

STEREO PRE-AMPLIFIER
SPEC-1
KCU

Service Manual



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1. SPECIFICATIONS

Semi-conductors		Furnished Parts	
Tuner	50	Connection Card with pin plug	1
Diodes	33	Operating Instructions	1 copy
Pre-amplifier		See search label for fastening VOLUME knob	1
Circuitry			
Equalizer amplifier . . . 3 stage direct coupled class A SEPP with 1st stage differential amplifier.		NOTE:	
Control amplifier . . . 3 stage direct coupled class A SEPP with 1st stage differential amplifier.		Specifications and the design subject to possible modification without notice due to improvements.	
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.A.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/600kohms		
Total Harmonic Distortion (20Hz to 20,000Hz)			
		No more than 0.02% (TV output)	
		No more than 0.05% (TV output)	
Frequency Response			
PHONO (RIIA Equalization)	30Hz to 15,000Hz, -10.5dB		
TUNER, AUX, TAPE PLAY	30Hz to 70,000Hz, -1, -6dB		
Tone Control (1.5dB step)			
BASS	MAIN -17.5dB (100Hz)		
	SUB -14.5dB (100Hz)		
TREBLE	MAIN -17.5dB (10,000Hz)		
	SUB -14.5dB (20,000Hz)		
Filter			
LOW	18Hz, 30Hz (12dB/oct.)		
HIGH	15,000Hz, 8,000Hz (12dB/oct.)		
Hum and Noise (HF, short-circuited, A Network)			
PHONO	-75dB		
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		
	18.78 x 7.34 x 14.38 in.		
Weight (Without package)	11.2kg, 24 to 10 or		

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
The **SPEAKERS SWITCH** selects the output (SPEAKER OUTPUT or LINE OUTPUT) to be 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.

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:

LOW FILTER SWITCH
Cuts low frequency noise.

OFF: Set to this position when filter is not required.

30Hz: Attenuates frequencies below 30Hz by 10dB.

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

120Hz: Attenuates frequencies above 120Hz by 12dB/octave.

OFF: Set to this position when not employing filter.

8kHz: Attenuates frequencies above 8kHz by 12dB/octave.

TONE SWITCH

TREBLE TWIN CONTROLS

Two controls for adjusting high frequency tone.

10kHz: Adjusts frequency band above 2.5kHz. +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.

Figure 1 shows a schematic diagram of the experimental setup. A subject is seated at a table, viewing a video screen. A camera is positioned above the screen. A target is placed on the table. A ruler is used to measure the distance from the subject's eye to the target. The distance is labeled as 100 cm. The target is labeled as 10 cm. The ruler is labeled as 100 cm. The subject is labeled as 'Subject'.

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.

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

Position	Attenuation
0dB	None
-1.5dB	1.5dB
-3.0dB	3.0dB

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.

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.

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

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 show component connected to AUX 1 jacks.

AUX 2: jacks.
To play component connected to AUX 2 jacks.

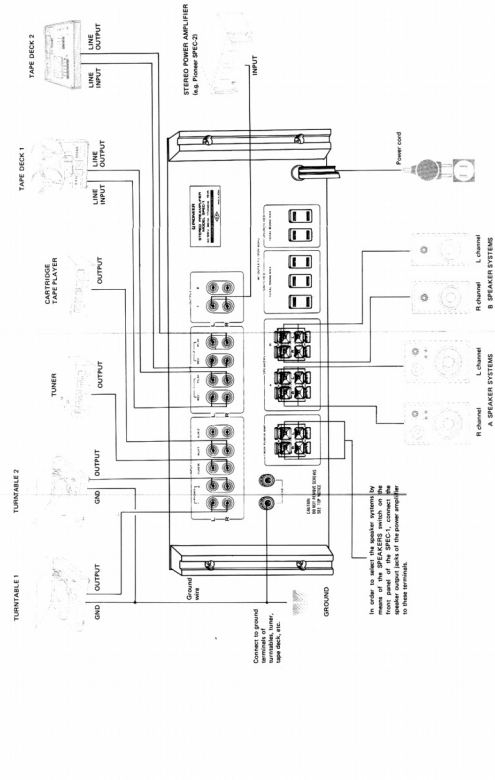
MIC MIXING CONTROL
Pull control outward to ON when using microphone. Turn the control to adjust ratio between another program source and the microphone source.

—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

SOURCE:
2: To monitor or play tape on tape deck connected to TAPE 2 (REC and PLAY) jacks.

3. CONNECTION DIAGRAM



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.

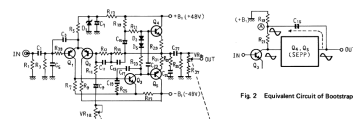


Fig. 2 Equivalent Circuit of Bootstrap

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 jacks 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 was an extremely high +45V push pull arrangement, inclusion of this circuit does not impact 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 SPEC1 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,

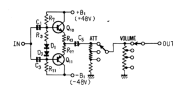


Fig. 3 Circuit Diagram of Input Buffer Amplifier

with a balanced power supply, 3 stage direct coupled amplifier and 1 stage buffer amplifier. The circuit is illustrated in Fig. 4.

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. S1 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, Cs and C7b becomes high at low frequencies, and NFB increases, thereby reducing amplifier gain.

• Treble Boost and Cut

Fig. 8a shows the equivalent circuit during treble boost. The combined impedance of Re, Ce, Rd and C7b becomes low at high frequencies, reducing NFB and increasing amplifier gain.

The equivalent circuit during treble cut is shown in Fig. 8b. Cd and Re impedance becomes low at high frequencies, increasing NFB and reducing amplifier gain.

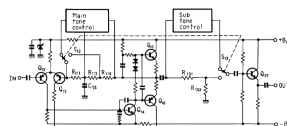


Fig. 4 Circuit Diagram of Tone Amplifier

• **Tone Control Flat and TONE Switch OFF**
The TFC 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 CB 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 CB 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 control flat it is decided by the ratio between R137 and R138. Since the voltage dividing resistors in both these cases have the same values, level and frequency response differences are absent.

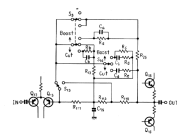


Fig. 5 Circuit Diagram of Main Tone Control

Note: *R22 and *R23 indicate NFB loop during tone control flat.

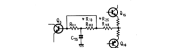


Fig. 6 Equivalent Circuit of Tone Control Flat and TONE Switch OFF

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 cut-off filter can be switched to the three positions of 10Hz, OFF and 100Hz. Change-over of this cut-off frequency is achieved by changing over C1 and C2. The high cut-off 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.

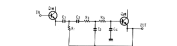


Fig. 7 Circuit Diagram of Filter Circuit

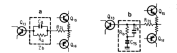


Fig. 8 Equivalent Circuit of Bass Boost and Cut

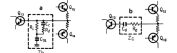


Fig. 9 Equivalent Circuit of Treble Boost and Cut

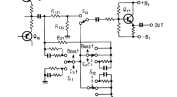


Fig. 10 Circuit Diagram of Sub Tone Control

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.

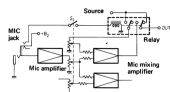


Fig. 11 Block Diagram of MIC Mixing Circuit

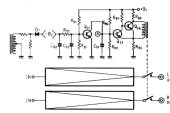


Fig. 12 Circuit Diagram of Muting Circuit

4.7 MUTING CIRCUIT

This opens the output circuit for 6 to 8 seconds after the POWER switch has been set to OFF 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

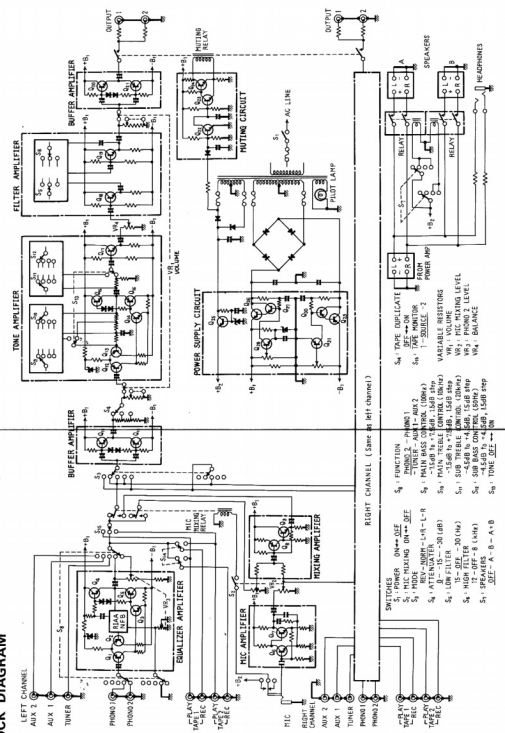
Immediately after the POWER switch is set to ON, delayed operation is provided by R88 and C51 in the Q23 base circuit. The delay time is determined by the time constant of R88 and C51. When the POWER switch is turned ON Q23 is reverse biased by -R2 from D1 and it switches OFF. At this time, +B1 passes 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 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.

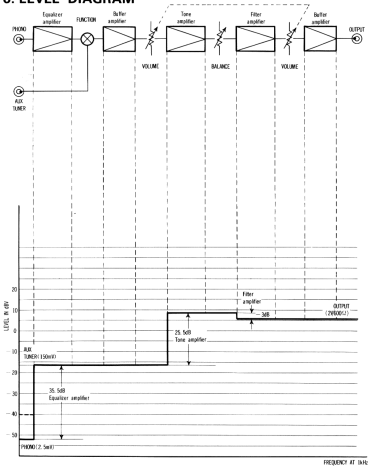
2. POWER Switch OFF Muting

During normal operation +B1 from R30 passes through R92. Since it flows to -B2, Q23 base is at cut-off potential. The small capacity of C53 in the -B2 circuit causes it to be discharged immediately by +B1 passing through R90 & R92. After discharge, +B1 passing through R90 is applied to Q23 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



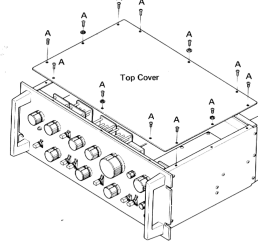
6. LEVEL DIAGRAM



7. DISASSEMBLY

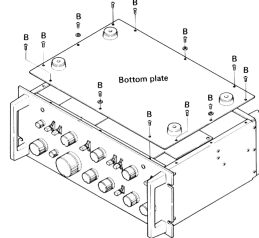
1. Removing the Top Cover

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



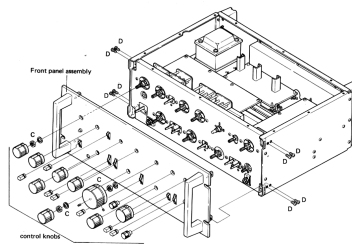
2. Removing the Bottom Plate

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



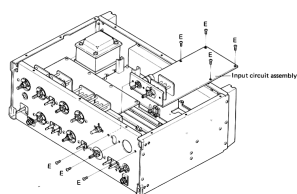
3. Removing the Front Panel Assembly

- (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, TREBLE, VOLUME, and MODE switch shafts nuts and washers (C).
- (2) Remove the 8 screws (D) to detach the front panel assembly.

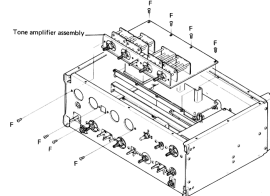




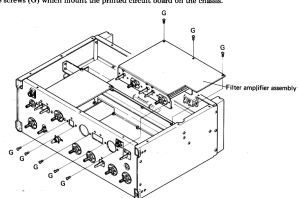
- 4. Removing the Input Circuit Assembly**
 (1) Remove the top cover and front panel.
 (2) Remove the 7 screws (E) which mount the printed circuit board on the chassis.



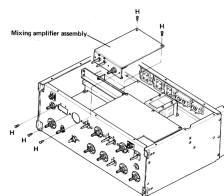
- 5. Removing the Tone Amplifier Assembly**
 (1) Remove the top cover and front panel.
 (2) Remove the 8 screws (F) which mount the printed circuit board on the chassis.



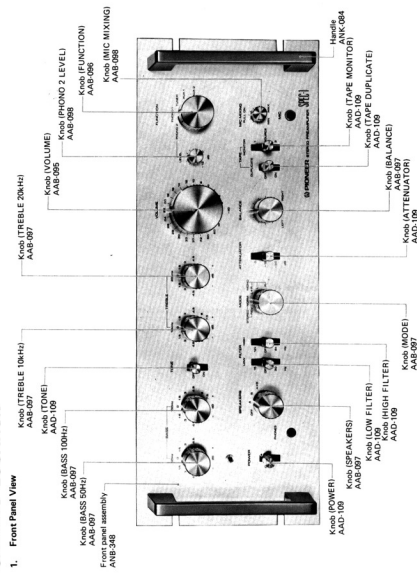
- 6. Removing the Filter Amplifier Assembly**
 (1) Remove the bottom plate and front panel.
 (2) Remove the 8 screws (G) which mount the printed circuit board on the chassis.

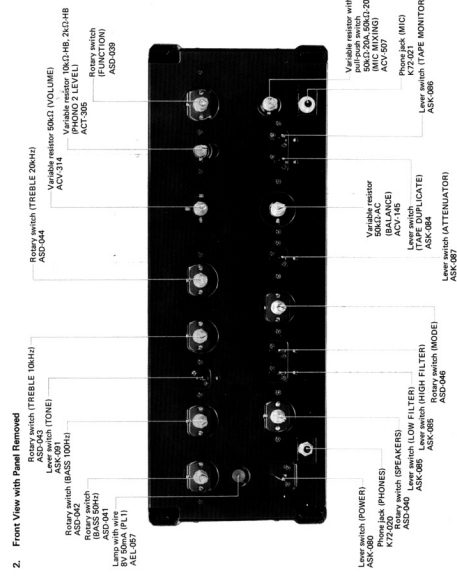


- 7. Removing the Mixing Amplifier Assembly**
 (1) Remove the bottom plate and front panel.
 (2) Remove the 5 screws (H) which mount the printed circuit board on the chassis.

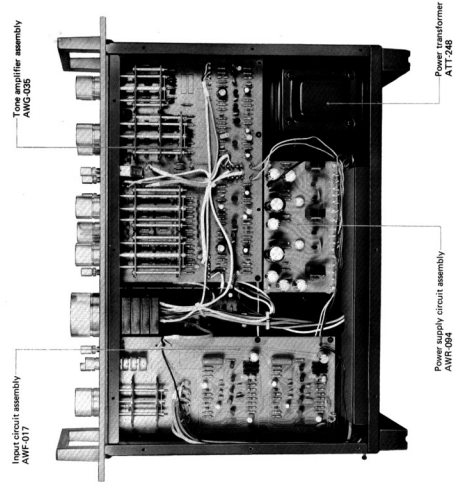


1. Front Panel View

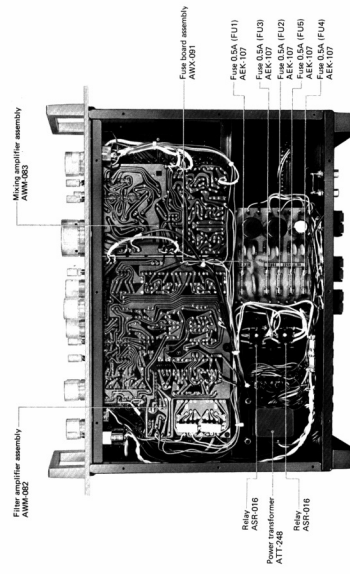




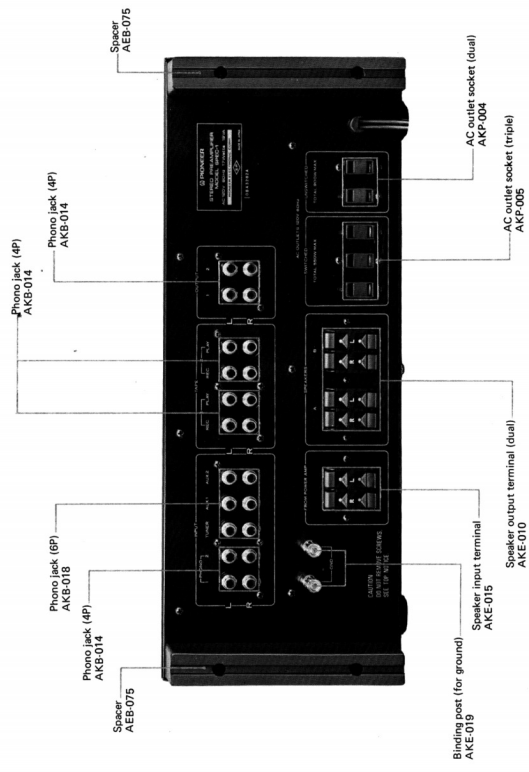
3. Top View



4. Bottom View

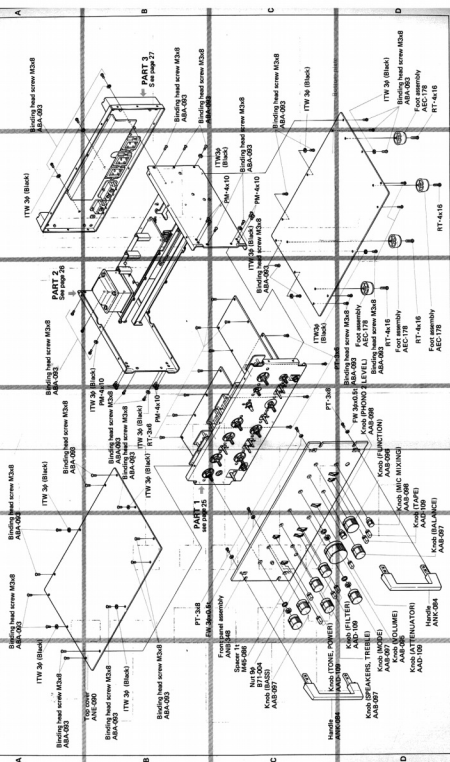


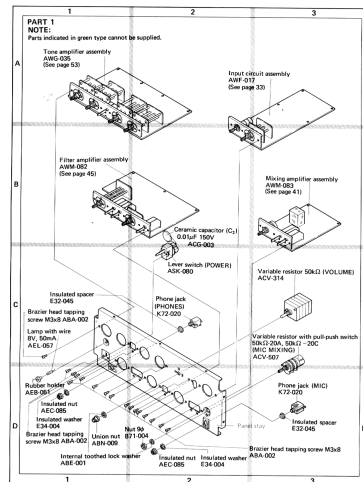
5. Rear View

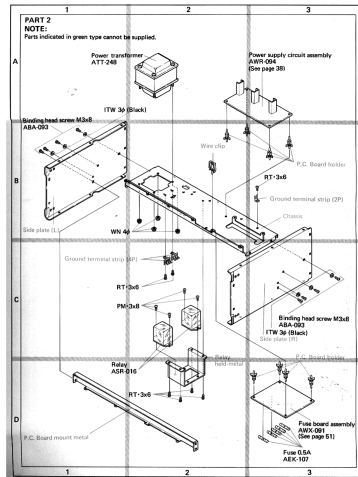


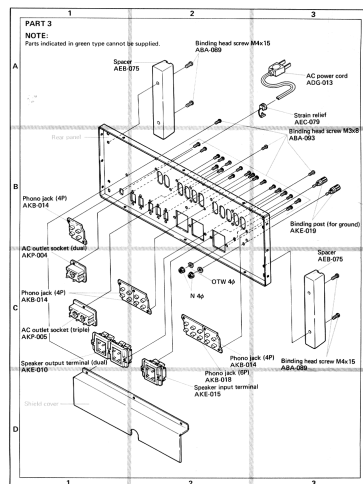
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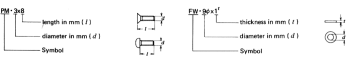


NOMENCLATURE OF SCREWS, WASHERS AND NUTS

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

Symbol	Description	Shape	Symbol	Description	Shape
RT	Braker head tapping screw		EW	E type washer	
FT	Flat head tapping screw		FW	Flat washer	
BT	Blind head tapping screw		SW	Spring lock washer	
CT	Countersunk head tapping screw		N	Nut	
TT	Truss head tapping screw		WN	Washer faced nut	
OCT	Oral countersunk head tapping screw		ITW	Internal toothed lock washer	
FW	Flat head machine screw		OTW	External toothed lock washer	
CM	Countersunk head machine screw		SC	Stromed set screw (Cone point)	
OCM	Oral countersunk head machine screw		SP	Stromed set screw (Flat point)	
TM	Truss head machine screw		HS	Hexagon socket headless set screw	
BM	Blind head machine screw		OCW	Oral countersunk head wood screw	
PSA	Pin head screw with spring lock washer		CW	Countersunk head wood screw	
PSS	Pin head screw with spring lock washer and flat washer		RR	Round head wood screw	
PSF	Pin head screw with flat washer				

EXAMPLE



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

10.1 SCHEMATIC DIAGRAM AND MISCELLANEOUS PARTS

Miscellaneous Parts List

CAPACITORS

Symbol	Description	Part No.
C1	Ceramic 0.001 50V	CD17P-4122-50
C2	Ceramic 0.01 100V	AC0508
C3	Ceramic 0.001 50V	CD17P-4122-50
C4	Electrolytic 1,000 25V	CEA-102P-25

RESISTORS AND POTENTIOMETERS

Symbol	Description	Part No.
R1	Wire wound 150 5W	RT08-151C
R2	Wire wound 150 5W	RT08-151C
VR1	Variable resistor 50K (VOLUME)	ACV-314
VR2	Variable resistor with potentiometer switch 50K-20A, 50K-20C (MIC MIXING)	ACV-927

SEMICONDUCTORS

Symbol	Description	Part No.
D1	Diode	2SB01-04
D2	Diode	2SB01-04

FUSES AND LAMP

Symbol	Description	Part No.
F1,1	Fuse 0.5A	ABG-107
F1,2	Fuse 0.5A	ABG-107
F1,3	Fuse 0.5A	ABG-107
F1,4	Fuse 0.5A	ABG-107
F1,5	Fuse 0.5A	ABG-107
F1,6	Fuse 0.5A	ABG-107
PL1	Lamp with wire BV 50mA	AEL-057

OTHERS

Symbol	Description	Part No.
T1	Power transformer	ATT-240
S1	Power switch (POWER)	AGR-009
S17	Relay	AGR-016
S18	Relay	AGR-016

NOTE:
• Capacitors in μF unless otherwise noted p.p.F.
• Resistors in Ω , $k\Omega$ unless otherwise noted k , M , $M\Omega$.

2SA726

2SC1313

2SC869

2SA628A

2SC1775A

2SC945

2SC1885

2SA912

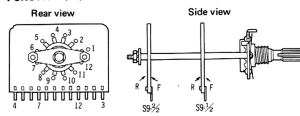
2SC1166

2SD313P

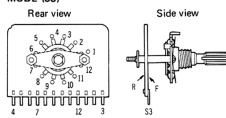
2SB507



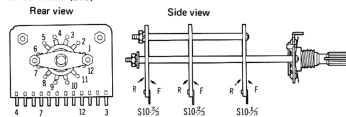
FUNCTION (S9)



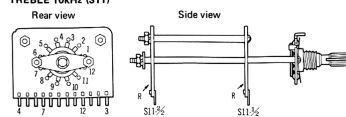
MODE (S3)



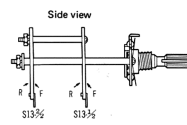
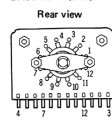
BASS 100Hz (S10)



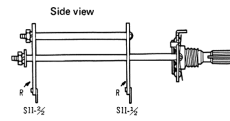
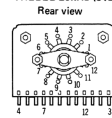
TREBLE 10kHz (S11)



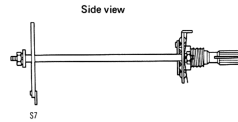
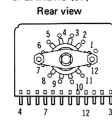
BASS 50Hz (S13)



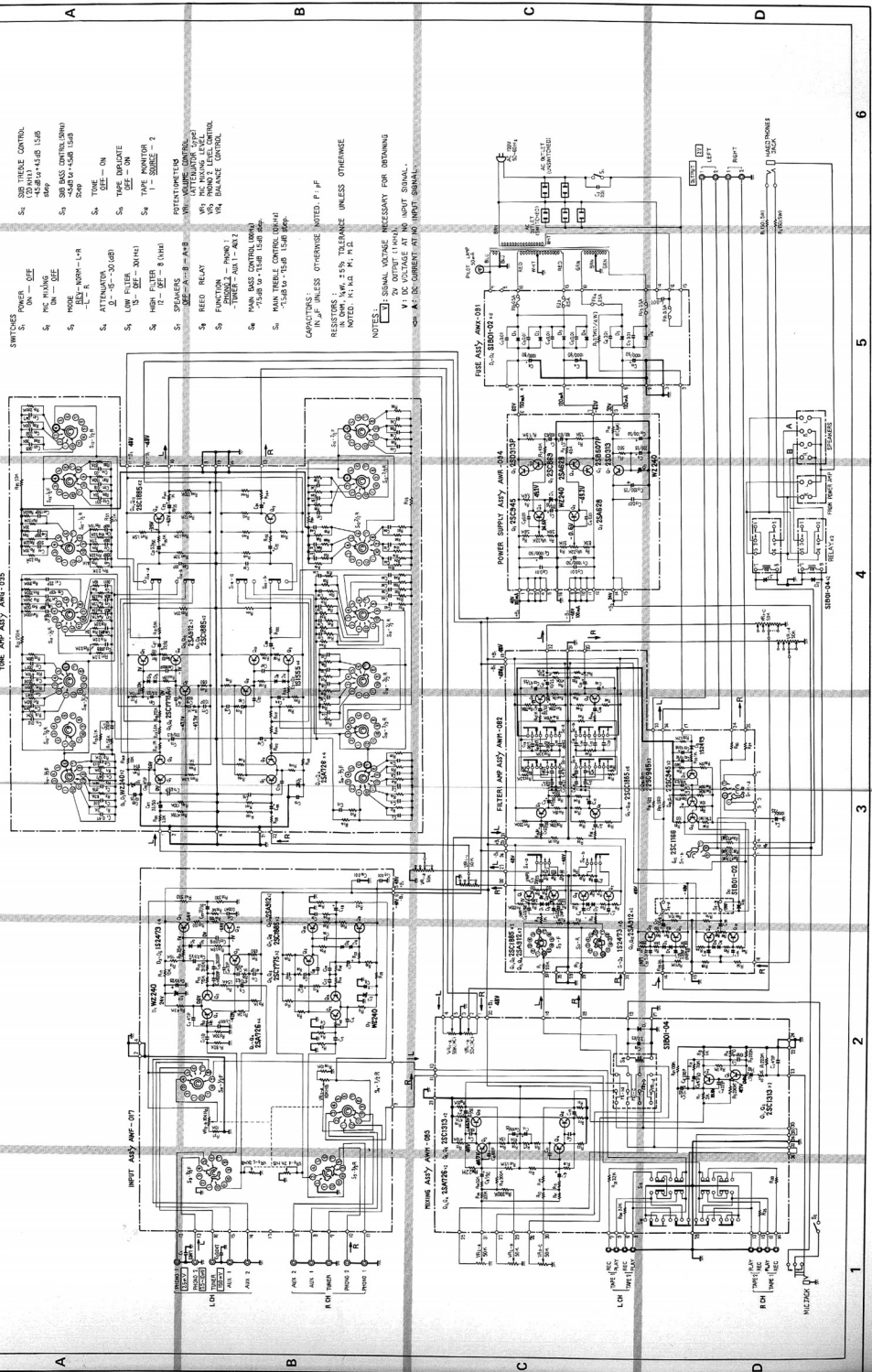
TREBLE 20kHz (S12)

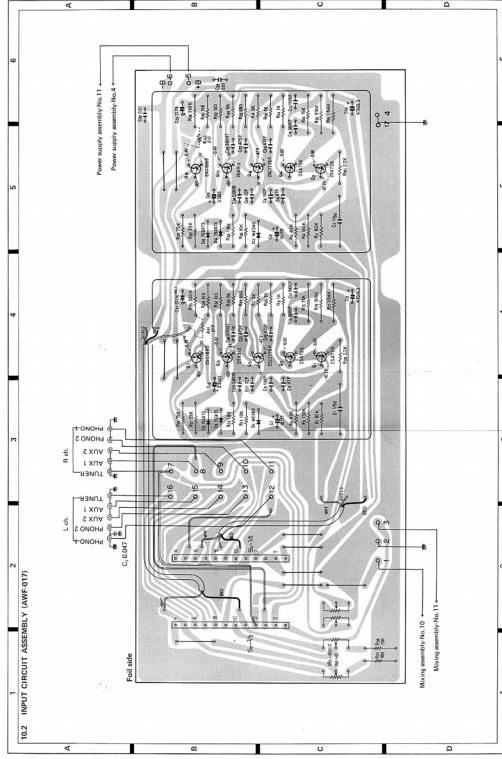


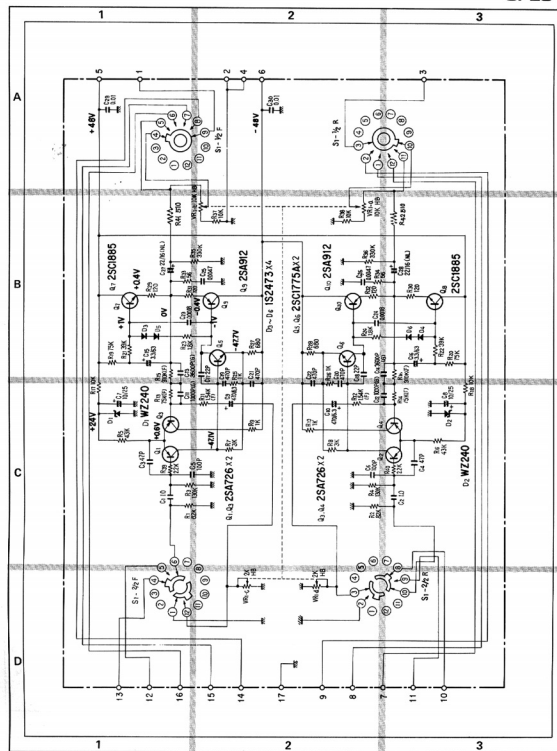
SPEAKERS (S7)



Schematic Diagram







Parts List of Input Circuit Assembly (AWF-017)

CAPACITORS					
Symbol	Description	Part No.	Symbol	Description	Part No.
C1	Polyester 1 50V	CGEA 100K 50	R16	Neat film 910k 1W	RM10SR 910SP
C2	Polyester 1 50V	CGEA 100K 50	R17	Carbon film 10k	RDUPS 102J
C3	Ceramic 47k 50V	CCGL 47K 50	R18	Carbon film 10k	RDUPS 102J
C4	Ceramic 47k 50V	CCGL 47K 50	R19	Carbon film 75k	RDUPS 752J
C5	Ceramic 100p 50V	CCGL 101K 50	R20	Carbon film 75k	RDUPS 752J
C6	Ceramic 100p 50V	CCGL 101K 50	R21	Carbon film 39k	RDUPS 392J
C7	Electrolytic 10 25V	CEA 10P 25	R22	Carbon film 39k	RDUPS 392J
C8	Electrolytic 10 25V	CEA 10P 25	R23	Carbon film 1.8k	RDUPS 182J
C9	Electrolytic 470 6.3V	CEA 471P 63J	R24	Carbon film 1.8k	RDUPS 182J
C10	Electrolytic 470 6.3V	CEA 471P 63J	R25	Carbon film 1k	RDUPS 102J
C11	Stanyl 0.001 50V	CGSA 102G 50	R26	Carbon film 1k	RDUPS 102J
C12	Stanyl 0.001 50V	CGSA 102G 50	R27	Carbon film 680	RDUPS 681J
C13	Stanyl 0.0005 50V	CGSA 302G 50	R28	Carbon film 680	RDUPS 681J
C14	Stanyl 0.0005 50V	CGSA 302G 50	R29	Carbon film 120	RDUPS 121J
C15	Electrolytic 3.3 63V	CEA 303P 63	R30	Carbon film 120	RDUPS 121J
C16	Electrolytic 3.3 63V	CEA 303P 63	R31	Carbon film 120	RDUPS 121J
C17	Ceramic 22p 50V	CCGL 22P 50	R32	Carbon film 120	RDUPS 121J
C18	Ceramic 22p 50V	CCGL 22P 50	R33	Carbon film 56	RDUPS 560J
C19	Ceramic 470p 50V	CKDV8 471K 50	R34	Carbon film 56	RDUPS 560J
C20	Ceramic 470p 50V	CKDV8 471K 50	R35	Carbon film 330k	RDUPS 330J
C21	Ceramic 470p 50V	CKDV8 471K 50	R36	Carbon film 330k	RDUPS 330J
C22	Ceramic 470p 50V	CKDV8 471K 50	R37	Carbon film 10k	RDUPS 102J
C23	Water 0.0018 50V	CGMA 182K 50	R38	Carbon film 10k	RDUPS 102J
C24	Water 0.0018 50V	CGMA 182K 50	R39	Carbon film 2.2k	RDUPS 220J
C25	Water 0.0047 50V	CGMA 472K 50	R40	Carbon film 2.2k	RDUPS 220J
C26	Water 0.0047 50V	CGMA 472K 50	R41	Carbon film 510	RDUPS 511J
C27	Electrolytic 22 16V	CEANL 22P 16	R42	Carbon film 510	RDUPS 511J
C28	Electrolytic 22 16V	CEANL 22P 16	VR1	Variable resistor 10k-5, 2k-8 (PHONO 2 LEVEL)	ACT-305
C29	Ceramic 0.01 50V	CKDV8 101K 50			
C30	Ceramic 0.01 50V	CKDV8 101K 50			

RESISTORS AND POTENTIOMETERS

Symbol	Description	Part No.
R1	Carbon film 82k	RDUPS 82J
R2	Carbon film 82k	RDUPS 82J
R3	Carbon film 150k	RDUPS 150J
R4	Carbon film 150k	RDUPS 150J
R5	Carbon film 42k	RDUPS 42J
R6	Carbon film 42k	RDUPS 42J
R7	Carbon film 3k	RDUPS 302J
R8	Carbon film 3k	RDUPS 302J
R9	Carbon film 1k	RDUPS 102J
R10	Carbon film 1k	RDUPS 102J
R11	Meat film 1.5k 1W	RM10SR 1501F
R12	Meat film 1.5k 1W	RM10SR 1501F
R13	Meat film 75k 1W	RM10SR 7502F
R14	Meat film 75k 1W	RM10SR 7502F
R15	Meat film 910k 1W	RM10SR 9102F

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SA726-F or G
Q2	Transistor	2SA491-G or B1
Q3	Transistor	2SA726-F or G
Q4	Transistor	2SA726-F or G
Q5	Transistor	2BC1756-A or F
Q6	Transistor	2BC1756-A or F
Q7	Transistor	2BC1756-A or F
Q8	Transistor	2BC1885-B, E or G
Q9	Transistor	2SA491-G or B1
Q10	Transistor	2SA491-G or B1
D1	Diode	WZ240
D2	Diode	WZ240

Part No.	Description	Part No.
03	Counts	100000
04	Counts	100000
05	Counts	100000
06	Counts	100000

Part No.	Description	Part No.
07	Counts	100000
08	Counts	100000

Part No.	Description	Part No.
09	Counts	100000
10	Counts	100000

Part No.	Description	Part No.
11	Counts	100000
12	Counts	100000

Part No.	Description	Part No.
13	Counts	100000
14	Counts	100000

Part No.	Description	Part No.
15	Counts	100000
16	Counts	100000

Part No.	Description	Part No.
17	Counts	100000
18	Counts	100000

Part No.	Description	Part No.
19	Counts	100000
20	Counts	100000

Part No.	Description	Part No.
21	Counts	100000
22	Counts	100000

Part No.	Description	Part No.
23	Counts	100000
24	Counts	100000

Part No.	Description	Part No.
25	Counts	100000
26	Counts	100000

Part No.	Description	Part No.
27	Counts	100000
28	Counts	100000

Part No.	Description	Part No.
29	Counts	100000
30	Counts	100000

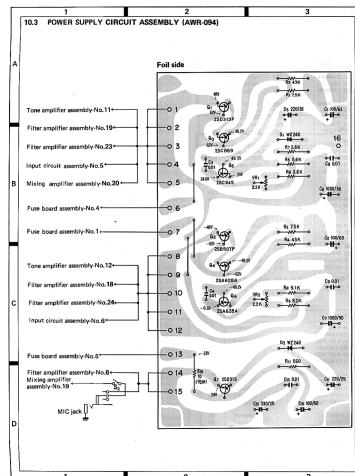
Part No.	Description	Part No.
31	Counts	100000
32	Counts	100000

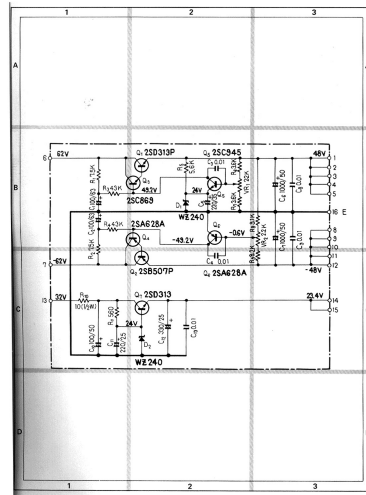
Part No.	Description	Part No.
33	Counts	100000
34	Counts	100000

Part No.	Description	Part No.
35	Counts	100000
36	Counts	100000

Part No.	Description	Part No.
37	Counts	100000
38	Counts	100000

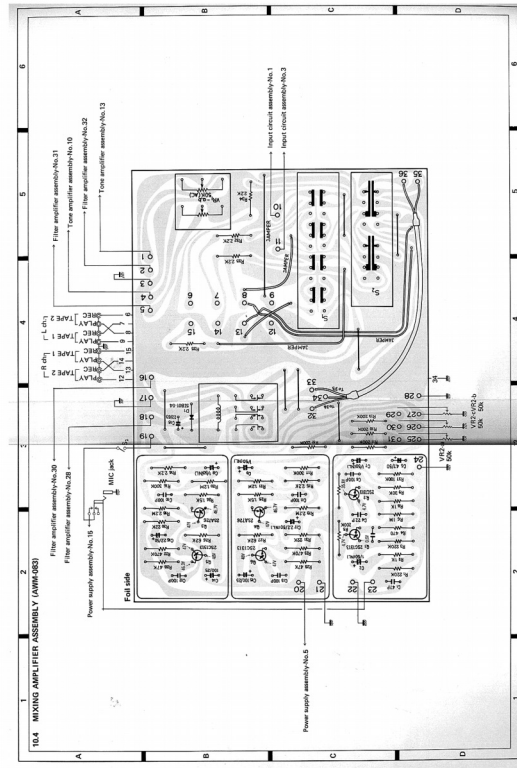
Part No.	Description	Part No.
39	Counts	100000
40	Counts	100000

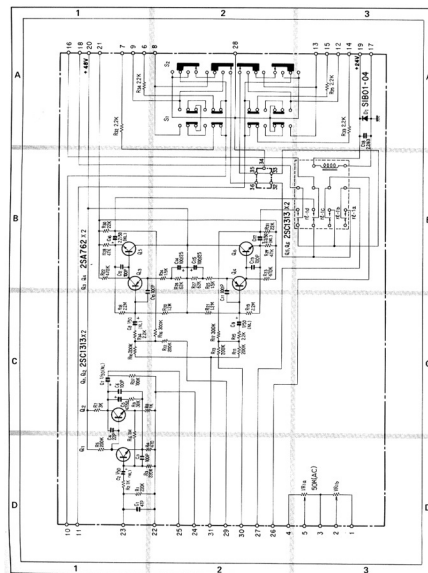




Parts List of Power Supply Circuit Assembly (AWR-094)

CAPACITORS					
Symbol	Description	Part No.	Symbol	Description	Part No.
C1	Electrolytic 100 63V	CEA 101P 63	Z1	Zener diode	WE240
C2	Electrolytic 100 63V	CEA 101P 63		Zener diode	WE240
C3	Ceramic 0.01 50V	CKD1Y 1032 50			
C4	Ceramic 0.01 50V	CKD1Y 1032 50			
C5	Electrolytic 220 35V	CEA 221P 35			
C6	Electrolytic 1000 60V	CEA 102P 60			
C7	Electrolytic 1000 60V	CEA 102P 60			
C8	Ceramic 0.01 60V	CKD1Y 1032 50			
C9	Ceramic 0.01 60V	CKD1Y 1032 50			
C10	Electrolytic 100 50V	CEA 101P 50			
C11	Electrolytic 220 25V	CEA 221P 25			
C12	Electrolytic 220 25V	CEA 221P 25			
C13	Ceramic 0.01 60V	CKD1Y 1032 50			
RESISTORS AND POTENTIOMETERS					
Symbol	Description	Part No.			
R1	Carbon Film 1.5k	RD4P5 752J			
R2	Carbon Film 7.5k	RD4P5 752J			
R3	Carbon Film 43k	RD4P5 432J			
R4	Carbon Film 43k	RD4P5 432J			
R5	Carbon Film 5.6k	RD4P5 562J			
R6	Carbon Film 3.9k	RD4P5 392J			
R7	Carbon Film 3.9k	RD4P5 392J			
R8	Carbon Film 9.1k	RD4P5 912J			
R9	Carbon Film 9.2k	RD4P5 922J			
R10	Carbon Film 10 3W	RD4P5P 105J			
R11	Carbon Film 550	RD4P5P 551J			
VR1	Slide Resistor 2.2k-5	ACR-055			
VR2	Slide Resistor 2.2k-5	ACR-055			
SEMICONDUCTORS					
Symbol	Description	Part No.			
Q1	Transistor 2N3033P-D or E	2N3033P-D or E			
Q2	Transistor 2N3033P-D, or E	2N3033P-D, or E			
Q3	Transistor 2N3033P-D, or E	2N3033P-D, or E			
Q4	Transistor 2N3033P-D, or E	2N3033P-D, or E			
Q5	Transistor 2N3033P-D, or E	2N3033P-D, or E			
Q6	Transistor 2N3033P-D, or E	2N3033P-D, or E			
Q7	Transistor 2N3033-D	2N3033-D			





Parts List of Mixing Amplifier Assembly (AWM-083)

CAPACITORS

Symbol	Description	Part No.
C1	Ceramic 47p 50V	CC01L 470K 50
C2	Electrolytic 1uF 50V	CEANL 010P 50
C3	Ceramic 100p 50V	CC01L 101K 50
C4	Ceramic 25p 50V	CC01L 250K 50
C5	Electrolytic 4.7 50V	CEA 400P 50
C6	Ceramic 100p 50V	CC01L 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	CC01L 101K 50
C11	Ceramic 100p 50V	CC01L 101K 50
C12	Ceramic 100p 50V	CC01L 101K 50
C13	Ceramic 100p 50V	CC01L 101K 50
C14	Electrolytic 100 25V	CEA 100P 25
C15	Electrolytic 100 25V	CEA 100P 25
C16	Electrolytic 2.2 50V	CEANL 2K0P 50
C17	Electrolytic 2.2 50V	CEANL 2K0P 50
C18	Electrolytic 2.2 50V	CEA 2K0P 50

RESISTORS AND POTENTIOMETERS

Symbol	Description	Part No.
R1	Carbon film 250K	RDUPS 250K
R2	Carbon film 1K	RDUPS 100K
R3	Carbon film 220K	RDUPS 220K
R4	Carbon film 47K	RDUPS 47K
R5	Carbon film 200K	RDUPS 200K
R6	Carbon film 1M	RDUPS 100K
R7	Carbon film 1K	RDUPS 100K
R8	Carbon film 1K	RDUPS 100K
R9	Carbon film 30K	RDUPS 300K
R10	Carbon film 250K	RDUPS 200K
R11	Carbon film 200K	RDUPS 200K
R12	Carbon film 300K	RDUPS 300K
R13	Carbon film 20K	RDUPS 20K
R14	Carbon film 2.2K	RDUPS 220K
R15	Carbon film 2.2K	RDUPS 220K
R16	Carbon film 300K	RDUPS 300K
R17	Carbon film 300K	RDUPS 300K
R18	Carbon film 2.2M	RDUPS 220K
R19	Carbon film 2.2M	RDUPS 220K
R20	Carbon film 1.5M	RDUPS 150K
R21	Carbon film 1.2M	RDUPS 120K
R22	Carbon film 470K	RDUPS 470K
R23	Carbon film 470K	RDUPS 470K
R24	Carbon film 1.5K	RDUPS 150K
R25	Carbon film 1.5K	RDUPS 150K

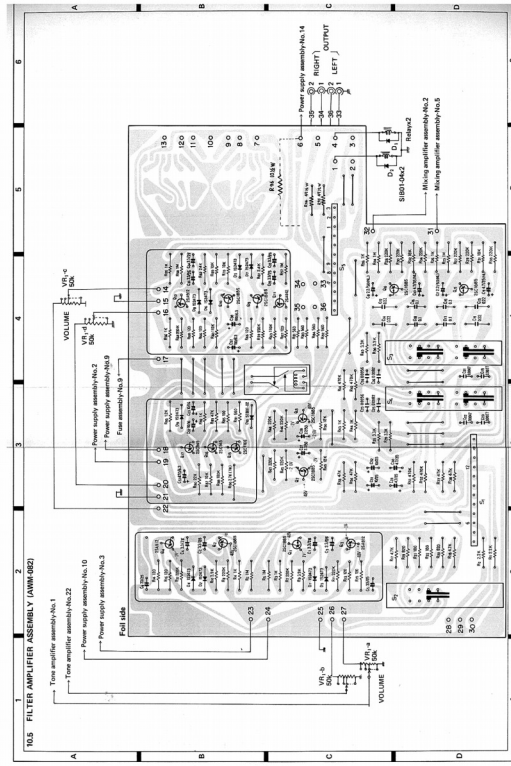
Symbol	Description	Part No.
R26	Carbon film 62K	RDUPS 62K
R27	Carbon film 62K	RDUPS 62K
R28	Carbon film 47K	RDUPS 47K
R29	Carbon film 47K	RDUPS 47K
R30	Carbon film 20K	RDUPS 200K
R31	Carbon film 22K	RDUPS 220K
R32	Carbon film 2.2K	RDUPS 220K
R33	Carbon film 2.2K	RDUPS 220K
R34	Carbon film 2.2K	RDUPS 220K
R35	Carbon film 2.2K	RDUPS 220K
R36	Carbon film 100K	RDUPS 100K
R37	Carbon film 100K	RDUPS 100K
VR1	Variable resistor 50K-A, C (BALANCE)	ACV-140

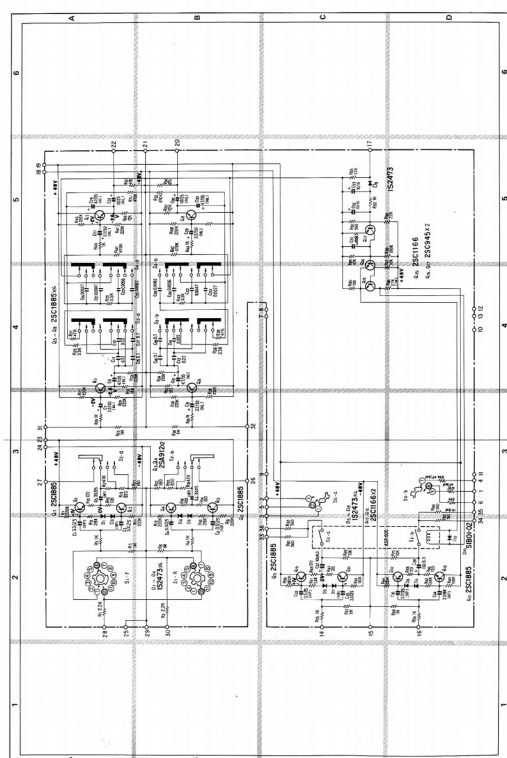
SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor 2N3132-G or H	2N3132-G or H
Q2	Transistor 2N3132-G or H	2N3132-G or H
Q3	Transistor 2SA750-F or G	2SA750-F or G
Q4	Transistor 2SA750-F or G	2SA750-F or G
Q5	Transistor 2N3132-G or H	2N3132-G or H
Q6	Transistor 2N3132-G or H	2N3132-G or H
D1	Diode 50B-01-04	50B-01-04

OTHERS

Symbol	Description	Part No.
S1	Lever switch 17A-FE DUPLICATOR	ASX-086
S2	Lever switch 17A-FE MONITOR	ASX-086
F1	Fuse	ABR-012





Parts List of Filter Amplifier Assembly (AWM-082)

CAPACITORS

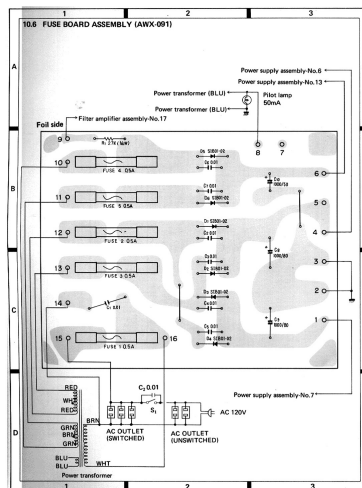
Symbol	Description	Part No.
C1	Electrolytic 3.3 25V ACH-302	
C2	Electrolytic 3.3 25V ACH-302	
C3	Electrolytic 3.3 25V ACH-302	
C4	Electrolytic 3.3 25V ACH-302	
C5	Electrolytic 33 25V OEA 330M 204P	
C6	Electrolytic 33 25V OEA 330M 204P	
C7	Electrolytic 2.2 50V CEANL 2K2P 56	
C8	Electrolytic 2.2 50V CEANL 2K2P 56	
C9	Electrolytic 4.7 35V CEANL 4K7P 35	
C10	Electrolytic 4.7 35V CEANL 4K7P 35	
C11	Mylar 0.22 50V COMA 22M 50	
C12	Mylar 0.22 50V COMA 22M 50	
C13	Mylar 0.22 50V COMA 22M 50	
C14	Mylar 0.22 50V COMA 22M 50	
C15	Mylar 0.1 50V COMA 10M 50	
C16	Mylar 0.1 50V COMA 10M 50	
C17	Mylar 0.1 50V COMA 10M 50	
C18	Mylar 0.1 50V COMA 10M 50	
C19	Mylar 0.0027 50V COMA 27J 50	
C20	Mylar 0.0027 50V COMA 27J 50	
C21	Mylar 0.0047 50V COMA 47J 50	
C22	Mylar 0.0047 50V COMA 47J 50	
C23	Mylar 0.0056 50V COMA 56J 50	
C24	Mylar 0.0056 50V COMA 56J 50	
C25	Mylar 0.0082 50V COMA 82J 50	
C26	Mylar 0.0082 50V COMA 82J 50	
C27	Electrolytic 2.2 50V CEANL 2K2P 50	
C28	Electrolytic 2.2 50V CEANL 2K2P 50	
C29	Electrolytic 4.7 25V CEANL 4K7P 25	
C30	Electrolytic 4.7 25V CEANL 4K7P 25	
C31	Electrolytic 10 25V CEANL 10P 25	
C32	Electrolytic 10 25V CEANL 10P 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 8.3V CEA 101P 8K3	
C38	Electrolytic 100 8.3V CEA 101P 8K3	
C39	.....	
C40	.....	
C41	.....	
C42	.....	
C43	.....	
C44	.....	
C45	.....	
C46	.....	
C47	.....	
C48	.....	

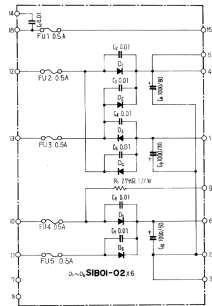
Symbol	Description	Part No.
C49	.....	.....
C50	.....	.....
C51	Electrolytic 470 6.3V CEA 471P 6K3	
C52	Electrolytic 10 16V CEA 100P 16	
C53	Electrolytic 10 16V CEA 100P 16	

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 3.3K RDUPS 33J	
R2	Carbon film 3.3K RDUPS 33J	
R3	Carbon film 1K RDUPS 10J	
R4	Carbon film 1K RDUPS 10J	
R5	Carbon film 1M RDUPS 10J	
R6	Carbon film 1M RDUPS 10J	
R7	Carbon film 20K RDUPS 20J	
R8	Carbon film 20K RDUPS 20J	
R9	Carbon film 3.3K RDUPS 33J	
R10	Carbon film 3.3K RDUPS 33J	
R11	Carbon film 20K RDUPS 20J	
R12	Carbon film 20K RDUPS 20J	
R13	Carbon film 120 RDUPS 12J	
R14	Carbon film 120 RDUPS 12J	
R15	Carbon film 120 RDUPS 12J	
R16	Carbon film 120 RDUPS 12J	
R17	Carbon film 4.7K RDUPS 47J	
R18	Carbon film 4.7K RDUPS 47J	
R19	Carbon film 820 RDUPS 82J	
R20	Carbon film 820 RDUPS 82J	
R21	Carbon film 180 RDUPS 18J	
R22	Carbon film 180 RDUPS 18J	
R23	Carbon film 1M RDUPS 10J	
R24	Carbon film 1M RDUPS 10J	
R25	Carbon film 1K RDUPS 10J	
R26	Carbon film 1K RDUPS 10J	
R27	Carbon film 20K RDUPS 20J	
R28	Carbon film 20K RDUPS 20J	
R29	Carbon film 20K RDUPS 20J	
R30	Carbon film 20K RDUPS 20J	
R31	Carbon film 18K RDUPS 18J	
R32	Carbon film 18K RDUPS 18J	
R33	Carbon film 20K RDUPS 20J	
R34	Carbon film 20K RDUPS 20J	
R35	Carbon film 3.3K RDUPS 33J	
R36	Carbon film 3.3K RDUPS 33J	
R37	Carbon film 4.7K RDUPS 47J	
R38	Carbon film 4.7K RDUPS 47J	
R39	Carbon film 3.3K RDUPS 33J	
R40	Carbon film 3.3K RDUPS 33J	
R41	Carbon film 470K RDUPS 47J	
R42	Carbon film 470K RDUPS 47J	
R43	Carbon film 1K RDUPS 10J	

Symbol	Description	Part No.	SEMICONDUCTORS		
Symbol	Description	Part No.	Symbol	Description	Part No.
R44 Carbon film 1k	RD/PS 102J		G1 Transistor	28C188A-R, S or G	
R45 Carbon film 220k	RD/PS 224J		G2 Transistor	28C188A-R, S or G	
R46 Carbon film 220k	RD/PS 224J		G3 Transistor	28A912-P, S or G	
R47 Carbon film 220k	RD/PS 224J		G4 Transistor	28A912-R, S or G	
R48 Carbon film 220k	RD/PS 224J		G5 Transistor	28C188A-R, S or G	
R49 Carbon film 12k	RD/PS 123J				
R50 Carbon film 12k	RD/PS 123J				
R51 Carbon film 470k	RD/PS 474J		G6 Transistor	28C188A-R, S or G	
R52 Carbon film 470k	RD/PS 474J		G7 Transistor	28C188A-P, V or S	
R53 Carbon film 47k	RD/PS 473J		G8 Transistor	28C188A-R, S or G	
R54 Carbon film 47k	RD/PS 473J				
R55 Carbon film 1k	RD/PS 102J				
R56 Carbon film 1k	RD/PS 102J		G9 Transistor	28C188A-R, S or G	
R57 Carbon film 1M	RD/PS 105J		G10 Transistor	28C188A-R, S or G	
R58 Carbon film 1M	RD/PS 105J		G11 Transistor	28A912-P, S or G	
R59 Carbon film 220k	RD/PS 224J		G12		
R60 Carbon film 220k	RD/PS 224J		G13		
R61 Carbon film 2.2k	RD/PS 222J		G14		
R62 Carbon film 2.2k	RD/PS 222J		G15 Transistor	28C188A-Q or Y	
R63 Carbon film 110k	RD/PS 114J		G16 Transistor	28C188A-R, S or G	
R64 Carbon film 110k	RD/PS 114J				
R65 Carbon film 10k	RD/PS 121J				
R66 Carbon film 120	RD/PS 121J		G17 Transistor	28C96-Q or R	
R67 Carbon film 120	RD/PS 121J				
R68 Carbon film 120	RD/PS 121J				
R69 Carbon film 12k	RD/PS 102J		D1 Diode	15K475	
R70 Carbon film 10k	RD/PS 102J		D2 Diode	15K500	
R71			D3 Diode	15K500	
R72			D4 Diode	15K500	
R73			D5 Diode	15K500	
R74			D6 Diode	15K500	
R75			D7 Diode	15K500	
R76			D8 Diode	15K475	
R77			D9 Diode	15K500	
R78			D10 Diode	6890-Q2	
R79					
R80					
R81 Carbon film 560	RD/PS 561J				
R82 Carbon film 560	RD/PS 561J				
R83 Carbon film 560	RD/PS 561J				
R84 Carbon film 560	RD/PS 561J				
R85 Carbon film 100	RD/PS 101J				
R86 Metal oxide 2.7k 1W	RD/PS 272K				
R87 Carbon film 10k	RD/PS 101J				
R88 Carbon film 180k	RD/PS 184J				
R89 Carbon film 47k	RD/PS 473J				
R90 Carbon film 22k	RD/PS 223J				
R91 Carbon film 560	RD/PS 561J				
R92 Carbon film 1k	RD/PS 102J				
R93 Carbon film 1.2k	RD/PS 122J				
R94 Carbon film 47 1W	RD/PS 470J				
R95 Carbon film 47 1W	RD/PS 470J				
R96 Carbon film 10 1W	RD/PS 100J				





Parts List of Fuse Board Assembly (AWX-091)

CAPACITORS

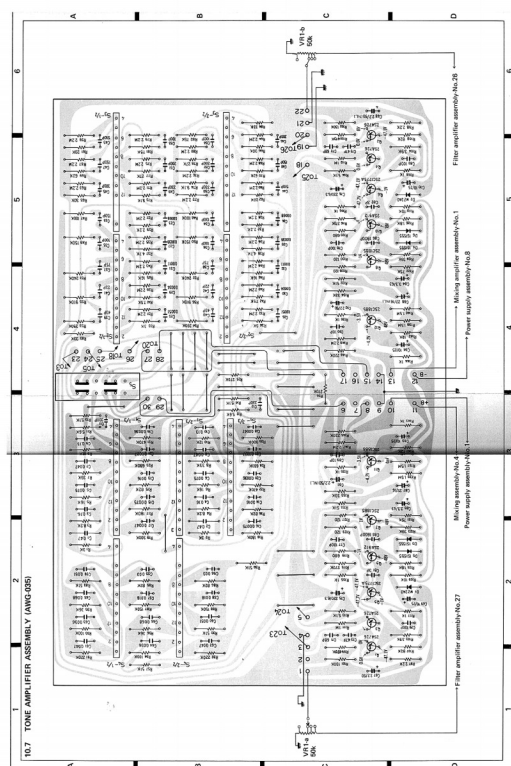
Symbol	Description	Part No.
C1	Ceramic 0.01 100V ACS-003	
C2	Ceramic 0.01 100V ACS-004	
C3	Ceramic 0.01 100V ACS-004	
C4	Ceramic 0.01 100V ACS-004	
C5	Ceramic 0.01 100V ACS-004	
C6	Ceramic 0.01 100V ACS-004	
C7	Ceramic 0.01 100V ACS-004	
C8	Electrolytic 1,000 80V ACI-003	
C9	Electrolytic 1,000 80V ACI-003	
C10	Electrolytic 1,000 80V CEA-100P 60	

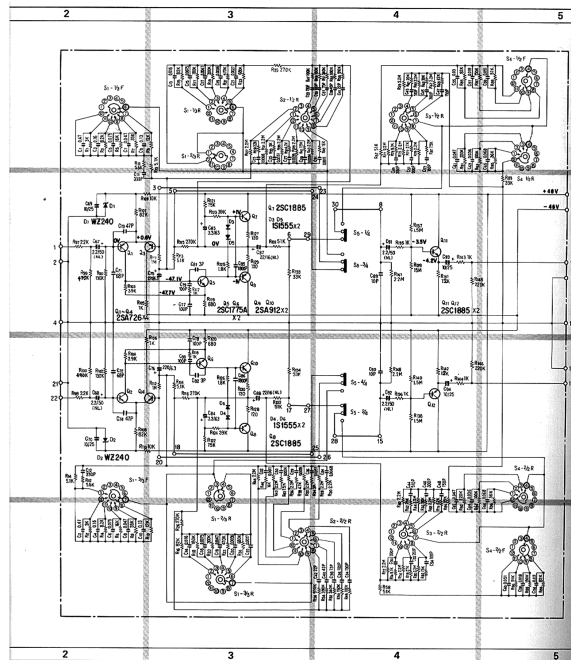
RESISTOR

Symbol	Description	Part No.
R1	Carbon film 0.1% R03MPS 2733	

SEMICONDUCTORS

Symbol	Description	Part No.
D1	Diode	S9801-02
D2	Diode	11010000
D3	Diode	11010000
D4	Diode	11010000
D5	Diode	11010000
D6	Diode	11010000





Perts List of Tone Amplifier Assembly (AWG-035)

CAPACITORS					
Symbol	Description	Part No.	Symbol	Description	Part No.
C1	Mylar 0.1 50V	CGMA 4146 50	C46	Styrol 100u 50V	CGSA 101 J 50
C2	Mylar 0.47 50V	CGMA 4146 50	C49	Styrol 330u 50V	CGSA 101 J 50
C3	Mylar 0.15 50V	CGMA 1641 50	C50	Styrol 270u 50V	CGSA 101 J 50
C4	Mylar 0.15 50V	CGMA 1641 50			
C5	Mylar 0.0175 50V	CGMA 1531 50	C51	Styrol 200u 50V	CGSA 101 J 50
C6	Mylar 0.075 50V	CGMA 1031 50	C52	Styrol 200u 50V	CGSA 101 J 50
C7	Mylar 0.047 50V	CGMA 4731 50	C53	Styrol 100u 50V	CGSA 101 J 50
C8	Mylar 0.047 50V	CGMA 4731 50	C54	Styrol 100u 50V	CGSA 101 J 50
C9	Mylar 0.13 50V	CGMA 1341 50	C55	Mylar 0.03 50V	CGMA 3031 50
C10	Mylar 0.13 50V	CGMA 1341 50			
C11	Styrol 330u 50V	CGSA 101 J 50	C56	Mylar 0.03 50V	CGMA 3031 50
C12	Styrol 330u 50V	CGSA 101 J 50	C57	Mylar 0.015 50V	CGMA 1031 50
C13	Mylar 0.015 50V	CGMA 1031 50	C58	Mylar 0.015 50V	CGMA 1031 50
C14	Mylar 0.015 50V	CGMA 1031 50	C59	Mylar 0.001 50V	CGMA 5131 50
C15	Mylar 0.0075 50V	CGMA 1031 50	C60	Mylar 0.001 50V	CGMA 5131 50
C16	Mylar 0.0075 50V	CGMA 1031 50			
C17	Mylar 0.0047 50V	CGMA 4731 50	C61	Mylar 0.047 50V	CGMA 4731 50
C18	Mylar 0.0047 50V	CGMA 4731 50	C62	Mylar 0.047 50V	CGMA 4731 50
C19	Mylar 0.0036 50V	CGMA 3621 50	C63	Mylar 0.008 50V	CGMA 3031 50
C20	Mylar 0.0036 50V	CGMA 3621 50	C64	Mylar 0.008 50V	CGMA 3031 50
			C65	Mylar 0.005 50V	CGMA 6031 50
C21	Mylar 0.0027 50V	CGMA 2721 50	C66	Mylar 0.005 50V	CGMA 6031 50
C22	Mylar 0.0027 50V	CGMA 2721 50	C67	Electrolytic 2.2 50V	CEAL 202P 50
C23	Mylar 0.0027 50V	CGMA 2721 50	C68	Electrolytic 2.2 50V	CEAL 202P 50
C24	Mylar 0.0006 50V	CGMA 6021 50	C69	Electrolytic 10 25V	CEA 100P 25
C25	Mylar 0.0006 50V	CGMA 6021 50	C70	Electrolytic 10 25V	CEA 100P 25
C26	Mylar 0.0051 50V	CGMA 5121 50			
C27	Mylar 0.0051 50V	CGMA 5121 50	C71	Ceramic 80p 50V	CCCL 800K 50
C28	Mylar 0.0039 50V	CGMA 3021 50	C72	Ceramic 47p 50V	CCCL 470K 50
C29	Mylar 0.0039 50V	CGMA 3021 50	C73	Ceramic 47p 50V	CCCL 470K 50
C30	Mylar 0.0034 50V	CGMA 3421 50	C74	Ceramic 47p 50V	CCCL 470K 50
C31	Mylar 0.0034 50V	CGMA 3421 50	C75	Electrolytic 220 6.3V	CEA 220P 6.3
C32	Mylar 0.0011 50V	CGMA 1121 50	C76	Electrolytic 220 6.3V	CEA 220P 6.3
C33	Mylar 0.0011 50V	CGMA 1121 50	C77	Ceramic 100u 50V	CCCL 101K 50
C34	Styrol 100u 50V	CGSA 101 J 50	C78	Ceramic 100u 50V	CCCL 101K 50
C35	Styrol 100u 50V	CGSA 101 J 50	C79	Ceramic 100u 50V	CCCL 101K 50
			C80	Ceramic 100u 50V	CCCL 101K 50
C36	Styrol 100u 50V	CGSA 101 J 50			
C37	Styrol 75u 50V	CGSA 100 J 50	C81	Ceramic 3u 50V	CCCL 300C 50
C38	Styrol 75u 50V	CGSA 100 J 50	C82	Ceramic 3u 50V	CCCL 300C 50
C39	Styrol 43u 50V	CGSA 430U 50	C83	Electrolytic 3.3 50V	CEA 303P 50
C40	Styrol 43u 50V	CGSA 430U 50	C84	Electrolytic 3.3 50V	CEA 303P 50
C41	Styrol 43u 50V	CGSA 430U 50	C85	Ceramic 0.0018 50V	CKD18 102K 50
C42	Styrol 43u 50V	CGSA 430U 50			
C43	Styrol 510u 50V	CGSA 511 J 50	C86	Ceramic 0.0018 50V	CKD18 102K 50
C44	Styrol 510u 50V	CGSA 511 J 50	C87	Electrolytic 22 16V	CEAL 220P 16
C45	Styrol 510u 50V	CGSA 511 J 50	C88	Electrolytic 22 16V	CEAL 220P 16
C46	Styrol 510u 50V	CGSA 511 J 50	C89	Ceramic 10u 50V	CCCL 100K 50
C47	Styrol 300u 50V	CGSA 301 J 50	C90	Ceramic 10u 50V	CCCL 100K 50
C48	Styrol 300u 50V	CGSA 301 J 50	C91	Electrolytic 2.2 50V	CEAL 202P 50
C49	Styrol 300u 50V	CGSA 301 J 50	C92	Electrolytic 2.2 50V	CEAL 202P 50
			C93	Electrolytic 10 25V	CEA 100P 25
			C94	Electrolytic 10 25V	CEA 100P 25

RESISTORS

Symbol	Description	Part No.	Symbol	Description	Part No.
R01	Carbon Film 3k	RDUPS 3032	R011	Carbon Film 240k	RDUPS 2442
R02	Carbon Film 3k	RDUPS 3032	R02	Carbon Film 240k	RDUPS 2442
R03	Carbon Film 8.2k	RDUPS 8222	R03	Carbon Film 240k	RDUPS 2442
R04	Carbon Film 8.2k	RDUPS 8222	R04	Carbon Film 240k	RDUPS 2442
R05	Carbon Film 16k	RDUPS 1622	R05	Carbon Film 810k	RDUPS 8142
R06	Carbon Film 16k	RDUPS 1622	R06	Carbon Film 810k	RDUPS 8142
R07	Carbon Film 32k	RDUPS 3222	R07	Carbon Film 81k	RDUPS 8132
R08	Carbon Film 32k	RDUPS 3222	R08	Carbon Film 81k	RDUPS 8132
R09	Carbon Film 17k	RDUPS 1722	R09	Carbon Film 2.2M	RDUPS 2222
R10	Carbon Film 17k	RDUPS 1722	R10	Carbon Film 2.2M	RDUPS 2222
R11	Carbon Film 5.6k	RDUPS 5622	R11	Carbon Film 20k	RDUPS 2022
R12	Carbon Film 5.6k	RDUPS 5622	R12	Carbon Film 20k	RDUPS 2022
R13	Carbon Film 5.1k	RDUPS 5122	R13	Carbon Film 2.3M	RDUPS 2322
R14	Carbon Film 5.1k	RDUPS 5122	R14	Carbon Film 2.3M	RDUPS 2322
R15	Carbon Film 50k	RDUPS 5022	R15	Carbon Film 20k	RDUPS 2022
R16	Carbon Film 82k	RDUPS 8222	R16	Carbon Film 30k	RDUPS 3022
R17	Carbon Film 180k	RDUPS 1842	R17	Carbon Film 2.3M	RDUPS 2322
R18	Carbon Film 180k	RDUPS 1842	R18	Carbon Film 2.3M	RDUPS 2322
R19	Carbon Film 300k	RDUPS 3042	R19	Carbon Film 62k	RDUPS 6222
R20	Carbon Film 300k	RDUPS 3042	R20	Carbon Film 62k	RDUPS 6222
R21	Carbon Film 470k	RDUPS 4742	R21	Carbon Film 2.3M	RDUPS 2322
R22	Carbon Film 470k	RDUPS 4742	R22	Carbon Film 2.3M	RDUPS 2322
R23	Carbon Film 680k	RDUPS 6842	R23	Carbon Film 5.1k	RDUPS 5122
R24	Carbon Film 680k	RDUPS 6842	R24	Carbon Film 5.1k	RDUPS 5122
R25	Carbon Film 270k	RDUPS 2742	R25	Carbon Film 2.3M	RDUPS 2322
R26	Carbon Film 270k	RDUPS 2742	R26	Carbon Film 2.3M	RDUPS 2322
R27	Carbon Film 2.2M	RDUPS 2222	R27	Carbon Film 27k	RDUPS 2722
R28	Carbon Film 2.2M	RDUPS 2222	R28	Carbon Film 27k	RDUPS 2722
R29	Carbon Film 2.2k	RDUPS 2222	R29	Carbon Film 2.3M	RDUPS 2322
R30	Carbon Film 2.2k	RDUPS 2222	R30	Carbon Film 2.3M	RDUPS 2322
R31	Carbon Film 2.2M	RDUPS 2222	R31	Carbon Film 75k	RDUPS 7522
R32	Carbon Film 2.2M	RDUPS 2222	R32	Carbon Film 75k	RDUPS 7522
R33	Carbon Film 2k	RDUPS 2022	R33	Carbon Film 33k	RDUPS 3322
R34	Carbon Film 2k	RDUPS 2022	R34	Carbon Film 33k	RDUPS 3322
R35	Carbon Film 2.2M	RDUPS 2222	R35	Carbon Film 82k	RDUPS 8222
R36	Carbon Film 2.2M	RDUPS 2222	R36	Carbon Film 82k	RDUPS 8222
R37	Carbon Film 4.7k	RDUPS 4722	R37	Carbon Film 100k	RDUPS 1042
R38	Carbon Film 4.7k	RDUPS 4722	R38	Carbon Film 100k	RDUPS 1042
R39	Carbon Film 2.2M	RDUPS 2222	R39	Carbon Film 51k	RDUPS 5122
R40	Carbon Film 2.2M	RDUPS 2222	R40	Carbon Film 51k	RDUPS 5122
R41	Carbon Film 7.5k	RDUPS 7522	R41	Carbon Film 270k	RDUPS 2742
R42	Carbon Film 7.5k	RDUPS 7522	R42	Carbon Film 220k	RDUPS 2242
R43	Carbon Film 2.2M	RDUPS 2222	R43	Carbon Film 100k	RDUPS 1042
R44	Carbon Film 2.2M	RDUPS 2222	R44	Carbon Film 100k	RDUPS 1042
R45	Carbon Film 18k	RDUPS 1822	R45	Carbon Film 34k	RDUPS 3422
R46	Carbon Film 16k	RDUPS 1622	R46	Carbon Film 34k	RDUPS 3422
R47	Carbon Film 100k	RDUPS 1042	R47	Carbon Film 2.2k	RDUPS 2222
R48	Carbon Film 100k	RDUPS 1042	R48	Carbon Film 2.2k	RDUPS 2222
R49	Carbon Film 100k	RDUPS 1042	R49	Carbon Film 470k	RDUPS 4742
R50	Carbon Film 100k	RDUPS 1042	R100	Carbon Film 470k	RDUPS 4742

Symbol	Description	Part No.
R101	Carbon film 150K	RD1PF 154J
R102	Carbon film 150K	RD1PF 154J
R103	Carbon film 3.5K	RD1PF 382J
R104	Carbon film 3.5K	RD1PF 382J
R105	Carbon film 1K	RD1PF 102J
R106	Carbon film 1K	RD1PF 102J
R107	Carbon film 82K	RD1PF 822J
R108	Carbon film 82K	RD1PF 822J
R109	Carbon film 10K	RD1PF 102J
R110	Carbon film 10K	RD1PF 102J
R111	Carbon film 1M	RD1PF 106J
R112	Carbon film 1M	RD1PF 106J
R113	Carbon film 5.1K	RD1PF 512J
R114	Carbon film 5.1K	RD1PF 512J
R115	Carbon film 270K	RD1PF 274J
R116	Carbon film 270K	RD1PF 274J
R117	Carbon film 1K	RD1PF 102J
R118	Carbon film 1K	RD1PF 102J
R119	Carbon film 480	RD1PF 481J
R120	Carbon film 480	RD1PF 481J
R121	Carbon film 75K	RD1PF 751J
R122	Carbon film 75K	RD1PF 751J
R123	Carbon film 28K	RD1PF 282J
R124	Carbon film 39K	RD1PF 392J
R125	Carbon film 2.2K	RD1PF 222J
R126	Carbon film 2.2K	RD1PF 222J
R127	Carbon film 120	RD1PF 121J
R128	Carbon film 120	RD1PF 121J
R129	Carbon film 120	RD1PF 121J
R130	Carbon film 120	RD1PF 121J
R131	Carbon film 51K	RD1PF 511J
R132	Carbon film 51K	RD1PF 511J
R133	Carbon film 33K	RD1PF 332J
R134	Carbon film 33K	RD1PF 332J
R135	Carbon film 1K	RD1PF 102J
R136	Carbon film 1K	RD1PF 102J
R137	Carbon film 1.5M	RD1PF 150J
R138	Carbon film 1.5M	RD1PF 150J
R139	Carbon film 1.5M	RD1PF 150J
R140	Carbon film 1.5M	RD1PF 150J
R141	Carbon film 12K	RD1PF 123J
R142	Carbon film 12K	RD1PF 123J
R143	Carbon film 1K	RD1PF 102J
R144	Carbon film 1K	RD1PF 102J
R145	Carbon film 220K	RD1PF 224J
R146	Carbon film 220K	RD1PF 224J
R147	Carbon film 2.2M	RD1PF 225J
R148	Carbon film 2.2M	RD1PF 225J

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SA76A-F, G
Q2	Transistor	2SA76A-F, G or RLJ
Q3	Transistor	2SA76A-F, G
Q4	Transistor	2SA76A-F, G
Q5	Transistor	2SA76A-F, G
Q6	Transistor	2SA76A-F, G
Q7	Transistor	2SC1885A-R, S or G
Q8	Transistor	2SC1885A-R, S or G
Q9	Transistor	2SA412A-R, S or G
Q10	Transistor	2SA412A-R, S or G
Q11	Transistor	2SC1885A-R, S or G
Q12	Transistor	2SC1885A-R, S or G
Q1	Zener diode	WZ40
Q2	Zener diode	WZ40
Q3	Diode	1N5965
Q4	Diode	1N5965
Q5	Diode	1N5965
Q6	Diode	1N5965

SWITCHES

Symbol	Description	Part No.
S1	Rotary switch (R455 100V)	ASD-040
S2	Rotary switch (T77E16 10V)	ASD-040
S3	Rotary switch (T77E16 10V)	ASD-040
S4	Rotary switch (R455 100V)	ASD-041
S5	Limit switch (TONE)	ASD-051

Number	Description	Part No.
R101	Carbon film 100k	RG4P5 104
R102	Carbon film 100k	RG4P5 104
R103	Carbon film 2.8k	RG4P5 282
R104	Carbon film 2.8k	RG4P5 282
R105	Carbon film 1k	RG4P5 102
R106	Carbon film 1k	RG4P5 102
R107	Carbon film 82k	RG4P5 822
R108	Carbon film 82k	RG4P5 822
R109	Carbon film 10k	RG4P5 102
R110	Carbon film 10k	RG4P5 102
R111	Carbon film 1M	RG4P5 106
R112	Carbon film 1M	RG4P5 106
R113	Carbon film 5.1k	RG4P5 512
R114	Carbon film 5.1k	RG4P5 512
R115	Carbon film 270k	RG4P5 274
R116	Carbon film 270k	RG4P5 274
R117	Carbon film 1k	RG4P5 102
R118	Carbon film 1k	RG4P5 102
R119	Carbon film 680	RG4P5 682
R120	Carbon film 680	RG4P5 682
R121	Carbon film 75k	RG4P5 752
R122	Carbon film 75k	RG4P5 752
R123	Carbon film 20k	RG4P5 202
R124	Carbon film 20k	RG4P5 202
R125	Carbon film 2.2k	RG4P5 222
R126	Carbon film 2.2k	RG4P5 222
R127	Carbon film 120	RG4P5 121
R128	Carbon film 120	RG4P5 121
R129	Carbon film 120	RG4P5 121
R130	Carbon film 120	RG4P5 121
R131	Carbon film 51k	RG4P5 512
R132	Carbon film 51k	RG4P5 512
R133	Carbon film 33k	RG4P5 332
R134	Carbon film 33k	RG4P5 332
R135	Carbon film 1k	RG4P5 102
R136	Carbon film 1k	RG4P5 102
R137	Carbon film 1.5M	RG4P5 155
R138	Carbon film 1.5M	RG4P5 155
R139	Carbon film 1.5M	RG4P5 155
R140	Carbon film 1.5M	RG4P5 155
R141	Carbon film 15k	RG4P5 152
R142	Carbon film 15k	RG4P5 152
R143	Carbon film 1k	RG4P5 102
R144	Carbon film 1k	RG4P5 102
R145	Carbon film 2.2k	RG4P5 222
R146	Carbon film 220k	RG4P5 224
R147	Carbon film 2.2M	RG4P5 226
R148	Carbon film 2.2M	RG4P5 226

SEMICONDUCTORS

Symbol	Description	Part No.
Q1	Transistor	2SA726-F, G
Q2	Transistor	2SA726-F, G (2SA684-GR or 8L)
Q3	Transistor	2SA726-F, G (2SA684-GR or 8L)
Q4	Transistor	2SA726-F, G (2SA684-GR or 8L)
Q5	Transistor	2SC773A-E, F (2SC7389P-G)
Q6	Transistor	2SC773A-E, F (2SC7389P-G)
Q7	Transistor	2SC1885-A, S or G
Q8	Transistor	2SC1885-A, S or G
Q9	Transistor	2SA612-B, S or G
Q10	Transistor	2SA612-B, S or G
Q11	Transistor	2SC1885-A, S or G (2SC7401P-F or G)
Q12	Transistor	2SC1885-A, S or G (2SC7401P-F or G)
D1	Zener diode	WZ240
D2	Zener diode	WZ240
D3	Diode	1N5960
D4	Diode	1N5960
D5	Diode	1N5966
D6	Diode	1N5966
D7	Diode	1N5966

SWITCHES

Symbol	Description	Part No.
S1	Rotary switch (BASS 100k)	ASD-045
S2	Rotary switch (TREBLE 10k)	ASD-045
S3	Rotary switch (TREBLE 10k)	ASD-045
S4	Rotary switch (BASS 100k)	ASD-045
S5	Limit switch (TONE)	ASD-081