



# *Service Manual*

STEREO AMPLIFIER

# **A-27**

 **PIONEER®**

**MODEL A-27 COMES IN THREE VERSIONS DISTINGUISHED AS FOLLOWS:**

Type	Voltage	Remarks
KU	120V only	U.S.A. model
S	110V, 120V, 220V and 240V (Switchable)	General export model
S/G	110V, 120V, 220V and 240V (Switchable)	U.S. Military model

Although the basic features of KU, S and S/G types are the same. The variations in safety standards in different countries has also necessitated variations in power supply and circuit component specifications.

This service manual is applicable to the KU type. For servicing of the other types please refer to the additional service manual (see page 59).

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# 1. SPECIFICATIONS

## Semiconductors

FET(s) . . . . .	4
Transistors . . . . .	122
Diodes . . . . .	80

## Power Amplifier Section

Continuous Power Output is 120 watts\* per channel, min., at 8 ohms from 5 Hertz to 30,000 Hertz with no more than 0.012 % total harmonic distortion or 180 watts per channel at 4 ohms from 5 Hertz to 30,000 Hertz with no more than 0.03 % 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 0.012%  
60 watts per channel power output,

8 ohms . . . . . No more than 0.01%

1 watt per channel power output,  
8 ohms . . . . . 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,  
8 ohms . . . . . No more than 0.005%

1 watt per channel power output,  
8 ohms . . . . . No more than 0.005%

Frequency Response . . . . . 5 to 200,000Hz<sup>+0</sup><sub>-1</sub> dB

Input (Sensitivity/Impedance) . . . . . 1V/50 kilohms  
(POWER AMP IN)

## Output

Speaker . . . . . A, B, A+B

Headphones . . . . . Low impedance

## Damping Factor

(5 Hertz to 30,000 Hertz, 8 ohms) . . . 60

## Hum and Noise

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

## Preamplifier Section

### Input (Sensitivity/Impedance)

PHONO 1 . . . . . MM; 2.5mV/0.1, 10, 25, 50, 100 kilohms  
MC; 250 $\mu$ V/100 ohms

PHONO 2 . . . . . MM; 2.5mV/0.1, 10, 25, 50, 100 kilohms  
MC; 250 $\mu$ V/100 ohms

CARTRIDGE LOAD . . . . . 100, 200, 300, 400, 500pF  
(both phono 1 and 2)

TUNER . . . . . 150mV/50 kilohms

AUX . . . . . 150mV/50 kilohms

TAPE PLAY 1 . . . . . 150mV/50 kilohms

TAPE PLAY 2 . . . . . 150mV/50 kilohms

Phono Overload Level (T.H.D. 0.01%, 1kHz)

PHONO 1, 2 . . . . . MM; 300mV  
MC; 30mV

## Output (Level/Impedance)

TAPE REC 1 . . . . . 150mV

TAPE REC 2 . . . . . 150mV

PRE OUT . . . . . 1V/600 ohms

15V/600 ohms (MAX)

## Total Harmonic Distortion

5 to 30,000Hz, 15V output . . . . . No more than 0.01%

5 to 30,000Hz, 1V output . . . . . No more than 0.02%

## Frequency Response

PHONO (RIAA Equalization) . . . . . 20Hz to 20,000Hz $\pm$ 0.2dB

TUNER, AUX, TAPE PLAY . . . . . 8Hz to 100,000Hz $\pm$ <sub>-1</sub><sup>+0</sup> dB

## Tone Control

BASS . . . . . Main control; +5dB, -5dB (100Hz)

Sub control; +4dB, -4dB (50Hz)

TREBLE . . . . . Main control; +5dB, -5dB (10kHz)

Sub control; +4dB, -4dB (20kHz)

Filter Low . . . . . 15Hz (6, 12dB/oct)

## Hum and Noise (IHF, short-circuited, A network)

PHONO . . . . . MM; 90dB

MC; 78dB

TUNER, AUX, TAPE PLAY . . . . . 100dB

Muting . . . . . -20dB

FLAT AMP BYPASS . . . . . -20dB

## Miscellaneous

Power Requirements . . . . . 120V, 60Hz

Power Consumption . . . . . 400W (UL)

Dimensions . . . . . 454(W) x 168(H) x

468(D) mm

17-7/8(W) x 6-5/8(H) x

18-3/8(D) in

Weight. . . . . Without package; 25.6kg (56lb 5oz)

With package; 28.6kg (62lb 15oz)

## Furnished Parts

Hex. wrench . . . . . 1

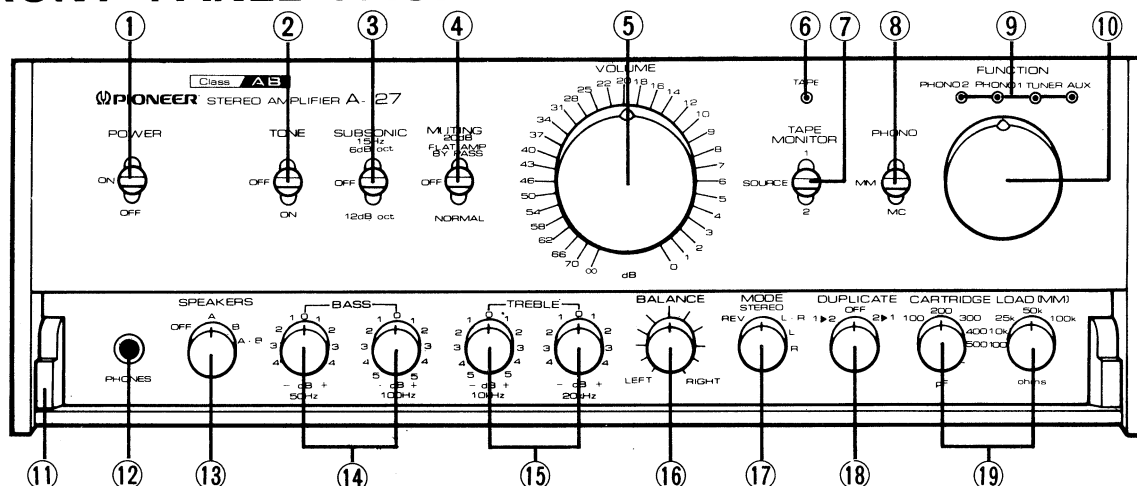
Operating instructions . . . . . 1

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

## NOTE:

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

## 2. FRONT PANEL FACILITIES



### ① POWER SWITCH

Set this switch to ON in order to supply power to the amplifier. Before switching the power on, set the VOLUME control to the  $\infty$  position.

### ② TONE ON/OFF SWITCH

Set this switch to ON when adjusting the BASS and TREBLE controls. In the OFF position, it causes the amplifier to operate with a flat frequency response.

### ③ SUBSONIC FILTER SWITCH

Use this switch to cancel out the noise in the ultra-low frequency range generated by record warp, etc. Although you will not be able to hear this noise, it can cause cross modulation distortion and damage the speakers.

15Hz 6dB/oct. . . . . Set the switch to this position to attenuate frequencies lower than 15Hz by 6dB/oct. Select this position when there is relatively little noise.

OFF . . . . . Set to this position when you do not intend to use the filter.

15Hz 12dB/oct. . . . . Set to this position to attenuate frequencies lower than 15Hz by 12dB/oct. Select this position when there is a great deal of noise.

### ④ AUDIO MUTING SWITCH

FLAT AMP BYPASS: When set to this position, the program source is reproduced directly without passing through the flat amplifier and tone control circuits. In cases like this, the sound will be attenuated 20dB more than the position indicated by the VOLUME control.

OFF: Keep the switch normally at this position.

NORMAL: Set to this position to attenuate the sound 20dB more than the position indicated by the VOLUME control. The tone control circuit can be worked at this position.

### ⑤ VOLUME CONTROL

Use this control to adjust the output level to the speakers and headphones. Turn it clockwise to increase the output level. No sound will be heard if you set it to  $\infty$ . The scale is graduated in dB which indicate the attenuation when the maximum output level is 0dB.

### ⑥ TAPE MONITOR LAMP

This lamp will come on when the TAPE MONITOR switch is set to position "1" or "2".

### ⑦ TAPE MONITOR SWITCH

Use this switch for monitoring the playback sound on a tape when using a tape deck or for monitoring the recorded sound during a recording.

1 . . . . . For monitoring the playback or recorded sound on a tape in a deck connected to the TAPE 1 jacks.

SOURCE . . . . . For performances from other music sources (not tapes) like records and FM broadcasts.

2 . . . . . For monitoring the playback or recorded sound on a tape in a deck connected to the TAPE 2 jacks.

#### NOTE:

Always set this switch to SOURCE when listening to records or broadcasts. The sound will not be heard through the speakers when the switch is set to position "1" or "2".

### ⑧ PHONO CARTRIDGE SELECTOR SWITCH (MM/MC)

Use this switch to select a position in line with the cartridge used on the turntable connected to the PHONO 1 or PHONO 2 jacks.

MM: Set to this position when using a moving magnet (MM), moving iron (MI) or induced magnet (IM) cartridge. The load resistance and load capacitance

can be varied using the CARTRIDGE LOAD controls.

MC: Set to this position when using a moving coil (MC) cartridge. The input impedance is 100 ohms.

### ⑨ FUNCTION INDICATOR LAMPS

These lamps indicate the position of the FUNCTION switch.

### ⑩ FUNCTION SELECTOR SWITCH

Use this switch to select the program source. The switch is coupled to the FUNCTION indicator lamps, and so the corresponding lamp will light up.

PHONO 2 . . . For playing records on a turntable connected to the PHONO 2 jacks.

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

TUNER . . . . . For listening to FM or AM broadcasts on a tuner connected to the TUNER jacks.

AUX . . . . . For listening to performances on another component, such as a cartridge tape player, which is connected to the AUX jacks.

#### NOTE:

*When selecting the switch during a performance, remember to turn the volume down first.*

### ⑪ GLASS PANEL

Push the panel down to open. To close, simply push the top of the panel up with the tip of your finger. Do not apply more force than is necessary since the panel is sensitive to heavy pressure.

### ⑫ HEADPHONES JACK (PHONES)

Plug the headphones into this jack when you want to listen through your stereo headphones.

Set the SPEAKERS switch to the OFF position if you want to listen to the sound through your headphones only.

### ⑬ SPEAKERS SELECTOR SWITCH

Use this switch to select the speaker systems.

OFF . . . . . Sound not obtained from speakers.

A . . . . . Sound obtained from speakers connected to the A speaker terminals.

B . . . . . Sound obtained from speakers connected to the B speaker terminals.

A+B . . . . . Sound obtained from speakers connected to both A and B speaker terminals.

### ⑭ TWIN BASS CONTROLS

Two controls for adjusting low frequency tone.

100Hz. . . . . Adjusts frequency band below 400Hz.  
+5dB to -5dB adjustment can be performed at 100Hz.

50Hz . . . . . Provides additional adjustment to 100Hz control for frequency band below 200Hz.

+4dB to -4dB adjustment can be performed at 50Hz.

### ⑮ TWIN TREBLE CONTROLS

Two controls for adjustment high frequency tone.

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

+5dB to -5dB adjustment can be performed at 10kHz.

20kHz. . . . . Provides additional adjustment to 10kHz control for frequency band above 5kHz.

+4dB to -4dB adjustment can be performed at 20kHz.

### ⑯ BALANCE CONTROL

Use this control to adjust stereo balance between the left and right speaker systems or headphones. Turn it clockwise from center to increase right channel volume and counter-clockwise from center to increase left channel volume in order to obtain a balance.

### ⑰ MODE SWITCH

Use this switch to select stereo and mono performances.  
REV . . . . . For reversing the left and right channels of the stereo input signals.

STEREO . . . . . For normal stereo performances.

L + R . . . . . For mixing the left and right channel stereo signals and for mono performances through both the left and right speakers.

L . . . . . For mono performances whereby the left channel stereo signals are reproduced through the left and right speakers.

R . . . . . For mono performances whereby the right channel stereo signals are reproduced through the left and right speakers.

### ⑱ TAPE DUPLICATE SWITCH

Select a position with this switch when using two tape decks to duplicate recorded tapes or edit tapes. This switch is otherwise kept at the OFF position.

1 ▶ 2 . . . . . For playing back the tape on a deck connected to the TAPE 1 jacks and recording (duplicating) on a deck connected to the TAPE 2 jacks.

OFF . . . . . Set to this position when not duplicating.

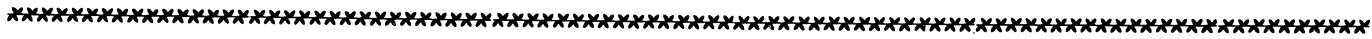
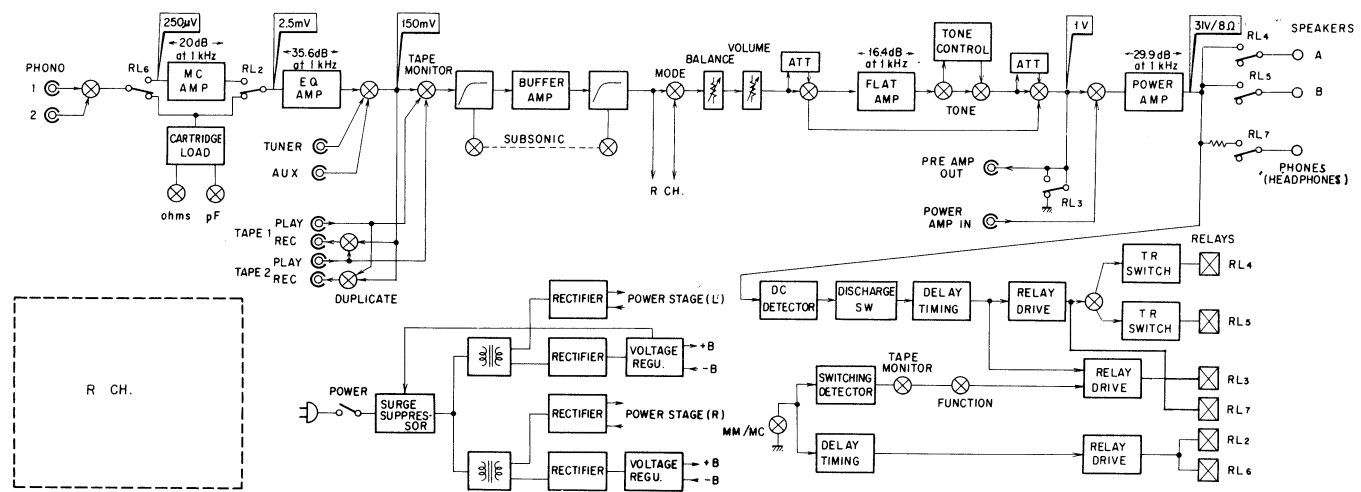
2 ▶ 1 . . . . . For playing back the tape on a deck connected to the TAPE 2 jacks and recording (duplicating) on a deck connected to the TAPE 1 jacks.

### ⑲ CARTRIDGE LOAD (MM) SELECTOR SWITCHES

These switches are used to select the input resistance (ohms) and input capacitance (pF) in accordance with the designated values of the moving magnet (MM) cartridge which you are using on your turntable.

These switches will not work when the cartridge selector switch is set to MC.

### 3. BLOCK DIAGRAM



### 4. CIRCUIT DESCRIPTIONS

#### 4.1 PREAMPLIFIER SECTION

##### Cartridge Load Selector

The equalizer amplifier has an input resistance of  $100k\Omega$ , and an input capacitance of  $100pF$ . It is possible, however, to vary the input resistance and input capacitance of the PHONO input to suit various cartridges. This is done by operating the CARTRIDGE LOAD selectors (ohms, pF), which effectively place resistors and capacitors in parallel with the input circuit. It is possible to select 5 different input resistance values, i.e.,  $100\Omega$ ,  $25k\Omega$ ,  $50k\Omega$  and  $100k\Omega$  and 5 different input capacitance values, i.e.,  $100pF$ ,  $200pF$ ,  $300pF$ ,  $400pF$  and  $500pF$ .

This function is only effective when the MM/MC switch is in the MM position.

##### MC Amplifier

The MC amplifier is a flat-response voltage amplifier with a gain of 20dB, designed for use with low-output moving-coil-type cartridges. It is inserted in front of the equalizer amplifier when the MM/MC switch is put in the MC position.

Fig. 1 shows the basic configuration of the circuit. The MC amplifier is a completely sym-

metrical DC-coupled 3-stage amplifier, the first stage of which employs newly developed ultra-low-noise parallel-connected NPN and PNP transistors. The S-N ratio is 78dB ( $250\mu V$  input, IHF-A).

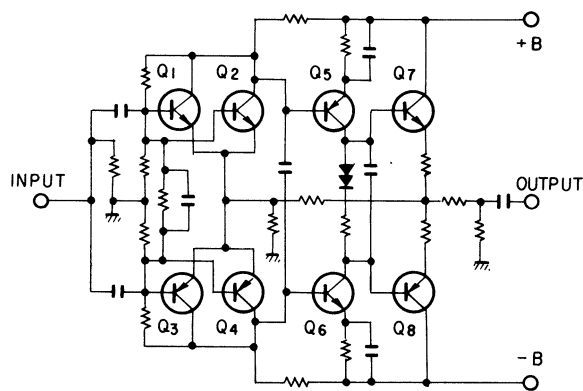


Fig. 1 Basic circuit of MC amplifier

### Equalizer Amplifier

Fig. 2 shows the basic circuit of the equalizer amplifier. The first stage is a differential amplifier consisting of a newly developed ultra-low-noise twin FET ( $Q_1$ , 2SK131S) and NPN twin transistor ( $Q_2$ ) connected in cascade, the load circuit of which is a current mirror circuit ( $Q_3, Q_4$ ).

Because an FET is used in the first stage of the equalizer amplifier, the input coupling capacitor is rendered unnecessary, and thus noise and distortion are correspondingly reduced. The cascade connection serves to reduce the load impedance of the FET. This prevents deterioration in high-frequency response due to the Miller Effect, and also reduces gate leak current noise on account of the reduced drain-to-source voltage.

The next stage ( $Q_5, Q_6$ ) is a Darlington arrangement, the load circuit of which is a constant-current source ( $Q_7$ ). This results in a high voltage gain.

The output stage ( $Q_8, Q_9$ ) is a symmetrical complementary SEPP Class A configuration. The output current is of the same order of magnitude as that of a small power amplifier, and is sufficient to cope with low-impedance loads.

The NFB circuit has a low impedance for reduced noise. The equalizer circuit contains large capacity ( $0.35\mu\text{F}$  and  $0.1\mu\text{F}$ )  $\pm 2\%$  tolerance polypropylene film capacitors and  $\pm 1\%$  tolerance metal film resistors.

The resultant S/N ratio of the equalizer amplifier is 90dB, while the equalizer deviation is  $\pm 0.2\text{dB}$  (20Hz to 20,000Hz).

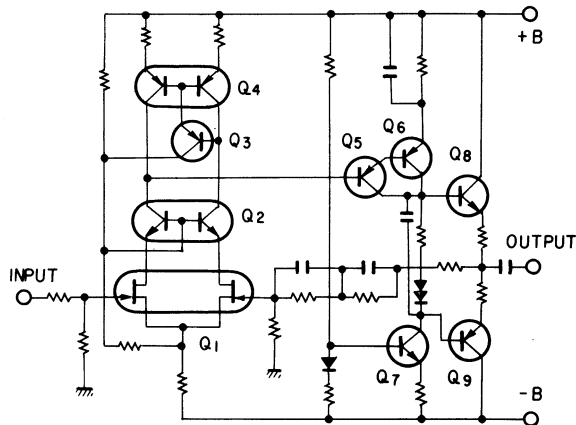


Fig. 2 Basic circuit of equalizer amplifier

### Buffer Amplifier

The buffer amplifier is a 3-stage DC-coupled voltage follower, the first stage of which is a differential amplifier. To increase the input capacity of the buffer amplifier, a constant-current source ( $Q_2$ ) is connected to the emitter of the first stage differential amplifier ( $Q_1$ ) and also the load circuit is a current-mirror ( $Q_3$ ). The output stage is a symmetrical complementary SEPP. As 100% NFB is employed, the circuit gain is 1 (0dB).

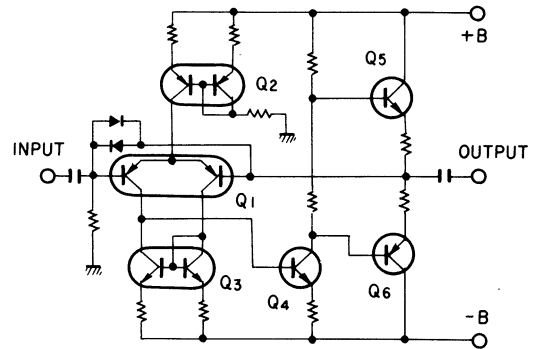


Fig. 3 Basic circuit of buffer amplifier

### Subsonic Filter

This is a high-pass filter with a cutoff frequency ( $-3\text{dB}$  point) of 15Hz. By operating the SUBSONIC switch, it is possible to vary the slope characteristics through OFF,  $-6\text{dB/oct}$  and  $-12\text{dB/oct}$ . When the switch is in the  $-6\text{dB/oct}$  position, a single-stage RC passive filter is inserted immediately in front of the buffer amplifier. When it is in the  $-12\text{dB}$  position, a single-stage RC passive filter is inserted both in front of and behind the buffer amplifier.

### Flat Amplifier

This amplifier is located in front of the tone control circuit. The first stage ( $Q_1$ ) is a differential amplifier, while the load circuit employs a current mirror ( $Q_2$ ). The second stage ( $Q_3$ ) is a high-gain amplifier employing a constant-current source ( $Q_4$ ) as its load circuit. The output stage ( $Q_5, Q_6$ ) is a complementary symmetrical SEPP circuit.

When the MUTING switch is put in the FLAT AMP BYPASS position, both the flat amplifier and the tone control circuit in the following stage are bypassed, and the gain is  $-20\text{dB}$  with respect to the OFF position.

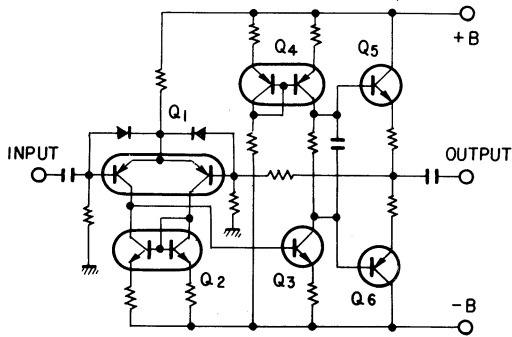


Fig. 4 Basic circuit of flat amplifier

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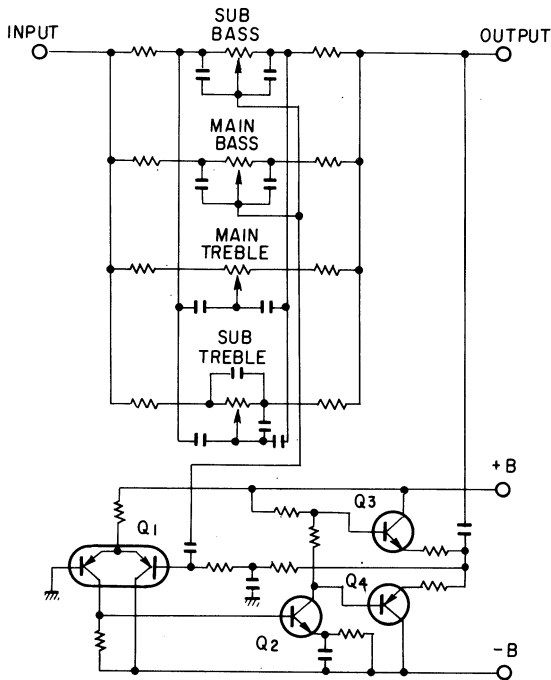


Fig. 5 Basic circuit of tone controls

## Tone Controls

The A-27 integrated amplifier is fitted with twin tone controls having different turnover frequencies. The main tone control is a conventional type, while the sub tone control is used to vary the extreme frequency characteristics at the low- and high-frequency ends.

Fig. 5 shows the basic tone control circuit. The tone amplifier is a 3-stage DC-coupled SEPP circuit, the first stage of which is a differential amplifier. The first stage differential amplifier is used as an inverter amplifier by grounding the non-inverted input and applying the input signal to the inverted input. Tone control is effected by applying input parallel feedback and providing the feedback circuit with frequency selective characteristics.

The main tone control can be adjusted over a range of  $\pm 5\text{dB}$  at 100Hz (BASS) and 10kHz (TREBLE) respectively, while the sub tone control can be adjusted over a range of  $\pm 4\text{dB}$ , in 1dB steps.

This circuit is bypassed when the TONE switch is in the OFF position.

## 4.2 POWER AMPLIFIER SECTION

### Amplifier Circuitry

The basic circuit arrangement of the power amplifier is shown in Fig. 6. The first stage is a differential amplifier comprising cascade-connected PNP twin transistors ( $Q_2, Q_3$ ), the load circuit of which is a current mirror employing an NPN twin transistor ( $Q_4$ ). The cascade connection reduces the load impedance of  $Q_2$ , and thus prevents deterioration of high-frequency response due to the Miller Effect. The current mirror provides push-pull operation in this stage, which serves to cancel even numbered harmonics and further increase gain.

$Q_1$  in the input circuit absorbs the outflow of base current from  $Q_2$ , and prevents the generation of a DC voltage. Because  $Q_1$  follows any temperature drift in  $Q_2$ , temperature drift of the center point voltage is prevented.

The pre-drive stage ( $Q_5, Q_6$ ) is a Darlington arrangement, the load circuit of which employs a constant-current source ( $D_1, Q_7$ ) resulting in a high voltage gain.

The power stage is a 3-stage Darlington arrangement, the last stage of which is a Class AB, parallel SEPP circuit employing an RET (Ring Emitter Transistor). The circuit operates in Class A up to an output of 3 watts. The RET is a kind of IC consisting of a number of small transistors on a single chip, with each transistor being connected in parallel via an emitter resistor. This provides



excellent high frequency characteristics comparable to those of a small-signal transistor. Furthermore, because there is no time constant in the NFB circuit in the low-frequency region, amplification is possible down to DC (DC inputs will be cut off, however, by the input coupling capacitor).

The circuit features described above provide an extremely wide power frequency range (120W + 120W, 5Hz to 30kHz, THD 0.01%, 8Ω).

**Drive Voltage Limiter**

When the power stage of an amplifier saturates as a result of overdriving, the NFB will cease to function normally and the amplifier will become extremely unstable. This is prevented here by diodes D<sub>5</sub> to D<sub>8</sub> in the following manner. D<sub>2</sub> to D<sub>4</sub> and VR<sub>2</sub> shift the DC level of the input signal to bias the power output stage. D<sub>6</sub> (D<sub>7</sub>) further shifts the DC level so as make D<sub>5</sub> (D<sub>8</sub>) conductive in the presence of an overdrive of magnitude greater than +B<sub>1</sub> (-B<sub>1</sub>), thus clipping the overdrive signal.

**Power Limiter**

The power limiter is a high-speed protection circuit which operates to protect the power transistors from overcurrent conditions caused by load shorts, etc.

The circuit (Fig. 7), constitutes a Wheatstone bridge, one arm of which is the load (R<sub>L</sub>), which is arranged so that Q<sub>16</sub> (Q<sub>17</sub>) is biased by the potential difference between the opposite corners of the bridge. As the value of R<sub>L</sub> decreases, Q<sub>16</sub> (Q<sub>17</sub>) starts to conduct, thus holding down the drive voltage and controlling the magnitude of the current flowing into the power transistors. Q<sub>18</sub> (Q<sub>19</sub>) is link connected to Q<sub>16</sub> (Q<sub>17</sub>) which provides sharp clipping characteristics.

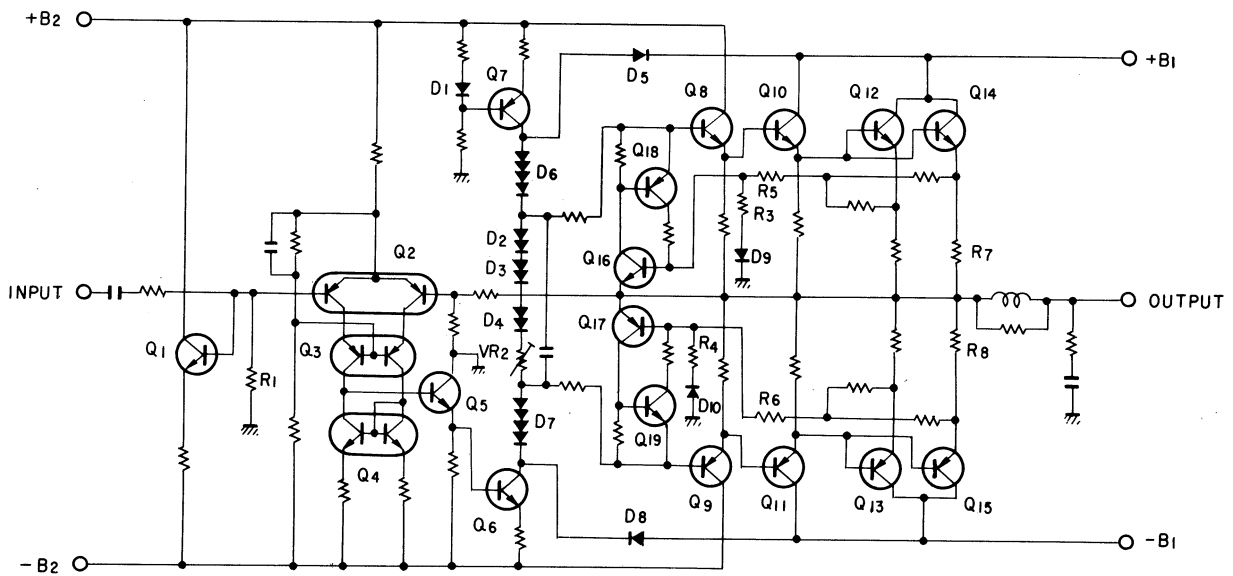


Fig. 6 Basic circuit of power amplifier

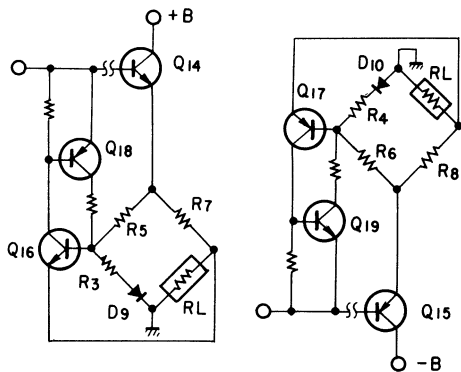


Fig. 7 Power limiter circuit

### 4.3 CONTROL SECTION

Fig. 8 shows the block diagram of the control section. RL<sub>2</sub> and RL<sub>6</sub> are changeover relays which are used to insert the MC amplifier in front of the equalizer amplifier. RL<sub>3</sub> is used for muting the output of the pre-amplifier. RL<sub>4</sub> and RL<sub>5</sub> are used for muting the output of the power amplifier (Also used for changeover of SPEAKERS terminals.). RL<sub>7</sub> is used for muting the headphone output.

#### Muting Operation when Power Supply is Turned Off and On

With reference to Fig. 9, when the power supply is turned on, Q<sub>1</sub> turns off due to -B<sub>1</sub> (The time constant of the -B<sub>1</sub> circuit is very small.). The timing capacitor C<sub>1</sub> charges up through R<sub>1</sub>, and thus Q<sub>2</sub>, Q<sub>3</sub> and Q<sub>4</sub> come on. When Q<sub>2</sub> conducts, RL<sub>3</sub> operates, and the muting on the pre-amplifier outputs is removed. When Q<sub>4</sub> conducts, either RL<sub>4</sub> or RL<sub>5</sub> (or both) operate, depending upon the position of the SPEAKERS switch, and the output muting on the power amplifier will be removed.

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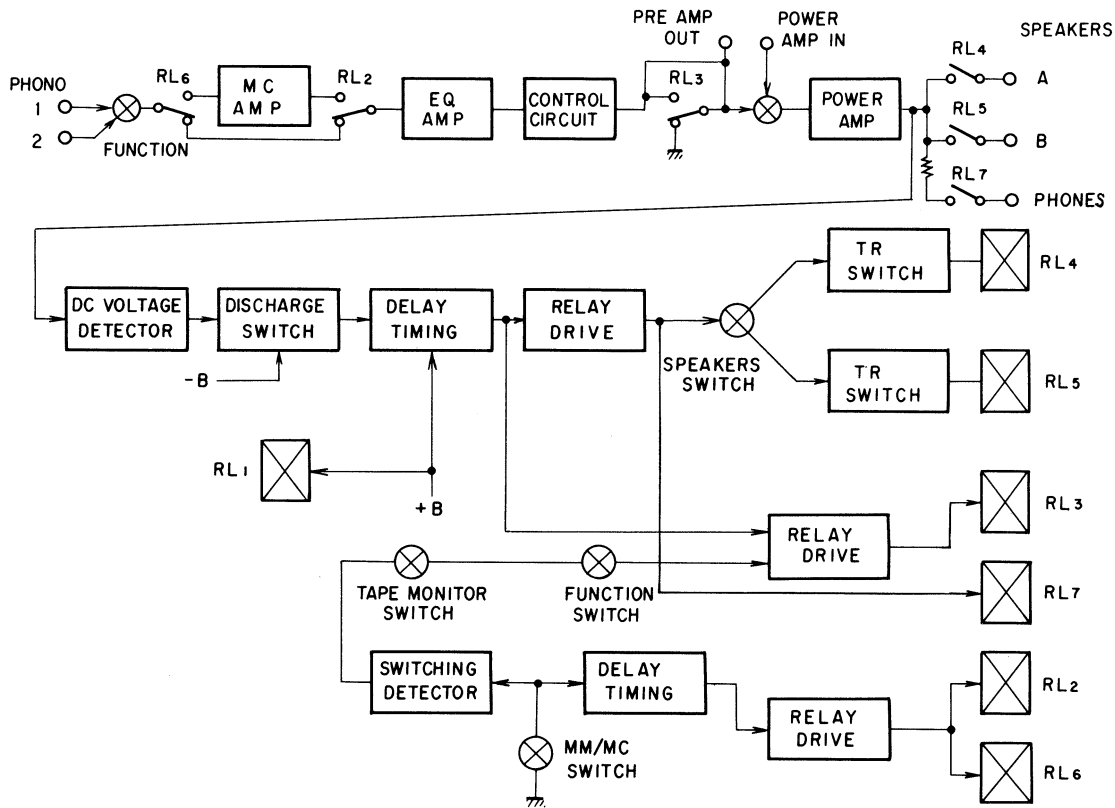


Fig. 8 Block diagram of control section

When the power supply is turned off,  $-B_1$  will abruptly decay, and  $Q_1$  will conduct owing to the residual component of  $+B_1$ . As a result,  $C_1$  will rapidly discharge, the base voltages of  $Q_2$  and  $Q_3$  will drop, and  $Q_2$  to  $Q_4$  will cease to conduct, whereupon the relays will become de-energized and restore muting.

**DC Voltage Detector**

This circuit is designed to protect the speakers by opening the output circuit should DC accidentally in the circuit.

The twin transistor  $Q_7$  constitutes a differential amplifier. One input is connected directly to the output circuit, while the other input is connected up via a capacitor ( $C_2$ ). When an AC signal appears at the output circuit of the power amplifier, both inputs to the differential amplifier will be equal and thus no output will be obtained therefrom. If a DC voltage appears at the output circuit of the main amplifier, it will be applied only to the input of the differential amplifier directly connected thereto, and hence the circuit balance will be lost. As a consequence, current will flow into either  $D_1$  or  $D_2$  and the base potential of  $Q_5$  will drop, thus turning  $Q_5$  on. This will cause the base potential of  $Q_1$  to rise, and turn on  $Q_1$ .  $C_1$  will rapidly discharge,  $Q_2$  to  $Q_4$  will go off and the relay will become de-energized, thus causing the output circuit to open.

**MM/MC Switching Circuit**

This circuit is designed to eliminate switching noise when operating the MM/MC switch. When the MM/MC switch is operated, the pre-amplifier output muting relay  $RL_3$  becomes de-energized, temporarily muting the pre-amplifier. Next,  $RL_2$  and  $RL_6$  change over and  $RL_3$  operates, thus terminating the muting condition.

With reference to Fig. 10, when the MM/MC switch ( $S_3$ ) is in the MM position, the potential of Point A will be reduced,  $Q_8$  will go off, and  $C_4$  will charge up until the inter-electrode voltage becomes approximately 6V. When  $S_3$  is put in the MC position, current will flow into  $C_3$  and the potential of Point A will rise. As a consequence,  $Q_8$  will be turned on and the potential of Point B will drop rapidly. Also, the potential of Point C will be brought down to approximately  $-6V$  on account of the electrical charge stored in  $C_4$ . This potential drop will act through  $D_3-D_4-S_4-S_2$ , causing the base potential of  $Q_2$  to fall; whereupon,  $Q_2$  will cease to conduct and  $RL_3$  will become de-energized, thus muting the output of the pre-amplifier. Owing to the charge on  $C_3$ , the potential of Point A will rise, and when  $C_5$  becomes charged  $Q_9$  and  $Q_{10}$  will be turned on, thus causing  $RL_2$  and  $RL_6$

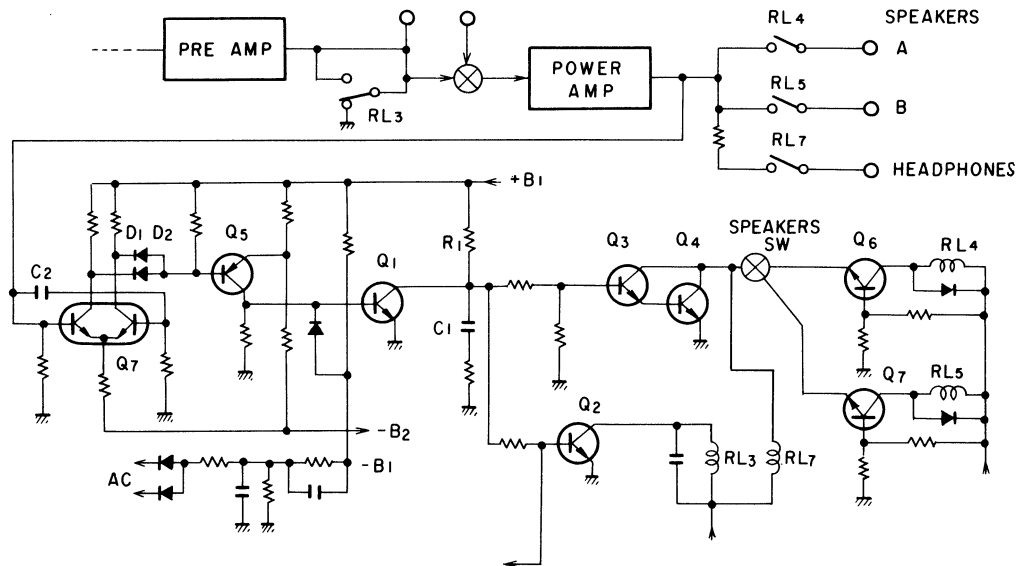


Fig. 9 Muting circuit

to operate, inserting the MC amplifier in front of the equalizer amplifier. When  $C_4$  discharges, the potential of Point C will rise,  $Q_2$  will be turned on and  $RL_3$  will operate, thus terminating the muting condition.

When  $S_3$  is changed from the MC to the MM position, the potential of Point A will fall rapidly, and  $Q_8$  will be turned off. Also, the potential of Point D will be temporarily reduced to approximately  $-6V$  on account of the electrical charge stored in  $C_3$  (Inter-electrode voltage is approximately  $6V$ ). This potential drop will act through  $D_5-S_4-S_2$ , causing the base potential of  $Q_2$  to fall; whereupon,  $Q_2$  will cease to conduct and  $RL_3$  will become de-energized, thus muting the output of the pre-amplifier. Owing to the reduced potential of Point A, when  $C_5$  discharges,  $Q_9$  and  $Q_{10}$  will be turned off,  $RL_2$  and  $RL_6$  will be de-energized and the MC amplifier will be bypassed. When  $C_3$  discharges, the potential of Point D will rise,  $Q_2$  will become conductive and  $RL_3$  will operate to terminate the muting condition.

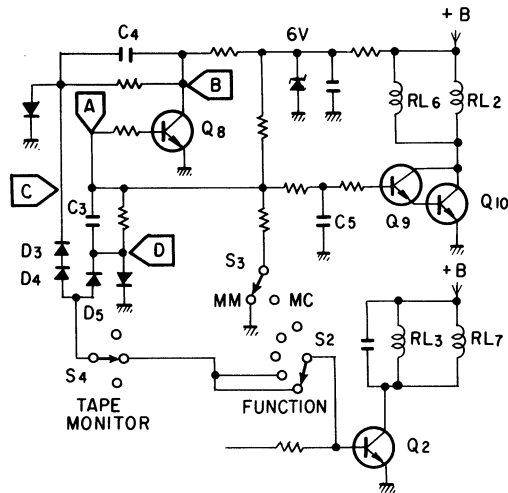


Fig. 10 MM/MC switching circuit

### Surge Current Suppressor Circuit

The power supply circuit of this amplifier contains two large power-supply transformers and four  $18,000\mu F$  capacitors. Consequently, when the amplifier is turned on, an extremely large surge current will flow. A surge current suppressor circuit is thus employed to significantly reduce the magnitude of this surge (Fig. 11).

When the POWER switch ( $S_1$ ) is off, the relay contacts ( $RL_1$ ) are in the unenergized condition, and a resistor ( $R_1$ ) is connected in series with the primary winding of the transformer. When  $S_1$  is turned on, current flows through  $R_1$ , thus greatly limiting the magnitude of the surge. When the DC output voltage of the power supply circuit reaches the specified value, the relay contacts ( $RL_1$ ) close and short circuit  $R_1$ . The time required for this operation is far less than the operating time of the muting circuit when the power supply is on, and hence there is no adverse influence upon normal operation.

$TF_1$  is a thermal fuse located in close proximity to  $R_1$ . If, for some reason or other,  $RL_1$  does not operate,  $TF_1$  will melt on account of the temperature rise of  $R_1$ , and the primary side of the power supply will be opened.

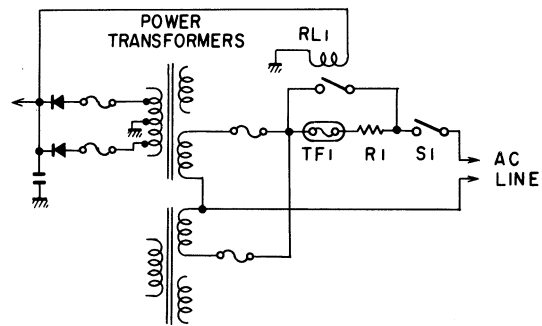


Fig. 11 Surge current suppressor circuit

## 5. DISASSEMBLY

### Wooden Cover

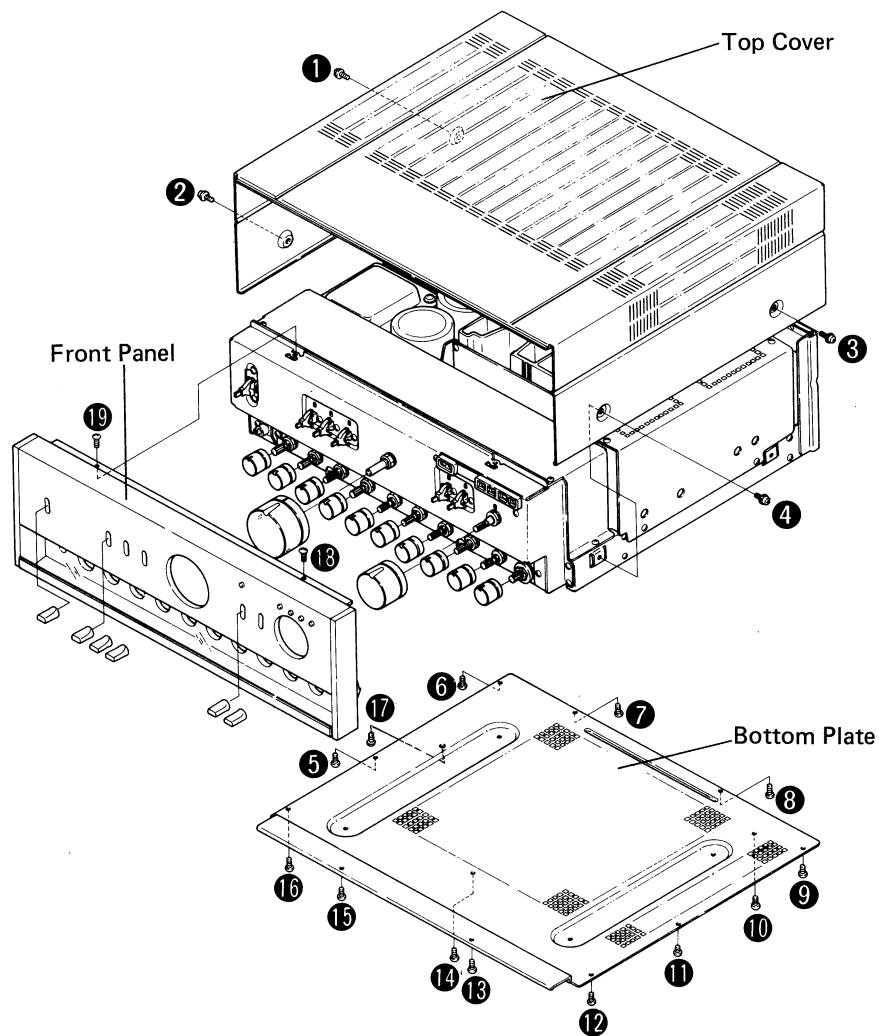
Remove the two screws on each side of the wooden cover (1—4).

### Bottom Plate

Remove the thirteen screws (5—17) to detach the bottom plate.


### Front Panel

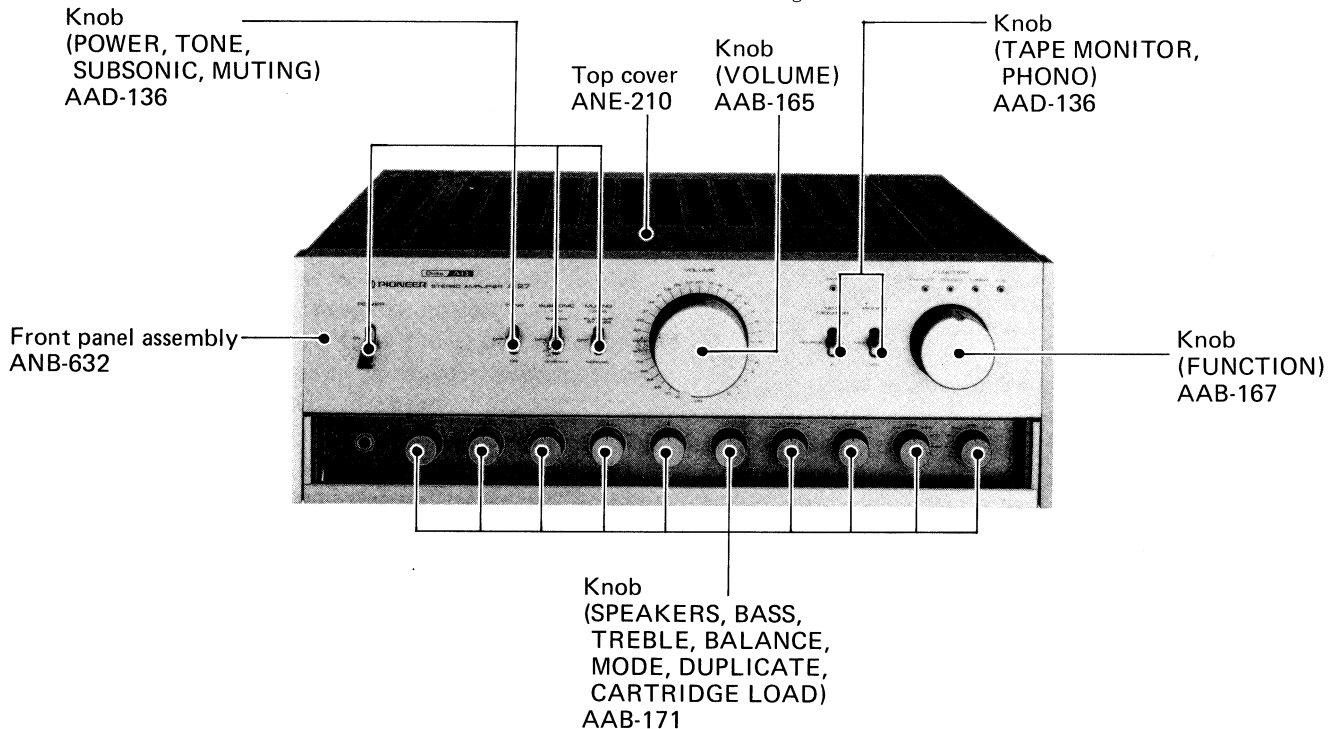
Remove the lever switch knobs by pulling. Remove the four screws (13, 15, 18, 19) from the top and bottom edges of the front panel.



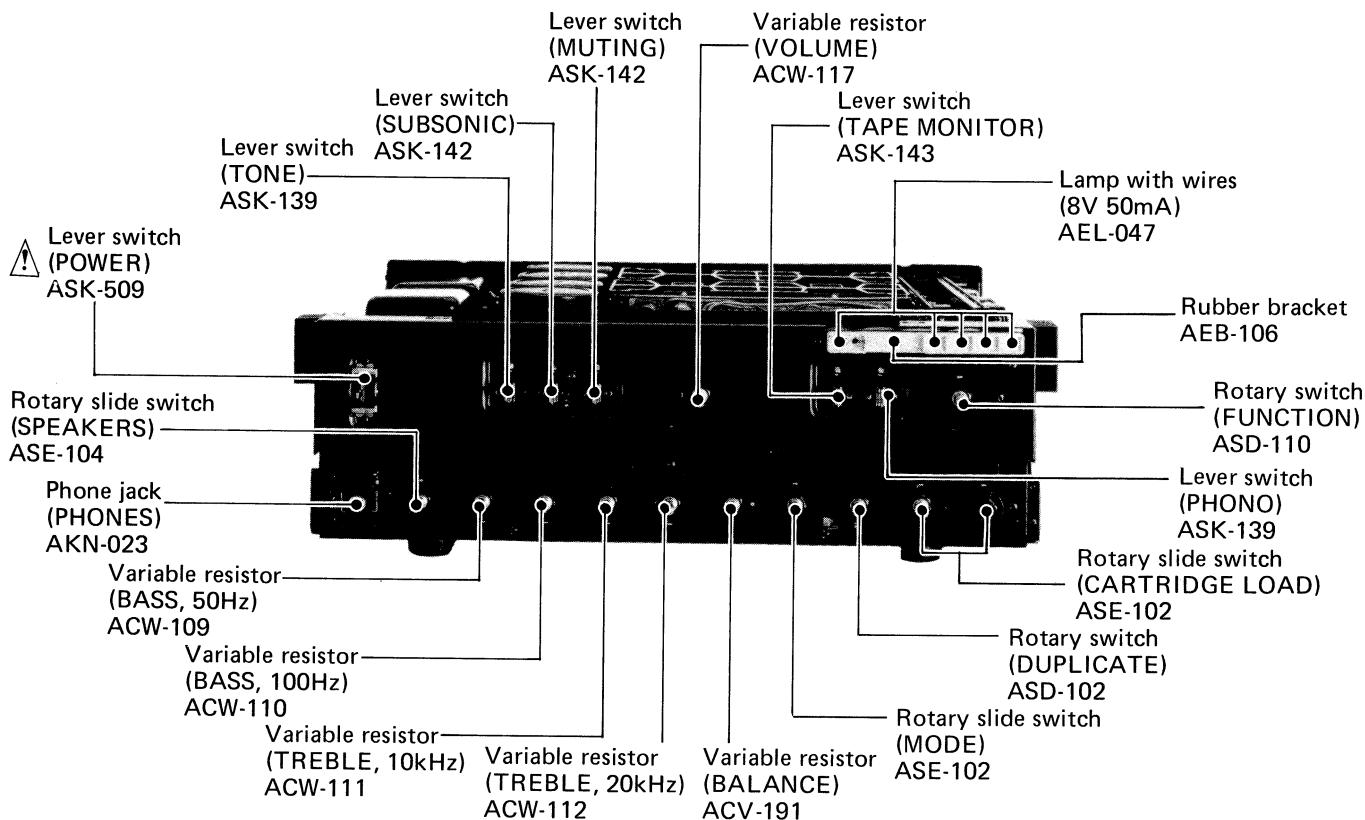
# 6. PARTS LOCATION

## 6.1 FRONT PANEL VIEW

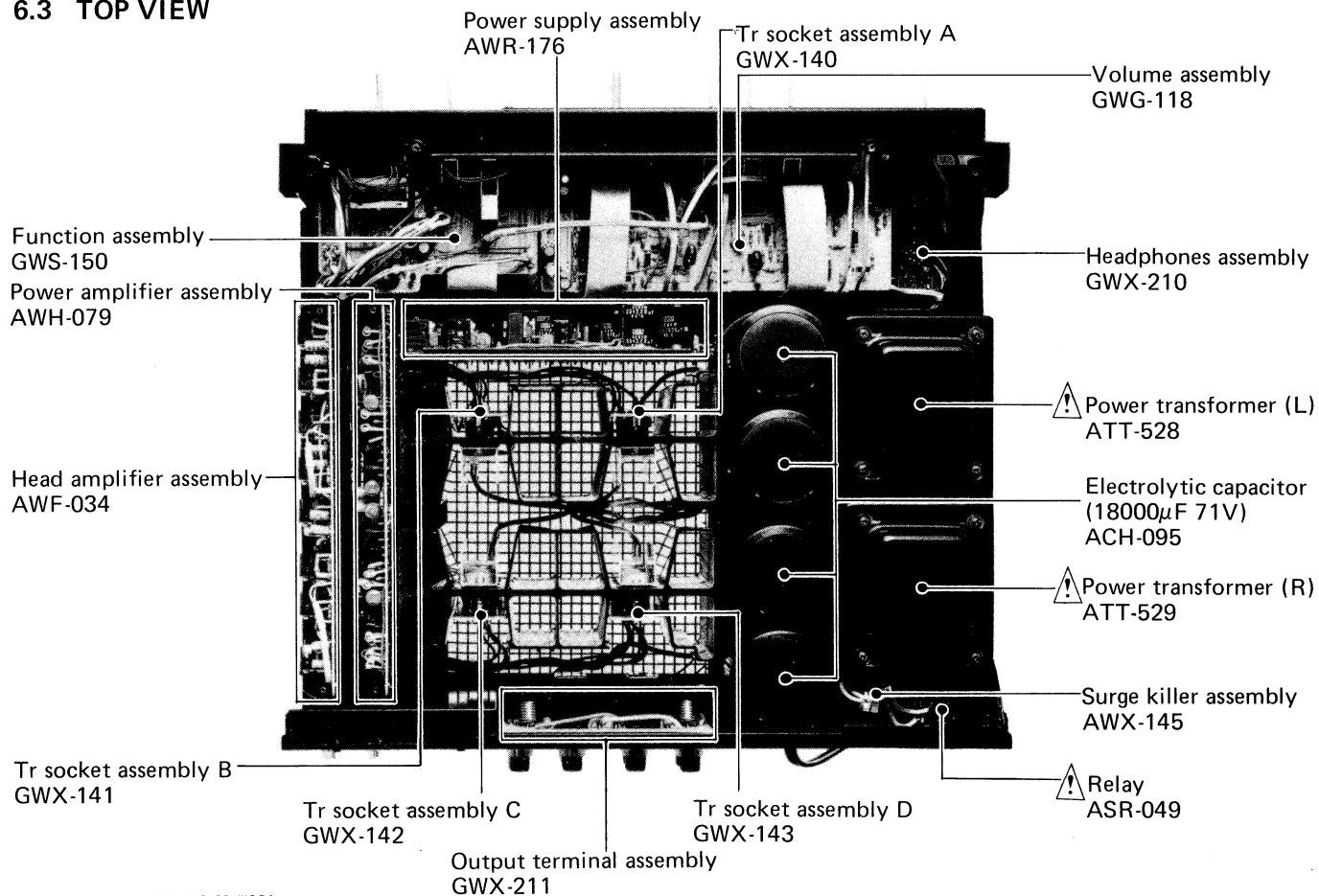
- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.



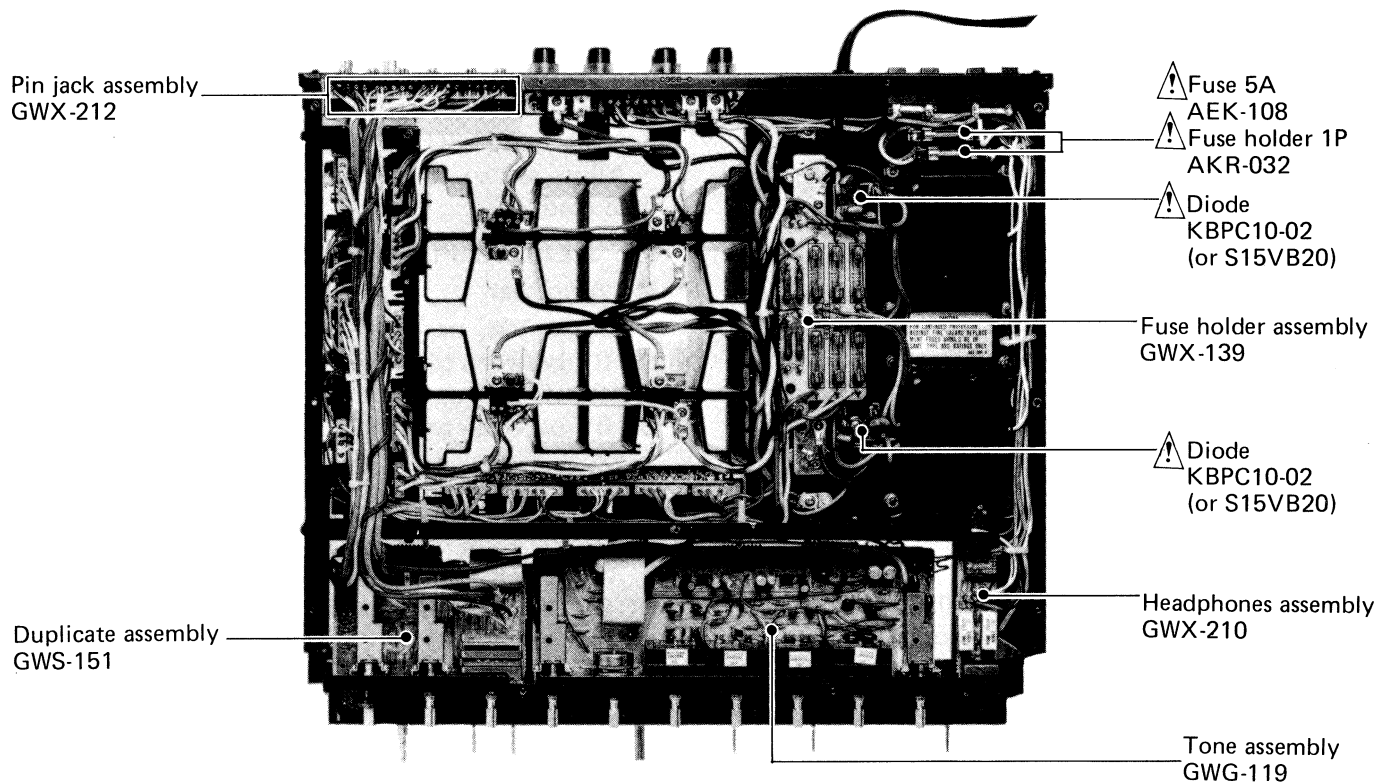
## 6.2 FRONT VIEW WITH PANEL REMOVED



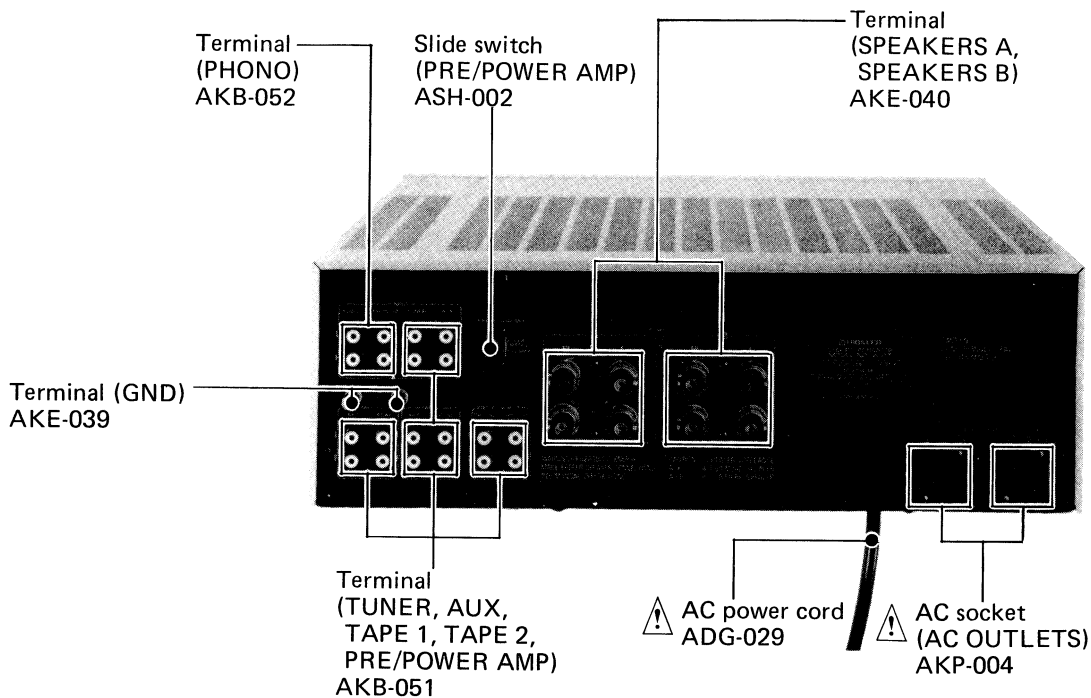
6.3 TOP VIEW



6.4 BOTTOM VIEW



## 6.5 REAR PANEL VIEW



## 7. ADJUSTMENTS

### 7.1 DC POWER SUPPLY CIRCUIT

Adjust  $VR_1$  (on the power supply assembly) for +32V between terminal No.5 and ground.

Adjust  $VR_2$  for +65V between terminal No.8 and ground.

### 7.2 POWER AMPLIFIER

Turn  $VR_3$  (L) and  $VR_4$  (R) fully counter-clockwise, but set  $VR_1$  (L) and  $VR_2$  (R) to their center positions. Without any load or input signal, turn the POWER switch on.

#### DC Balance

Adjust  $VR_1$  (L) for DC 0V between terminal No.44 (on the Tr socket assembly) and ground.

Adjust  $VR_2$  (R) for DC 0V between terminal No.45 (on the Tr socket assembly) and ground.

If zero volts (to within  $\pm 30mV$ ) cannot be attained, disconnect the resistors  $R_{11}$  (L) and  $R_{12}$  (R) on the power amplifier assembly (or reconnect if already disconnected), and then readjust.

#### Idle Current

Adjust  $VR_3$  (L) and  $VR_4$  (R) for DC 88mV between terminals  $TP_1$  and  $TP_2$ .

Allow set to warm up for at least 10 minutes, then readjust.

### 7.3 HEAD AMPLIFIER

#### MC Amplifier

Adjust  $VR_1$  on the head amplifier assembly for DC 0V between terminal  $TPL_1$  and ground.

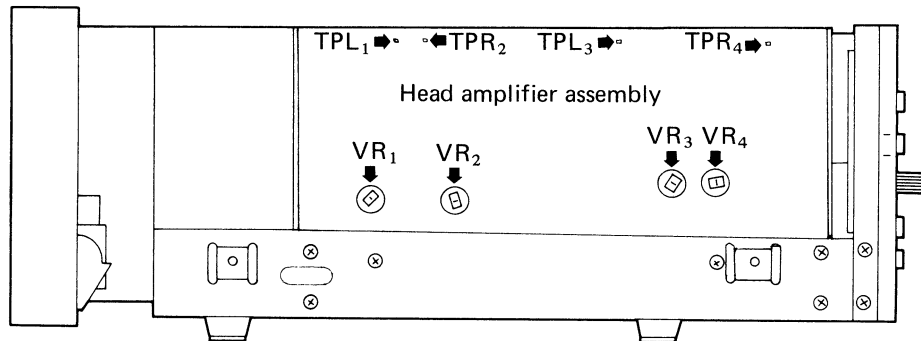
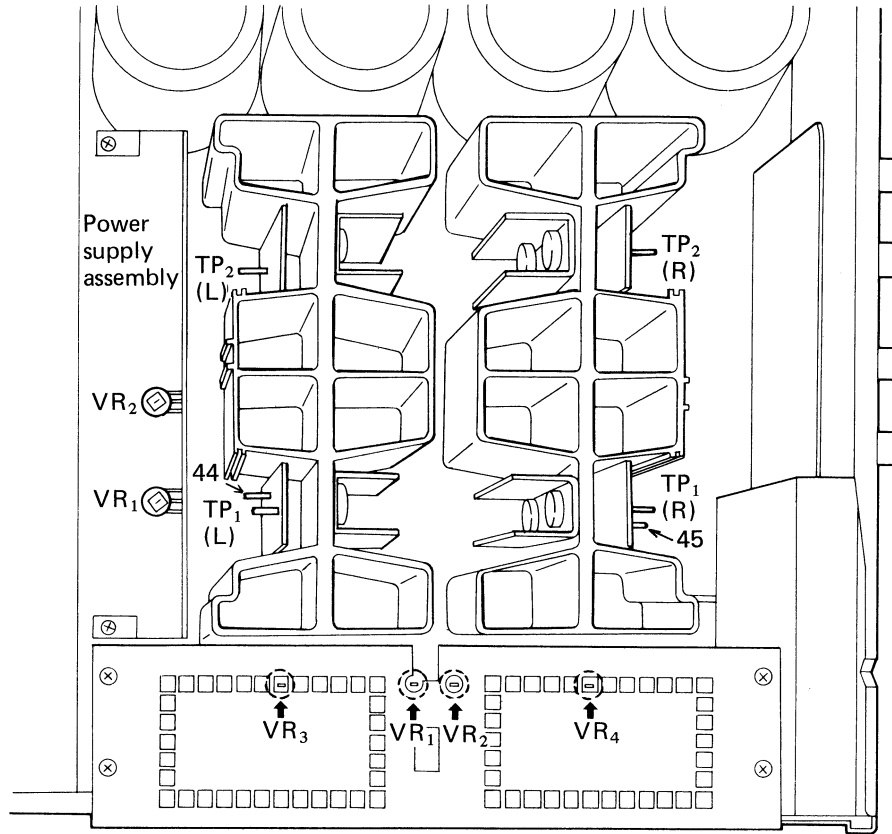
Adjust  $VR_2$  on the head amplifier assembly for DC 0V between terminal  $TPR_2$  and ground.

#### Equalizer Amplifier

Adjust  $VR_3$  on the head amplifier assembly for DC 0V between terminal  $TPL_3$  and ground.

Adjust  $VR_4$  on the head amplifier assembly for DC 0V between terminal  $TPR_4$  and ground.





# 8. EXPLODED VIEW

NOTE:

marked parts cannot be supplied.

A

B

C

D

A

B

C

D

1

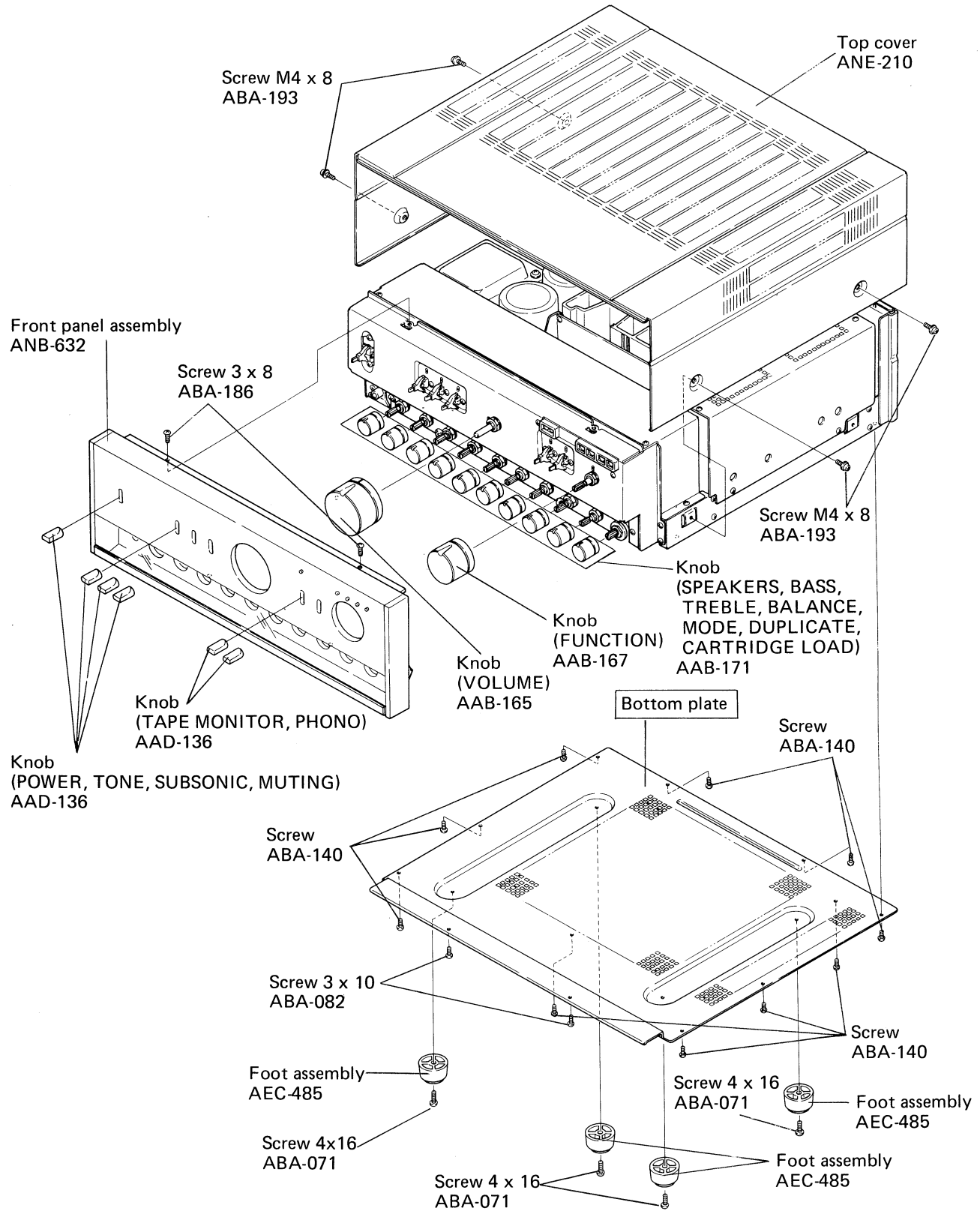
2

3

1

2

3



plied.

A

B

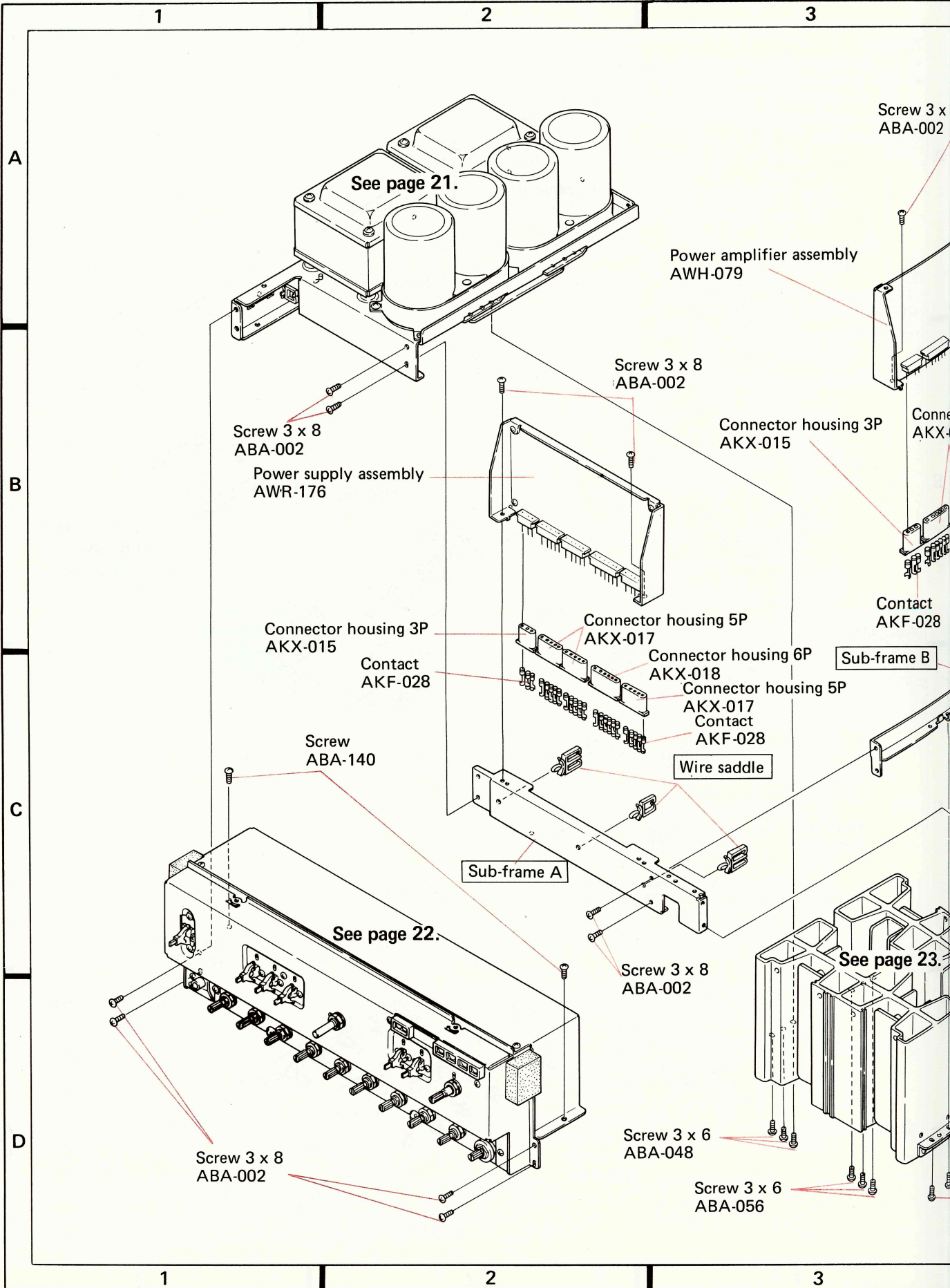
C

D

1

2

3



See page 21.

Power amplifier assembly AWH-079

Screw 3 x 8 ABA-002

Screw 3 x 8 ABA-002

Power supply assembly AWR-176

Screw 3 x 8 ABA-002

Connector housing 3P AKX-015

Connector housing 3P AKX-015

Contact AKF-028

Connector housing 5P AKX-017

Connector housing 6P AKX-018

Connector housing 5P AKX-017

Contact AKF-028

Contact AKF-028

Sub-frame B

Screw ABA-140

Wire saddle

Sub-frame A

See page 22.

Screw 3 x 8 ABA-002

Screw 3 x 8 ABA-002

Screw 3 x 6 ABA-048

Screw 3 x 6 ABA-056

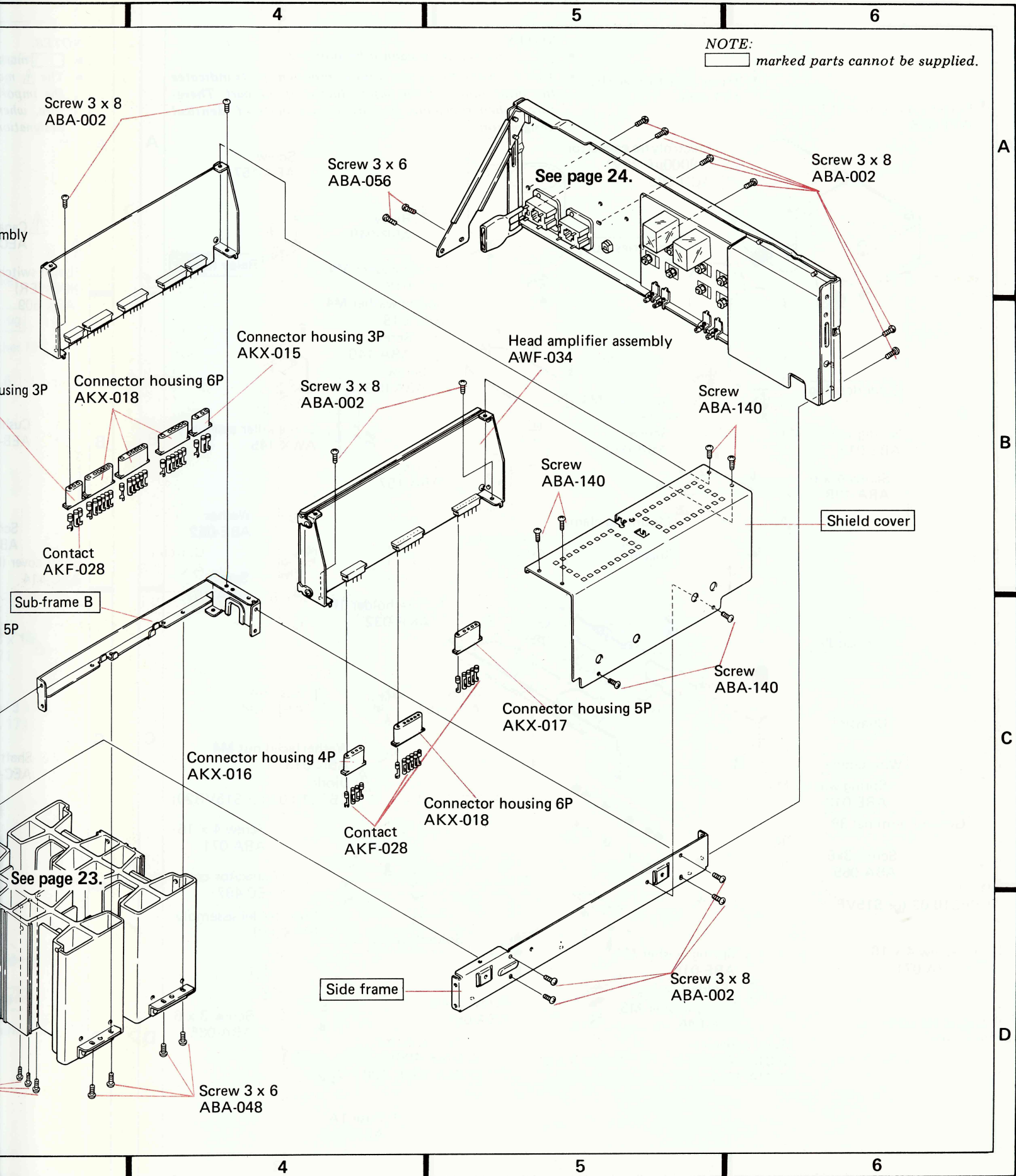
See page 23.

1

2

3

bly






1

2

3

NOTES:

-  marked parts cannot be supplied.
- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

 Power transformer (L) ATT-528

 Power transformer (R) ATT-529

Electrolytic capacitor (18000 $\mu$ F 71V) ACH-095

Solderless lug

Screw ABA-157

 Relay ASR-049

Spring washer M4 ABE-018

Spring washer M4 ABE-018

Screw ABA-140

Screw ABA-083

Screw 4 x 6 ABA-128

Spring washer M4 ABE-018

Screw ABA-083

Solderless lug


Spring washer M4 ABE-018

Screw 4 x 6 ABA-128

Mounting clamp

Spacer

Screw 3x16 ABA-171

 Fuse holder 1P AKR-032

Washer ABE-052

Screw ABA-157

Wire saddle


Chassis

Wire saddle

Spring washer M4 ABE-018

Ground terminal 3P

Screw 3x6 ABA-065

 Diode KBPC10-02 (or S15VB20)

Screw 4 x 16 ABA-071

Capacitor cover AEC-497

Spring washer M4 ABE-018

Spring washer M3 ABE-046

Mylar capacitor (0.01 $\mu$ F 400V) CQMA 103K 400

Screw 3 x 6 ABA-065


Screw 3 x 6 ABA-065

Mylar capacitor (0.01 $\mu$ F 400V) CQMA 103K 400

 Fuse 1A AEK-106

Connecting plate

Washer M4 ABN-013

 Diode KBPC10-02 (or S15VB20)



Screw 4 x 16 ABA-071

Capacitor cover AEC-497

Fuse holder assembly GWX-139

Screw 3 x 6 ABA-065

NOTES:

-  mar...
- The  m... the impor... fore, wh... designation

 Cap... AEC...

Lever switch (POWER) ASK-509

Cush... AEB...

Shaft cover AEC-414



Shaft AEC...

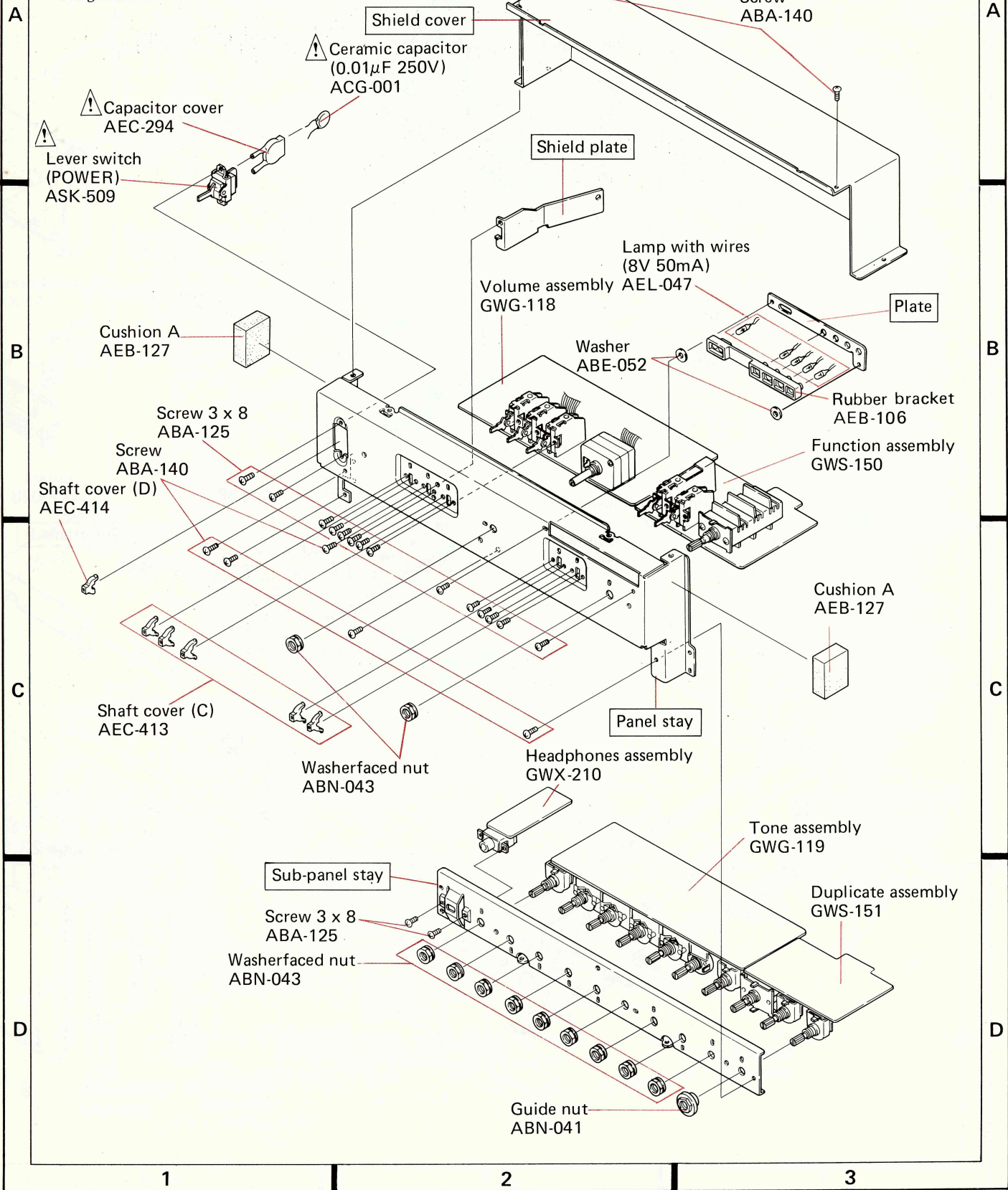
1

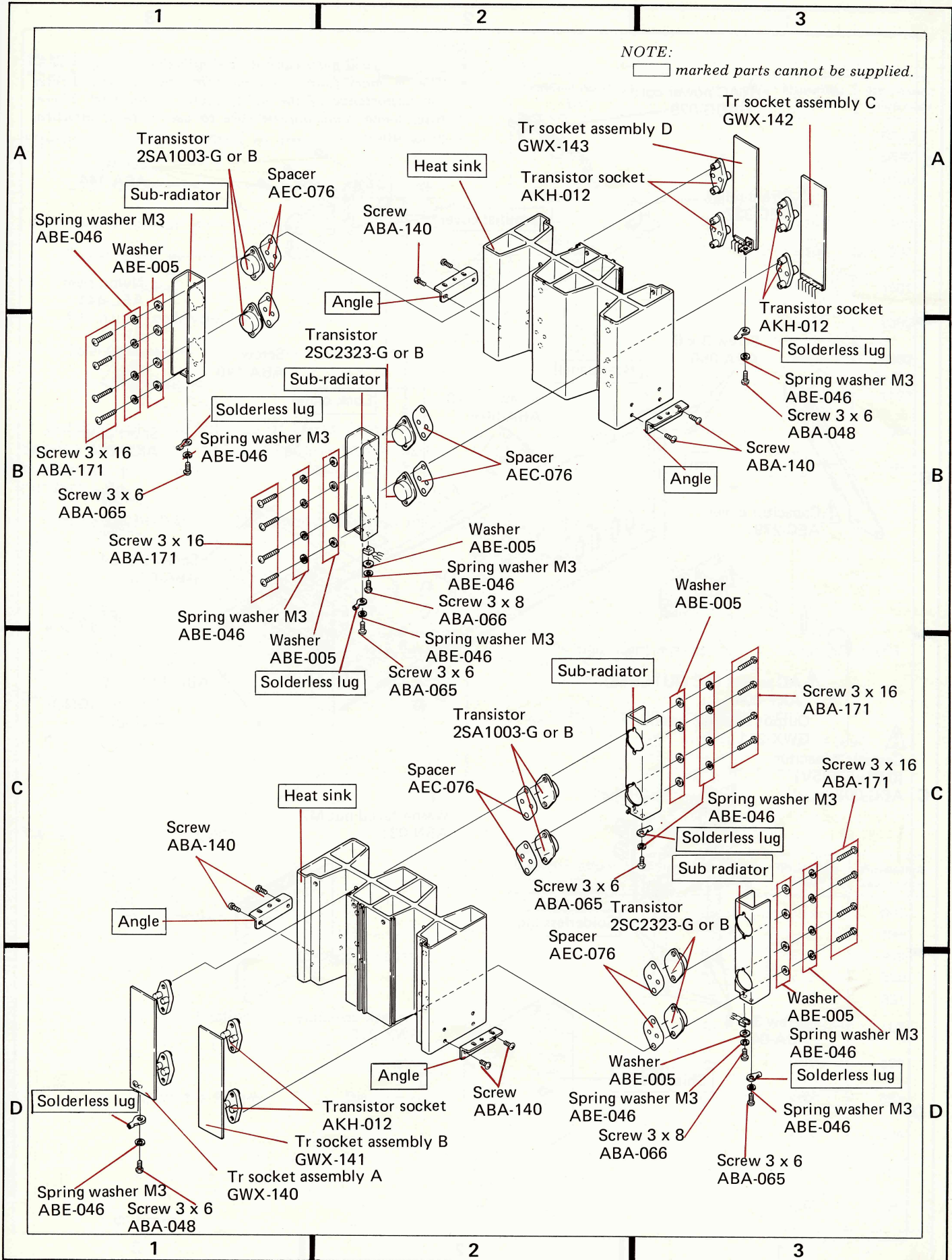
2

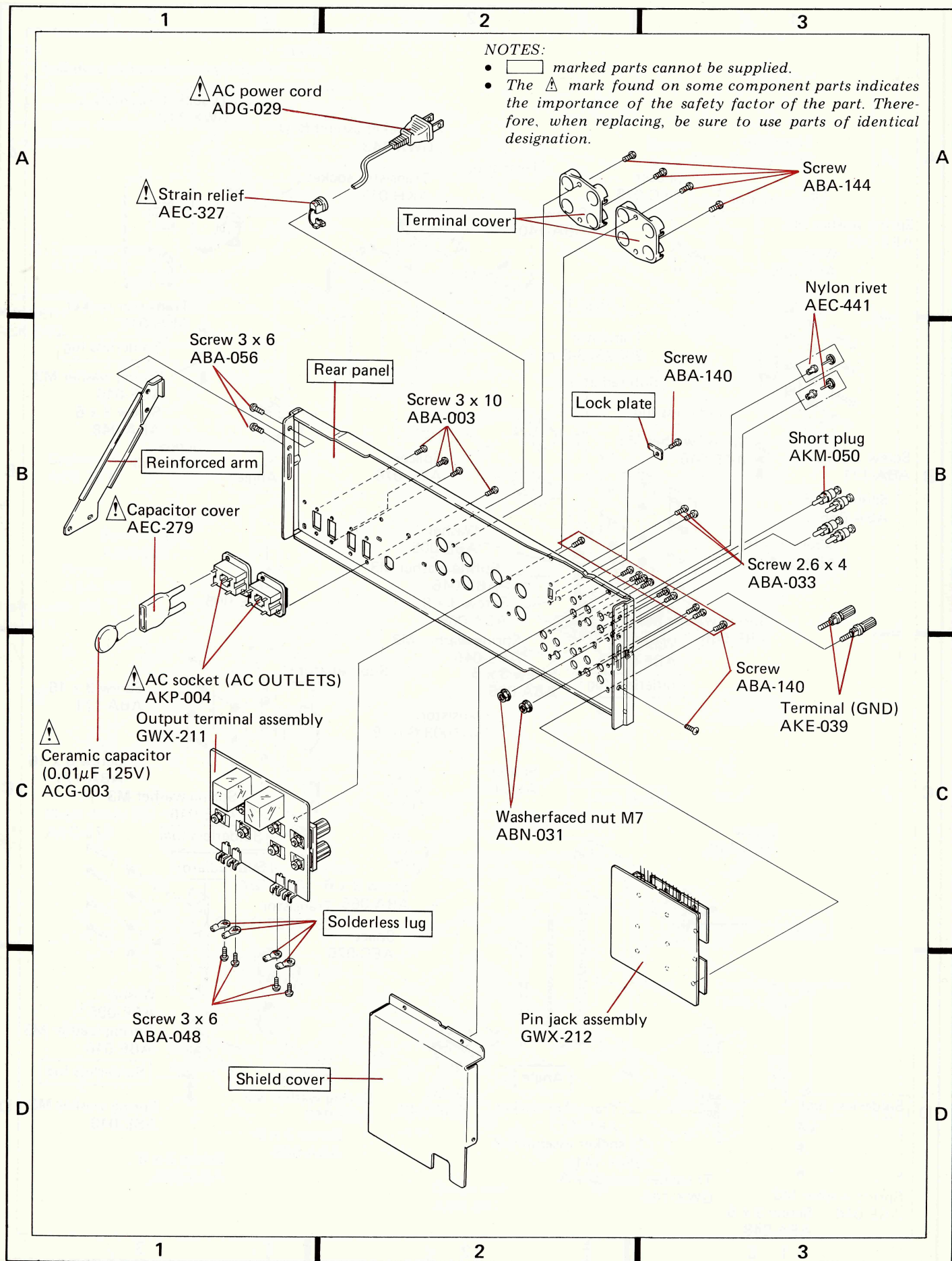
3

**NOTES:**

-  marked parts cannot be supplied.
- The  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.



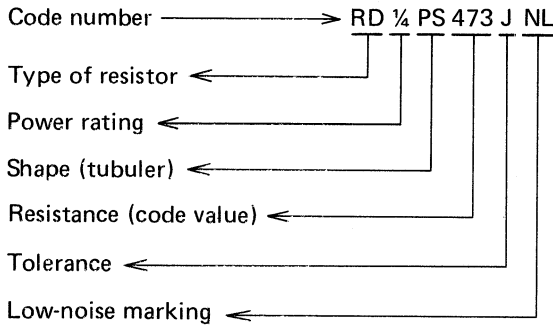






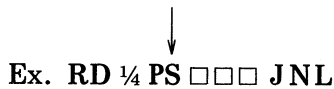
# RESISTANCE VALUE CODES

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

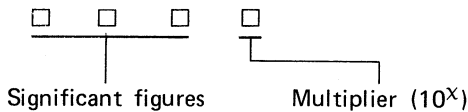


When ordering resistor components, first ascertain the actual resistance value from the circuit diagram, and then convert it into code no. form as shown in the following examples.

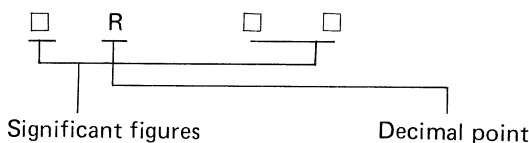
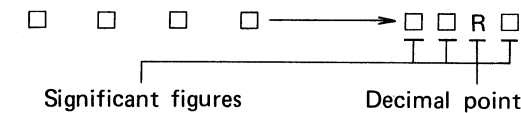
For further details on code numbers, refer to "Tuning Fork" VOL. 1.

## Ex. 1 For □□□□ Codes

### \* General resistors



### \* Resistors with fractional values

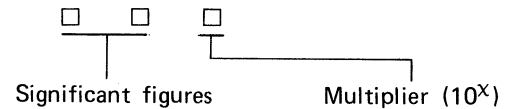


## Ex. 1

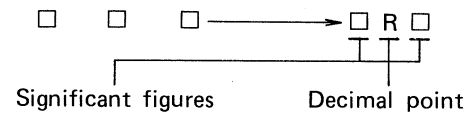
Nominal resistance (Ω)	Significant figure (three figures)	Multiplier (10 <sup>x</sup> )	Resistance value code
5.1	510	.....	5R10
5.62	562	.....	5R62
10	100	.....	10R0
22.5	225	.....	22R5
110	110	x10 <sup>0</sup>	1100
1k (1000)	100	x10 <sup>1</sup>	1001
1.56k (1560)	156	x10 <sup>1</sup>	1561
10k (10000)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

## Ex. 2 For □□□ Codes

### \* General resistors



### \* Resistors with fractional values



## Ex. 2

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

# 9. SCHEMATIC DIAGRAMS, P. C. BOARD PATTERNS AND PARTS LIST

**NOTE:**

When ordering resistors, first convert resistance values into code formas 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 × 10 <sup>1</sup>	561	RD¼PS	561 J
47kΩ	47 × 10 <sup>3</sup>	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 × 10 <sup>1</sup>	5621	RN¼SR	5621 F
--------	-----------------------	------	-------	--------

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

## 9.1 MISCELLANEA

### Miscellaneous Parts

#### CAPACITORS

Part No.	Symbol & Description
$\Delta$ ACG-001	C1 Ceramic 0.01/250V
$\Delta$ ACG-003	C2 Ceramic 0.01/125V
CQMA 103K 400	C3-C6
ACH-095	C7-C10 Electrolytic 18000/71V

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SC2323-G or B	Q1, Q3, Q5, Q7
2SA1003-G or B	Q2, Q4, Q6, Q8
* hfe of these transistors (Q1-Q8) should have the same value.	
$\Delta$ KBPC10-02	D1, D2
(S15VB20)	

#### LAMP AND FUSES

Part No.	Symbol & Description
AEL-047	PL1-PL5 Lamp with wires 8V, 50mA
$\Delta$ AEK-106	FU1-FU6 Fuse 1A
$\Delta$ AEK-108	FU7, FU8 Fuse 5A

#### P.C. BOARD ASSEMBLIES

Part No.	Description
GWS-150	Function assembly
GWS-151	Duplicate assembly
GWX-210	Headphones assembly
AWF-034	Head amplifier assembly
GWG-118	Volume assembly

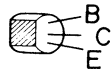
Part No.	Symbol & Description
GWG-119	Tone assembly
AWH-079	Power amplifier assembly
GWX-211	Output terminal assembly
GWX-212	Pin jack assembly
AWR-176	Power supply assembly
AWX-145	Surge killer assembly
GWX-139	Fuse holder assembly
GWX-140	Tr socket assembly A
GWX-141	Tr socket assembly B
GWX-142	Tr socket assembly C
GWX-143	Tr socket assembly D

#### OTHERS

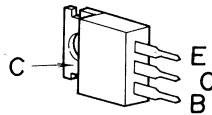
Part No.	Symbol & Description
$\Delta$ ASK-509	S1 Lever switch (POWER)
$\Delta$ ASR-049	RL1 Relay
$\Delta$ ATT-528	T1 Power transformer (L)
$\Delta$ ATT-529	T2 Power transformer (R)
AKE-039	Terminal (GND)
$\Delta$ AKP-004	AC socket (AC OUTLET)
AKH-012	Transistor socket
AKX-015	Connector housing 3P
AKX-017	Connector housing 5P
AKX-016	Connector housing 4P
AKX-018	Connector housing 6P
AKF-028	Contact (for connector)
$\Delta$ ADG-029	AC power cord
AKM-050	Short plug
$\Delta$ AKR-032	Fuse holder 1P

# External Appearance of Transistors and ICs

2SA834  
 2SA872A  
 2SC945A  
 2SC1649  
 2SC1775A  
 2SA733  
 2SC1844



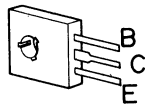
2SB536  
 2SB536A  
 2SD381  
 2SD381A



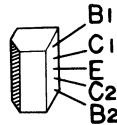
2SA978



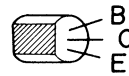
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 2SC1903



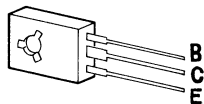
2SA979  
 2SC1583



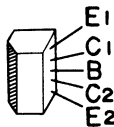
2SC1384



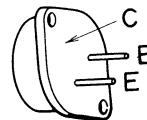
2SA939  
 2SC2071



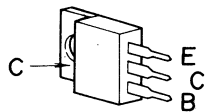
2SA995  
 2SC2291



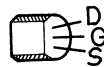
2SA1003  
 2SC2323



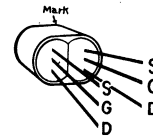
2SB682  
 2SD712



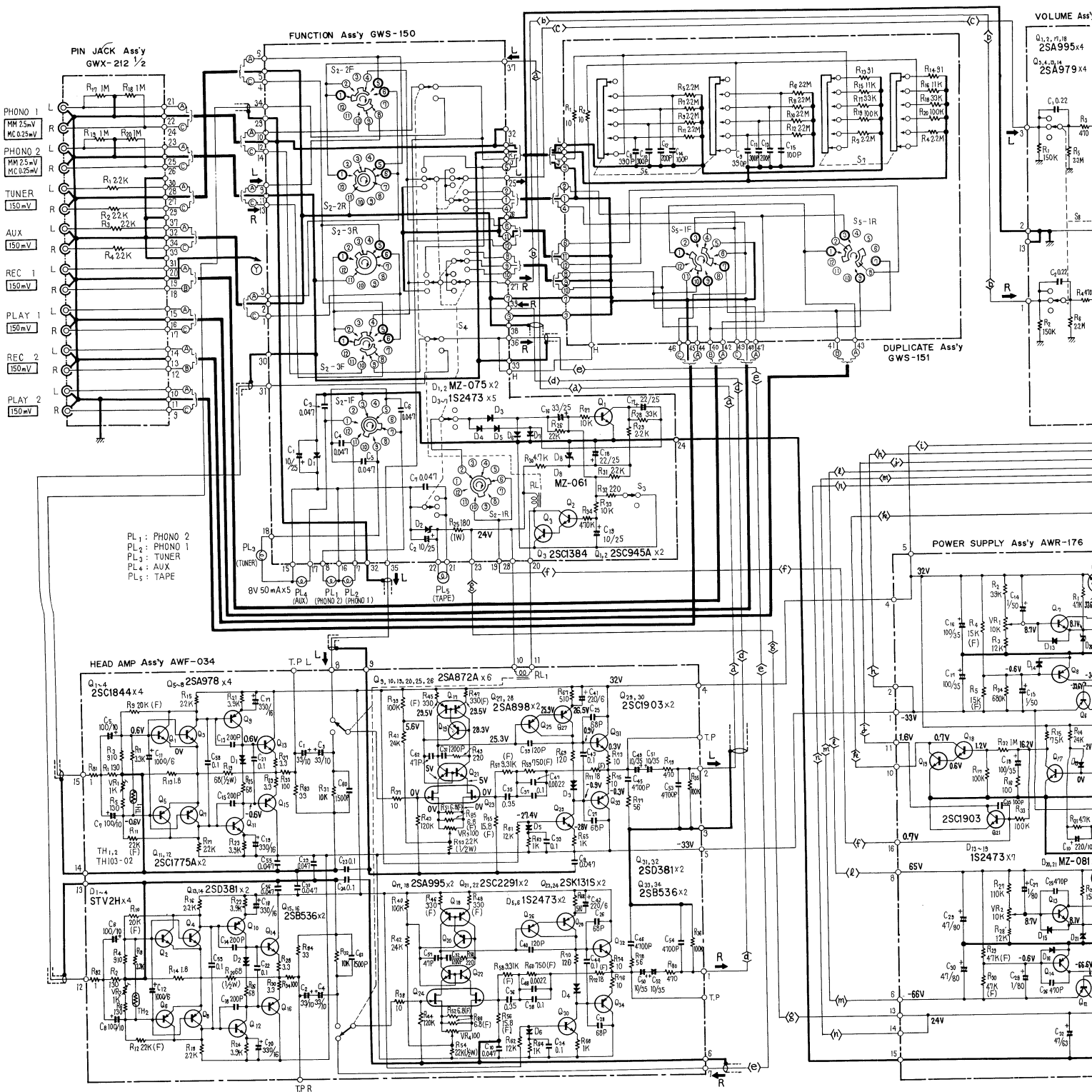
2SK34

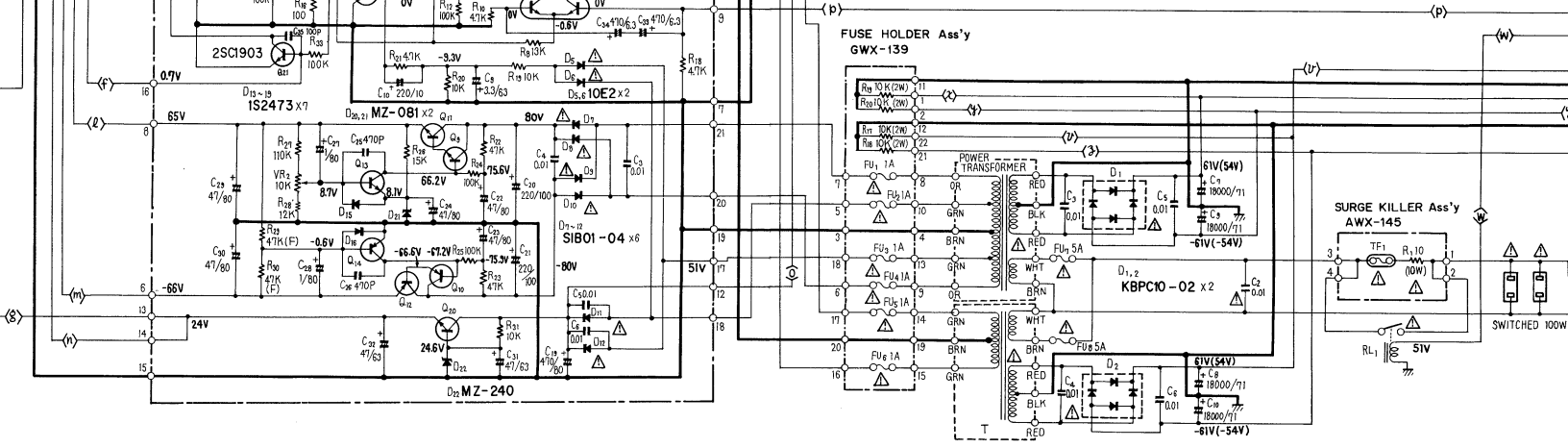
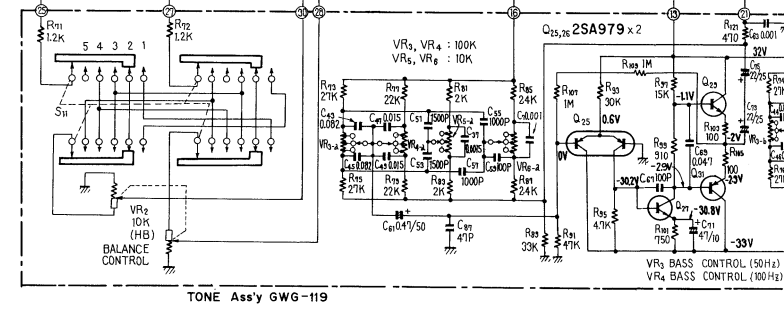
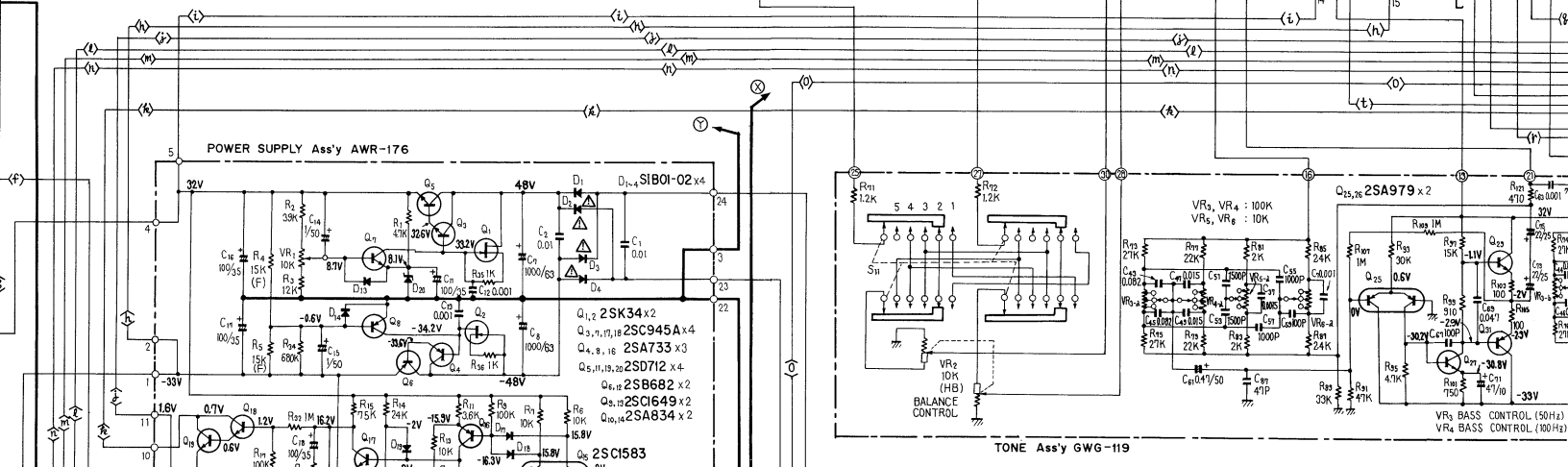
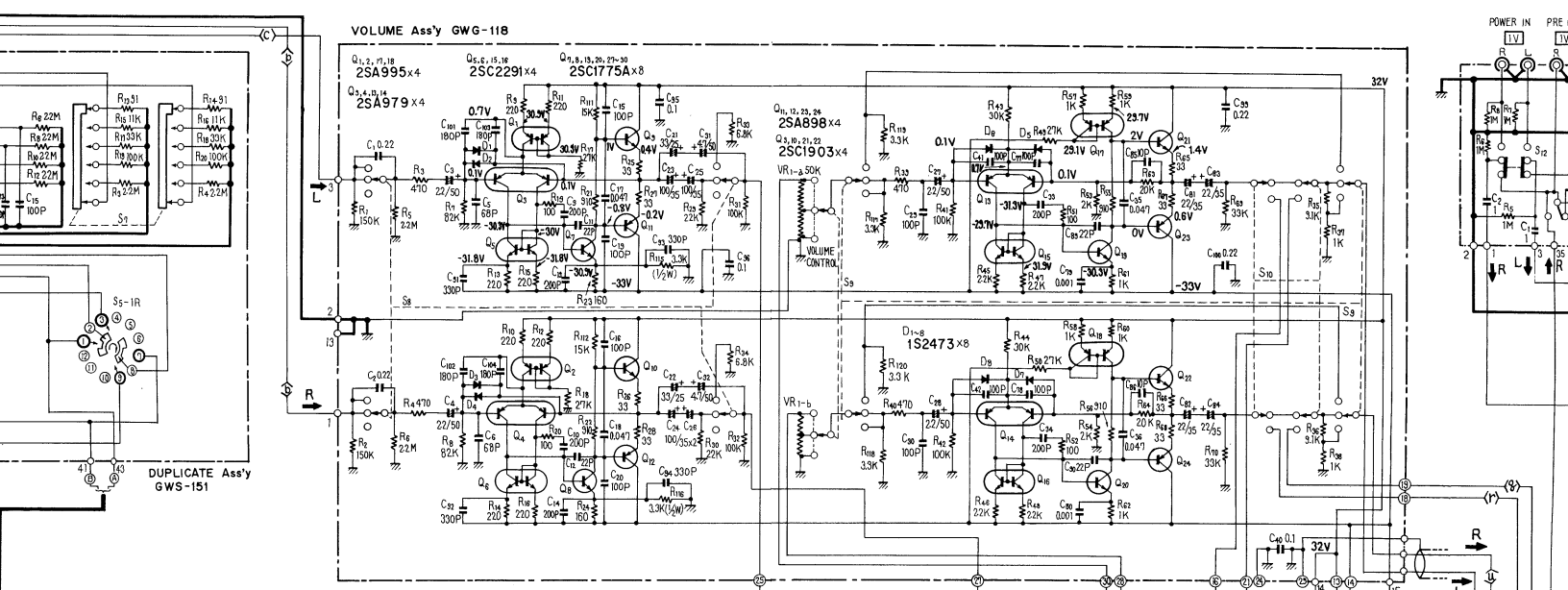


2SK131S



# 9.2 SCHEMATIC DIAGRAM





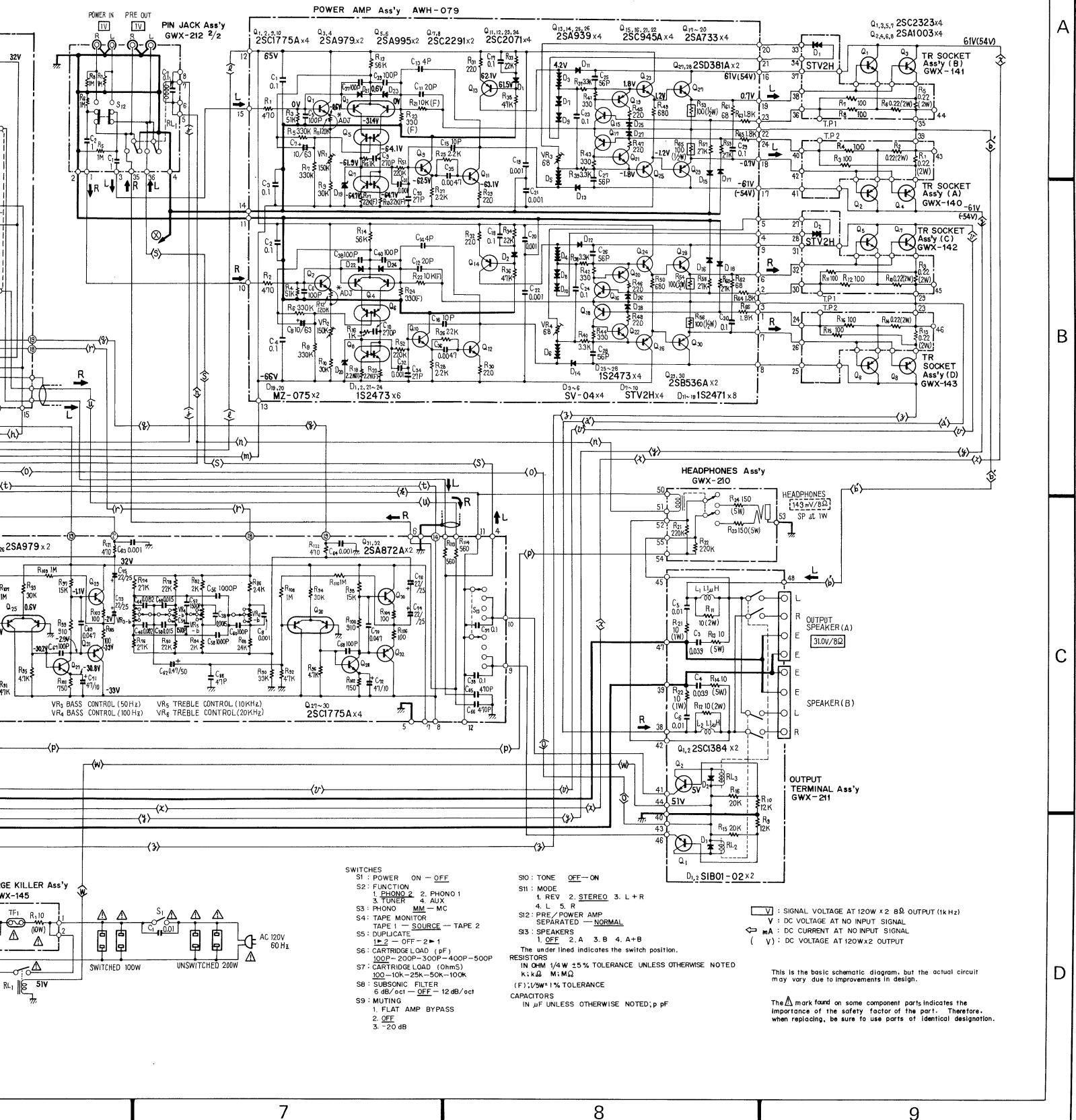
7

8

9

NOTE:

The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.



A

B

C

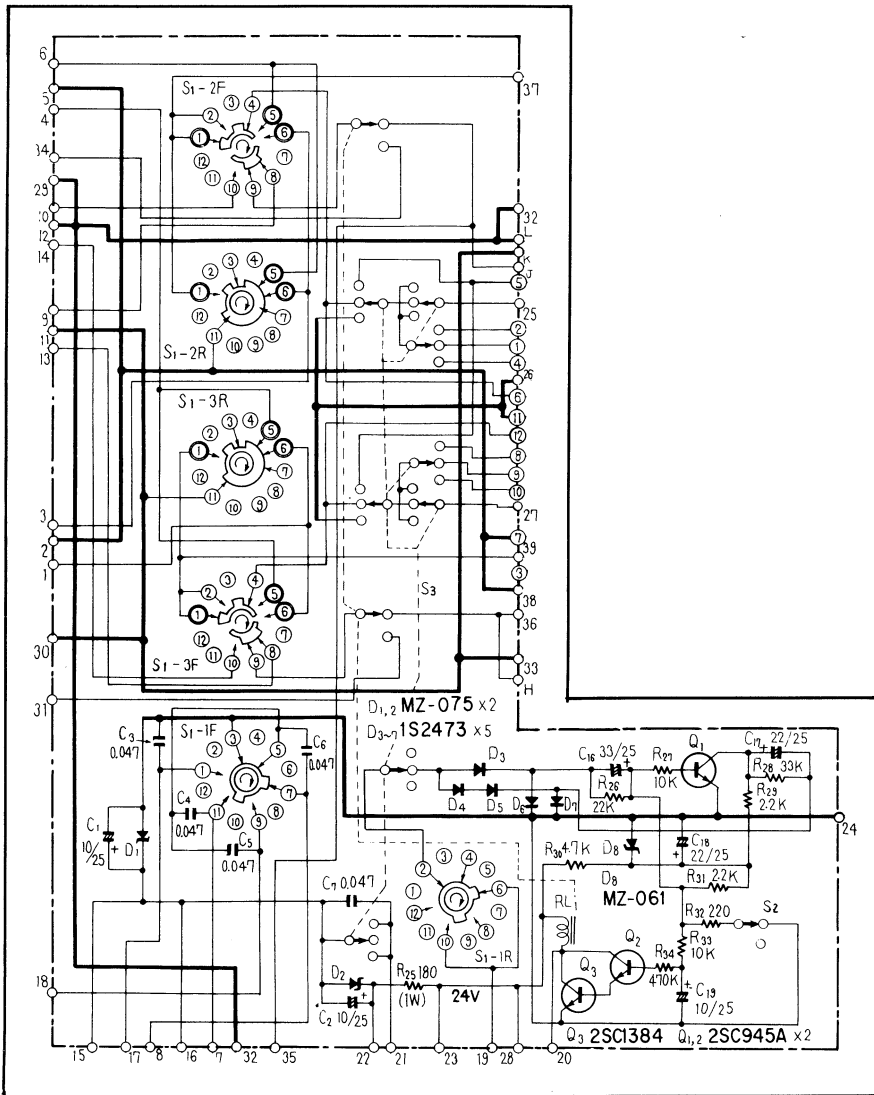
D

7

8

9

### 9.3 FUNCTION ASSEMBLY (GWS-150)



#### Parts List

##### SWITCHES

Part No.	Symbol & Description
ASD-110	S1 Rotary (FUNCTION)
ASK-139	S2 Lever (PHONO)
ASK-143	S3 Lever (TAPE MONITOR)
ASR-042	RL1 Relay

##### CAPACITORS

Part No.	Symbol & Description
CEA 100P 25	C1, C2, C19
CKDYF 473Z 50	C3-C7
CEA 330P 25	C16
CEA 220P 25	C17, C18

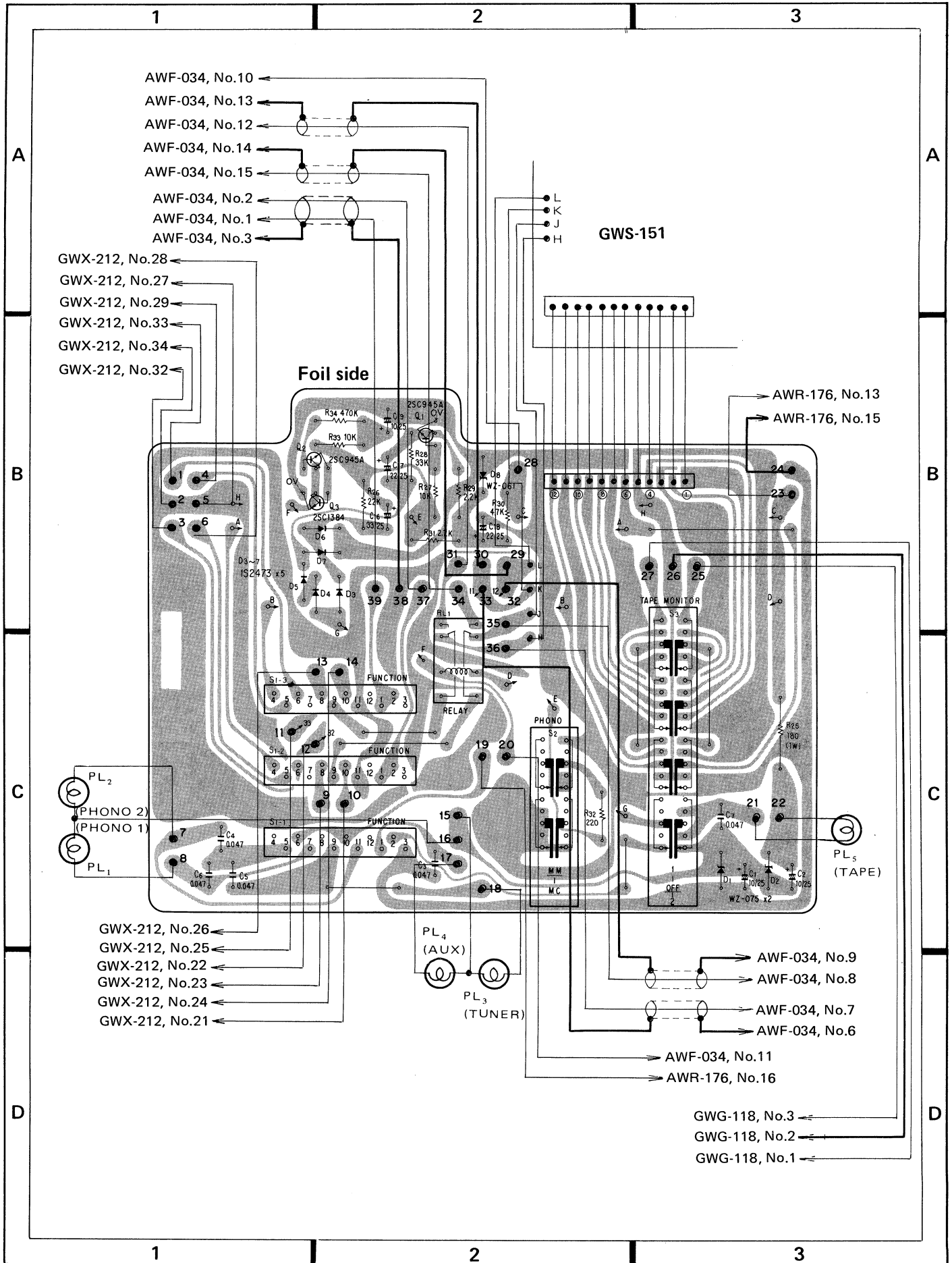
##### RESISTORS

Part No.	Symbol & Description
RS1P □□□ J	R25
RD¼PM □□□ J	R26-R34

##### SEMICONDUCTORS

Part No.	Symbol & Description
2SC945A-Q (2SC945A-R) (2SC945A-S)	Q1, Q2
2SC1384-R	Q3
MZ-075	D1, D2
1S2473	D3-D7
MZ-061	D8

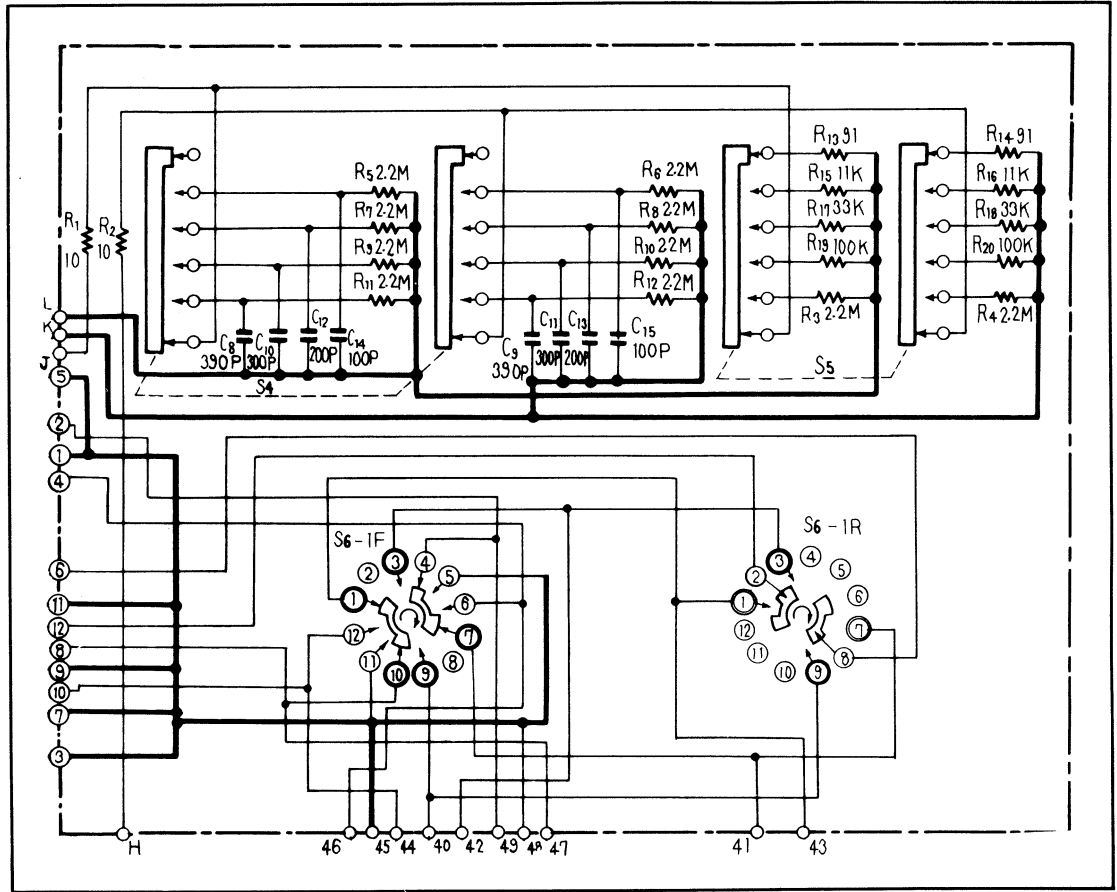
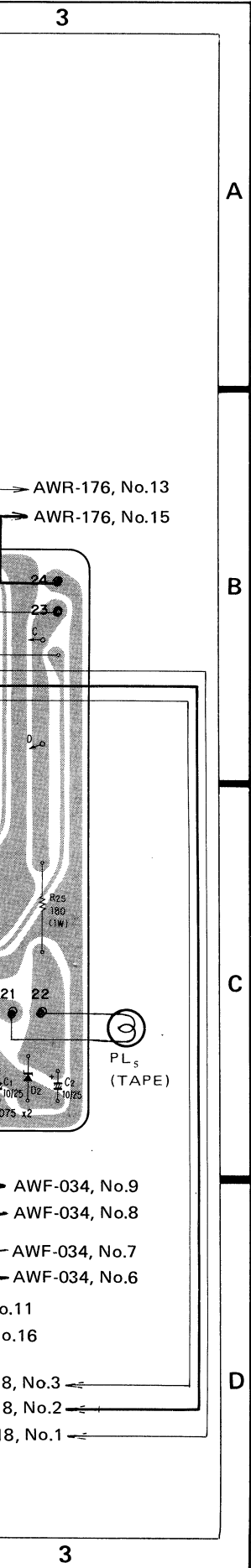
Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.



Part  
SWI  
Part  
ASE  
ASD  
CAP  
Part  
CKD  
CCD  
CCD  
CCD  
RES  
Part  
RD%



9.4 DUPLICATE ASSEMBLY (GWS-151)



Parts List

SWITCHES

Part No.	Symbol & Description
ASE-102	S5, S6 Rotary slide (CARTRIDGE LOAD)
ASD-102	S7 Rotary (DUPLICATE)

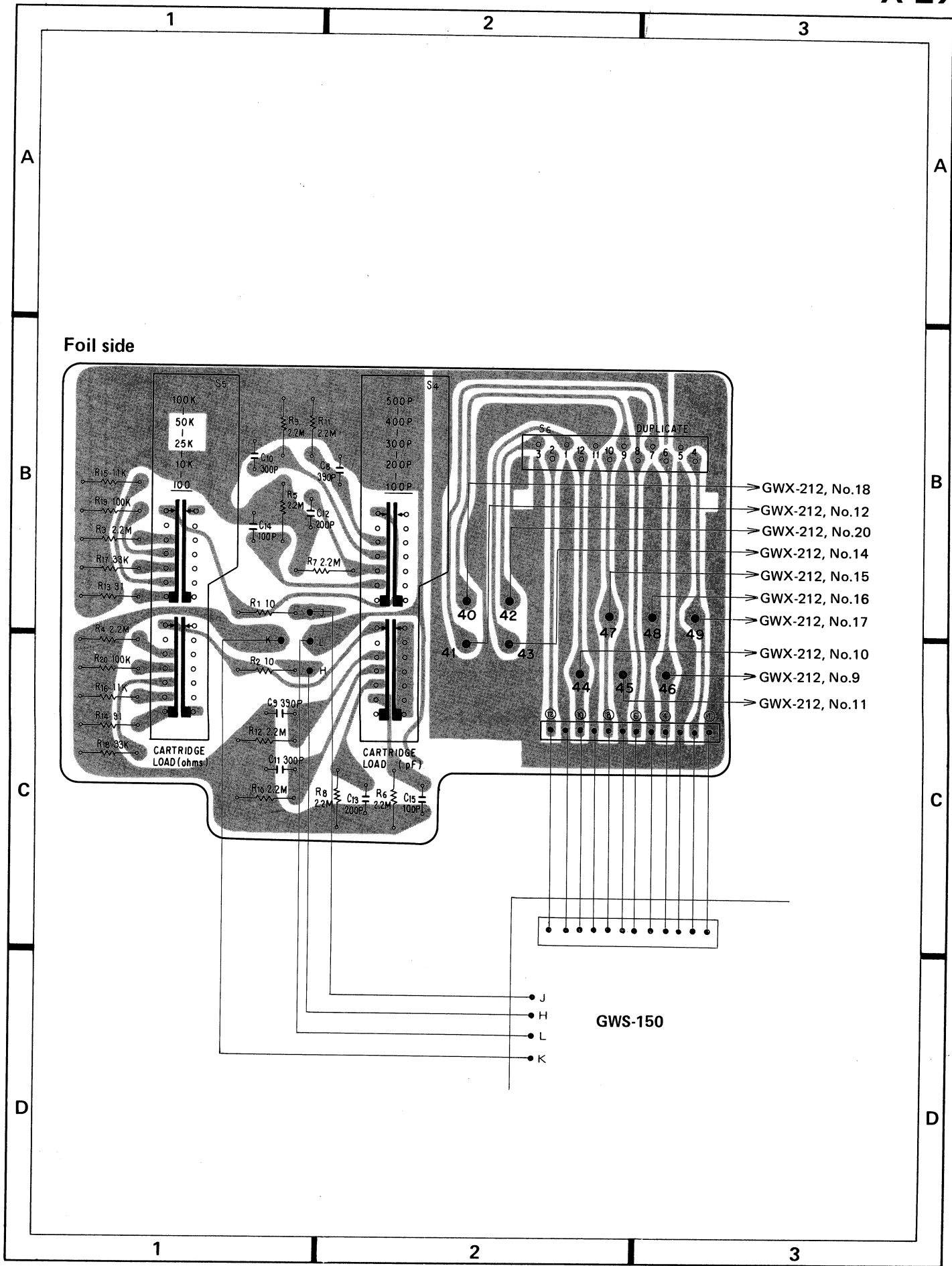
CAPACITORS

Part No.	Symbol & Description
CKDYB 391K 50	C8, C9
CCDSL 301K 50	C10, C11
CCDSL 201K 50	C12, C13
CCDSL 101K 50	C14, C15

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

RESISTORS

Part No.	Symbol & Description
RD¼PM □□□J	R1-R20



Foil side

1

2

3

A

A

B

B

C

C

D

D

- GWX-212, No.18
- GWX-212, No.12
- GWX-212, No.20
- GWX-212, No.14
- GWX-212, No.15
- GWX-212, No.16
- GWX-212, No.17
- GWX-212, No.10
- GWX-212, No.9
- GWX-212, No.11

GWS-150

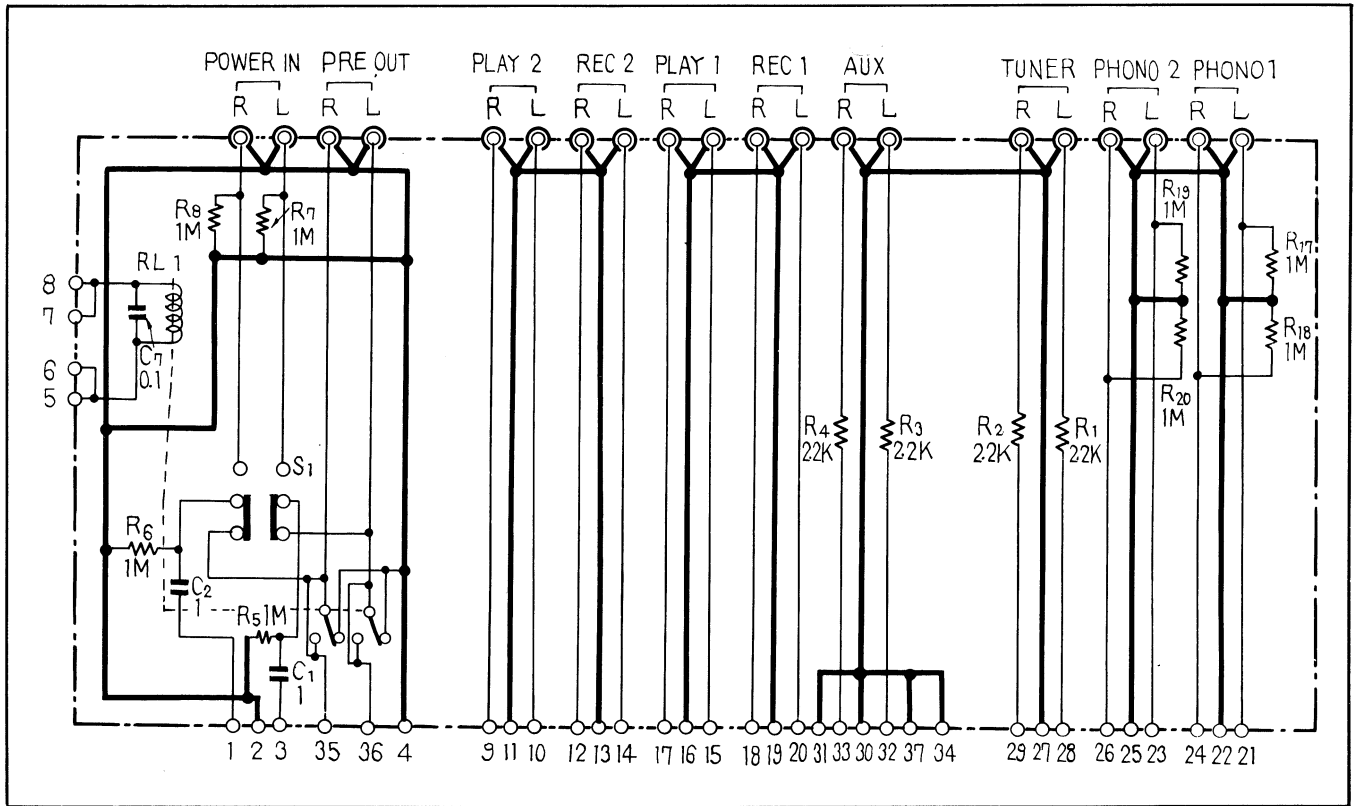
- J
- H
- L
- K

1

2

3

## 9.5 PIN JACK ASSEMBLY (GWX-212)



### Parts List of Pin Jack Assembly (GWX-212)

#### SWITCHES

Part No.	Symbol & Description
ASH-002	S1 Slide switch (PRE/POWER AMP)
ASR-042	RL1 Relay

#### CAPACITORS

Part No.	Symbol & Description
ACE-020	C1, C2 Metallized mylar 1/50V
CQMA 104K 250	C7

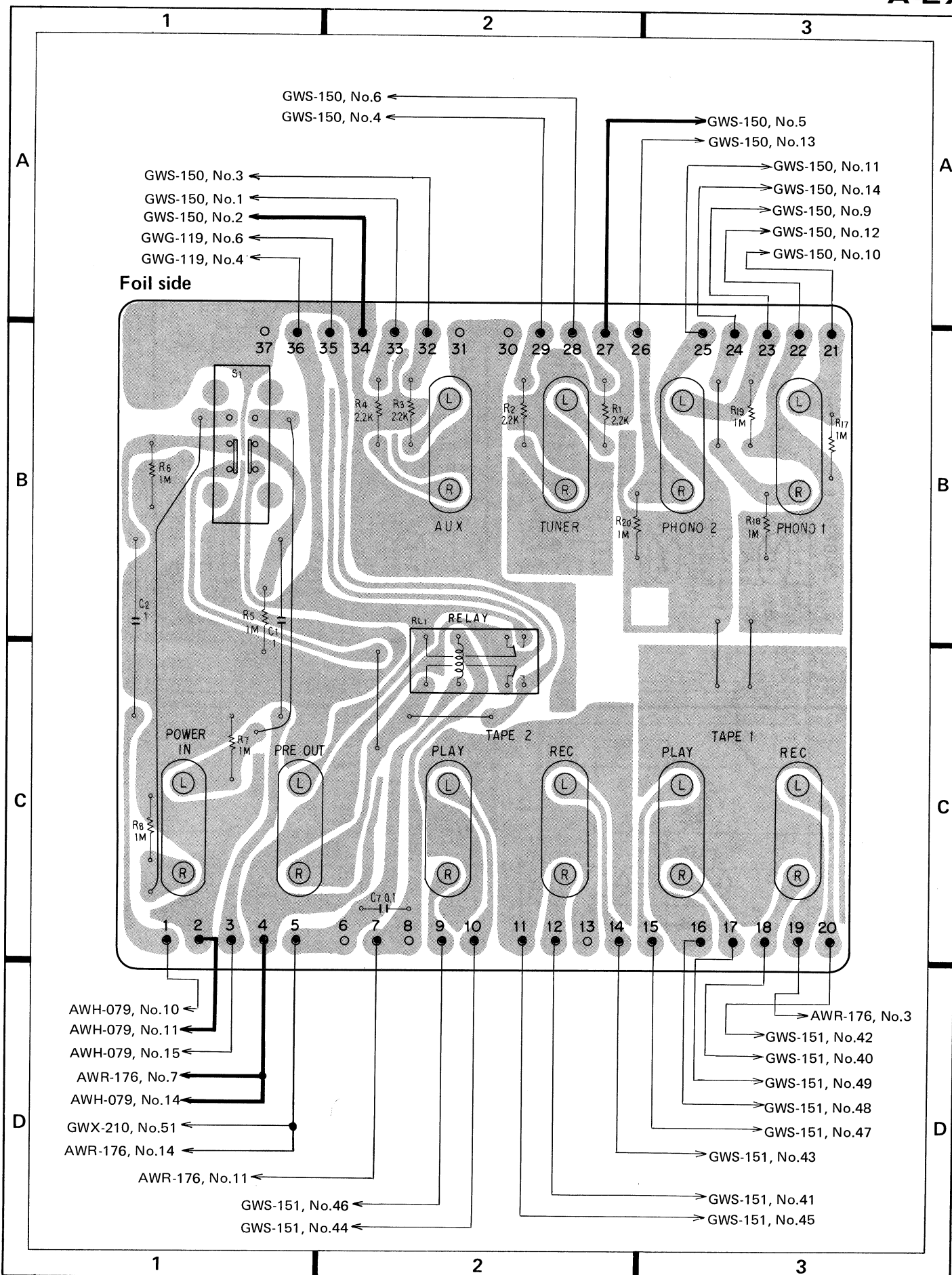
#### RESISTORS

Part No.	Symbol & Description
RD¼PM □□□ J	R1-R8, R17-R20

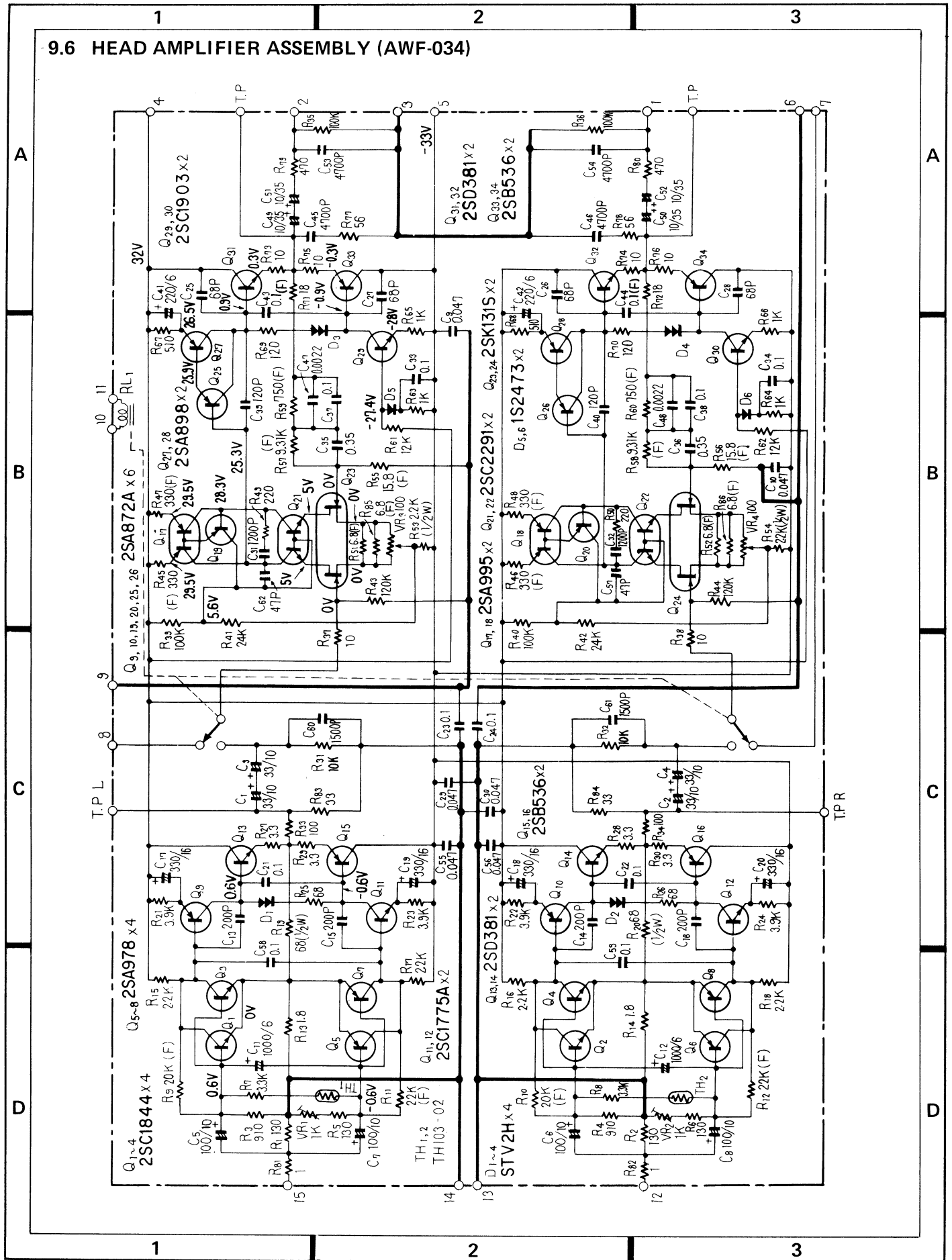
#### OTHERS

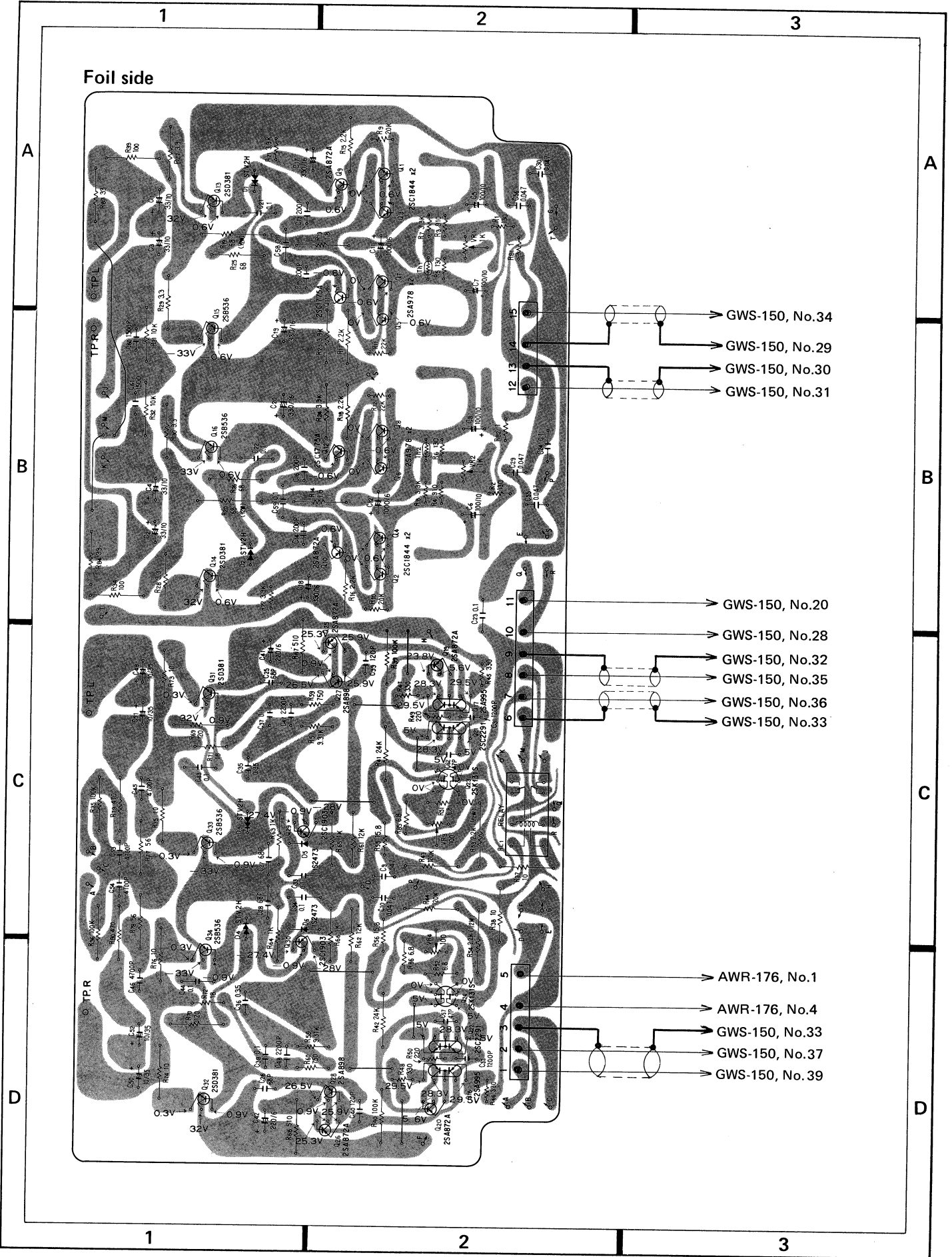
Part No.	Description
AKB-051	Terminal (TUNER, AUX, TAPE, PRE OUT, POWER AMP IN)
AKB-052	Terminal (PHONO)

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*



# 9.6 HEAD AMPLIFIER ASSEMBLY (AWF-034)





## Parts List of Head Amplifier Assembly (AWF-034)

### SEMICONDUCTORS

Part No.	Symbol & Description
2SC1844-F or E	Q1—Q4
2SA978-G or F	Q5—Q8
2SA872A-E or D	Q9, Q10, Q19, Q20, Q25, Q26
2SC1775A-E or F	Q11, Q12
2SD381-L or M	Q13, Q14, Q31, Q32
2SB536-L or M	Q15, Q16, Q33, Q34
2SA995-F or G	Q17, Q18
2SC2291-F or G	Q21, Q22
2SK131S-L or M	Q23, Q24
2SA898-V or B	Q27, Q28
2SC1903-V or B	Q29, Q30
STV2H	D1—D4
1S2473	D5, D6
(1S1555)	
TH103-02	TH1, TH2

### CAPACITORS

Part No.	Symbol & Description
CEANL 330P 10	C1—C4
CEANL 101P 10	C5—C8
CQMA 473K 50	C9, C10, C29, C30, C55, C56
CEA 102P 6	C11, C12
CCDSL 201K 50	C13—C16
CEA 331P 16	C17—C20
CQMA 104K 50	C21—C24, C33, C34, C43, C44, C58, C59
CCDSL 680K 50	C25—C28
CQMA 122J 50	C31, C32
ACE-030	C35, C36 Polypropylene 0.35/50V
CQPA 104G 50	C37, C38
CCDSL 121K 50	C39, C40
CEA 221P 6	C41, C42
CQMA 472K 50	C45, C46, C53, C54
CQMA 222K 50	C47, C48
CEA 100P 35	C49—C52
CCDSL 470K 50	C57, C62
CQMA 152K 50	C60, C61

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

### RESISTORS

Part No.	Symbol & Description
ACP-024	VR1, VR2 Semi-fixed 1k-B
ACP-015	VR3, VR4 Semi-fixed 100-B
RD $\frac{1}{4}$ PS □□□ J	R13—R18, R23—R26, R31, R32, R35—R44,
RD $\frac{1}{4}$ PS □□□ J	R61—R70, R77, R78, R83, R84
RD $\frac{1}{4}$ VS □□□ J	R1—R8, R21, R22, R49, R50, R81, R82

Part No.	Symbol & Description
RN $\frac{1}{5}$ SQ □□□□ F	R9—R12, R45—R48
RD $\frac{1}{2}$ PSF □□□ J	R19, R20
RD $\frac{1}{4}$ PSF □□□ J	R27—R30, R33, R34, R73—R76, R79, R80
RN $\frac{1}{4}$ SR □□□□ F	R51, R52, R85, R86 R55—R60, R71, R72
RD $\frac{1}{2}$ PS □□□ J	R53, R54

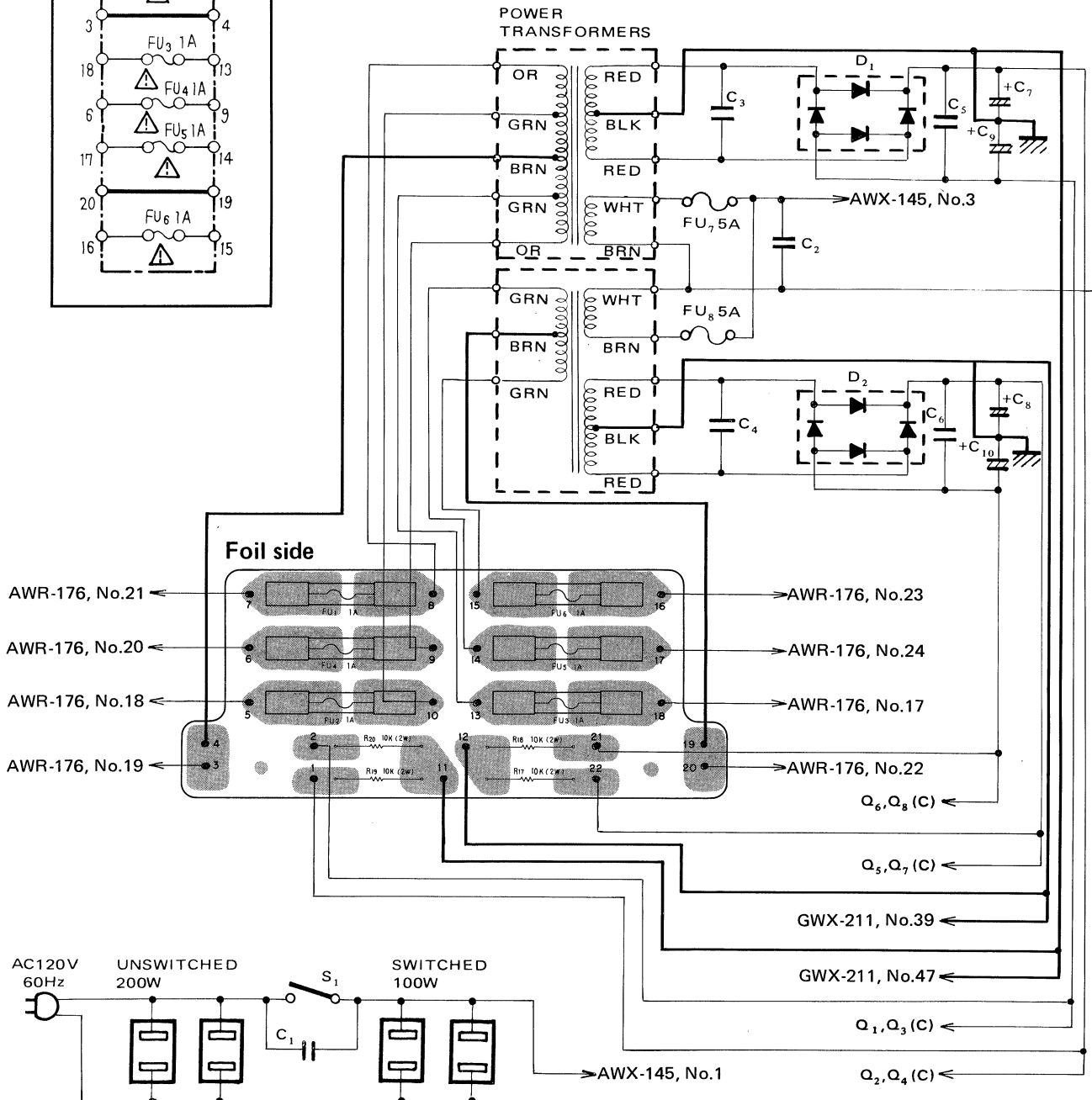
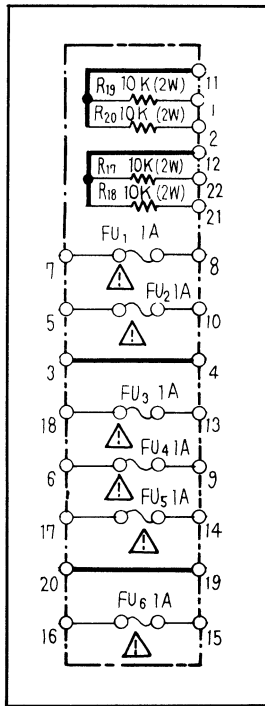
### OTHERS

Part No.	Symbol & Description
ASR-042	RL1 Relay
ANH-340	Heat sink

9.7 FUSE HOLDER ASSEMBLY (GWX-139)

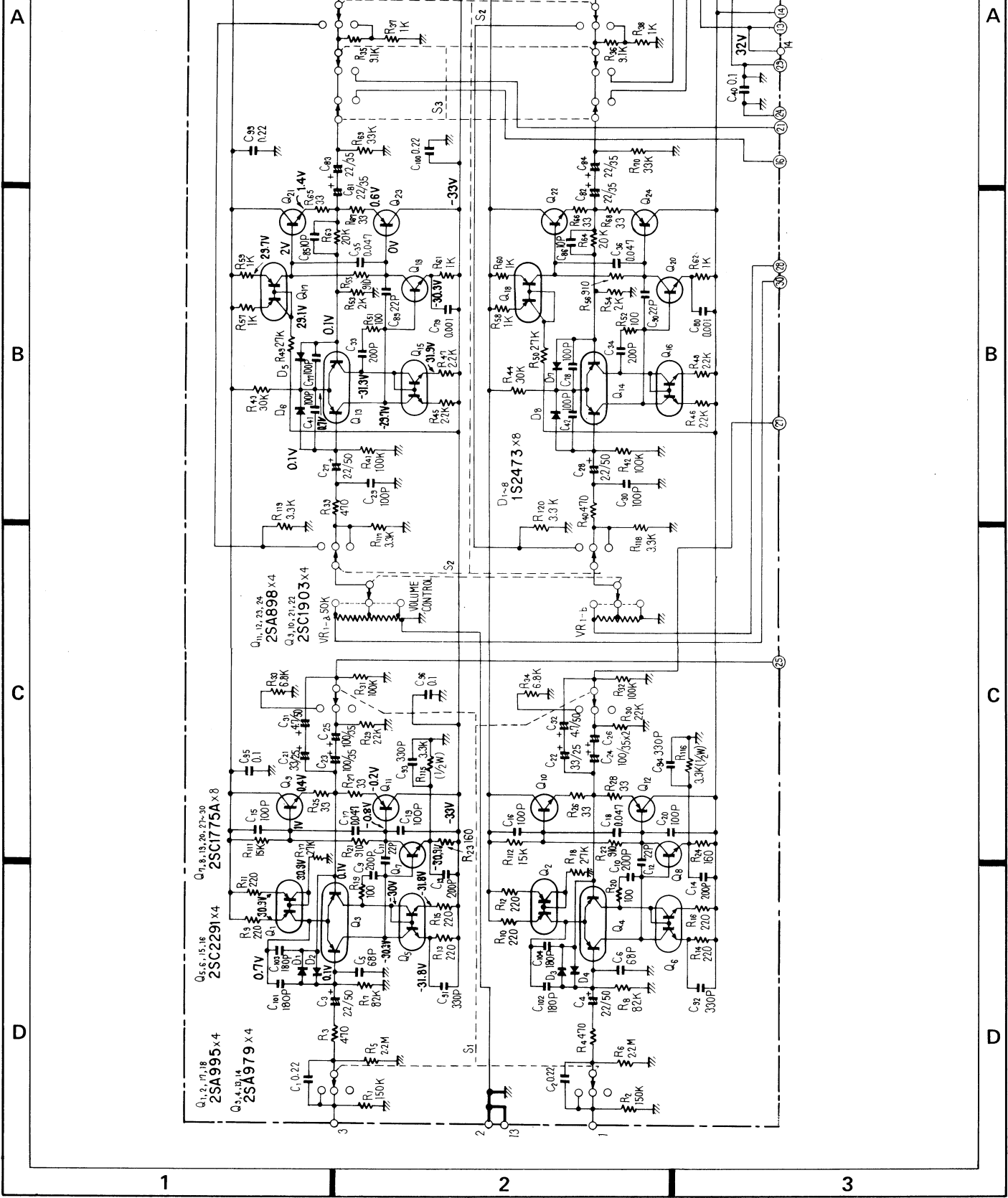
Parts List of Fuse Holder Assembly (GWX-139)

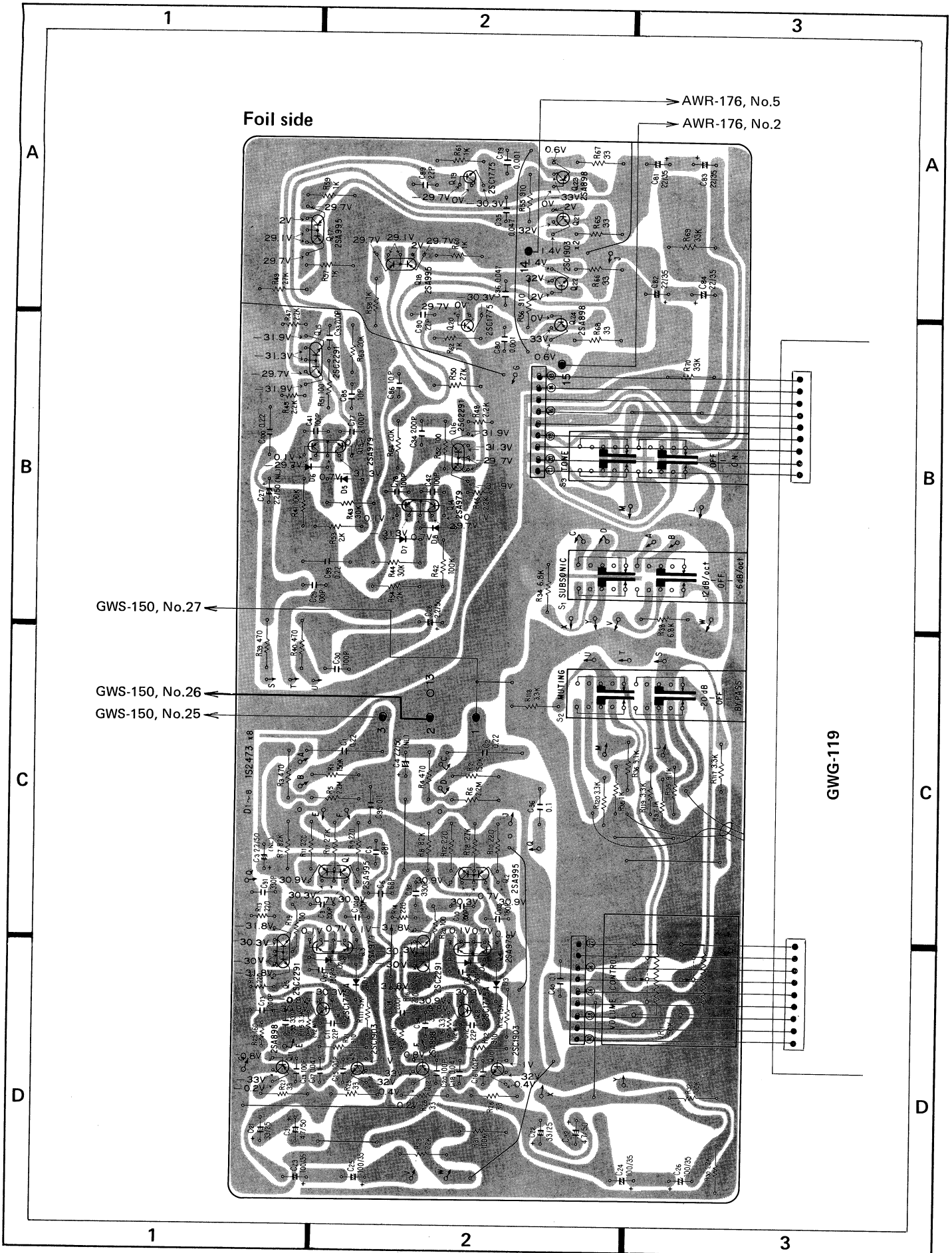
Part No.	Symbol & Description
RS2P 103J	R17-R19 Metal film resistor
AKR-013	Fuse clip





# 9.8 VOLUME ASSEMBLY (GWG-118)





Foil side

AWR-176, No.5  
AWR-176, No.2

GWS-150, No.27  
GWS-150, No.26  
GWS-150, No.25

GWG-119

## Parts List of Volume Assembly (GWG-118)

## SWITCHES

Part No.	Symbol & Description
ASK-142	S1, S2 Lever (SUBSONIC, MUTING)
ASK-139	S3 Lever (TONE)

## CAPACITORS

Part No.	Symbol & Description
CQMA 224K 50	C1, C2, C99, C100
CEANL 2R2P 50	C3, C4, C27, C28
CCDSL 680K 50	C5, C6
CCDSL 201K 50	C9, C10, C13, C14, C33, C34
CCDSL 220K 50	C11, C12, C89, C90
CCDSL 101K 50	C15, C16, C19, C20, C29, C30
CCDSL 101K 50	C41, C42, C77, C78
CQMA 473K 50	C17, C18, C35, C36
CEA 330P 35	C21, C22
CEA 101P 35	C23-C26
CEANL 4R7M 50	C31, C32
CQMA 102K 50	C79, C80
CEA 220P 35	C81-C84
CCDSL 100F 50	C85, C86
CQMA 104K 50	C96, C95, C40
CKDKB 331K 50	C91-C94
CCDSL 181K 50	C101-C104

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

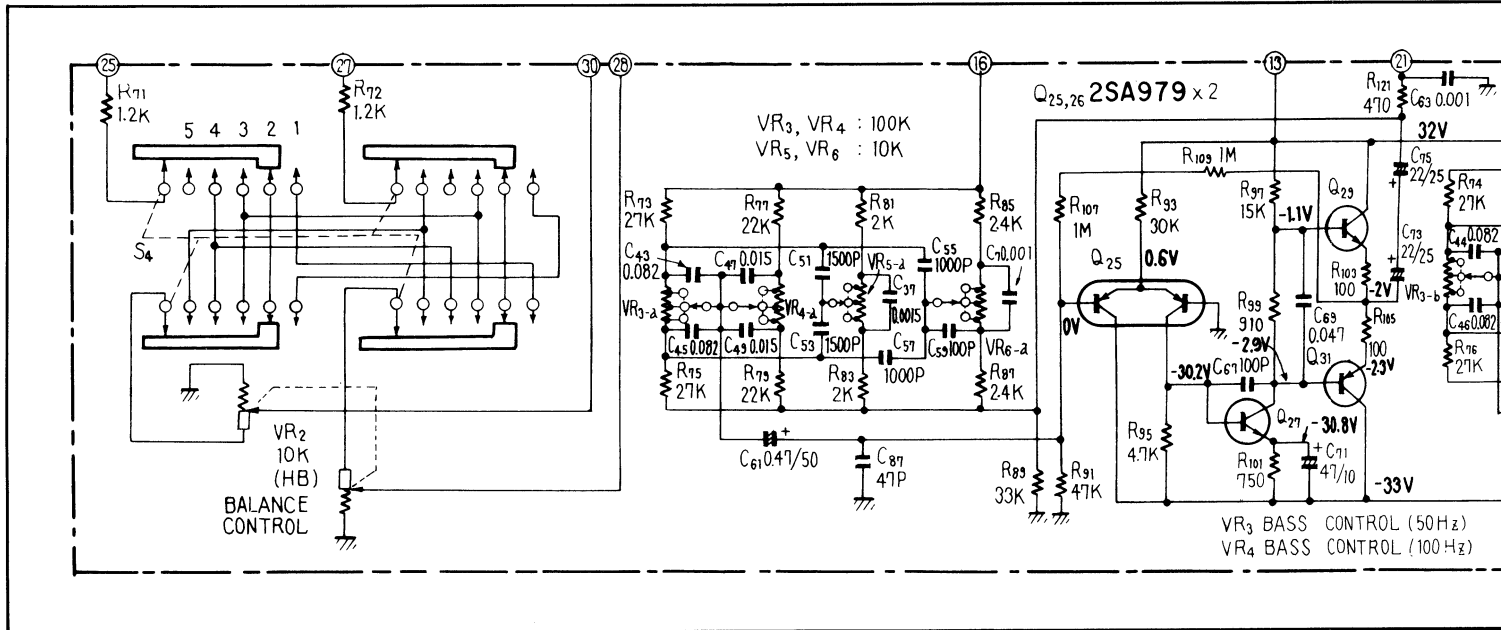
## RESISTORS

Part No.	Symbol & Description
ACW-117	VR1 Variable (VOLUME)
RD $\frac{1}{4}$ PM $\square\square\square$ J	R1-R12, R17-R22, R25-R44, R49-R70
RD $\frac{1}{4}$ PM $\square\square\square$ J	R111, R112, R117-R120
RD $\frac{1}{4}$ VS $\square\square\square$ J	R13-R16, R23, R24
RN $\frac{1}{2}$ SQ $\square\square\square\square$ F	R45-R48
RD $\frac{1}{2}$ PS $\square\square\square$ J	R115, R116

## SEMICONDUCTORS

Part No.	Symbol & Description
2SA995-G or F	Q1, Q2, Q17, Q18
2SA979-F or G	Q3, Q4, Q13, Q14
2SC2291-G or F	Q5, Q6, Q15, Q16
2SC1775A-E or F	Q7, Q8, Q19, Q20
2SC1903-V or B	Q9, Q10, Q21, Q22
2SA898-V or B	Q11, Q12, Q23, Q24
1S2473 (1S1555)	D1-D8

## 9.9 TONE ASSEMBLY (GWG-119)



### Parts List of Tone Assembly (GWG-119)

#### SWITCHES

Part No.	Symbol & Description
ASE-102	S4 Rotary slide (MODE)
ASE-104	S5 Rotary slide (SPEAKERS)

#### CAPACITORS

Part No.	Symbol & Description
CQMA 102K 50	C7, C8, C63, C64
CQMA 152K 50	C37, C38
CQMA 823J 50	C43—C46
CQMA 153J 50	C47—C50
CQMA 152J 50	C51—C54
CQMA 102J 50	C55—C58
CCDSL 101K 50	C59, C60, C67, C68
ACH-334	C61, C62 Electrolytic 0.47/50NP
CKDYB 471K 50	C65, C66
CQMA 473K 50	C69, C70

Part No.	Symbol & Description
CEA 470P 10	C71, C72
CEANL 220P 25	C73—C76
CCDSL 470K 50	C87, C88
CQMA 104K 50	C97, C98

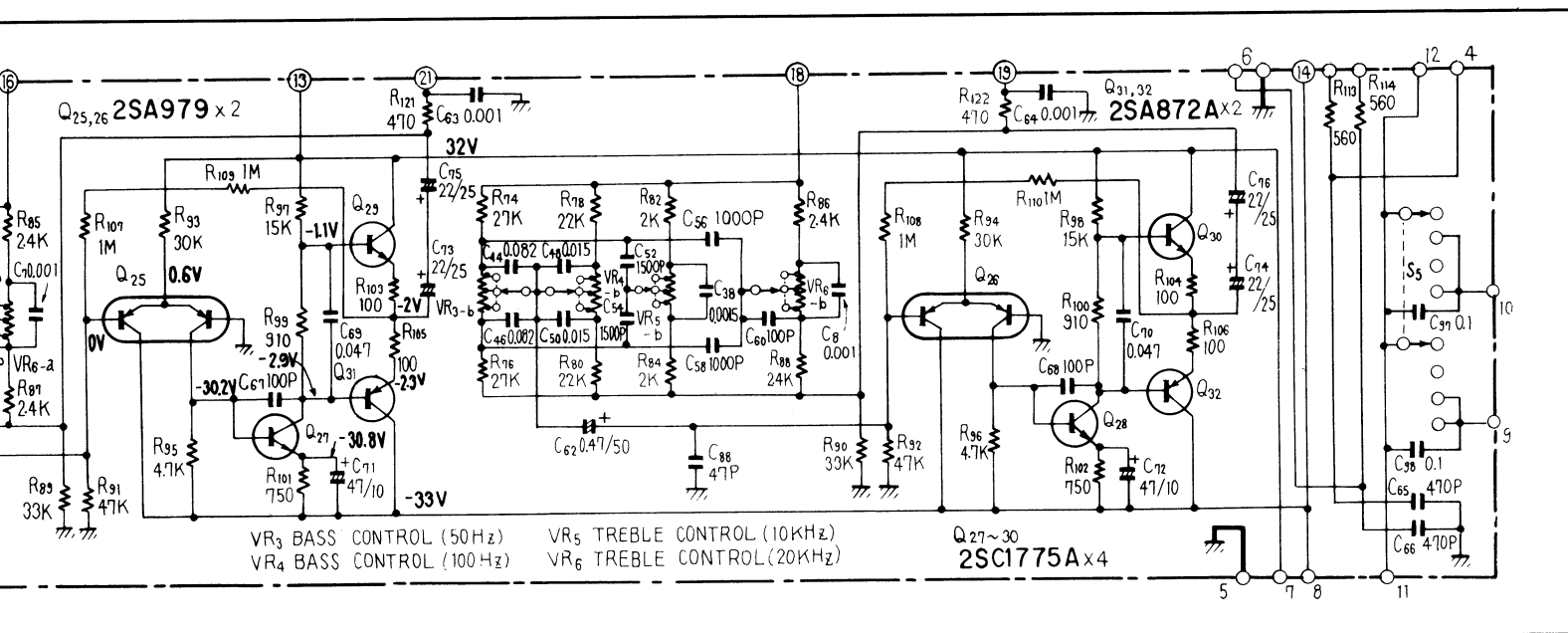
#### RESISTORS

Part No.	Symbol & Description
ACV-191	VR2 Variable (BALANCE)
ACW-109	VR3 Variable (SUB BASS)
ACW-110	VR4 Variable (MAIN BASS)
ACW-111	VR5 Variable (MAIN TREBLE)
ACW-112	VR6 Variable (SUB TREBLE)
RD¼PM □□□ J	R71—R110, R113, R114, R121, R122

Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SA979-F or C	Q25, Q26
2SC1775A-E or	Q27, Q28
2SA872A-E or	Q29



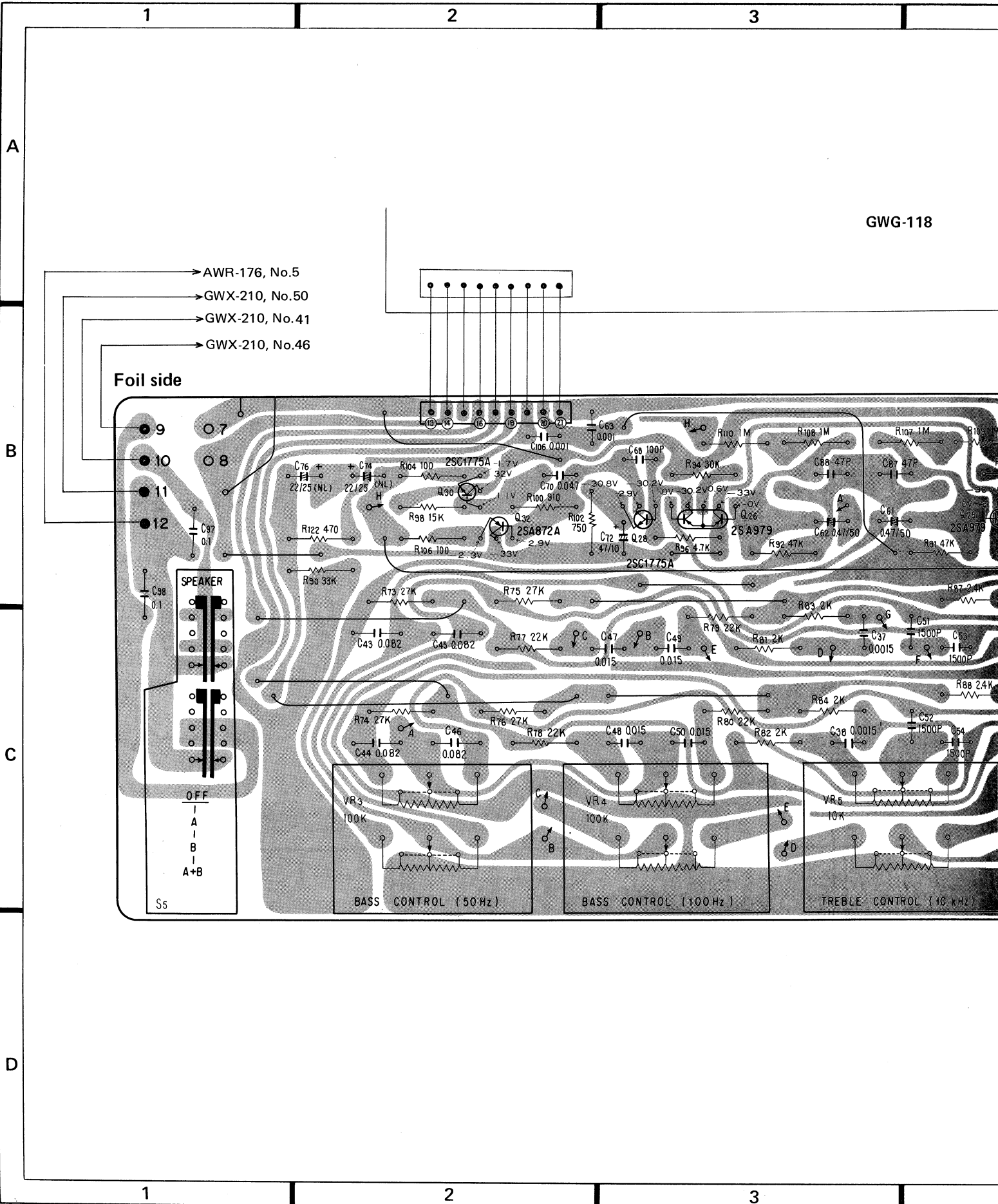
### SEMICONDUCTORS

Part No.	Symbol & Description
2SA979-F or G	Q25, Q26
2SC1775A-E or F	Q27-Q30
2SA872A-E or D	Q31, Q32

When ordering resistors, convert the resistance value into code form, and write the part no. as before.

When ordering capacitors, write the value in code form, and write the part no. as before.

Resistors R113, R114, R121, R122



- AWR-176, No.5
- GWX-210, No.50
- GWX-210, No.41
- GWX-210, No.46

Foil side

SPEAKER

S5

BASS CONTROL (50 Hz)

BASS CONTROL (100 Hz)

TREBLE CONTROL (10 kHz)

4

5

6

GWG-118

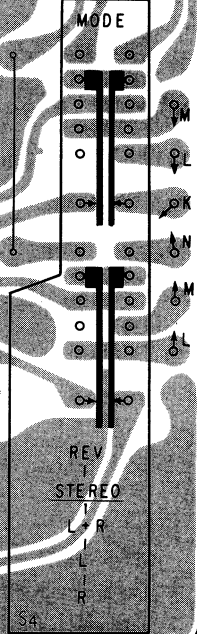
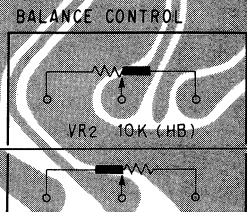
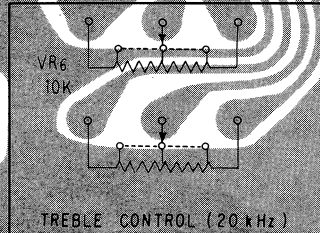
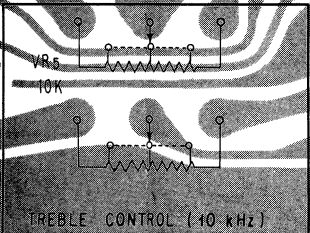
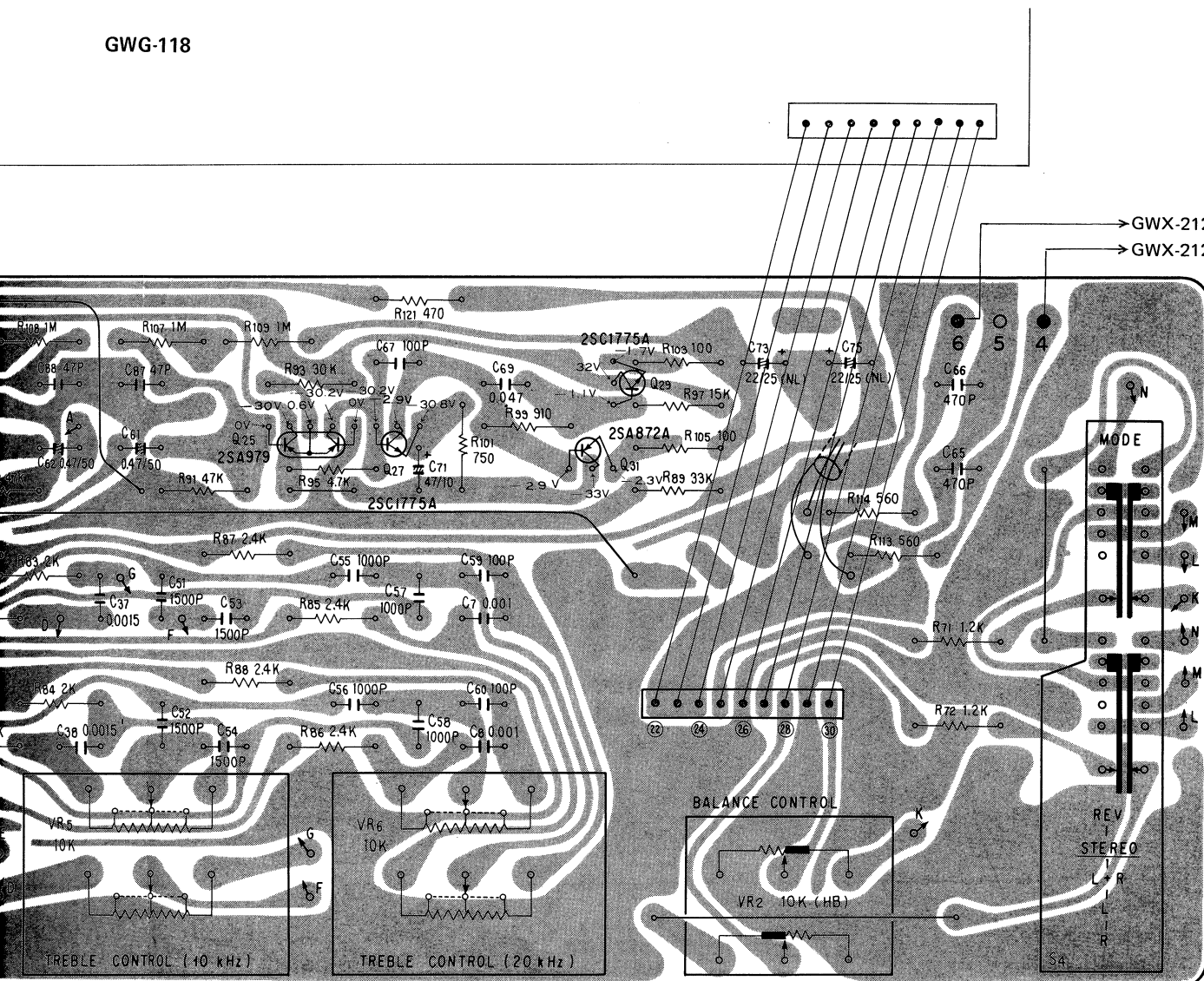
A

B

C

D

→ GWX-212, No.35  
→ GWX-212, No.36



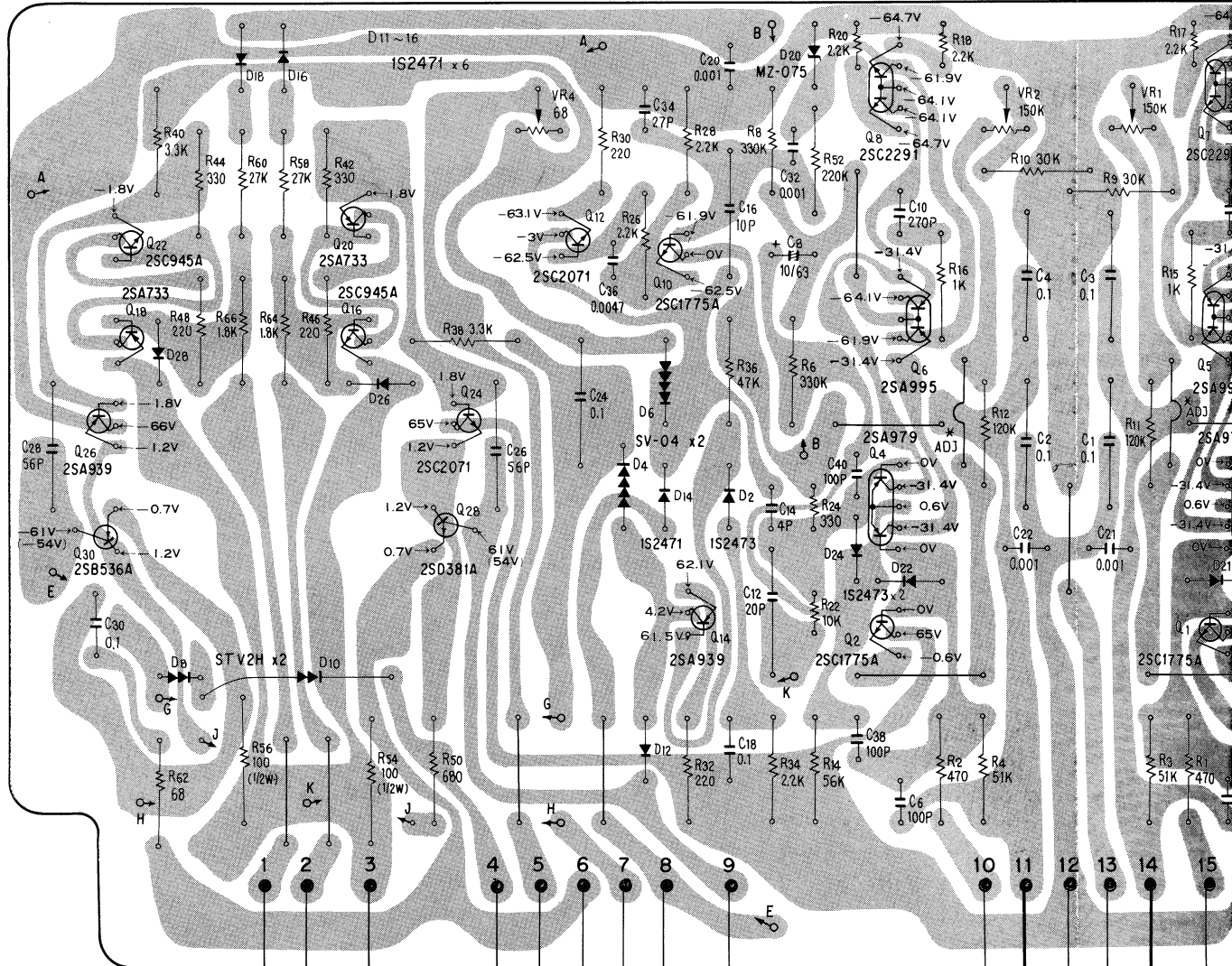
4

5

6

9.10 POWER AMPLIFIER ASSEMBLY (AWH-079)

Foil side

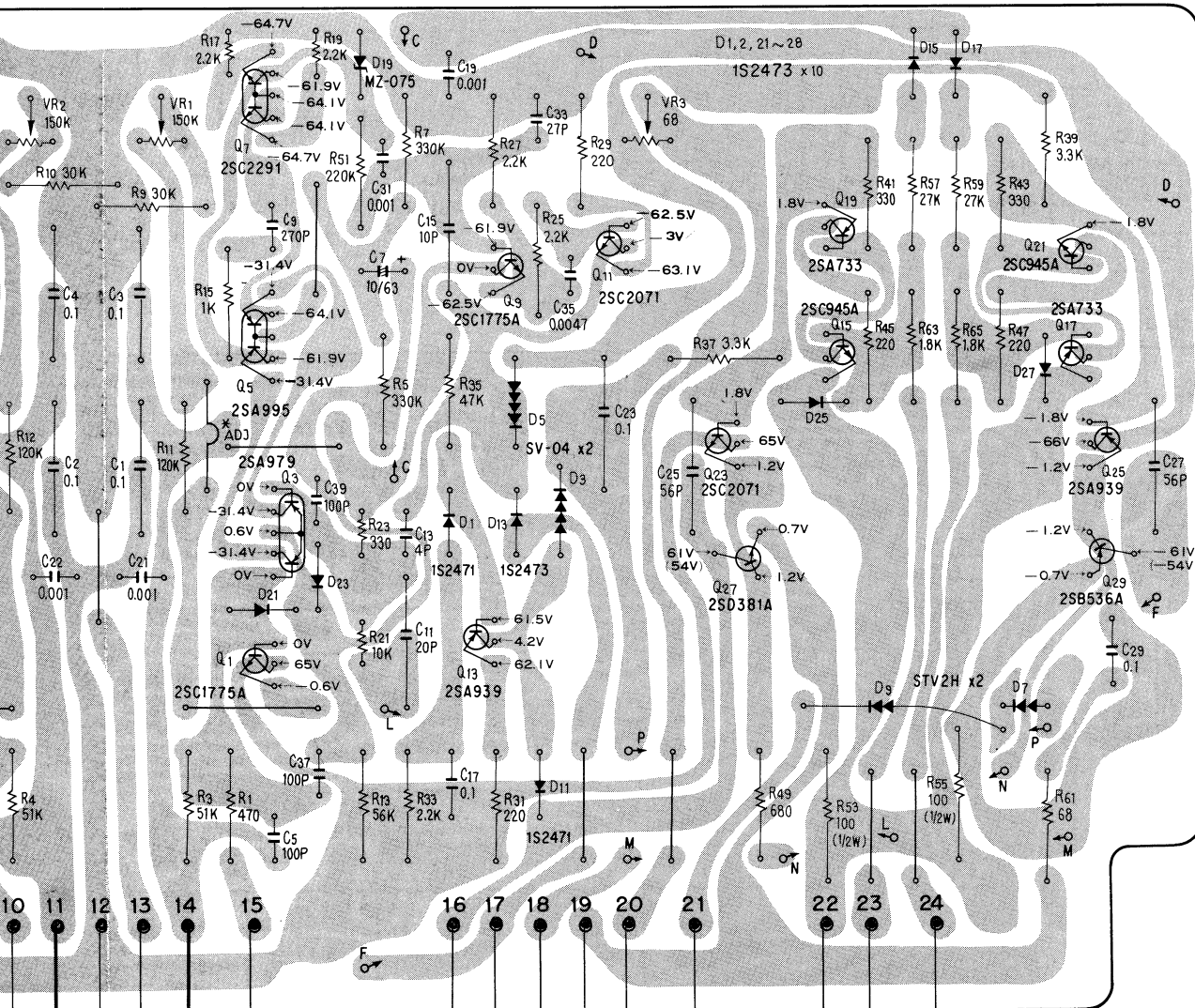


- GWX-143, No.24 ←
- GWX-142, No.30 ←
- GWX-211, No.38 ←
- GWX-142, No.29 ←
- GWX-143, No.23 ←

- GWX-142, No.28 ←
- GWX-142, No.27 ←
- GWX-142, No.32 ←
- GWX-143, No.26 ←
- GWX-143, No.25 ←
- GWX-142, No.31 ←

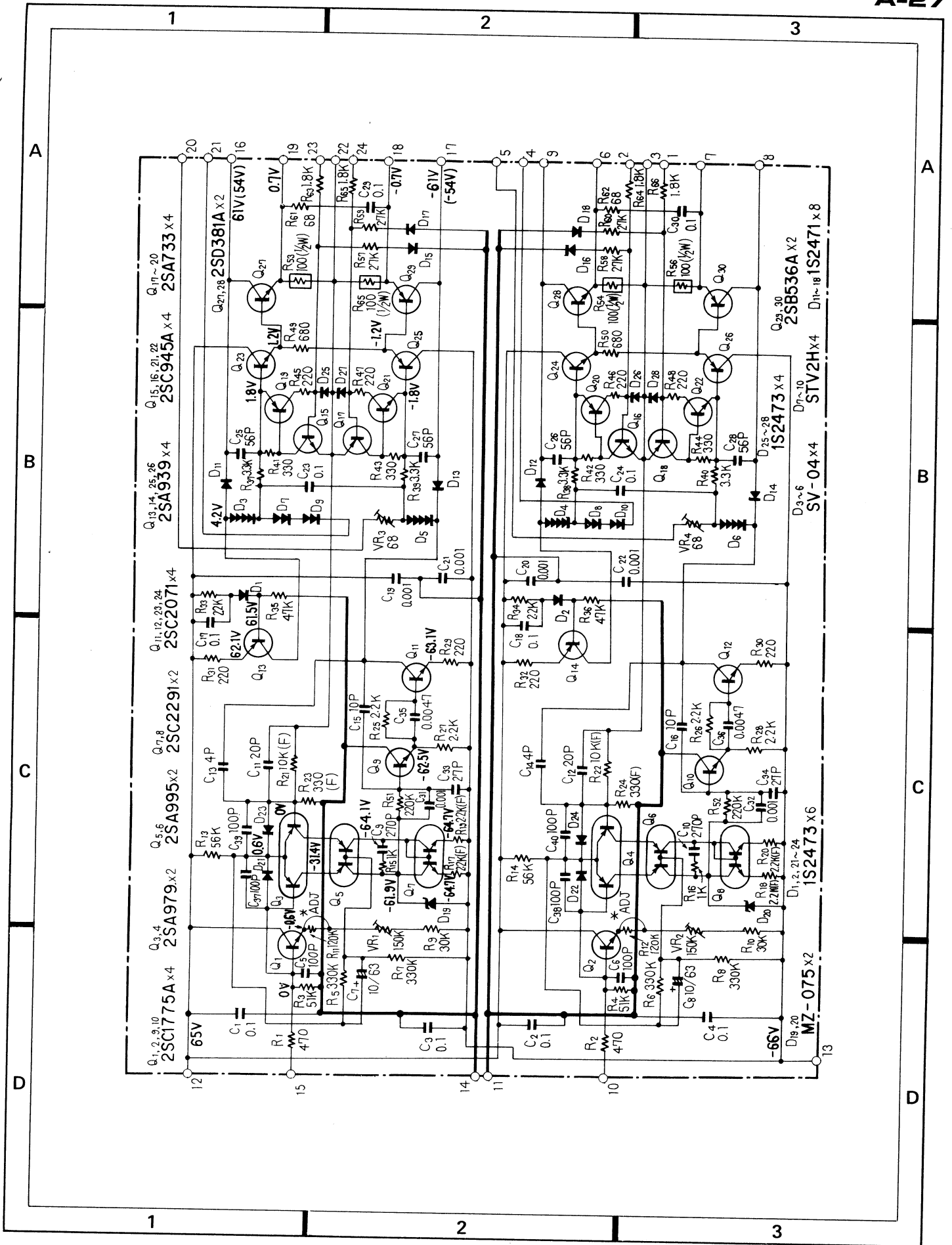
- GWX-212, No.1 ←
- GWX-212, No.2 ←
- AWR-176, No.8 ←
- AWR-176, No.6 ←
- GWX-212, No.4 ←
- GWX-212, No.3 ←





- > GWX-140, No.40
- > GWX-141, No.36
- > GWX-211, No.48
- > GWX-141, No.35
- > GWX-140, No.39

- > GWX-141, No.34
- > GWX-141, No.33
- > GWX-141, No.38
- > GWX-140, No.42
- > GWX-140, No.41
- > GWX-141, No.37



## Parts List of Power Amplifier Assembly (AWH-079)

### CAPACITORS

Part No.	Symbol & Description
CQMA 104K 250	C1-C4, C23, C24
CCDSL 101K 50	C5, C6, C37-C40
CEA 100P 63	C7, C8
CCDSL 271K 50	C9, C10
CCDSL 200K 500	C11, C12
CCDSL 040D 500	C13, C14
CCDSL 100K 500	C15, C16
CQMA 104K 50	C17, C18, C29, C30
CQMA 102K 400	C19-C22
CCDSL 560K 500	C25-C28
CQMA 102K 50	C31, C32
CCDSL 270K 500	C33, C34
CQMA 472K 50	C35, C36

*Note: When ordering resistors, convert the resistance value into code form and then rewrite the part no. as before.*

### RESISTORS

Part No.	Symbol & Description
ACP-063	VR1, VR2 Semi-fixed 150k-B
ACP-065	VR3, VR4 Semi-fixed 68-B
RD $\frac{1}{4}$ PS □□□ J	R1-R16, R25, R26, R35, R36, R51, R52
RD $\frac{1}{4}$ PS □□□ J	R57-R62
RN $\frac{1}{2}$ SQ □□□□ F	R17-R24
RD $\frac{1}{4}$ PSF □□□ J	R27-R34, R37-R50, R63-R66
ACN-016	R53-R56 Fusible resistor 100/ $\frac{1}{2}$ W

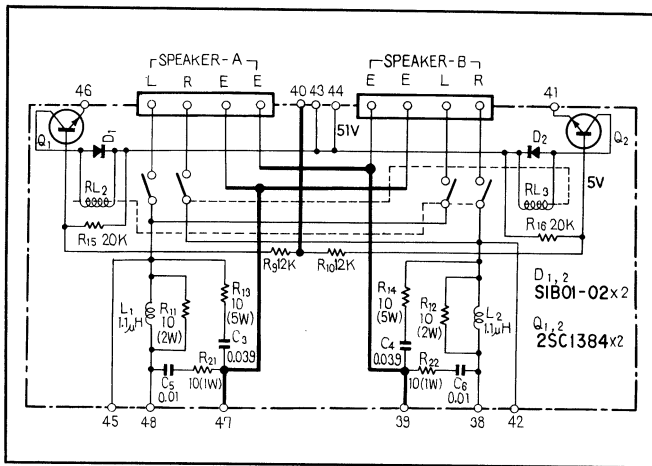
### SEMICONDUCTORS

Part No.	Symbol & Description
2SC1775A-E	Q1, Q2
2SA979-F	Q3, Q4
2SA995-F or G	Q5, Q6
2SC2291-F or G	Q7, Q8
2SC1775A-E or F	Q9, Q10
2SC2071-V or B	Q11, Q12, Q23, Q24
2SA939-V or B	Q13, Q14, Q25, Q26
2SC945A-R or Q (2SC1647-P or Q)	Q15, Q16, Q21, Q22
2SA733-R or Q (2SA823-P or Q)	Q17, Q18, Q19, Q20
2SD381A-L	Q27, Q28
2SB536A-L	Q29, Q30
1S2473 (1S1555)	D1, D2, D21-D28
SV-04	D3-D6
STV2H	D7-D10
1S2471	D11-D18
MZ-075	D19, D20

### OTHERS

Part No.	Description
ANH-400	Heat sink
ANH-340	Heat sink
AEC-410	Transistor cover

### 9.11 OUTPUT TERMINAL ASSEMBLY (GWX-211)



### Parts List of Output Terminal Assembly (GWX-211)

#### SWITCHES

Part No.	Symbol & Description
ASR-047	RL2, RL3 Relay

#### CAPACITORS

Part No.	Symbol & Description
CQMA 393K 400	C3, C4
CQMA 103K 400	C5, C6

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

#### RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{4}$ PS 000 J	R9, R10, R15, R16
RS2P 000 J	R11, R12
RT5B 000 K	R13, R14
RS1P 000 J	R21, R22

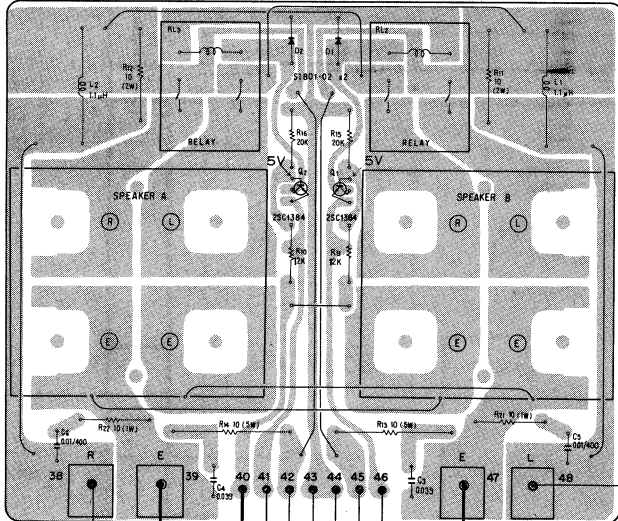
#### SEMICONDUCTORS

Part No.	Symbol & Description
2SC1384-Q or R	Q1, Q2
SIB01-02 (10E2)	D1, D2

#### OTHERS

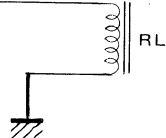
Part No.	Description
ABE-031	Spring washer M5
ABN-037	Nut M5
AKE-040	Terminal (SPEAKERS)

#### Foil side

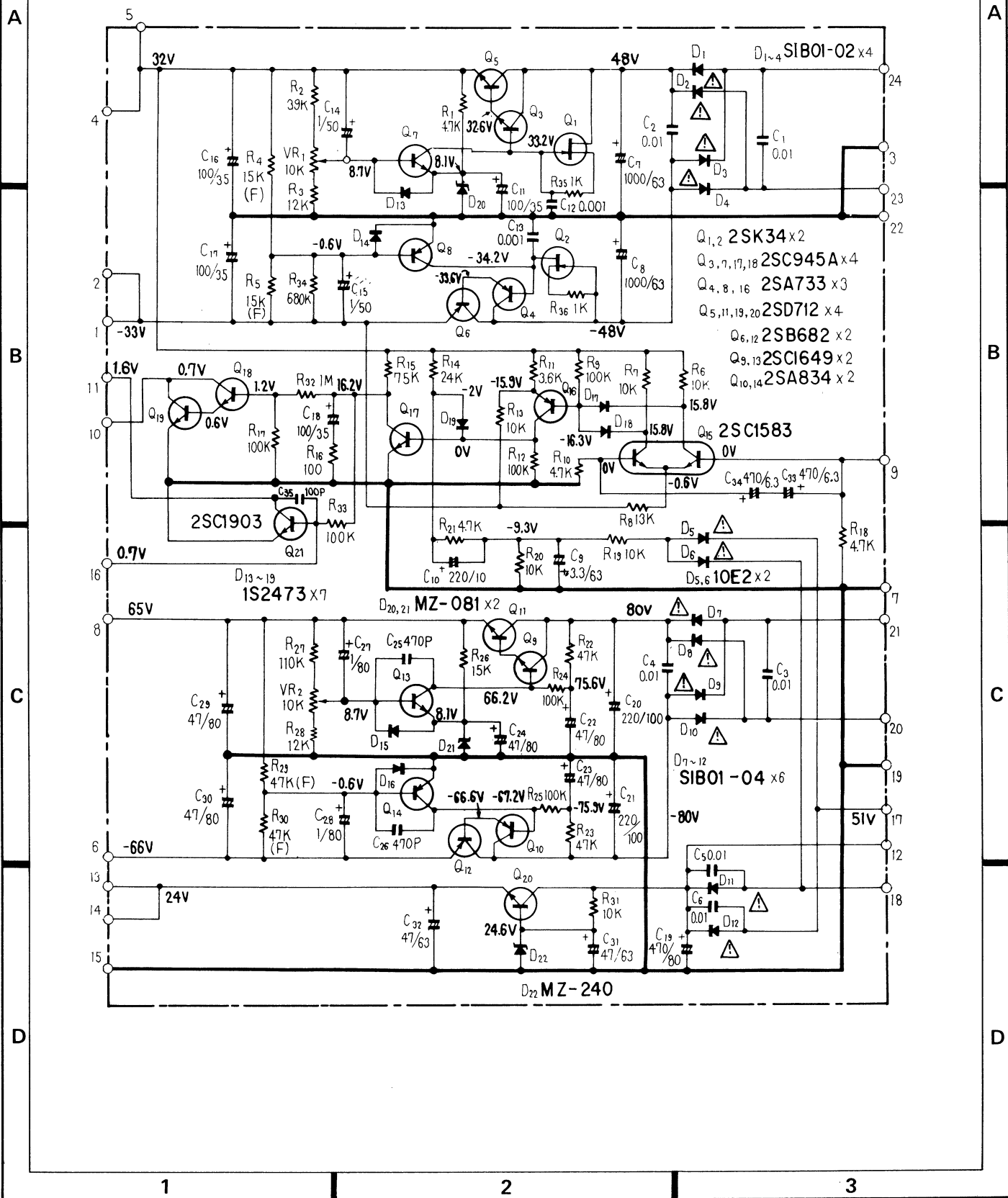


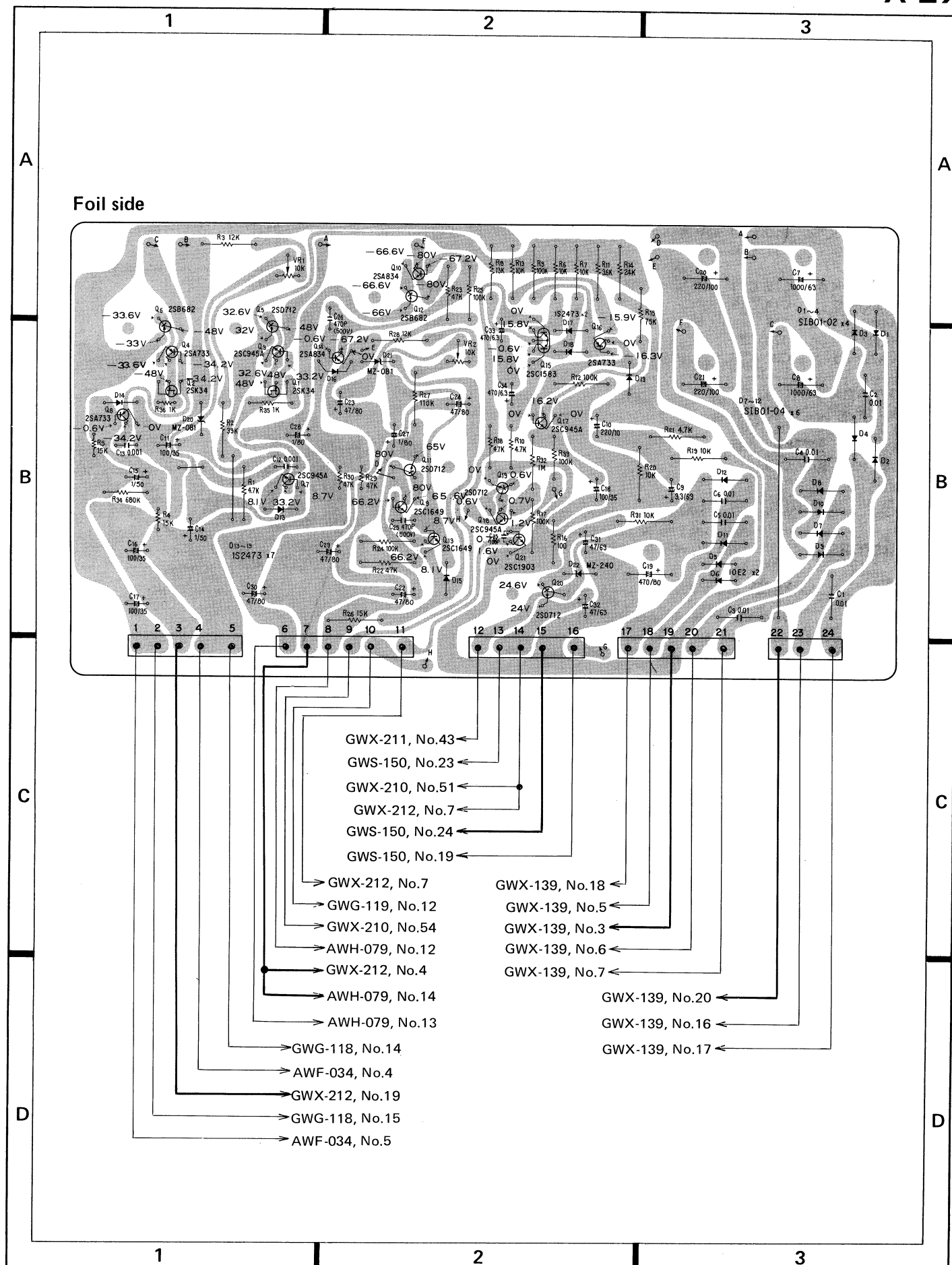
- GWX-141, No.35
- AWH-079, No.22
- GWX-140, No.39
- GWX-139, No.11
- GWG-119, No. 9
- GWX-210, No.55

- AWR-176, No.12
- GWX-210, No.52
- GWG-119, No.10
- GWX-139, No.12
- GWX-142, No.29
- AWH-079, No.3
- GWX-143, No.23



# 9.12 POWER SUPPLY ASSEMBLY (AWR-176)





## Parts List of Power Supply Assembly (AWR-176)

### CAPACITORS

Part No.	Symbol & Description	Part No.	Symbol & Description
ACG-004	C1-C6 Ceramic 0.01/150V	△SIB01-02	D1-D4
ACH-202	C7, C8 Electrolytic 1000/63V	(10E2)	
CEA 3R3P 63	C9	△10E2	D5, D6
CEA 221P 10	C10	△SIB01-04	D7-D12
CEA 101P 35	C11, C16-C18	(SR1K-8)	
CKDYB 102K 50	C12, C13	1S2473	D13-D17
CEA 010P 50	C14, C15	(1S1555)	
ACH-038	C19 Electrolytic 470/80V	1S2473	D18, D19
ACH-087	C20, C21	MZ-081	D20, D21
CEA 470P 80	C22-C24, C29, C30	(WZ-081)	
CKDYB 471K 500	C25, C26	MZ-240	D22
CEA 010P 80	C27, C28	(WZ-240)	
CEA 470P 63	C31, C32		
CEA 471P 6	C33, C34		
CCDSL 101K 50	C35		

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

### RESISTORS

Part No.	Symbol & Description
ACP-064	VR1, VR2 Semi-fixed
RD¼PS □□□ J	R1-R3, R6-R9, R11-R15, R17, R19-R28,
RD¼PS □□□ J	R31, R32
RN½SQ □□□□ F	R4, R5, R29, R30
RD¼PM □□□ J	R10, R16, R18, R33-R36

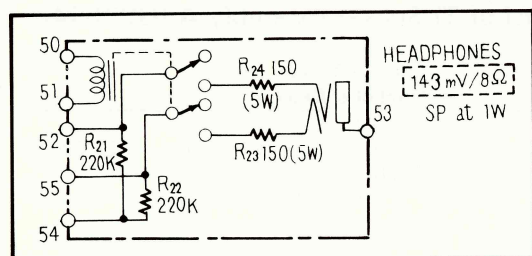
### OTHERS

Part No.	Description
ANH-340	Heat sink
ANH-400	Heat sink

### SEMICONDUCTORS

Part No.	Symbol & Description
2SK34-C or B	Q1, Q2
2SC945A-Q or R	Q3, Q7, Q17, Q18
(2SC1647-P or N)	
2SA733-Q or R	Q4, Q8, Q16
(2SA823-P or N)	
2SD712-D or C	Q5, Q19,
(2SD313-D or E)	
2SB682-D or C	Q6
(2SB507-D or E)	
2SC1649-N or P	Q9, Q13
(2SC1914A-F or G)	
2SA834-N or P	Q10, Q14
(2SA904A-F or G)	
2SD712-D or C	Q11, Q20
2SB682-D or C	Q12
2SC1583-F or G	Q15
(2SC2259-F or G)	
2SC1903-V	Q21

### 9.13 HEADPHONES ASSEMBLY (GWX-210)



### Parts List of Headphones Assembly (GWX-210)

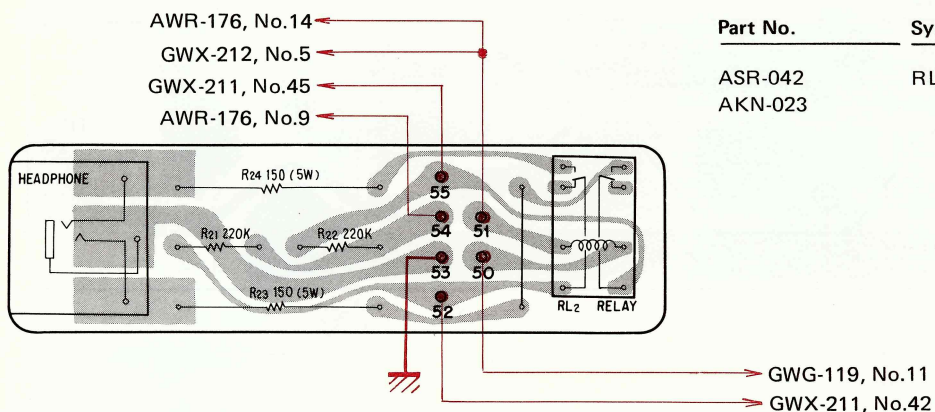
Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.

#### RESISTORS

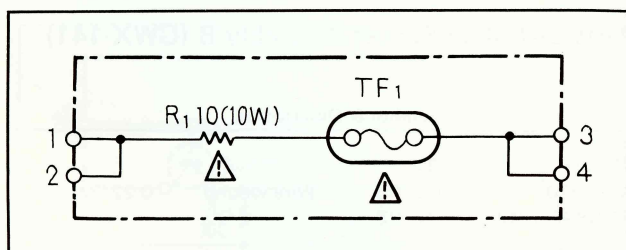
Part No.	Symbol & Description
RD¼PM □□□ J	R21, R22
RT5B □□□ K	R23, R24

#### OTHERS

Part No.	Symbol & Description
ASR-042	RL2 Relay
AKN-023	Phone jack (PHONES)

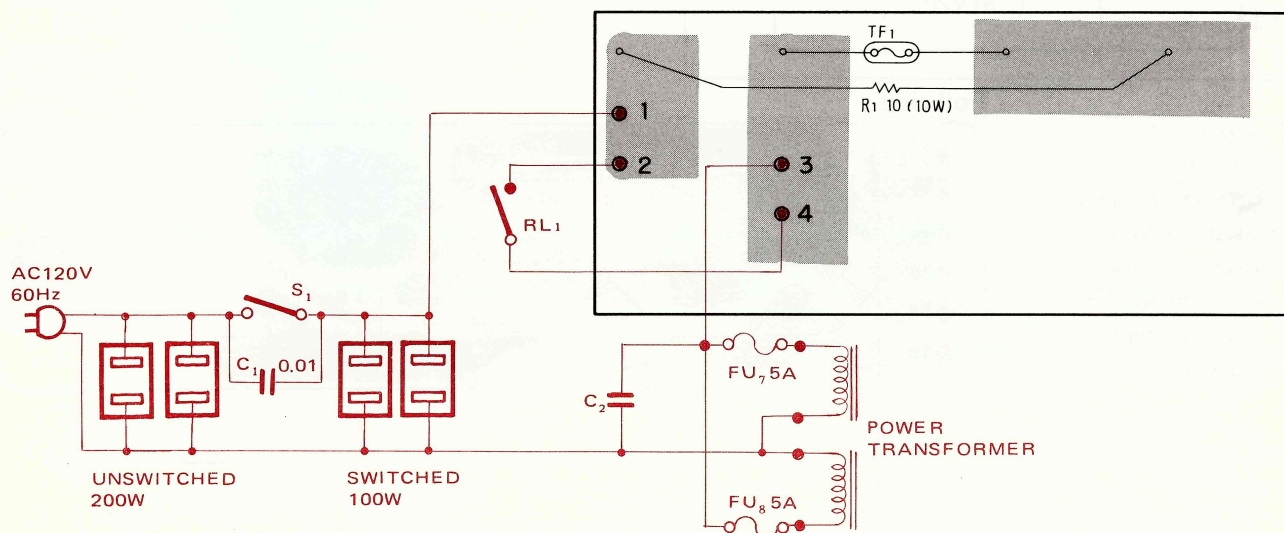


### 9.14 SURGE KILLER ASSEMBLY (AWX-145)



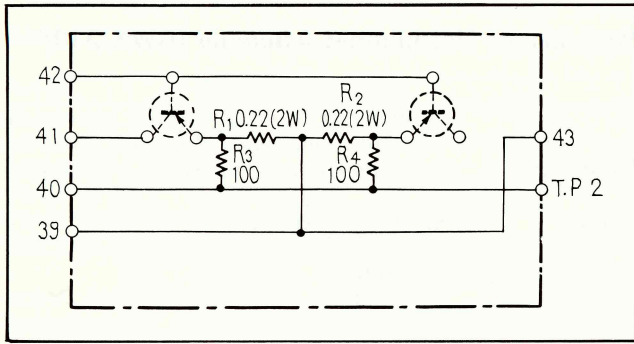
### Parts List of Surge Killer Assembly (AWX-145)

Part No.	Symbol & Description
△AEX-001	TF1 Micro temp.
△RT10B 100K	R1





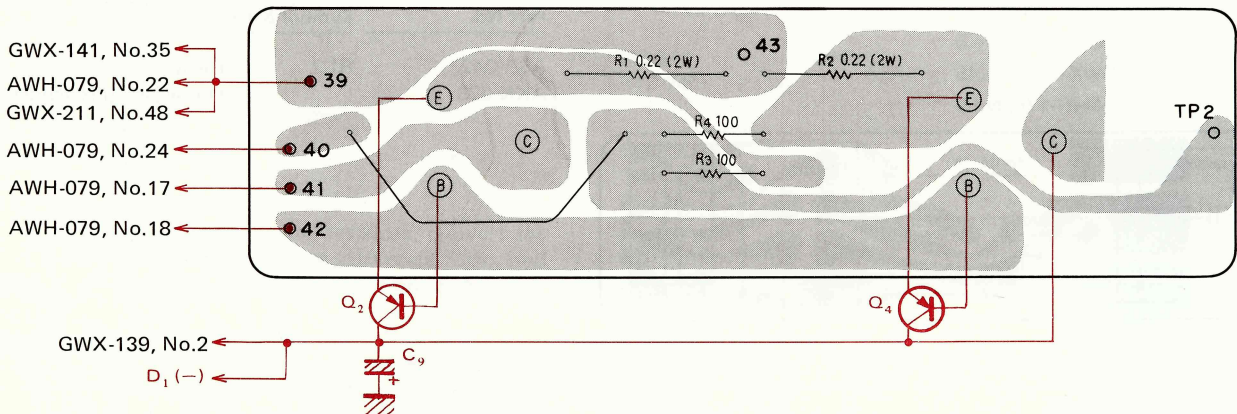
### 9.15 TR SOCKET ASSEMBLY A (GWX-140)



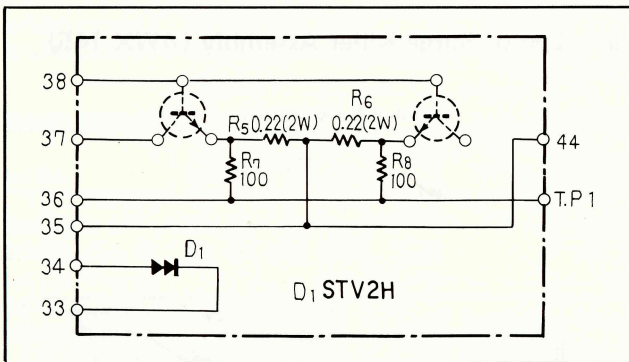
### Parts List of Tr Socket Assembly A (GWX-140)

Part No.	Symbol & Description
ACN-020	R1, R2 Wire wound 0.22/2W
RD¼PSF 101J	R3, R4

#### Foil side



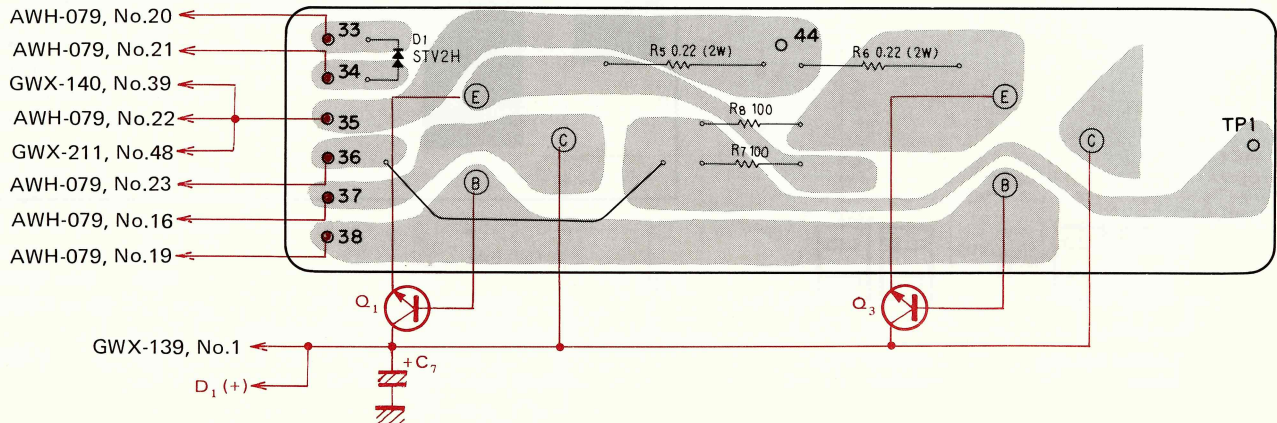
### 9.16 TR SOCKET ASSEMBLY B (GWX-141)



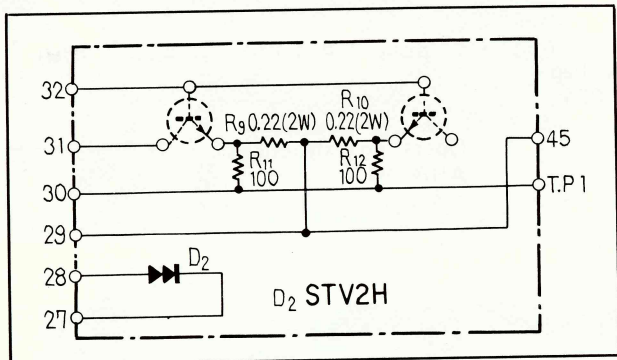
### Parts List of Tr Socket Assembly B (GWX-141)

Part No.	Symbol & Description
STV2H	D1
ACN-020	R5, R6 Wire wound 0.22/2W
RD¼PSF 101J	R7, R8

#### Foil side



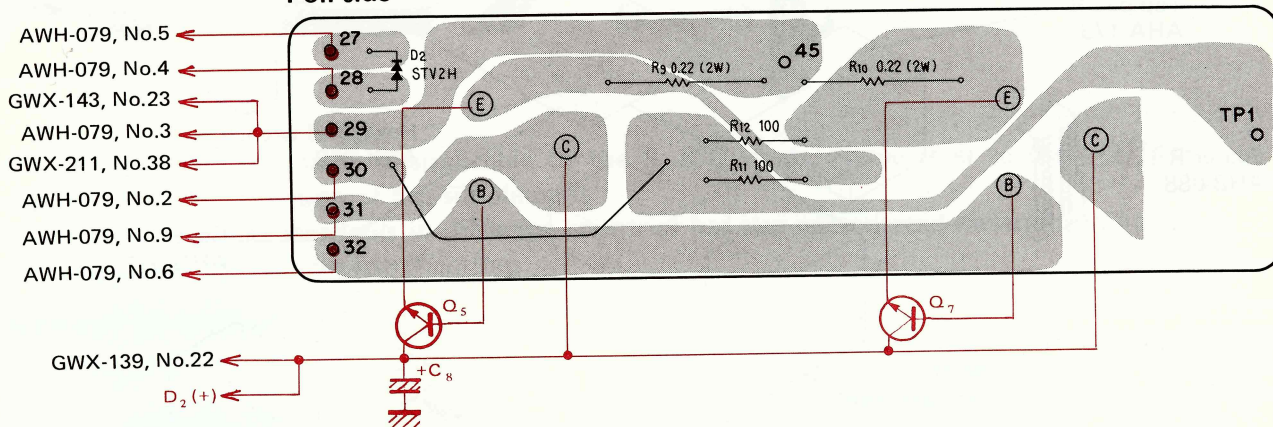
9.17 TR SOCKET ASSEMBLY C(GWX-142)



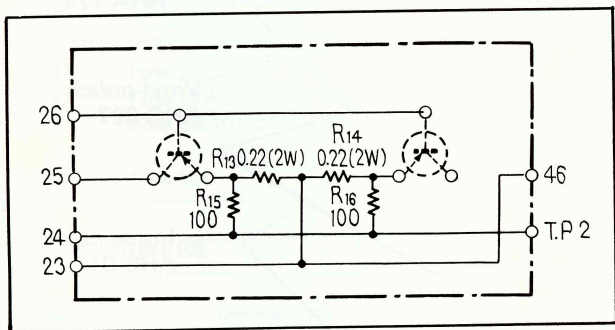
Parts List of Tr Socket Assembly C (GWX-142)

Part No.	Symbol & Description
STV2H	D2
ACN-020	R9, R10 Wire wound 0.22/2W
RD¼PSF 101J	R11, R12

Foil side



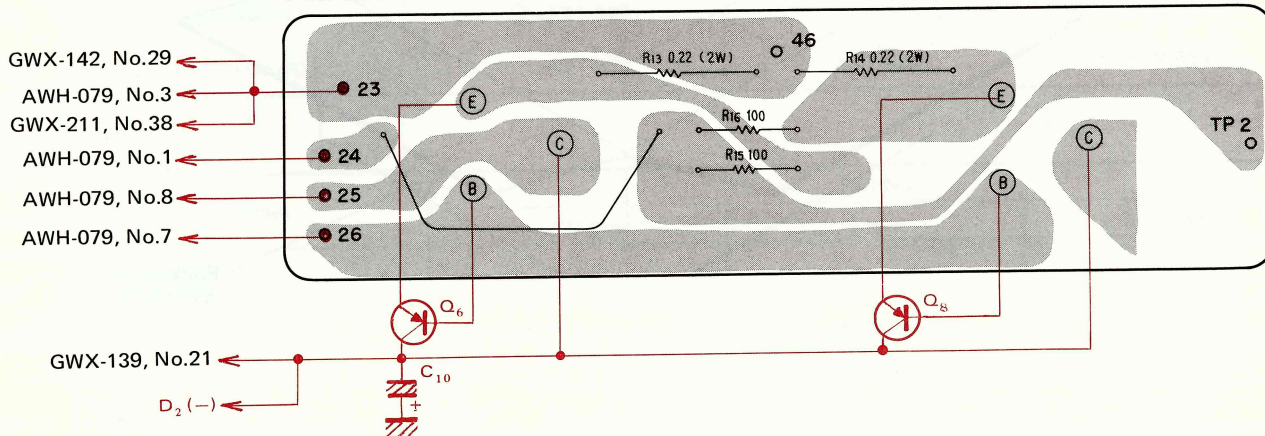
9.18 TR SOCKET ASSEMBLY D(GWX-143)



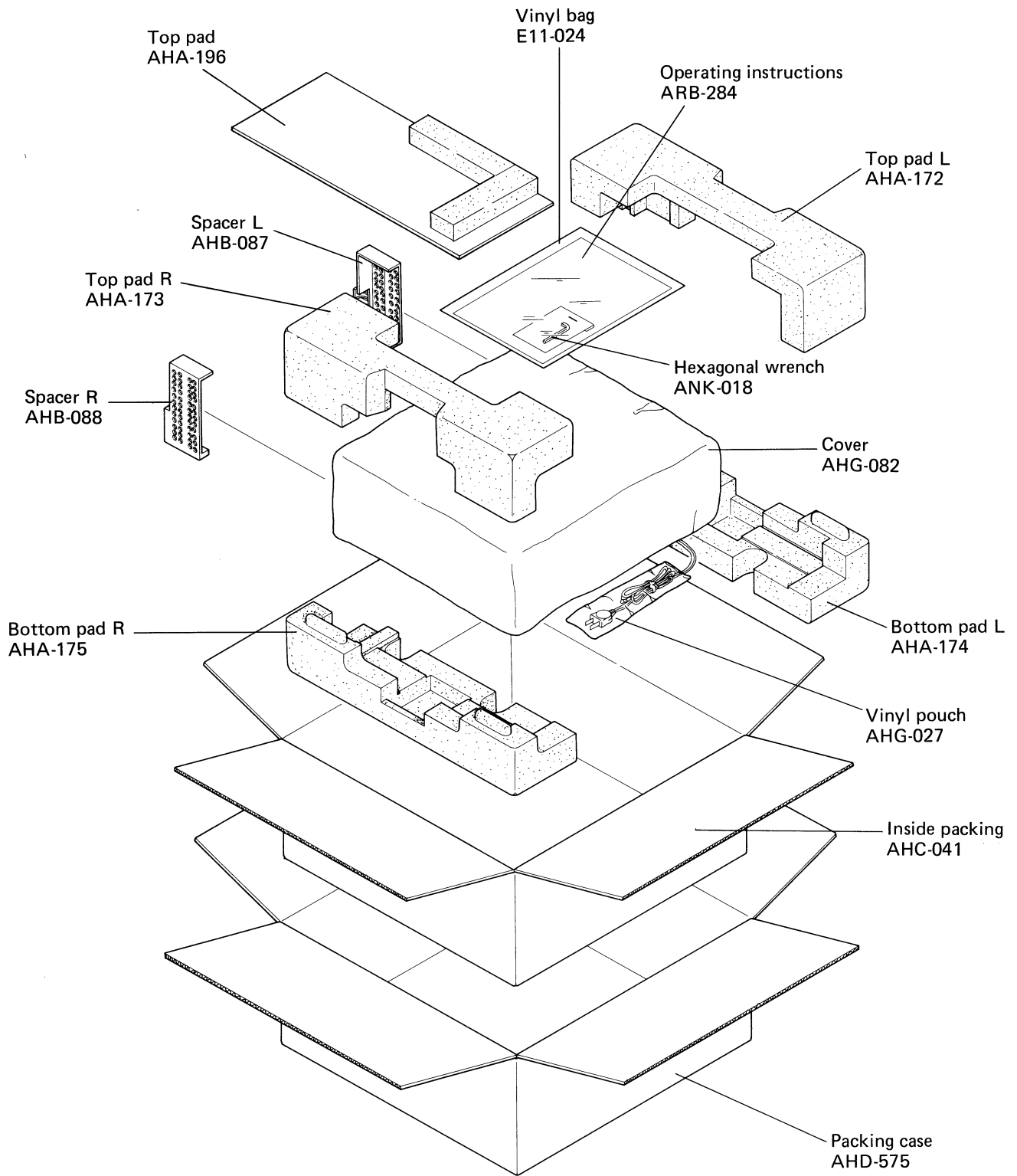
Parts List of Tr Socket Assembly D (GWX-143)

Part No.	Symbol & Description
ACN-020	R13, R14 Wire wound 0.22/2W
RD¼PSF 101J	R15, R16

Foil side



# 10. PACKING



ADDITIONAL

PIONEER®

# Service Manual

# A-27 S, S/G

This additional service manual is applicable to the S, S/G types. Please refer to the A-27/KU service manual with exception of this supplement.

The variations in safety standards in different countries has also necessitated variations in power supply and circuit component specifications.

## CONTRAST OF MISCELLANEOUS PARTS

### NOTE:

- The  $\Delta$  mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.

### FUSES

Symbol	Description	Part No.		
		KU type	S type	S/G type
$\Delta$ FU7	Fuse 5A	AEK-108	.....	.....
$\Delta$ FU7	Fuse 12A (for 110, 120V)	.....	AEK-113	AEK-113
$\Delta$ FU7	Fuse 6A (for 220, 240V)	.....	AEK-109	AEK-109
$\Delta$ FU8	Fuse 5A	AEK-108	.....	.....

### TRANSFORMERS

Symbol	Description	Part No.		
		KU type	S type	S/G type
$\Delta$ T1	Power transformer (L)	ATT-528	ATT-538	ATT-538
$\Delta$ T2	Power transformer (R)	ATT-529	ATT-539	ATT-539

### SWITCHES

Symbol	Description	Part No.		
		KU type	S type	S/G type
$\Delta$ S1	Lever switch (POWER)	ASK-509	ASK-502	ASK-502
$\Delta$ S2	Plug in selector (with fuse holder)	.....	AKR-031	AKR-031
$\Delta$ RL1	Relay	.....	ASR-049	ASR-049

### CAPACITORS

Symbol	Description	Part No.		
		KU type	S type	S/G type
△ C2	Ceramic 0.01 125V	ACG-003	.....	.....
△ C2	Ceramic 0.01 250V	.....	ACG-001	ACG-001

### P.C. BOARD ASSEMBLIES

Symbol	Description	Part No.		
		KU type	S type	S/G type
	Output terminal assembly	GWX-211	GWX-137	GWX-137
	Pin jack assembly	GWX-212	GWX-138	GWX-138
	Surge killer assembly	AWX-145	.....	.....

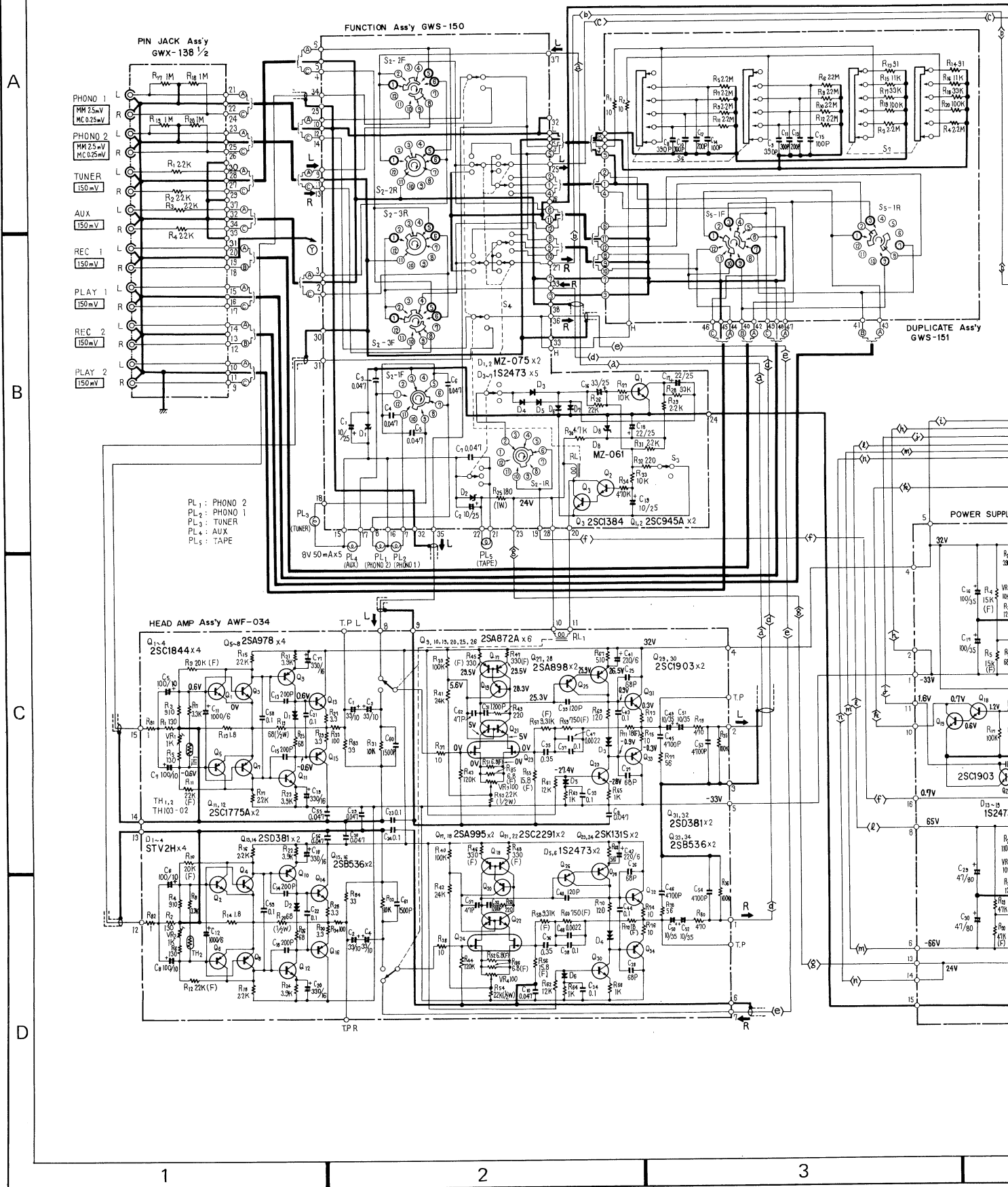
### PACKING AND FURNISHED PARTS

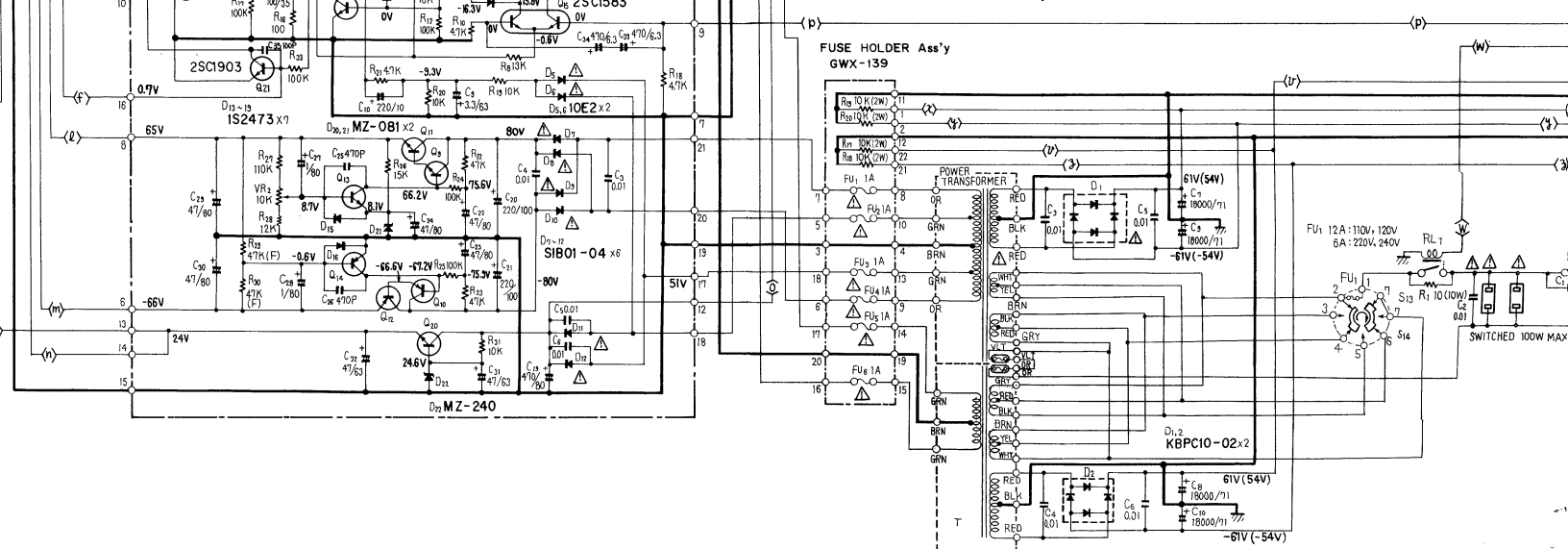
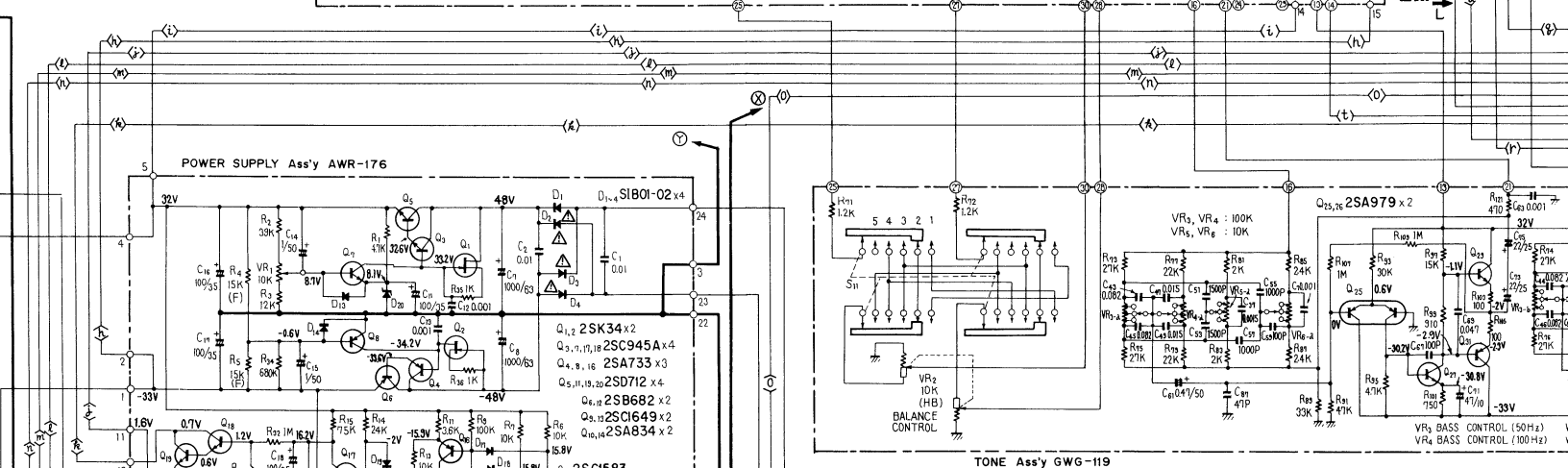
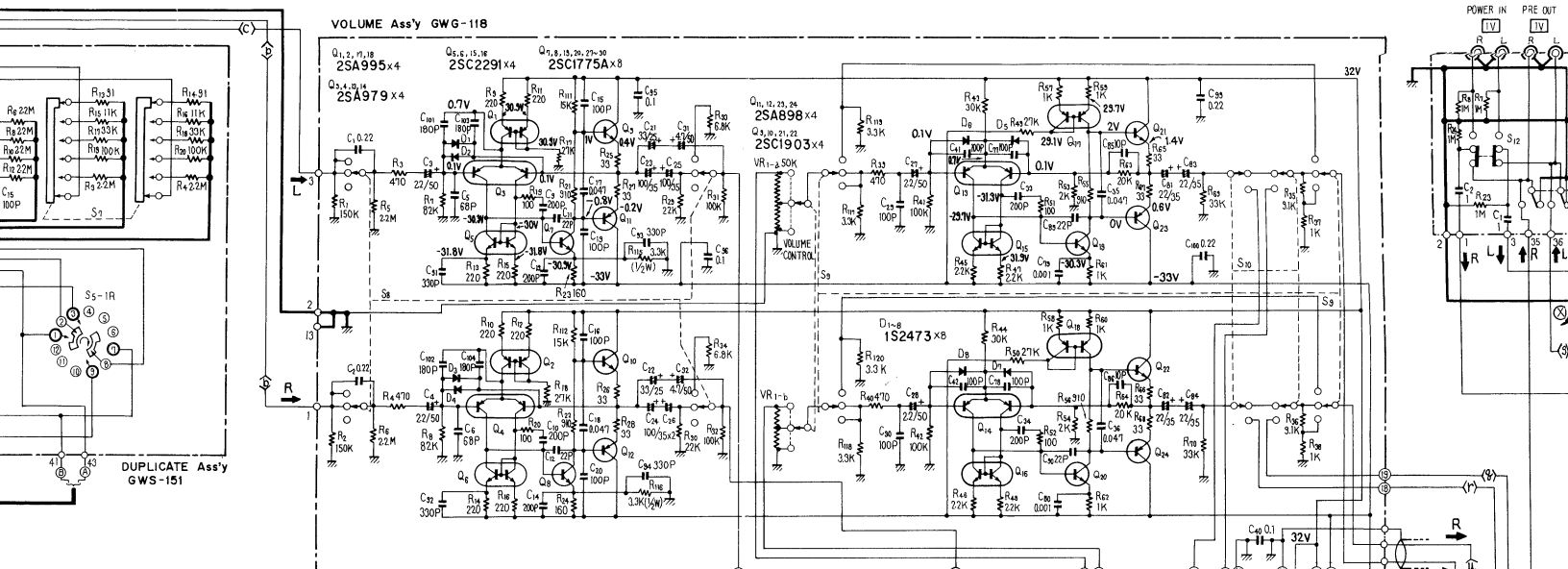
Symbol	Description	Part No.		
		KU type	S type	S/G type
	Packing case	AHD-575	AHD-575	AHD-585
	Cardboard spacer	.....	.....	AHB-098
	Operating instructions	ARB-284	ARB-288	ARB-288
△	Fuse 6A	.....	AEK-109	AEK-109
△	Fuse 12A	.....	AEK-113	AEK-113
	Vinyl pouch (for fuses)	.....	E11-033	E11-033

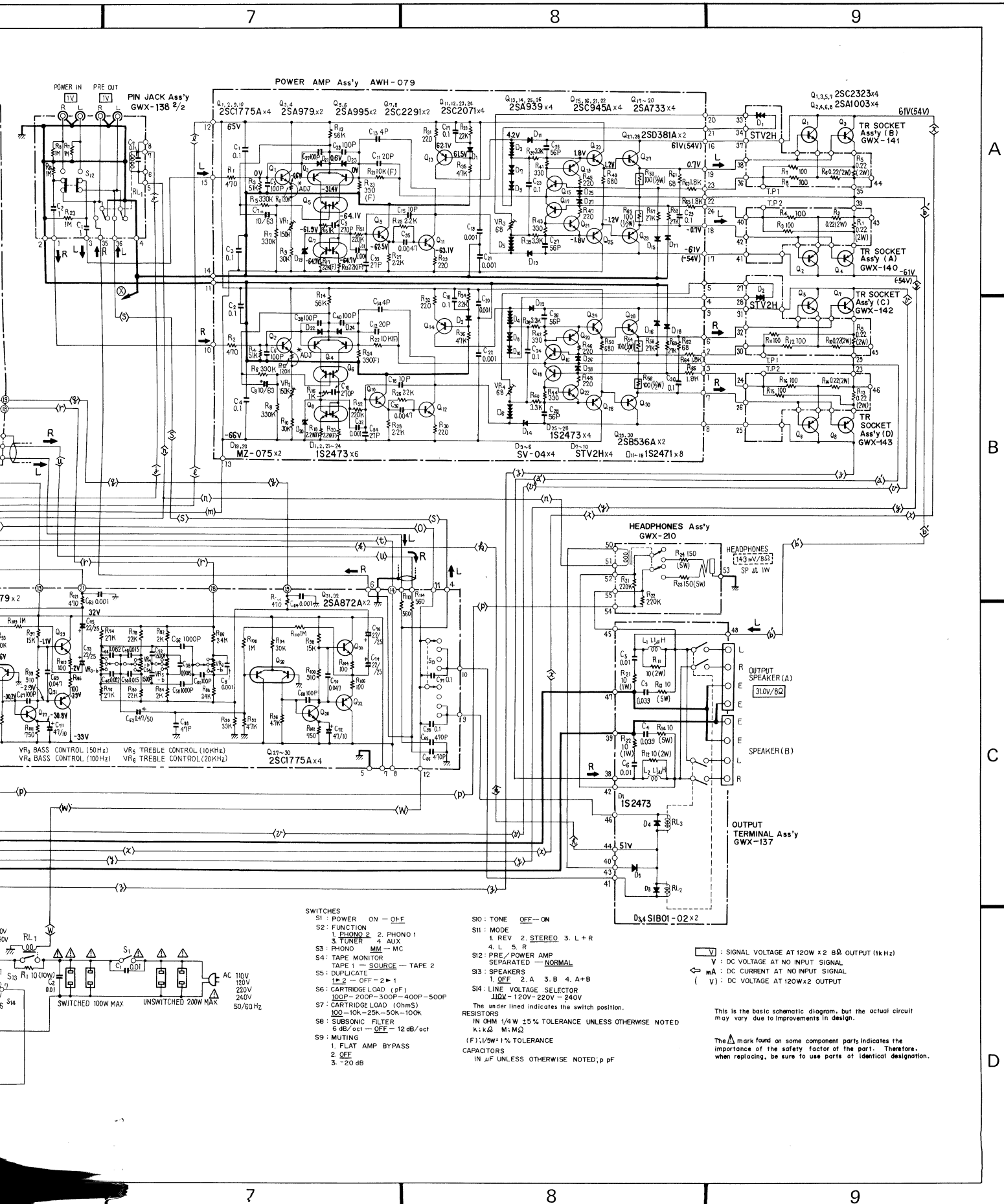
### OTHERS

Symbol	Description	Part No.		
		KU type	S type	S/G type
△	Fuse holder 1P	AKR-032	.....	.....
△	AC socket (AC OUTLETS)	AKP-004	AKP-021	AKP-021
△	Terminal strip 2P	.....	AKC-030	AKC-030
△ R1	Wire wound resistor 10Ω 10W	.....	ACN-022	ACN-022
△	AC power cord	ADG-029	ADG-015	ADG-015
△	Capacitor cover (for C1)	AEC-294	.....	.....
△	Capacitor cover (for C2)	AEC-279	AEC-099	AEC-099
	Top cover	ANE-210	ANE-185	ANE-185

# SCHEMATIC DIAGRAM FOR S AND S/G TYPES







A

B

C

D

- SWITCHES**  
 S1: POWER ON-OFF  
 S2: FUNCTION  
     1. PHONO 2. PHONO 1  
     3. TUNER 4. AUX  
 S3: PHONO MM-MC  
 S4: TAPE MONITOR  
     TAPE 1-SOURCE-TAPE 2  
 S5: DUPLICATE  
     1-2-OFF-2-1  
 S6: CARTRIDGE LOAD (pF)  
     100P-200P-300P-400P-500P  
 S7: CARTRIDGE LOAD (Ohms)  
     100-10K-25K-50K-100K  
 S8: SUBSONIC FILTER  
     5dB/oct - OFF-12dB/oct  
 S9: MUTING  
     1. FLAT AMP BYPASS  
     2. OFF  
     3. -20dB

- S10: TONE OFF-ON  
 S11: MODE  
     1. REV 2. STEREO 3. L+R  
     4. L 5. R  
 S12: PRE/POWER AMP  
     SEPARATED-NORMAL  
 S13: SPEAKERS  
     1. OFF 2. A 3. B 4. A+B  
 S14: LINE VOLTAGE SELECTOR  
     110V-120V-220V-240V
- The under lined indicates the switch position.
- RESISTORS**  
 IN OHM 1/4W ±5% TOLERANCE UNLESS OTHERWISE NOTED  
 K: kΩ M: MΩ
- CAPACITORS**  
 IN μF UNLESS OTHERWISE NOTED; p pF

⊖ V: SIGNAL VOLTAGE AT 120W X 2 @ 8Ω OUTPUT (1kHz)  
 V: DC VOLTAGE AT NO INPUT SIGNAL  
 mA: DC CURRENT AT NO INPUT SIGNAL  
 ( V ): DC VOLTAGE AT 120W X 2 OUTPUT

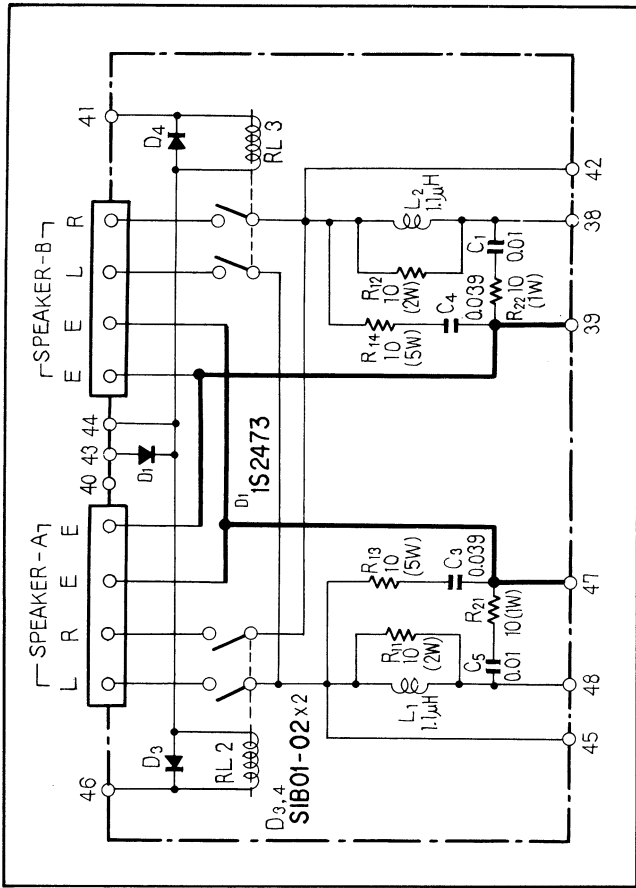
This is the basic schematic diagram, but the actual circuit may vary due to improvements in design.

The Δ mark found on some component parts indicates the importance of the safety factor of the part. Therefore, when replacing, be sure to use parts of identical designation.



# OUTPUT TERMINAL ASSEMBLY (GWX-137)

# PIN JACK



## Parts List of Output Terminal Assembly (GWX-137)

### SWITCHES

Part No.	Symbol & Description
ASR-047	RL2, RL3 Relay

### CAPACITORS

Part No.	Symbol & Description
CQMA 393K 250	C3, C4
CQMA 103K 400	C5, C6

*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

### RESISTORS

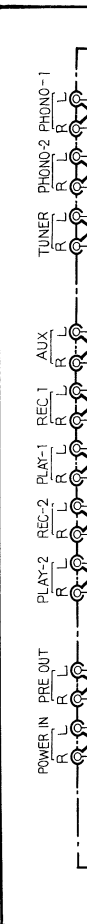
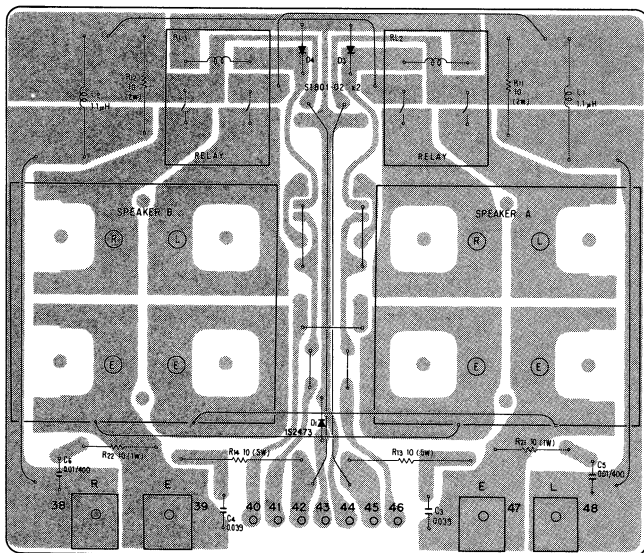
Part No.	Symbol & Description
RS2P □□□ J	R11, R12
RT5B □□□ K	R13, R14
RS1P □□□ J	R21, R22

### SEMICONDUCTORS

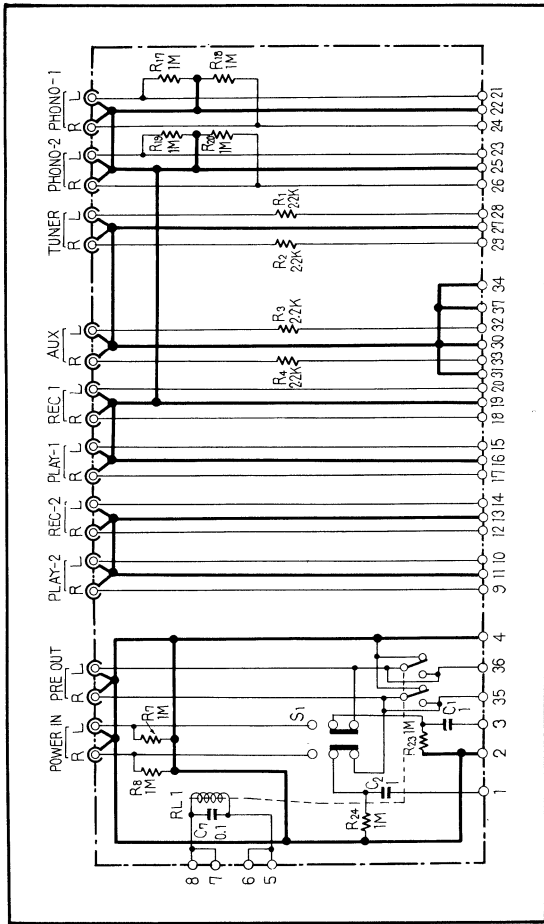
Part No.	Symbol & Description
1S2473	D1
SIB01-02 (10E2)	D3, D4

### OTHERS

Part No.	Description
ABE-031	Spring washer M5
ABN-037	Nut M5
AKE-037	Terminal (SPEAKERS)



# PIN JACK ASSEMBLY (GWX-138)



## Parts List of Pin Jack Assembly (GWX-138)

### SWITCHES

Part No.	Symbol	Description
ASH-002	S1	Slide switch (PRE/POWER AMP)
ASR-042	RL1	Relay

### CAPACITORS

Part No.	Symbol	Description
ACE-020	C1, C2	Metallized mylar 1/50V
CQMA 104K 250	C7	

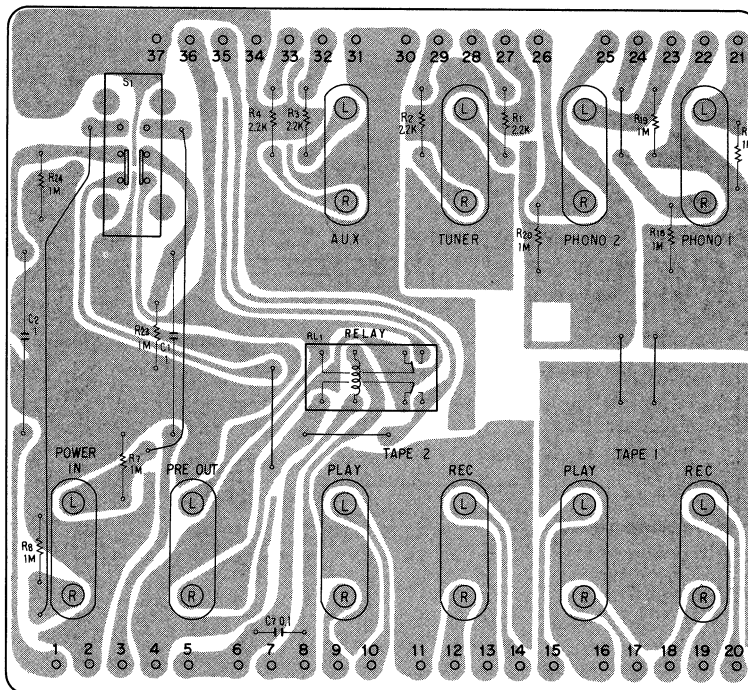
*Note: When ordering resistors, convert the resistance value into code form, and then rewrite the part no. as before.*

### RESISTORS

Part No.	Symbol & Description
RD $\frac{1}{4}$ PM □□□J	R1-R4, R7, R8, R17-R24

### OTHERS

Part No.	Description
AKB-051	Terminal (TUNER, AUX, TAPE, PRE OUT, POWER AMP IN)
AKB-052	Terminal (PHONO)



PART # ART-321  
S/M A-27

SM0300

INV: 01789V01

1 MR: 250-77 30

**PIONEER ELECTRONIC CORPORATION** 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan  
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