QUADRAPHONIC AMPLIFIER

QA—800/FVW

NOTE: Concerning the following, refer to:

1. Service manual of model QM-800 on page 15: packing method and parts,
2. Service manual of model QC-800 on pages 11 and 29: circuit description and parts list of Q unit (AWM-001), and
3. Service manual of model QC-800 on page 32: parts list of lever switch unit (AWS-002).

CONTENTS

1. SPECIFICATIONS

SEMICONDUCTORS

Transistors 51
Diodes 9

POWER AMPLIFIER SECTION

Music Power Output (IHF)	204W (4Ω) 144W (8Ω)
Continuous Power Output (2 channels driven)	34W + 34W/34W + 34W (4Ω) 27W + 27W/27W + 27W (8Ω)
Continuous Power Output (4 channels driven)	24W x 4 (4Ω) 20W x 4 (8Ω)
Power Output in the range of 20Hz to 20kHz (2 channels driven)	23W + 23W/23W + 23W (8Ω, Harmonic Distortion Less than 0.5%)
Harmonic Distortion	Less than 0.5% (Continuous power output)
Intermodulation Distortion	Less than 0.8% (Continuous power output)
Power Bandwidth (IHF)	15Hz to 50kHz (8Ω), 4 channels driven, Harmonic Distortion Less than 0.5%) 10Hz to 50kHz (8Ω, 2 channels driven, Harmonic Distortion Less than 0.5%)
Frequency Response	8Hz to 70kHz, ±1dB
Input Sensitivity/Impedance (1kHz, Continuous power output)	500mV/50kΩ
Speakers	4 to 16Ω
Phones Jacks	For [CH.1, CH.3] & [CH.2, CH.4]
Damping Factor	40 (8Ω, 1kHz)

PREAMPLIFIER SECTION

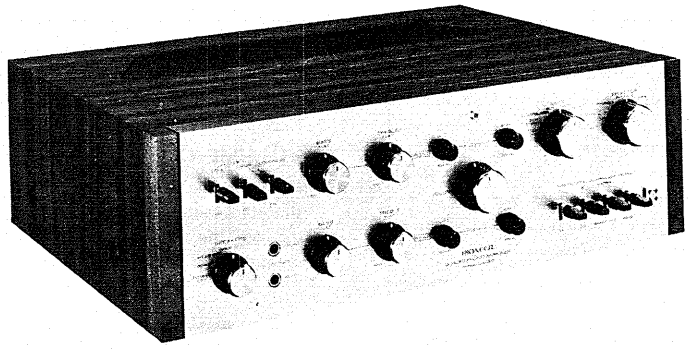
Output Voltage	500mV (Rated output)	
Harmonic Distortion	Less than 0.08%	
Frequency Response	20Hz to 40kHz, ±1dB	
Input Sensitivity/Impedance (1kHz, for rated output)	PHONO 1, 2	2.5mV/50kΩ (2 CH.)
	TUNER	200mV/100kΩ (4 CH.)
	AUX 1, 2	200mV/100kΩ (4 CH.)
	TAPE MONITOR 1, 2	200mV/100kΩ (4 CH.)
Recording Output	TAPE REC	1, 2 (Pin jack) 200mV (4 CH.)
BASS Control	−10dB, + 10dB/100Hz	
TREBLE Control	−10dB, + 10dB/10kHz	
LOW Filter	−10dB/50Hz	
HIGH Filter	−10dB/10kHz	
Equalization Curve	PHONO :	RIAA S.T.D.
Loudness Contour	+11dB/100Hz, + 7dB/10kHz with volume control set at −40dB position	
Muting	−20dB	
Hum and Noise (IHF)	PHONO	More than 80dB
	TUNER, AUX	More than 90dB
Channel Separation (1kHz)	PHONO	More than 40dB
	TUNER, AUX	More than 50dB

MISCELLANEOUS

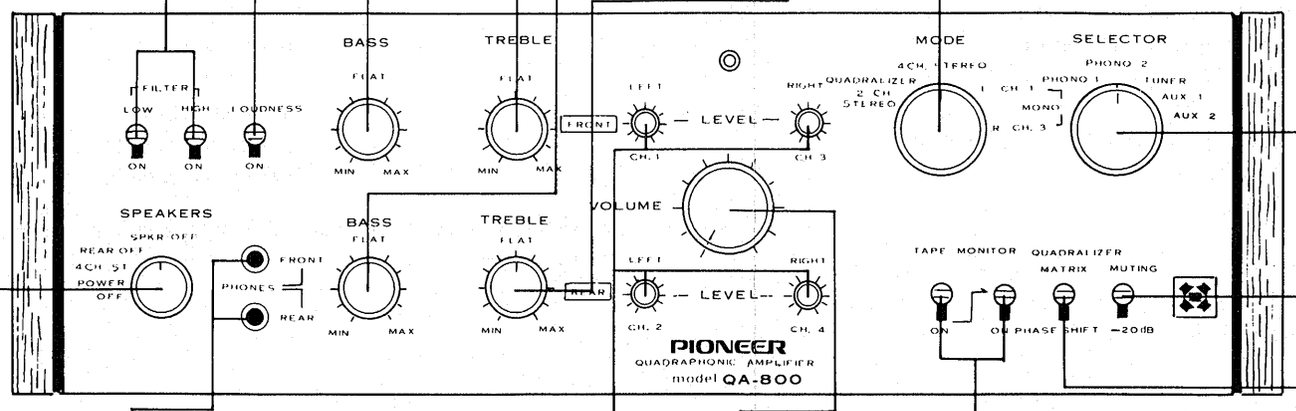
Power Requirements		110V, 120V, 130V, 220V and 240V. (Switchable) 50 – 60Hz
Power Consumption		400W (Max.)
Dimensions (overall)		16-$\frac{15}{16}$ in./430mm (width) 5-$\frac{11}{16}$ in./145mm (height) 13-$\frac{1}{4}$ in./337mm (depth)
Weight	Without package	24lb, /10.9kg
	With package	28lb,6oz/12.9kg
Furnished Accessories		

Pin Plug	8
Speaker Plug	6
Fuse (1.5A)	1
Fuse (3A)	2
Polishing Cloth	1
Operating Instructions	1
Connection cord (L, R)	2

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



2. FRONT PANEL FACILITIES



FILTERS

LOW – Use this filter to eliminate low-frequency interference, such as motor rumbling or hum.

HIGH – Use this filter to eliminate high-frequency interference, such as that from fluorescent lights.

LOUDNESS

To listen to quieter sound, set this to ON. This emphasizes the low and high notes. For normal listening, set it to OFF.

FRONT BASS CONTROL

Controls the bass of channels 1 and 3. Turning the control to the right will increase the tone, and to the left will decrease the tone.

FRONT TREBLE CONTROL

Controls the treble of channels 1 and 3. Use the control in the same way as FRONT BASS CONTROL.

REAR BASS CONTROL

Controls the bass of channels 2 and 4. Use the control in the same way as FRONT BASS CONTROL.

REAR TREBLE CONTROL

Controls the treble of channels 2 and 4. Use the control in the same way as FRONT BASS CONTROL.

MODE SWITCH

2 CH. STEREO ..... 2-channel stereo playback

QUADRALIZER ... 2-channel stereo program source is to be reproduced as a 4-channel stereo program through the provision of MATRIX or PHASE SHIFT system.

4 CH. STEREO ..... 4-channel stereo playback.

MONO L (CH. 1) .... Input signal for the FRONT LEFT (CH. 1) is to be reproduced through all four speaker systems.

MONO R (CH. 3) ... Input signal for the FRONT RIGHT (CH. 3) is to be reproduced through all four speaker systems.

SELECTOR SWITCH

PHONO 1 ..... For playing records by a turntable connected to the PHONO 1 jacks.

PHONO 2 ..... Same as above, for PHONO 2 jacks.

TUNER ..... For radio reception through a tuner.

AUX 1 ..... For playing signal source fed to the AUX 1 jacks.

AUX 2 ..... Same as above, for AUX 2 jacks.

MUTING SWITCH

With this switch set to –20dB position, the output level is attenuated by 20 dB at once.

QUADRALIZER SELECT SWITCH

Select either MATRIX or PHASE SHIFT system.

MATRIX ..... For a 4-channel stereo playback through MATRIX system from 2-channel input source.

PHASE SHIFT Depress the switch for a 4-channel stereo playback through PHASE SHIFT system from 2-channel input source.

SPEAKER SWITCH

POWER OFF – Turns the power off. Power supply to the AC OUTLET (SWITCHED) on the rear panel will also be cut off.

4 CH. ST – Turns the power on. All four speaker systems will be activated.

REAR OFF – Speaker systems in the rear will be deactivated.

SPKR OFF – All four speaker systems will be deactivated. Set the switch to this position when using headphones.

PHONES JACKS

For connecting stereo headphones.

With the plug connected to FRONT jack, you will hear the sound through the speaker system (CH. 1) in the left ear, and the sound through the speaker system (CH. 3) in the right ear.

With the plug connected to REAR jack, you will hear the sound through the speaker system (CH. 2) in the left ear, and the sound through the speaker system (CH. 4) in the right ear.

LEVEL CONTROLS (CH. 1, CH. 2, CH. 3, CH. 4)

Control the output level of each speaker sytem. Turn the control (CH. 1) to increase the level of the FRONT LEFT (CH. 1) speaker system. Likewise, turn the controls (CH. 2 to CH. 4) to increase the level of the corresponding speaker system.

VOLUME CONTROL

Controls the output volumes of all four channels simultaneously. Turning the control to the right will increase the volume, and to the left will decrease the volume.

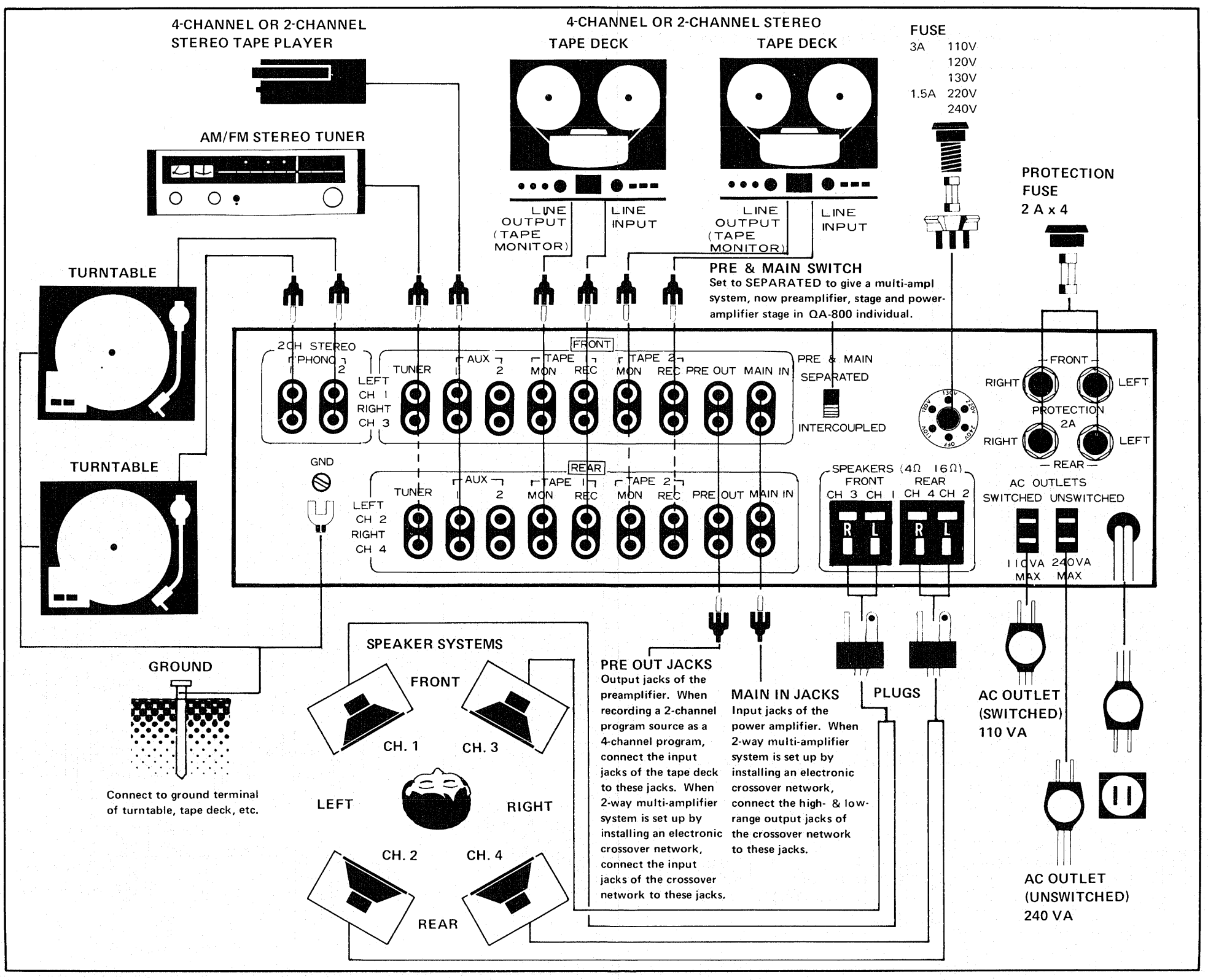
TAPE MONITOR SWITCHES (1 and 2)

These switches are set to ON for checking the recording conditions or for playback with tape decks.

1. This switch is set to ON for monitoring recording in progress or for playback with a tape deck connected to TAPE 1 MON jacks and TAPE 1 REC jacks.
2. This switch is set to ON for checking the recording conditions or for playback with a tape deck connected to TAPE 2 MON jacks and TAPE 2 REC jacks.

NOTE: For a record playing or radio reception, leave these switches set to the OFF position. With the switches set to ON, speakers will not operate.

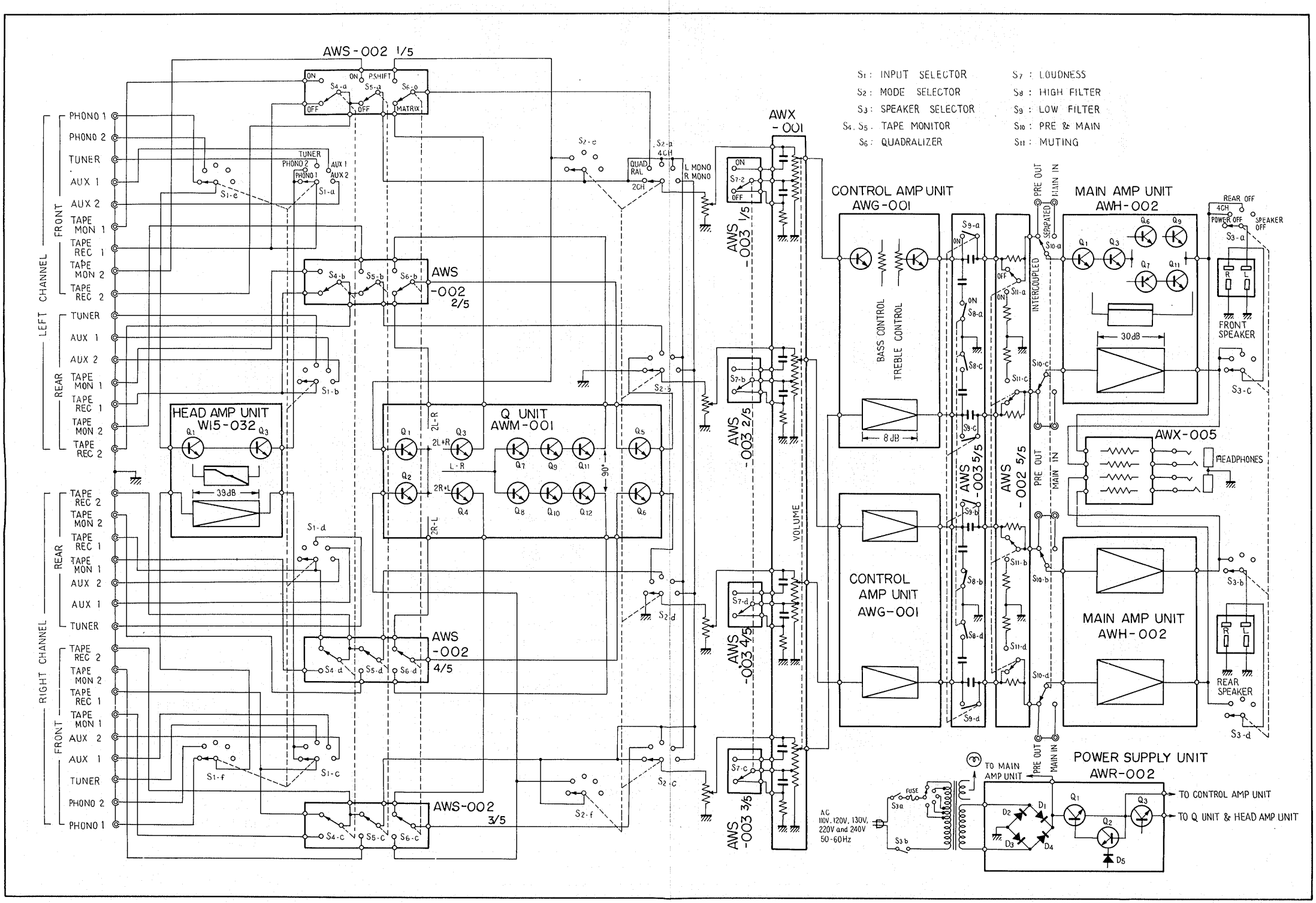
3. CONNECTION DIAGRAM



4. CIRCUIT DESCRIPTION

4-1 BLOCK DIAGRAM

The block diagram shows the signal path in the QA-800 as well as the auxiliary circuits such as the power supply.



4-2 LOW LEVEL INPUT CIRCUITS

Low level signals such as from a phono cartridge are supplied into the PHONO 1 and 2 input jacks.
Program sources are selected by the input selector S_1.

4-3 HEAD AMPLIFIER

The complete head amplifier is contained on PCB No. W15-032, consisting of two directly coupled circuits. The overall negative feedback loop circuit for equalization is connected from the collector of Q_3 to the emitter of Q_1.
The equalization characteristic is RIAA playback for PHONO.

4-4 HIGH LEVEL INPUTS AND CONTROL CIRCUITS

High level inputs such as AUX 1, 2 and TUNER are also selected by S_1. Input from tape deck and recording output signal (a head amplifier output or a direct output from a high level input) are switched by TAPE MONITOR switches (S_4 and S_5), respectively. The selected signal then passes to mode switch S_2, balance and volume controls.

5-5 CONTROL AMPLIFIER

This stage, consisting of two transistors and tone controls, is embodied on PCB No. AWG-001.
The top amplifier stage obtains stable, high impedance under all conditions.
Bass and treble control circuits are connected between collector and base of Q_3.

4-6 FILTER

The filter stage is embodied on PCB No. AWS-003.
Filter design uses an RC network of 6dB/oct.

4-7 POWER AMPLIFIER CIRCUIT

The power amplifier circuit assembled in the PCB No. AWH-002 consists of six transistors (Q_1, Q_3, Q_5, Q_7, Q_9 and Q_{11}) for each channel. Overall NFB is applied from output to the emitter of Q_1, thus improving distortion and frequency response. Transistors Q_3, Q_5, Q_7 Q_9 and Q_{11} are all direct coupled, stabilizing the circuit by applying NFB in both AC and DC. The thermistor stabilizes temperature characteristics.

4-8 POWER SUPPLY

Q_1 and Q_2 are a voltage regulator, supplying low-ripple rectified current to the control amplifier section.
The other voltage for the head amplifier and Q unit section is obtained from the voltage regulator through ripple filter Q3. For the power amplifier voltage is obtained from a bridge rectifier. All parts except the filter capacitor and power transformer are located on PCB No. AWR-002.

5. DISASSEMBLY

5-1 WOODEN CASE

Remove the 4 screws from the sides of the wooden case. Pull the case backward off the amplifier housing.

5-2 FRONT PANEL

Pull off all knobs, then remove nuts and washers from shafts as shown in Photo 2. The front panel can now be removed.

5-3 BOTTOM PLATE

The bottom plate can be removed after loosening the 8 screws.

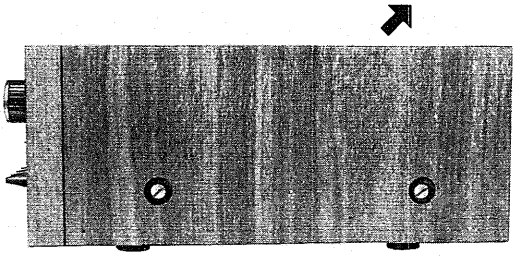


Photo 1

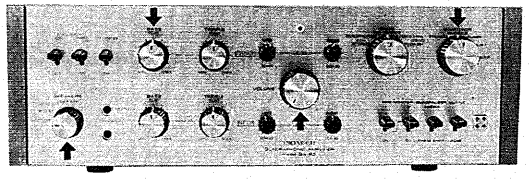


Photo 2

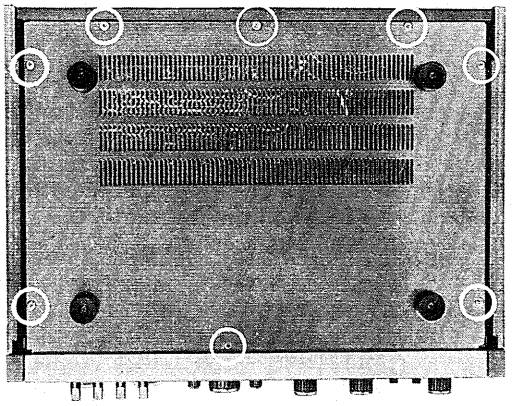
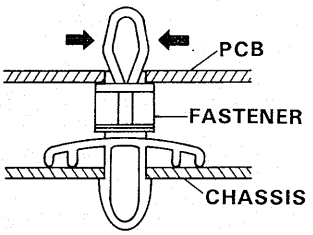


Photo 3

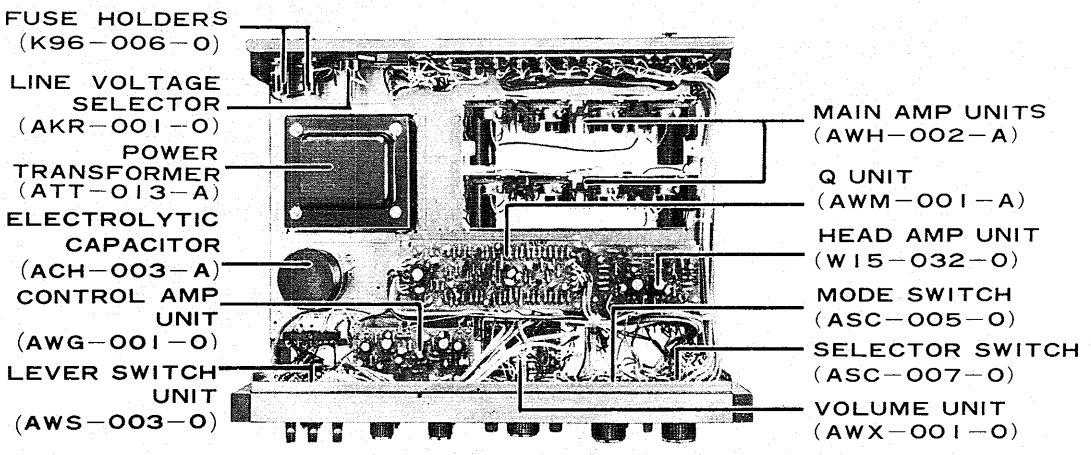
NOTE: When removing unit, please observe:

1. Don't simply pull unit up to remove, as this may damage hole or fastener boss. Damaged fastener cannot be repaired.
2. Squeeze upper part of fastener with small tweezers as indicated by arrows in illustration, then pull unit upward.
3. Fasteners once removed from chassis cannot be used again as they lose strength.

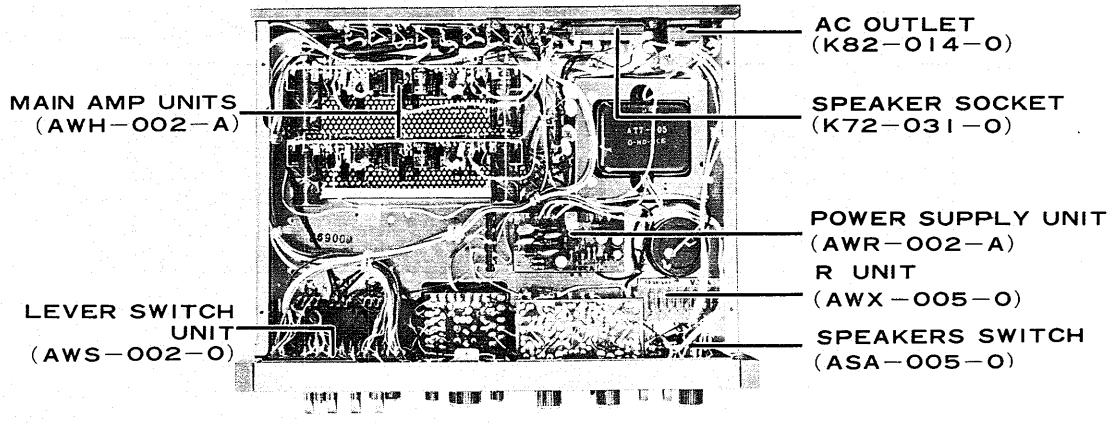


5-4 PARTS AND PCB LOCATION

TOP VIEW



BOTTOM VIEW



6. ALIGNMENT PROCEDURES

6-1 DC NEUTRAL VOLTAGE ALIGNMENT

a) Set all controls as follows:
INPUT SELECTOR . . . . . AUX 1
MODE SELECTOR . . . 4 CH. STEREO
TAPE MONITOR SWITCHES . . . . OFF
BASS, TREBLE CONTROLS . . . FLAT
LOUDNESS SWITCH . . . . . OFF
LOW, HIGH FILTER SWITCHES . . . . . OFF
MUTING SWITCH . . . . . OFF
PRE & MAIN SWITCH . . . . . SEPARATED
LEVEL AND VOLUME CONTROLS . . . . . MIN
SPEAKER SWITCH . . . . POWER OFF

b) Set SPEAKERS switch to 4 CH. STEREO position.

c) Connect voltmeter between Q_{11} collector and E_3 on PCB AWH-002.

d) Adjust VR_1 on PCB AWH-002 for 28V meter reading.

e) Connect voltmeter between Q_{12} collector and E_4 on PCB AWH-002.

f) Adjust VR_2 as in step (c).

6-2 IDLE CURRENT ADJUSTMENT

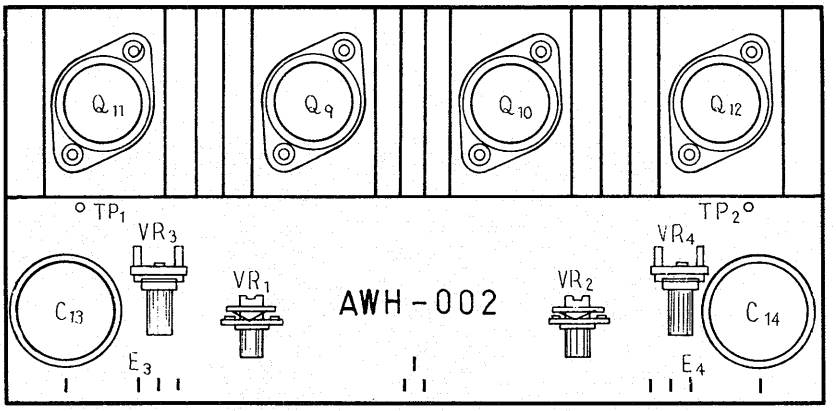
a) Set all controls as in 6-1 (a). Then:
- Connect AC cord to AC outlet.
- Set SPEAKERS switch to 4 CH. STEREO position.
- Allow a few minutes for amplifier to warm up.

b) Set voltmeter near 0.1V full scale range, connect between TP_1 and E_3 on PCB AWH-002.

c) Adjust VR_3 on PCB AWH-002 to obtain meter reading of 0.01V ± 20%.

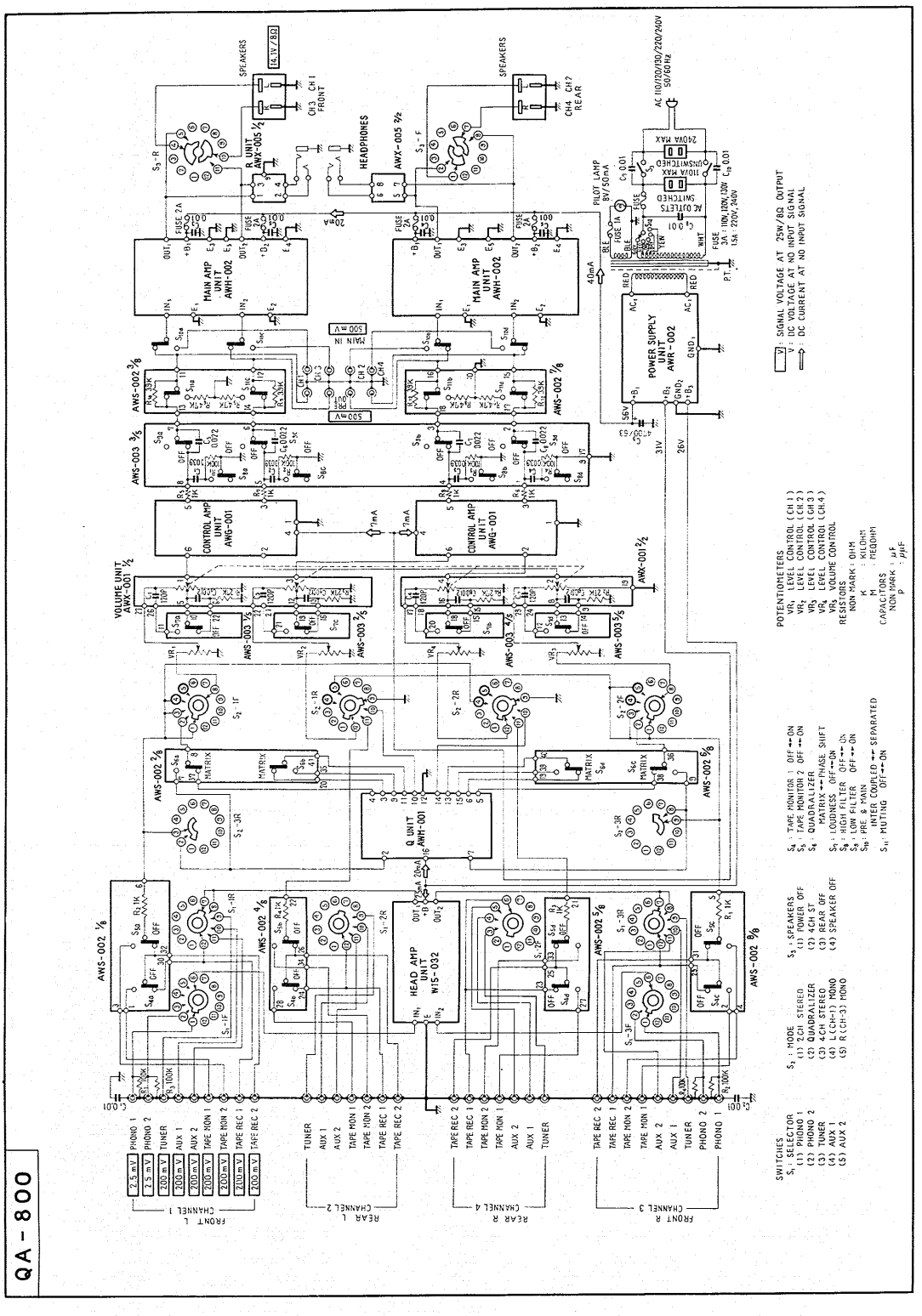
d) Connect voltmeter between TP_2 and E_4 on PCB AWH-002.

e) Adjust VR_4 as in step (c)

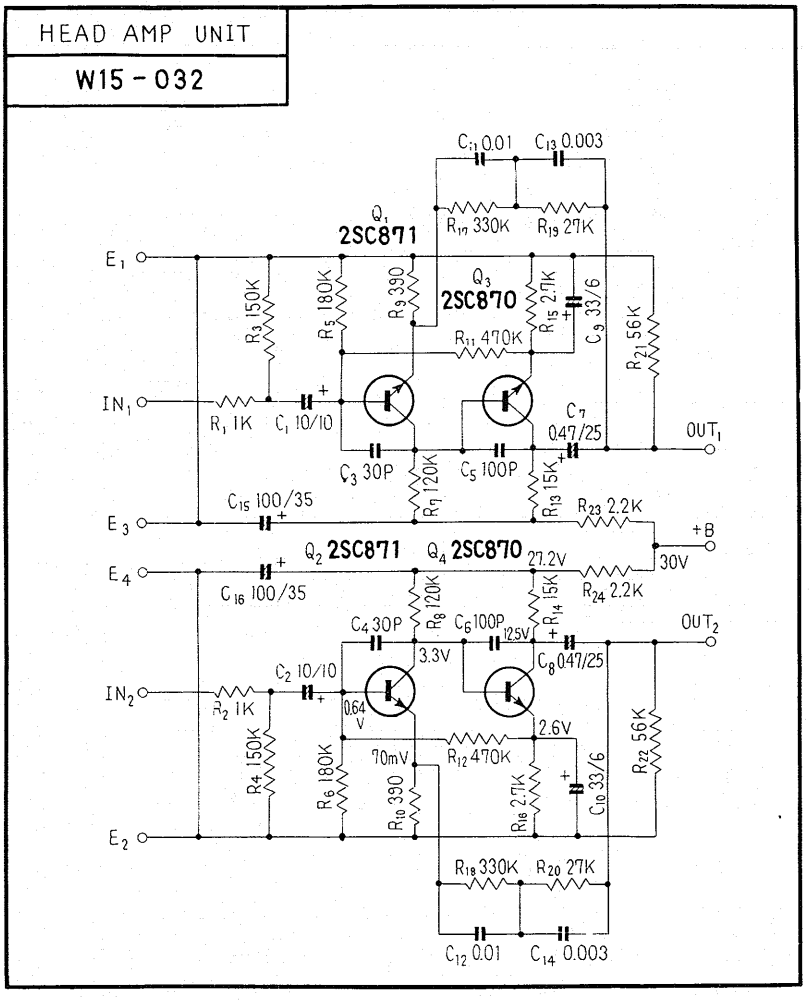


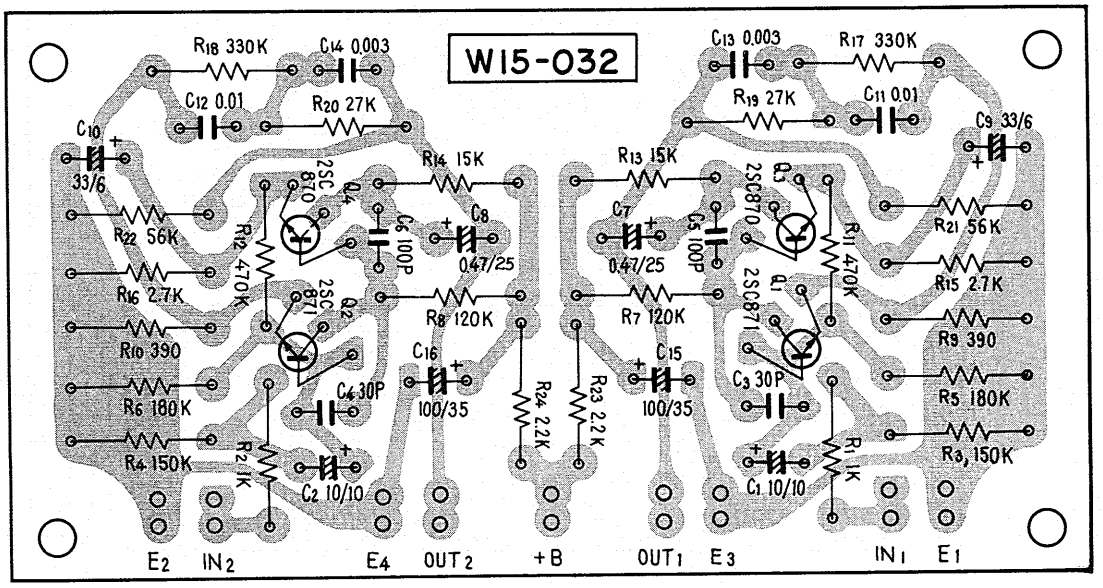
7. SCHEMATIC DIAGRAMS AND PCB PATTERNS

7-1 UNIT CONNECTION DIAGRAM

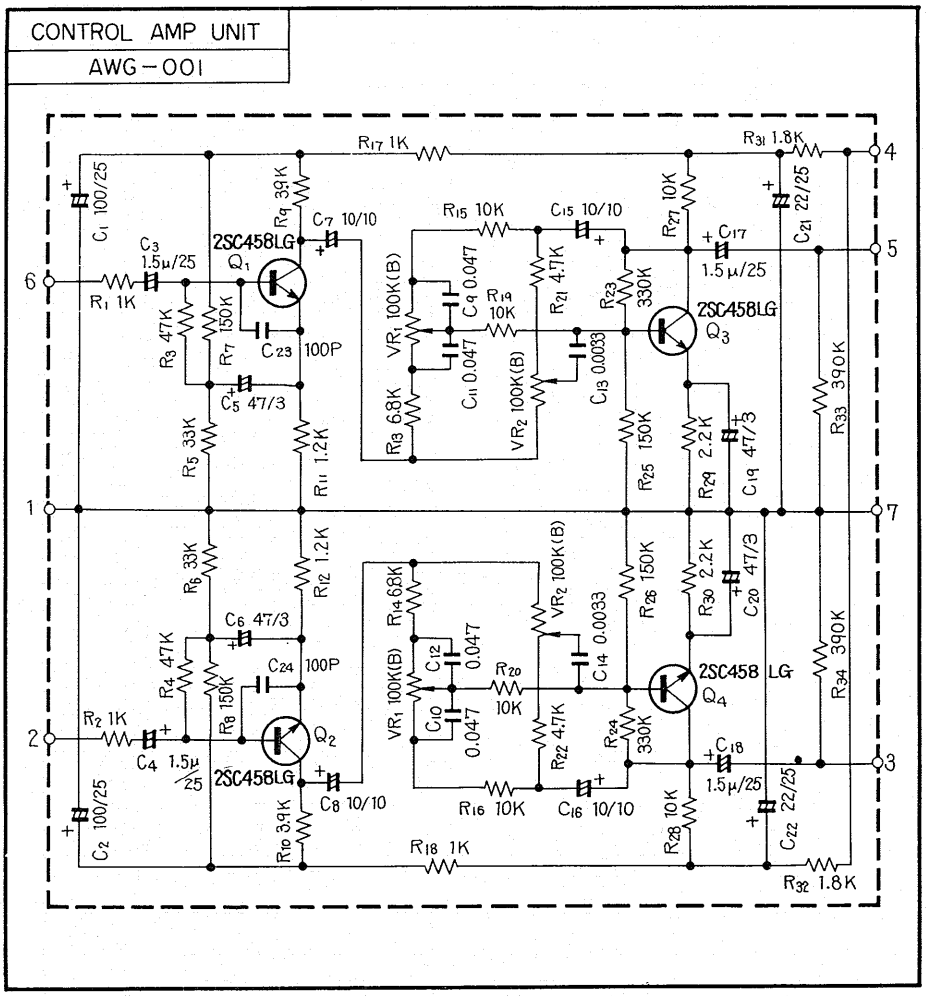


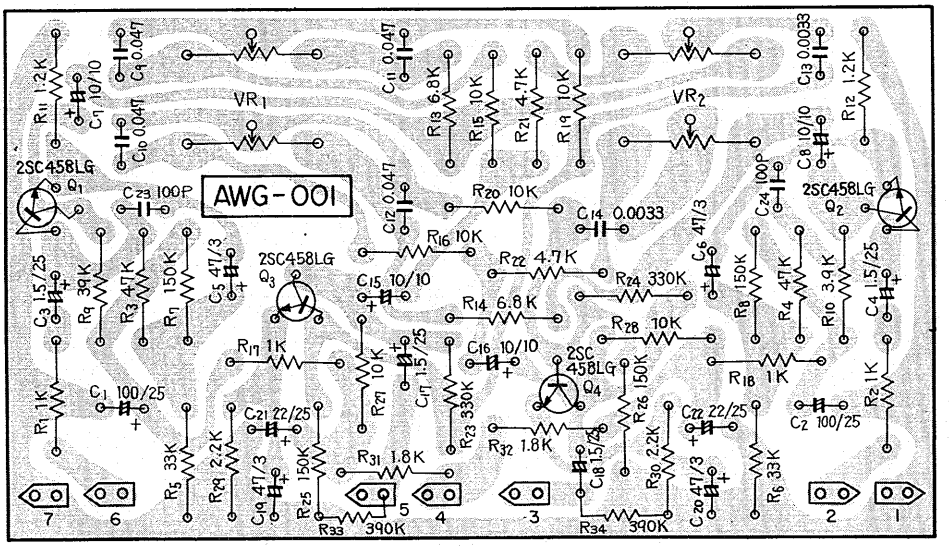
7-2 HEAD AMP UNIT (W15-032)

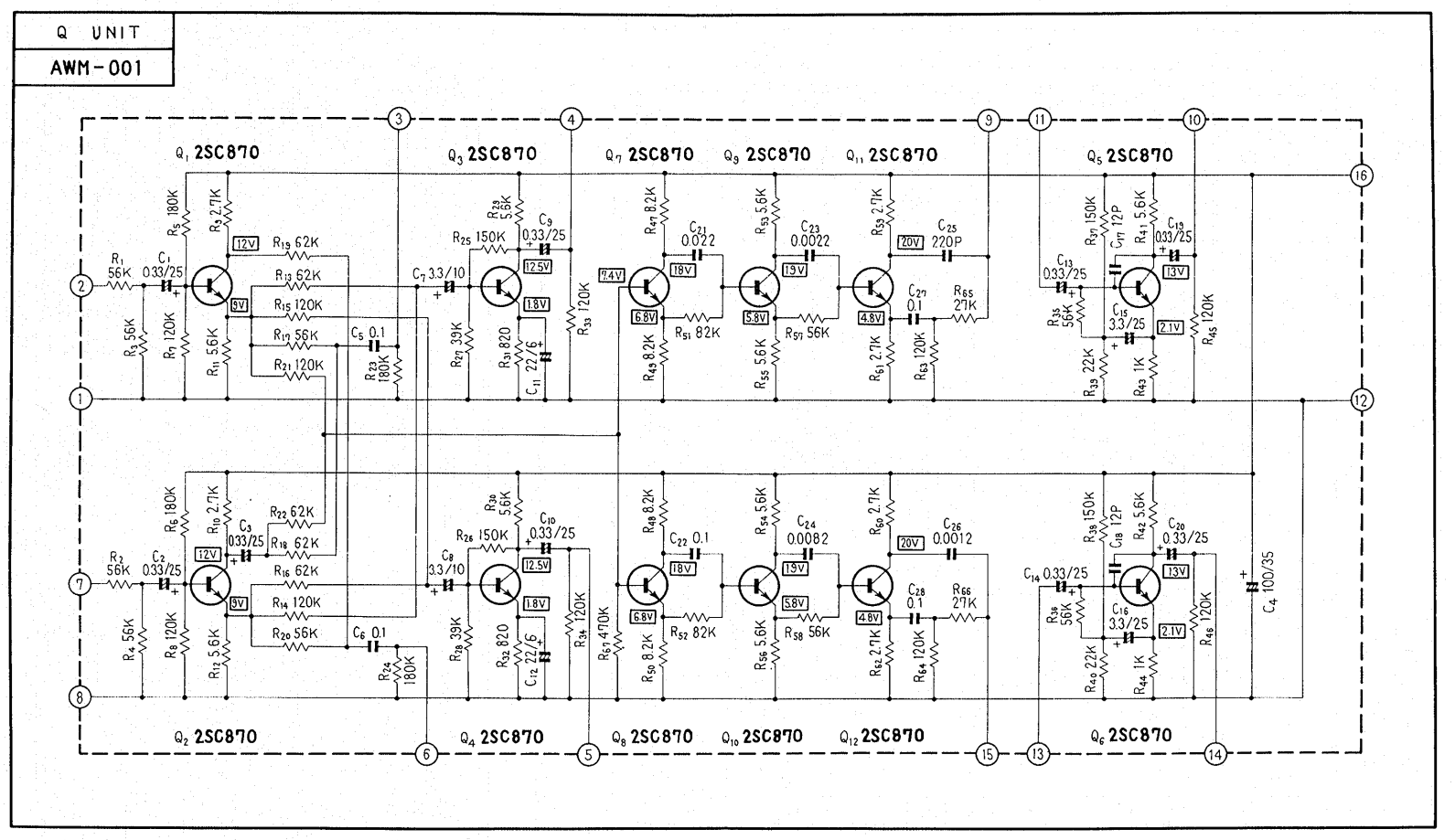




7-3 CONTROL AMP UNIT (AWG-001)

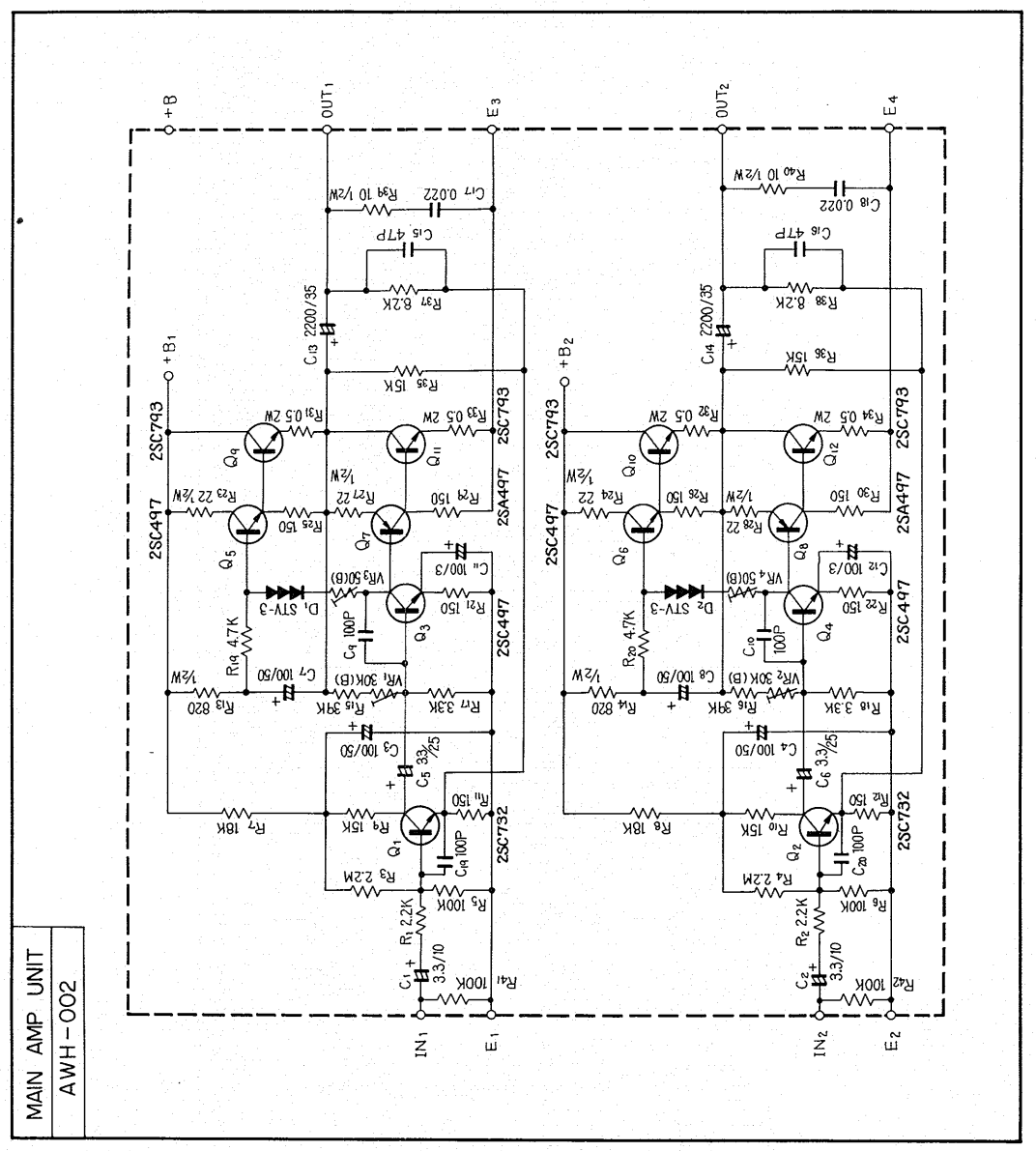


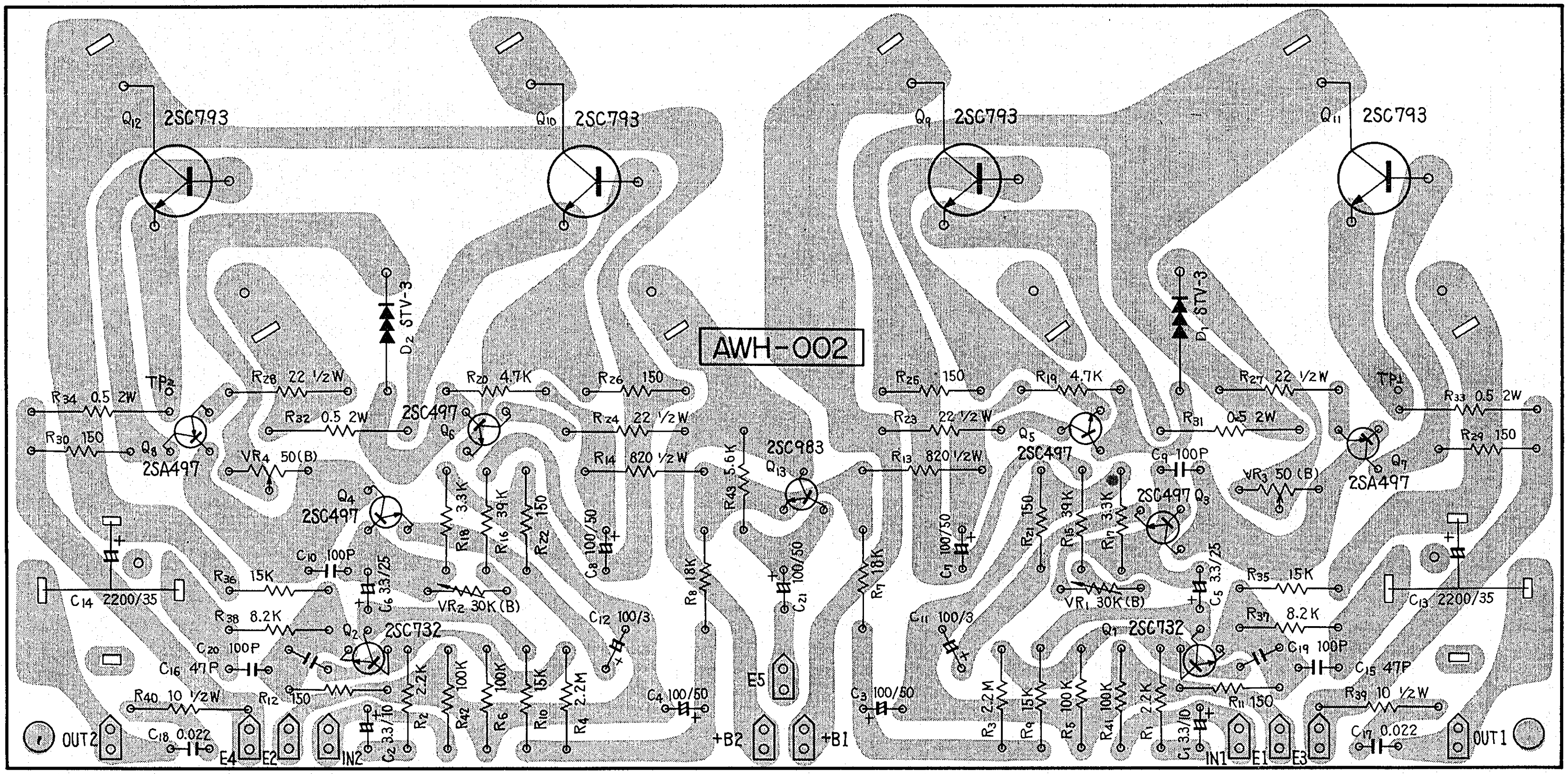



Q UNIT
AWM-001
Q1 2SC870
Q3 2SC870
Q7 2SC870
Q9 2SC870
Q11 2SC870
Q5 2SC870
Q2 2SC870
Q4 2SC870
Q8 2SC870
Q10 2SC870
Q12 2SC870
Q6 2SC870
R1 56K
R2 56K
R3 2.7K
R4 56K
R5 180K
R6 180K
R7 120K
R8 120K
R9 56K
R10 2.7K
R11 5.6K
R12 5.6K
R13 62K
R14 120K
R15 120K
R16 62K
R17 56K
R18 62K
R19 62K
R20 56K
R21 120K
R22 62K
R23 180K
R24 180K
R25 150K
R26 150K
R27 39K
R28 39K
R29 5.6K
R30 5.6K
R31 820
R32 820
R33 120K
R34 470K
R35 150K
R36 56K
R37 12P
R38 56K
R39 22K
R40 22K
R41 5.6K
R42 5.6K
R43 1K
R44 1K
R45 120K
R46 120K
R47 8.2K
R48 8.2K
R49 8.2K
R50 8.2K
R51 82K
R52 82K
R53 5.6K
R54 5.6K
R55 5.6K
R56 5.6K
R57 56K
R58 56K
R59 2.7K
R60 2.7K
R61 2.7K
R62 2.7K
R63 120K
R64 120K
R65 27K
R66 27K
C1 0.33/25
C2 0.33/25
C3 0.33/25
C4 100/35
C5 0.1
C6 0.1
C7 3.3/10
C8 3.3/10
C9 0.33/25
C10 0.33/25
C11 22/6
C12 22/6
C13 0.33/25
C14 0.33/25
C15 3.3/25
C16 3.3/25
C17 12P
C18 12P
C19 0.33/25
C20 0.33/25
C21 0.022
C22 0.1
C23 0.0022
C24 0.0082
C25 220P
C26 0.0012
C27 0.1
C28 0.1
12V
9V
7.4V
6.8V
18V
12.5V
1.8V
19V
5.8V
20V
4.8V
13V
2.1V

AWM-001
8 7 6 5 4 3 2 1
16 15 14 13 12 11 10 9
Q1 2SC870
Q2 2SC870
Q3 2SC870
Q4 2SC870
Q5 2SC870
Q6 2SC870
Q7 2SC870
Q8 2SC870
Q9 2SC870
Q10 2SC870
Q11 2SC870
Q12 2SC870
R1 56K
R2 56K
R3 56K
R4 56K
R5 180K
R6 180K
R7 120K
R8 120K
R9 2.7K
R10 2.7K
R11 5.6K
R12 5.6K
R13 62K
R14 120K
R15 120K
R16 62K
R17 56K
R18 62K
R19 62K
R20 56K
R21 120K
R22 62K
R23 180K
R24 180K
R25 150K
R26 150K
R27 39K
R28 39K
R29 5.6K
R30 5.6K
R31 820
R32 820
R33 120K
R34 120K
R35 56K
R36 56K
R37 150K
R38 150K
R39 22K
R40 22K
R41 5.6K
R42 5.6K
R43 1K
R44 1K
R45 120K
R46 120K
R47 8.2K
R48 8.2K
R49 8.2K
R50 8.2K
R51 82K
R52 82K
R53 5.6K
R54 5.6K
R55 5.6K
R56 5.6K
R57 56K
R58 56K
R59 2.7K
R60 2.7K
R61 2.7K
R62 2.7K
R63 120K
R64 120K
R65 27K
R66 27K
R67 470K
R68 470K
C1 0.33/25
C2 0.33/25
C3 0.33/25
C4 100/35
C5 0.1
C6 0.1
C7 3.3/10
C8 3.3/10
C9 0.33/25
C10 0.33/25
C11 22/6
C12 22/6
C13 0.33/25
C14 0.33/25
C15 3.3/25
C16 3.3/25
C17 12P
C18 12P
C19 0.33/25
C20 0.33/25
C21 0.022
C22 0.1
C23 0.0022
C24 0.0082
C25 220P
C26 0.0012
C27 0.1
C28 0.1

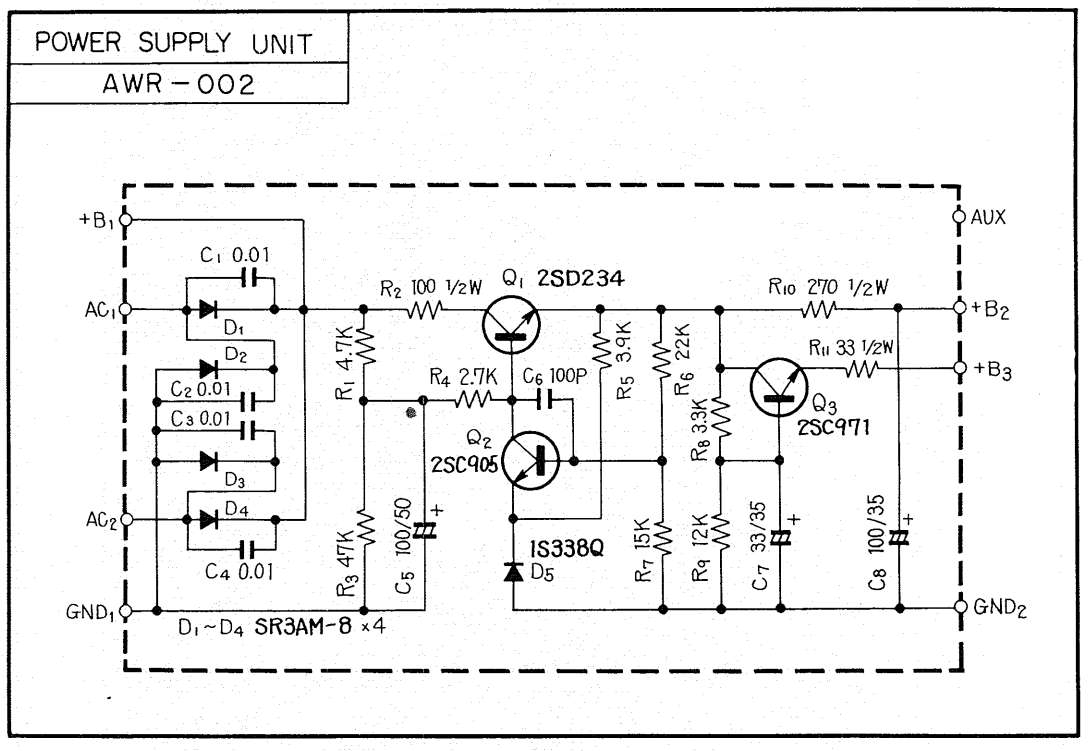
7-5 MAIN AMP UNIT (AWH-002)

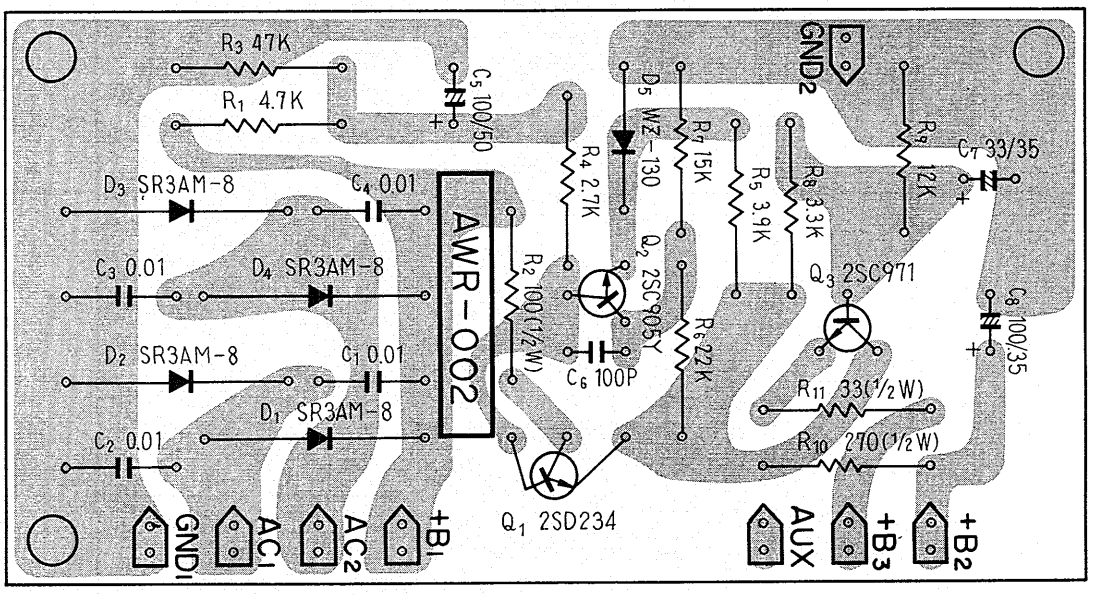




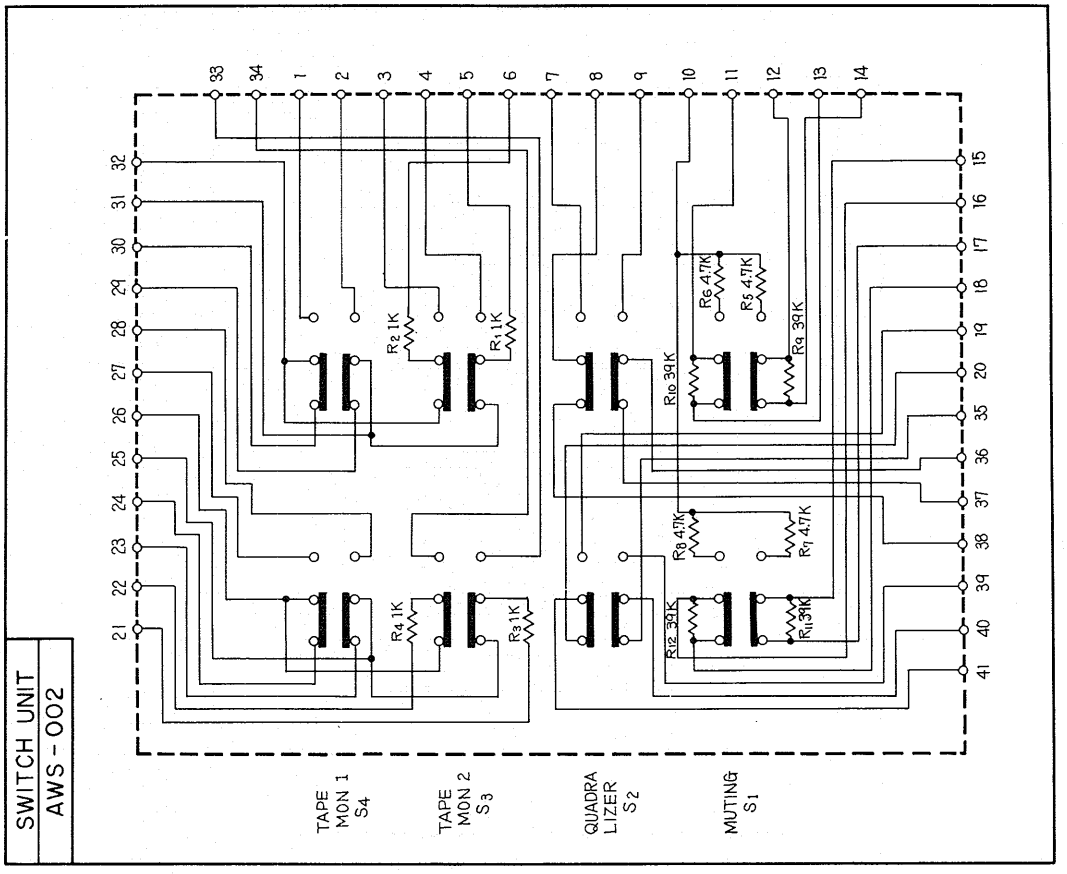
AWH-002
Q12 2SC793
Q10 2SC793
Q9 2SC793
Q11 2SC793
D2 STV-3
D1 STV-3
TP2
TP1
R34 0.5 2W
R30 150
R28 22 1/2W
R32 0.5 2W
Q8
2SA497
VR4 50(B)
R20 4.7K
2SC497
Q6
R26 150
R24 22 1/2W
R14 820 1/2W
Q4
2SC497
R18 3.3K
R16 39K
R22 150
C8 100/50
R43 5.6K
2SC983
Q13
C21 100/50
R8 18K
R7 18K
R25 150
R23 22 1/2W
R13 820 1/2W
R19 4.7K
Q5
2SC497
R27 22 1/2W
R31 0.5 2W
C9 100P
VR3 50 (B)
2SC497 Q3
R33 0.5 2W
R29 150
Q7
2SA497
C7 100/50
R21 150
R15 39K
R17 3.3K
C14 2200/35
C13 2200/35
R36 15K
C10 100P
C6 3.3/25
VR2 30K (B)
R38 8.2K
Q2 2SC732
C20 100P
C16 47P
C12 100/3
R40 10 1/2W
R12 150
R2 2.2K
R42 100K
R6 100K
R10 15K
R4 2.2M
C2 3.3/10
C4 100/50
C3 100/50
E5
+B2
+B1
R35 15K
C5 3.3/25
VR1 30K (B)
C11 100/3
R37 8.2K
Q1 2SC732
C19 100P
C15 47P
R39 10 1/2W
R11 150
R3 2.2M
R9 15K
R5 100K
R41 100K
R1 2.2K
C1 3.3/10
C18 0.022
C17 0.022
OUT2
E4
E2
IN2
IN1
E1
E3
OUT1

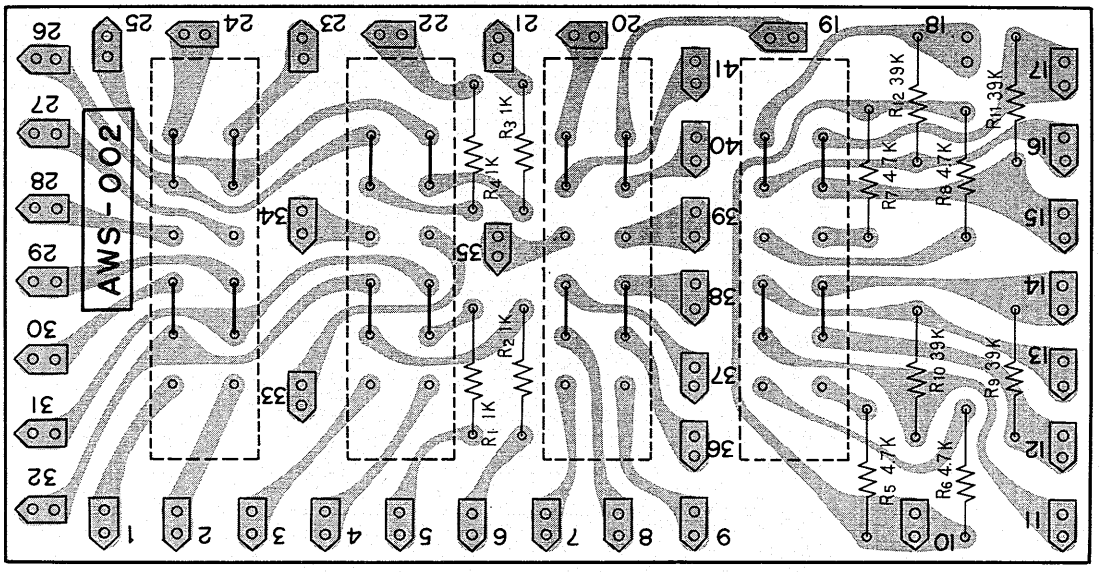
7-6 POWER SUPPLY UNIT (AWR-002)



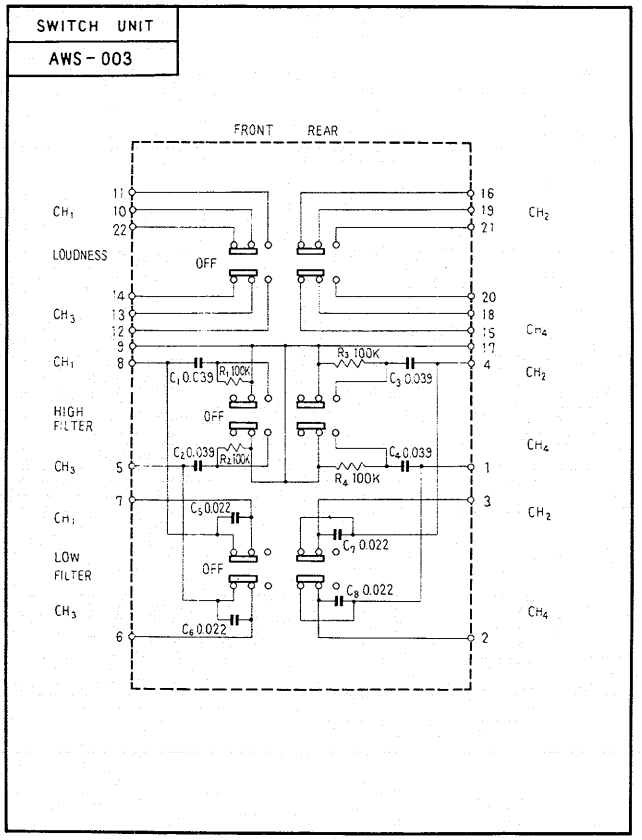


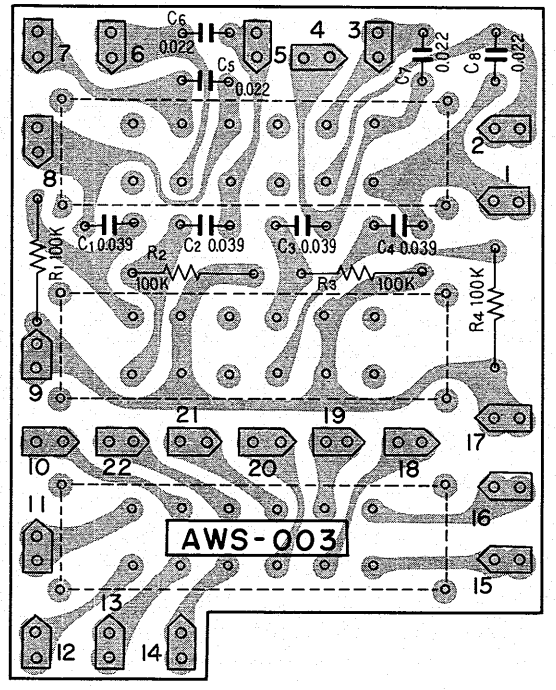
7-7 LEVER SWITCH UNIT (AWS-002)



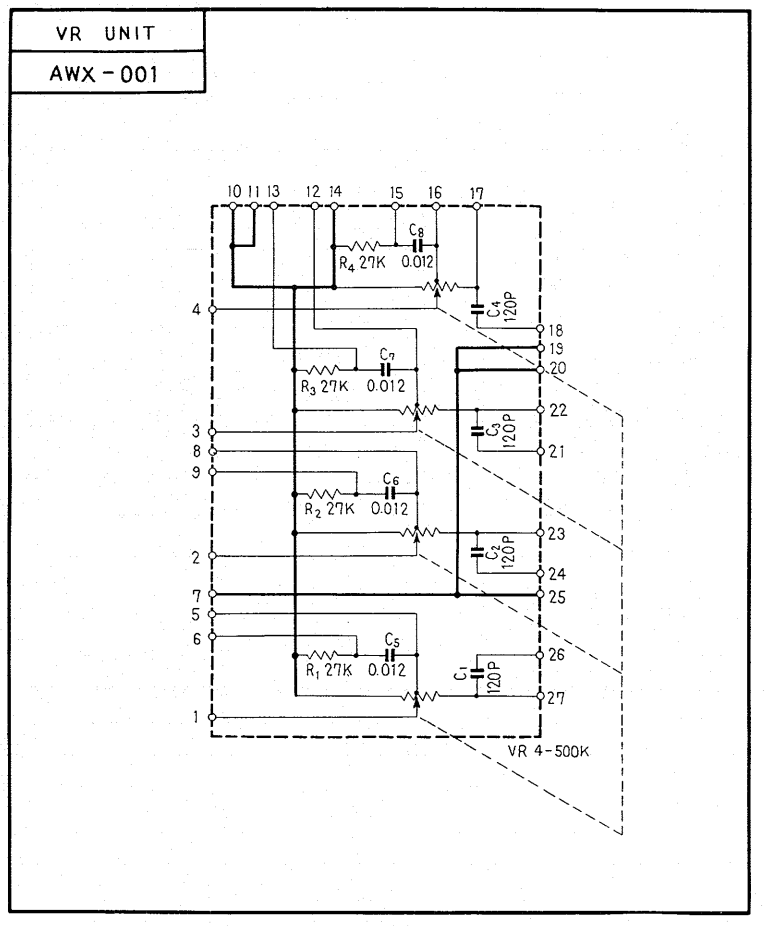


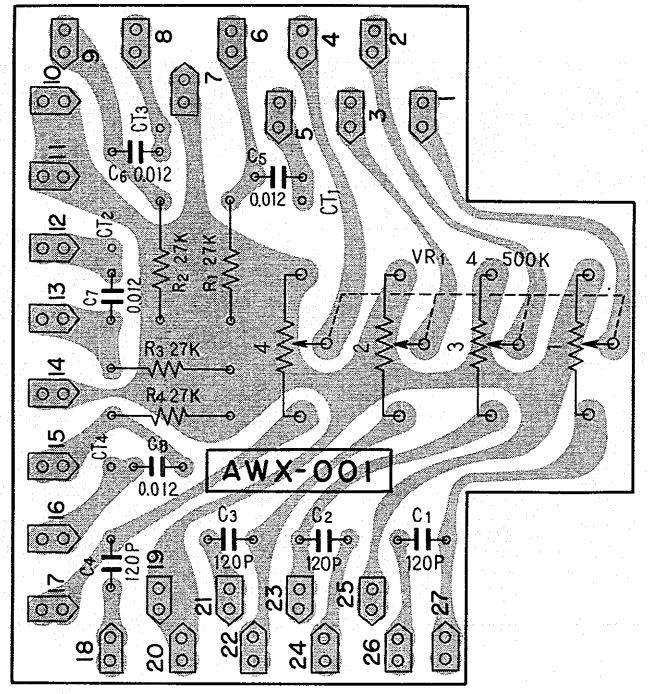
7-8 LEVER SWITCH UNIT (AWS-003)



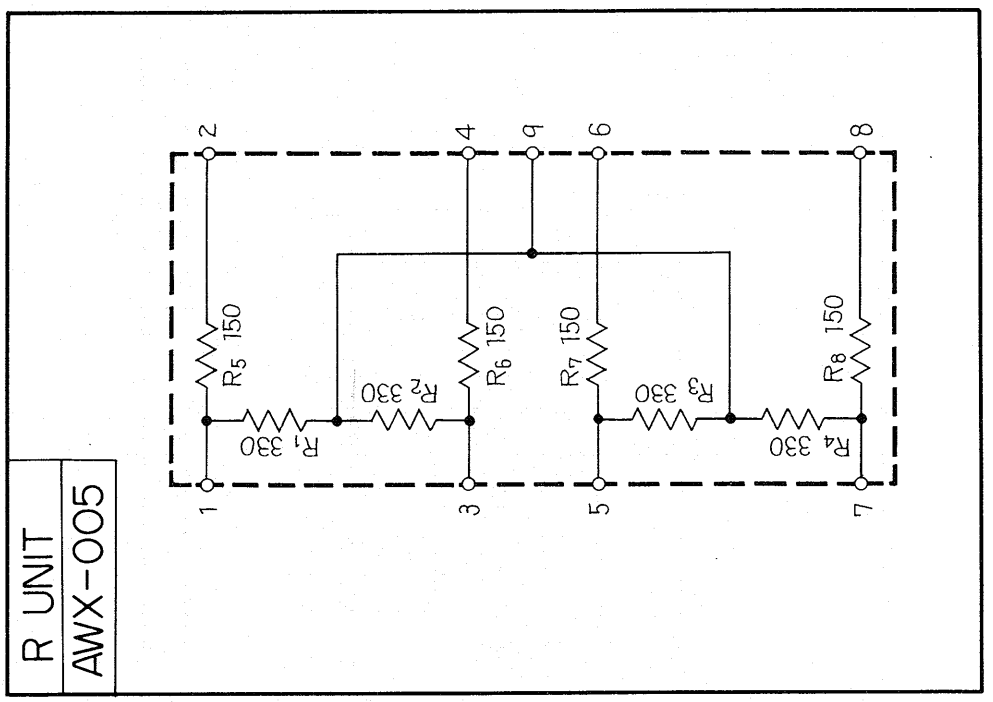


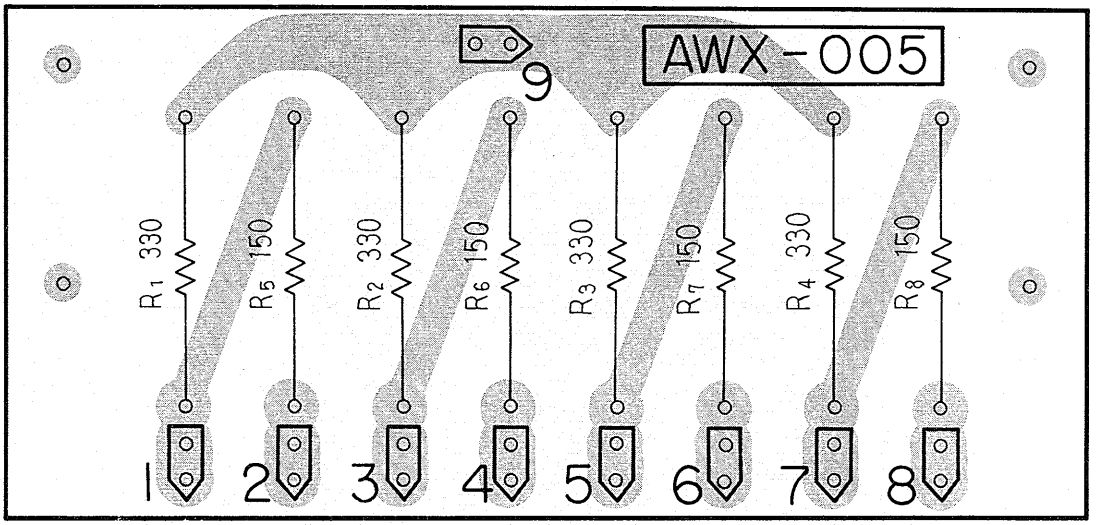
7-9 VOLUME UNIT (AWX-001)





7-10 R UNIT (AWX-005)





8. PARTS LIST

8-1 MISCELLANEOUS PARTS

CAPACITORS

IN μF UNLESS OTHERWISE NOTED. p: μμF.

Symbol	Description			Part No.	
C1	Ceramic	0.01	50V	CKDYF 103Z 50	
C2	Ceramic	0.01	50V	CKDYF 103Z 50	
C3	Ceramic	0.01	DC 1.4kV	C43-003-0	
C4	Ceramic	0.01	DC 1.4kV	C43-003-0	
C5	Ceramic	0.01	DC 1.4kV	C43-003-0	
C6	Ceramic	0.01	DC 1.4kV	C43-003-0	
C7	Ceramic	0.01	DC 1.4kV	C43-003-0	
C8	Ceramic	0.01	DC 1.4kV	C43-003-0	
C9	Electrolytic	4700	63V	ACH-003-A	
C10	Ceramic	0.01	DC 1.4kV	C43-003-0	

RESISTORS

IN Ω, ¼W UNLESS OTHERWISE NOTED. k: kΩ, M: MΩ.

Symbol	Description		Part No.	
R1	Carbon film	100k	RD¼PS 104K	
R2	Carbon film	100k	RD¼PS 104K	
R3	Carbon film	100k	RD¼PS 104K	
R4	Carbon film	100k	RD¼PS 104K	
R5	Carbon film	1k	RD¼PW 102KNL	
R6	Carbon film	1k	RD¼PW 102KNL	
R7	Carbon film	1k	RD¼PW 102KNL	
R8	Carbon film	1k	RD¼PW 102KNL	

SWITCHES

Symbol	Description	Part No.	
S1	SELECTOR switch	ASC-007-0	
S2	MODE switch	ASC-005-0	
S3	SPEAKERS switch	ASA-005-0	
S10	PRE & MAIN switch	ASH-001-0	

OTHERS

Symbol	Description	Part No.	
	Head amp unit	W15-032-0	
	Control amp unit	AWG-001-0	
	Main amp unit	AWH-002-B	
	Q unit	AWM-001-A	
	Power supply unit	AWR-002-0	
	Lever switch unit	AWS-002-0	
	Lever switch unit	AWS-003-0	
	Volume unit	AWX-001-0	
	R unit	AWX-005-0	
	Wooden case	M52-139-C	
	Front panel ass'y	ANB-066-0	
	Foot	AEC-012-0	
	Knob for volume, selector and mode	A12-229-A	
	Knob for bass, treble and speakers	A12-232-A	
	Knob for level control	A12-241-A	
	Knob for lever switch	A19-095-A	
	Quadraphonic badge	AAM-003-A	
	4P input terminal board	K21-010-E	
	18P input terminal board	AKB-001-0	
	4P ground terminal	K13-047-0	

Symbol	Description	Part No.	
	Pilot lamp	E22-020-0	
	Fuse 2A for protection	E21-035-A	
	Fuse 1A for protection	E21-020-0	
	Fuse 1.5A	E21-012-0	
	Spare AC outlet	K82-014-0	
	Speaker socket	K72-031-0	
	Fuse holder	K96-006-0	
	Fuse holder	AKR-001-0	
	Headphones jack	K72-026-0	
	Pilot lamp socket	K42-003-A	
	AC power cord	D11-002-B	
	Short pin plug	K71-028-0	
	Packing case	AHD-017-0	
	Protector for packing	H11-070-B	
	Screw to fix wooden case	B11-041-A	
	Screw for grounding	B11-012-A	
	Operating instructions	ARB-014-0	
	Connection cord(white)	D51-003-B	
	Connection cord(red)	D51-004-B	
	Pin plug	K72-015-A	
	Fuse 3A	E21-006-0	
	Speaker plug	K72-007-B	
	Power transformer	ATT-013-A	

POTENTIOMETERS

Symbol	Description	Part No.	
VR1	Level control, 500k-B	ACV-004-0	
VR2	Level control, 500k-B	ACV-004-0	
VR3	Level control, 500k-B	ACV-004-0	
VR4	Level control, 500k-B	ACV-004-0	

8-2 HEAD AMP UNIT (W15-032)

CAPACITORS

Symbol	Description			Part No.	
C1	Electrolytic	10	10V	CEA 100P 10	
C2	Electrolytic	10	10V	CEA 100P 10	
C3	Ceramic	30p	50V	CCDSL 300K 50	
C4	Ceramic	30p	50V	CCDSL 300K 50	
C5	Ceramic	100p	50V	CCDSL 101K 50	
C6	Ceramic	100p	50V	CCDSL 101K 50	
C7	Electrolytic	0.47	25V	CSSA R47M 25	
C8	Electrolytic	0.47	25V	CSSA R47M 25	
C9	Electrolytic	33	6V	CEA 330P 6	
C10	Electrolytic	33	6V	CEA 330P 6	
C11	Mylar	0.01	50V	CQMA 103M 50	
C12	Mylar	0.01	50V	CQMA 103M 50	
C13	Mylar	0.003	50V	CQMA 302M 50	
C14	Mylar	0.003	50V	CQMA 302M 50	
C15	Electrolytic	100	35V	CEA 101P 35	
C16	Electrolytic	100	35V	CEA 101P 35	
C17	Ceramic	100p	50V	CCDSL 101K 50	
C18	Ceramic	100p	50V	CCDSL 101K 50	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	1k	RD¼PS 102K	
R2	Carbon film	1k	RD¼PS 102K	
R3	Carbon film	150k	RD¼PS 154K	
R4	Carbon film	150k	RD¼PS 154K	
R5	Carbon film	180k	RD¼PS 184K	

Symbol	Description	Part No.	
R6	Carbon film 180k	RD¼PS 184K	
R7	Carbon film 120k	RD¼PS 124K	
R8	Carbon film 120k	RD¼PS 124K	
R9	Carbon film 390	RD¼PS 391K	
R10	Carbon film 390	RD¼PS 391K	
R11	Carbon film 470k	RD¼PS 474K	
R12	Carbon film 470k	RD¼PS 474K	
R13	Carbon film 15k	RD¼PS 153K	
R14	Carbon film 15k	RD¼PS 153K	
R15	Carbon film 2.7k	RD¼PS 272K	
R16	Carbon film 2.7k	RD¼PS 272K	
R17	Carbon film 330k	RD¼PS 334K	
R18	Carbon film 330k	RD¼PS 334K	
R19	Carbon film 27k	RD¼PS 273K	
R20	Carbon film 27k	RD¼PS 273K	
R21	Carbon film 56k	RD¼PS 563K	
R22	Carbon film 56k	RD¼PS 563K	
R23	Carbon film 2.2k	RD¼PS 222K	
R24	Carbon film 2.2k	RD¼PS 222K	

TRANSISTORS

Symbol	Description	Part No.	
Q1	2SC871 GR or BL		
Q2	2SC871 GR or BL		
Q3	2SC870		
Q4	2SC870		

8-3 CONTROL AMP UNIT (AWG-001)

CAPACITORS

Symbol	Description	Part No.	
C1	Electrolytic 100 25V	CEA 101P 25	
C2	Electrolytic 100 25V	CEA 101P 25	
C3	Electrolytic 1.5 25V	CSSA 1R5X 25	
C4	Electrolytic 1.5 25V	CSSA 1R5X 25	
C5	Electrolytic 47 3V	CEA 470P 3	
C6	Electrolytic 47 3V	CEA 470P 3	
C7	Electrolytic 10 16V	CEA 100P 16	
C8	Electrolytic 10 16V	CEA 100P 16	
C9	Mylar 0.047 50V	CQMA 473M 50	
C10	Mylar 0.047 50V	CQMA 473M 50	
C11	Mylar 0.047 50V	CQMA 473M 50	
C12	Mylar 0.047 50V	CQMA 473M 50	
C13	Mylar 0.0033 50V	CQMA 332M 50	
C14	Mylar 0.0033 50V	CQMA 332M 50	
C15	Electrolytic 10 16V	CEA 100P 16	
C16	Electrolytic 10 16V	CEA 100P 16	
C17	Electrolytic 1.5 25V	CSSA 1R5X 25	
C18	Electrolytic 1.5 25V	CSSA 1R5X 25	
C19	Electrolytic 47 3V	CEA 470P 3	
C20	Electrolytic 47 3V	CEA 470P 3	
C21	Electrolytic 22 25V	CEA 220P 25	
C22	Electrolytic 22 25V	CEA 220P 25	
C23	Ceramic 100p 50V	CCDSL 101K 50	
C24	Ceramic 100p 50V	CCDSL 101K 50	

RESISTORS

Symbol	Description	Part No.	
R1	Carbon film 1k	RD¼PS 102K	
R2	Carbon film 1k	RD¼PS 102K	
R3	Carbon film 47k	RD¼PS 473K	
R4	Carbon film 47k	RD¼PS 473K	
R5	Carbon film 33k	RD¼PS 333K	
R6	Carbon film 33k	RD¼PS 333K	
R7	Carbon film 150k	RD¼PS 154K	
R8	Carbon film 150k	RD¼PS 154K	
R9	Carbon film 3.9k	RD¼PS 392K	
R10	Carbon film 3.9k	RD¼PS 392K	
R11	Carbon film 1.2k	RD¼PS 122K	
R12	Carbon film 1.2k	RD¼PS 122K	
R13	Carbon film 6.8k	RD¼PS 682K	
R14	Carbon film 6.8k	RD¼PS 682K	
R15	Carbon film 10k	RD¼PS 103K	
R16	Carbon film 10k	RD¼PS 103K	
R17	Carbon film 1k	RD¼PS 102K	
R18	Carbon film 1k	RD¼PS 102K	
R19	Carbon film 10k	RD¼PS 103K	
R20	Carbon film 10k	RD¼PS 103K	
R21	Carbon film 4.7k	RD¼PS 472K	
R22	Carbon film 4.7k	RD¼PS 472K	
R23	Carbon film 330k	RD¼PS 334K	
R24	Carbon film 330k	RD¼PS 334K	
R25	Carbon film 150k	RD¼PS 154K	
R26	Carbon film 150k	RD¼PS 154K	
R27	Carbon film 10k	RD¼PS 103K	
R28	Carbon film 10k	RD¼PS 103K	
R29	Carbon film 2.2k	RD¼PS 222K	
R30	Carbon film 2.2k	RD¼PS 222K	
R31	Carbon film 1.8k	RD¼PS 182K	
R32	Carbon film 1.8k	RD¼PS 182K	
R33	Carbon film 390k	RD¼PS 394K	
R34	Carbon film 390k	RD¼PS 394K	
VR1	Bass control, 100k - B	C82-050-0	
VR2	Treble control, 100k - B	C82-050-0	

TRANSISTORS

Symbol	Description	Part No.	
Q1	2SC458LG-B or C		
Q2	2SC458LG-B or C		
Q3	2SC458LG-B or C		
Q4	2SC458LG-B or C		

8-4 MAIN AMP UNIT (AWH-002)

CAPACITORS

Symbol	Description	Part No.	
C1	Electrolytic 3.3 10V	CEA 3R3P 10	
C2	Electrolytic 3.3 10V	CEA 3R3P 10	
C3	Electrolytic 100 50V	CEA 101P 50	
C4	Electrolytic 100 50V	CEA 101P 50	
C5	Electrolytic 3.3 25V	CEA 3R3P 25	
C6	Electrolytic 3.3 25V	CEA 3R3P 25	
C7	Electrolytic 100 50V	CEA 101P 50	
C8	Electrolytic 100 50V	CEA 101P 50	
C9	Ceramic 100p 50V	CCDSL 101K 50	
C10	Ceramic 100p 50V	CCDSL 101K 50	

Symbol	Description			Part No.	
C11	Electrolytic	100	6V	CEA 101P 6	
C12	Electrolytic	100	6V	CEA 101P 6	
C13	Electrolytic	2200	35V	ACH-004-0	
C14	Electrolytic	2200	35V	ACH-004-0	
C15	Ceramic	47p	50V	CCDSL 470K 50	
C16	Ceramic	47p	50V	CCDSL 470K 50	
C17	Mylar	0.022	50V	CQMA 223M 50	
C18	Mylar	0.022	50V	CQMA 223M 50	
C19	Ceramic	100p	50V	CCDSL 101K 50	
C20	Ceramic	100p	50V	CCDSL 101K 50	

RESISTORS

Symbol	Description			Part No.	
R1	Carbon film	2.2k		RD¼PS 222K	
R2	Carbon film	2.2k		RD¼PS 222K	
R3	Carbon film	2.2M		RD¼PS 225K	
R4	Carbon film	2.2M		RD¼PS 225K	
R5	Carbon film	100k		RD¼PS 104K	
R6	Carbon film	100k		RD¼PS 104K	
R7	Carbon film	18k		RD¼PS 183K	
R8	Carbon film	18k		RD¼PS 183K	
R9	Carbon film	15k		RD¼PS 153K	
R10	Carbon film	15k		RD¼PS 153K	
R11	Carbon film	150		RD¼PS 151K	
R12	Carbon film	150		RD¼PS 151K	
R13	Carbon film	820	½W	RD½PS 821K	
R14	Carbon film	820	½W	RD½PS 821K	
R15	Carbon film	39k		RD¼PS 393K	
R16	Carbon film	39k		RD¼PS 393K	
R17	Carbon film	3.3k		RD¼PS 332K	
R18	Carbon film	3.3k		RD¼PS 332K	
R19	Carbon film	4.7k		RD¼PS 472K	
R20	Carbon film	4.7k		RD¼PS 472K	

Symbol	Description			Part No.	
R21	Carbon film	150		RD¼PS 151K	
R22	Carbon film	150		RD¼PS 151K	
R23	Carbon film	22	½W	RD½PS 220K	
R24	Carbon film	22	½W	RD½PS 220K	
R25	Carbon film	150		RD¼PS 151K	
R26	Carbon film	150		RD¼PS 151K	
R27	Carbon film	22	½W	RD½PS 220K	
R28	Carbon film	22	½W	RD½PS 220K	
R29	Carbon film	150		RD¼PS 151K	
R30	Carbon film	150		RD¼PS 151K	
R31	Wire wound	0.5	2W	RT2P 0R5K	
R32	Wire wound	0.5	2W	RT2P 0R5K	
R33	Wire wound	0.5	2W	RT2P 0R5K	
R34	Wire wound	0.5	2W	RT2P 0R5K	
R35	Carbon film	15k		RD¼PS 153K	
R36	Carbon film	15k		RD¼PS 153K	
R37	Carbon film	8.2k		RD¼PS 822K	
R38	Carbon film	8.2k		RD¼PS 822K	
R39	Carbon film	10	½W	RD½PS 100K	
R40	Carbon film	10	½W	RD½PS 100K	
R41	Carbon film	100k		RD¼PS 104K	
R42	Carbon film	100k		RD¼PS 104K	
VR1	Semi-fixed	30k-B		C92–024–B	
VR2	Semi-fixed	30k-B		C92–024–B	
VR3	Semi-fixed	50-B		C92–043–A	
VR4	Semi-fixed	50-B		C92–043–A	

SEMICONDUCTORS

Symbol	Description	Part No.	
Q1	2SC732 Transistor		
Q2	2SC732 Transistor		
Q3	2SC497-O or Y Transistor		
Q4	2SC497-O or Y Transistor		
Q5	2SC497-O or Y Transistor		
Q6	2SC497-O or Y Transistor		
Q7	2SA497-O or Y Transistor		
Q8	2SA497-O or Y Transistor		
Q9	2SC793-Y Transistor		
Q10	2SC793-Y Transistor		
Q11	2SC793-Y Transistor		
Q12	2SC793-Y Transistor		
D1	STV-3 Varistor		
D2	STV-3 Varistor		

8-5 POWER SUPPLY UNIT (AWR-002)

CAPACITORS

Symbol	Description	Part No.	
C1	Ceramic 0.01 DC 1.4kV	C43-003-0	
C2	Ceramic 0.01 DC 1.4kV	C43-003-0	
C3	Ceramic 0.01 DC 1.4kV	C43-003-0	
C4	Ceramic 0.01 DC 1.4kV	C43-003-0	
C5	Electrolytic 100 50V	CEA 101P 50	
C6	Ceramic 100p 50V	CCDSL 101K 50	
C7	Electrolytic 33 35V	CEA 330P 35	
C8	Electrolytic 100 35V	CEA 101P 35	

RESISTORS

Symbol	Description	Part No.	
R1	Carbon film 4.7k	RD¼PS 472K	
R2	Carbon film 100 ½W	RD½PS 101K	
R3	Carbon film 47k	RD¼PS 473K	
R4	Carbon film 2.7k	RD¼PS 272K	
R5	Carbon film 3.9k	RD¼PS 392K	
R6	Carbon film 22k	RD¼PS 223K	
R7	Carbon film 15k	RD¼PS 153K	
R8	Carbon film 3.3k	RD¼PS 332K	
R9	Carbon film 12k	RD¼PS 123K	
R10	Carbon film 270 ½W	RD½PS 271K	
R11	Carbon film 33 ½W	RD½PS 330K	

SEMICONDUCTORS

Symbol	Description	Part No.	
Q1	2SD234P-O or Y Transistor		
Q2	2SC905-Y or G Transistor		
Q3	2SC971-3 or 2 Transistor		
D1	SR3AM-8 Diode		
D2	SR3AM-8 Diode		
D3	SR3AM-8 Diode		
D4	SR3AM-8 Diode		
D5	1S338Q Zener diode		

8-6 LEVER SWITCH UNIT (AWS-003)

CAPACITORS

Symbol	Description			Part No.	
C1	Mylar	0.039	50V	CQMA 393K 50	
C2	Mylar	0.039	50V	CQMA 393K 50	
C3	Mylar	0.039	50V	CQMA 393K 50	
C4	Mylar	0.039	50V	CQMA 393K 50	
C5	Mylar	0.022	50V	CQMA 223K 50	
C6	Mylar	0.022	50V	CQMA 223K 50	
C7	Mylar	0.022	50V	CQMA 223K 50	
C8	Mylar	0.022	50V	CQMA 223K 50	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	100k	RD¼PS 104KNL	
R2	Carbon film	100k	RD¼PS 104KNL	
R3	Carbon film	100k	RD¼PS 104KNL	
R4	Carbon film	100k	RD¼PS 104KNL	

SWITCHES

Symbol	Description	Part No.	
S1	Lever switch	ASK-004-O	
S2	Lever switch	ASK-004-O	
S3	Lever swtich	ASK-004-O	

8-7 VOLUME UNIT (AWX-001)

CAPACITORS

Symbol	Description			Part No.	
C1	Ceramic	120p	50V	CCDSL 121K 50	
C2	Ceramic	120p	50V	CCDSL 121K 50	
C3	Ceramic	120p	50V	CCDSL 121K 50	
C4	Ceramic	120p	50V	CCDSL 121K 50	
C5	Mylar	0.012	50V	CQMA 123K 50	
C6	Mylar	0.012	50V	CQMA 123K 50	
C7	Mylar	0.012	50V	CQMA 123K 50	
C8	Mylar	0.012	50V	CQMA 123K 50	

RESISTORS

Symbol	Description		Part No.	
R1	Carbon film	27k	RD¼PS 273K	
R2	Carbon film	27k	RD¼PS 273K	
R3	Carbon film	27k	RD¼PS 273K	
R4	Carbon film	27k	RD¼PS 273K	
VR1	4 gang, 500k-B	VOLUME	ACV-302-O	

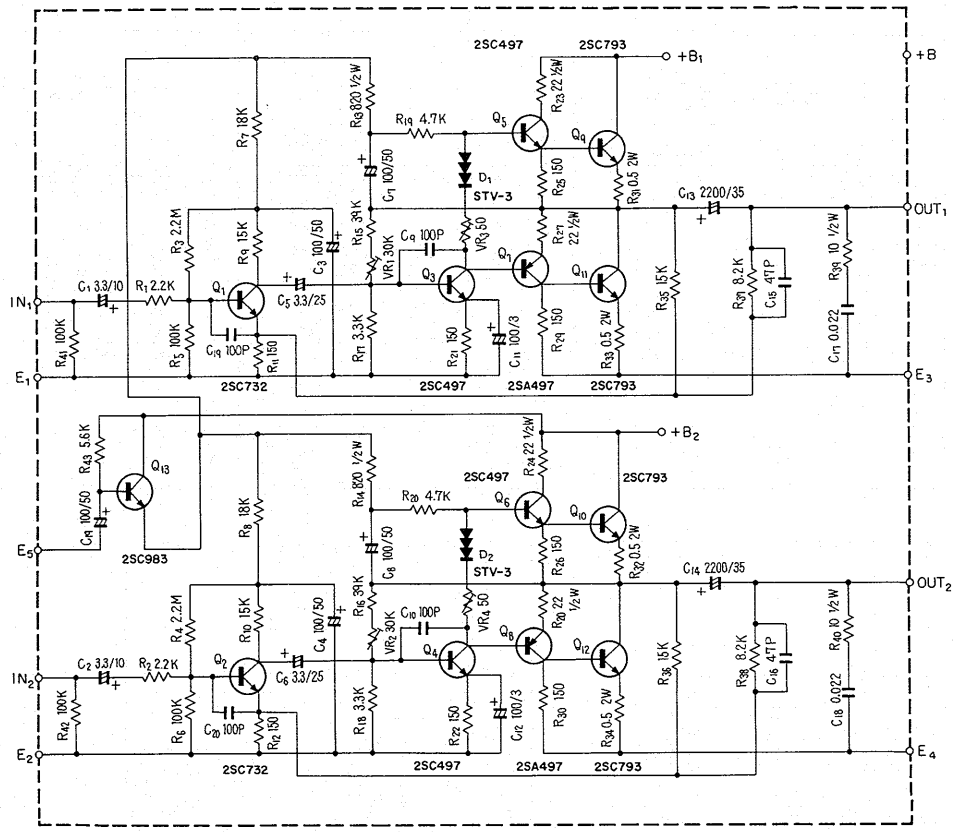
8-8 R UNIT (AWX-005)

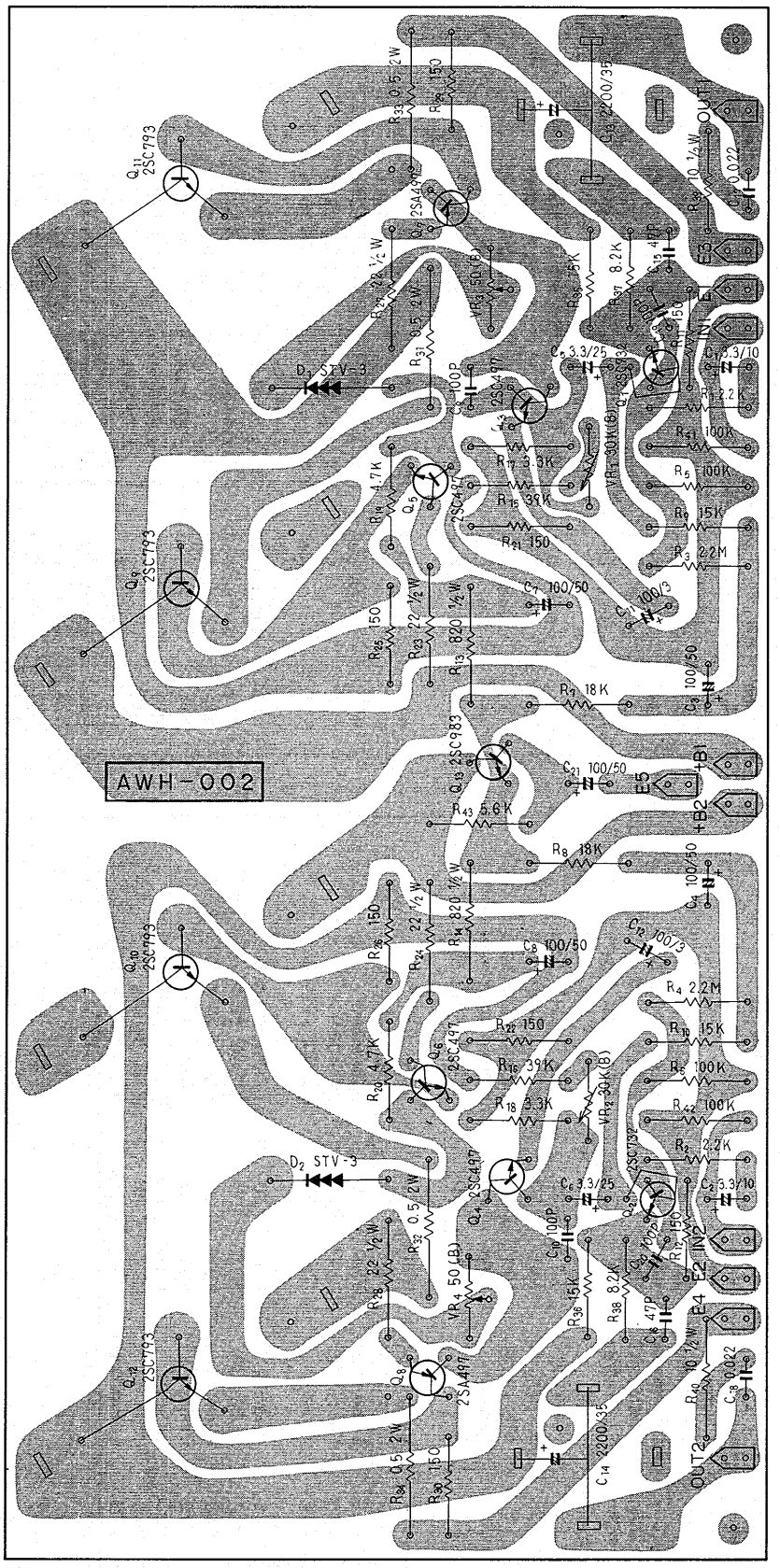
RESISTORS

Symbol	Description			Part No.	
R1	Metal oxide	330	2W	RS2P 331K	
R2	Metal oxide	330	2W	RS2P 331K	
R3	Metal oxide	330	2W	RS2P 331K	
R4	Metal oxide	330	2W	RS2P 331K	
R5	Metal oxide	150	2W	RS2P 151K	
R6	Metal oxide	150	2W	RS2P 151K	
R7	Metal oxide	150	2W	RS2P 151K	
R8	Metal oxide	150	2W	RS2P 151K	

NOTE: When Serial Numbers of this model become No. 14501, thereafter use the following CIRCUIT DIAGRAM, PCB, and PARTS LIST newly prepared for repair service of MAIN AMP UNIT.

MAIN AMP UNIT
AWH-002




AWH-002
Q11 2SC793
Q9 2SC793
Q10 2SC793
Q12 2SC793
Q13 2SC983
Q1 2SA497
Q2 2SA497
Q3 2SC497
Q4 2SC497
Q5 2SC497
Q6 2SC497
Q7 2SC497
Q8 2SA497
D1 STV-3
D2 STV-3
VR1 30K(B)
VR2 50K(B)
VR3 50K(B)
VR4 50K(B)
C1 0.022
C2 3.3/10
C3 3.3/25
C4 47P
C5 100P
C6 3.3/25
C7 100/50
C8 100/50
C9 100/50
C10 100P
C11 100/3
C12 100/3
C13 2200/35
C14 2200/35
C15 0.022
C16 47P
C17 3.3/10
C18 3.3/25
C19 100/3
C20 100/3
C21 100/50
C22 100/50
R1 2.2K
R2 2.2K
R3 2.2M
R4 2.2M
R5 100K
R6 15K
R7 150
R8 18K
R9 150
R10 15K
R11 100K
R12 150
R13 820 1/2W
R14 820 1/2W
R15 39K
R16 39K
R17 3.3K
R18 3.3K
R19 4.7K
R20 4.7K
R21 150
R22 150
R23 22 1/2W
R24 22 1/2W
R25 150
R26 150
R27 8.2K
R28 8.2K
R29 0.5 2W
R30 150
R31 0.5 2W
R32 0.5 2W
R33 0.5 2W
R34 22 1/2W
R35 22 1/2W
R36 15K
R37 8.2K
R38 8.2K
R39 15K
R40 10 1/2W
R41 100K
R42 100K
R43 5.6K
E1 IN1
E2 IN2
E3 OUT1
E4 OUT2
E5 +B1
+B2

MAIN AMP UNIT (AWH-002)

CAPACITORS

Symbol	Description			Part No.	
C1	Electrolytic	3.3	10V	CEA 3R3P 10	
C2	Electrolytic	3.3	10V	CEA 3R3P 10	
C3	Electrolytic	100	50V	CEA 101P 50	
C4	Electrolytic	100	50V	CEA 101P 50	
C5	Electrolytic	3.3	25V	CEA 3R3P 25	
C6	Electrolytic	3.3	25V	CEA 3R3P 25	
C7	Electrolytic	100	50V	CEA 101P 50	
C8	Electrolytic	100	50V	CEA 101P 50	
C9	Ceramic	100p	50V	CCDSL 101K 50	
C10	Ceramic	100p	50V	CCDSL 101K 50	
C11	Electrolytic	100	6V	CEA 101P 6	
C12	Electrolytic	100	6V	CEA 101P 6	
C13	Electrolytic	2200	35V	ACH-004-0	
C14	Electrolytic	2200	35V	ACH-004-0	
C15	Ceramic	47p	50V	CCDSL 470K 50	
C16	Ceramic	47p	50V	CCDSL 470K 50	
C17	Mylar	0.022	50V	CQMA 223M 50	
C18	Mylar	0.022	50V	CQMA 223M 50	
C19	Ceramic	100p	50V	CCDSL 101K 50	
C20	Ceramic	100p	50V	CCDSL 101K 50	
C21	Electrolytic	100	50V	CEA 101P 50	

RESISTORS

Symbol	Description			Part No.	
R1	Carbon film	2.2k		RD¼PS 222K	
R2	Carbon film	2.2k		RD¼PS 222K	
R3	Carbon film	2.2M		RD¼PS 225K	
R4	Carbon film	2.2M		RD¼PS 225K	
R5	Carbon film	100k		RD¼PS 104K	
R6	Carbon film	100k		RD¼PS 104K	
R7	Carbon film	18k		RD¼PS 183K	
R8	Carbon film	18k		RD¼PS 183K	
R9	Carbon film	15k		RD¼PS 153K	
R10	Carbon film	15k		RD¼PS 153K	
R11	Carbon film	150		RD¼PS 151K	
R12	Carbon film	150		RD¼PS 151K	
R13	Carbon film	820	½W	RD½PS 821K	
R14	Carbon film	820	½W	RD½PS 821K	
R15	Carbon film	39k		RD¼PS 393K	
R16	Carbon film	39k		RD¼PS 393K	
R17	Carbon film	3.3k		RD¼PS 332K	
R18	Carbon film	3.3k		RD¼PS 332K	
R19	Carbon film	4.7k		RD¼PS 472K	
R20	Carbon film	4.7k		RD¼PS 472K	
R21	Carbon film	150		RD¼PS 151K	
R22	Carbon film	150		RD¼PS 151K	
R23	Carbon film	22	½W	RD½PS 220K	
R24	Carbon film	22	½W	RD½PS 220K	
R25	Carbon film	150		RD¼PS 151K	
R26	Carbon film	150		RD¼PS 151K	
R27	Carbon film	22	½W	RD½PS 220K	
R28	Carbon film	22	½W	RD½PS 220K	
R29	Carbon film	150		RD¼PS 151K	
R30	Carbon film	150		RD¼PS 151K	

Symbol	Description			Part No.	
R31	Wire wound	0.5	2W	RT2P 0R5K	
R32	Wire wound	0.5	2W	RT2P 0R5K	
R33	Wire wound	0.5	2W	RT2P 0R5K	
R34	Wire wound	0.5	2W	RT2P 0R5K	
R35	Carbon film	15k		RD¼PS 153K	
R36	Carbon film	15k		RD¼PS 153K	
R37	Carbon film	8.2k		RD¼PS 822K	
R38	Carbon film	8.2k		RD¼PS 822K	
R39	Carbon film	10	½W	RD½PS 100K	
R40	Carbon film	10	½W	RD½PS 100K	
R41	Carbon film	100k		RD¼PS 104K	
R42	Carbon film	100k		RD¼PS 104K	
R43	Carbon film	5.6k		RD¼PS 562J	
VR1	Semi-fixed	30k-B		C92–024–B	
VR2	Semi-fixed	30k-B		C92–024–B	
VR3	Semi-fixed	50-B		C92–043–A	
VR4	Semi-fixed	50-B		C92–043–A	

SEMICONDUCTORS

Symbol	Description		Part No.	
Q1	2SC732	Transistor		
Q2	2SC732	Transistor		
Q3	2SC497-O or Y	Transistor		
Q4	2SC497-O or Y	Transistor		
Q5	2SC497-O or Y	Transistor		
Q6	2SC497-O or Y	Transistor		
Q7	2SA497-O or Y	Transistor		
Q8	2SA497-O or Y	Transistor		
Q9	2SC793-Y	Transistor		
Q10	2SC793-Y	Transistor		
Q11	2SC793-Y	Transistor		
Q12	2SC793-Y	Transistor		
Q13	2SC983-O or Y	Transistor		
D1	STV-3	Varistor		
D2	STV-3	Varistor		

MEMO

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