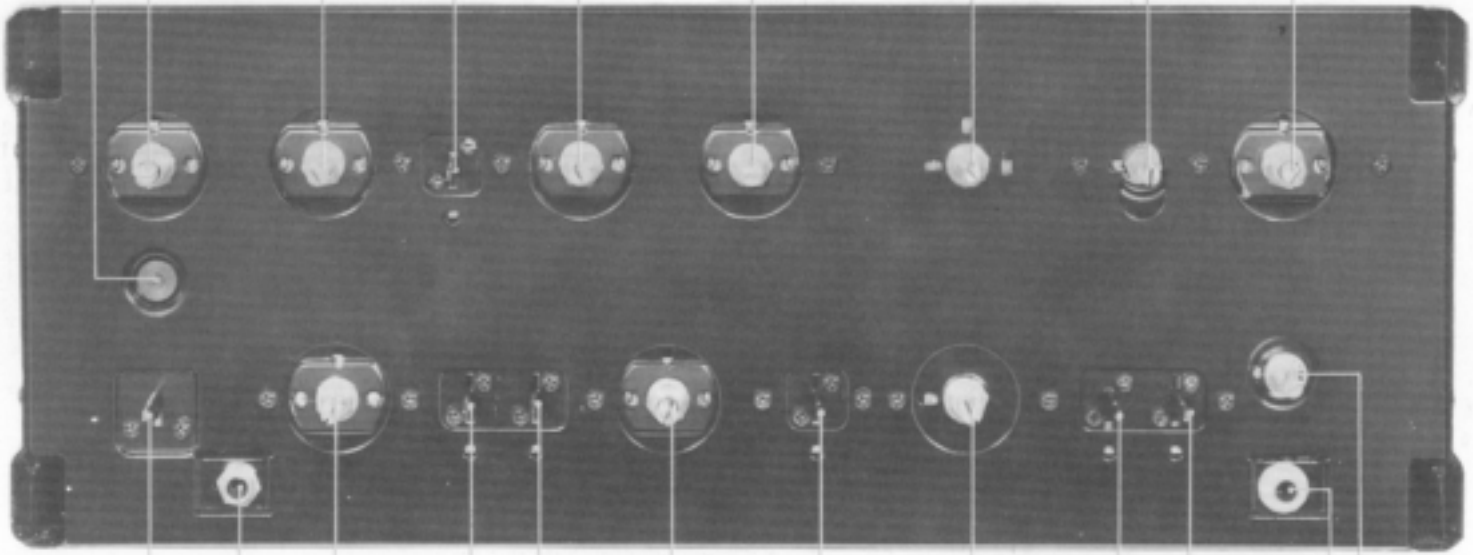


8. PARTS LOCATION

1. Front Panel View



2. Front View with Panel Removed



Rotary switch (TREBLE 10kHz)
ASD-043

Lever switch (TONE)
ASK-091

Rotary switch (BASS 100Hz)
ASD-042

Rotary switch
(BASS 50Hz)
ASD-041

Lamp with wire
8V 50mA (PL1)
AEL-057

Rotary switch (TREBLE 20kHz)
ASD-044

Variable resistor 50kΩ (VOLUME)
ACV-314

Variable resistor 10kΩ-HB, 2kΩ-HB
(PHONO 2 LEVEL)
ACT-305

Rotary switch
(FUNCTION)
ASD-039

Lever switch (POWER)
ASK-080

Phone jack (PHONES)
K72-020

Rotary switch (SPEAKERS)
ASD-040

Lever switch (LOW FILTER)
ASK-085

Lever switch (HIGH FILTER)
ASK-085

Rotary switch (MODE)
ASD-046

Lever switch (ATTENUATOR)
ASK-087

Variable resistor
50kΩ-AC
(BALANCE)
ACV-145

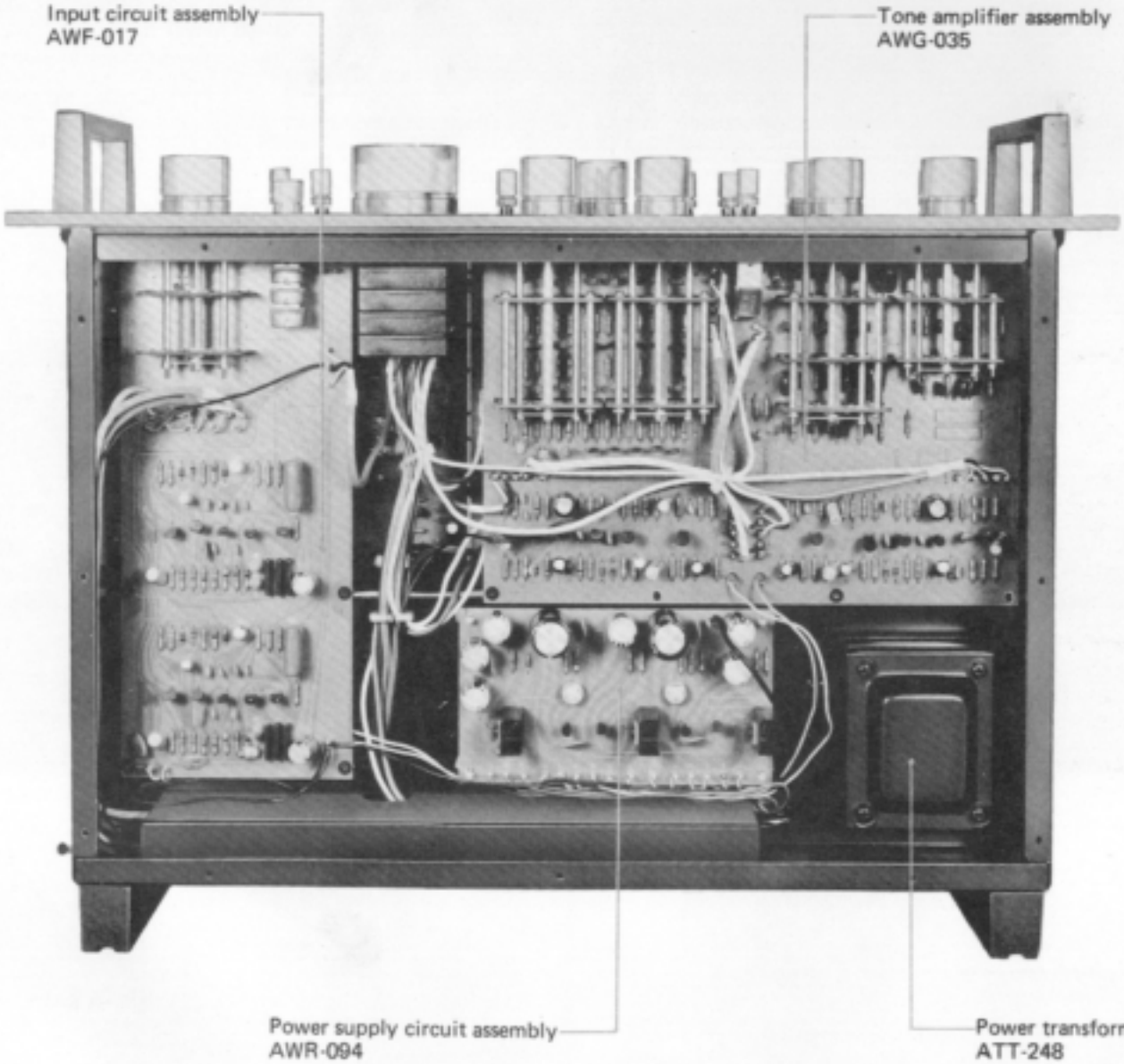
Lever switch
(TAPE DUPLICATE)
ASK-084

Variable resistor with
pull-push switch
50kΩ-20A, 50kΩ-20C
(MIC MIXING)
ACV-507

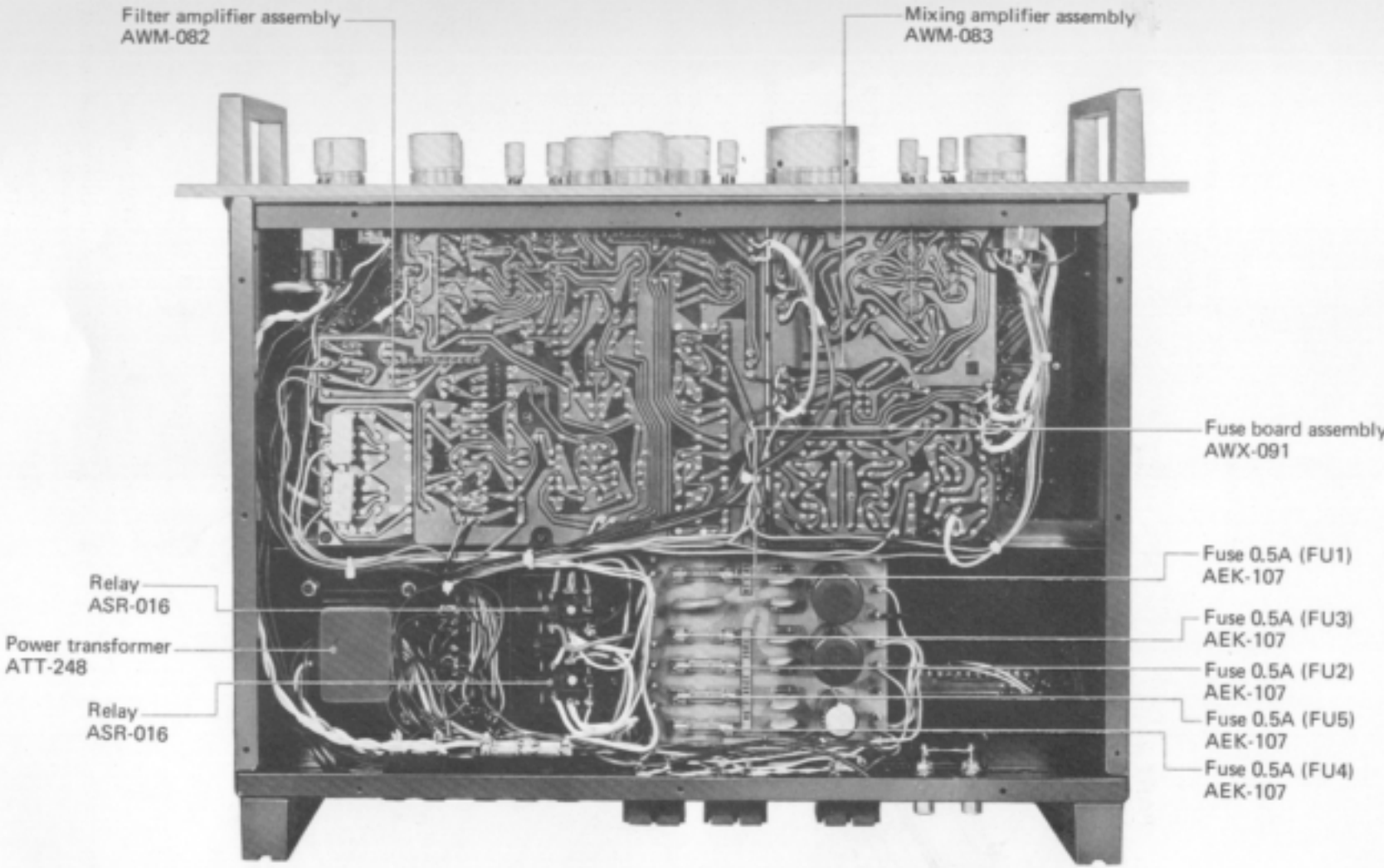
Phone jack (MIC)
K72-021

Lever switch (TAPE MONITOR)
ASK-086

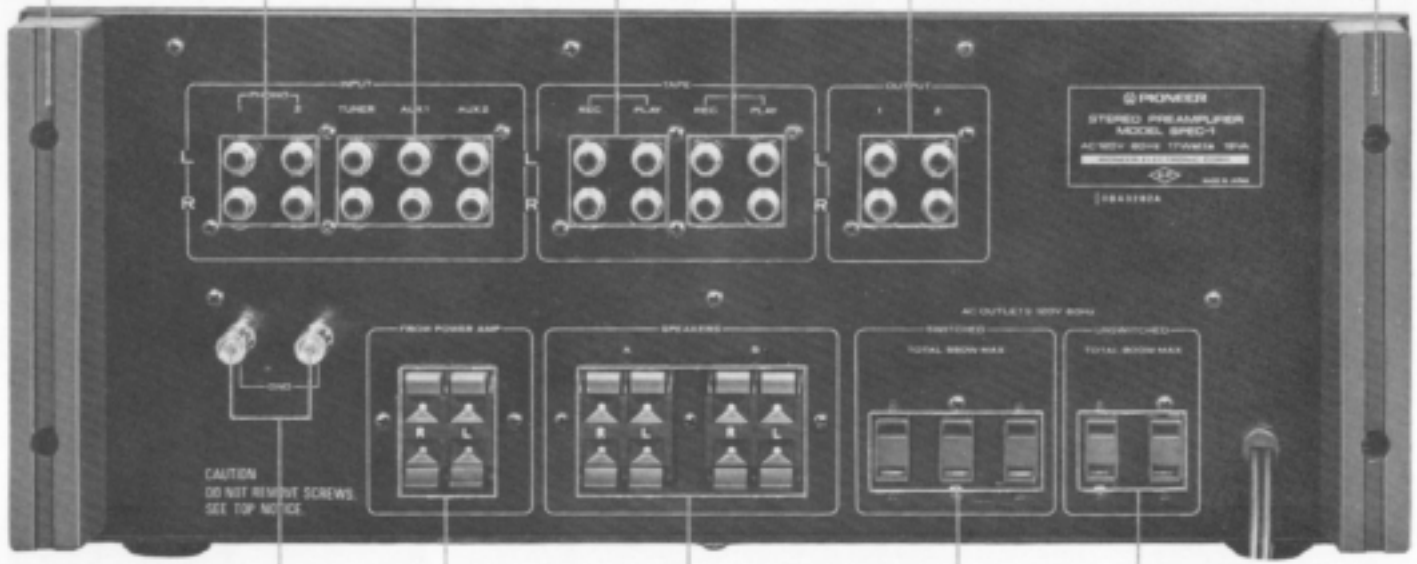
3. Top View


Input circuit assembly
AWF-017
Tone amplifier assembly
AWG-035
Power supply circuit assembly
AWR-094
Power transformer
ATT-248

4. Bottom View

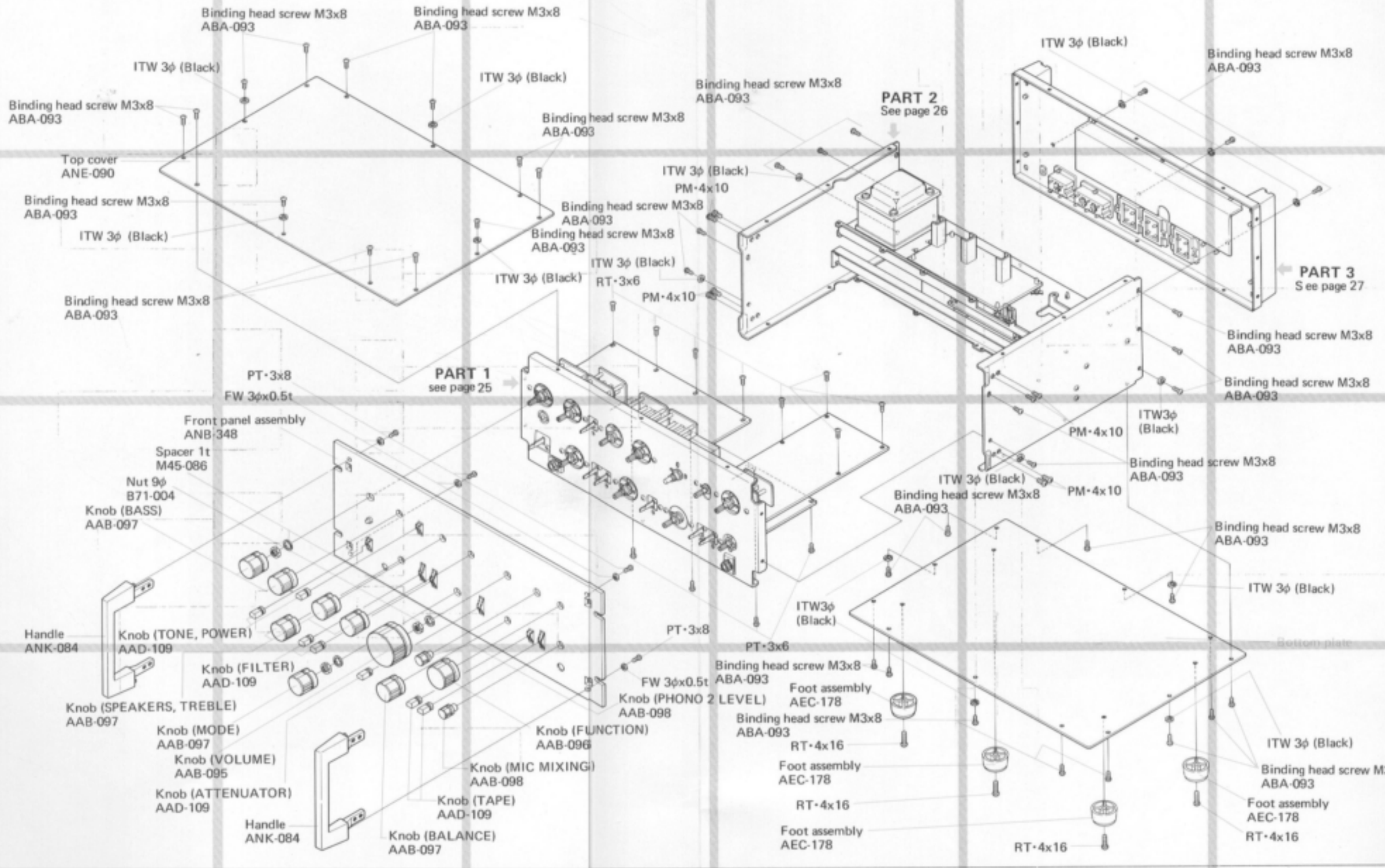


5. Rear View


Phono jack (4P)
AKB-014
Phono jack (6P)
AKB-018
Phono jack (4P)
AKB-014
Phono jack (4P)
AKB-014
Spacer
AEB-075
Spacer
AEB-075
Binding post (for ground)
AKE-019
Speaker input terminal
AKE-015
Speaker output terminal (dual)
AKE-010
AC outlet socket (dual)
AKP-004
AC outlet socket (triple)
AKP-005

9. EXPLODED VIEWS

NOTE:
Parts indicated in green type cannot be supplied.



PART 1
NOTE:
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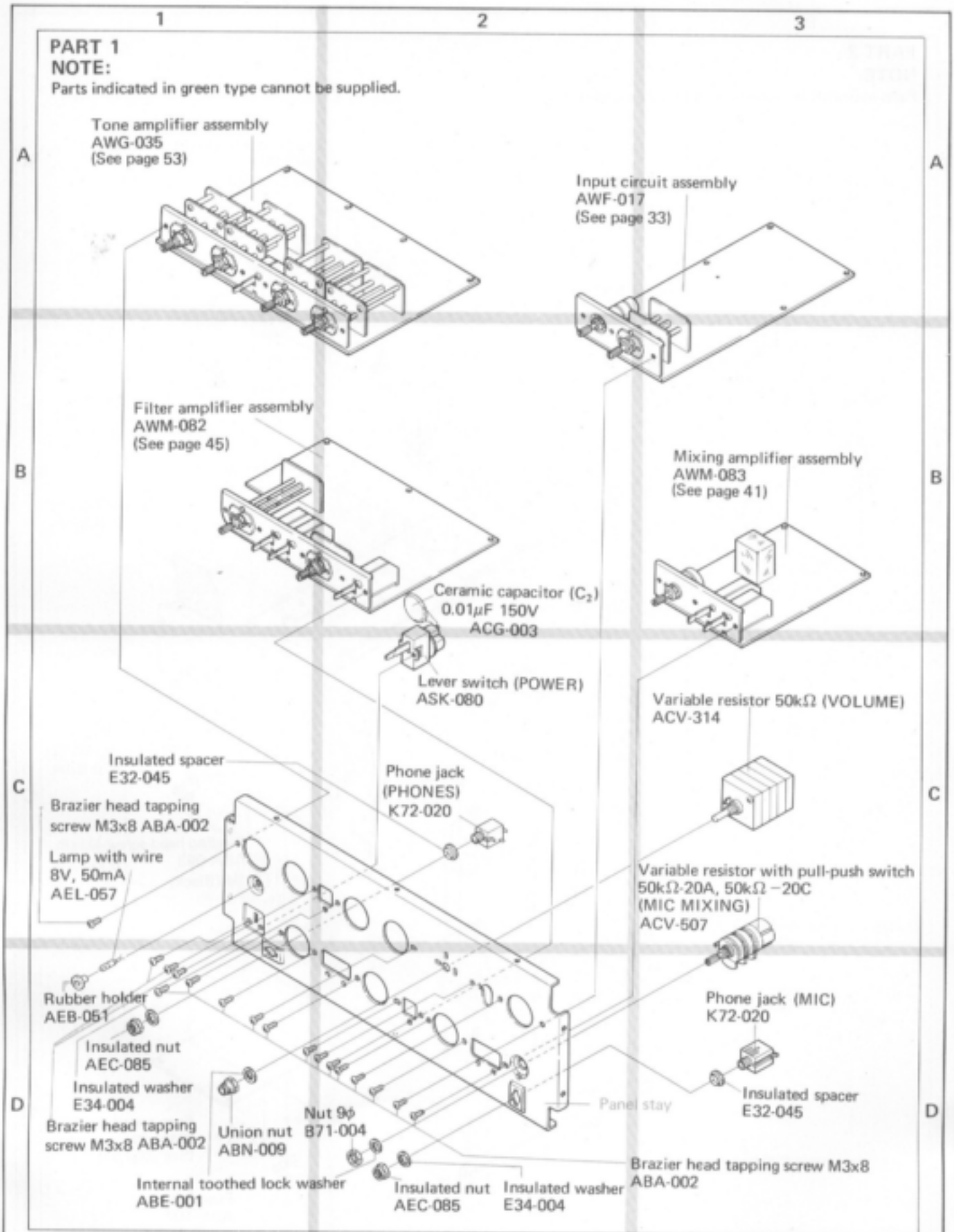

PART 2

NOTE:

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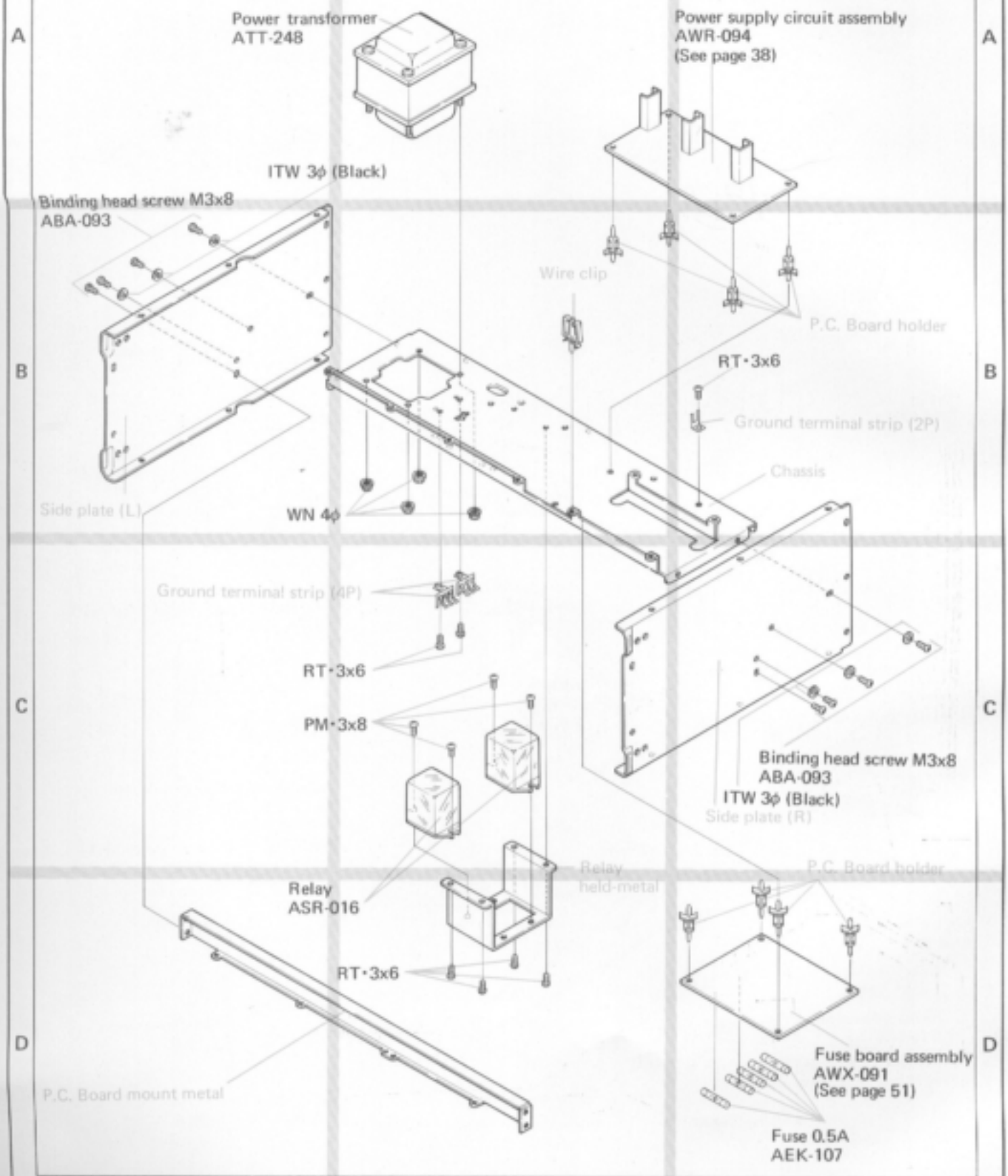

PART 3

NOTE:
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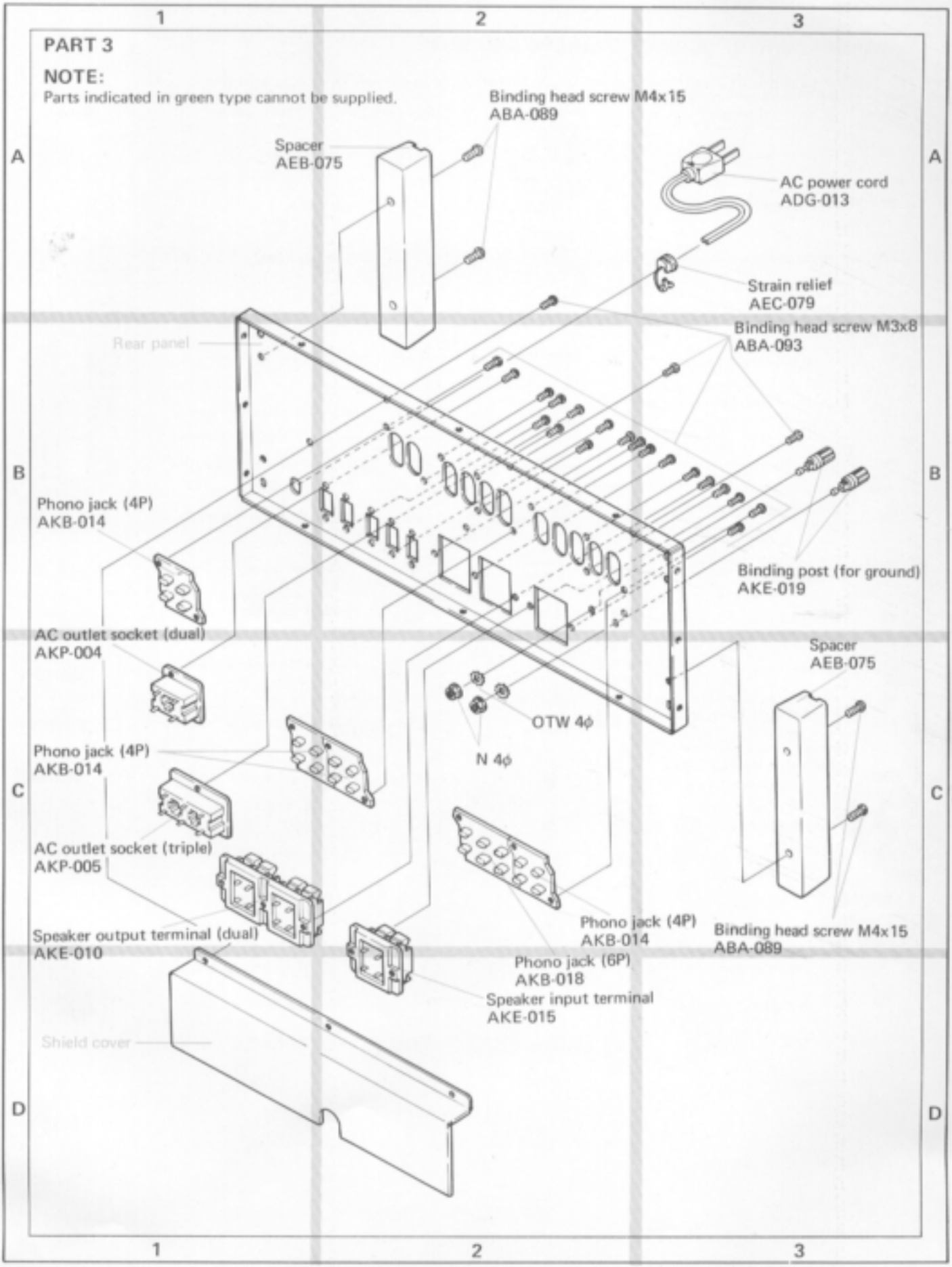


NOMENCLATURE OF SCREWS, WASHERS AND NUTS

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

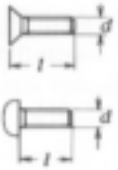
Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
BT	Binding head tapping screw	
CT	Countersunk head tapping screw	
TT	Truss head tapping screw	
OCT	Oval countersunk head tapping screw	
PM	Pan head machine screw	
CM	Countersunk head machine screw	
OCM	Oval countersunk 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	
SC	Slotted set screw (Cone point)	
SF	Slotted set screw (Flat point)	
HS	Hexagon socket headless set screw	
OCW	Oval countersunk head wood screw	
CW	Countersunk head wood screw	
RW	Round head wood screw	

EXAMPLE

PM - 3x8

- length in mm (l)
- diameter in mm (d)
- Symbol



FW - 9ϕ x 1^t

- thickness in mm (t)
- diameter in mm (d)
- Symbol

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

10.1 SCHEMATIC DIAGRAM AND MISCELLANEOUS PARTS

NOTE:
- *Capacitors: in μF unless otherwise noted p:pF*
- *Resistors: in Ω, ¼W unless otherwise noted k:kΩ, M:MΩ*

Miscellaneous Parts List

CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.047	50V	CKDYF 473Z 50
C2	Ceramic	0.01	150V	ACG-003
C3	Ceramic	0.047	50V	CKDYF 473Z 50
C4	Electrolytic	1,000	25V	CEA 102P 25

RESISTORS AND POTENTIOMETERS

Symbol	Description			Part No.
R1	Wire wound	150	5W	RT5B 151K
R2	Wire wound	150	5W	RT5B 151K
VR1	Variable resistor 50k (VOLUME)			ACV-314
VR2	Variable resistor with pull-push switch 50k-20A, 50k-20C (MIC MIXING)			ACV-507

SEMICONDUSTORS

Symbol	Description	Part No.
D1	Diode	SIB01-04
D2	Diode	SIB01-04

FUSES AND LAMP

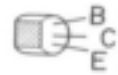
Symbol	Description	Part No.
FU1	Fuse 0.5A	AEK-107
FU2	Fuse 0.5A	AEK-107
FU3	Fuse 0.5A	AEK-107
FU4	Fuse 0.5A	AEK-107
FU5	Fuse 0.5A	AEK-107
PL1	Lamp with wire 8V 50mA	AEL-057

OTHERS

Symbol	Description	Part No.
T1	Power transformer	ATT-248
S1	Lever switch (POWER)	ASK-080
S17	Relay	ASR-016
S18	Relay	ASR-016

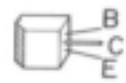
2SA726
2SC1313
2SC869
2SA628A

2SC1775A
2SC945

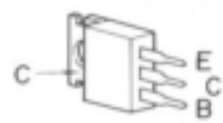


2SC1885
2SA912

2SC1166

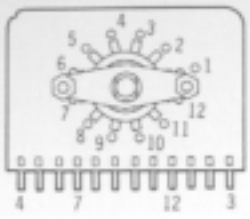


2SD313P
2SB507

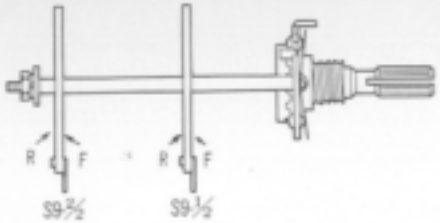


FUNCTION (S9)

Rear view

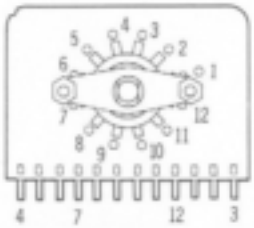


Side view

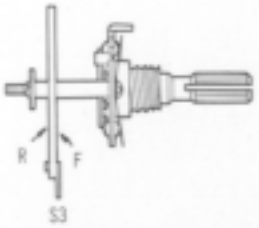


MODE (S3)

Rear view

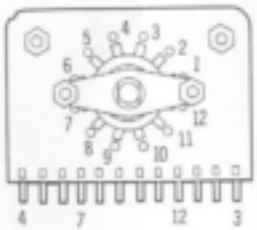


Side view

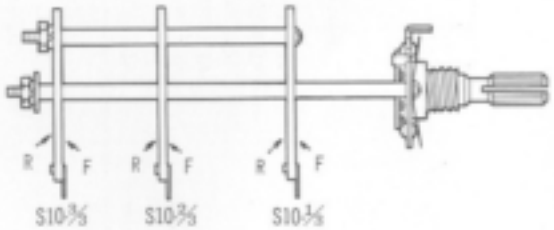


BASS 100Hz (S10)

Rear view

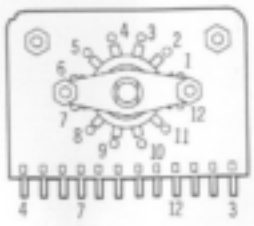


Side view

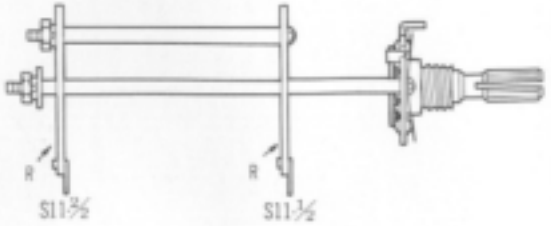


TREBLE 10kHz (S11)

Rear view

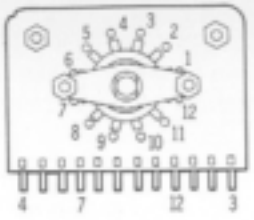


Side view

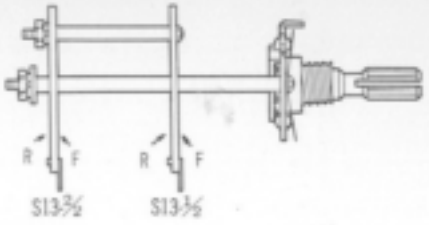


BASS 50Hz (S13)

Rear view

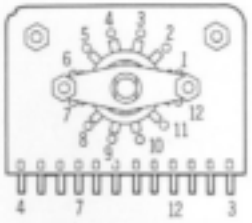


Side view

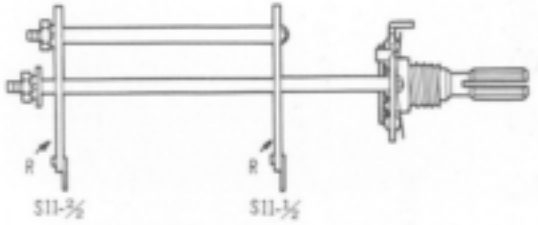


TREBLE 20kHz (S12)

Rear view

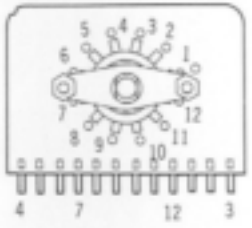


Side view

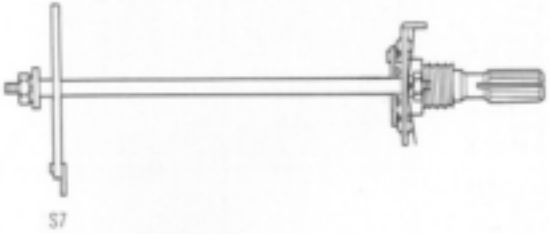


SPEAKERS (S7)

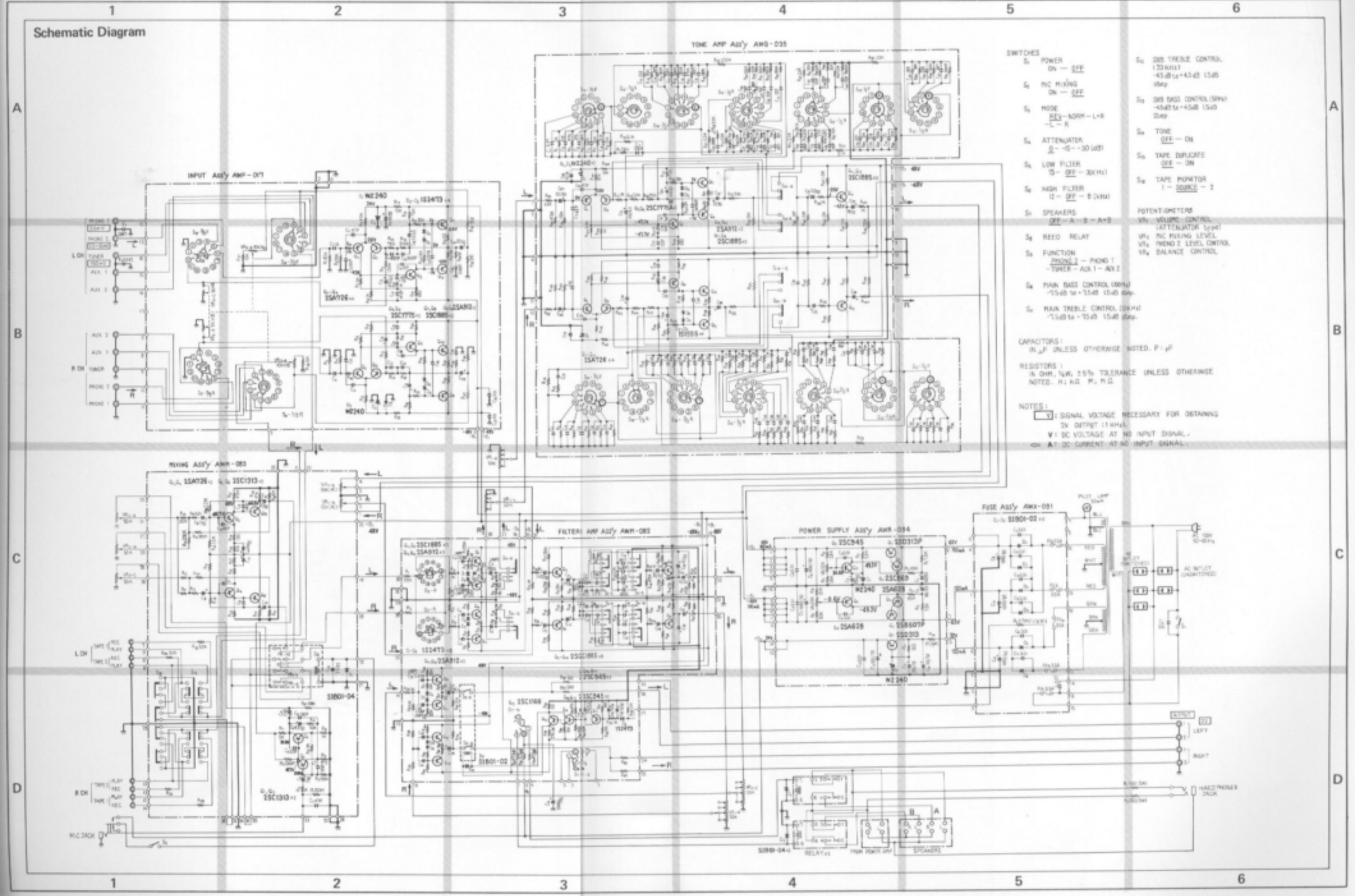
Rear view



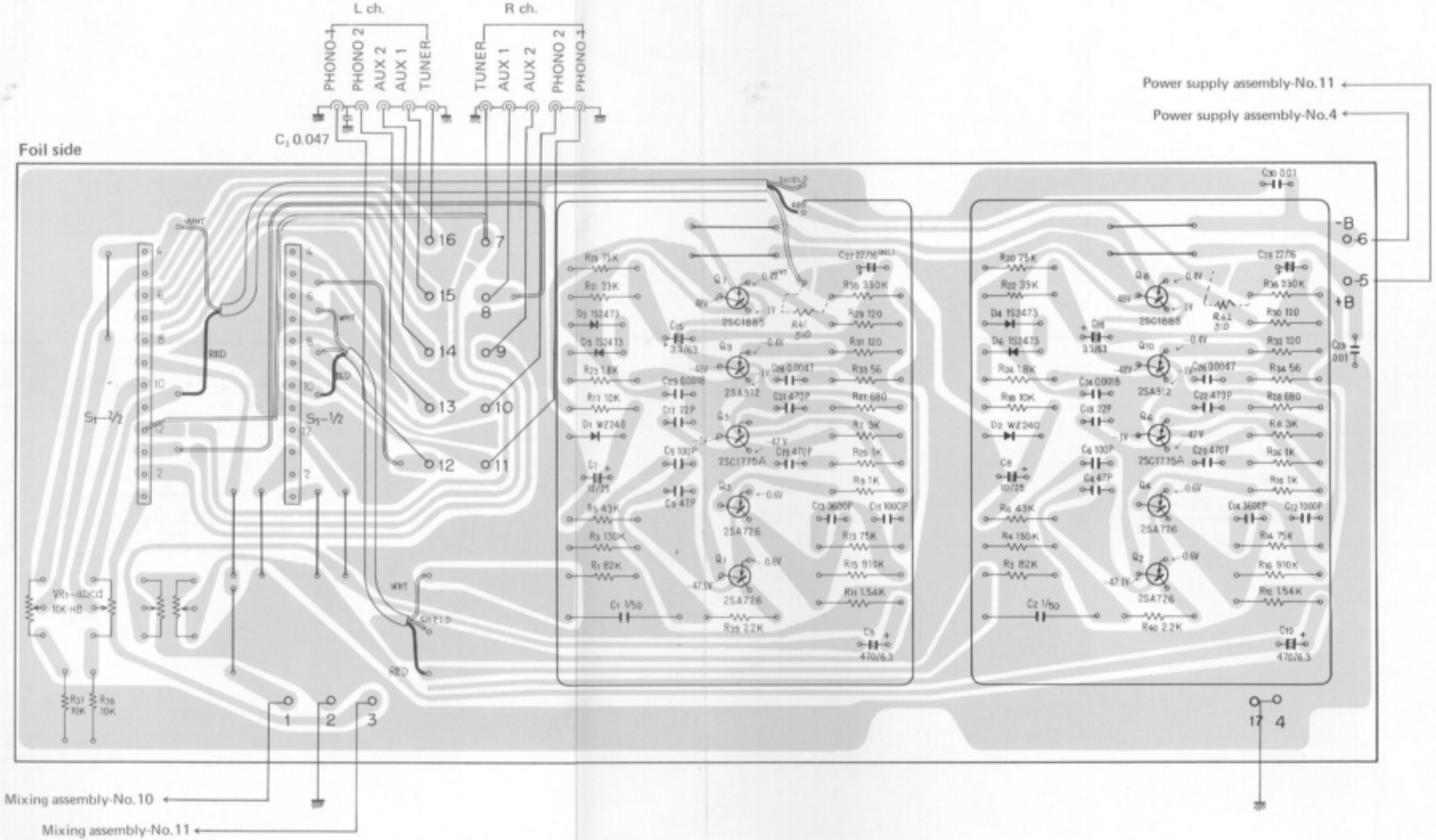
Side view

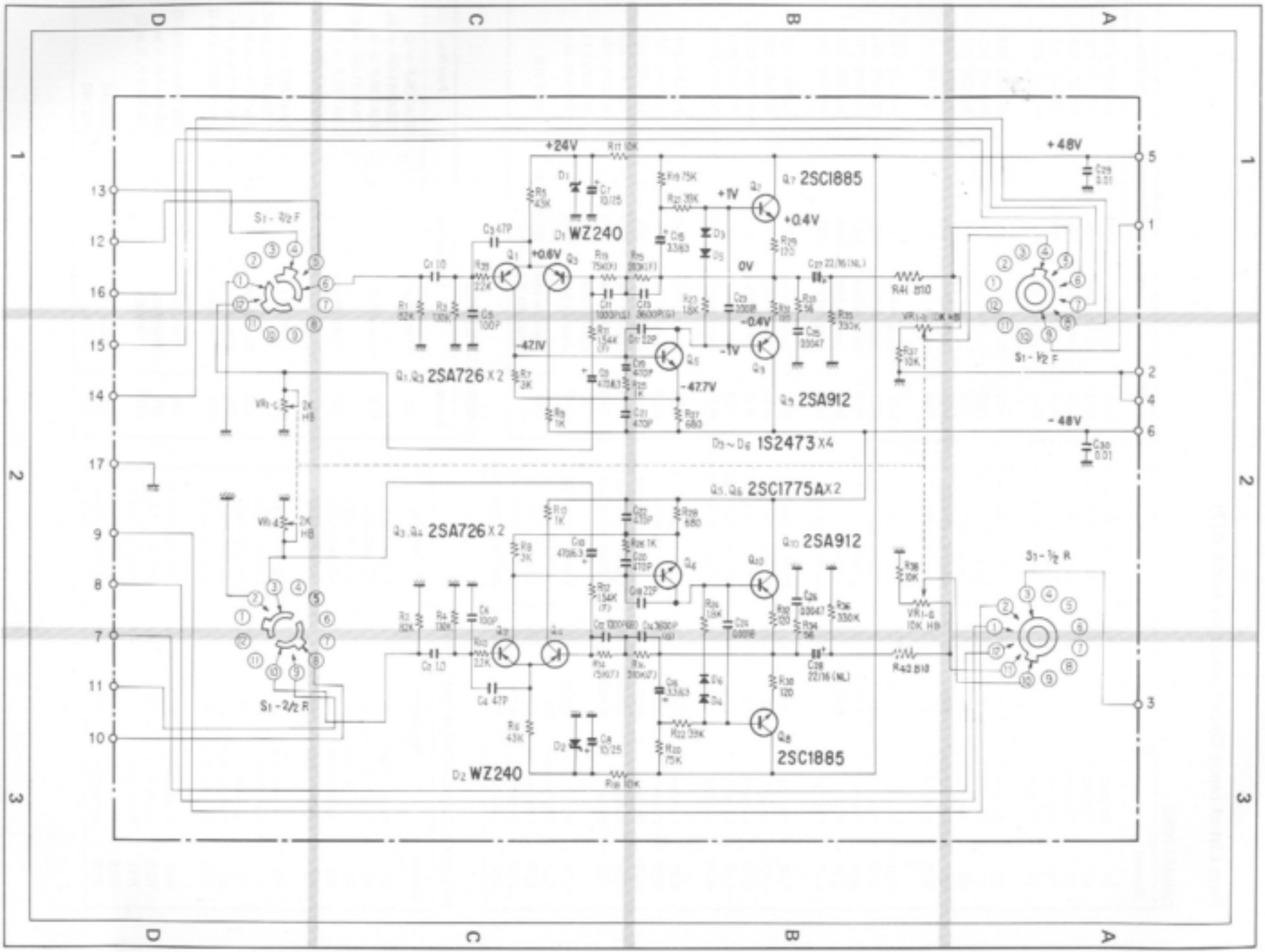


Schematic Diagram



10.2 INPUT CIRCUIT ASSEMBLY (AWF-017)




+24V
+48V
-48V
+1V
+0.4V
0V
-0.4V
-1V
+0.6V
-47V
-47.7V
D1 WZ240
D2 WZ240
Q7 2SC1885
Q8 2SC1885
Q1,Q3 2SA726 X2
Q3,Q4 2SA726 X2
Q5,Q6 2SC1775A X2
Q9 2SA912
Q10 2SA912
D3~D6 1S2473 X4
S1-1/2 F
S1-1/2 R
S1-2/2 F
S1-2/2 R
VR1-C 2K HB
VR1-A 10K HB
VR1-B 10K HB
VR1-D 10K HB

SPEC-1

Parts List of Input Circuit Assembly (AWF-017)

CAPACITORS

Symbol	Description			Part No.
C1	Polyester	1	50V	CQEA 105K 50
C2	Polyester	1	50V	CQEA 105K 50
C3	Ceramic	47p	50V	CCDSL 470K 50
C4	Ceramic	47p	50V	CCDSL 470K 50
C5	Ceramic	100p	50V	CCDSL 101K 50
C6	Ceramic	100p	50V	CCDSL 101K 50
C7	Electrolytic	10	25V	CEA 100P 25
C8	Electrolytic	10	25V	CEA 100P 25
C9	Electrolytic	470	6.3V	CEA 471P 6R3
C10	Electrolytic	470	6.3V	CEA 471P 6R3
C11	Styrol	0.001	50V	CQSA 102G 50
C12	Styrol	0.001	50V	CQSA 102G 50
C13	Styrol	0.0036	50V	CQSA 362G 50
C14	Styrol	0.0036	50V	CQSA 362G 50
C15	Electrolytic	3.3	63V	CEA 3R3P 63
C16	Electrolytic	3.3	63V	CEA 3R3P 63
C17	Ceramic	22p	50V	CCDSL 220K 50
C18	Ceramic	22p	50V	CCDSL 220K 50
C19	Ceramic	470p	50V	CKDYB 471K 50
C20	Ceramic	470p	50V	CKDYB 471K 50
C21	Ceramic	470p	50V	CKDYB 471K 50
C22	Ceramic	470p	50V	CKDYB 471K 50
C23	Mylar	0.0018	50V	CQMA 182K 50
C24	Mylar	0.0018	50V	CQMA 182K 50
C25	Mylar	0.0047	50V	CQMA 472K 50
C26	Mylar	0.0047	50V	CQMA 472K 50
C27	Electrolytic	22	16V	CEANL 220P 16
C28	Electrolytic	22	16V	CEANL 220P 16
C29	Ceramic	0.01	50V	CKDYB 103K 50
C30	Ceramic	0.01	50V	CKDYB 103K 50

RESISTORS AND POTENTIOMETERS

Symbol	Description			Part No.
R1	Carbon film	82k		RD¼PS 823J
R2	Carbon film	82k		RD¼PS 823J
R3	Carbon film	130k		RD¼PS 134J
R4	Carbon film	130k		RD¼PS 134J
R5	Carbon film	43k		RD¼PS 433J
R6	Carbon film	43k		RD¼PS 433J
R7	Carbon film	3k		RD¼PS 302J
R8	Carbon film	3k		RD¼PS 302J
R9	Carbon film	1k		RD¼PS 102J
R10	Carbon film	1k		RD¼PS 102J
R11	Metal film	1.54k	½W	RN½SR 1541F
R12	Metal film	1.54k	½W	RN½SR 1541F
R13	Metal film	75k	½W	RN½SR 7502F
R14	Metal film	75k	½W	RN½SR 7502F
R15	Metal film	910k	½W	RN½SR 9103F
R16	Metal film	910k	½W	RN½SR 9103F
R17	Carbon film	10k		RD¼PS 103J
R18	Carbon film	10k		RD¼PS 103J
R19	Carbon film	75k		RD¼PS 753J
R20	Carbon film	75k		RD¼PS 753J
R21	Carbon film	39k		RD¼PS 393J
R22	Carbon film	39k		RD¼PS 393J
R23	Carbon film	1.8k		RD¼PS 182J
R24	Carbon film	1.8k		RD¼PS 182J
R25	Carbon film	1k		RD¼PS 102J
R26	Carbon film	1k		RD¼PS 102J
R27	Carbon film	680		RD¼PS 681J
R28	Carbon film	680		RD¼PS 681J
R29	Carbon film	120		RD¼PS 121J
R30	Carbon film	120		RD¼PS 121J
R31	Carbon film	120		RD¼PS 121J
R32	Carbon film	120		RD¼PS 121J
R33	Carbon film	56		RD¼PS 560J
R34	Carbon film	56		RD¼PS 560J
R35	Carbon film	330k		RD¼PS 334J
R36	Carbon film	330k		RD¼PS 334J
R37	Carbon film	10k		RD¼PS 103J
R38	Carbon film	10k		RD¼PS 103J
R39	Carbon film	2.2k		RD¼PS 222J
R40	Carbon film	2.2k		RD¼PS 222J
R41	Carbon film	510		RD¼PS 511J
R42	Carbon film	510		RD¼PS 511J
VR1	Variable resistor (PHONO 2 LEVEL)	10k-B, 2k-B		ACT-305

SEMICONDUCTORS

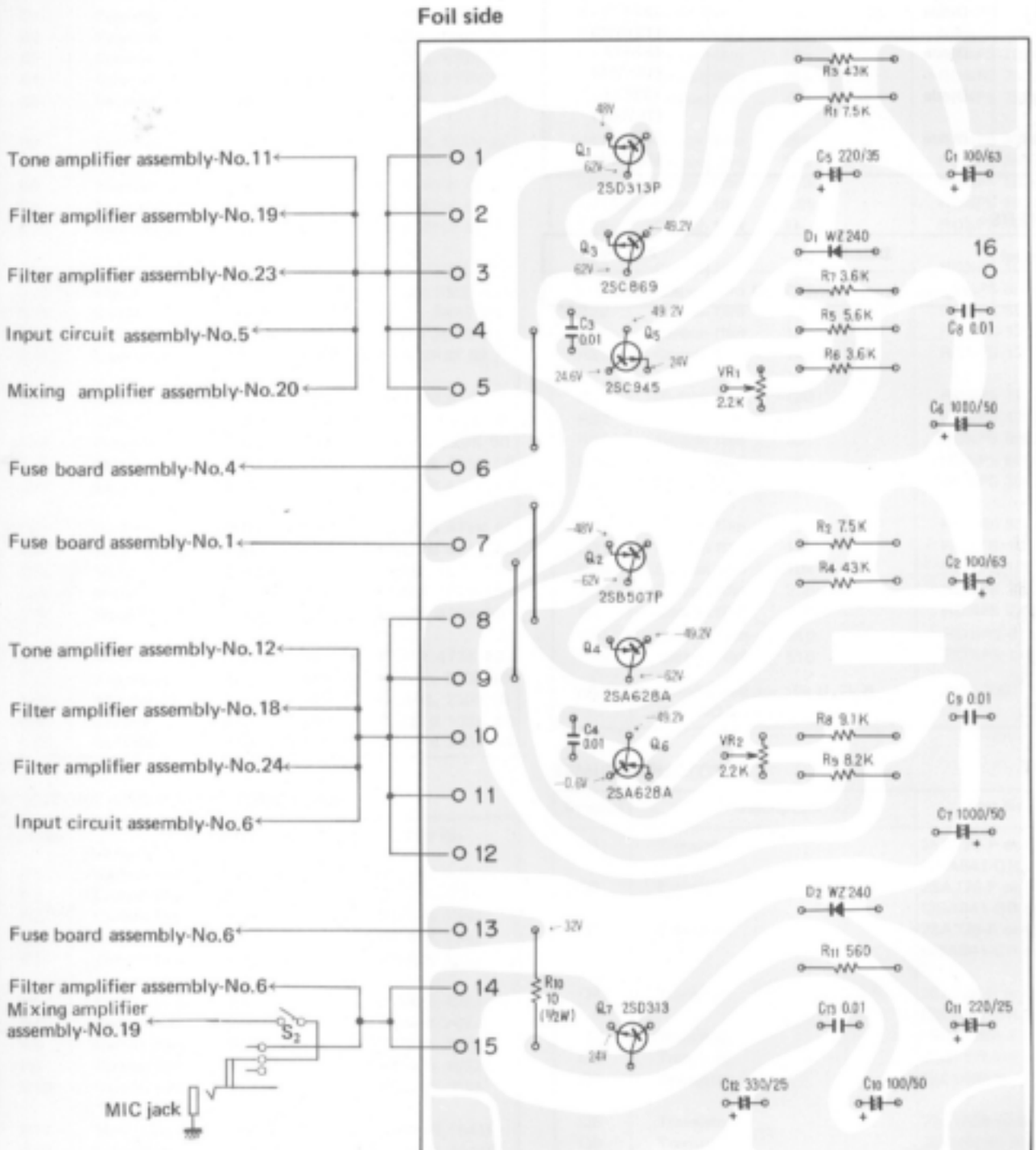
Symbol	Description	Part No.
Q1	Transistor	2SA726-F or G (2SA841-GR or BL)
Q2	Transistor	2SA726-F or G (2SA841-GR or BL)
Q3	Transistor	2SA726-F or G (2SA841-GR or BL)
Q4	Transistor	2SA726-F or G (2SA841-GR or BL)
Q5	Transistor	2SC1775A-E or F
Q6	Transistor	2SC1775A-E or F
Q7	Transistor	2SC1885-R, S or Q
Q8	Transistor	2SC1885-R, S or Q
Q9	Transistor	2SA912-R, S or Q
Q10	Transistor	2SA912-R, S or Q
D1	Diode	WZ240
D2	Diode	WZ240

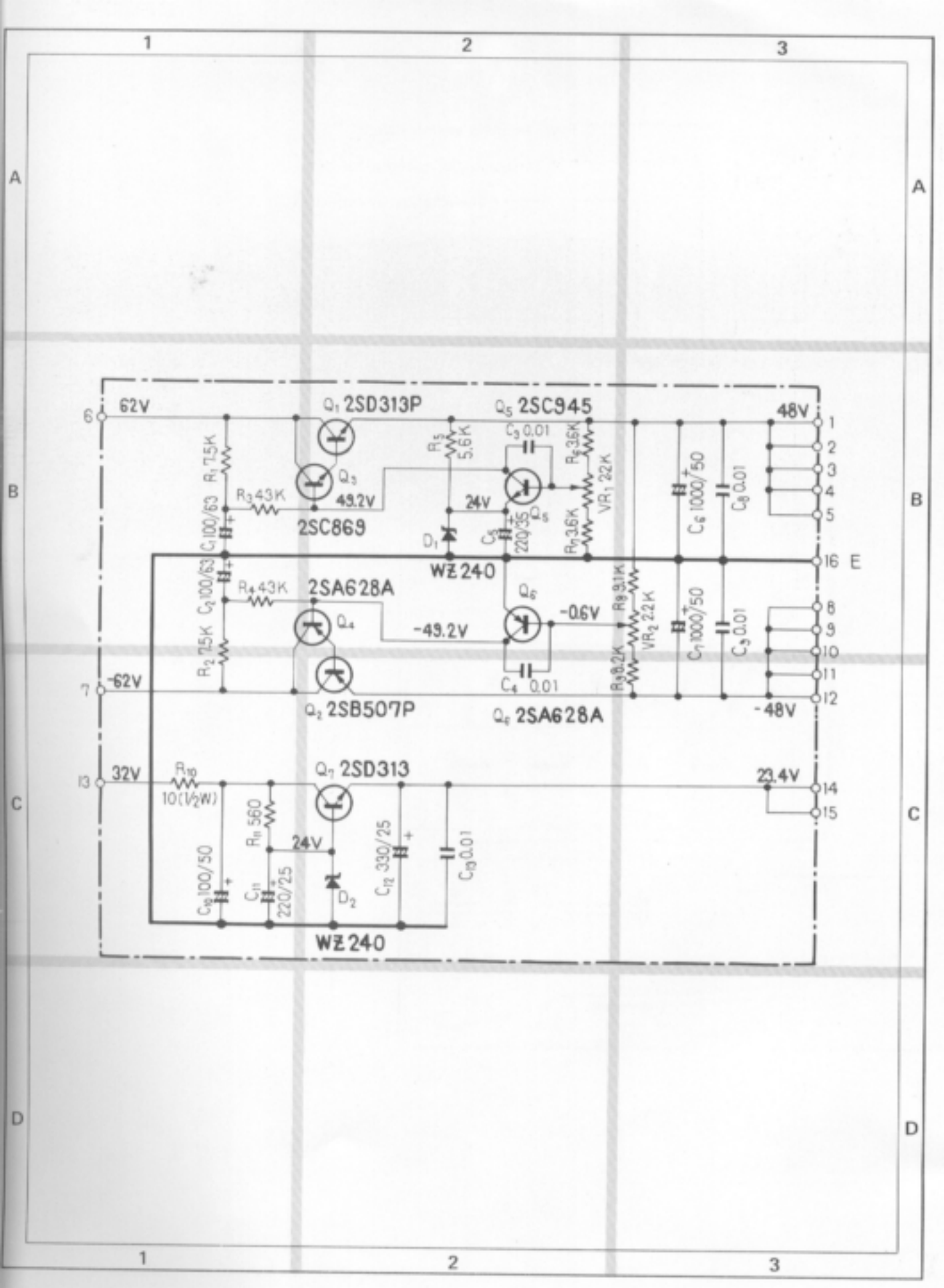
Symbol	Description	Part No.
D3	Diode	1S2473 (1S1555)
D4	Diode	1S2473 (1S1555)
D5	Diode	1S2473 (1S1555)
D6	Diode	1S2473 (1S1555)

OTHERS

Symbol	Description	Part No.
S1	Rotary switch (FUNCTION)	ASD-039

10.3 POWER SUPPLY CIRCUIT ASSEMBLY (AWR-094)




1
2
3
A
B
C
D
6
7
13
62V
-62V
32V
Q1 2SD313P
Q3
2SC869
49.2V
R1 7.5K
R3 43K
C1 100/63
R2 2.5K
C2 100/63
R4 43K
2SA628A
Q4
-49.2V
Q2 2SB507P
R5 5.6K
C3 0.01
Q5 2SC945
24V
Q5
D1
WZ240
C5 220/35
R6 3.6K
VR1 22K
R7 3.6K
C6 1000/50
C8 0.01
48V
1
2
3
4
5
16
E
Q6
-0.6V
C4 0.01
R9 9.1K
VR2 2.2K
R8 8.2K
C7 1000/50
C9 0.01
8
9
10
11
12
Q6 2SA628A
-48V
R10 10(1/2W)
Q7 2SD313
23.4V
14
15
R11 560
24V
C10 100/50
C11 220/25
D2
C12 330/25
C13 0.01
WZ240

Parts List of Power Supply Circuit Assembly (AWR-094)

CAPACITORS

Symbol	Description			Part No.
C1	Electrolytic	100	63V	CEA 101P 63
C2	Electrolytic	100	63V	CEA 101P 63
C3	Ceramic	0.01	50V	CKDYF 103Z 50
C4	Ceramic	0.01	50V	CKDYF 103Z 50
C5	Electrolytic	220	35V	CEA 221P 35
C6	Electrolytic	1000	50V	CEA 102P 50
C7	Electrolytic	1000	50V	CEA 102P 50
C8	Ceramic	0.01	50V	CKDYF 103Z 50
C9	Ceramic	0.01	50V	CKDYF 103Z 50
C10	Electrolytic	100	50V	CEA 101P 50
C11	Electrolytic	220	25V	CEA 221P 25
C12	Electrolytic	330	25V	CEA 331P 25
C13	Ceramic	0.01	50V	CKDYF 103Z 50

RESISTORS AND POTENTIOMETERS

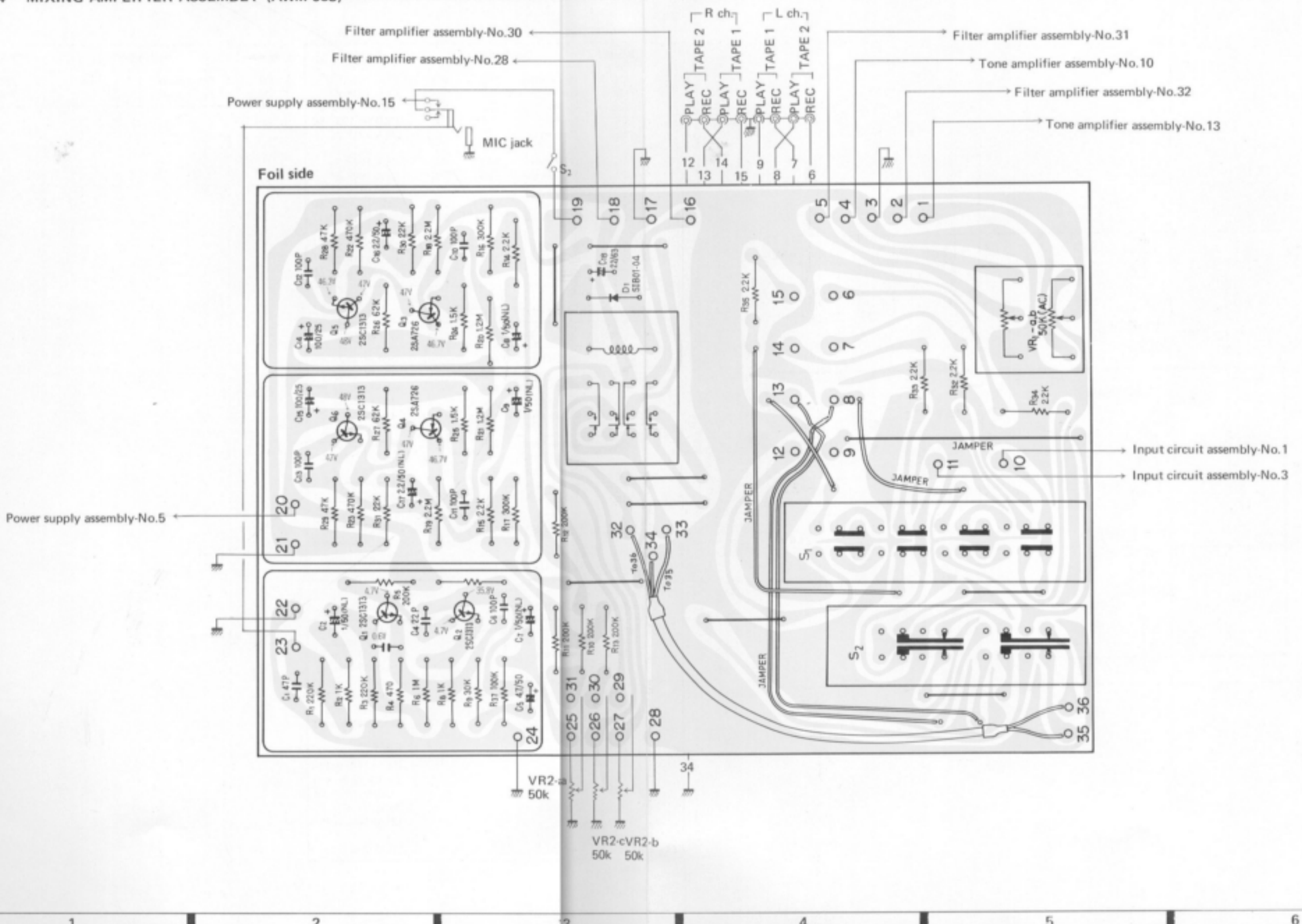
Symbol	Description			Part No.
R1	Carbon film	7.5k		RD¼PS 752J
R2	Carbon film	7.5k		RD¼PS 752J
R3	Carbon film	43k		RD¼PS 433J
R4	Carbon film	43k		RD¼PS 433J
R5	Carbon film	5.6k		RD¼PS 562J
R6	Carbon film	3.6k		RD¼PS 362J
R7	Carbon film	3.6k		RD¼PS 362J
R8	Carbon film	9.1k		RD¼PS 912J
R9	Carbon film	8.2k		RD¼PS 822J
R10	Carbon film	10	½W	RD½PSF 100J
R11	Carbon film	560		RD¼PSF 561J
VR1	Semi fixed	2.2k-B		ACP-005
VR2	Semi fixed	2.2k-B		ACP-005

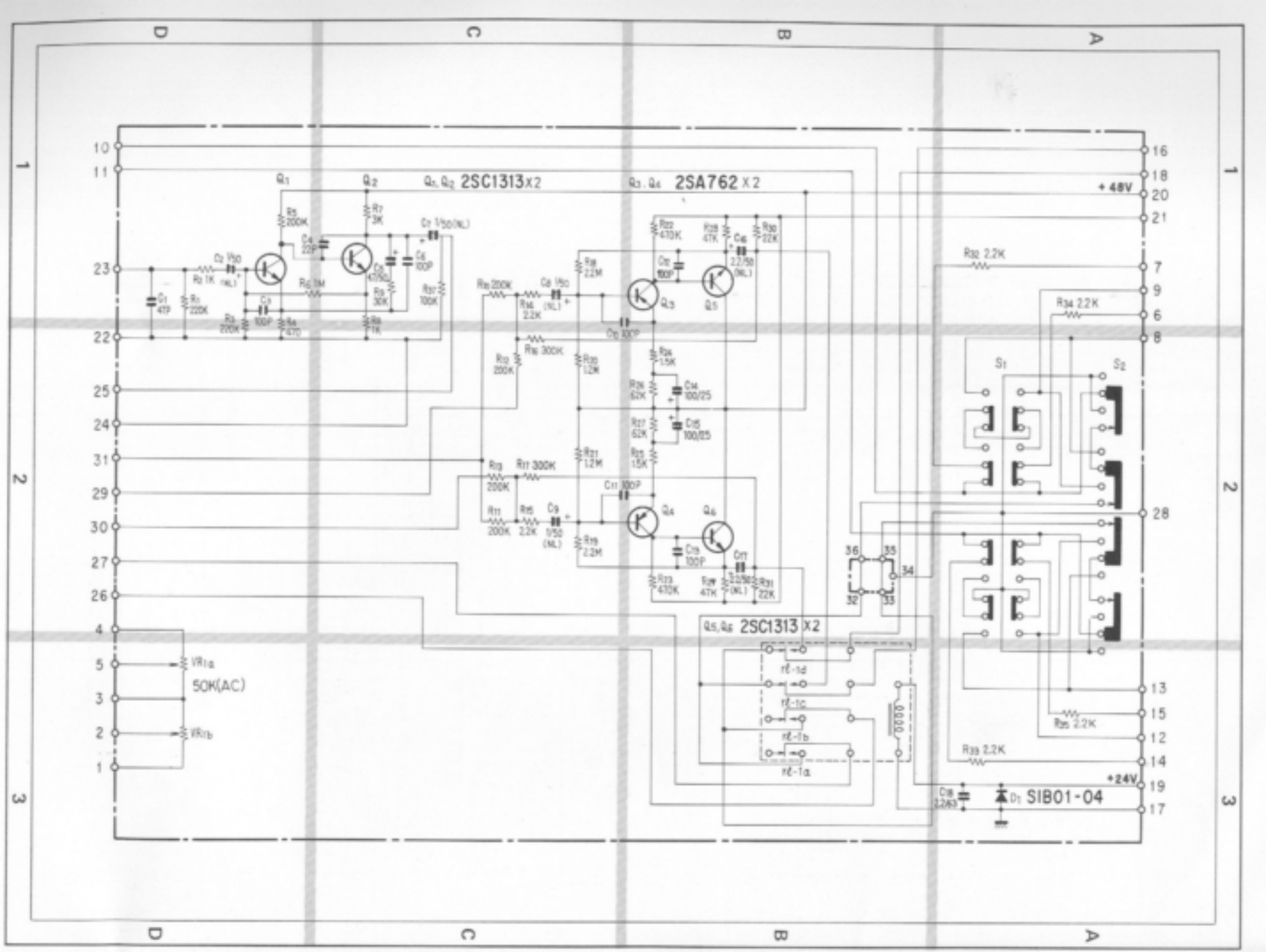
SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SD313P-D or E (2SD562-O or Y)
Q2	Transistor	2SB507P-D, or E (2SB596-O or Y)
Q3	Transistor	2SC869-C or D (2SC1649-N or P)
Q4	Transistor	2SA628A-C or D (2SA834-N or P)
Q5	Transistor	2SC945-Q or R (2SC1647-P or Q)
Q6	Transistor	2SA628A-C or D (2SA834-N or P)
Q7	Transistor	2SD313-D

Symbol	Description	Part No.
D1	Zener diode	WZ240
D2	Zener diode	WZ240

10.4 MIXING AMPLIFIER ASSEMBLY (AWM-083)




Q1
Q2
Q1, Q2 2SC1313X2
Q3, Q4 2SA762 X2
+48V
+24V
Q5, Q6 2SC1313 X2
VR1a
50K(AC)
VR1b
D1 SIB01-04
S1
S2

Parts List of Mixing Amplifier Assembly (AWM-083)

CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	47p	50V	CCDSL 470k 50
C2	Electrolytic	1	50V	CEANL 010P 50
C3	Ceramic	100p	50V	CCDSL 101K 50
C4	Ceramic	22p	50V	CCDSL 220K 50
C5	Electrolytic	4.7	50V	CEA 4R7P 50
C6	Ceramic	100p	50V	CCDSL 101K 50
C7	Electrolytic	1	50V	CEANL 010P 50
C8	Electrolytic	1	50V	CEANL 010P 50
C9	Electrolytic	1	50V	CEANL 010P 50
C10	Ceramic	100p	50V	CCDSL 101K 50
C11	Ceramic	100p	50V	CCDSL 101K 50
C12	Ceramic	100p	50V	CCDSL 101K 50
C13	Ceramic	100p	50V	CCDSL 101K 50
C14	Electrolytic	100	25V	CEA 101P 25
C15	Electrolytic	100	25V	CEA 101P 25
C16	Electrolytic	2.2	50V	CEANL 2R2P 50
C17	Electrolytic	2.2	50V	CEANL 2R2P 50
C18	Electrolytic	2.2	63V	CEA 2R2P 63

RESISTORS AND POTENTIOMETERS

Symbol	Description		Part No.
R1	Carbon film	220k	RD¼PS 224J
R2	Carbon film	1k	RD¼PS 102J
R3	Carbon film	220k	RD¼PS 224J
R4	Carbon film	470	RD¼PS 471J
R5	Carbon film	200k	RD¼PS 204J
R6	Carbon film	1M	RD¼PS 105J
R7	Carbon film	3k	RD¼PS 302J
R8	Carbon film	1k	RD¼PS 102J
R9	Carbon film	30k	RD¼PS 303J
R10	Carbon film	200k	RD¼PS 204J
R11	Carbon film	200k	RD¼PS 204J
R12	Carbon film	200k	RD¼PS 204J
R13	Carbon film	200k	RD¼PS 204J
R14	Carbon film	2.2k	RD¼PS 222J
R15	Carbon film	2.2k	RD¼PS 222J
R16	Carbon film	300k	RD¼PS 304J
R17	Carbon film	300k	RD¼PS 304J
R18	Carbon film	2.2M	RD¼PS 225J
R19	Carbon film	2.2M	RD¼PS 225J
R20	Carbon film	1.2M	RD¼PS 125J
R21	Carbon film	1.2M	RD¼PS 125J
R22	Carbon film	470k	RD¼PS 474J
R23	Carbon film	470k	RD¼PS 474J
R24	Carbon film	1.5k	RD¼PS 152J
R25	Carbon film	1.5k	RD¼PS 152J
R26	Carbon film	62k	RD¼PS 623J
R27	Carbon film	62k	RD¼PS 623J
R28	Carbon film	47k	RD¼PS 473J
R29	Carbon film	47k	RD¼PS 473J
R30	Carbon film	22k	RD¼PS 223J
R31	Carbon film	22k	RD¼PS 223J
R32	Carbon film	2.2k	RD¼PS 222J
R33	Carbon film	2.2k	RD¼PS 222J
R34	Carbon film	2.2k	RD¼PS 222J
R35	Carbon film	2.2k	RD¼PS 222J
R36	.....		.....
R37	Carbon film	100k	RD¼PS 104J
VR1	Variable resistor (BALANCE)	50k-A, C	ACV-145

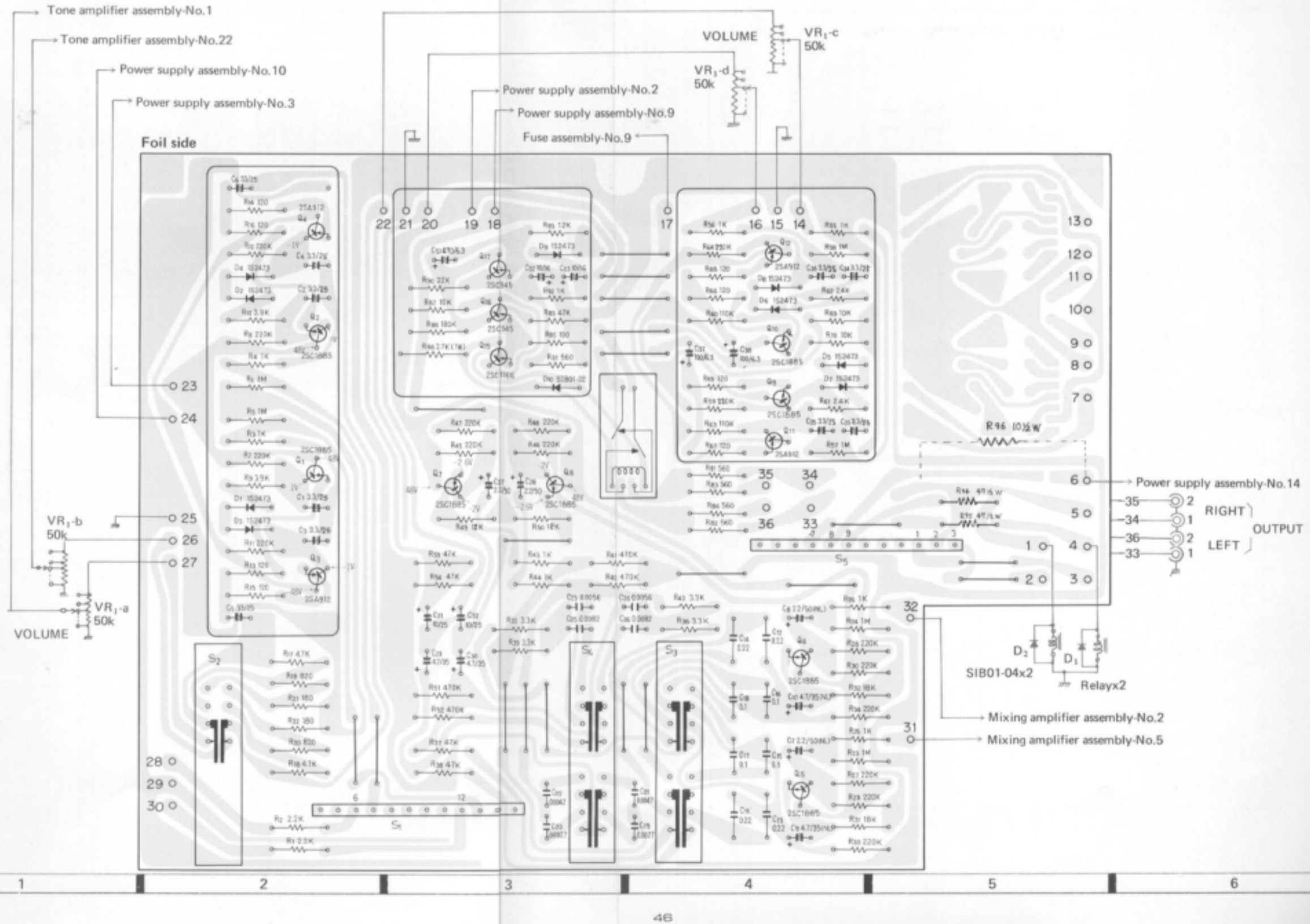
SEMICONDUCTORS

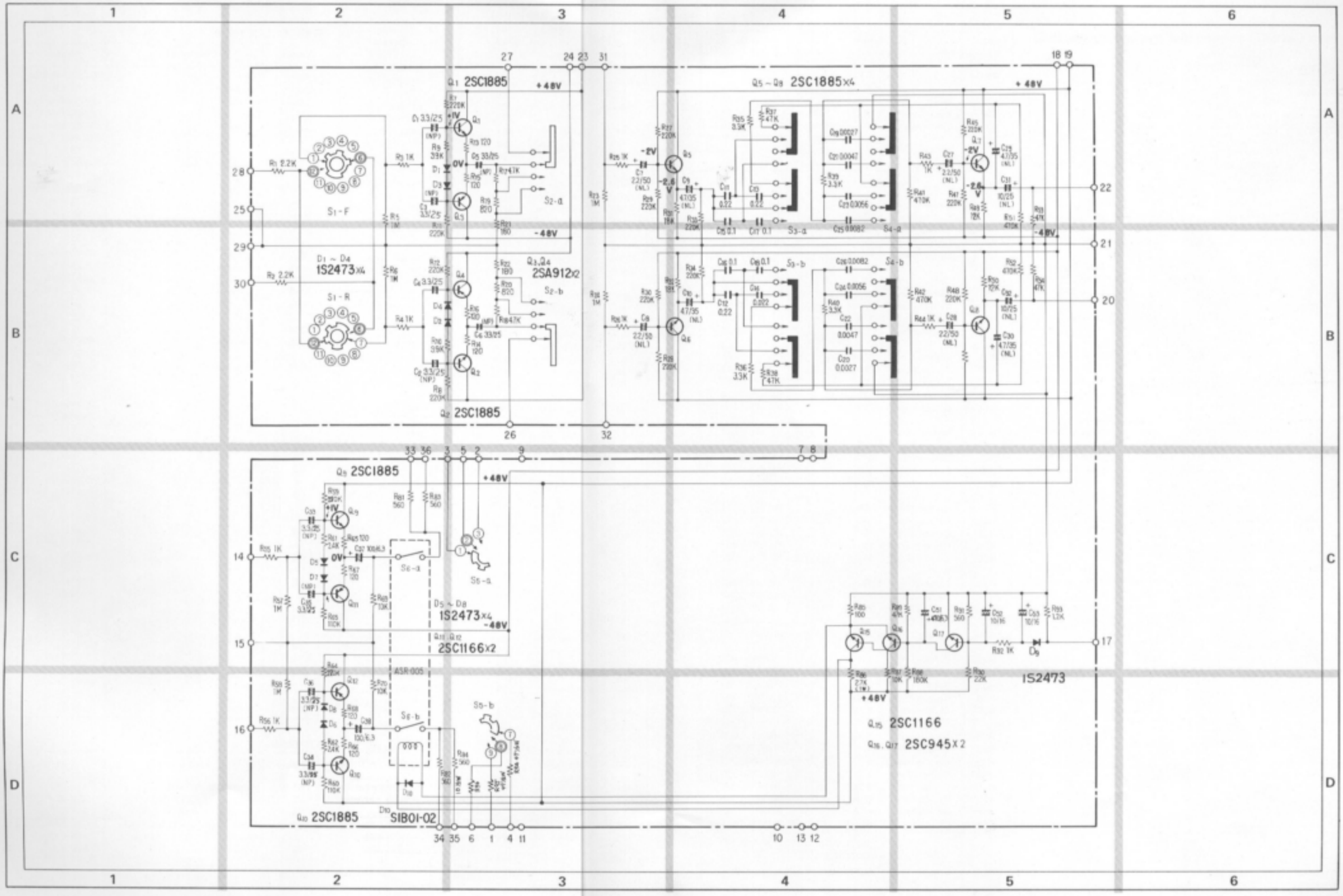
Symbol	Description	Part No.
Q1	Transistor	2SC1313-G or H (2SC1681-BL or V)
Q2	Transistor	2SC1313-G or H (2SC1681-BL or V)
Q3	Transistor	2SA726-F or G (2SA841-GR or BL)
Q4	Transistor	2SA726-F or G (2SA841-GR or BL)
Q5	Transistor	2SC1313-G or H (2SC1681-BL or V)
Q6	Transistor	2SC1313-G or H (2SC1681-BL or V)
D1	Diode	SIB-01-04

OTHERS

Symbol	Description	Part No.
S1	Lever switch (TAPE DUPLICATE)	ASK-084
S2	Lever switch (TAPE MONITOR)	ASK-086
	Relay	ASR-012

10.5 FILTER AMPLIFIER ASSEMBLY (AWM-082)




Q1 2SC1885
Q2 2SC1885
Q3,Q4 2SA912x2
Q5 ~ Q8 2SC1885x4
D1 ~ D4 1S2473x4
S1-F
S1-R
S2-a
S2-b
S3-a
S3-b
S4-a
S4-b
+48V
-48V
0V
-2V
-2.6V
Q9 2SC1885
Q10 2SC1885
D5 ~ D8 1S2473x4
Q11,Q12 2SC1166x2
ASR-005
S5-a
S5-b
S6-a
S6-b
D10 S1B01-02
Q15 2SC1166
Q16,Q17 2SC945x2
1S2473
+48V
-48V

Parts List of Filter Amplifier Assembly (AWM-082)

CAPACITORS

Symbol	Description			Part No.
C1	Electrolytic	3.3	25V	ACH-302
C2	Electrolytic	3.3	25V	ACH-302
C3	Electrolytic	3.3	25V	ACH-302
C4	Electrolytic	3.3	25V	ACH-302
C5	Electrolytic	33	25V	CEA 330M 25NP
C6	Electrolytic	33	25V	CEA 330M 25NP
C7	Electrolytic	2.2	50V	CEANL 2R2P 50
C8	Electrolytic	2.2	50V	CEANL 2R2P 50
C9	Electrolytic	4.7	35V	CEANL 4R7P 35
C10	Electrolytic	4.7	35V	CEANL 4R7P 35
C11	Mylar	0.22	50V	CQMA 224J 50
C12	Mylar	0.22	50V	CQMA 224J 50
C13	Mylar	0.22	50V	CQMA 224J 50
C14	Mylar	0.22	50V	CQMA 224J 50
C15	Mylar	0.1	50V	CQMA 104J 50
C16	Mylar	0.1	50V	CQMA 104J 50
C17	Mylar	0.1	50V	CQMA 104J 50
C18	Mylar	0.1	50V	CQMA 104J 50
C19	Mylar	0.0027	50V	CQMA 272J 50
C20	Mylar	0.0027	50V	CQMA 272J 50
C21	Mylar	0.0047	50V	CQMA 472J 50
C22	Mylar	0.0047	50V	CQMA 472J 50
C23	Mylar	0.0056	50V	CQMA 562J 50
C24	Mylar	0.0056	50V	CQMA 562J 50
C25	Mylar	0.0082	50V	CQMA 822J 50
C26	Mylar	0.0082	50V	CQMA 822J 50
C27	Electrolytic	2.2	50V	CEANL 2R2P 50
C28	Electrolytic	2.2	50V	CEANL 2R2P 50
C29	Electrolytic	4.7	35V	CEANL 4R7P 35
C30	Electrolytic	4.7	35V	CEANL 4R7P 35
C31	Electrolytic	10	25V	CEANL 100P 25
C32	Electrolytic	10	25V	CEANL 100P 25
C33	Electrolytic	3.3	25V	ACH-302
C34	Electrolytic	3.3	25V	ACH-302
C35	Electrolytic	3.3	25V	ACH-302
C36	Electrolytic	3.3	25V	ACH-302
C37	Electrolytic	100	6.3V	CEA 101P 6R3
C38	Electrolytic	100	6.3V	CEA 101P 6R3
C39	.....			.....
C40	.....			.....
C41	.....			.....
C42	.....			.....
C43	.....			.....
C44	.....			.....
C45	.....			.....
C46	.....			.....
C47	.....			.....
C48	.....			.....
C49	.....			.....
C50	.....			.....
C51	Electrolytic	470	6.3V	CEA 471P 6R3
C52	Electrolytic	10	16V	CEA 100P 16
C53	Electrolytic	10	16V	CEA 100P 16

RESISTORS

Symbol	Description		Part No.
R1	Carbon film	2.2k	RD¼PS 222J
R2	Carbon film	2.2k	RD¼PS 222J
R3	Carbon film	1k	RD¼PS 102J
R4	Carbon film	1k	RD¼PS 102J
R5	Carbon film	1M	RD¼PS 105J
R6	Carbon film	1M	RD¼PS 105J
R7	Carbon film	220k	RD¼PS 224J
R8	Carbon film	220k	RD¼PS 224J
R9	Carbon film	3.9k	RD¼PS 392J
R10	Carbon film	3.9k	RD¼PS 392J
R11	Carbon film	220k	RD¼PS 224J
R12	Carbon film	220k	RD¼PS 224J
R13	Carbon film	120	RD¼PS 121J
R14	Carbon film	120	RD¼PS 121J
R15	Carbon film	120	RD¼PS 121J
R16	Carbon film	120	RD¼PS 121J
R17	Carbon film	4.7k	RD¼PS 472J
R18	Carbon film	4.7k	RD¼PS 472J
R19	Carbon film	820	RD¼PS 821J
R20	Carbon film	820	RD¼PS 821J
R21	Carbon film	180	RD¼PS 181J
R22	Carbon film	180	RD¼PS 181J
R23	Carbon film	1M	RD¼PS 105J
R24	Carbon film	1M	RD¼PS 105J
R25	Carbon film	1k	RD¼PS 102J
R26	Carbon film	1k	RD¼PS 102J
R27	Carbon film	220k	RD¼PS 224J
R28	Carbon film	220k	RD¼PS 224J
R29	Carbon film	220k	RD¼PS 224J
R30	Carbon film	220k	RD¼PS 224J
R31	Carbon film	18k	RD¼PS 183J
R32	Carbon film	18k	RD¼PS 183J
R33	Carbon film	220k	RD¼PS 224J
R34	Carbon film	220k	RD¼PS 224J
R35	Carbon film	3.3k	RD¼PS 332J
R36	Carbon film	3.3k	RD¼PS 332J
R37	Carbon film	47k	RD¼PS 473J
R38	Carbon film	47k	RD¼PS 473J
R39	Carbon film	3.3k	RD¼PS 322J
R40	Carbon film	3.3k	RD¼PS 332J
R41	Carbon film	470k	RD¼PS 474J
R42	Carbon film	470k	RD¼PS 474J
R43	Carbon film	1k	RD¼PS 102J

Symbol	Description			Part No.
R44	Carbon film	1k		RD¼PS 102J
R45	Carbon film	220k		RD¼PS 224J
R46	Carbon film	220k		RD¼PS 224J
R47	Carbon film	220k		RD¼PS 224J
R48	Carbon film	220k		RD¼PS 224J
R49	Carbon film	12k		RD¼PS 123J
R50	Carbon film	12k		RD¼PS 123J
R51	Carbon film	470k		RD¼PS 474J
R52	Carbon film	470k		RD¼PS 474J
R53	Carbon film	47k		RD¼PS 473J
R54	Carbon film	47k		RD¼PS 473J
R55	Carbon film	1k		RD¼PS 102J
R56	Carbon film	1k		RD¼PS 102J
R57	Carbon film	1M		RD¼PS 105J
R58	Carbon film	1M		RD¼PS 105J
R59	Carbon film	220k		RD¼PS 224J
R60	Carbon film	220k		RD¼PS 224J
R61	Carbon film	2.2k		RD¼PS 222J
R62	Carbon film	2.2k		RD¼PS 222J
R63	Carbon film	110k		RD¼PS 114J
R64	Carbon film	110k		RD¼PS 114J
R65	Carbon film	120		RD¼PS 121J
R66	Carbon film	120		RD¼PS 121J
R67	Carbon film	120		RD¼PS 121J
R68	Carbon film	120		RD¼PS 121J
R69	Carbon film	10k		RD¼PS 103J
R70	Carbon film	10k		RD¼PS 103J
R71	.....			.....
R72	.....			.....
R73	.....			.....
R74	.....			.....
R75	.....			.....
R76	.....			.....
R77	.....			.....
R78	.....			.....
R79	.....			.....
R80	.....			.....
R81	Carbon film	560		RD¼PS 561J
R82	Carbon film	560		RD¼PS 561J
R83	Carbon film	560		RD¼PS 561J
R84	Carbon film	560		RD¼PS 561J
R85	Carbon film	100		RD¼PS 101J
R86	Metal oxide	2.7k	1W	RS1P 272K
R87	Carbon film	10k		RD¼PS 103J
R88	Carbon film	180k		RD¼PS 184J
R89	Carbon film	47k		RD¼PS 473J
R90	Carbon film	22k		RD¼PS 223J
R91	Carbon film	560		RD¼PS 561J
R92	Carbon film	1k		RD¼PS 102J
R93	Carbon film	1.2k		RD¼PS 122J
R94	Carbon film	47	½W	RD½PS 470J
R95	Carbon film	47	½W	RD½PS 470J
R96	Carbon film	10	½W	RD½PS 100J

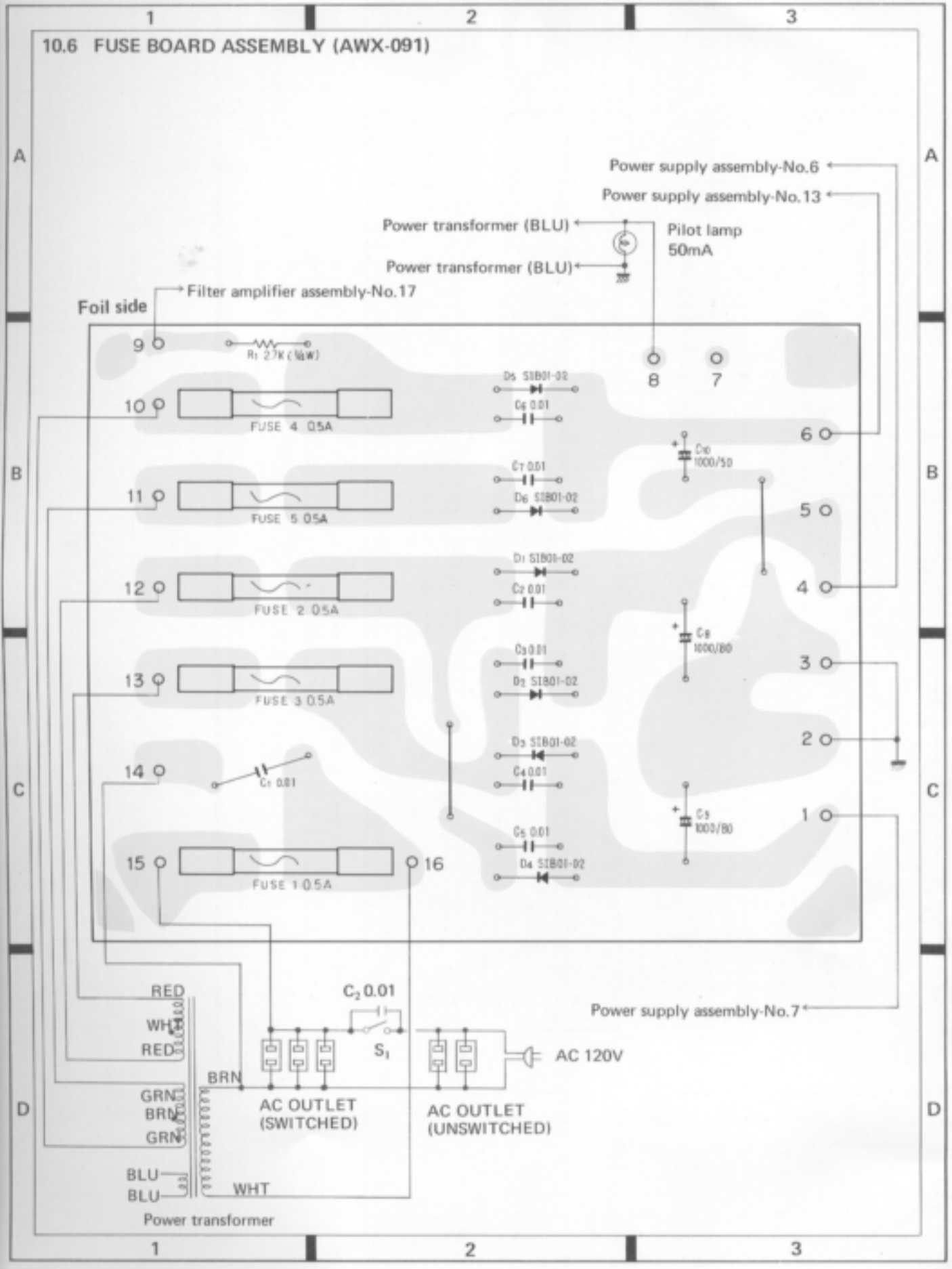
SEMICONDUCTORS

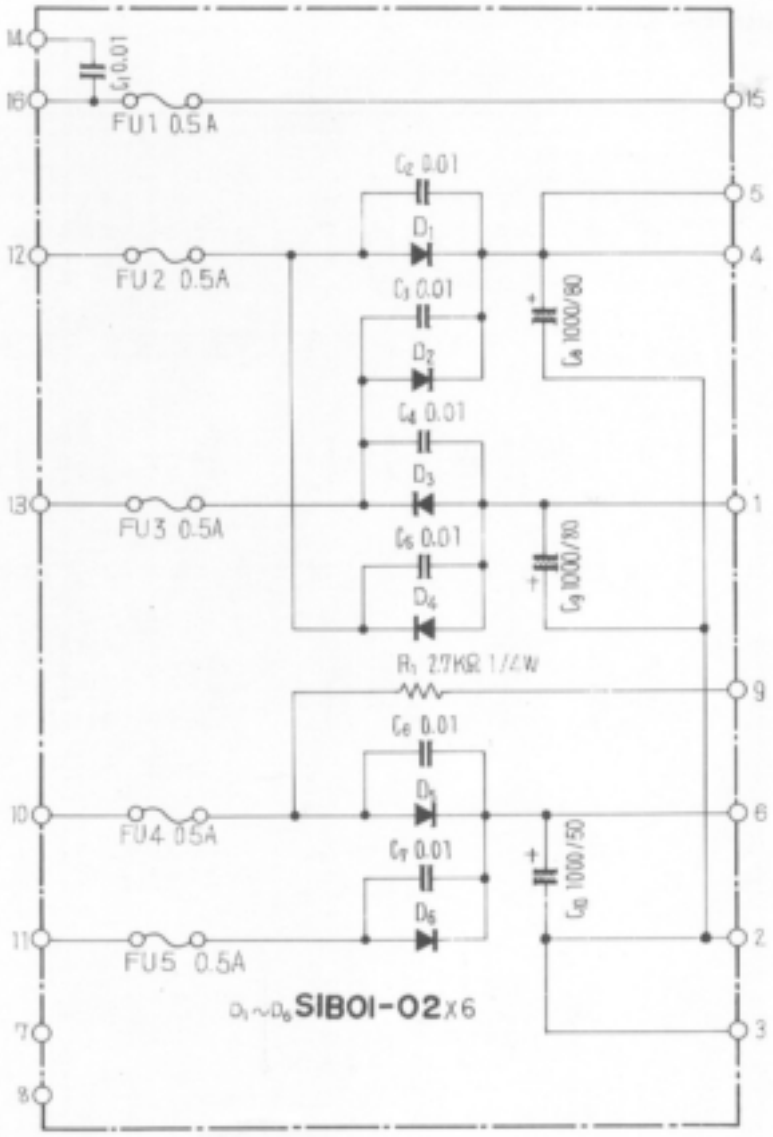
Symbol	Description	Part No.
Q1	Transistor	2SC1885-R, S or Q
Q2	Transistor	2SC1885-R, S or Q
Q3	Transistor	2SA912-R, S or Q
Q4	Transistor	2SA912-R, S or Q
Q5	Transistor	2SC1885-R, S or Q (2SC1451-P, V or S)
Q6	Transistor	2SC1885-R, S or Q (2SC1451-P, V or S)
Q7	Transistor	2SC1885-R, S or Q (2SC1451-P, V or S)
Q8	Transistor	2SC1885-R, S or Q (2SC1451-P, V or S)
Q9	Transistor	2SC1885-R, S or Q
Q10	Transistor	2SC1885-R, S or Q
Q11	Transistor	2SA912-R, S or Q
Q12	Transistor	2SA912-R, S or Q
Q13	.....	.....
Q14	.....	.....
Q15	Transistor	2SC1166-O or Y (2SC1384-R or Q)
Q16	Transistor	2SC945-Q or R (2SC1647-P or Q)
Q17	Transistor	2SC945-Q or R (2SC1647-P or Q)
D1	Diode	1S2473 (1S1555)
D2	Diode	1S2473 (1S1555)
D3	Diode	1S2473 (1S1555)
D4	Diode	1S2473 (1S1555)
D5	Diode	1S2473 (1S1555)
D6	Diode	1S2473 (1S1555)
D7	Diode	1S2473 (1S1555)
D8	Diode	1S2473 (1S1555)
D9	Diode	1S2473 (1S1555)
D10	Diode	SIB01-02

OTHERS

Symbol	Description	Part No.
S1	Rotary switch (MODE)	ASD-046
S2	Lever switch (ATTENUATOR)	ASK-087
S3	Lever switch (LOW FILTER)	ASK-085
S4	Lever switch (HIGH FILTER)	ASK-085
S5	Rotary switch (SPEAKERS)	ASD-040
S6	Reed relay (MUTING)	ASR-005

10.6 FUSE BOARD ASSEMBLY (AWX-091)





Parts List of Fuse Board Assembly (AWX-091)

CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.01	150V	ACG-003
C2	Ceramic	0.01	150V	ACG-004
C3	Ceramic	0.01	150V	ACG-004
C4	Ceramic	0.01	150V	ACG-004
C5	Ceramic	0.01	150V	ACG-004
C6	Ceramic	0.01	150V	ACG-004
C7	Ceramic	0.01	150V	ACG-004
C8	Electrolytic	1,000	80V	ACH-053
C9	Electrolytic	1,000	80V	ACH-053
C10	Electrolytic	1,000	50V	CEA 102P 50

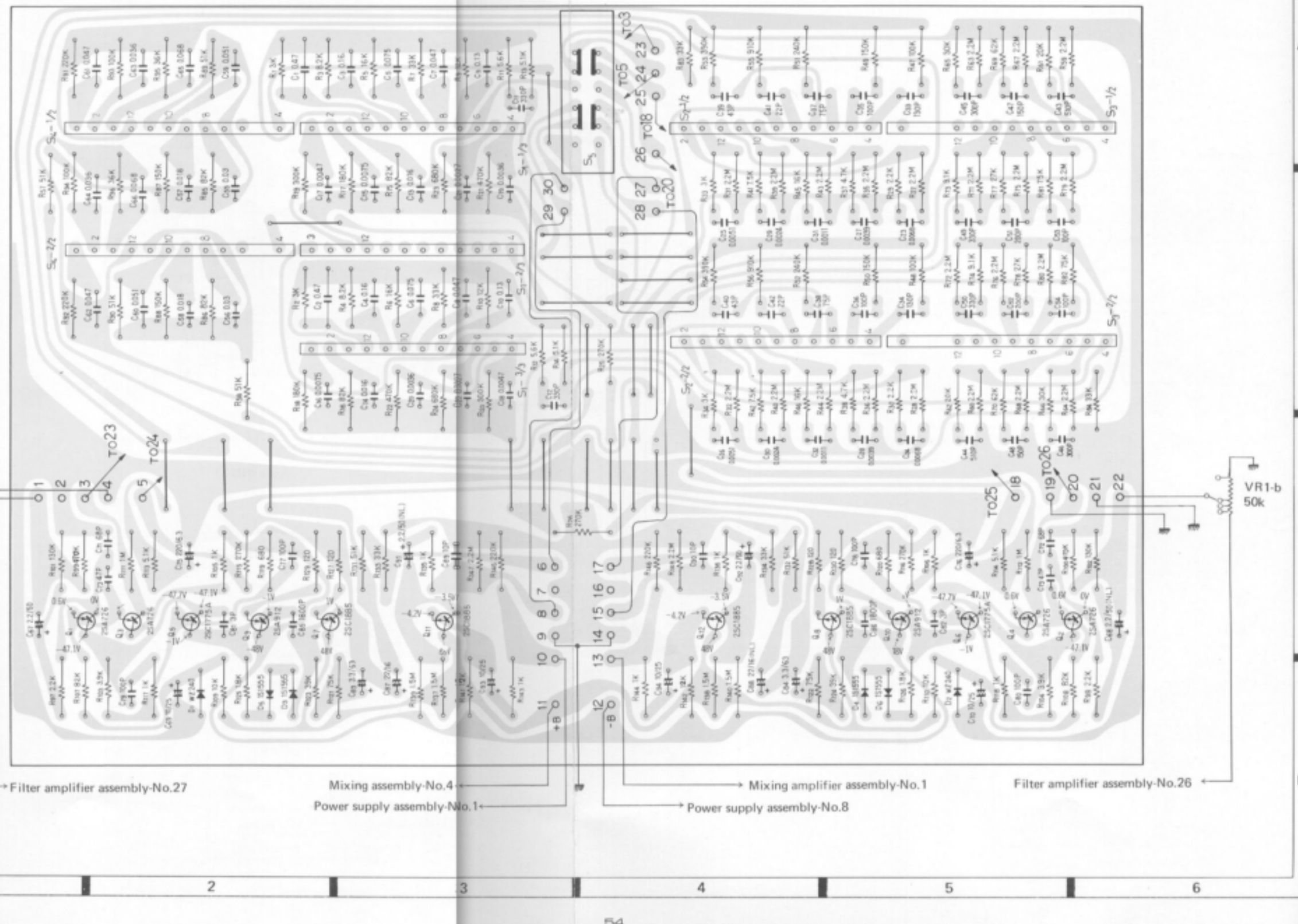
RESISTOR

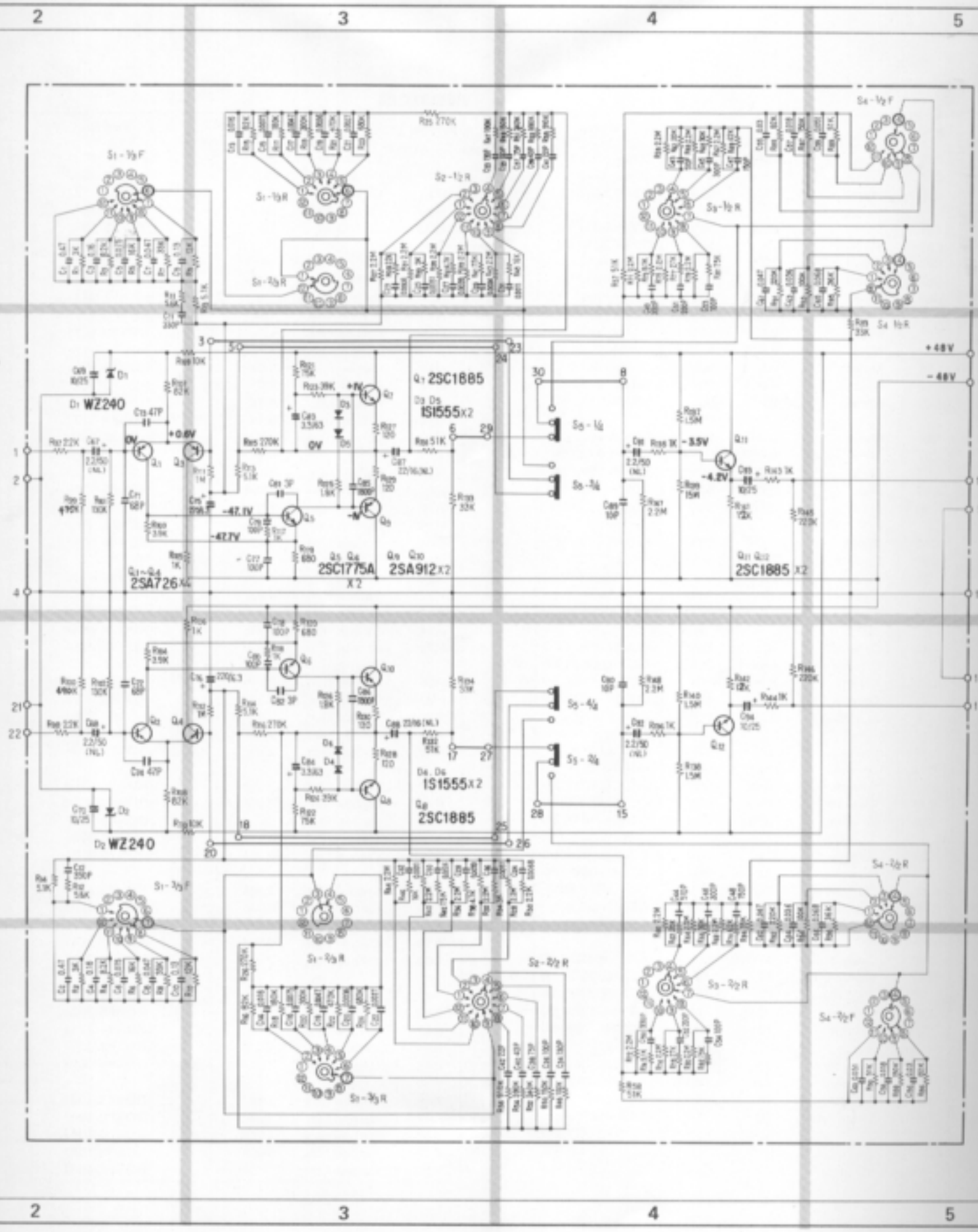
Symbol	Description		Part No.
R1	Carbon film	2.7k	RD¼PS 272J

SEMICONDUCTORS

Symbol	Description	Part No.
D1	Diode	SIB01-02 (1S1886)
D2	Diode	SIB01-02 (1S1886)
D3	Diode	SIB01-02 (1S1886)
D4	Diode	SIB01-02 (1S1886)
D5	Diode	SIB01-02 (1S1886)
D6	Diode	SIB01-02 (1S1886)

10.7 TONE AMPLIFIER ASSEMBLY (AWG-035)




2
3
4
5
D1 WZ240
D2 WZ240
Q1 2SC1885
D3 D5 1S1555 X2
Q1~Q4 2SA726 X4
Q5 Q6 2SC1775A X2
Q9 Q10 2SA912 X2
Q11 Q12 2SC1885 X2
D4 D6 1S1555 X2
Q8 2SC1885
+48V
-48V
+0.6V
0V
-47.1V
-47.7V
-3.5V
-4.2V
S1 - 1/3 F
S1 - 2/3 R
S1 - 3/3 R
S2 - 1/2 R
S2 - 2/2 R
S3 - 1/2 R
S3 - 2/2 R
S4 - 1/2 F
S4 - 2/2 F
S4 - 1/2 R
S4 - 2/2 R
S5 - 1/4
S5 - 2/4
S5 - 3/4
S5 - 4/4

Parts List of Tone Amplifier Assembly (AWG-035)

CAPACITORS

Symbol	Description			Part No.
C1	Mylar	0.47	50V	CQMA 474k 50
C2	Mylar	0.47	50V	CQMA 474k 50
C3	Mylar	0.16	50V	CQMA 164J 50
C4	Mylar	0.16	50V	CQMA 164J 50
C5	Mylar	0.075	50V	CQMA 753J 50
C6	Mylar	0.075	50V	CQMA 753J 50
C7	Mylar	0.047	50V	CQMA 473J 50
C8	Mylar	0.047	50V	CQMA 473J 50
C9	Mylar	0.13	50V	CQMA 134J 50
C10	Mylar	0.13	50V	CQMA 134J 50
C11	Styrol	330p	50V	CQSA 331J 50
C12	Styrol	330p	50V	CQSA 331J 50
C13	Mylar	0.016	50V	CQMA 163J 50
C14	Mylar	0.016	50V	CQMA 163J 50
C15	Mylar	0.0075	50V	CQMA 752J 50
C16	Mylar	0.0075	50V	CQMA 752J 50
C17	Mylar	0.0047	50V	CQMA 472J 50
C18	Mylar	0.0047	50V	CQMA 472J 50
C19	Mylar	0.0036	50V	CQMA 362J 50
C20	Mylar	0.0036	50V	CQMA 362J 50
C21	Mylar	0.0027	50V	CQMA 272J 50
C22	Mylar	0.0027	50V	CQMA 272J 50
C23	Mylar	0.0068	50V	CQMA 682J 50
C24	Mylar	0.0068	50V	CQMA 682J 50
C25	Mylar	0.0051	50V	CQMA 512J 50
C26	Mylar	0.0051	50V	CQMA 512J 50
C27	Mylar	0.0039	50V	CQMA 392J 50
C28	Mylar	0.0039	50V	CQMA 392J 50
C29	Mylar	0.0024	50V	CQMA 242J 50
C30	Mylar	0.0024	50V	CQMA 242J 50
C31	Mylar	0.0011	50V	CQMA 112J 50
C32	Mylar	0.0011	50V	CQMA 112J 50
C33	Styrol	130p	50V	CQSA 131J 50
C34	Styrol	130p	50V	CQSA 131J 50
C35	Styrol	100p	50V	CQSA 101J 50
C36	Styrol	100p	50V	CQSA 101J 50
C37	Styrol	75p	50V	CQSA 750J 50
C38	Styrol	75p	50V	CQSA 750J 50
C39	Styrol	43p	50V	CQSA 430J 50
C40	Styrol	43p	50V	CQSA 430J 50
C41	Styrol	43p	50V	CQSA 430J 50
C42	Styrol	43p	50V	CQSA 430J 50
C43	Styrol	510p	50V	CQSA 511J 50
C44	Styrol	510p	50V	CQSA 511J 50
C45	Styrol	300p	50V	CQSA 301J 50
C46	Styrol	300p	50V	CQSA 301J 50
C47	Styrol	150p	50V	CQSA 151J 50

Symbol	Description			Part No.
C48	Styrol	150p	50V	CQSA 151J 50
C49	Styrol	330p	50V	CQSA 331J 50
C50	Styrol	330p	50V	CQSA 331J 50
C51	Styrol	200p	50V	CQSA 201J 50
C52	Styrol	200p	50V	CQSA 201J 50
C53	Styrol	100p	50V	CQSA 101J 50
C54	Styrol	100p	50V	CQSA 101J 50
C55	Mylar	0.03	50V	CQMA 303J 50
C56	Mylar	0.03	50V	CQMA 303J 50
C57	Mylar	0.018	50V	CQMA 183J 50
C58	Mylar	0.018	50V	CQMA 183J 50
C59	Mylar	0.051	50V	CQMA 513J 50
C60	Mylar	0.051	50V	CQMA 513J 50
C61	Mylar	0.047	50V	CQMA 473J 50
C62	Mylar	0.047	50V	CQMA 473J 50
C63	Mylar	0.036	50V	CQMA 363J 50
C64	Mylar	0.036	50V	CQMA 363J 50
C65	Mylar	0.068	50V	CQMA 683J 50
C66	Mylar	0.068	50V	CQMA 683J 50
C67	Electrolytic	2.2	50V	CEANL 2R2P 50
C68	Electrolytic	2.2	50V	CEANL 2R2P 50
C69	Electrolytic	10	25V	CEA 100P 25
C70	Electrolytic	10	25V	CEA 100P 25
C71	Ceramic	68p	50V	CCDSL 680K 50
C72	Ceramic	68p	50V	CCDSL 680K 50
C73	Ceramic	47p	50V	CCDSL 470K 50
C74	Ceramic	47p	50V	CCDSL 470K 50
C75	Electrolytic	220	6.3V	CEA 221P 6.3
C76	Electrolytic	220	6.3V	CEA 221P 6.3
C77	Ceramic	100p	50V	CCDSL 101K 50
C78	Ceramic	100p	50V	CCDSL 101K 50
C79	Ceramic	100p	50V	CCDSL 101K 50
C80	Ceramic	100p	50V	CCDSL 101K 50
C81	Ceramic	3p	50V	CCDSL 030C 50
C82	Ceramic	3p	50V	CCDSL 030C 50
C83	Electrolytic	3.3	63V	CEA 3R3P 63
C84	Electrolytic	3.3	63V	CEA 3R3P 63
C85	Ceramic	0.0018	50V	CKDYB 182K 50
C86	Ceramic	0.0018	50V	CKDYB 182K 50
C87	Electrolytic	22	16V	CEANL 220P 16
C88	Electrolytic	22	16V	CEANL 220P 16
C89	Ceramic	10p	50V	CCDSL 100K 50
C90	Ceramic	10p	50V	CCDSL 100K 50
C91	Electrolytic	2.2	50V	CEANL 2R2P 50
C92	Electrolytic	2.2	50V	CEANL 2R2P 50
C93	Electrolytic	10	25V	CEA 100P 25
C94	Electrolytic	10	25V	CEA 100P 25

RESISTORS

Symbol	Description		Part No.
R1	Carbon film	3k	RD¼PS 302J
R2	Carbon film	3k	RD¼PS 302J
R3	Carbon film	8.2k	RD¼PS 822J
R4	Carbon film	8.2k	RD¼PS 822J
R5	Carbon film	16k	RD¼PS 163J
R6	Carbon film	16k	RD¼PS 163J
R7	Carbon film	33k	RD¼PS 333J
R8	Carbon film	33k	RD¼PS 333J
R9	Carbon film	12k	RD¼PS 123J
R10	Carbon film	12k	RD¼PS 123J
R11	Carbon film	5.6k	RD¼PS 562J
R12	Carbon film	5.6k	RD¼PS 562J
R13	Carbon film	5.1k	RD¼PS 512J
R14	Carbon film	5.1k	RD¼PS 512J
R15	Carbon film	82k	RD¼PS 823J
R16	Carbon film	82k	RD¼PS 823J
R17	Carbon film	180k	RD¼PS 184J
R18	Carbon film	180k	RD¼PS 184J
R19	Carbon film	300k	RD¼PS 304J
R20	Carbon film	300k	RD¼PS 304J
R21	Carbon film	470k	RD¼PS 474J
R22	Carbon film	470k	RD¼PS 474J
R23	Carbon film	680k	RD¼PS 684J
R24	Carbon film	680k	RD¼PS 684J
R25	Carbon film	270k	RD¼PS 274J
R26	Carbon film	270k	RD¼PS 274J
R27	Carbon film	2.2M	RD¼PS 225J
R28	Carbon film	2.2M	RD¼PS 225J
R29	Carbon film	2.2k	RD¼PS 222J
R30	Carbon film	2.2k	RD¼PS 222J
R31	Carbon film	2.2M	RD¼PS 225J
R32	Carbon film	2.2M	RD¼PS 225J
R33	Carbon film	3k	RD¼PS 302J
R34	Carbon film	3k	RD¼PS 302J
R35	Carbon film	2.2M	RD¼PS 225J
R36	Carbon film	2.2M	RD¼PS 225J
R37	Carbon film	4.7k	RD¼PS 472J
R38	Carbon film	4.7k	RD¼PS 472J
R39	Carbon film	2.2M	RD¼PS 225J
R40	Carbon film	2.2M	RD¼PS 225J
R41	Carbon film	7.5k	RD¼PS 752J
R42	Carbon film	7.5k	RD¼PS 752J
R43	Carbon film	2.2M	RD¼PS 225J
R44	Carbon film	2.2M	RD¼PS 225J
R45	Carbon film	16k	RD¼PS 163J
R46	Carbon film	16k	RD¼PS 163J
R47	Carbon film	100k	RD¼PS 104J
R48	Carbon film	100k	RD¼PS 104J
R49	Carbon film	150k	RD¼PS 154J
R50	Carbon film	150k	RD¼PS 154J

Symbol	Description		Part No.
R51	Carbon film	240k	RD¼PS 244J
R52	Carbon film	240k	RD¼PS 244J
R53	Carbon film	390k	RD¼PS 394J
R54	Carbon film	390k	RD¼PS 394J
R55	Carbon film	910k	RD¼PS 914J
R56	Carbon film	910k	RD¼PS 914J
R57	Carbon film	51k	RD¼PS 513J
R58	Carbon film	51k	RD¼PS 513J
R59	Carbon film	2.2M	RD¼PS 225J
R60	Carbon film	2.2M	RD¼PS 225J
R61	Carbon film	20k	RD¼PS 203J
R62	Carbon film	20k	RD¼PS 203J
R63	Carbon film	2.2M	RD¼PS 225J
R64	Carbon film	2.2M	RD¼PS 225J
R65	Carbon film	30k	RD¼PS 303J
R66	Carbon film	30k	RD¼PS 303J
R67	Carbon film	2.2M	RD¼PS 225J
R68	Carbon film	2.2M	RD¼PS 225J
R69	Carbon film	62k	RD¼PS 623J
R70	Carbon film	62k	RD¼PS 623J
R71	Carbon film	2.2M	RD¼PS 225J
R72	Carbon film	2.2M	RD¼PS 225J
R73	Carbon film	9.1k	RD¼PS 912J
R74	Carbon film	9.1k	RD¼PS 912J
R75	Carbon film	2.2M	RD¼PS 225J
R76	Carbon film	2.2M	RD¼PS 225J
R77	Carbon film	27k	RD¼PS 273J
R78	Carbon film	27k	RD¼PS 273J
R79	Carbon film	2.2M	RD¼PS 225J
R80	Carbon film	2.2M	RD¼PS 225J
R81	Carbon film	75k	RD¼PS 753J
R82	Carbon film	75k	RD¼PS 753J
R83	Carbon film	33k	RD¼PS 333J
R84	Carbon film	33k	RD¼PS 333J
R85	Carbon film	82k	RD¼PS 823J
R86	Carbon film	82k	RD¼PS 823J
R87	Carbon film	150k	RD¼PS 154J
R88	Carbon film	150k	RD¼PS 154J
R89	Carbon film	51k	RD¼PS 513J
R90	Carbon film	51k	RD¼PS 513J
R91	Carbon film	220k	RD¼PS 224J
R92	Carbon film	220k	RD¼PS 224J
R93	Carbon film	100k	RD¼PS 104J
R94	Carbon film	100k	RD¼PS 104J
R95	Carbon film	36k	RD¼PS 363J
R96	Carbon film	36k	RD¼PS 363J
R97	Carbon film	2.2k	RD¼PS 222J
R98	Carbon film	2.2k	RD¼PS 222J
R99	Carbon film	470k	RD¼PS 474J
R100	Carbon film	470k	RD¼PS 474J

Symbol	Description		Part No.
R101	Carbon film	130k	RD¼PS 134J
R102	Carbon film	130k	RD¼PS 134J
R103	Carbon film	3.9k	RD¼PS 392J
R104	Carbon film	3.9k	RD¼PS 392J
R105	Carbon film	1k	RD¼PS 102J
R106	Carbon film	1k	RD¼PS 102J
R107	Carbon film	82k	RD¼PS 823J
R108	Carbon film	82k	RD¼PS 823J
R109	Carbon film	10k	RD¼PS 103J
R110	Carbon film	10k	RD¼PS 103J
R111	Carbon film	1M	RD¼PS 105J
R112	Carbon film	1M	RD¼PS 105J
R113	Carbon film	5.1k	RD¼PS 512J
R114	Carbon film	5.1k	RD¼PS 512J
R115	Carbon film	270k	RD¼PS 274J
R116	Carbon film	270k	RD¼PS 274J
R117	Carbon film	1k	RD¼PS 102J
R118	Carbon film	1k	RD¼PS 102J
R119	Carbon film	680	RD¼PS 681J
R120	Carbon film	680	RD¼PS 681J
R121	Carbon film	75k	RD¼PS 753J
R122	Carbon film	75k	RD¼PS 753J
R123	Carbon film	39k	RD¼PS 393J
R124	Carbon film	39k	RD¼PS 393J
R125	Carbon film	2.2k	RD¼PS 222J
R126	Carbon film	2.2k	RD¼PS 222J
R127	Carbon film	120	RD¼PS 121J
R128	Carbon film	120	RD¼PS 121J
R129	Carbon film	120	RD¼PS 121J
R130	Carbon film	120	RD¼PS 121J
R131	Carbon film	51k	RD¼PS 513J
R132	Carbon film	51k	RD¼PS 513J
R133	Carbon film	33k	RD¼PS 333J
R134	Carbon film	33k	RD¼PS 333J
R135	Carbon film	1k	RD¼PS 102J
R136	Carbon film	1k	RD¼PS 102J
R137	Carbon film	1.5M	RD¼PS 155J
R138	Carbon film	1.5M	RD¼PS 155J
R139	Carbon film	1.5M	RD¼PS 155J
R140	Carbon film	1.5M	RD¼PS 155J
R141	Carbon film	12k	RD¼PS 123J
R142	Carbon film	12k	RD¼PS 123J
R143	Carbon film	1k	RD¼PS 102J
R144	Carbon film	1k	RD¼PS 102J
R145	Carbon film	220k	RD¼PS 224J
R146	Carbon film	220k	RD¼PS 224J
R147	Carbon film	2.2M	RD¼PS 225J
R148	Carbon film	2.2M	RD¼PS 225J

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SA726-F, G (2SA841-GR or BL)
Q2	Transistor	2SA726-F, G (2SA841-GR or BL)
Q3	Transistor	2SA726-F, G (2SA841-GR or BL)
Q4	Transistor	2SA726-F, G (2SA841-GR or BL)
Q5	Transistor	2SC1775A-E, F (2SC1596P-S)
Q6	Transistor	2SC1775A-E, F (2SC1596P-S)
Q7	Transistor	2SC1885-R, S or Q
Q8	Transistor	2SC1885-R, S or Q
Q9	Transistor	2SA912-R, S or Q
Q10	Transistor	2SA912-R, S or Q
Q11	Transistor	2SC1885-R, S or Q (2SC1451P-V or S)
Q12	Transistor	2SC1885-R, S or Q (2SC1451P-V or S)
D1	Zener diode	WZ240
D2	Zener diode	WZ240
D3	Diode	1S1555 (1S2473)
D4	Diode	1S1555 (1S2473)
D5	Diode	1S1555 (1S2473)
D6	Diode	1S1555 (1S2473)

SWITCHES

Symbol	Description	Part No.
S1	Rotary switch (BASS 100Hz)	ASD-042
S2	Rotary switch (TREBLE 10kHz)	ASD-043
S3	Rotary switch (TREBLE 20kHz)	ASD-044
S4	Rotary switch (BASS 50Hz)	ASD-041
S5	Lever switch (TONE)	ASK-091

Symbol	Description	Part No.
R101	Carbon film 130k	RD¼PS 134J
R102	Carbon film 130k	RD¼PS 134J
R103	Carbon film 3.9k	RD¼PS 392J
R104	Carbon film 3.9k	RD¼PS 392J
R105	Carbon film 1k	RD¼PS 102J
R106	Carbon film 1k	RD¼PS 102J
R107	Carbon film 82k	RD¼PS 823J
R108	Carbon film 82k	RD¼PS 823J
R109	Carbon film 10k	RD¼PS 103J
R110	Carbon film 10k	RD¼PS 103J
R111	Carbon film 1M	RD¼PS 105J
R112	Carbon film 1M	RD¼PS 105J
R113	Carbon film 5.1k	RD¼PS 512J
R114	Carbon film 5.1k	RD¼PS 512J
R115	Carbon film 270k	RD¼PS 274J
R116	Carbon film 270k	RD¼PS 274J
R117	Carbon film 1k	RD¼PS 102J
R118	Carbon film 1k	RD¼PS 102J
R119	Carbon film 680	RD¼PS 681J
R120	Carbon film 680	RD¼PS 681J
R121	Carbon film 75k	RD¼PS 753J
R122	Carbon film 75k	RD¼PS 753J
R123	Carbon film 39k	RD¼PS 393J
R124	Carbon film 39k	RD¼PS 393J
R125	Carbon film 2.2k	RD¼PS 222J
R126	Carbon film 2.2k	RD¼PS 222J
R127	Carbon film 120	RD¼PS 121J
R128	Carbon film 120	RD¼PS 121J
R129	Carbon film 120	RD¼PS 121J
R130	Carbon film 120	RD¼PS 121J
R131	Carbon film 51k	RD¼PS 513J
R132	Carbon film 51k	RD¼PS 513J
R133	Carbon film 33k	RD¼PS 333J
R134	Carbon film 33k	RD¼PS 333J
R135	Carbon film 1k	RD¼PS 102J
R136	Carbon film 1k	RD¼PS 102J
R137	Carbon film 1.5M	RD¼PS 155J
R138	Carbon film 1.5M	RD¼PS 155J
R139	Carbon film 1.5M	RD¼PS 155J
R140	Carbon film 1.5M	RD¼PS 155J
R141	Carbon film 12k	RD¼PS 123J
R142	Carbon film 12k	RD¼PS 123J
R143	Carbon film 1k	RD¼PS 102J
R144	Carbon film 1k	RD¼PS 102J
R145	Carbon film 220k	RD¼PS 224J
R146	Carbon film 220k	RD¼PS 224J
R147	Carbon film 2.2M	RD¼PS 225J
R148	Carbon film 2.2M	RD¼PS 225J

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SA726-F, G (2SA841-GR or BL)
Q2	Transistor	2SA726-F, G (2SA841-GR or BL)
Q3	Transistor	2SA726-F, G (2SA841-GR or BL)
Q4	Transistor	2SA726-F, G (2SA841-GR or BL)
Q5	Transistor	2SC1775A-E, F (2SC1596P-S)
Q6	Transistor	2SC1775A-E, F (2SC1596P-S)
Q7	Transistor	2SC1885-R, S or Q
Q8	Transistor	2SC1885-R, S or Q
Q9	Transistor	2SA912-R, S or Q
Q10	Transistor	2SA912-R, S or Q
Q11	Transistor	2SC1885-R, S or Q (2SC1451P-V or S)
Q12	Transistor	2SC1885-R, S or Q (2SC1451P-V or S)
D1	Zener diode	WZ240
D2	Zener diode	WZ240
D3	Diode	1S1555 (1S2473)
D4	Diode	1S1555 (1S2473)
D5	Diode	1S1555 (1S2473)
D6	Diode	1S1555 (1S2473)

SWITCHES

Symbol	Description	Part No.
S1	Rotary switch (BASS 100Hz)	ASD-042
S2	Rotary switch (TREBLE 10kHz)	ASD-043
S3	Rotary switch (TREBLE 20kHz)	ASD-044
S4	Rotary switch (BASS 50Hz)	ASD-041
S5	Lever switch (TONE)	ASK-091