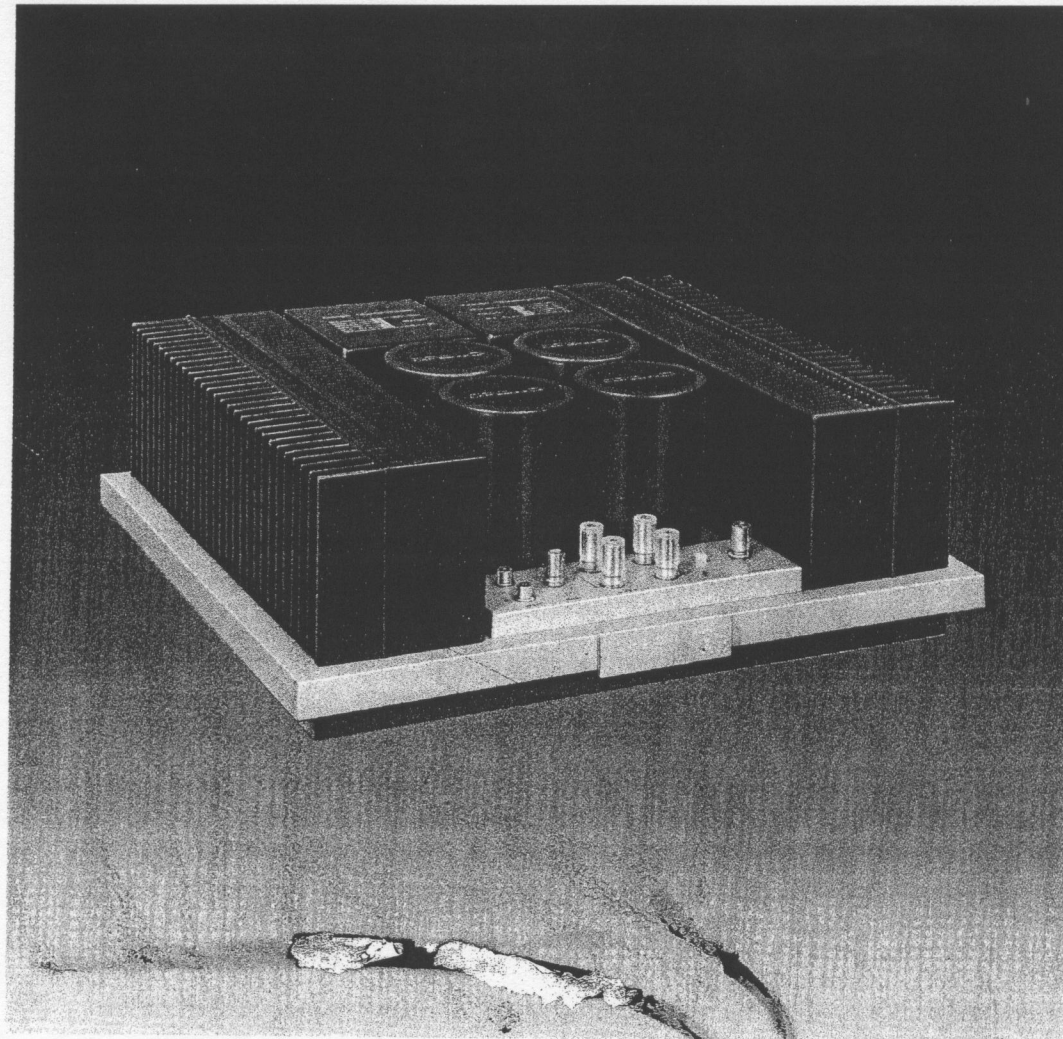




Service Manual

STEREO AMPLIFIER

M-25

 **PIONEER®**

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1. SPECIFICATIONS

Semiconductors

Transistors	55
Diodes	51

Amplifier Section

Circuitry . . . First stage current mirror loaded, Three-stage
Darlington, Parallel push-pull, Pure complementary
OCL (class AB operation)

Continuous Power Output of 120 watts* per channel, min., at 8 ohms from 5 Hertz to 30,000 Hertz with no more than 0.01 % total harmonic distortion, or 120 watts* per channel at 4 ohms from 5 Hertz to 20,000 Hertz with no more than 0.02% total harmonic distortion.

Total Harmonic Distortion (20 Hertz to 20,000 Hertz, 8 ohms)

Continuous rated power output . . No more than 0.008%

Total Harmonic Distortion (5 Hertz to 30,000 Hertz, 8 ohms)

Continuous rated power output . . No more than 0.01%
60 watts per channel

power output No more than 0.008%

1 watt per channel

power output No more than 0.008%

Intermodulation Distortion (50 Hertz : 7,000 Hertz=4:1)

Continuous rated power output . . No more than 0.006%
60 watts per channel

power output No more than 0.005%

1 watt per channel

power output No more than 0.005%

Frequency Response 5 Hertz to 200,000 Hertz ± 1 dB

Input (Sensitivity / Impedance) 1V/50 kilohms
Output

Speaker 4 ohms to 16 ohms

Damping Factor (5 Hertz to 30,000 Hertz, 8 ohms) 60

Hum and Noise (IHF, short-circuited, A network) . . 120dB

Miscellaneous

Power Requirements 120V, 60Hz only
Power Consumption 320 watts (UL)
Dimensions 420(W) x 153(H) x 370(D) mm
16-9/16 x 6-1/32 x 14-9/16 in.

Weight without package 23.5kg; 51lb 11 oz
with package 26.2kg; 57lb 10 oz

Furnished Parts

Connection Cord with Pin Plugs 1
Operating Instructions 1

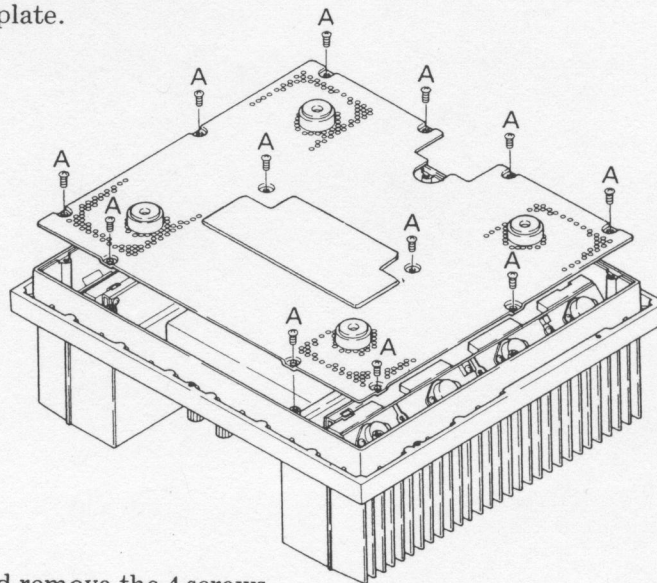
**Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifiers.*

NOTE:

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

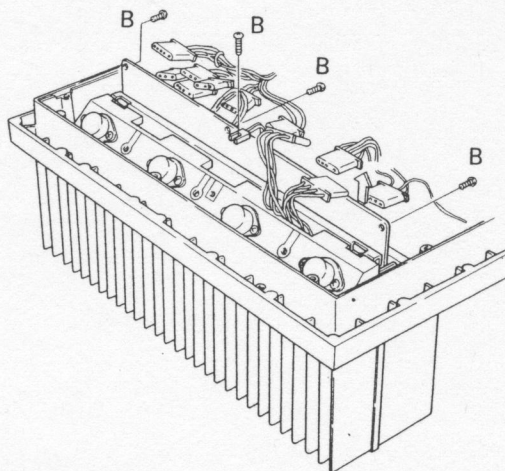
2. DISASSEMBLY

Remove the 12 mounting screws (A) at the bottom plate and lift off the bottom plate.



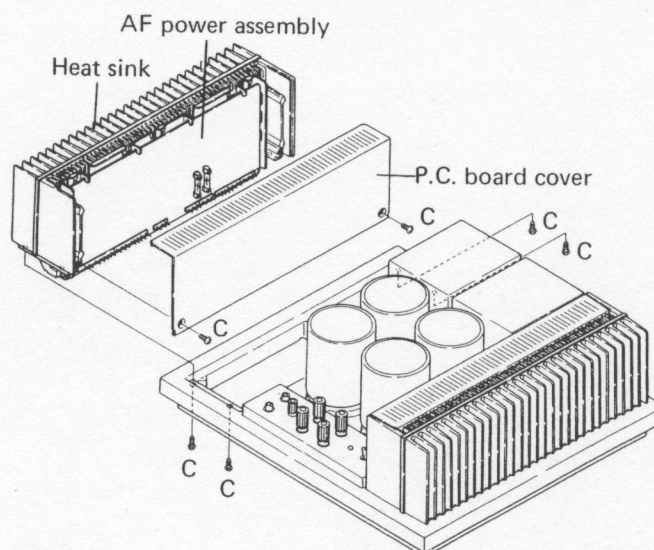
AF Power Assembly

Disconnect the connectors and remove the 4 screws (B). Pull off the P.C. board.

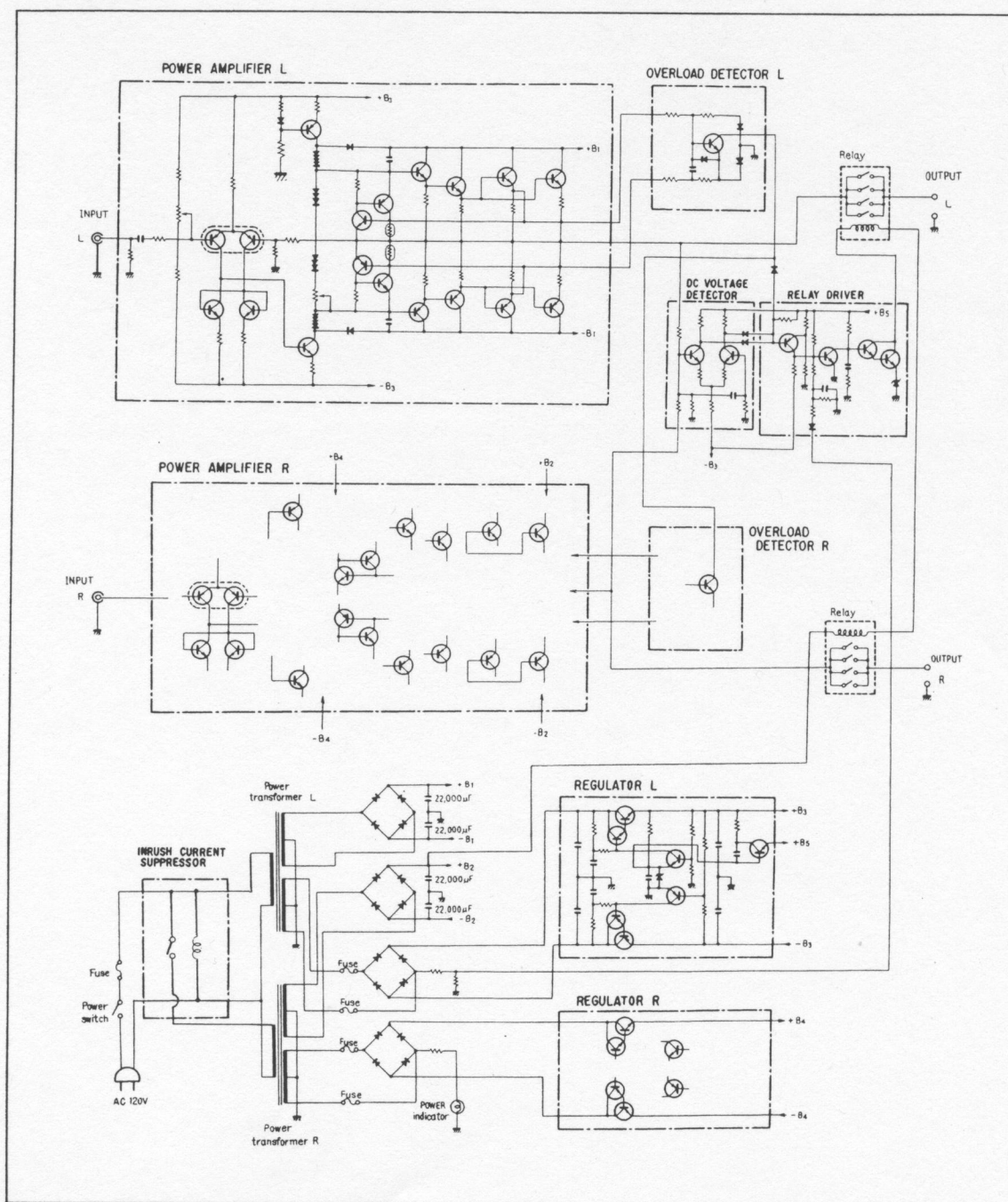


Heat Sink

Remove the 4 screws (C).



3. BLOCK DIAGRAM



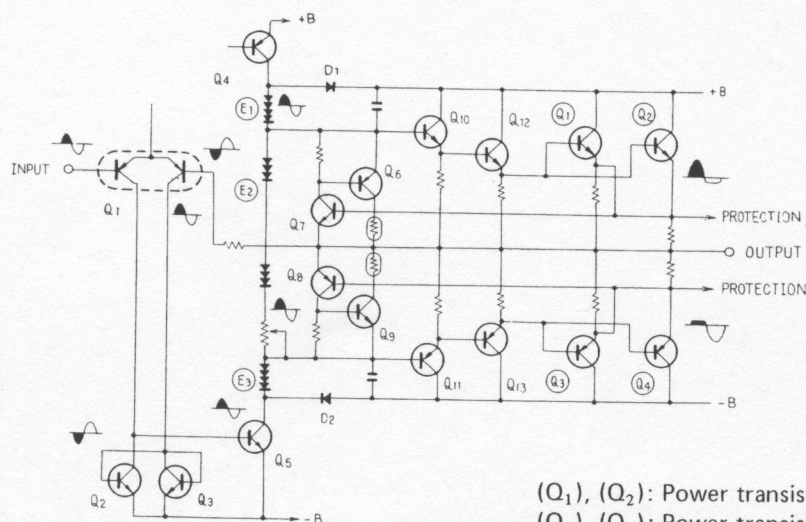
4. CIRCUIT DESCRIPTIONS

The block diagram of this unit is given on page 5.

4.1 POWER AMP (Fig. 1)

The first stage is a PNP silicon dual transistor differential amp (Q_1) with a current mirror load (Q_2 , Q_3) that provides a stable high gain. The voltage amplification stage (Q_5) has a constant-current circuit (Q_4) as its load, and performs high-linearity, high gain amplification. D_1 and E_1 in Fig. 1 limit the peak value of the positive drive voltage, and D_2 and E_3 limit the peak value of the negative drive voltage to prevent clipping at the power stage. The bias circuit maintains the bias voltage constant by detecting the temperature of the drive transistor and power stage with a thermister.

The current control circuit (Q_6 , Q_7 , Q_8 , Q_9) prevents overcurrent flowing, and controls the power at a 4Ω load. If an overcurrent should flow in the power transistor at a 4Ω load for any reason, the voltage drop across the emitter resistance of the transistor becomes higher than that during normal operation. Since this voltage is divided and applied to the base of Q_7 and Q_8 , Q_6 and Q_9 are turned ON, and the signal voltage applied to the power stage is reduced. The output stage is a 3-stage Darlington parallel push-pull SEPP circuit. Since the newly developed power transistor RET (Ring Emitter Transistor) uses an NPN, PNP pair, and the emitter resistor is an extremely low-inductance, non-inductive winding wire-wound resistor, maximum output is obtained up to the ultra-high region.



(Q_1), (Q_2): Power transistor MN25
(Q_3), (Q_4): Power transistor MP25

Fig. 1

4.2 PROTECTION CIRCUIT (Fig. 2)

A protection circuit is provided that automatically turns the output circuit on and off using a relay, to protect the amp and speakers. A four-circuit relay is employed. One of these relays is used for each channel and the contacts are connected in parallel for improved reliability. The Pioneer standard protection circuit consists of the three sections shown in Fig. 2.

• Relay drive section

This circuit controls operation of the relay. When the power switch is set to the ON position, the signal is gradually faded in (muting); and when the power switch is set to the OFF position, power is quickly cut off. The output is opened by command from the DC-voltage detector and overcurrent detector.

During normal operation, reverse bias is applied to the base of Q_{18} , and Q_{18} is cut off. When an abnormal voltage is detected by the DC-voltage detector, current flows thru R_{65} , and base potential of Q_{18} suddenly drops, and Q_{18} is turned ON. Since forward bias is applied to Q_{19} , Q_{19} is turned ON, and the voltage at point (A) drops, Q_{20} and Q_{21} are turned OFF (relay contacts released).

• DC voltage detector

This circuit detects the DC voltage generated at the output center point. This circuit employs a differential amp with capacitors connected between the bases of the transistors, and one terminal connected to the output center point. The outputs are in phase and cancel mutually for AC signals, and the balance is disturbed for DC voltages and only the DC voltage is detected.

When the DC balance of the power stage is disturbed for some reason, a differential voltage is generated between the bases of the differential transistors, the collector currents of Q_{16} or Q_{17} are unbalanced, and diode D_{16} or D_{17} conducts. Therefore, Q_{18} is turned ON and a signal is sent to the relay drive circuit so that the output circuit is opened.

• Overload detector

This circuit detects shorting of the output circuit or excessively low load resistance. There are two bridge circuits with the load (speaker, etc.) as one leg. When these bridge circuits are unbalanced, or V_{BE} of Q_{14} exceeds 0.6V, a signal is sent to the relay drive circuit to open the output circuit.

4.3 POWER SUPPLY CIRCUIT (Fig. 3)

Two power transformers are used, and the left and right amp power supplies are completely independent. Power is supplied to the power amp stage by a bridge rectifier and two large 22,000 μ F capacitors. power is supplied to the drive stage from a winding separate from the power stage thru a bridge rectifier and voltage regulator.

• Surge killer circuit

When the power switch of an amp having two high-capacity power supplies, such as this unit, is set to the ON position, an extremely large inrush current flows, and the primary side fuse—having a capacity that allows safe normal operation, would be blown, or the AC line is adversely affected. Moreover, the surge current of the rectification diode also becomes large because the capacity of the smoothing capacitor is large. Therefore, a surge killer is provided at the primary side of the power transformer to protect the AC line, and thus control the surge current of the rectification diode.

When the power switch (S_1) is set to the ON position, current flows in the relay (RL_3), and the relay contacts are closed. The closing time of these contacts is utilized to control the surge current.

Since this period is shorter than the muting time of the output circuit when the power switch is set to the ON position, it has no affect on normal operation.

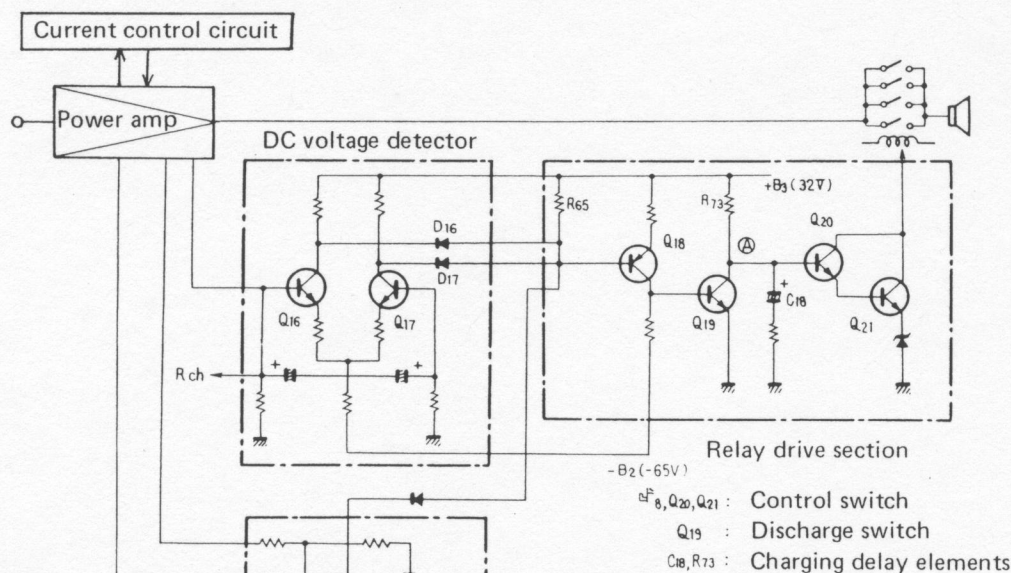


Fig. 2

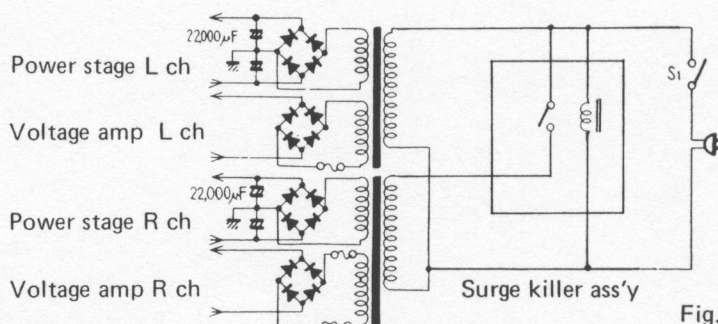
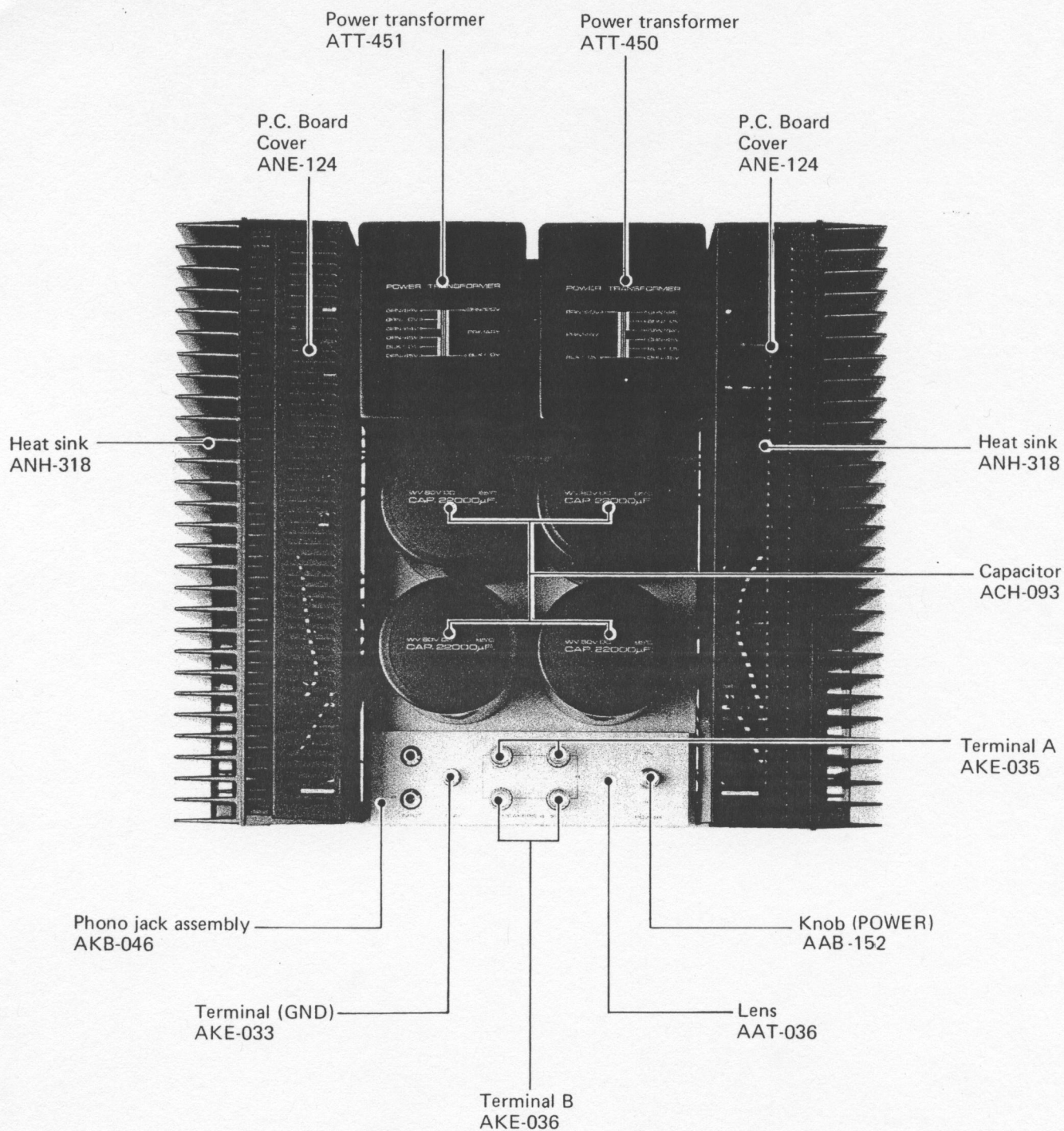


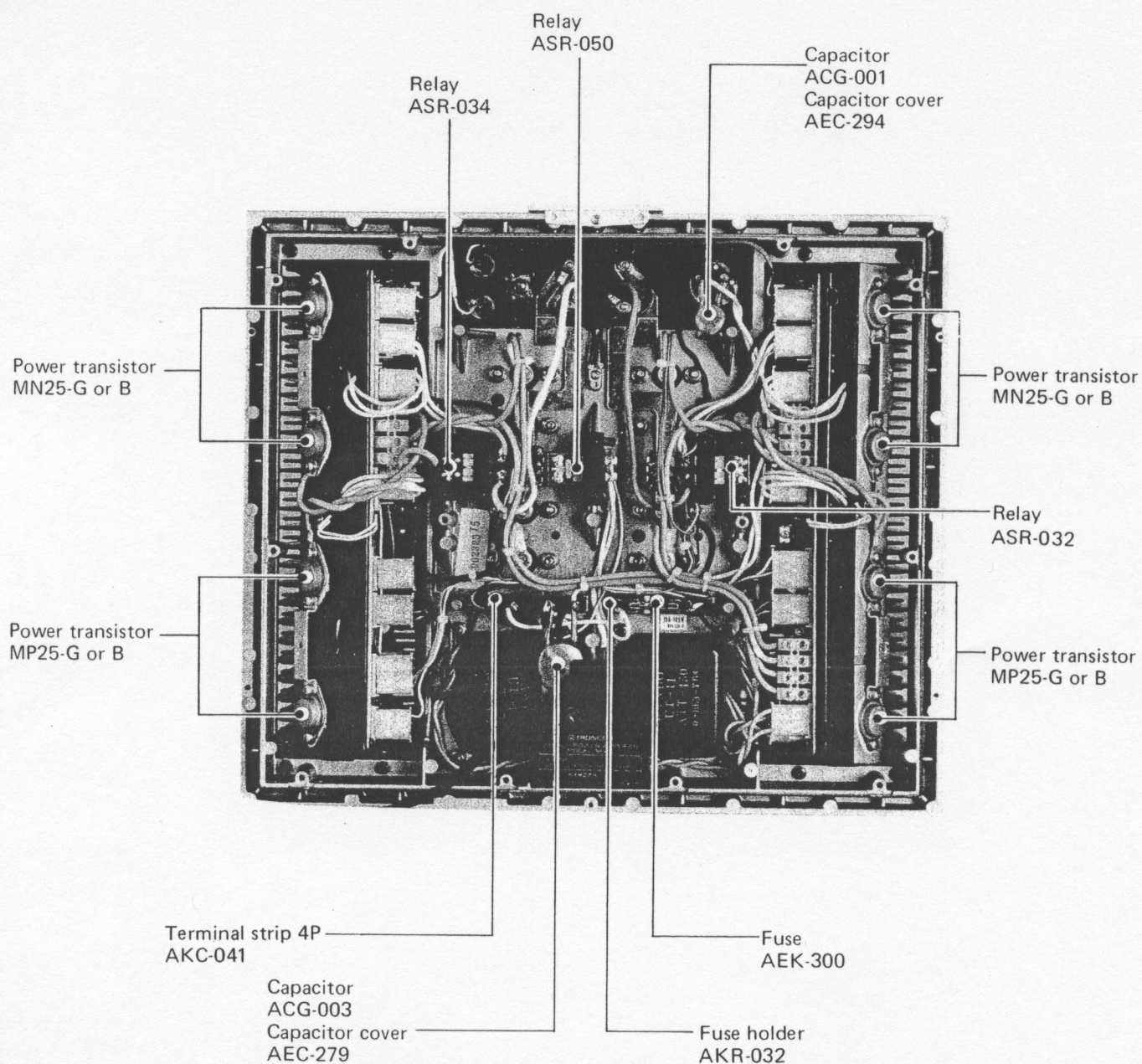
Fig. 3

5. PARTS LOCATION

5.1 TOP VIEW



5.2 BOTTOM VIEW



6. ADJUSTMENT

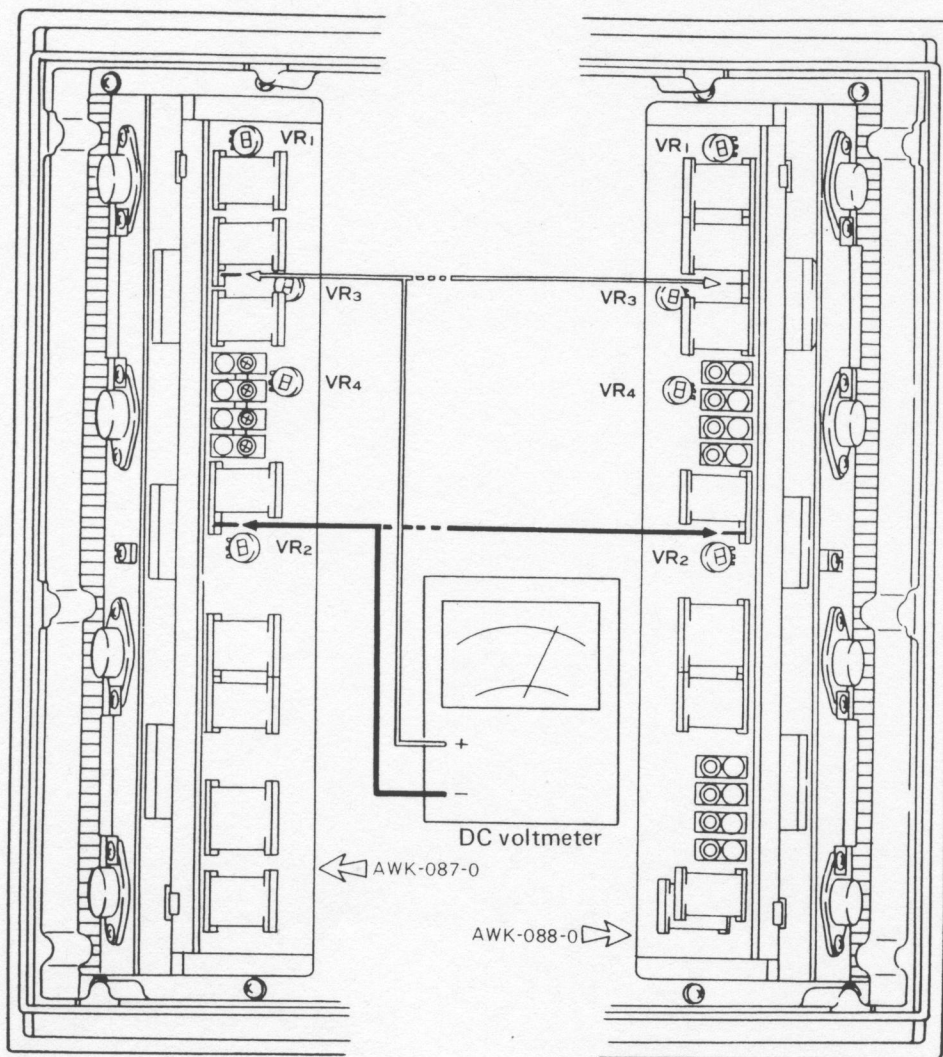
- Open the input output terminals.
- The left channel is AWK-087, and the right channel is AWK-088. Both the left and right channels are adjusted in the same manner.
- Turn the amp upside down.

6.1 IDLE CURRENT ADJUSTMENT

1. Connect a DC voltmeter between the TP terminals, and adjust VR_2 to obtain a voltmeter reading of 0.2V.
2. Ten minutes or more after the power has been turned on, re-adjust VR_2 to obtain a voltmeter reading of 0.09V.

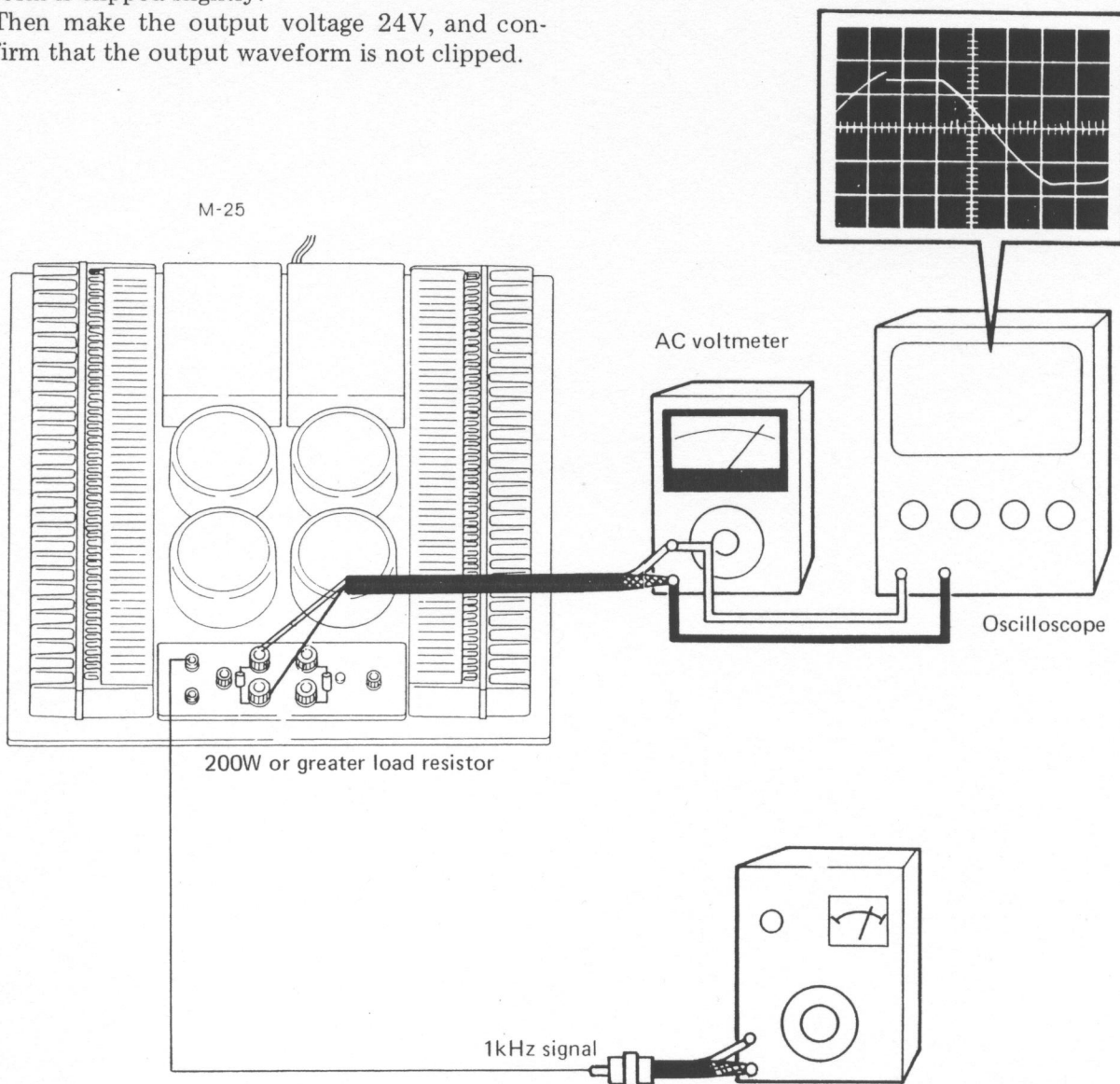
6.2 CENTER POTENTIAL ADJUSTMENT

1. Adjust VR_1 to obtain a voltage of 20mV across the output terminals (+, -).



6.3 CURRENT CONTROL CIRCUIT ADJUSTMENT

1. Setup the equipment as illustrated in Fig. 4. Connect a 4Ω (200W or greater) load to the OUTPUT terminal.
2. Apply a 1kHz signal to the INPUT terminal, and adjust the input to obtain an output voltage of 25V.
3. Observe the waveform on the oscilloscope, and adjust VR_3 and VR_4 so that the output waveform is clipped slightly.
4. Then make the output voltage 24V, and confirm that the output waveform is not clipped.

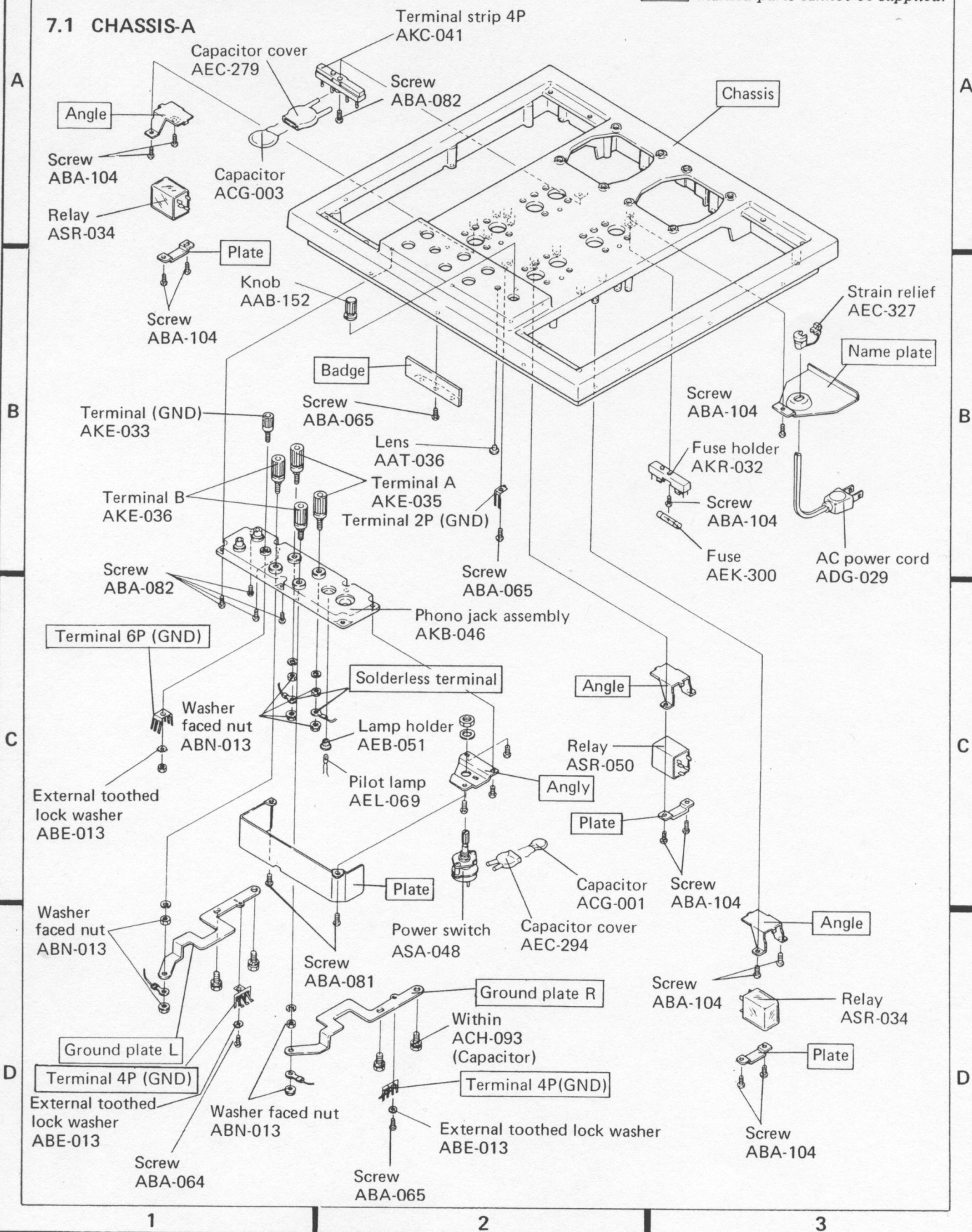


7. EXPLODED VIEW

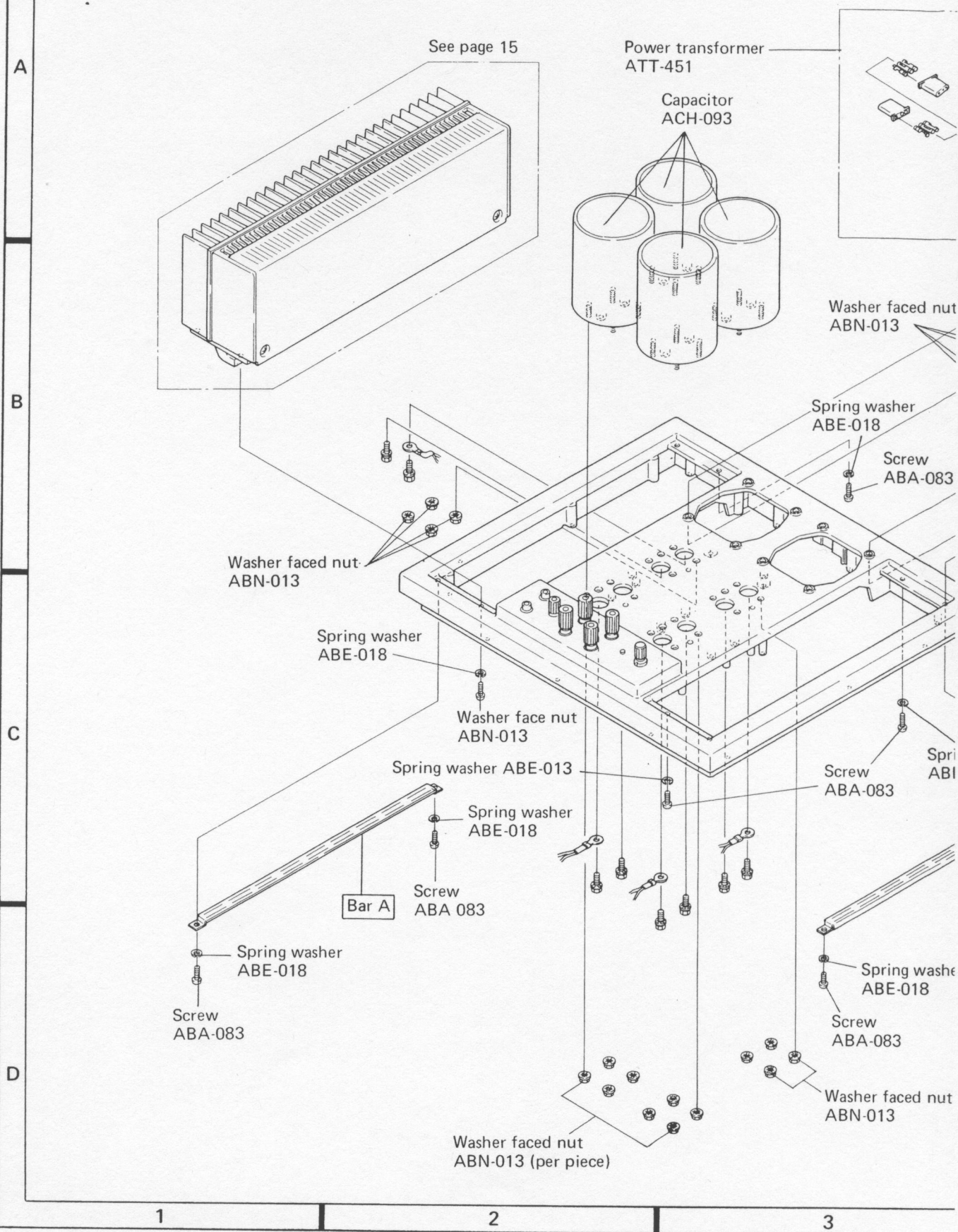
NOTE:

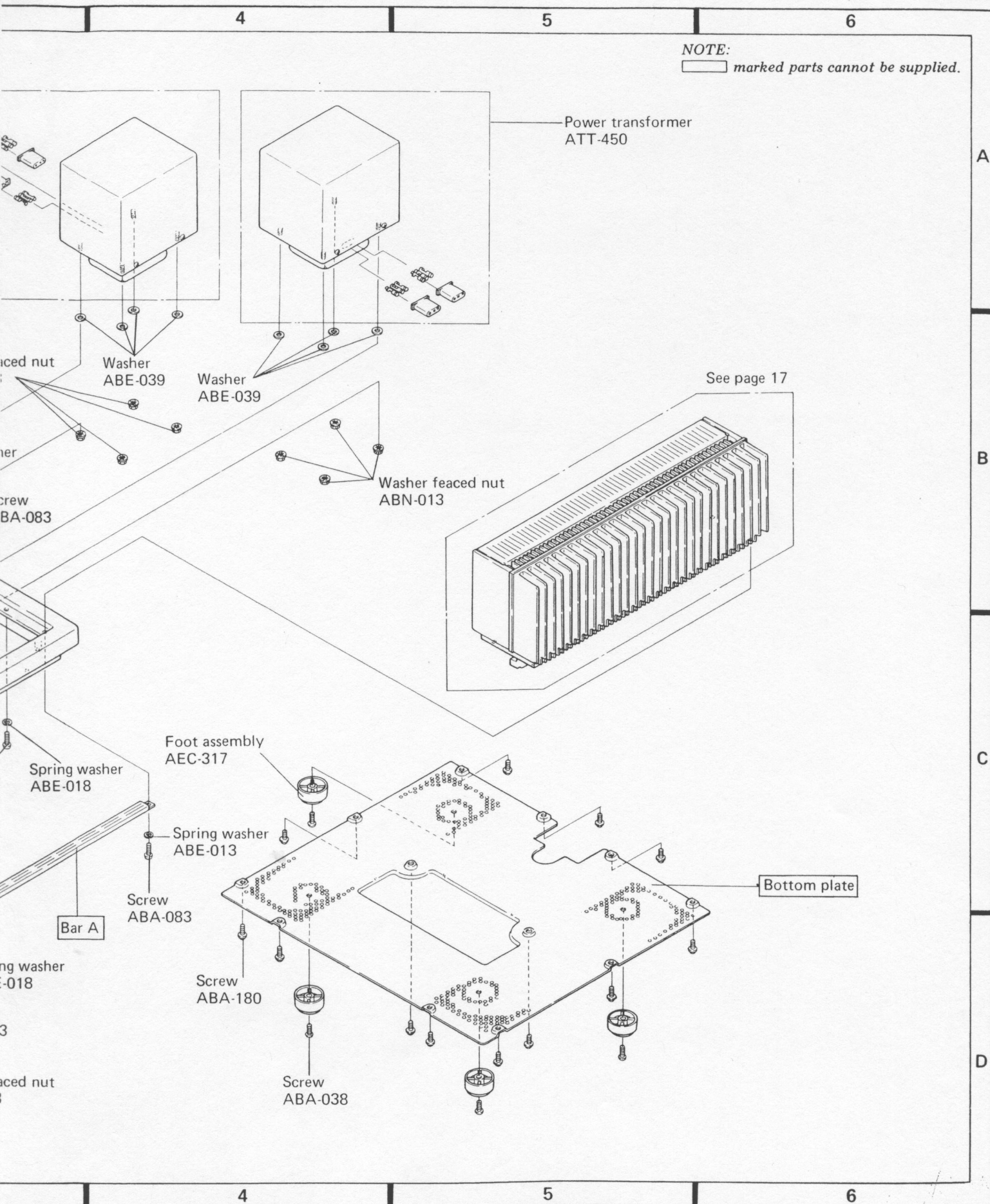
marked parts cannot be supplied.

7.1 CHASSIS-A

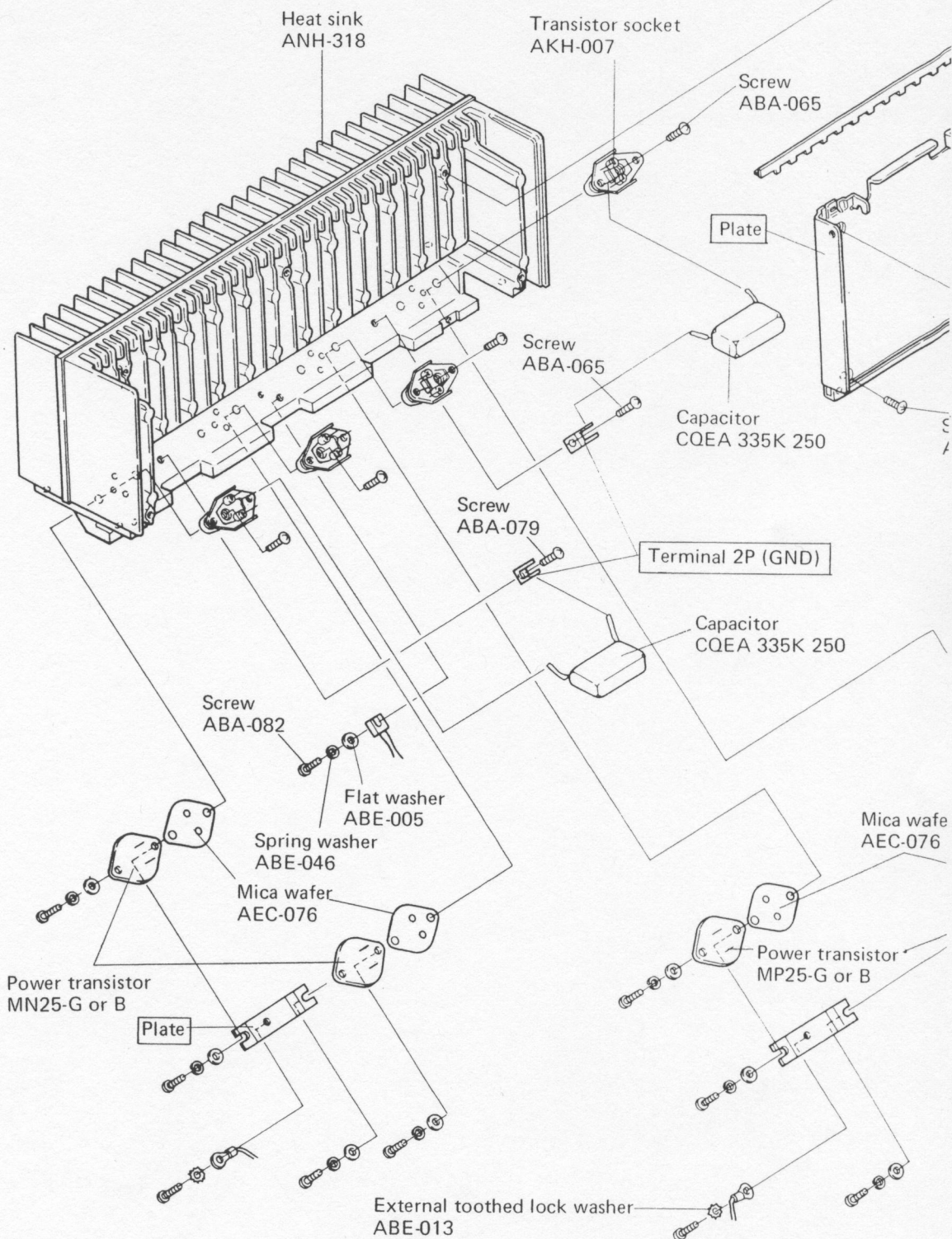


7.2 CHASSIS-B





7.3 POWER AMPLIFIER (L)



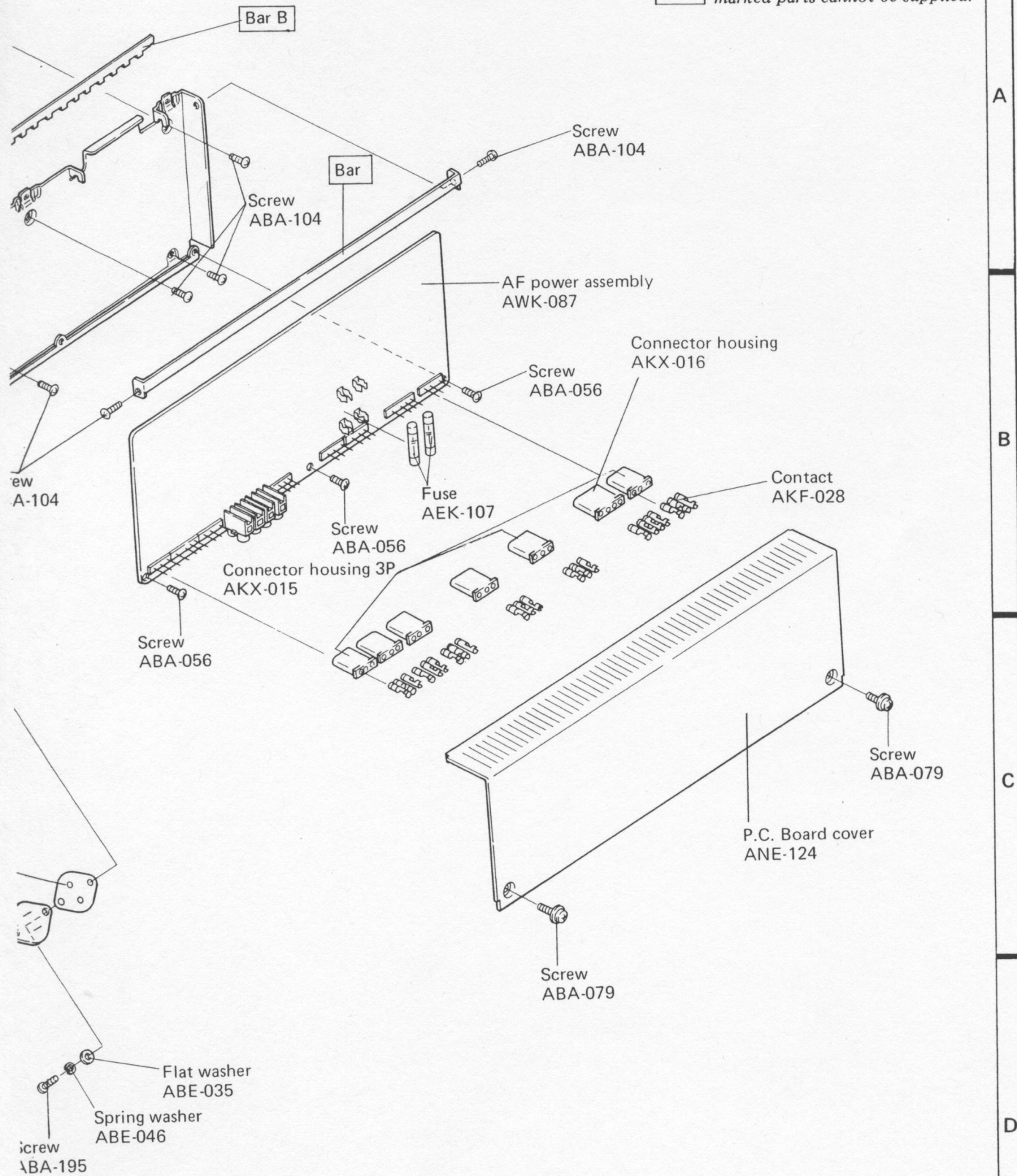
4

5

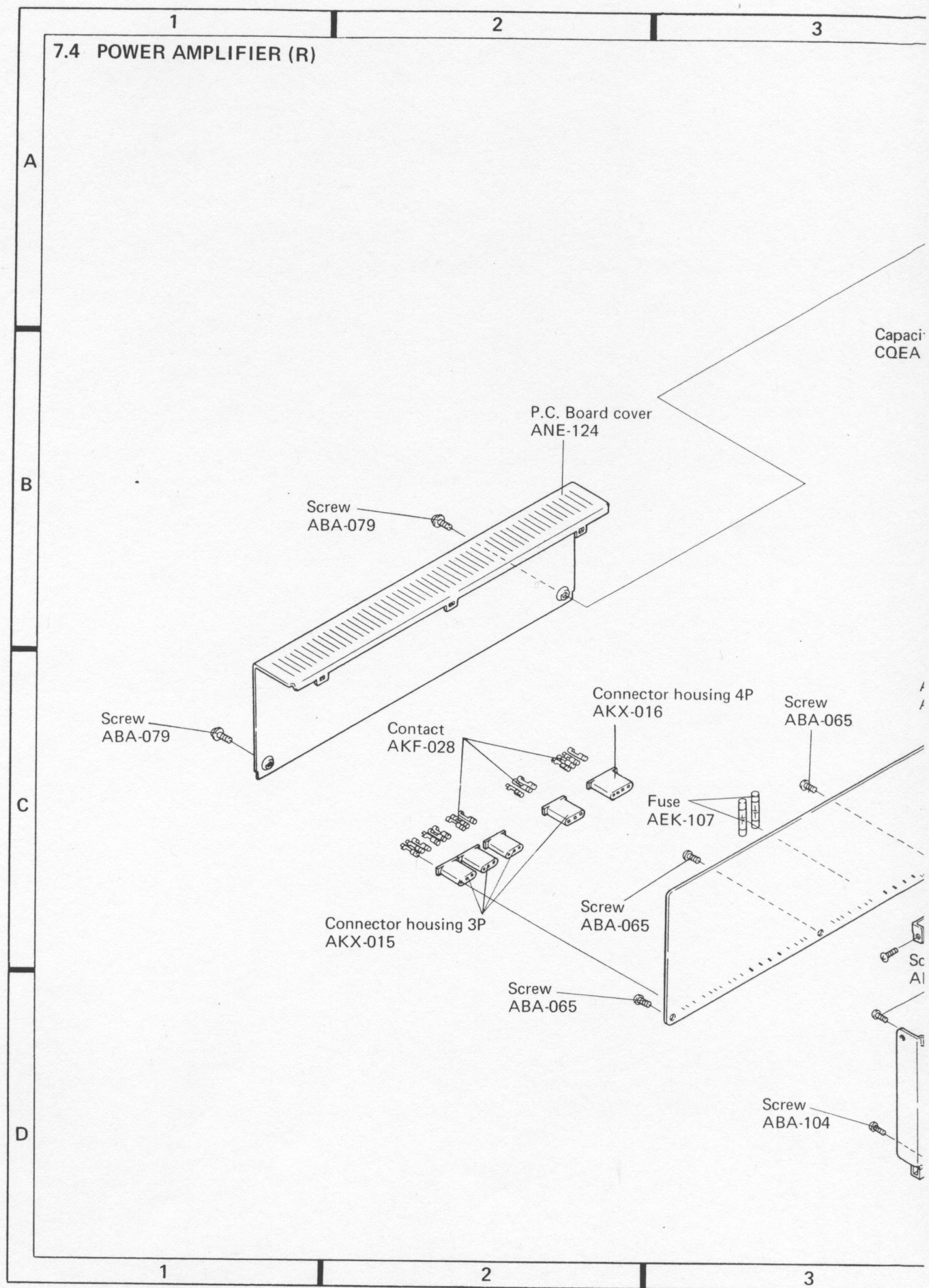
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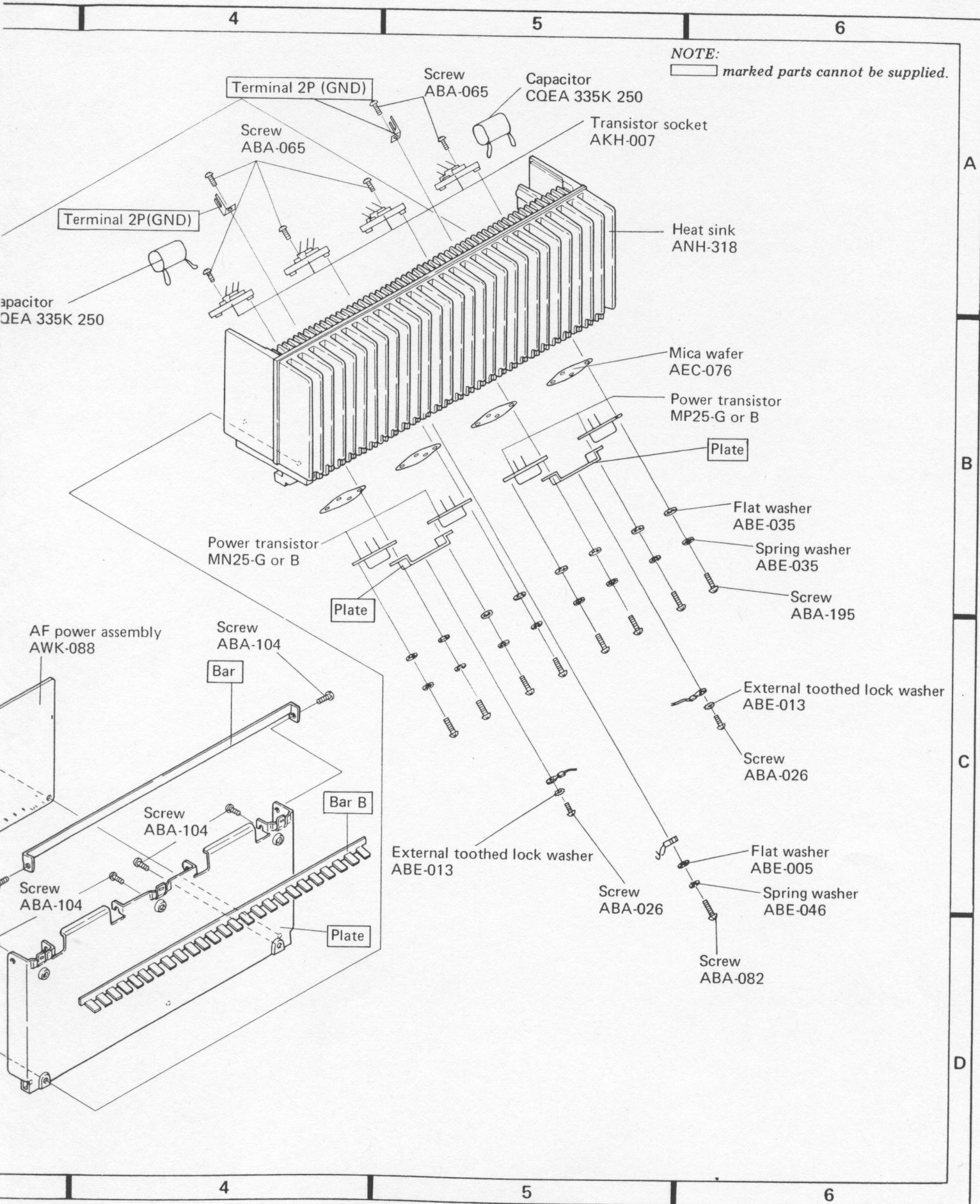
NOTE:

marked parts cannot be supplied.

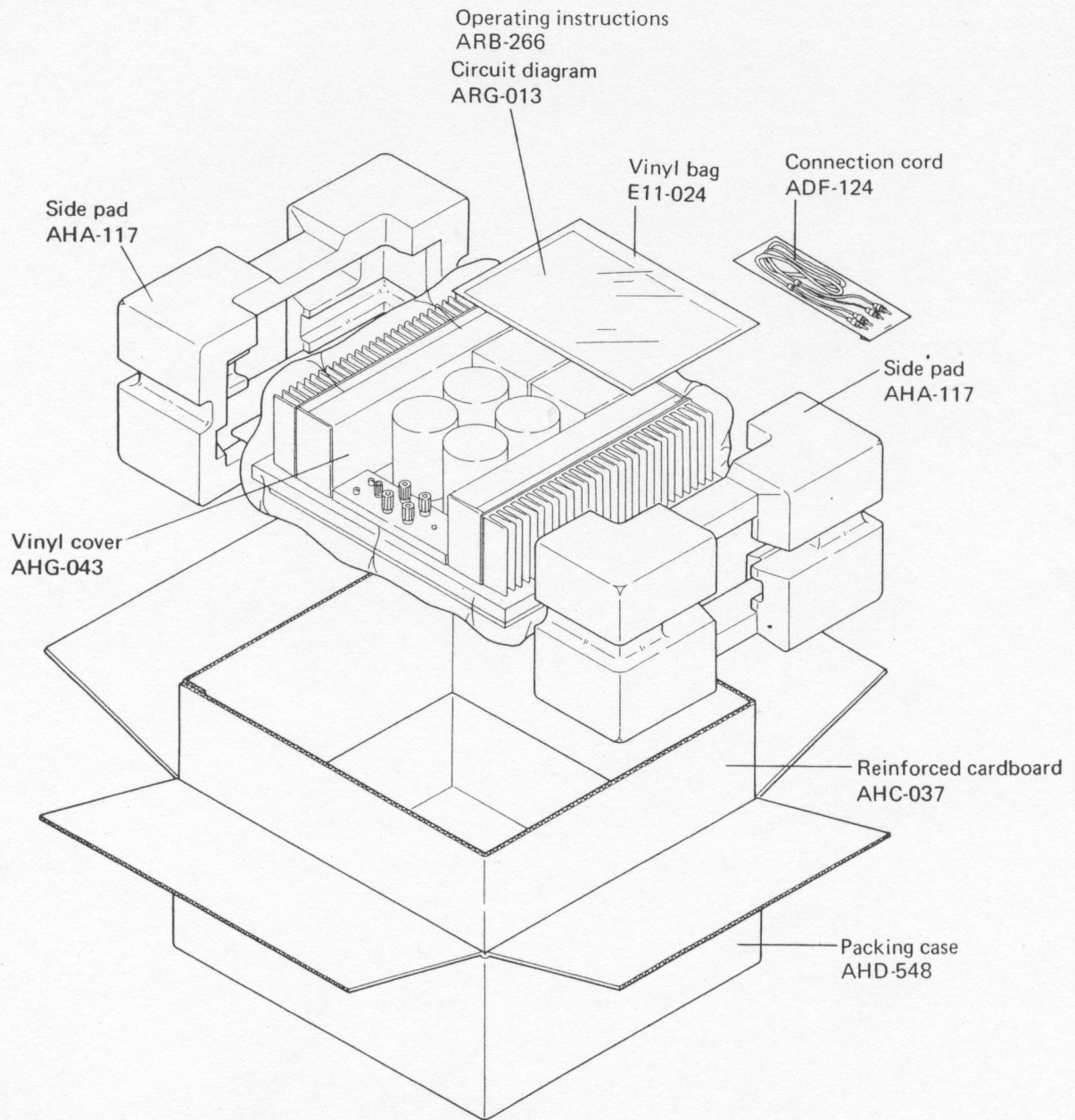


7.4 POWER AMPLIFIER (R)





8. PACKING



9. SCHEMATIC DIAGRAM, P.C. BOARD PATTERNS AND PARTS LIST

9.1 MISCELLANEA

NOTE:
When ordering resistors, first covert resistance values into code form as shown in the following examples.

Ex. 1 When there are 2 effective digits (any digit apart from 0), such as 560 ohm and 47k ohm (tolerance is shown by J = 5%, and K = 10%).

560Ω 56 × 10¹ 561 RD¼PS 561 J
47kΩ 47 × 10³ 473 RD¼PS 473 J
0.5Ω 0R5 RN2H 0R5 K
1Ω 010 RSIP 010 K

Ex. 2 When there are 3 effective digits (such as in high precision metal film resistors).

5.62kΩ 562 × 10¹ 5621 RN¼SR 5621 F

Miscellaneous Parts

CAPACITORS

Part No.	Symbol & Description	Part No.	Description
ACH-093	C1—C4	AKE-033	Terminal (GRD)
CQEA 335K 250	C5—C8	AKC-041	Terminal 4P
ACG-001	C9	AKR-032	Fuse holder
ACG-003	C10	ADG-029	AC Power cord
		AKH-007	Transistor socket

SEMICONDUCTORS

Part No.	Symbol & Description
VN25-G or B	Q1, Q2, Q5, Q6
VP25-G or B	Q3, Q4, Q7, Q8

LAMP, FUSE

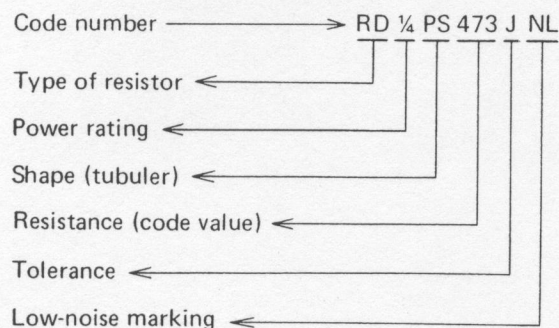
Part No.	Symbol & Description
AEK-300	FU1
AEK-107	FU2—FU5
AEL-069	PL1

OTHERS

Part No.	Symbol & Description
ATT-451	PT1 Power transformer
ATT-450	PT2 Power transformer
ASA-048	S1 Power switch
ASR-034	RL1, RL2 Relay
ASR-050	RL3 Relay
AWK-087	AF power assembly
AWK-088	AF power assembly
AKB-046	Terminal assembly (INPUT)
AKE-035	Terminal (RED mark)
AKE-036	Terminal (WHITE mark)

RESISTANCE VALUE CODES

Code numbers of resistors used in Pioneer equipment are expressed in the following way:—



Furthermore, in the list of parts found in the Service Manual, the resistance (code value) part of the above code number is expressed as □□□ or □□□□.

Resistors included in the Service Manual list of parts

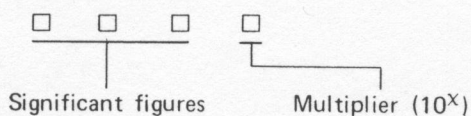
Ex. RD 1/4 PS □□□ JNL

When ordering resistor components, first ascertain the actual resistance value from the circuit diagram, and then convert it into code no. form as shown in the following examples.

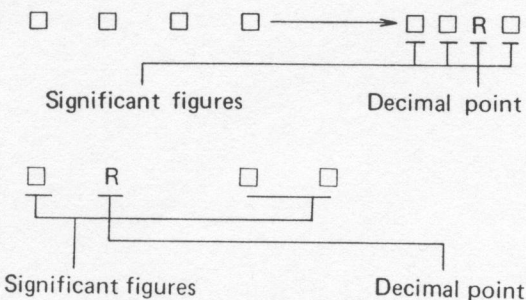
For further details on code numbers, refer to "Tuning Fork" VOL. 1.

Ex. 1 For □□□□ Codes

* General resistors



* Resistors with fractional values

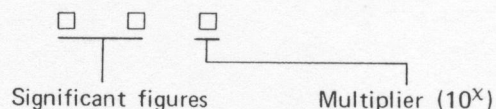


Ex. 1

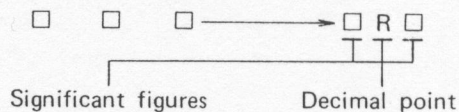
Nominal resistance (Ω)	Significant figure (three figures)	Multiplier (10 ^x)	Resistance value code
5.1	510		5R10
5.62	562		5R62
10	100		10R0
22.5	225		22R5
110	110	x10 ⁰	1100
1k (1000)	100	x10 ¹	1001
1.56k (1560)	156	x10 ¹	1561
10k (10000)	100	x10 ²	1002
33.6k (33600)	336	x10 ²	3362
112k (112000)	112	x10 ³	1123
1M (1000000)	100	x10 ⁴	1004
1.56M (1560000)	156	x10 ⁴	1564

Ex. 2 For □□□ Codes

* General resistors



* Resistors with fractional values

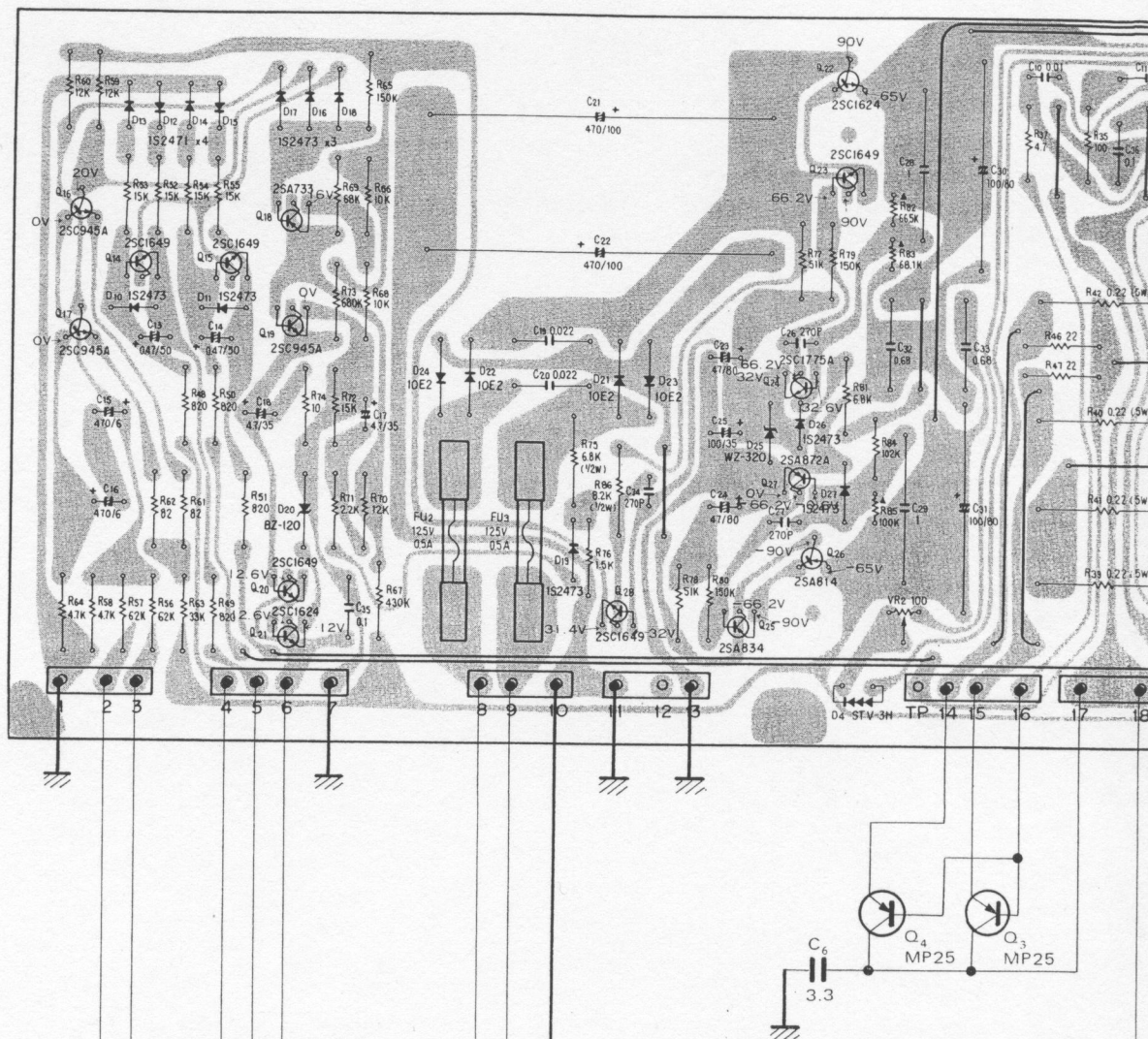


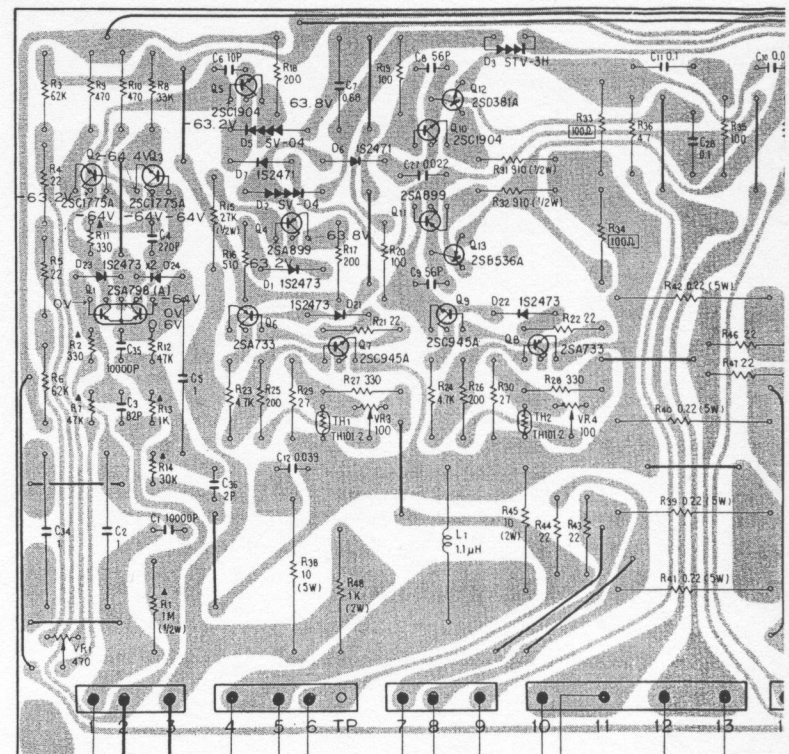
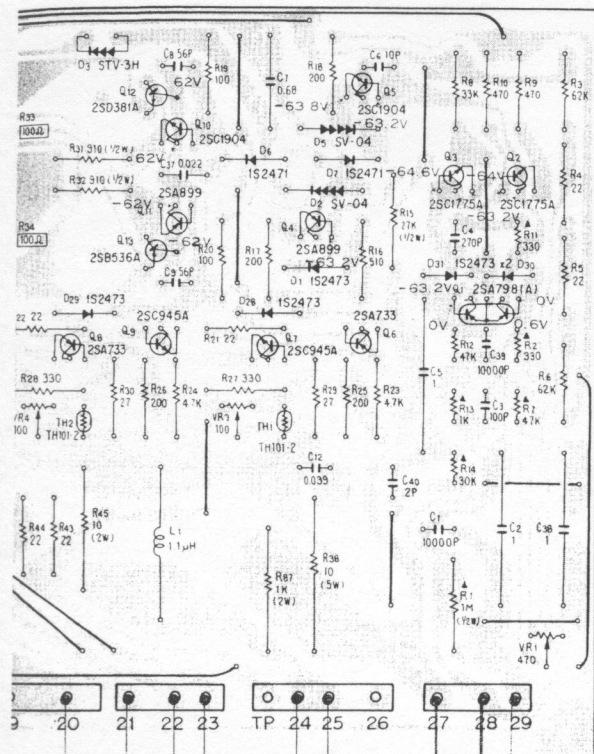
Ex. 2

Nominal resistance (Ω)	Significant figure (two figures)	Multiplier (10 ^x)	Resistance value code
0.5	05		0R5
1.5	15		1R5
1	01	x10 ⁰	010
22	22	x10 ⁰	220
330	33	x10 ¹	331
1k (1000)	10	x10 ²	102
5.6k (5600)	56	x10 ³	562
68k (68000)	68	x10 ³	683
820k (820000)	82	x10 ⁴	824
1M (1000000)	10	x10 ⁵	105
2.2M (2200000)	22	x10 ⁵	225

2

D





A W K - 0 8 8

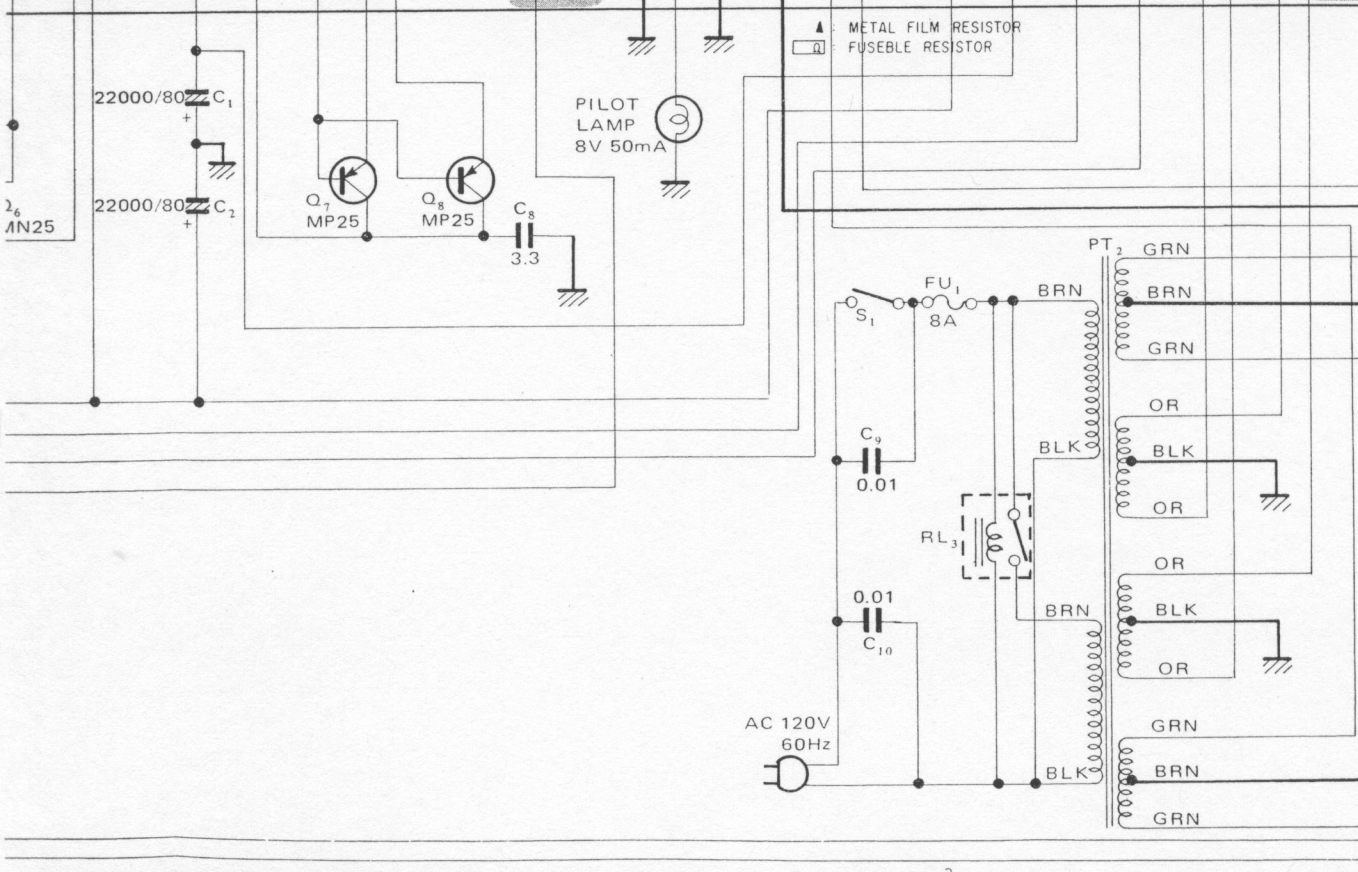
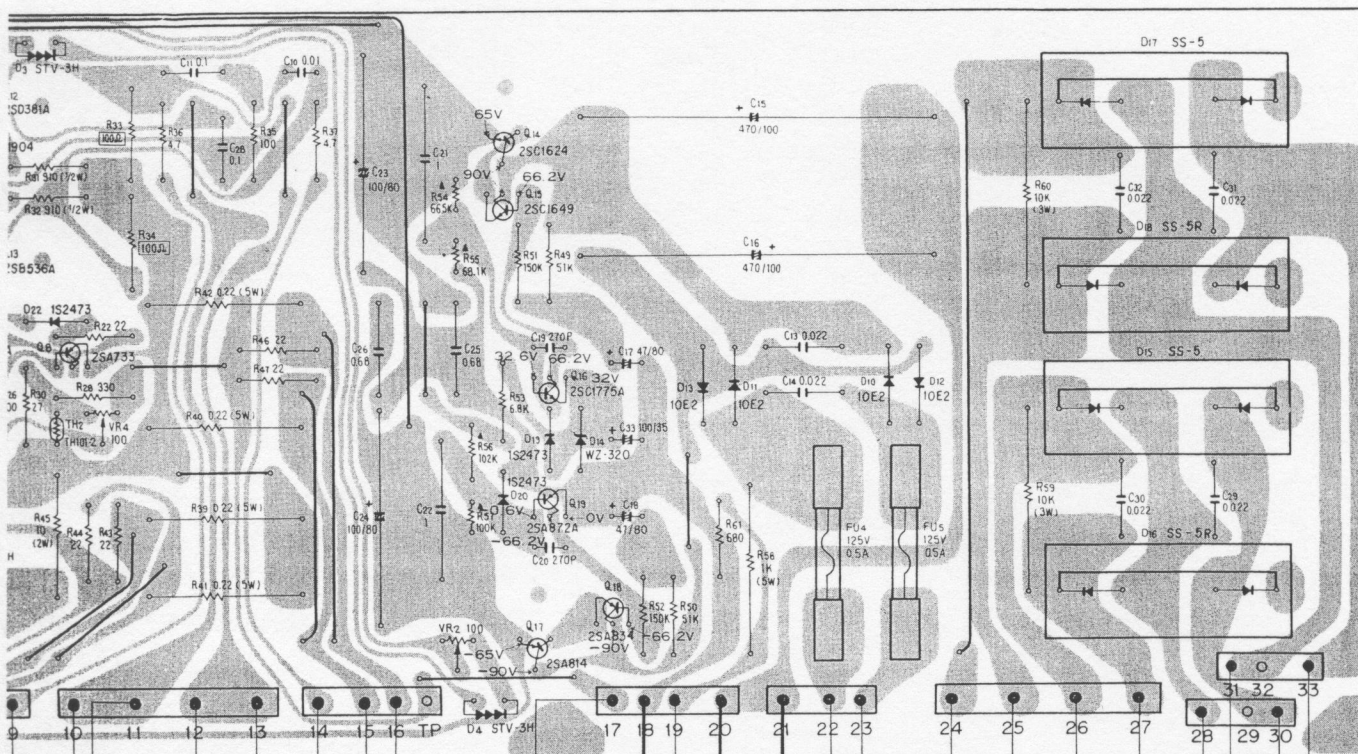
	METAL FILM RESISTOR
	FUSEBLE RESISTOR

INPUT L INPUT R

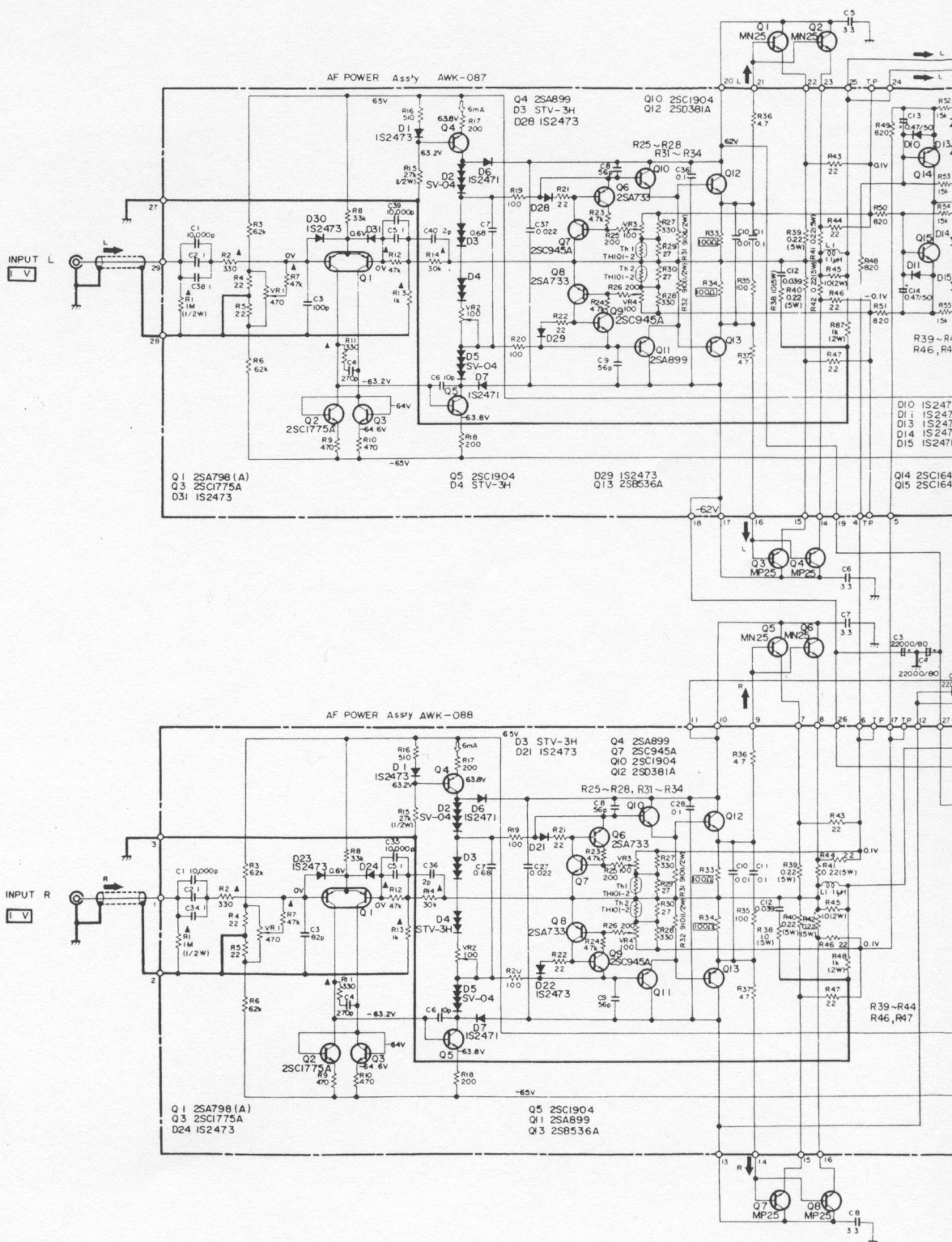
OUTPUT

30.98/89

22000/90
22000/80



9.3 SCHEMATIC DIAGRAM





9.4 PARTS LIST OF AF POWER ASSEMBLY (AWK-087)

Part List

CAPACITORS

Part No.	Symbol & Description
ACE-027	C1, C39
ACE-020	C2, C38
ACE-025	C4, C26, C27, C34
CQEA 105K 250	C5
ACE-023	C6
CQEA 684K 250	C7, C32, C33
ACE-024	C8, C9
CQMA 103K 50	C10
CQMA 104K 50	C11
CQMA 393K 50	C12
CEA R47P 50	C13, C14
CEA 471P 6	C15, C16
CEA 4R7P 35	C17, C18
CQEA 223K 400	C19, C20 C37
CEB 471P 100	C21, C22
CEA 470P 80	C23, C24
CEA 101P 35	C25
ACE-022	C40
CQEA 105K 250	C28, C29
CEB 101P 80	C30, C31
CQMA 104K 250	C35, C36
ACE-029	C3

RESISTORS

Part No.	Symbol & Description
ACP-033	VR1
ACP-032	VR2—VR4
RN½PT □□□□ G	R1
RN½SQ □□□□ F	R2, R7, R11—R14, R82, R83, R85
RD¼PS □□□ JNL	R3, R6
RD¼PS □□□ J	R4, R5, R8—R10, R23, R24, R29, R30 R35, R48—R74, R76—R81
RD¼PS □□□ J	R15, R75, R86
RD¼PSF □□□ J	R16—R22, R25—R28, R36, R37, R43 R44, R46, R47
RD¼PSF □□□ J	R31, R32
ACN-016	R33, R34
RT5B □□□ K	R38
ACN-017	R39—R42
RS2P □□□ J	R45, R87
RN¼PT □□□□ G	R84

OTHERS

Part No.	Symbol & Description
ATH-012	L1
AKC-067	Terminal 4P
AKR-013	Fuse holder
ANH-340	Heat sink
ANH-317	Heat sink

SEMICONDUCTORS

Part No.	Symbol & Description
2SA798/A/-F or G	Q1
2SC1775A-E or F	Q2, Q3, Q24
2SA899-V	Q4, Q11
(2SA899A-V)	
2SC1904-V	Q5, Q10
(2SC1904A-V)	
2SA733-Q or R	Q6, Q8, Q18
(2SA823-Q)	
2SC945A-Q or P	Q7, Q9, Q16, Q17, Q19
(2SC1649-P)	
2SD381A-L or K	Q12
2SB536A-L or K	Q13
2SC1649-P	Q14, Q15, Q20, Q23, Q28
2SC1624-O or Y	Q21, Q22
(2SD381-M,L or K)	
2SA834-P	Q25
2SA814-O or Y	Q26
(2SB536-M,L or K)	
2SA872A-E or F	Q27
1S2473	D1, D10, D11, D16—D19, D26—D29
(1S1555)	
SV-04	D2, D5
STV3H	D3, D4
1S2471	D6, D7, D12—15
BZ-120	D20
10E2	D21—D24
(1S1886)	
WZ-320	D25
TH101-2	TH1, TH2

9.5 PARTS LIST OF AF POWER ASSEMBLY (AWK-088)

Parts List

CAPACITORS

Part No.	Symbol & Description
ACE-027	C1, C35
ACE-020	C2, C34
ACE-028	C3
ACE-025	C4
CQEA 105K 250	C5
ACE-023	C6
CQEA 684K 250	C7, C25, C26
ACE-024	C8, C9
CQMA 103K 50	C10
CQMA 104K 50	C11
CQMA 393K 50	C12
CQEA 223K 400	C13, C14, C27, C29-C32
CEB 471P 100	C15, C16
CEA 470P 80	C17, C18
ACE-025	C19, C20
CQEA 105K 250	C21, C22
CEB 101P 80	C23, C24
CQMA 104K 250	C28
CEA 101P 35	C33
ACE-022	C36

RESISTORS

Part No.	Symbol & Description
ACP-033	VR1
ACP-032	VR2-VR4
RN $\frac{1}{2}$ PT $\square\square\square\square$ G	R1
RN $\frac{1}{2}$ SQ $\square\square\square\square$ F	R2, R7, R11-R14, R54, R55, R57
RD $\frac{1}{2}$ PS $\square\square\square$ JNL	R3, R6
RD $\frac{1}{2}$ PS $\square\square\square$ J	R4, R5, R8-R10, R23, R24, R29, R30
	R35, R49-R53, R16-R18
RD $\frac{1}{2}$ PS $\square\square\square$ J	R15
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R19-R22, R25-R28, R36, R37, R43, R44
	R46, R47
RD $\frac{1}{2}$ PSF $\square\square\square$ J	R31, R32
ACN-016	R33, R34
RT5B $\square\square\square$ K	R38, R58
ACN-017	R39-R42
RS2P $\square\square\square$ J	R45, R48
RN $\frac{1}{2}$ PT $\square\square\square\square$ G	R56
RS3P $\square\square\square$ J	R59, R60

OTHERS

Part No.	Symbol & Description
ATH-012	L1
AKC-067	Terminal 4P
AKR-013	Fuse holder
ANH-340	Heat sink
ANH-317	Heat sink

SEMICONDUCTORS

Part No.	Symbol & Description
2SA798/A/-F or G	Q1
2SC1775A-E or F	Q2, Q3, Q16
2SA899-V	Q4, Q11
(2SA899A-V)	
2SC1904-V	Q5, Q10
(2SC1904A-V)	
2SA733-Q or R	Q6, Q8
(2SA823-Q)	
2SC945A-Q or P	Q7, Q9
(2SC1649-P)	
2SD381A-L or K	Q12
2SB536A-L or K	Q13
2SC1624-O or Y	Q14
(2SD381-L,M or K)	
2SC1649-P	Q15
2SA814-O or Y	Q17
(2SB536-M,L or K)	
2SA834-P	Q18
2SA872A-E or F	Q19
1S2473	D1, D19-D24
(1S1555)	
SV-04	D2, D5
STV3H	D3, D4
1S2471	D6, D7
10E2	D10-D13
(1S1886)	
WZ-320	D14
SS5	D15, D17
SS5R	D16, D18
TH101-2	TH1, TH2