

# *Service Manual*

STEREO AMPLIFIER

# **SA-9800**

 **PIONEER®**

## MODEL SA-9800 COMES IN FIVE VERSIONS DISTINGUISHED AS FOLLOWS:

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

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 the servicing of the other types please refer to the additional service manuals.

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# 1. SPECIFICATIONS

## Semiconductors

ICs	3
FETs	6
Transistors	73
Diodes	36
Others	3

## Power Amplifier Section

Continuous Power Output is 100watts\* per channel, min., at 8 ohms from 10 Hertz to 20,000 Hertz with no more than 0.005% total harmonic distortion, or 100 watts\* per channel at 4 ohms from 10 Hertz to 20,000 Hertz with no more than 0.005% total harmonic distortion.

### Continuous Power Output

10Hz to 50kHz	100W + 100W (T.H.D. 0.01%, 8 ohms)
	120W + 120W (T.H.D. 0.02%, 4 ohms)

### Total Harmonic Distortion (10 Hertz to 20,000 Hertz)

continuous rated power output	No more than 0.005%
50 watts per channel power output, 8 ohms	No more than 0.004%
1 watt per channel power output, 8 ohms	No more than 0.004%

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

continuous rated power output	No more than 0.002%
50 watts per channel power output, 8 ohms	No more than 0.002%
1 watt per channel power output, 8 ohms	No more than 0.002%

### Frequency Response

5 to 200,000 Hertz	$\pm 0.5$ dB (POWER AMP IN)
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### Input (Sensitivity/Impedance)

	1V/50 kilohms (POWER AMP IN)
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### Output

Speaker	A, B, A+B
Headphones	Low impedance
Damping Factor (20 Hertz to 20,000 Hertz, 8 ohms)	55
Hum and Noise (IHF, short-circuited, A network)	118dB

## Preamplifier Section

### Input (Sensitivity/Impedance)

PHONO 1 MM	2.5mV/50 kilohms
PHONO 2 MM	2.5mV/50 kilohms
PHONO 2 MC	100 $\mu$ V/100 ohms

CARTRIDGE LOAD	Both Phono 1 and 2
	100, 10k, 25k, 50k, 100k ohms
	100, 200, 300, 400, 500pF

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. 0.002%, 1kHz)

PHONO 1	250mV
PHONO 2	250mV (MM), 10mV (MC)

### Output (Level/Impedance)

TAPE REC 1	150mV
TAPE REC 2	150mV
PRE OUT	1V/600 ohms, 3V/600 ohms (max.)

### Total Harmonic Distortion

10 to 50,000 Hertz, 1V output	No more than 0.006%
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### Frequency Response

PHONO (RIAA Equalization)	20Hz to 20,000Hz $\pm 0.2$ dB
TUNER, AUX, TAPE PLAY	5Hz to 100,000Hz $\pm 0.5$ dB

### Tone Control

BASS	400Hz position	+10dB, -10dB (100Hz)
	200Hz position	+10dB, -10dB (50Hz)
	Turnover Frequency	400Hz/200Hz
TREBLE	2.5kHz position	+10dB, -10dB (10kHz)
	5kHz position	+10dB, -10dB (20kHz)
	Turnover Frequency	2.5kHz/5kHz

Filter SUBSONIC	15Hz (12dB/oct)
HIGH	8kHz (12dB/oct)

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

PHONO MM/MC	90dB/72dB
TUNER, AUX, TAPE PLAY	110dB

### Muting

	-20dB
Loudness Contour (Volume control set at -40dB position)	+6dB (100Hz), +3dB (10kHz)

## Miscellaneous

Power Requirements	120V, 60Hz
Power Consumption	280W (UL)
Dimensions	453(W) x 155(H) x 425(D) mm
	17-11/16(W) x 6-1/8(H) x 16-3/4(D) in
Weight Without package	18.4kg (40 lb 9 oz)

## Furnished Parts

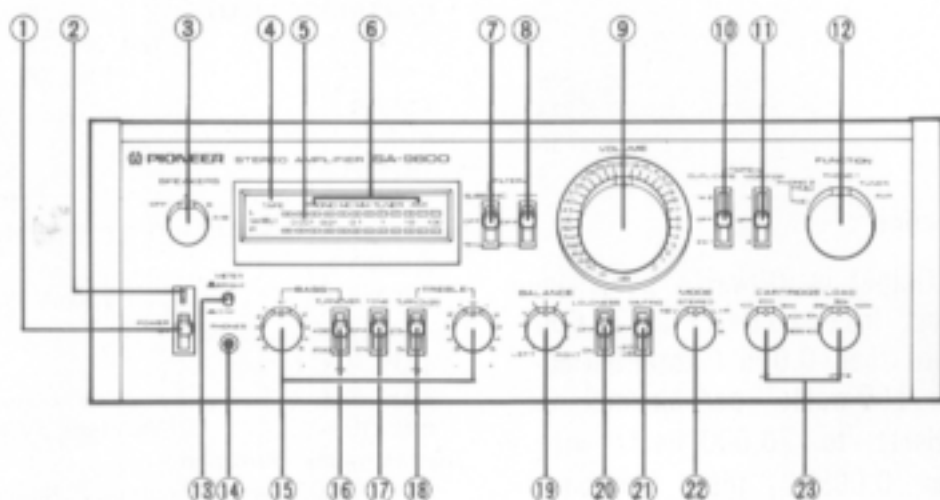
Operating instructions	1
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\* Measured pursuant to Federal Trade Commission's Trade Regulation rule on Power Output Claims for Amplifier.

### 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 to supply power to the amplifier. There will be a short delay when it is set to ON, because the muting circuit has been actuated to suppress the unpleasant noise that is sometimes generated when the power is on and off.

### ② POWER INDICATOR

When the power switch is set to ON, this lamp lights up, indicating the amplifier is turned on.

### ③ SPEAKER SELECTOR

Use this selector 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.

### ④ TAPE MONITOR INDICATOR

The TAPE lamp lights up when the tape monitor switch is set to either position "1" or "2".

### ⑤ POWER METER

This meter allows you to read out the rated power level on the fluorescent display tube when speakers with a nominal impedance of 8 ohms are connected to the amplifier's speaker terminals.

### ⑥ FUNCTION INDICATORS

The PHONO, MC, MM, TUNER, AUX function indicators light up in accordance with the position of the function selector.

### NOTE:

The function indicator will not go off when the tape monitor switch is set to position "1" or "2". This indicates a program at the recording source end during the monitoring of a recording.

### ⑦ SUBSONIC FILTER SWITCH

When this switch is set to the 15Hz position, the subsonic filter with a cut-off frequency of 15Hz is actuated. The subsonic filter serves to attenuate frequencies lower than 15Hz in a 12dB/oct slope. It is therefore effective in suppressing ultra-low frequency noise which is generated by record warp and other causes. You cannot actually hear this noise but it is a factor in the generation of intermodulation distortion and it may damage your speaker system. Set this switch to the 15Hz position during record play for the best effect.

### ⑧ HIGH FILTER SWITCH

The high filter with a cut-off frequency of 8kHz is actuated when this switch is set to the 8kHz position.

The high filter serves to attenuate frequencies higher than 8kHz in a 12dB/oct slope. This is why it is effective in suppressing high-frequency noise or noise from scratches on records being played.

### ⑨ 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.

**⑩ TAPE DUPLICATE SWITCH**

Use this switch when employing two tape decks to duplicate recorded tapes or edit tapes. This switch is otherwise kept at the OFF position.

**1 ▶ 2:** When 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:** When 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.

**⑪ TAPE MONITOR SWITCH**

Use this switch to select the program source which is being reproduced.

**1:** Set here to monitor a recording or a tape being played back on a tape deck which is connected to the TAPE 1 jacks.

**OFF:** Set here whenever you are not playing back a tape or monitoring a recording (i.e. when you have set the function selector to PHONO 1, PHONO 2 MM, MC, TUNER, or AUX for an alternative program source).

**2:** Set here to monitor a recording or a tape being played back on a tape deck which is connected to the TAPE 2 jacks.

**⑫ FUNCTION SELECTOR**

Use this selector to select the program source. When set, the function indicator above the meter panel corresponding to the position of the function selector will light up.

**PHONO 2 MC:** Set here when playing records on a turntable with a moving coil (MC) cartridge connected to the rear PHONO 2 jacks.

(The PHONO MC function indicator lights up.)

**PHONO 2 MM:** Set here when playing records on a turntable with a moving magnet (MM) cartridge connected to the rear PHONO 2 jacks.

(The PHONO MM function indicator lights up.)

**PHONO 1:** Set here when playing records on a turntable connected to the PHONO 1 jacks. (The PHONO MM function indicator lights up.)

If you intend to play a record on a turntable with a moving coil cartridge, connect the turntable to the rear PHONO 2 jacks and then set the function selector to the PHONO 2 MC position.

**TUNER:** Set here when listening to broadcasts on a tuner connected to the TUNER jacks. (The TUNER function indicator lights up.)

**AUX:** Set here when listening to a program source which is connected to the AUX jacks.

(The AUX function indicator lights up.)

**NOTE:**

*When the function selector is set to the PHONO 2 MM or PHONO 1 position, you can select the input circuit resistance and the input capacitance in line with the load impedance of the cartridge being used with the CARTRIDGE LOAD selectors (ohms and pF).*

**⑬ METER SWITCH**

This allows you to select the brightness of the meter panel.

**BRIGHT** (released position): This brightens the meter panel.

**DIM** (depressed position): This dims the meter panel. When your listening room is dark and the meter panel is too bright, set the switch to the DIM position.

**⑭ HEADPHONE JACK**

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

**NOTE:**

*Set the speaker selector to OFF when listening only with headphones.*

**⑮ BASS AND TREBLE CONTROLS**

Use these controls to adjust the bass and the treble. If you set the tone switch to ON and turn the bass control to right from its center position, you will be able to emphasize the sound in a frequency range is lower than that selected by the bass turnover switch.

Conversely, turning this control from the center position to the left will attenuate the sound.

You can use the treble control to adjust the sound in a frequency higher than that selected by the treble turnover switch. For further details, refer to "TURNOVER SWITCHES" on page 6.

**⑯ BASS TURNOVER SWITCH**

Use this switch to change over the frequency in which the sound adjustment with the bass control is starting to take effect. Select 200Hz or 400Hz in accordance with the characteristics of your listening room and of your speakers, and with your general preference.

### 17 TONE SWITCH

Set this switch to ON when adjusting the bass and treble controls. When set to OFF, the tone control circuits are disengaged and frequency response is flat. This function is convenient for checking phono cartridge and speaker tone quality and listening room acoustics.

### 18 TREBLE TURNOVER SWITCH

Use this switch to change over the frequency in which the sound adjustment with the treble control is starting to take effect. Select 2.5kHz or 5kHz in accordance with the characteristics of your listening room and of your speakers, and with your general preference.

### 19 BALANCE CONTROL

Use this control to balance the volume of the left and right channels. First, however, set the mode selector to mono (L+R, L, or R), and adjust so that the sound appears to come from somewhere exactly between the two speakers. If the sound appears to be louder on the right, it means that the volume of the right channel is higher. Turn the balance control to the left and adjust.

Conversely, if the sound appears to be louder on the left, it means that the volume of the left channel is higher. Therefore, turn the balance control to the right and adjust. After adjusting, return the mode selector to STEREO.

### 20 LOUDNESS SWITCH

When listening to a performance with the volume control turned down, set this switch to ON and the bass and treble will be accentuated.

When the volume is low, the human ear finds it harder to hear the bass and treble than when the volume is high. The loudness switch is thus designed to compensate for this deficiency. By setting it to ON, the bass and treble come through much more strongly and the sound takes on a punch even when the volume control is turned down.

### 21 MUTING SWITCH

Set this switch to -20dB to attenuate the audio output indicated by the volume control by 20dB. There is no need to adjust the volume control if you use this switch when turning down the audio output temporarily and when changing over records or tapes.

### 22 MODE SELECTOR

Use this selector for selecting the performances.

**REV:** Reverses left and right channel stereo signals and reproduces them stereophonically.

**STEREO:** Set to this position for normal stereo reproduction.

**L+R:** Mixes left and right channel signals and reproduces them monophonically.

**L:** Left channels signal is reproduced monophonically from both speakers.

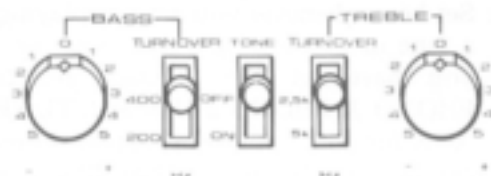
**R:** Right channel signal is reproduced monophonically from both speakers.

### 23 CARTRIDGE LOAD SELECTORS (ohms and pF)

These selectors allow you to select the input resistance and input capacitance in line with the rated load impedance and load capacitance of a moving magnet (MM) cartridge for record play.

Use these two switches to produce the sound quality of your preference or the ideal conditions for your cartridge.

### TURNOVER SWITCHES



This amplifier adopts a tone control system that combined bass and treble controls with two turnover switches which are used to select the frequency. Select the frequency with the turnover switches and then enhance or attenuate the sound in the lower (or higher) frequencies with the bass (or treble) controls.

For instance, if the bass turnover switch is set to 400Hz (see Fig. A), the bass covers a wide with large gain per step of the bass control. For this reason, the reproduced sound sometimes seems unnatural depending on the program source, but this can be remedied by setting the switch to 200Hz.

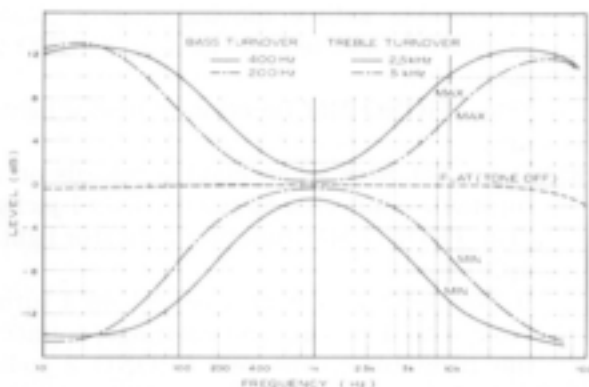
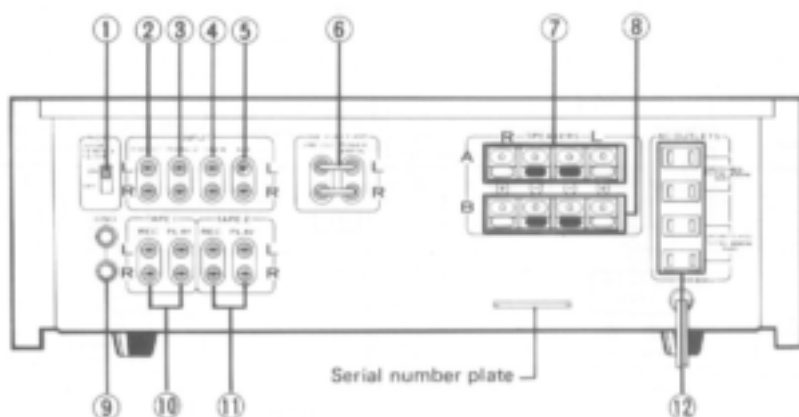


Fig. A

### 3. REAR PANEL FACILITIES



#### ① PHONO INTERFERENCE FILTER SWITCH

This is used to attenuate radio-frequency interference from external electronic or electrical appliances or products during record play.

**NOTE:**

When the function selector is at PHONO 2 MC, this function doesn't operate, since it is not necessary when playing with the moving coil cartridge.

#### ② PHONO 1 JACKS

Connect the output cords of the turntable with the moving magnet (MM) cartridge to these jacks.

#### ③ PHONO 2 JACKS

When using the moving coil (MC) cartridge, be sure to connect the output cords of the turntable to these jacks. However, these jacks can also be used for the moving magnet (MM) cartridge.

#### ④ TUNER JACKS

Connect the tuner cords to these jacks.

#### ⑤ AUX JACKS

These are auxiliary input jacks. Connect a TV tuner or cartridge tape player to them.

#### ⑥ PREAMPLIFIER/POWER AMPLIFIER CONNECTOR BAR

When this connector bar is disconnected from the jacks, you can separate the SA-9800's preamplifier and power amplifier.

**NOTE:**

If this bar is not connected properly, you will not hear any sound from the speakers connected to the SPEAKERS terminals.

#### ⑦ SPEAKERS TERMINALS A

Connect your first pair of speakers to these terminals.

#### ⑧ SPEAKERS TERMINALS B

Connect your second pair of speakers to these terminals.

#### ⑨ GND TERMINALS

These are the ground terminals. Connect the ground wire of the turntable, etc. to these terminals.

#### ⑩ TAPE 1 JACKS

Connect the tape deck cords to these jacks. Connect the REC (recording) jacks to the INPUT jacks on the tape deck, and the PLAY (playback) jacks to the OUTPUT jacks.

#### ⑪ TAPE 2 JACKS

Connect your second tape deck cords to these jacks.

#### ⑫ AC OUTLETS

These are spare power outlets. Insert the power plug on the stereo components (turntable, tuner, tape deck, etc.) into these outlets.

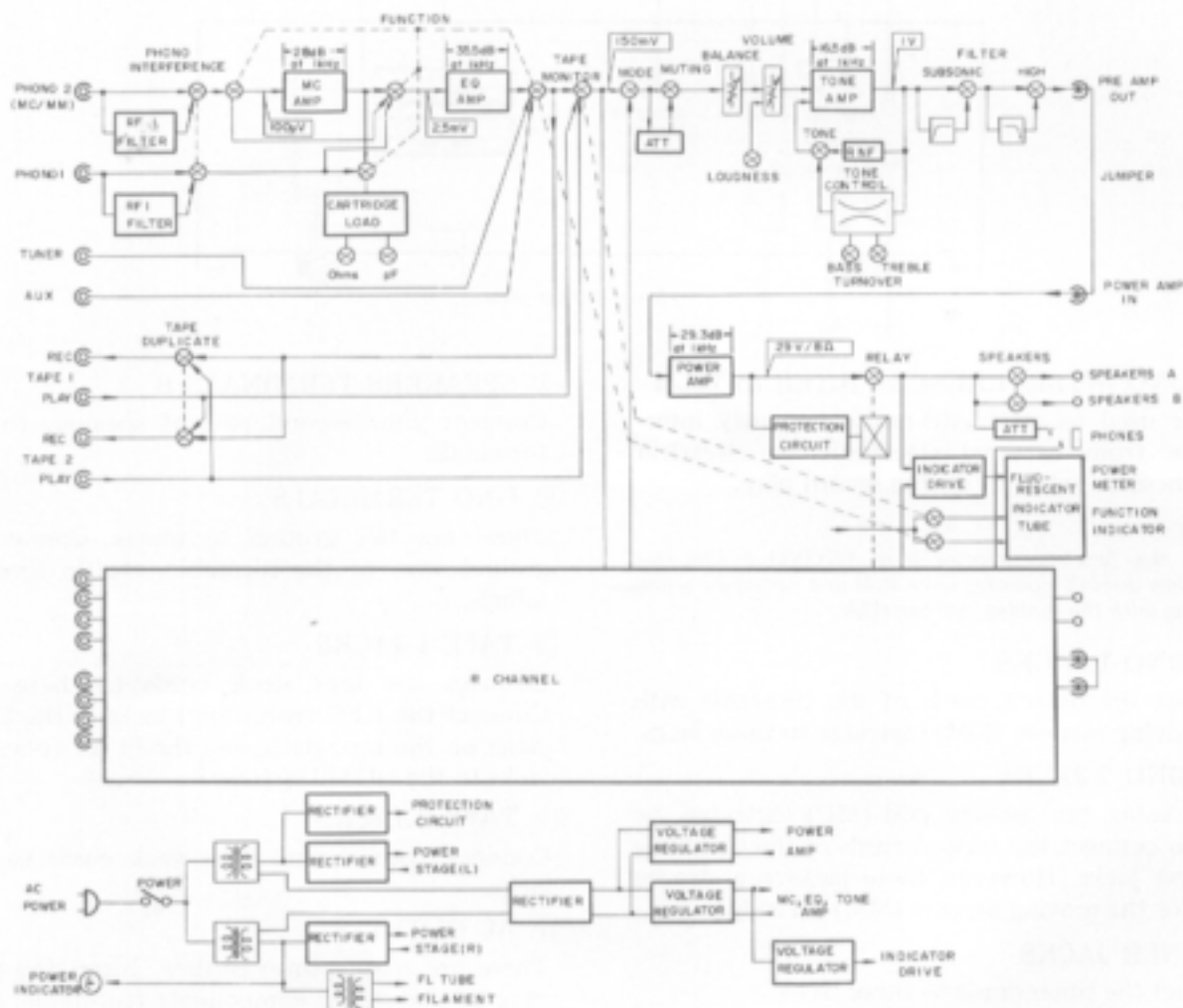
**SWITCHED:** The power supplied through these outlets is coupled to the operation of the amplifier's power switch. The maximum power capacity which may be connected to the two SWITCHED outlets is 200W.

**UNSWITCHED:** The power is always supplied through these two outlets regardless of the position of the power switch. The maximum power capacity which may be connected to these two outlets is 200W.

**NOTES:**

- Never connect an iron or a toaster to these outlets.
- Do not get the power outlets and the power plugs wet or touch them with wet hands, since you may get an electric shock.

## 4. BLOCK DIAGRAM



## 5. CIRCUIT DESCRIPTIONS

### 5.1 PRE-AMPLIFIER SECTION

#### Cartridge Load Selector

The input resistance and input capacitance of the PHONO (MM) input may be varied. The EQ amplifier input resistance is set to  $100k\Omega$ , and the input capacitance to  $100pF$ . By operation of the CARTRIDGE LOAD selectors, different resistors and capacitors will be in parallel with the phono input circuit. Five different input resistance levels ( $100\Omega$ ,  $10k\Omega$ ,  $30k\Omega$ ,  $50k\Omega$  and  $100k\Omega$ ) and five different input capacitance levels ( $100pF$ ,  $200pF$ ,  $300pF$ ,  $400pF$  and  $500pF$ ) are available, permit-

ting the user to select optimum load conditions for the phono cartridge being employed in the turntable connected to the PHONO terminals.

This function is only effective when the FUNCTION switch is in the PHONO (1 or 2) MM position.



### Phono Interference Filter

Because of the high sensitivity of the phono input circuits, a certain amount of radio frequency interference may occur. This may be reduced by simply turning the rear panel PHONO INTERFERENCE FILTER on (thereby connecting a resistor in series with the phono input circuits).

### MC Amplifier

The MC amplifier is a flat-response voltage amplifier with a gain of 28dB, designed for use with low-output moving-coil-type cartridges. It is inserted in front of the equalizer amplifier when the FUNCTION switch is input in the PHONO 2 MC position.

Fig. 5-2 shows the basic configuration of the circuit. The MC amplifier is a completely symmetrical DC-coupled 3-stage amplifier, the first stage of which employs newly developed ultra-low-noise NPN and PNP transistors. The S-N ratio is 72dB (100 $\mu$ V input, IHF-A).

### EQ Amplifier

Fig. 5-3 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 ( $Q_1$ ) 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 reduce gate leak current noise on account of the reduced drain-to-source voltage.

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

The output stage ( $Q_7, Q_8$ ) 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 resultant S-N ratio of the equalizer amplifier is 90dB, while the equalizer deviation is  $\pm 0.2$ dB (20Hz to 20,000Hz).

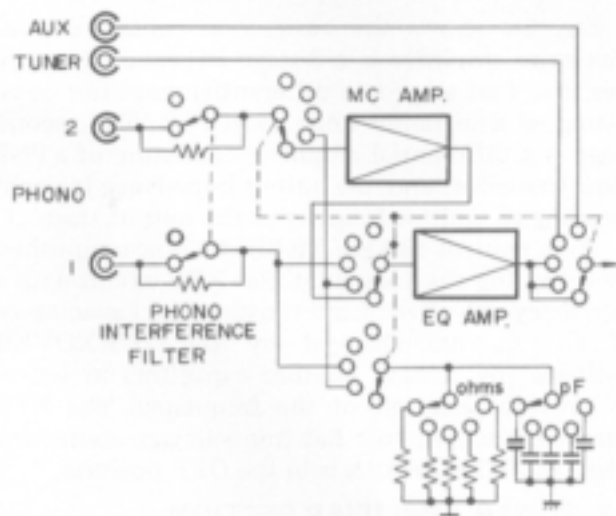


Fig. 5-1 Phono Circuit

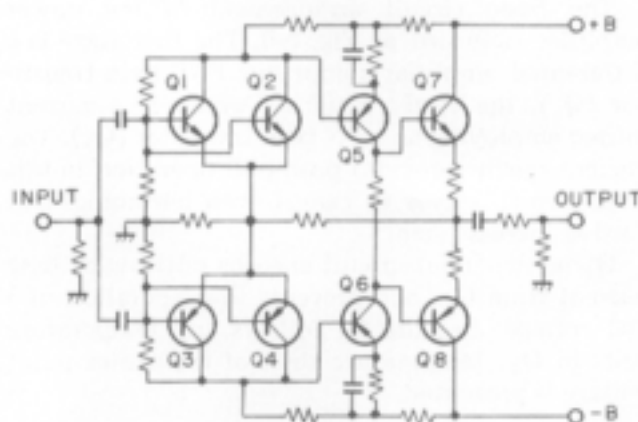


Fig. 5-2 MC Amplifier

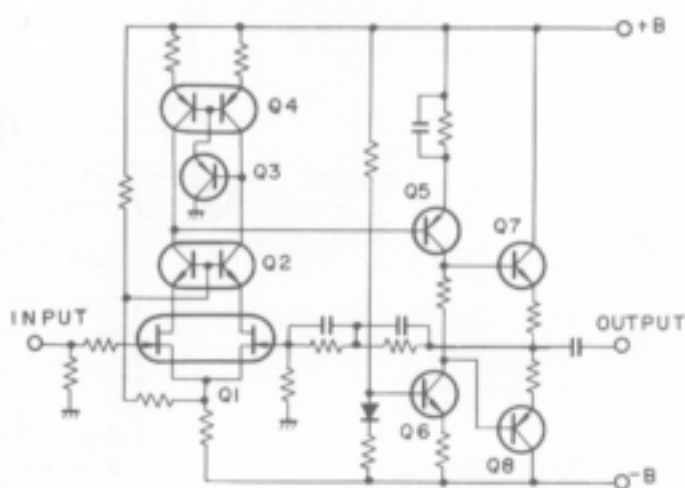


Fig. 5-3 EQ Amplifier

## Tone Controls

Fig. 5-4 shows the basic tone control circuit. The tone amplifier is a 3-stage DC-coupled amplifier, the first stage is a differential amplifier consisting of a ultra-low-noise twin FET. The second stage is a differential amplifier consisting of a PNP twin transistor, and the output impedance lowered by using an emitter follower at the output stage.

Tone control (BASS, TREBLE) is accomplished by providing the tone amplifier NFB circuit with a frequency selective characteristic. The capacitance of  $C_1 - C_4$  are changed by the TURNOVER switches (by adding another capacitors in series) to provide selection of the frequency. The NFB circuit is changed to a flat frequency characteristic when the TONE switch is in the OFF position.

## 5.2 POWER AMPLIFIER SECTION

### Amplifier Circuit

The basic circuit arrangement of the power amplifier is shown in Fig. 5-5. The first stage is a differential amplifier comprising PNP twin transistor ( $Q_2$ ), the load circuit of which is a current mirror employing an NPN twin transistor ( $Q_3$ ). The current mirror provides push-pull operation in this stage, which serves to cancel even harmonics and further increase gain.

$Q_1$  in the input circuit absorbs 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-driver stage ( $Q_4, Q_5$ ) is a Darlington arrangement, the load circuit of which employs a constant-current source ( $D_1, Q_6$ ) resulting a high voltage gain.

The power stage bias voltage is supplied by the NSA circuit. The NSA circuit provides non-switching operation in the power stage (refer to "NSA Circuit").

The power stage ( $Q_7 - Q_{12}$ ) is a 2-stage Darlington arrangement, the last stage is parallel SEPP circuit employing an SL RET (Super Linearity Ring Emitter Transistor). 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 (100W + 100W, 10Hz to 20kHz, THD 0.005%,  $8\Omega$ ).

### 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.

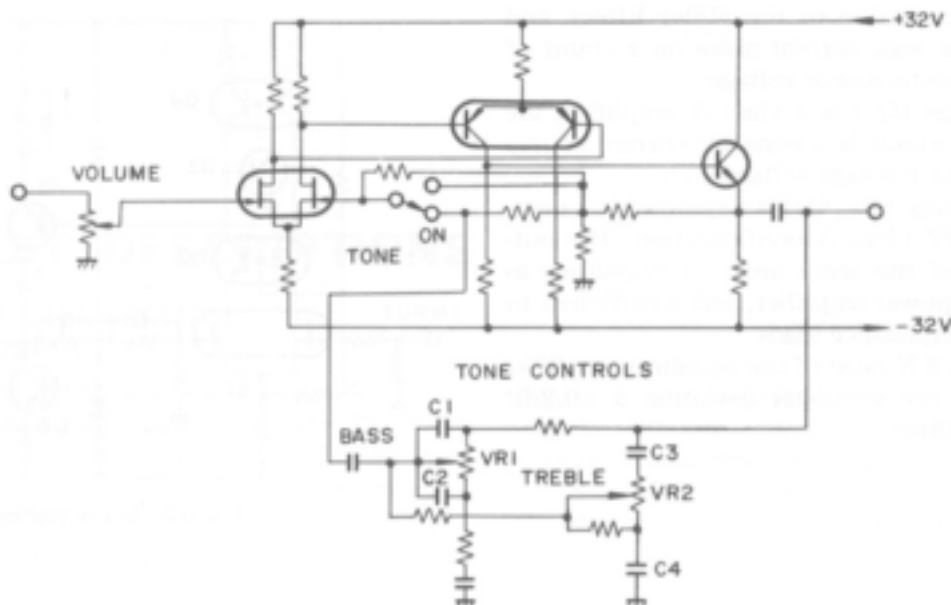


Fig. 5-4 Tone Control Circuit

The circuit (Fig. 5-6), constitutes a Wheatstone bridge (Fig. 5-7), one arm of which the load ( $R_L$ ), which is arranged so that  $Q_1(Q_2)$  is biased by the potential difference between the opposite corners of the bridge. As the value of  $R_L$  decreases,  $Q_1(Q_2)$

start to conduct, thus holding down the drive voltage and controlling the magnitude of the current flowing in to the power transistors.  $Q_3(Q_4)$  is link connected to  $Q_1(Q_2)$  which provides sharp clipping characteristics.

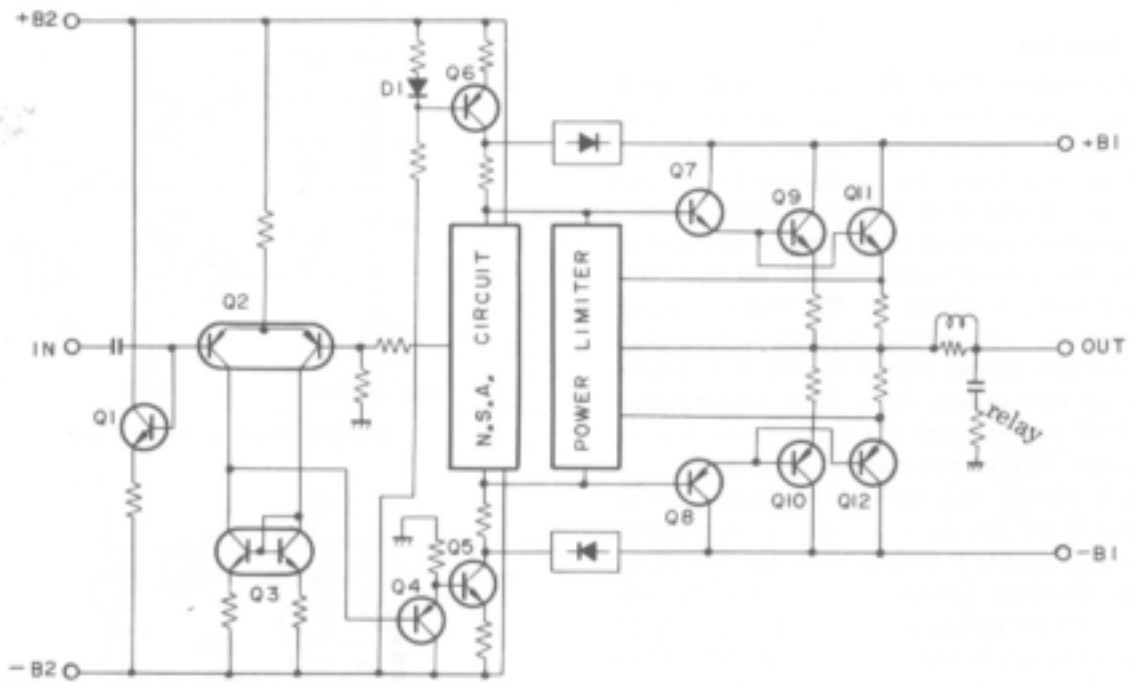


Fig. 5-5 Power Amplifier

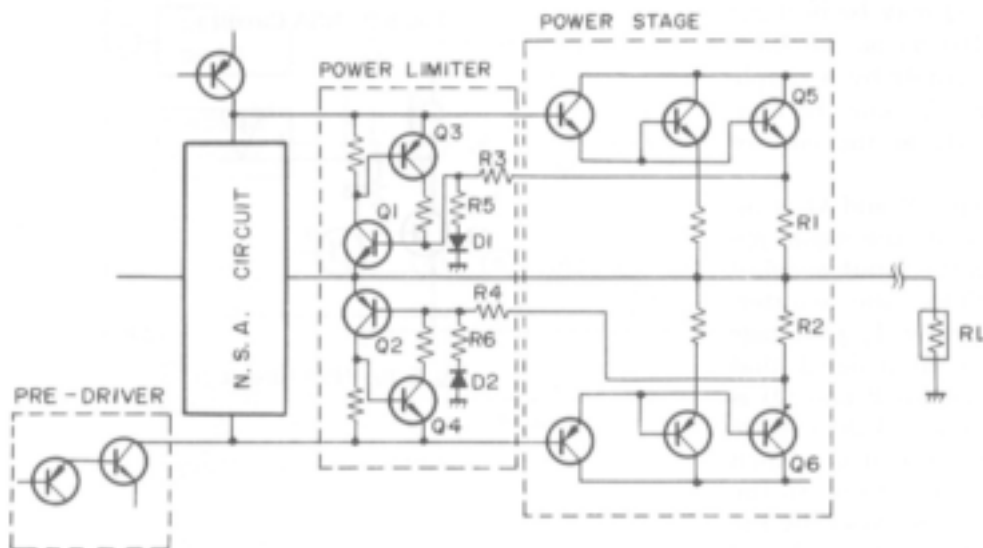


Fig. 5-6 Power Limiter

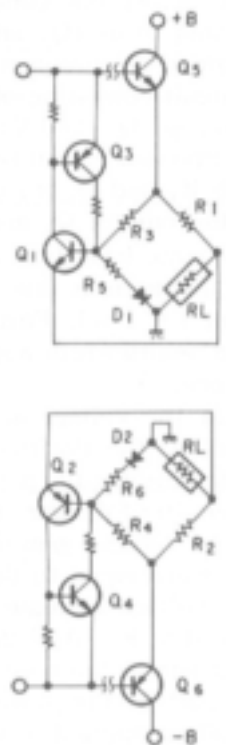


Fig. 5-7 Bridge Circuit

## NSA (Non-Switching Amplifier) Circuit

By operating the power stage only within the active region (no possible cut-off) and with minimum idle current, the NSA circuit prevents the generation of switching distortion and reduces heat loss.

### Operating Principle

Since idle current flows through normal class B SEPP power stages (see Fig. 5-8) when no signal is applied, a fixed amount (with the voltage across points P and R serving as a bias). The voltages across points P and Q, and Q and R at this time will be equal. When the positive portion of a signal is applied to this circuit, the power stage current on the NPN side is increased, resulting in the voltage across points P and Q also being increased. However, since the voltage across points P and R is practically constant (see note), the voltage across points P and R (PNP power stage bias) will be decreased, resulting in the PNP power stage being cut off.

The NSA circuit increases the voltage across points P and R by the same amount as the voltage increase across points P and Q, thereby cancelling the voltage decrease across points Q and R, and preventing the PNP power stage from being cut off.

This NSA circuit is outlined in Fig. 5-9. When there is no signal applied to the circuit,  $Q_1$  and  $Q_2$  are almost cut off, while  $Q_3$  and  $Q_4$  will be on. The voltage across the collector and base of both of these transistors ( $Q_3$  and  $Q_4$ ) at this time may be disregarded. Consequently, with the power stage bias circuit consisting of 4 PN junctions formed by  $Q_3$ ,  $D_3$ , and  $Q_4$ , and  $VR_1$ , this circuit is equivalent to the previous circuit shown in Fig. 5-8.

With  $R_1$  and  $D_1$  ensuring a constant flow of current, the base of  $Q_1$  and point Q may be brought to the same level (see Fig. 5-10) on an AC basis (level fluctuations due to the signal) by a simple shift in DC level. Furthermore,  $Q_1$  may be considered emitter-follower with  $R_3$  as the emitter resistance.

When the voltage across points P and Q is increased by the positive portion of the signal applied to this circuit, it becomes the input signal of this emitter-follower ( $Q_1$ ). Since the emitter-follower voltage gain is practically 1, a voltage more or less equal to that of the input signal (that is, the voltage increase across points P and Q) is produced at  $R_3$ . And the  $R_3$  voltage is the voltage applied across the base and collector of  $Q_3$  which forms part of the power stage bias circuit. So the bias voltage applied to  $Q_3$  will be in excess by the same amount that the voltage across points P and Q is increased (by positive portion of the signal) above the voltage level when no signal is being

applied. Consequently, the increase in voltage across points P and Q cancels the decrease in voltage across points Q and R, thereby maintaining the idle current without cutting the PNP power

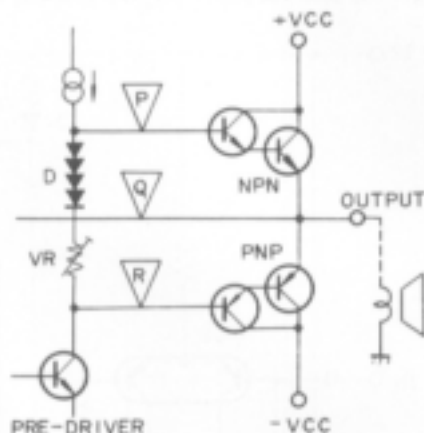


Fig. 5-8 Normal Power Stage

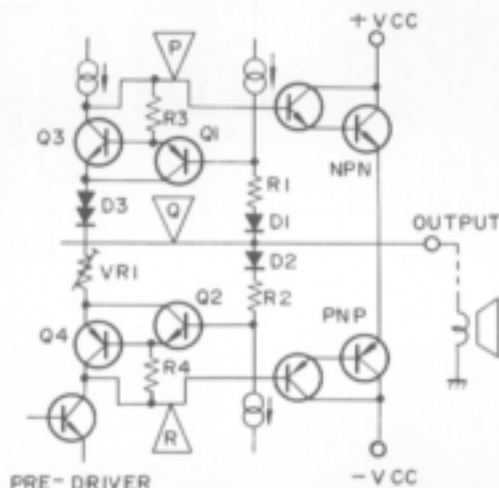


Fig. 5-9 NSA Circuit

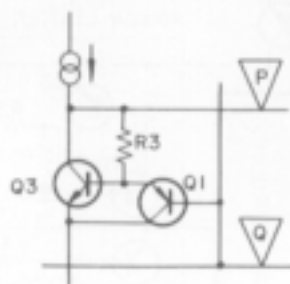


Fig. 5-10 NSA Circuit

stage off (noting that there actually is a slight decrease in current). For the negative portions of the signal,  $Q_3$  and  $Q_4$  are operated in the same manner, thereby preventing the NPN power stage from being cut off.

In other words, the NSA circuit acts to prevent any "power stage cut-off" signals from being applied to the power stage (see Fig. 5-11).

*Note:*

*The pre-drive current actually decreases when the positive portion of the signal is applied, resulting in a decrease in the voltage across points P and R.*

### 5.3 INDICATOR CIRCUIT

The SA-9800 output power and function indicators feature fluorescent indicator tube (FL tube). In this tube, thermionic emissions from the cathode are accelerated into the fluorescent substance of the segmental anodes, resulting in the emission of light. This tube is used to indicate numerals, letters, and other symbols.

An outline of the FL tube drive circuit is shown in Fig. 5-12. The output circuit signal is first passed through a low-pass filter and a compressor

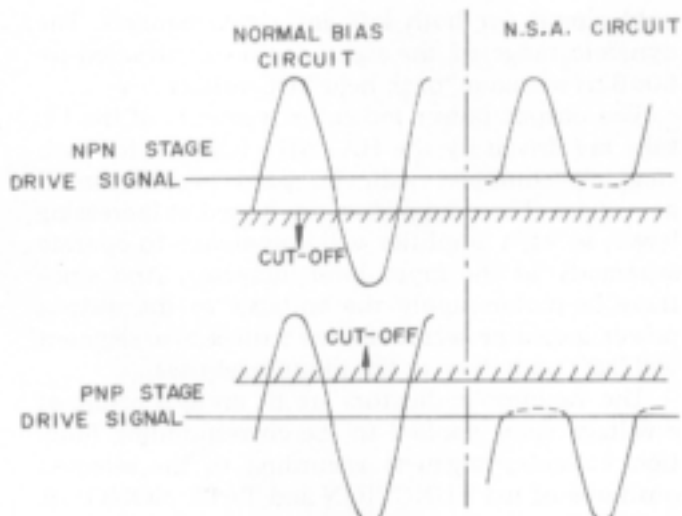


Fig. 5-11 Driving Signal of Power Stage

circuit before being applied to pin no.6 (4) of the IC (TA7318P-A). The compressor circuit makes use of the non-linearity of the rising portion of the diode's  $V_d - I_d$  characteristics to contract the signal dynamic range by 20dB. The IC contains a detector circuit, compressor (40dB), and peak

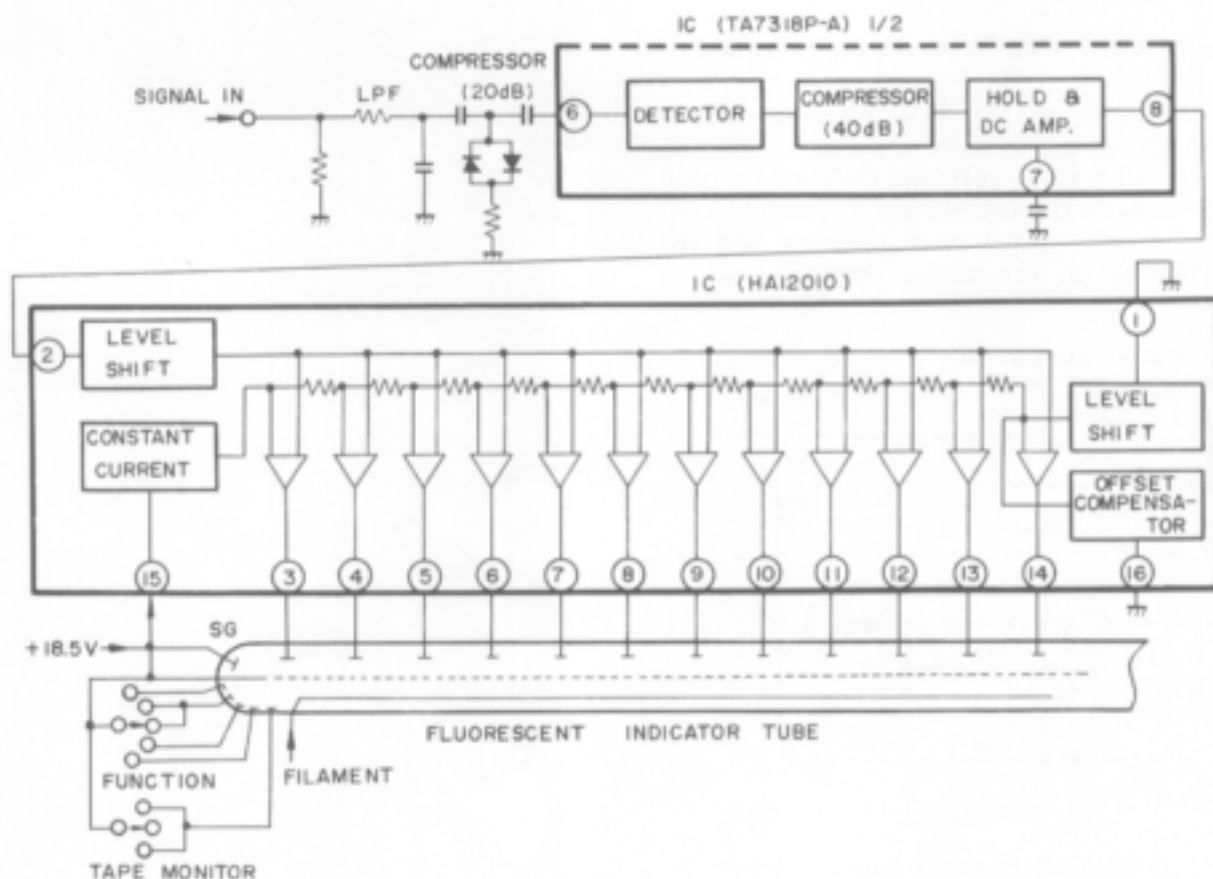


Fig. 5-12 Indicator Circuit

hold circuit for both left and right channels. The dynamic range of the signal is thus contracted by 60dB to obtain a "peak held" DC voltage.

The output power indicator segments of the FL tube are driven by the HA12010 ICs (one for each channel) equipped with 12 pairs of differential amplifiers. These amplifiers are biased at increasing levels, so each amplifier will commence to operate separately as the input level increases. And since these amplifiers apply the voltages to the output power indicator segments, each successive segment will light up in turn as the input level rises.

The function indicators are lit up as a result of a voltage being applied to the corresponding function indicator segment according to the selected positions of the FUNCTION and TAPE MONITOR switches.

#### 5.4 PROTECTION CIRCUIT

The purpose of this circuit is to protect the speakers. The relay in the output circuit is automatically opened in any of the following cases:

1. During the "transient operations" when the power supply is turned on and off.
2. Upon detection of a DC voltage in the output circuit, caused by component failure or accident.

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

With reference to Fig. 5-13 when the power supply is turned on, if there is no input (DC) on  $Q_1$  and  $Q_2$ , they will be off, and the timing capacitor  $C_2$  charges up through  $R_3$  and  $R_4$ , and thus on. When  $Q_3$  conducts, the relay operates, and the output muting on the power amplifier will be removed.

When the power supply is turned off,  $+B_1$  will abruptly decay,  $C_2$  will discharge through  $D_1$  and  $D_2$ .  $Q_3$  will cease to conduct, whereupon the relay will become de-energized and restore muting.

#### DC Voltage Detector

The output circuit is connected to the  $Q_2$  emitter and  $Q_1$  base via a low-pass filter ( $R_1, C_1$ ). Any DC voltages appearing the output circuit of the power amplifier, it will be applied to the  $Q_2$  emitter and the  $Q_1$  base. If the voltage is negative,  $Q_2$  will rapidly discharge. As consequence,  $Q_3$  will turn on and the relay will become de-energized, thus causing the output circuit to open.

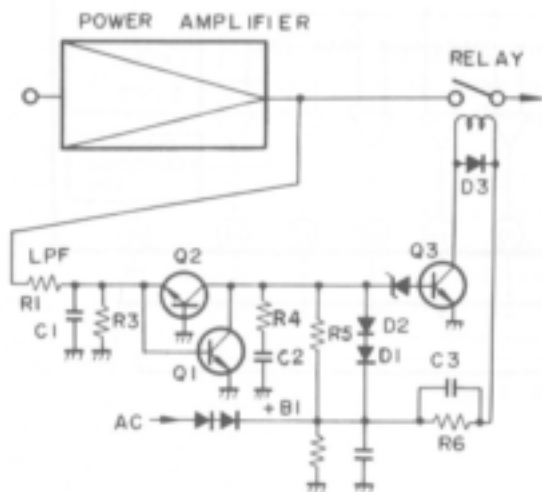


Fig. 5-13 Protection Circuit

## 6. DISASSEMBLY

### Wooden Cover

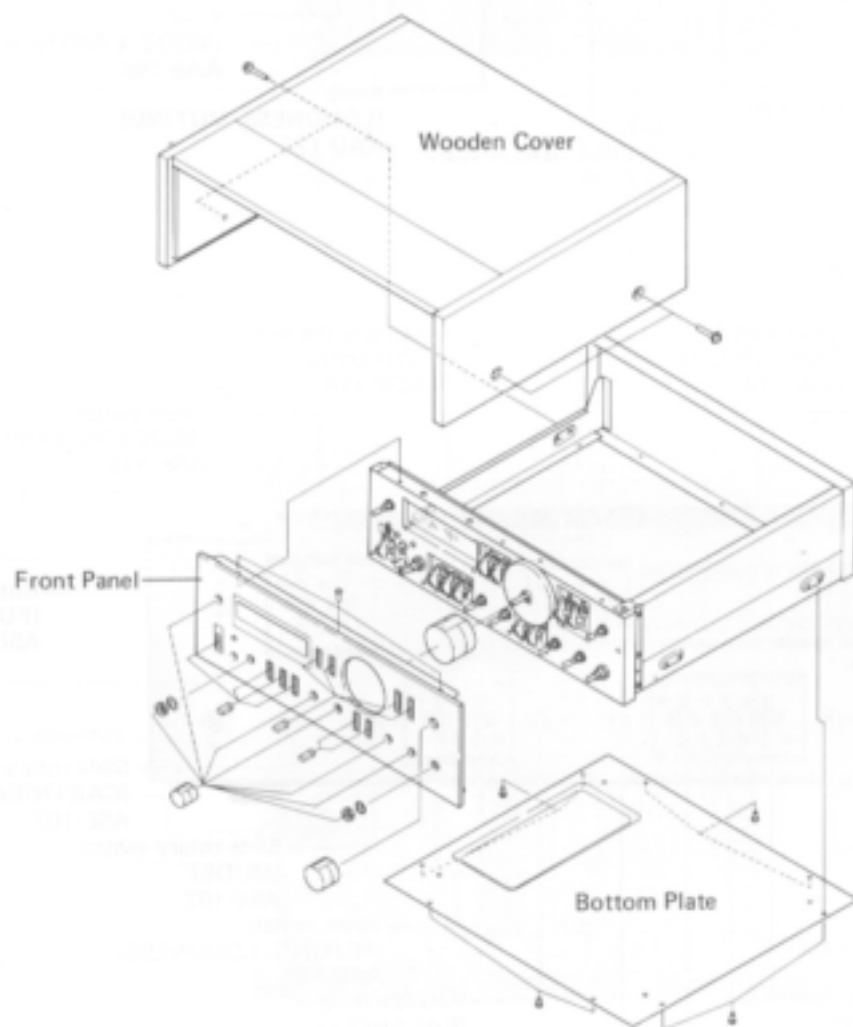
Remove the two screws on each side of the wooden cover.

### Bottom Plate


Remove the eleven screws to detach the bottom plate.

### Front Panel

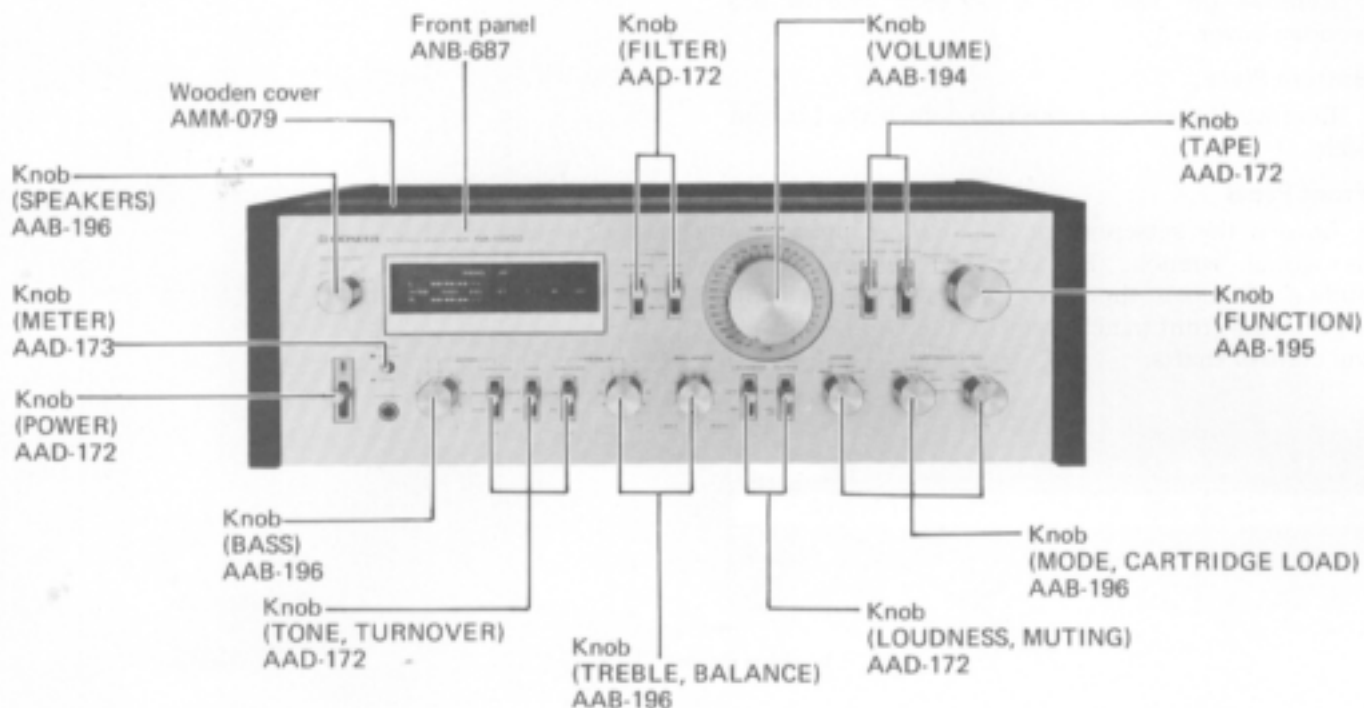
Loosen the setscrews of TUNING knob with a hexagonal wrench. Remove all the knobs by pulling. Remove the three screws from the top edge of the front panel. Remove the two nuts from the control shafts.



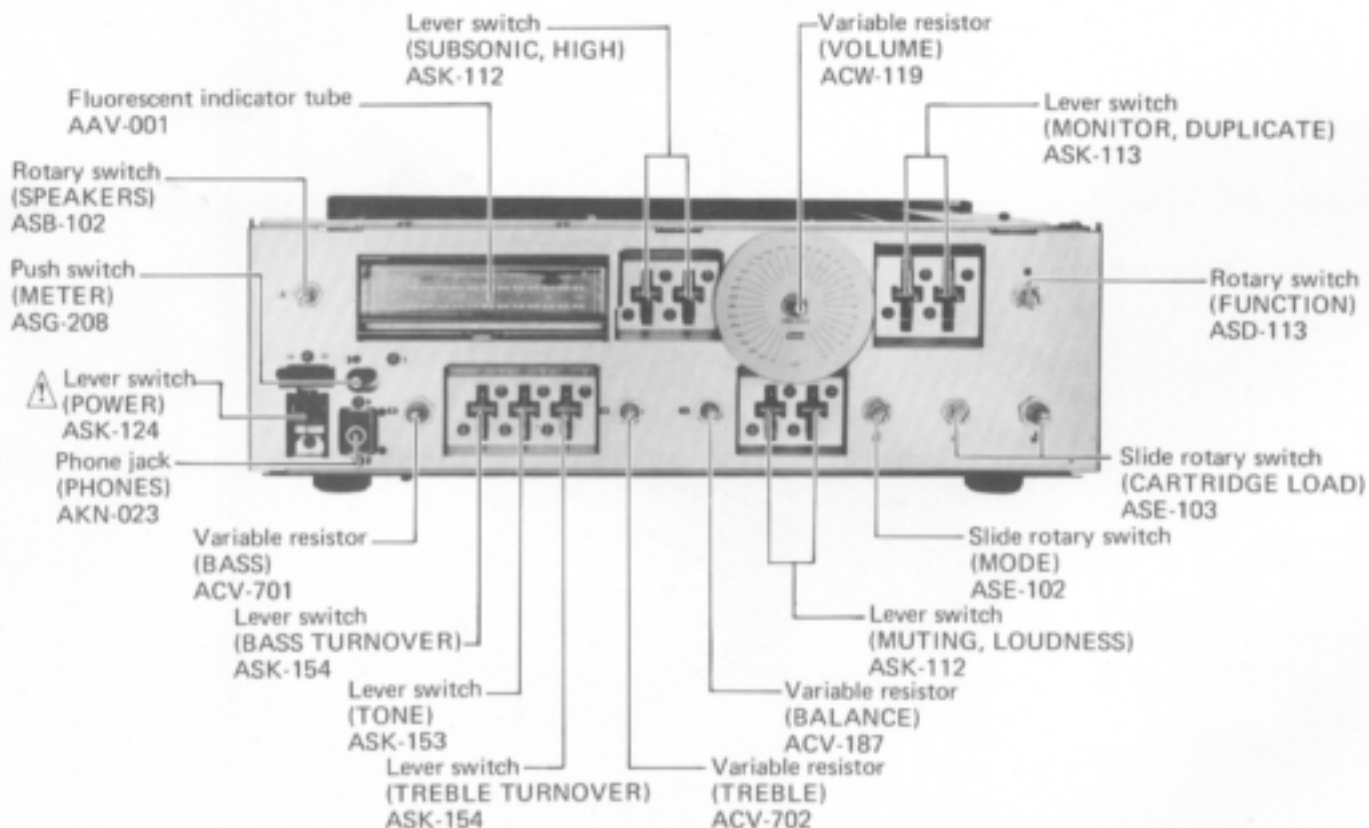
# 7. PARTS LOCATION

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.

## Front Panel View

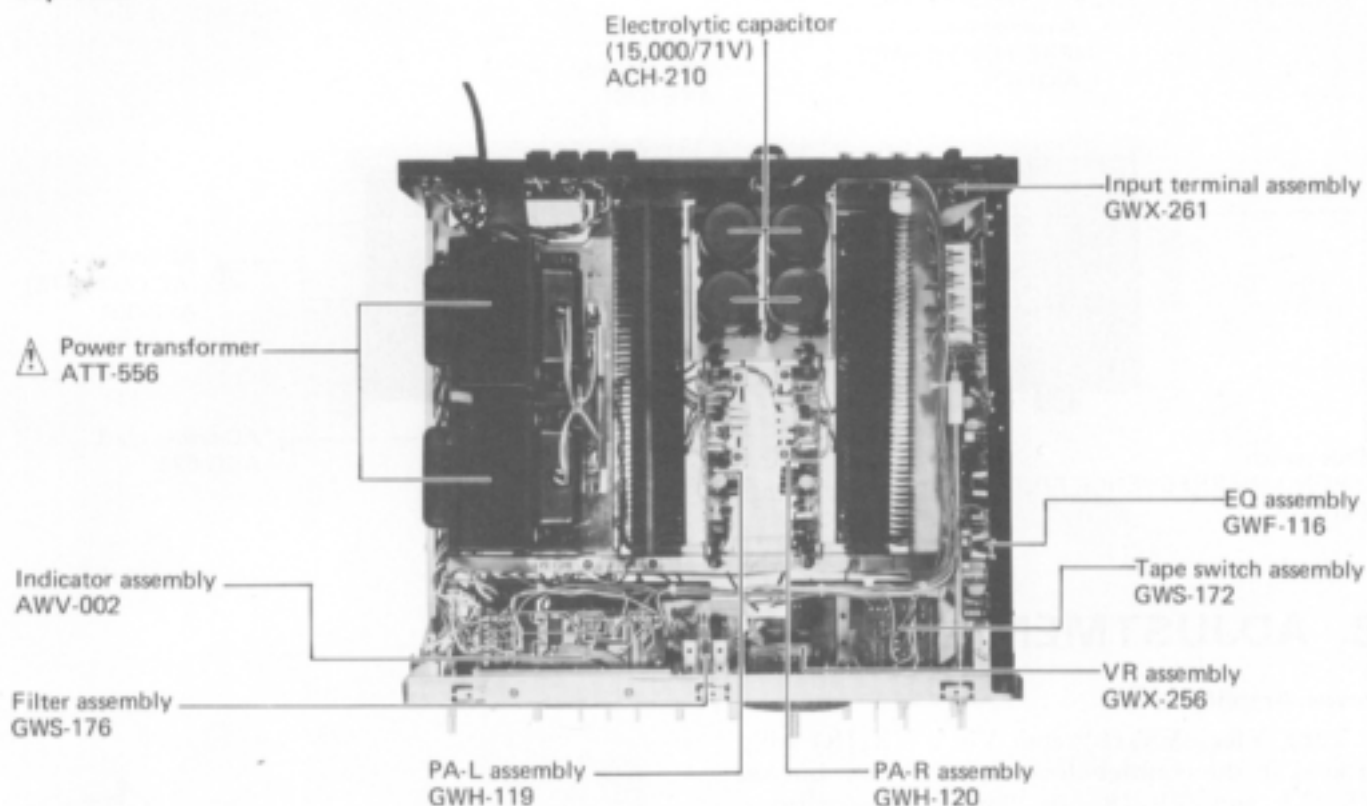


## Front View with Panel Removed

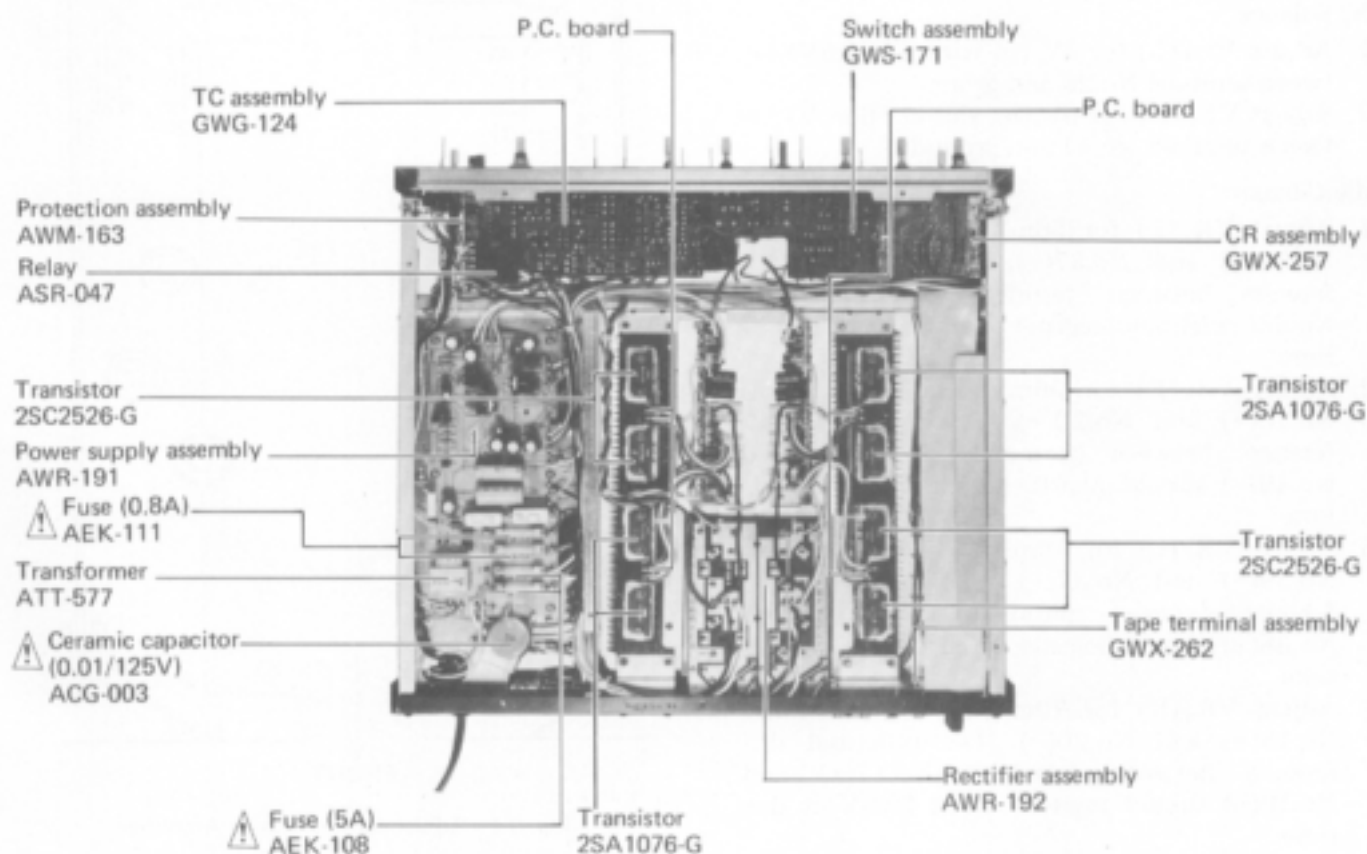




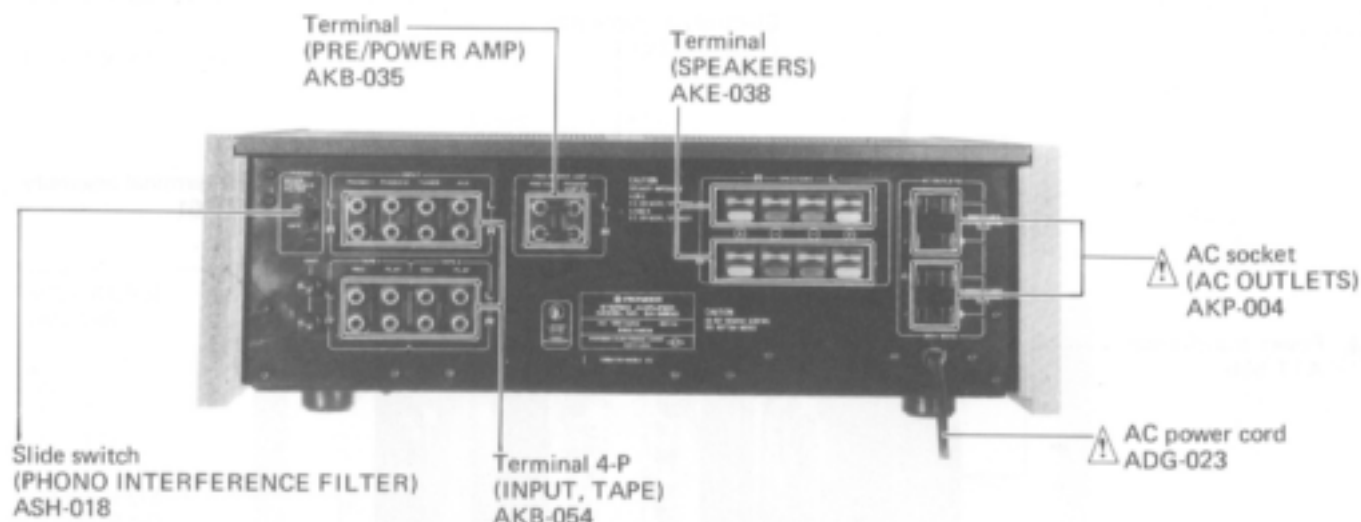
## Top View



## Bottom View



## Rear Panel View



## 8. ADJUSTMENTS

### Power Amplifier

Turn  $VR_3$ ,  $VR_5$  (L) and  $VR_4$ ,  $VR_6$  (R) fully around in the counter-clockwise direction, but set  $VR_1$  (L) and  $VR_2$  (R) to the center positions. Without any load or input signal, turn the POWER switch ON.

### DC Balance

1. Adjust  $VR_1$  (L) for 0V (to within  $\pm 60$ mV) between terminal No.26 and ground.
2. Adjust  $VR_2$  (R) for 0V (to within  $\pm 60$ mV) between terminal No.11 and ground.

### Idle Current

1. Adjust  $VR_3$  (L) for 56mV between terminals No.39(+) and No.37(-). The potential difference between terminals No.40(+) and No.38(-) should register about 56mV at this time.
2. Adjust  $VR_4$  (R) for 56mV between terminals No.18(+) and No.20(-). The potential difference between terminals No.17(+) and No.19(-) should register about 56mV at this time.
3. Adjust  $VR_5$  (L) for 70mV between terminals No.39(+) and No.37(-). The potential difference between terminals No.40(+) and No.38(-) should register about 70mV at this time.
4. Adjust  $VR_6$  (R) for 70mV between terminals No.18(+) and No.20(-). The potential difference between terminals No.17(+) and No.19(-) should register about 70mV at this time.

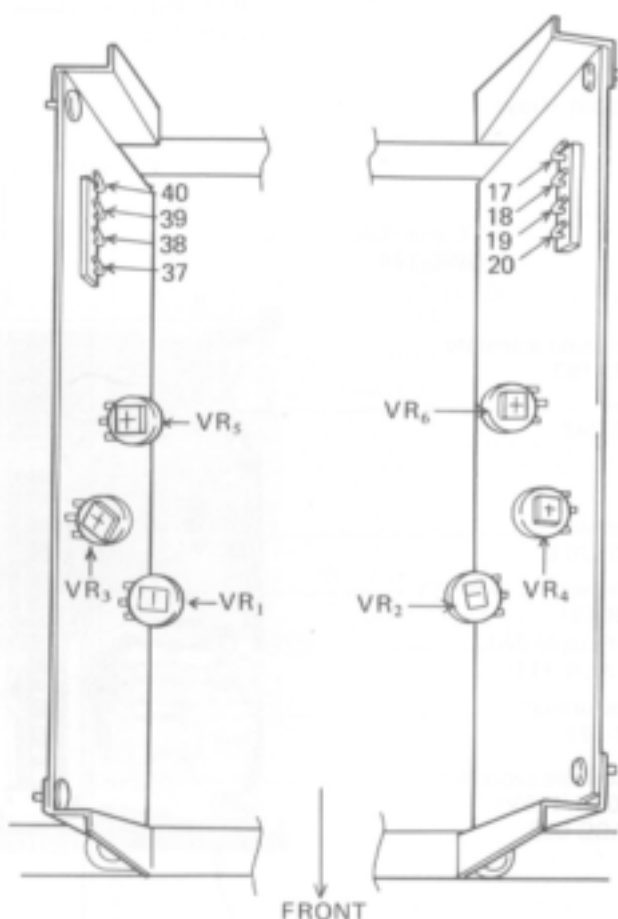


Fig. 8-1 Adjustments of Power Amplifier

### Output Power Indicator Calibration

1. Apply a 1kHz signal to the POWER AMP IN terminals (or any other input power amplifier input terminals).
2. Adjust the level of this input signal so that the voltage on the output terminals (SPEAKERS) read 8.9V (AC).
3. Adjust VR<sub>1</sub>(L) and VR<sub>2</sub>(R) of the indicator assembly so that the output power indicator read 10 watts.

### Preamplifier

Remove the shield covers.

### MC Amplifier

Adjust VR<sub>1</sub>(L) for DC 0V (to within  $\pm 0.2V$ ) between terminal No.15 and ground.

Adjust VR<sub>2</sub>(R) for DC 0V (to within  $\pm 0.2V$ ) between terminal No.16 and ground.

### EQ Amplifier

Adjust VR<sub>3</sub>(L) for DC 0V (to within  $\pm 0.2V$ ) between terminal No.17 and ground.

Adjust VR<sub>4</sub>(R) for DC 0V (to within  $\pm 0.2V$ ) between terminal No.18 and ground.

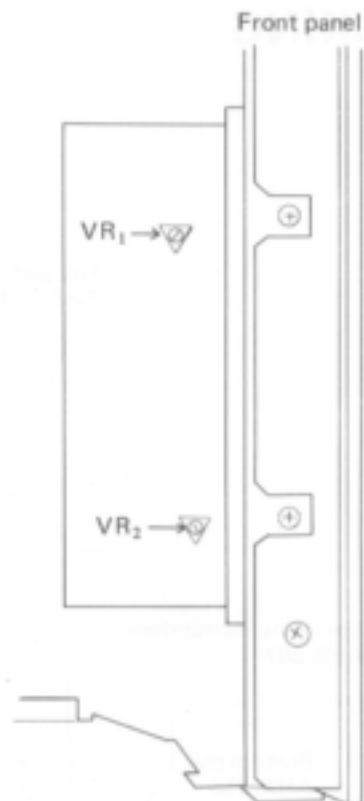


Fig. 8-2 Power Indicator Calibration

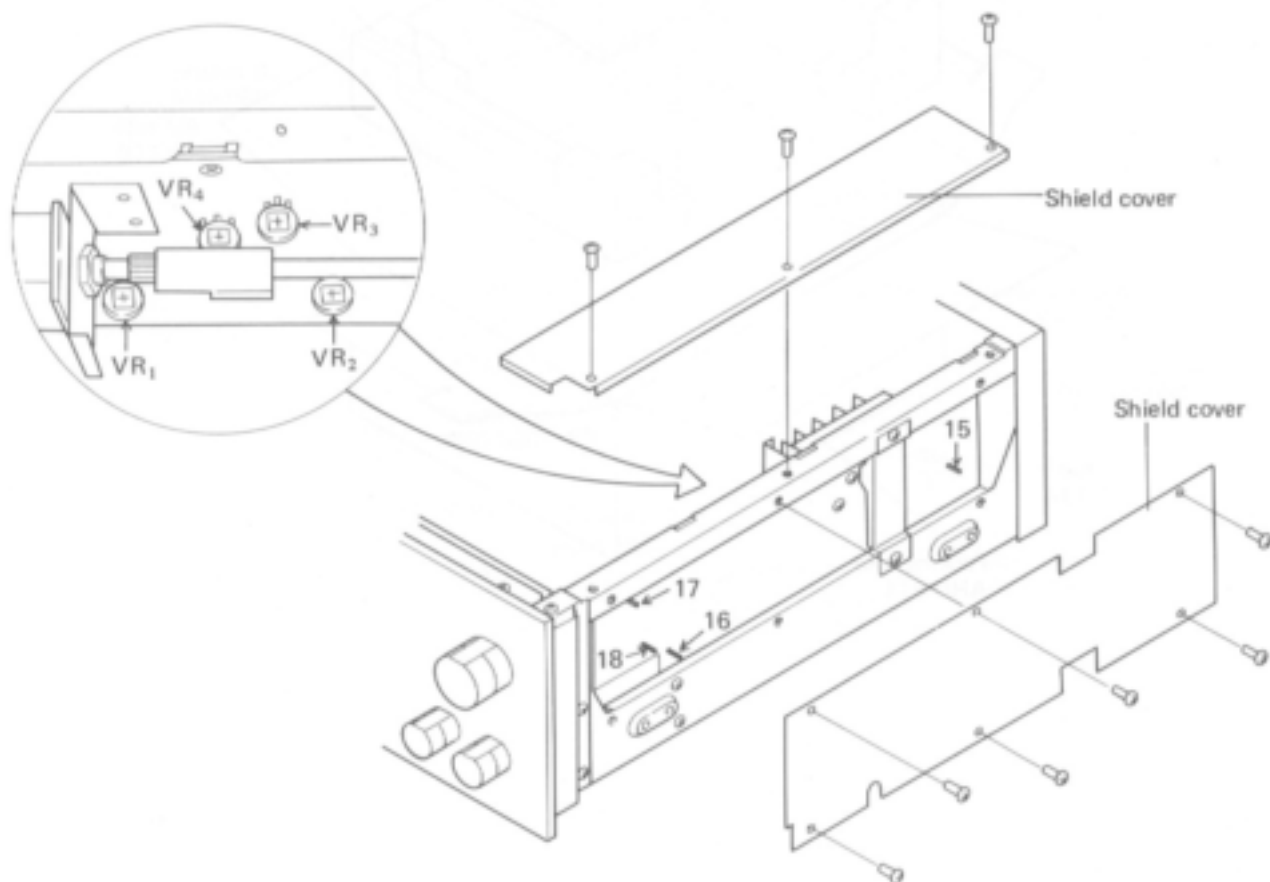
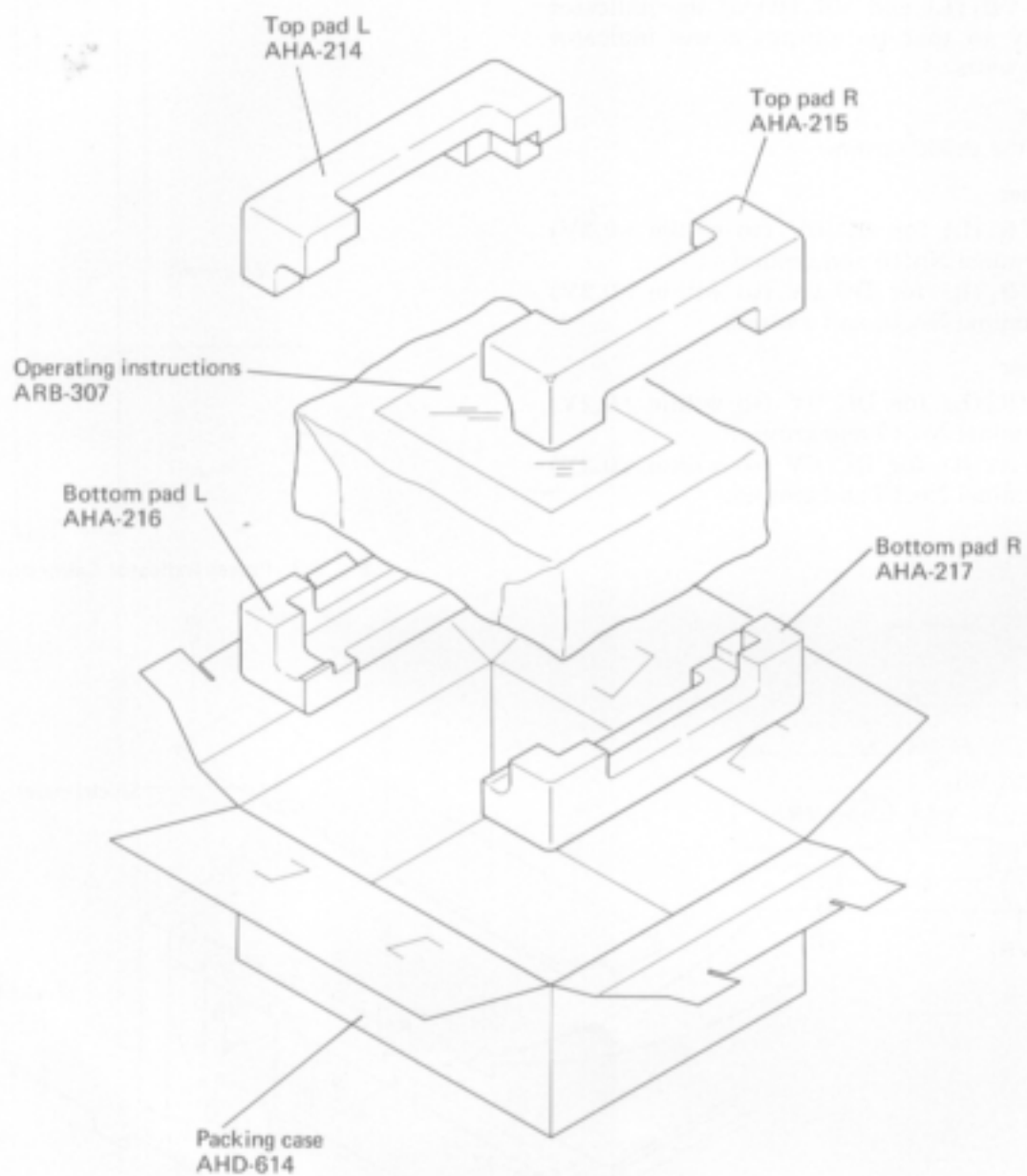




Fig. 8-3 Adjustments of Preamplifier

## 9. PACKING

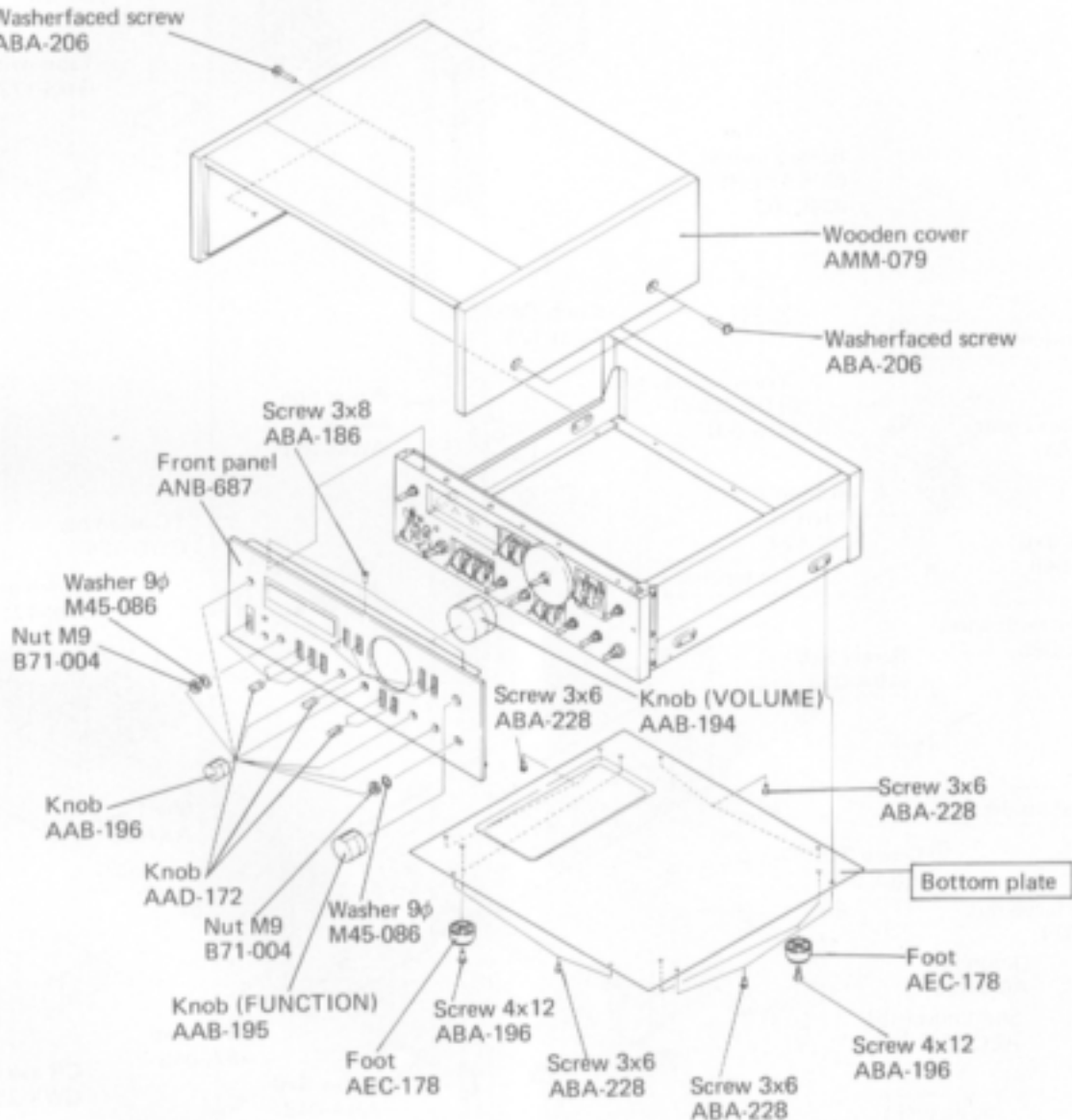


## 10. EXPLODED VIEW

## 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.

Washerfaced screw  
ABA-206



1

2


3

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.

A

A

B

B

C

C

D

D

Indicator assembly  
AWV-002Filter assembly  
GWS-176VR assembly  
GWX-256Tape switch assembly  
GWS-172Rotary switch  
(SPEAKERS)  
ASB-102Knob (METER)  
AAD-173Protection  
assembly  
AWM-163Capacitor cover  
AEC-294Ceramic capacitor  
(0.01/250V)  
ACG-001Lever switch  
(POWER)  
ASK-124TC assembly  
GWG-124Switch assembly  
GWS-171Screw 3x10  
ABA-082Screw 3x6  
ABA-048Screw 3x6  
ABA-048Lamp with wires  
AEL-095

Lamp holder

Screw 3x6  
ABA-048Shaft  
AXA-221

Joint

Washerfaced nut  
ABN-024Union nut  
ABN-046Shaft cover (S)  
AEC-305Screw 3x6  
ABA-048CR assembly  
GWX-257

Scale disk



Centering nut  
ABN-028Washerfaced nut  
ABN-024Shaft cover (S)  
AEC-305Shaft cover (L)  
AEC-304Union nut  
ABN-046Screw 3x6  
ABA-048

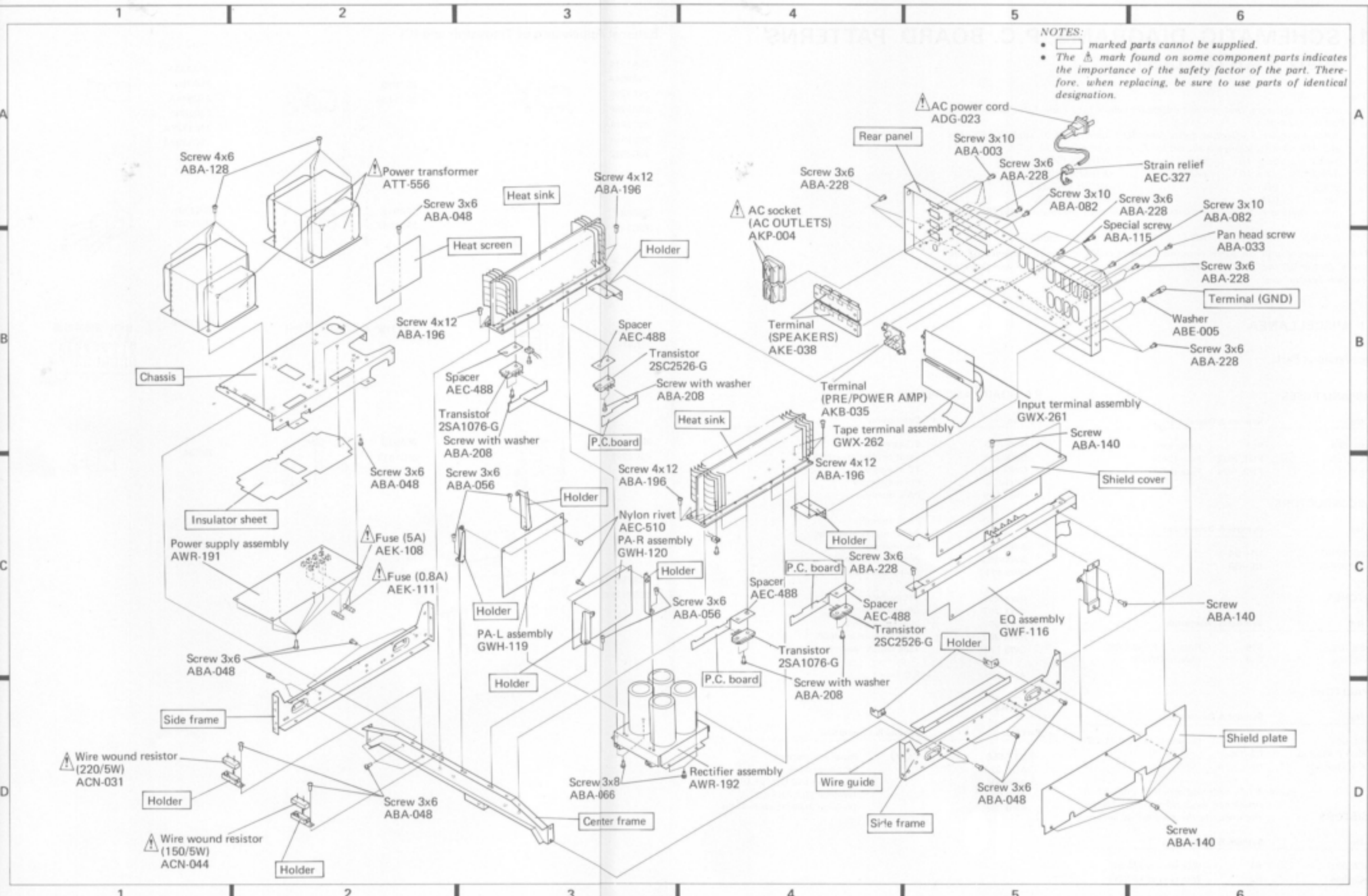
1

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.



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

## NOTES:

- When ordering resistors, first convert resistance values into code form as shown in the following examples.

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

560Ω    56 × 10<sup>1</sup>    561 ..... RD4PS 561J

47kΩ    47 × 10<sup>3</sup>    473 ..... RD4PS 473J

0.5Ω    0R5 ..... RN2H 0R5K

1Ω    010 ..... RSIP 010K

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

5.62kΩ    562 × 10<sup>1</sup>    5621 ..... RN4SR 5621F

- 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.

## 11.1 MISCELLANEA

### Miscellaneous Parts

#### LAMP AND FUSES

Part No.	Symbol & Description
$\Delta$ AEL-095	PL1 Lamp with wires
$\Delta$ AEK-108	FU1, FU2 Fuse (5A)
$\Delta$ AEK-111	FU3, FU4 Fuse (0.8A)

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SC2526-G	Q1-Q4
2SA1076-G	Q5-Q8

#### SWITCHES

Part No.	Symbol & Description
$\Delta$ ASB-102	S16 Rotary (SPEAKERS)
$\Delta$ ASK-124	S18 Lever (POWER)

#### CAPACITORS

Part No.	Symbol & Description
$\Delta$ ACG-001	C1 Ceramic 0.01/250V
CKDYF 473Z 50	C2-C6
CEA 010P 50	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
$\Delta$ ACN-031	R1 Wire wound 220/5W
$\Delta$ ACN-044	R2 Wire wound 150/5W

#### P.C. BOARD ASSEMBLIES

Part No.	Description
GW-116	EQ assembly
GWX-261	Input terminal assembly
GWG-124	TC assembly
GWS-176	Filter assembly
GWH-119	PA-L assembly
GWH-120	PA-R assembly
AWR-191	Power supply assembly
AWR-192	Rectifier assembly
AWM-163	Protection assembly
GWS-171	Switch assembly
GWX-256	VR assembly
GWX-257	CR assembly
AWV-002	Indicator assembly
GWX-262	Tape terminal assembly
GWS-172	Tape switch assembly
ANP-865	P.C. board

#### OTHERS

Part No.	Symbol & Description
$\Delta$ ATT-556	T1, T2 Power transformer
$\Delta$ ADG-023	AC power cord
$\Delta$ AKP-004	AC socket (AC OUTLETS)
AKE-038	Terminal (SPEAKERS)
AKB-035	Terminal (PRE/POWER AMP)



**External Appearance of Transistors and ICs**

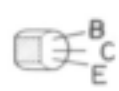
2SA1114  
 2SA904A  
 2SA726S  
 2SA726P  
 2SC1914A  
 2SC1919  
 2SC2602



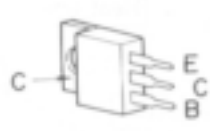
2SA850  
 2SC1735



2SA733A  
 2SA750  
 2SC945A  
 2SC1400  
 2SC1775A  
 2SC1890A



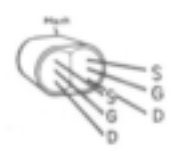
2SB682  
 2SD712



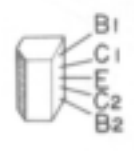
2SA912  
 2SC1885



2SK129A  
 2SK131S



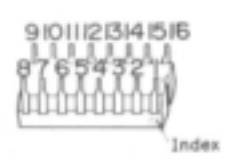
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 2SA979



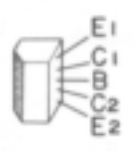
TA7318P-A



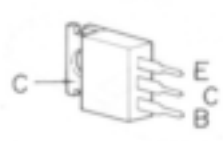
HA12010



2SA995  
 2SC2291



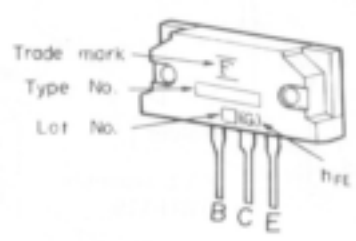
2SA913  
 2SC1913



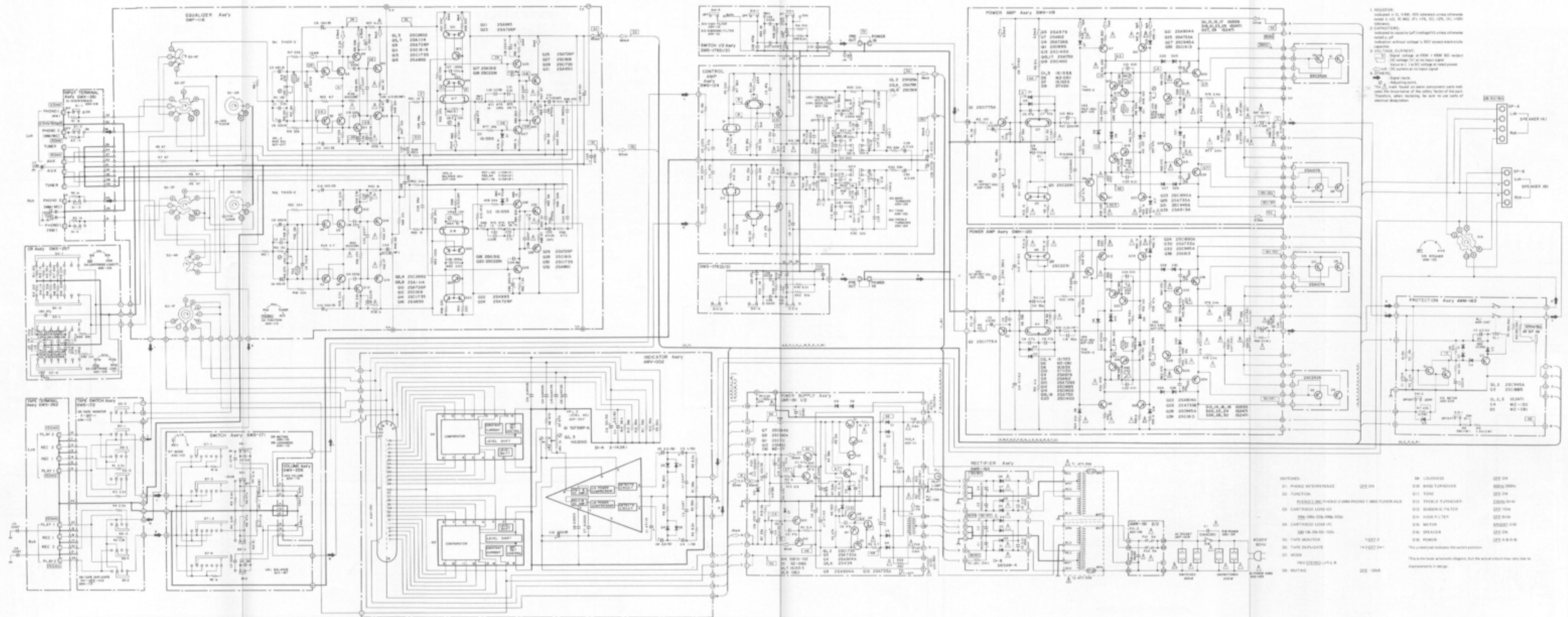
2SK34



2SA1076-G  
 2SC2526-G



11.2 SCHEMATIC DIAGRAM

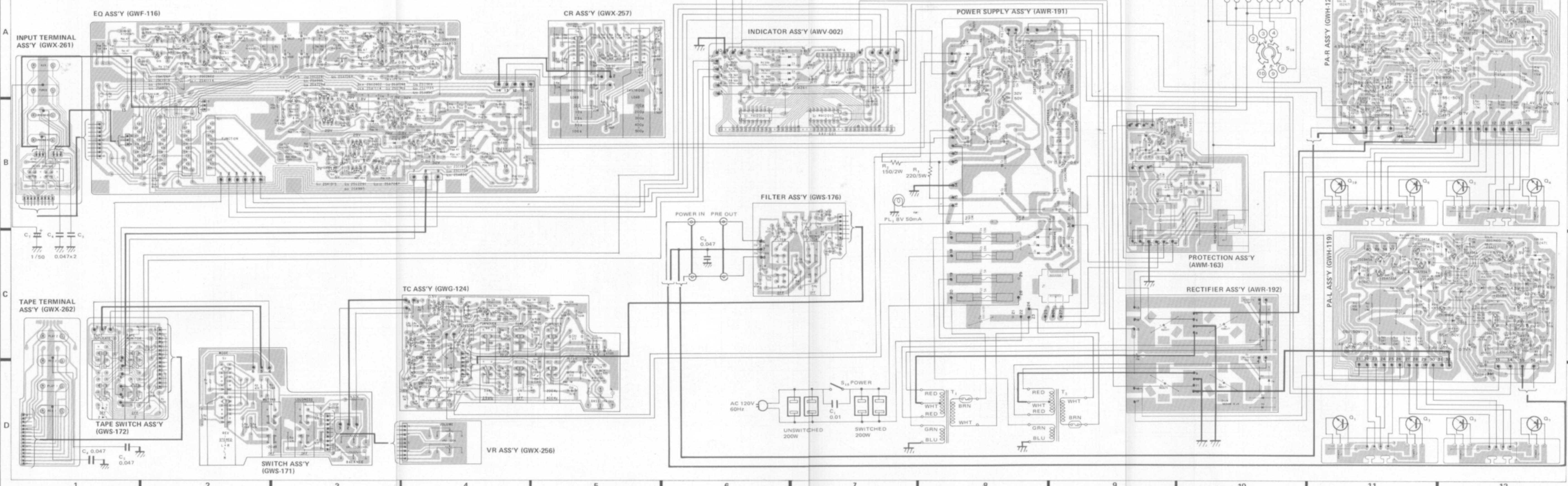


- RESISTORS**  
 UNLESS OTHERWISE SPECIFIED, ALL RESISTORS ARE 1/4 WATT, 5% TOLERANCE, CARBON FILM TYPE. RESISTOR VALUES ARE IN OHMS, KILOHMS (K), MEGOHMS (M), AND GIGAOHMS (G).  
 CAPACITORS  
 UNLESS OTHERWISE SPECIFIED, ALL CAPACITORS ARE 50V DC RATED. CAPACITOR VALUES ARE IN PICOFARADS (P), NANOFARADS (N), MICROFARADS (M), AND FARADS (F).  
 INDUCTORS  
 UNLESS OTHERWISE SPECIFIED, ALL INDUCTORS ARE 10% TOLERANCE, AIR CORE, AND 100 OHM DC RESISTANCE.  
 TRANSISTORS  
 UNLESS OTHERWISE SPECIFIED, ALL TRANSISTORS ARE 100V, 100MA, 100MHZ, SILICON, NPN TYPE.  
 DIODES  
 UNLESS OTHERWISE SPECIFIED, ALL DIODES ARE 1N4148, 1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007, 1N4008, 1N4009, 1N4010, 1N4011, 1N4012, 1N4013, 1N4014, 1N4015, 1N4016, 1N4017, 1N4018, 1N4019, 1N4020, 1N4021, 1N4022, 1N4023, 1N4024, 1N4025, 1N4026, 1N4027, 1N4028, 1N4029, 1N4030, 1N4031, 1N4032, 1N4033, 1N4034, 1N4035, 1N4036, 1N4037, 1N4038, 1N4039, 1N4040, 1N4041, 1N4042, 1N4043, 1N4044, 1N4045, 1N4046, 1N4047, 1N4048, 1N4049, 1N4050, 1N4051, 1N4052, 1N4053, 1N4054, 1N4055, 1N4056, 1N4057, 1N4058, 1N4059, 1N4060, 1N4061, 1N4062, 1N4063, 1N4064, 1N4065, 1N4066, 1N4067, 1N4068, 1N4069, 1N4070, 1N4071, 1N4072, 1N4073, 1N4074, 1N4075, 1N4076, 1N4077, 1N4078, 1N4079, 1N4080, 1N4081, 1N4082, 1N4083, 1N4084, 1N4085, 1N4086, 1N4087, 1N4088, 1N4089, 1N4090, 1N4091, 1N4092, 1N4093, 1N4094, 1N4095, 1N4096, 1N4097, 1N4098, 1N4099, 1N4100.

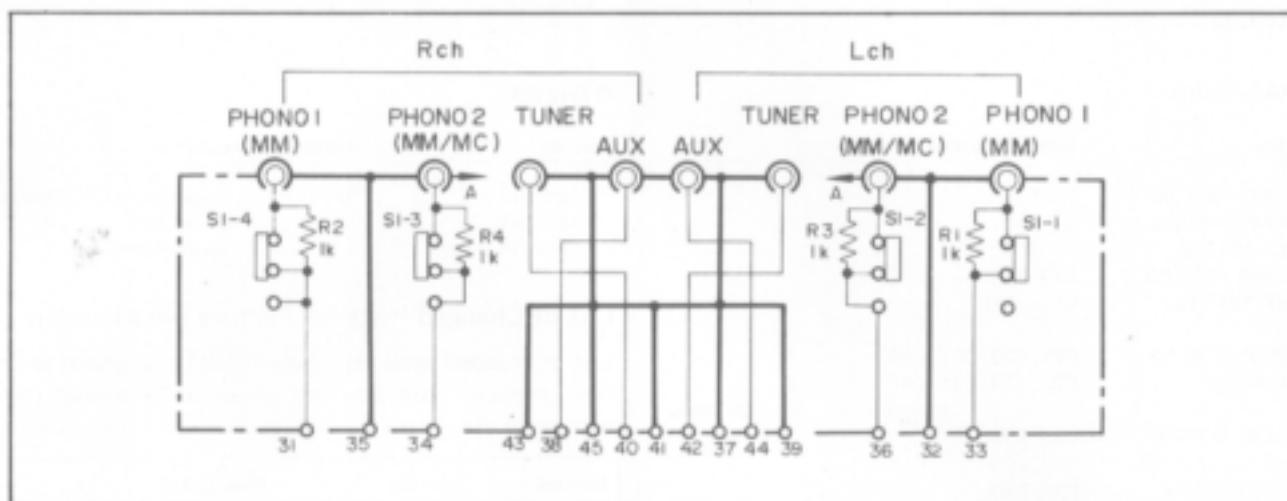
**NOTE:**  
 The indicated semiconductors are representative ones only. Other alternative semiconductors may be used and are listed in the parts list.

- SWITCHES**  
 UNLESS OTHERWISE SPECIFIED, ALL SWITCHES ARE 1/20 AMP, 125VAC, 1000 CYCLES PER SECOND, AND 10% TOLERANCE.  
 RELAYS  
 UNLESS OTHERWISE SPECIFIED, ALL RELAYS ARE 12VDC, 100MA, 1000 CYCLES PER SECOND, AND 10% TOLERANCE.  
 DIODES  
 UNLESS OTHERWISE SPECIFIED, ALL DIODES ARE 1N4148, 1N4001, 1N4002, 1N4003, 1N4004, 1N4005, 1N4006, 1N4007, 1N4008, 1N4009, 1N4010, 1N4011, 1N4012, 1N4013, 1N4014, 1N4015, 1N4016, 1N4017, 1N4018, 1N4019, 1N4020, 1N4021, 1N4022, 1N4023, 1N4024, 1N4025, 1N4026, 1N4027, 1N4028, 1N4029, 1N4030, 1N4031, 1N4032, 1N4033, 1N4034, 1N4035, 1N4036, 1N4037, 1N4038, 1N4039, 1N4040, 1N4041, 1N4042, 1N4043, 1N4044, 1N4045, 1N4046, 1N4047, 1N4048, 1N4049, 1N4050, 1N4051, 1N4052, 1N4053, 1N4054, 1N4055, 1N4056, 1N4057, 1N4058, 1N4059, 1N4060, 1N4061, 1N4062, 1N4063, 1N4064, 1N4065, 1N4066, 1N4067, 1N4068, 1N4069, 1N4070, 1N4071, 1N4072, 1N4073, 1N4074, 1N4075, 1N4076, 1N4077, 1N4078, 1N4079, 1N4080, 1N4081, 1N4082, 1N4083, 1N4084, 1N4085, 1N4086, 1N4087, 1N4088, 1N4089, 1N4090, 1N4091, 1N4092, 1N4093, 1N4094, 1N4095, 1N4096, 1N4097, 1N4098, 1N4099, 1N4100.

11.3 P.C. BOARDS CONNECTION DIAGRAM



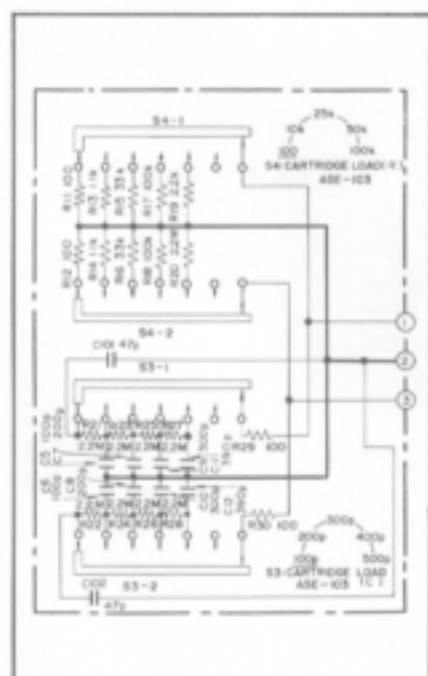
## 11.4 INPUT TERMINAL ASSEMBLY (GWX-261)



## Parts List

Part No.	Symbol & Description
ASH-018	S1 Slide switch (PHONO INTERFERENCE)
RD&PM 102J AKB-054	R1-R4 Terminal (INPUT)

## 11.5 CR ASSEMBLY (GWX-257)



## Parts List

## SWITCHES

Part No.	Symbol & Description
ASE-103	S3, S4 Slide rotary

*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&PM 000 J	R11-R30

## CAPACITORS

Part No.	Symbol & Description
CQSH 101K 50	C5, C6
CQSH 201K 50	C7, C8
CQSH 301K 50	C9, C10
CQSH 391K 50	C11, C12
CCDSL 470K 50	C101, C102

## 11.6 EQ ASSEMBLY (GWF-116)

### Parts List

#### CAPACITORS

Part No.	Symbol & Description
QOMA 103K 50	C1, C2
CEANL 101M 6	C3-C8
CEA 101P 35	C9-C12
CCDSL 221K 50	C13-C16
CEA 101P 16	C17-C20
QOMA 473K 50	C21, C22, C37, C38
ACH-318	C23, C24, C41, C42 Electrolytic 4.7/25 (NP)
CCDSL 560K 50	C25, C26
CKDYB 122K 50	C27, C28
QOPA 353G 50	C29, C30
QOPA 124G 50	C31, C32
CCDSL 180K 50	C33, C34
CEA 221P 10	C35, C36
QOMA 472K 50	C39, C40
QOMA 392K 50	C43, C44
CEA 470P 50	C45, C46
QOMA 153J 50	C101, C102
QOMA 182J 50	C103, 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
ACP-077	VR1, VR2 Semifixed 1k-B
ACP-019	VR3, VR4 Semifixed 100-B
RD%PM 000 J	R5-R28, R31-R36, R45-R56, R61
RD%PM 000 J	R62, R77-R86, R91-R96
RD%PSF 000 J	R29, R30
RD%PMF 000 J	R37-R44, R87-R90
RN <sup>1</sup> / <sub>2</sub> SQ 000 F	R57-R60, R67-R76
RD%PS 000 J	R65, R66
RN%SR 0000 F	R63, R64

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SC2602	Q1-Q4
2SA1114	Q5-Q8
2SA726P (2SA750)	Q9, Q10, Q23-Q26
2SC1919 (2SC1400)	Q11, Q12, Q27, Q28
2SC1735	Q13, Q14, Q29, Q30
2SA850	Q15, Q16, Q31, Q32
2SK131S	Q17, Q18
2SC2291	Q19, Q20
2SA995	Q21, Q22
1S1555 (1S2473)	D1, D2
TH103-2	Th1, Th2

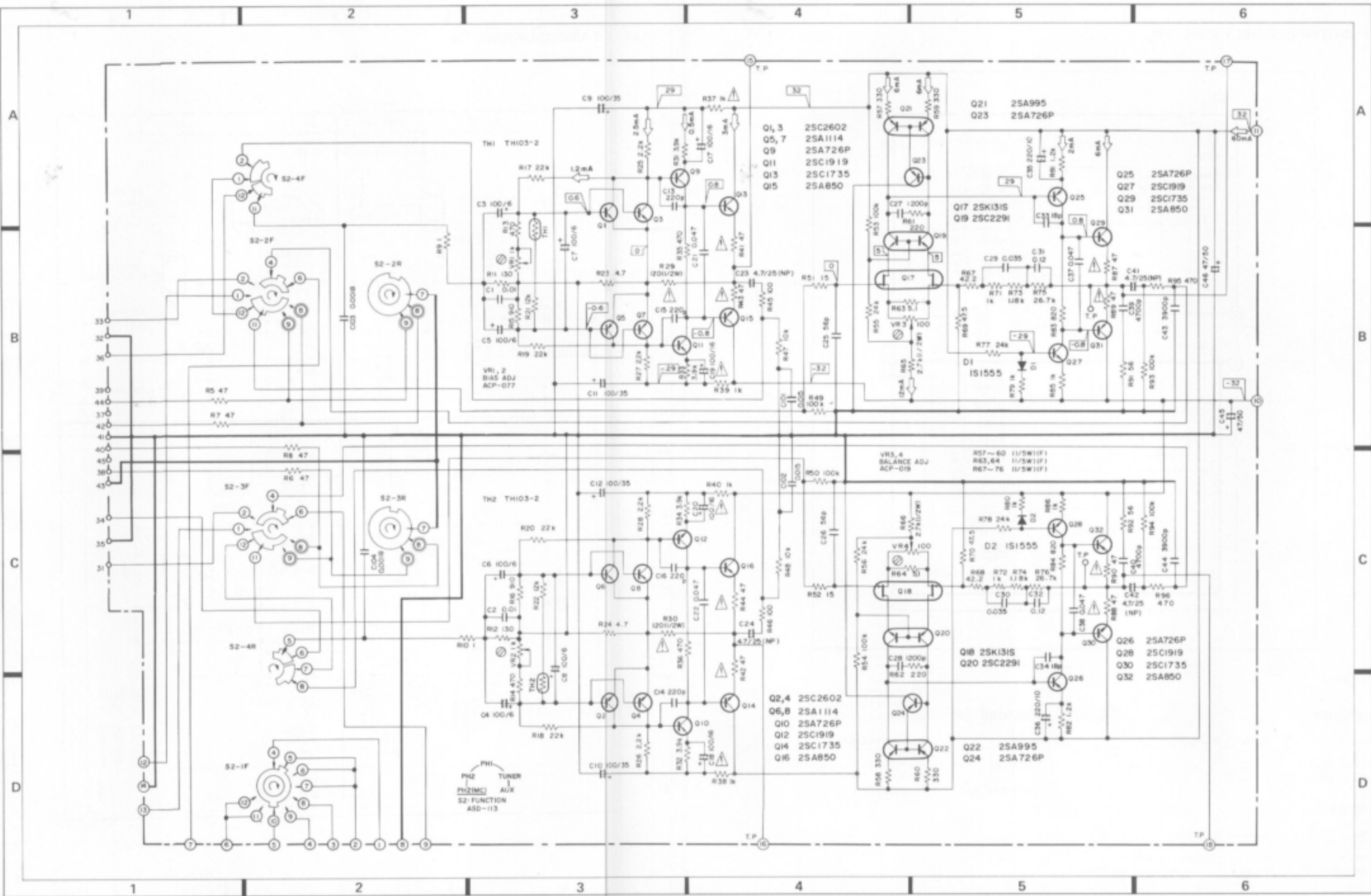
#### OTHERS

Part No.	Symbol & Description
ASD-113	S2 Rotary switch (FUNCTION)
ABA-048	Screw 3x6
ABN-024	Washerfaced nut

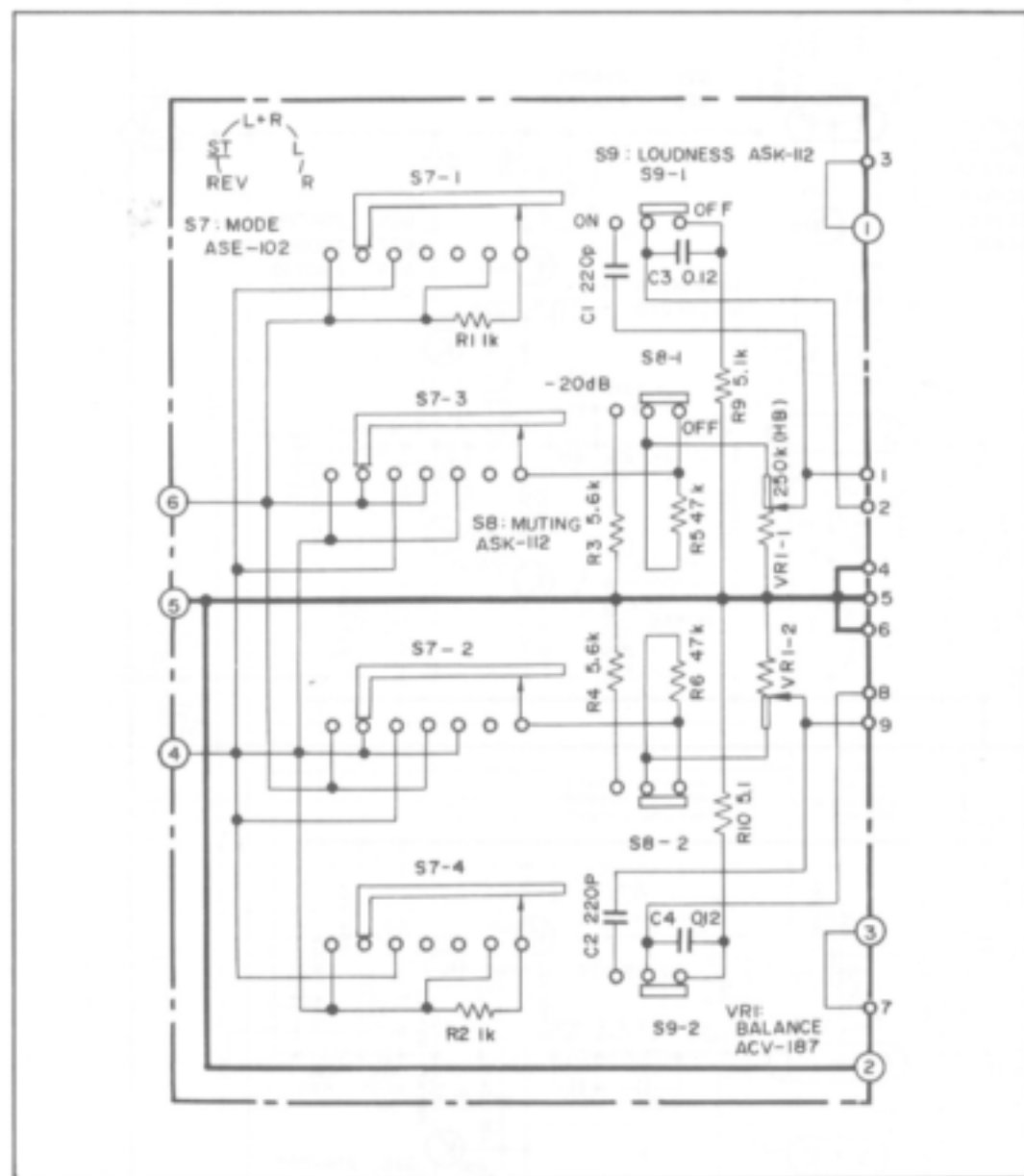
#### List of Changed Parts for Factory Modification

List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description



## 11.7 SWITCH ASSEMBLY (GWS-171)



### Parts List

#### CAPACITORS

Part No.	Symbol & Description
CCDSL 221J 50	C1, C2
CQMA 124J 50	C3, C4

#### SWITCHES

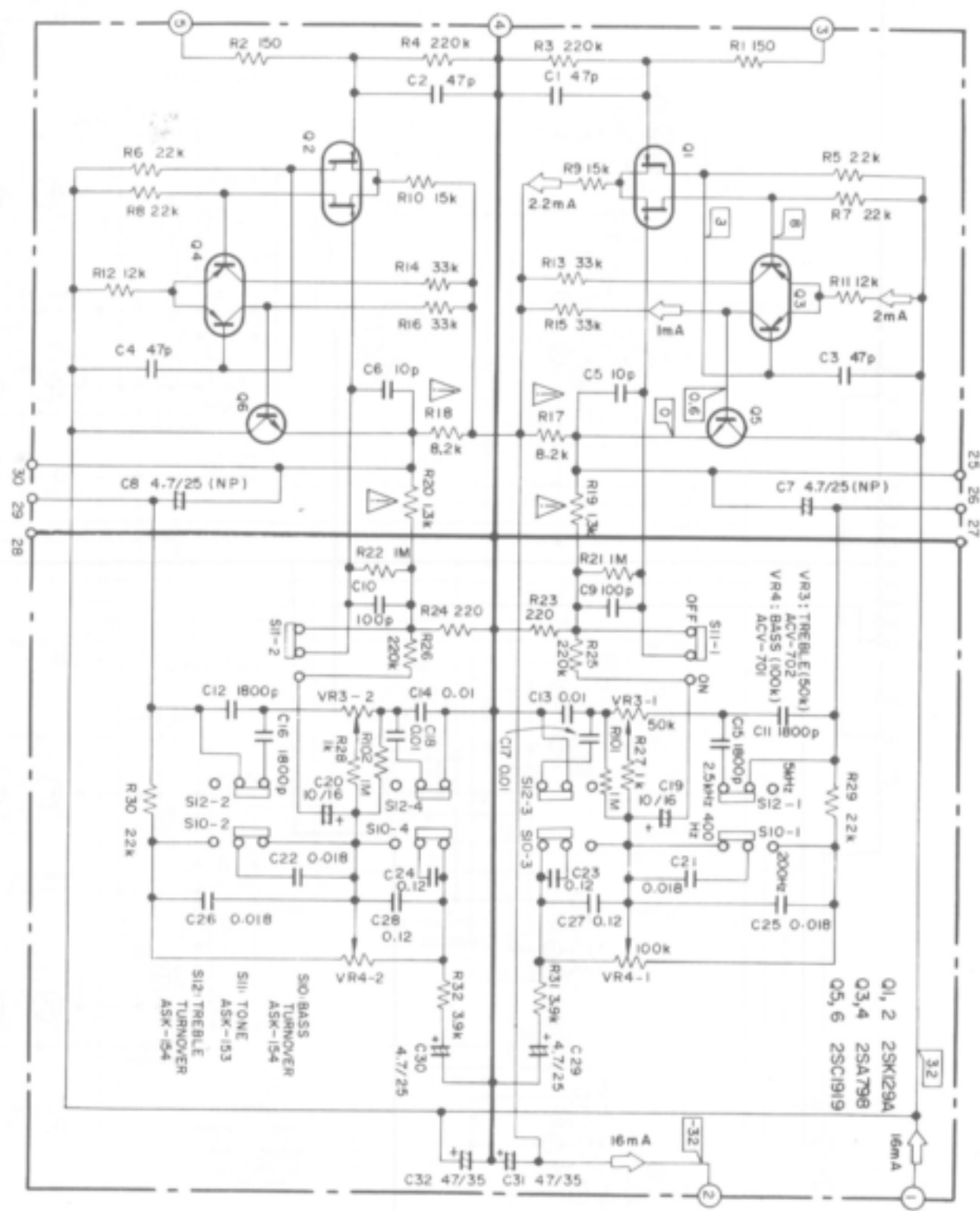
Part No.	Symbol & Description
ASE-102	S7 Slide-rotary (MODE)
ASK-112	S8, S9 Lever (MUTING, LOUDNESS)

#### RESISTORS

Part No.	Symbol & Description
ACV-187	VR1 Variable (BALANCE)
RD&PM □□□ J	R1-R6, R9, R10

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

# 11.8 TC ASSEMBLY (GWG-124)





## Parts List of TC Assembly (GWG-124)

## OTHER

Part No.	Description
ABA-026	Pan head screw

## CAPACITORS

Part No.	Symbol & Description
CCDSL 470K 50	C1-C4
CCDSL 100K 50	C5, C6
ACH-318	C7, C8 Electrolytic 4.7/25V (NP)
CCDSL 101K 50	C9, C10
CKDYB 182K 50	C11, C12, C15, C16
QOMA 103J 50	C13, C14, C17, C18
CEANL 100M 16	C19, C20
QOMA 183J 50	C21, C22, C25, C26
QOMA 124J 50	C23, C24, C27, C28
CEANL 4R7M 25	C29, C30
CEA 470P 35	C31, C32

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

## RESISTORS

Part No.	Symbol & Description
ACV-702	VR3 Variable (TREBLE)
ACV-701	VR4 Variable (BASS)
RD%PM □□□ J	R1-R16, R21-R32, R101, R102
△RD%PMF □□□ J	R17-R20

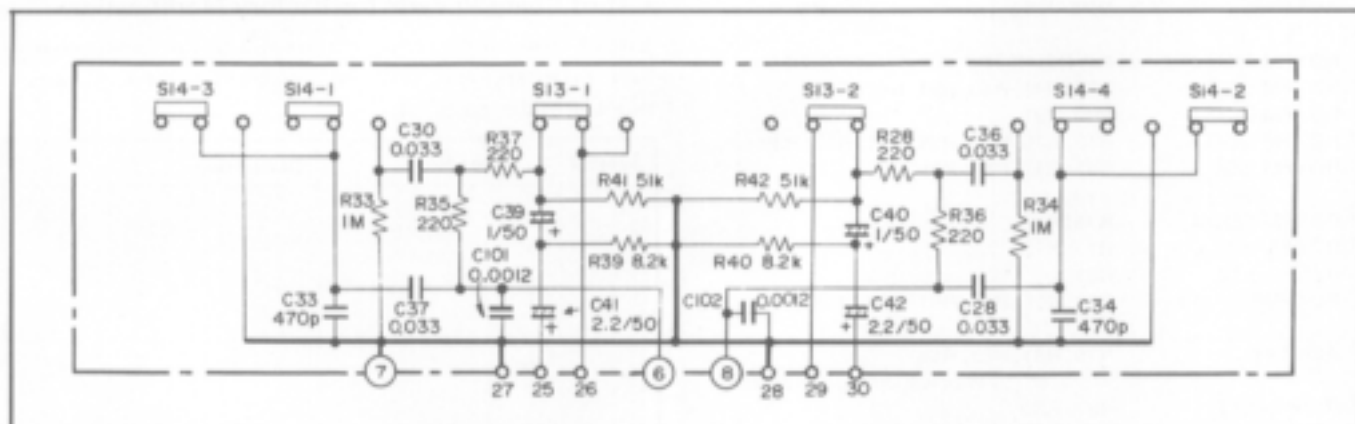
## SEMICONDUCTORS

Part No.	Symbol & Description
2SK129A	Q1, Q2
2SA798	Q3, Q4
2SC1919 (2SC1400)	Q5, Q6

## SWITCHES

Part No.	Symbol & Description
ASK-154	S10, S12 Lever (TURNOVER)
ASK-153	S11 Lever (TONE)

## 11.9 FILTER ASSEMBLY (GWS-176)



## Parts List

## CAPACITORS

Part No.	Symbol & Description
CCDSL 471K 50	C33, C34
QOMA 333J 50	C35-C38
CEANL 010M 50	C39, C40
CEANL 2R2M 50	C41, C42
QOMA 122J 50	C101, C102

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%PM □□□ J	C33-C42

## SWITCHES

Part No.	Symbol & Description
ASK-112	S13, S14 Lever (FILTER)

## 11.10 PA-L ASSEMBLY (GWH-119)

### Parts List

#### CAPACITORS

Part No.	Symbol & Description
CEANL 2R2P 50	C1
CCDSL 101K 50	C3
CCDSL 470K 50	C5, C7
CCDSL 390K 50	C9
CEA 470P 63	C11, C13
CCDSL 820K 50	C15
CQMA 102K 400	C17
CQMA 472K 50	C19
CQMA 103K 50	C21, C23
CCDSL 470K 500	C25, C27
CQMA 473J 100	C29

*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-035	VR1 Semifixed 330k-B
ACP-019	VR3 Semifixed 100-B
ACP-076	VR5 Semifixed 68k-B
RD%PM 000 J	R1, R3, R5, R7, R9, R11, R19, R25
RD%PM 000 J	R27, R45, R49, R51, R57, R67
RD%PM 000 J	R69, R91
RD%PM 000 J	R13, R15, R23, R29, R31, R37, R39
RD%PM 000 J	R41, R47, R53, R55, R59
RD%PM 000 J	R75, R77
RD%PS 000 J	R17, R73
RS1P 000 J	R21
RD%PMF 000 J	R33, R35, R43, R61, R63, R65, R71
ACN-041	R79, R81, R83, R85 Wire wound 0.47/5W
RS1P 000 J	R87, R89

#### SEMICONDUCTORS

Part No.	Symbol & Description
2SC1775A-E	Q1
2SA979-F	Q3
2SC2291	Q5
2SA912	Q7
2SA726S	Q9
2SC1885	Q11
2SC1400	Q13, Q19
2SA750	Q15, Q17
2SA904A	Q21
2SC1890A	Q23

Part No.	Symbol & Description
2SA733A	Q25, Q29
2SC945A	Q27, Q31
2SC1913	Q33
2SA913	Q35
1S1555 (1S2473)	D1, D3, D7, D11, D13, D15, D17
MZ-061 (WZ-061)	D5
STV2H-O	D9
1S2471	D19, D21, D23, D25, D27, D29
TH103-2	Th1

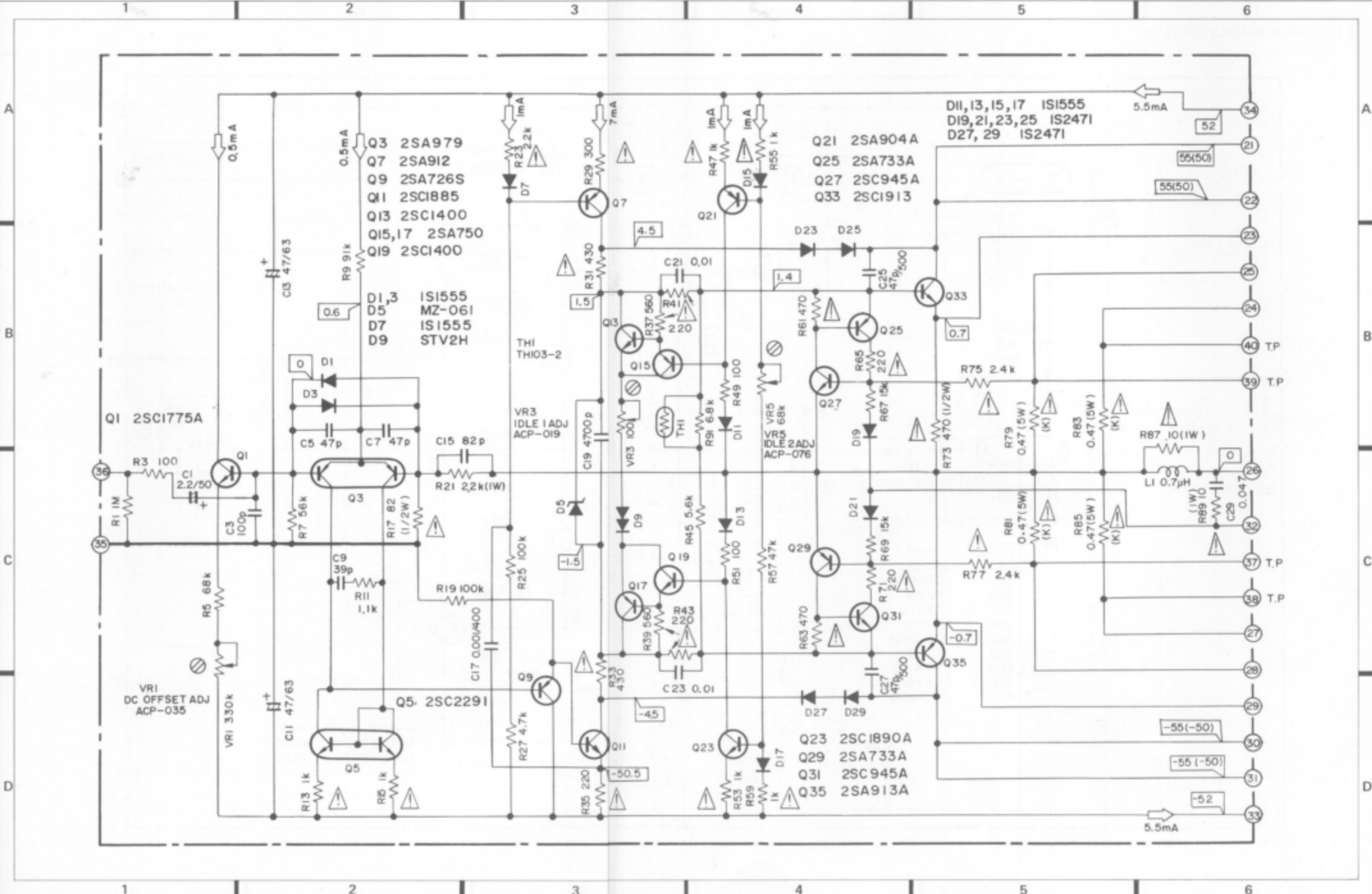
#### OTHER

Part No.	Description
ABA-048	Screw 3x6
ABA-026	Screw 3x6 (Pan head)

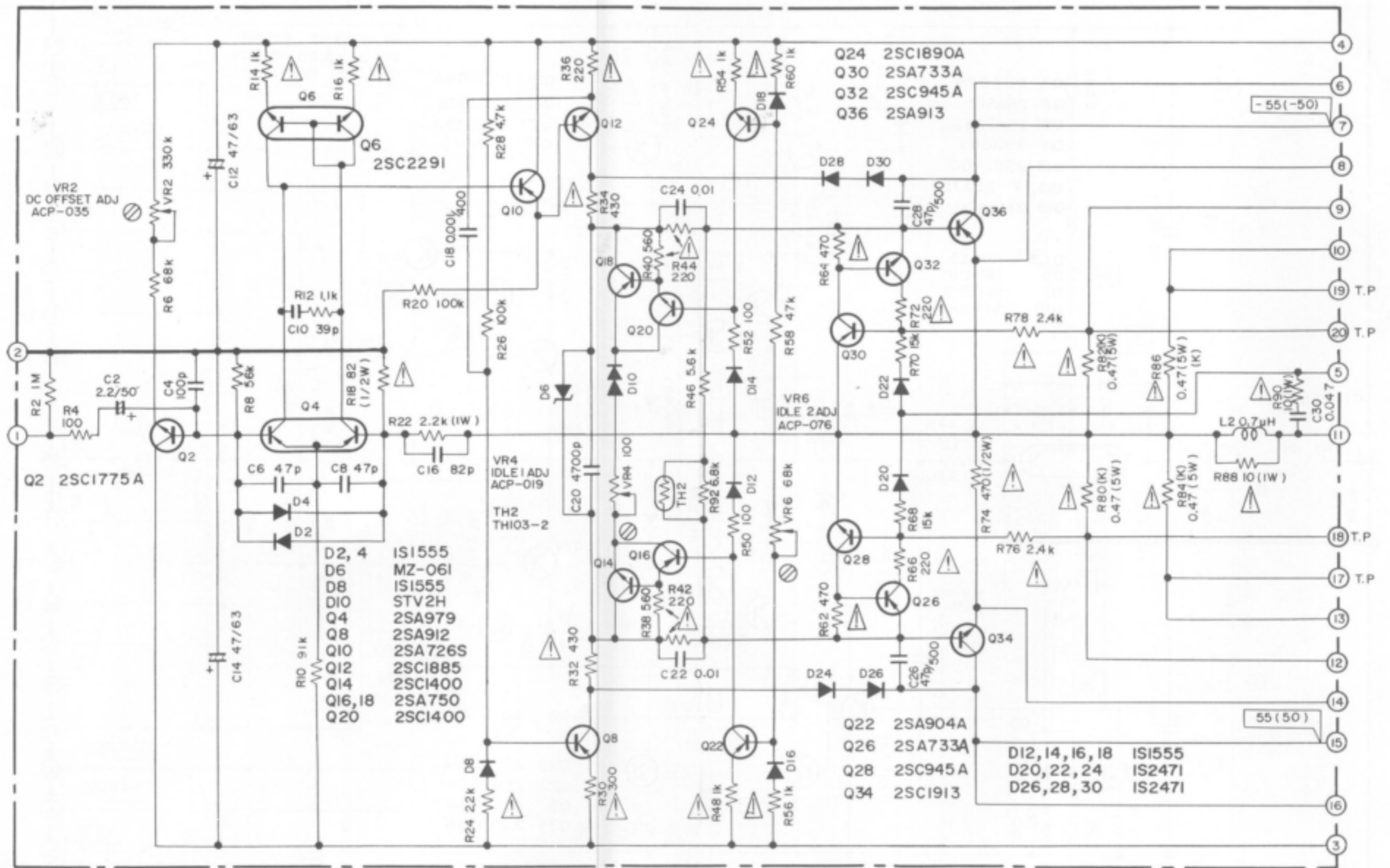
#### List of Changed Parts for Factory Modification

List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description



11.11 PA-R ASSEMBLY (GWH-120)



## Parts List of PA-R Assembly (GWH-120)

### CAPACITORS

Part No.	Symbol & Description
CEANL 2R2P 50	C2
CCDSL 101K 50	C4
CCDSL 470K 50	C6, C8
CCDSL 390K 50	C10
CEA 470P 63	C12, C14
CCDSL 820K 50	C16
CQMA 102K 400	C18
CQMA 472K 50	C20
CQMA 103K 50	C22, C24
CCDSL 470K 500	C26, C28
CQMA 473J 100	C30

*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-035	VR2 Semifixed 330k-B
ACP-019	VR4 Semifixed 100-B
ACP-076	VR6 Semifixed 68k-B
RD%PM 000 J	R2, R4, R6, R8, R10, R12, R20, R26
RD%PM 000 J	R28, R46, R50, R52, R58, R68
RD%PM 000 J	R70, R92
RD%PM 000 J	R14, R16, R24, R30, R32, R38, R40
RD%PM 000 J	R42, R48, R54, R56, R60
RD%PM 000 J	R76, R78
RD%PS 000 J	R18, R74
RS1P 000 J	R22
RD%PMF 000 J	R34, R36, R44, R62, R64, R66, R72
ACN-041	R80, R82, R84, R86 Wire wound 0.47/5W
RS1P 000 J	R88, R90

### SEMICONDUCTORS

Part No.	Symbol & Description
25C1775A-E	Q2
25A979-F	Q4
25C2291	Q6
25A912	Q8
25A726S	Q10
25C1885	Q12
25C1400	Q14, Q20
25A750	Q16, Q18
25A904A	Q22
25C1890A	Q24
25A733A	Q26, Q30
25C945A	Q28, Q32
25C1913	Q34
25A913	Q36

Part No.	Symbol & Description
1S1555 (1S2473)	D2, D4, D8, D12, D14, D16, D18
MZ-061 (WZ-061)	D6
STV2H-O	D10
1S2471	D20, D22, D24, D26, D28, D30
TH103-2	Th2

### OTHER

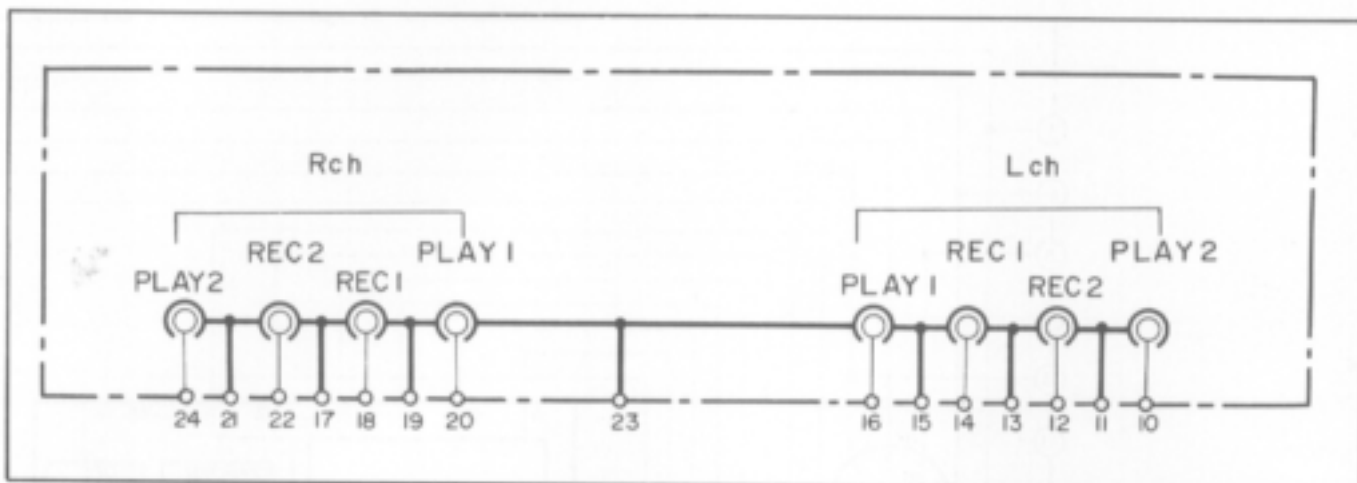
Part No.	Symbol & Description
ABA-048	Screw 3x6
ABA-026	Screw 3x6 (Pan head)

### List of Changed Parts for Factory Modification

List of changed parts information will be furnished whenever necessary and you are requested to amend parts number in this parts list.

Symbol	Part No.	Description

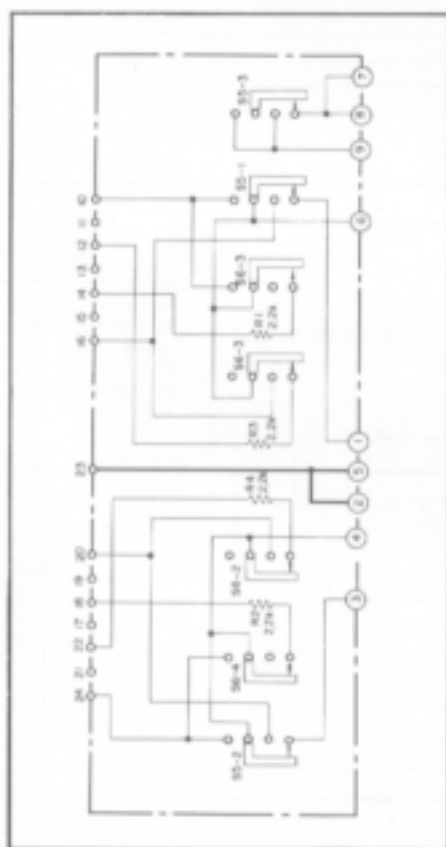
## 11.12 TAPE TERMINAL ASSEMBLY (GWX-262)



## Parts List

Part No.	Description
AKB-054	Terminal (TAPE 1, 2)

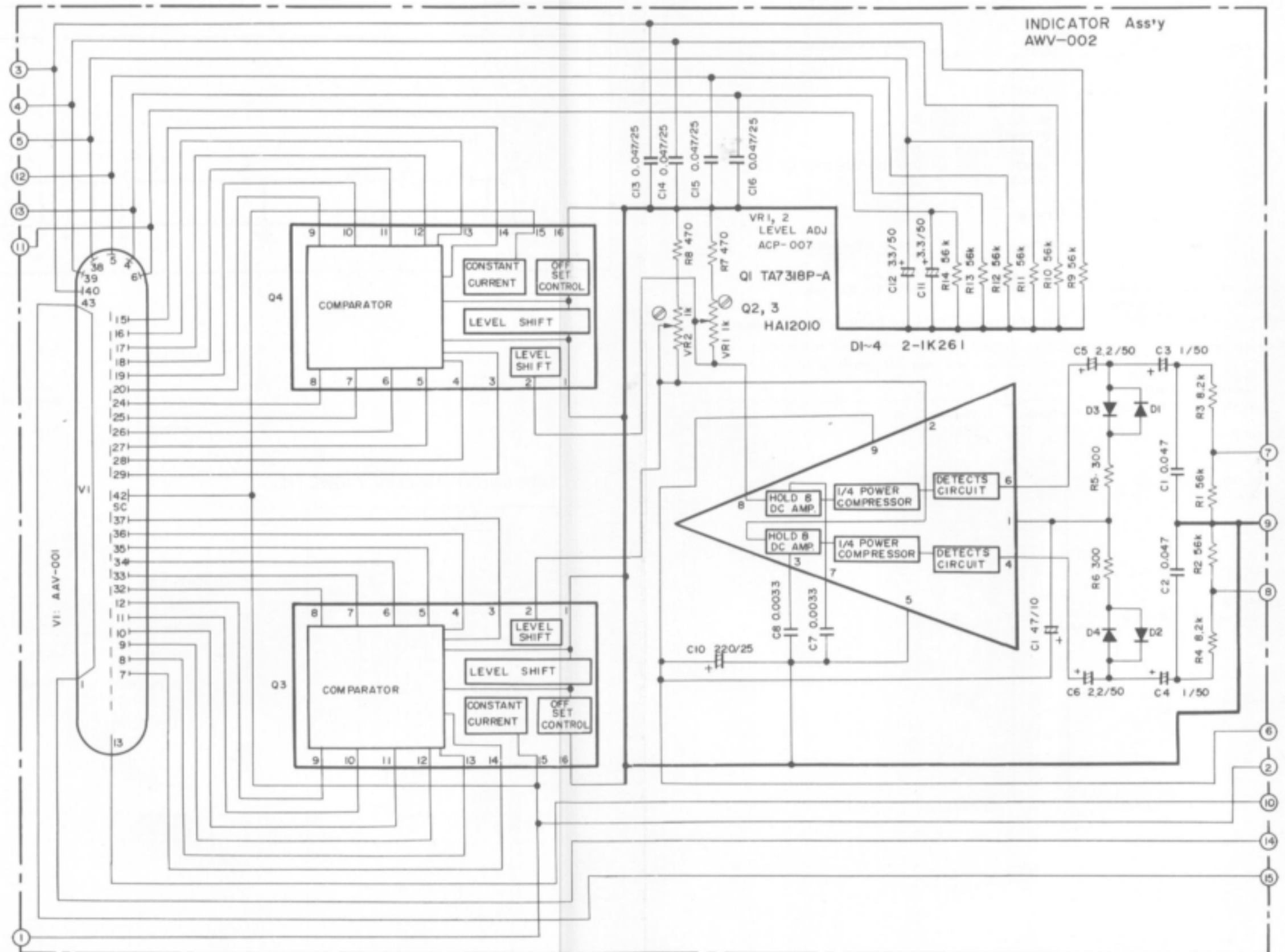
## 11.13 TAPE SWITCH ASSEMBLY (GWS-172)



## Parts List

Part No.	Symbol & Description
ASK-113	S5, S6 Lever switch (TAPE)
RDNPM 000 J	R1-R4

11.14 INDICATOR ASSEMBLY (AWV-002)



## Parts List of Indicator Assembly (AWV-002)

## CAPACITORS

Part No.	Symbol & Description
QOMA 473K 50	C1, C2
CEA 010P 50	C3, C4
CEA 2R2P 50	C5, C6
QOMA 332K 50	C7, C8
CEA 470P 10	C9
CEA 221P 25	C10
CEA 3R3P 50	C11, C12
CKD8C 473Z 25	C13-C16

*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-007	VR1, VR2 Semifixed 1k-B
RD%PM □□□J	R1-R14

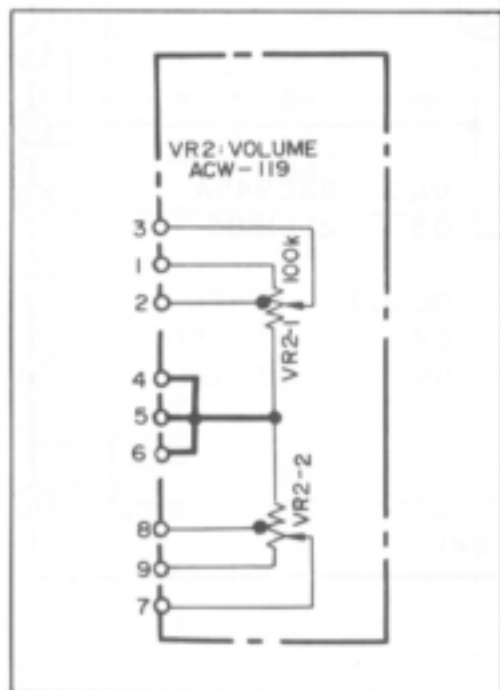
## SEMICONDUCTORS

Part No.	Symbol & Description
TA7318P-A	Q1
HA12010	Q2, Q3
2-1K261	D1-D4

## OTHERS

Part No.	Symbol & Description
AAV-001	V1 Fluorescent indicator tube
ABA-048	Screw 3x6

## 11.15 VR ASSEMBLY (GWX-256)

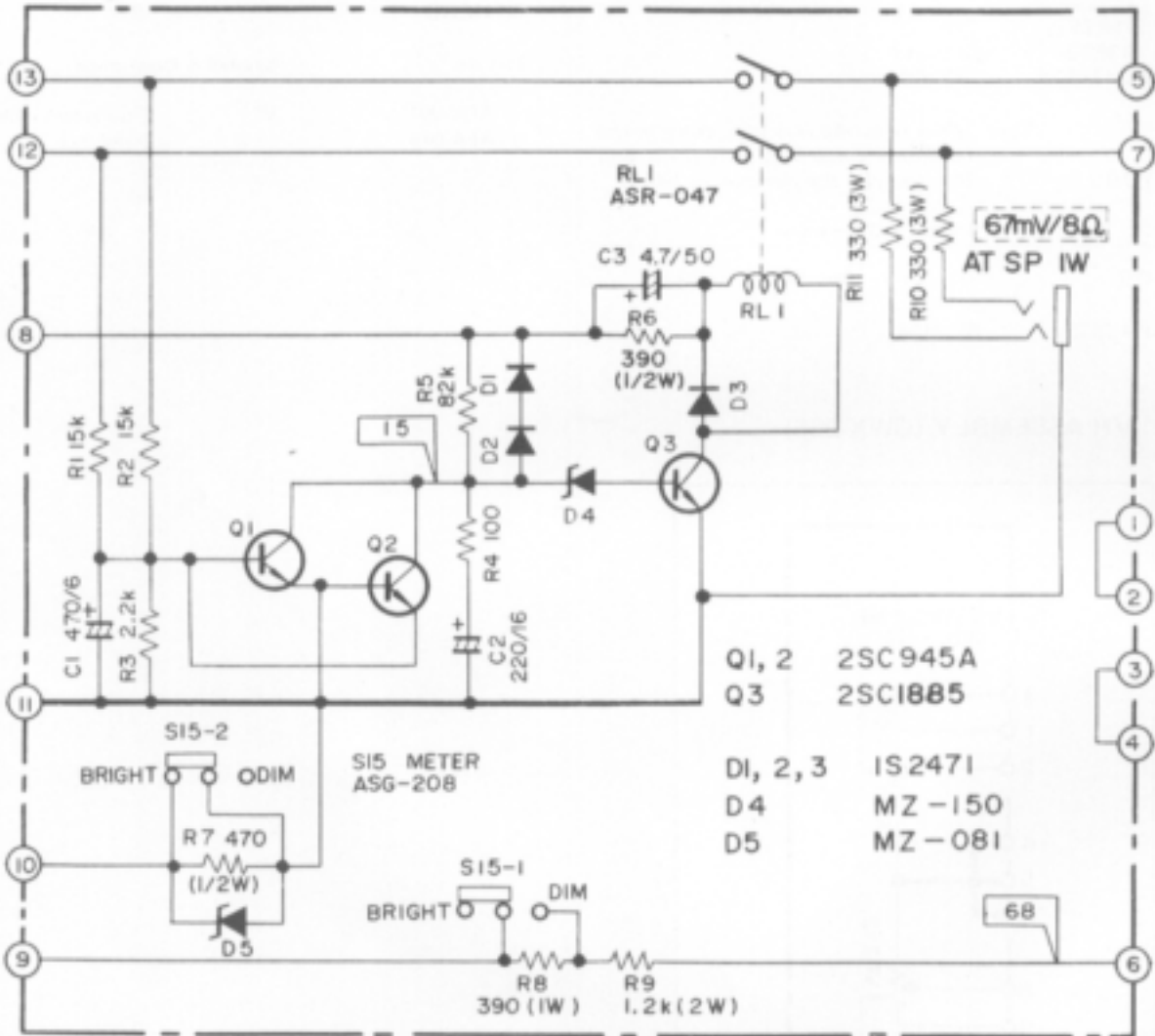


## Parts List

Part No.	Symbol & Description
ACW-119	VR2 Variable resistor (VOLUME)



11.16 PROTECTION ASSEMBLY (AWM-163)



Q1, 2 2SC945A  
Q3 2SC1885

D1, 2, 3 IS2471  
D4 MZ-150  
D5 MZ-081

S15 METER  
ASG-208

68

A

B

C

D

A

B

C

D

## Parts List of Protection Assembly (AWM-163)

## CAPACITORS

Part No.	Symbol & Description
CEA 471P 6	C1
CEA 221P 16	C2
CEA 4R7P 50	C3

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%PM 000 J	R1-R5
RD%PS 000 J	R6, R7
RS1P 000 J	R8
RS2P 000 J	R9
RS3P 000 J	R10, R11

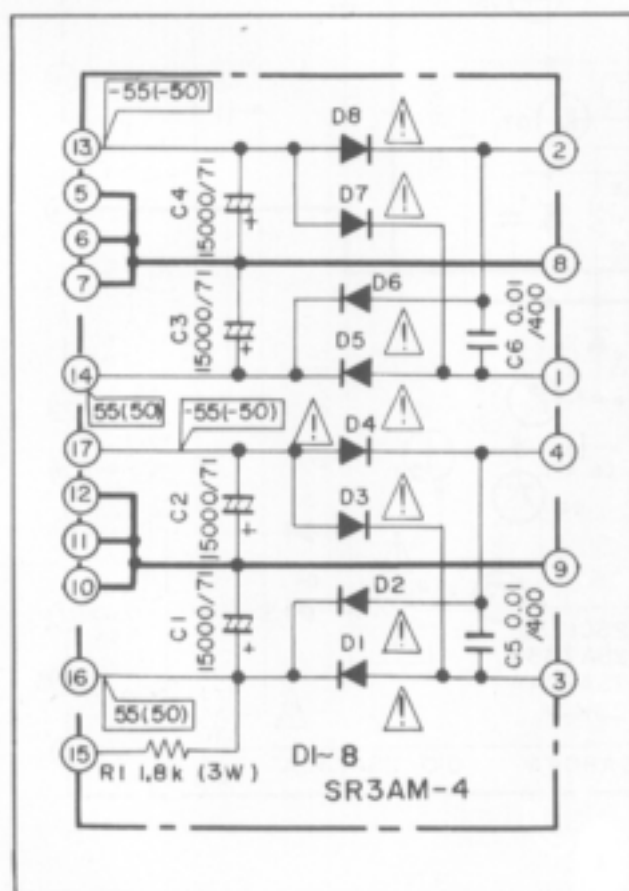
## SEMICONDUCTORS

Part No.	Symbol & Description
2SC945A	Q1, Q2
2SC1885	Q3
1S2471	D1-D3
MZ-150 (WZ-150)	D4
MZ-081 (WZ-081)	D5

## OTHERS

Part No.	Symbol & Description
ASR-047	RL1 Relay
ASG-208	S15 Push switch (METER)
AKN-023	Phone jack (PHONES)
ABA-048	Screw 3x6

## 11.17 RECTIFIER ASSEMBLY (AWR-192)



## Parts List

## CAPACITORS

Part No.	Symbol & Description
ACH-210	C1-C4 Electrolytic 15,000/71V
COMA 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
RS3P 000 J	R1

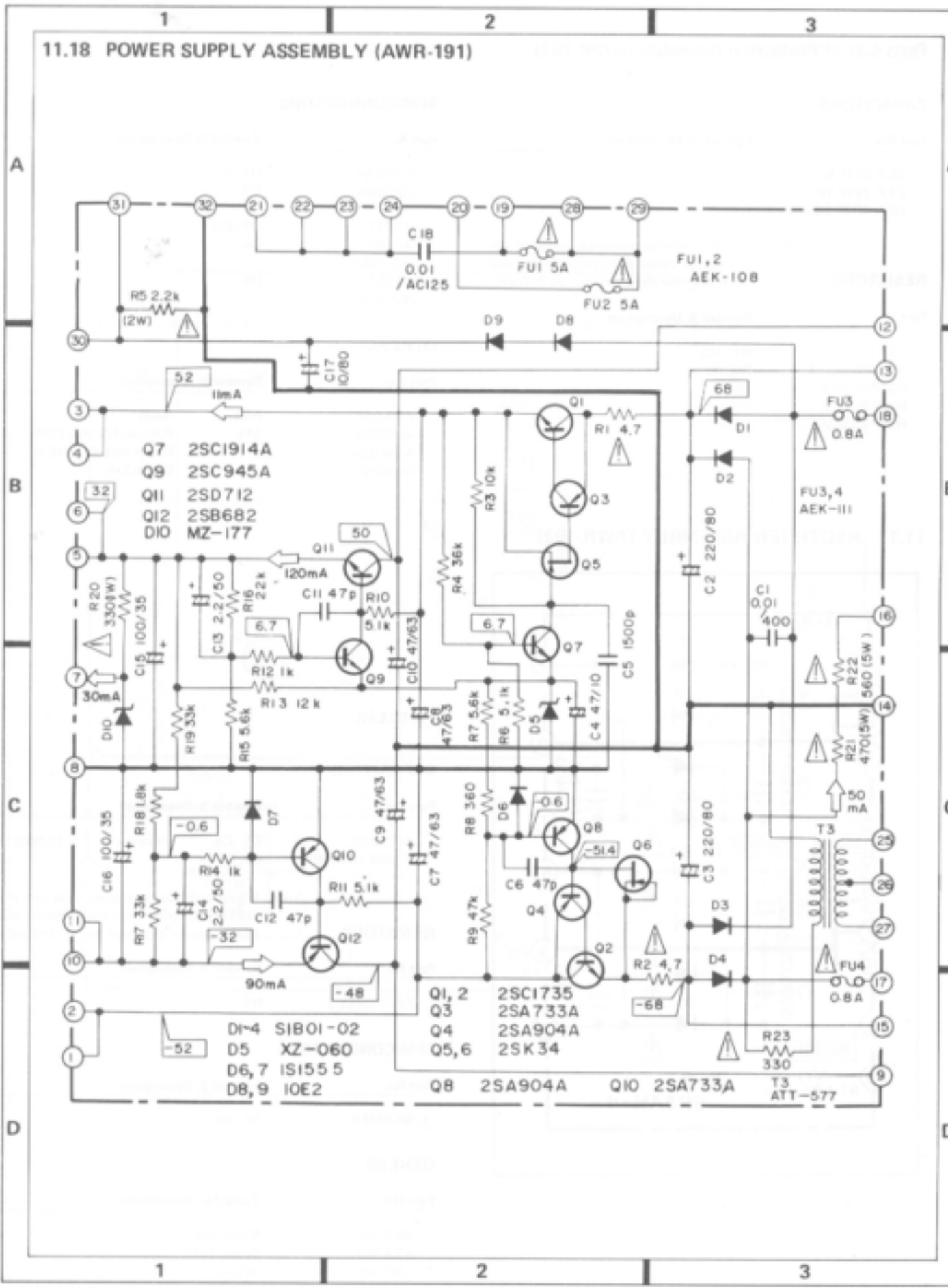
## SEMICONDUCTORS

Part No.	Symbol & Description
SR3AM-4	D1-D8

## OTHERS

Part No.	Symbol & Description
ABA-048	Screw 3x6
ABA-051	Screw 3x12
ABE-020	Washer

# 11.18 POWER SUPPLY ASSEMBLY (AWR-191)



## Parts List of Power Supply Assembly (AWR-191)

## CAPACITORS

Part No.	Symbol & Description
CQMA 103K 400	C1
CEB 221P 80	C2, C3
CEA 470P 10	C4
CKDYB 152K 50	C5
CCDSL 470K 50	C6, C11, C12
CEA 470P 63	C7-C10
CEA 2R2P 50	C13, C14
CEA 101P 35	C15, C16
CEA 100P 80	C17
△ ACG-003	C18          Ceramic          0.01/125V

*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%PMF □□□ J	R1, R2, R23
RD%PM □□□ J	R3, R4, R6-R19,
△ RS2P □□□ J	R5
△ RS1P □□□ J	R20
△ RT5B □□□ K	R21, R22

## SEMICONDUCTORS

Part No.	Symbol & Description
2SC1735	Q1, Q2
2SA733A	Q3, Q10
2SA904A (2SA893A)	Q4, Q8
2SK34	Q5, Q6
2SC1914A (2SC1890A)	Q7
2SC945A	Q9
2SD712 (2SD313P)	Q11
2SB682 (2SB507P)	Q12
S1B01-02 XZ-060	D1-D4 D5
1S1555 (1S2473)	D6, D7
10E2 MZ-177 (WZ-177)	D8, D9 D10

## OTHERS

Part No.	Symbol & Description
ATT-577	T3          Transformer
ABA-026	Pan head screw
AEC-279	Capacitor cover

ADDITIONAL

 PIONEER

# Service Manual

STEREO AMPLIFIER

# SA-9800 S S/G

The basic performance of the S and S/G types are the same as the KU type. The KU and S/G types have wooden covers, while S type employs metal. This additional service manual is applicable to the S and S/G types, please refer to the KU type service manual with the exception of this supplements.

## SPECIFICATIONS

The specifications for S and S/G types are the same as the KU type except for following sections;

### Micellaneous

Power Requirements . AC110/120/220/240V (switchable),  
50/60Hz

Dimensions (S type) . . . . . 420(W)x150(H)x425(D)mm  
16-17/32(W)x5-29/32(H)x16-3/4(D)in

### Weight


S type . . . . . Without Package; 18kg (39 lb 11 oz)  
With Package; 20kg (44 lb 1 oz)

S/G type . . . . . Without Package; 19.1kg (42 lb 2 oz)

### Furnished Parts

Fuse (5A) . . . . . 1  
Fuse (10A) . . . . . 1

## CONTRAST OF MISCELLANEOUS PARTS

- 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.

### P.C. BOARD ASSEMBLIES

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
	PA-L assembly	GWH-119	GWH-125	GWH-125
	PA-R assembly	GWH-120	GWH-126	GWH-126
	Power supply assembly	AWR-191	AWR-194	AWR-194

## TRANSFORMERS

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
△T1	Power transformer	ATT-556	ATT-578	ATT-559
△T2	Power transformer	ATT-556	ATT-579	ATT-560

## FUSES

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
△FU1	Fuse (5A)	AEK-108	AEK-108	(AEK-108)
△FU1	Fuse (10A)	.....	(AEK-114)	AEK-114
△FU2	Fuse (5A)	AEK-108	.....	.....

## CAPACITOR

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
△C7	Ceramic 0.01/250V	.....	ACG-001	ACG-001
C7	Electrolytic 1/50V	CEA 010P 50	.....	.....
C8	Electrolytic 1/50V	.....	CEA 010P 50	CEA 010P 50

## SWITCH

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
△S18	Lever switch (POWER)	ASK-124	ASK-128	ASK-128

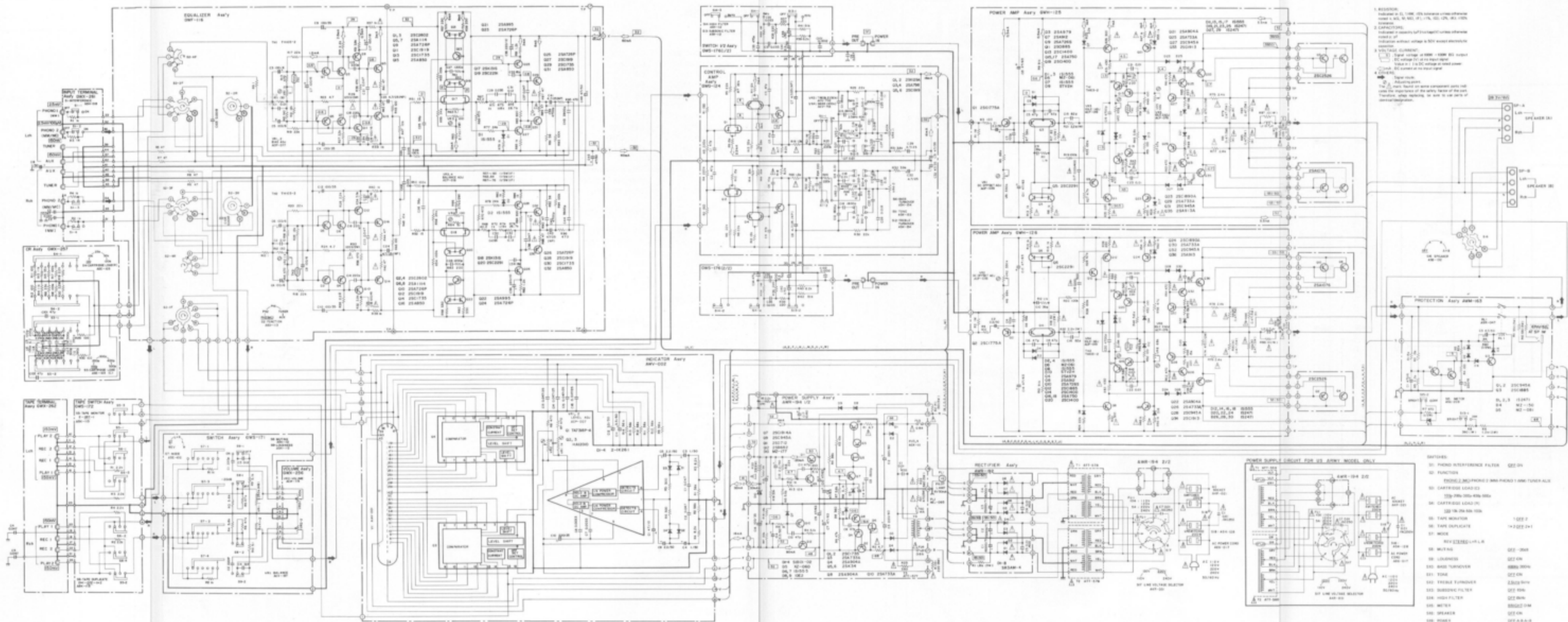
## OTHERS

Symbol	Part Name	Part No.		
		KU type	S type	S/G type
△	AC power cord	ADG-023	ADG-017	ADG-017
△	AC socket (AC OUTLETS)	AKP-004	AKP-021	AKP-021
△	Plug in selector	.....	AKR-031	AKR-031
	Top cover (wooden)	AMM-079	.....	AMM-079
	Top cover (metal)	.....	ANE-222	.....
	Screw (for top cover)	ABA-206	ABA-079	ABA-206

## PACKING AND FURNISHED PARTS

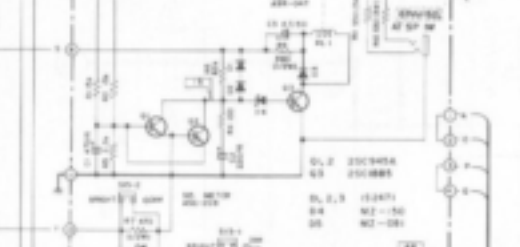
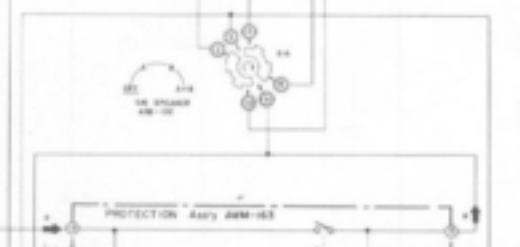
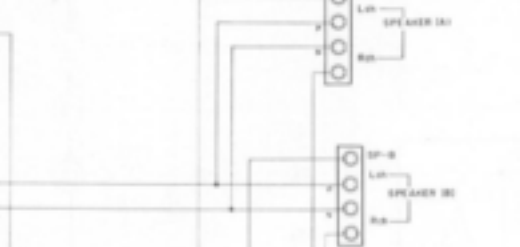
Symbol	Part Name	Part No.		
		KU type	S type	S/G type
	Packing case	AHD-614	AHD-617	AHD-616
	Top pad L	AHA-214	.....	AHA-214
	Top pad R	AHA-215	.....	AHA-215
	Bottom pad L	AHA-216	.....	AHA-216
	Bottom pad R	AHA-217	.....	AHA-217
	Side pad	.....	AHA-218	.....
	Cardboard spacer	.....	.....	AHB-099
	Operating instructions	ARB-307	ARB-312	ARB-312
△	Fuse (5A)	.....	AEK-108	AEK-108
△	Fuse (10A)	.....	AEK-114	AEK-114

SCHEMATIC DIAGRAM FOR S, S/G TYPES



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

- RESISTORS:  
Indicated in Ω, K, M, unless otherwise indicated.  
RESISTOR VALUES:  
Indicated in Ω, K, M, unless otherwise indicated.  
CAPACITORS:  
Indicated in pF, μF, unless otherwise indicated.  
TUBES:  
Indicated in 6X4, 6X5, 6X6, 6X7, 6X8, 6X9, 6X10, 6X11, 6X12, 6X13, 6X14, 6X15, 6X16, 6X17, 6X18, 6X19, 6X20, 6X21, 6X22, 6X23, 6X24, 6X25, 6X26, 6X27, 6X28, 6X29, 6X30, 6X31, 6X32, 6X33, 6X34, 6X35, 6X36, 6X37, 6X38, 6X39, 6X40, 6X41, 6X42, 6X43, 6X44, 6X45, 6X46, 6X47, 6X48, 6X49, 6X50, 6X51, 6X52, 6X53, 6X54, 6X55, 6X56, 6X57, 6X58, 6X59, 6X60, 6X61, 6X62, 6X63, 6X64, 6X65, 6X66, 6X67, 6X68, 6X69, 6X70, 6X71, 6X72, 6X73, 6X74, 6X75, 6X76, 6X77, 6X78, 6X79, 6X80, 6X81, 6X82, 6X83, 6X84, 6X85, 6X86, 6X87, 6X88, 6X89, 6X90, 6X91, 6X92, 6X93, 6X94, 6X95, 6X96, 6X97, 6X98, 6X99, 6X100.



COMPONENTS:

10	PHONO INTERFERENCE FILTER	0.025M
11	FUSE	1A
12	PHONO INTERFERENCE FILTER	0.025M
13	CAPACITOR LOAD (1)	1000μF
14	CAPACITOR LOAD (2)	1000μF
15	TAP WINDING	100V
16	TAP WINDING	100V
17	INDICATOR LAMP	100V
18	INDICATOR LAMP	100V
19	INDICATOR LAMP	100V
20	INDICATOR LAMP	100V
21	INDICATOR LAMP	100V
22	INDICATOR LAMP	100V
23	INDICATOR LAMP	100V
24	INDICATOR LAMP	100V
25	INDICATOR LAMP	100V
26	INDICATOR LAMP	100V
27	INDICATOR LAMP	100V
28	INDICATOR LAMP	100V
29	INDICATOR LAMP	100V
30	INDICATOR LAMP	100V

This is a schematic diagram. It is not a wiring diagram. It is not a parts list. It is a schematic diagram.

## POWER SUPPLY ASSEMBLY (AWR-194)

A

A

B

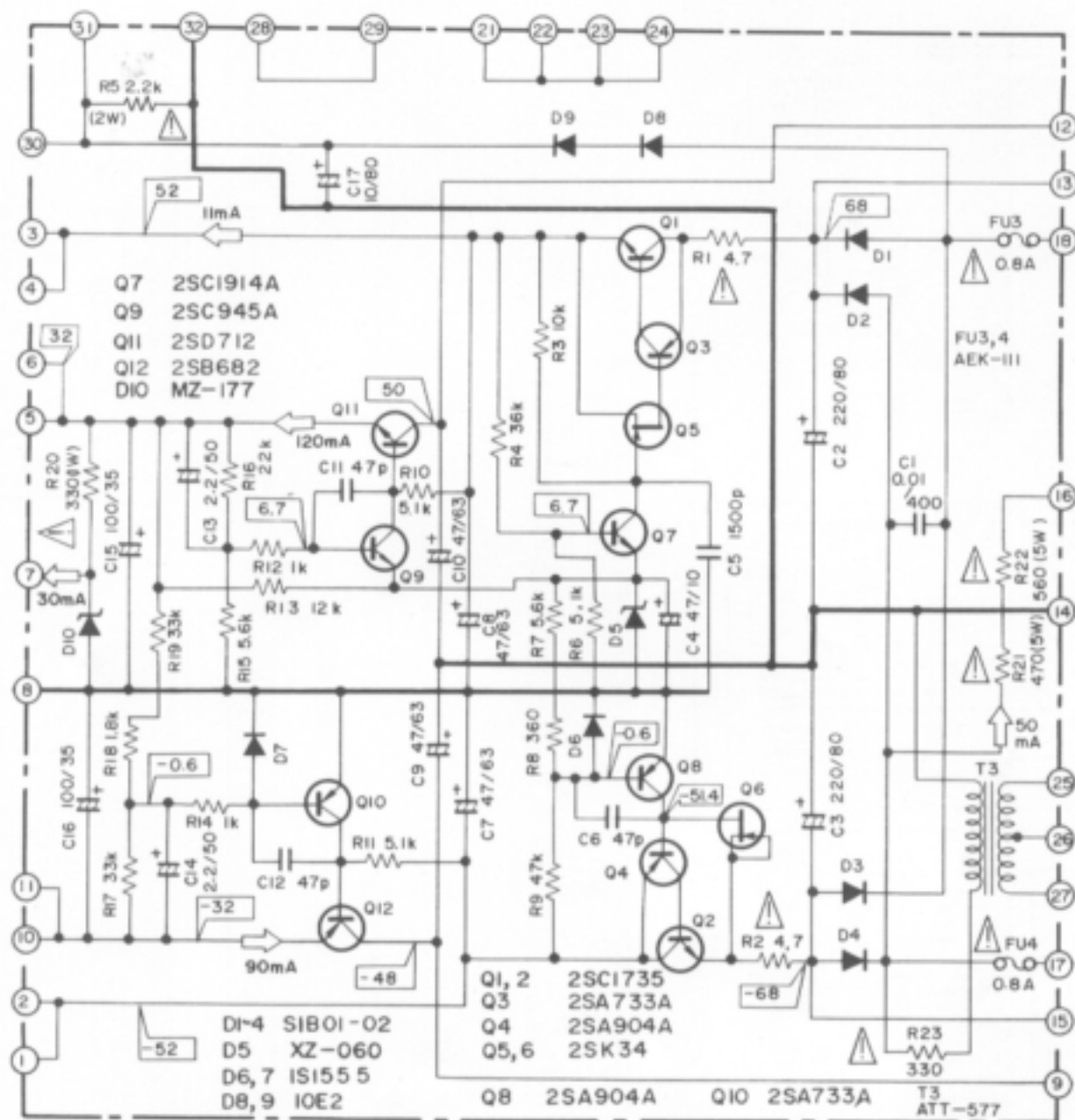
B

C

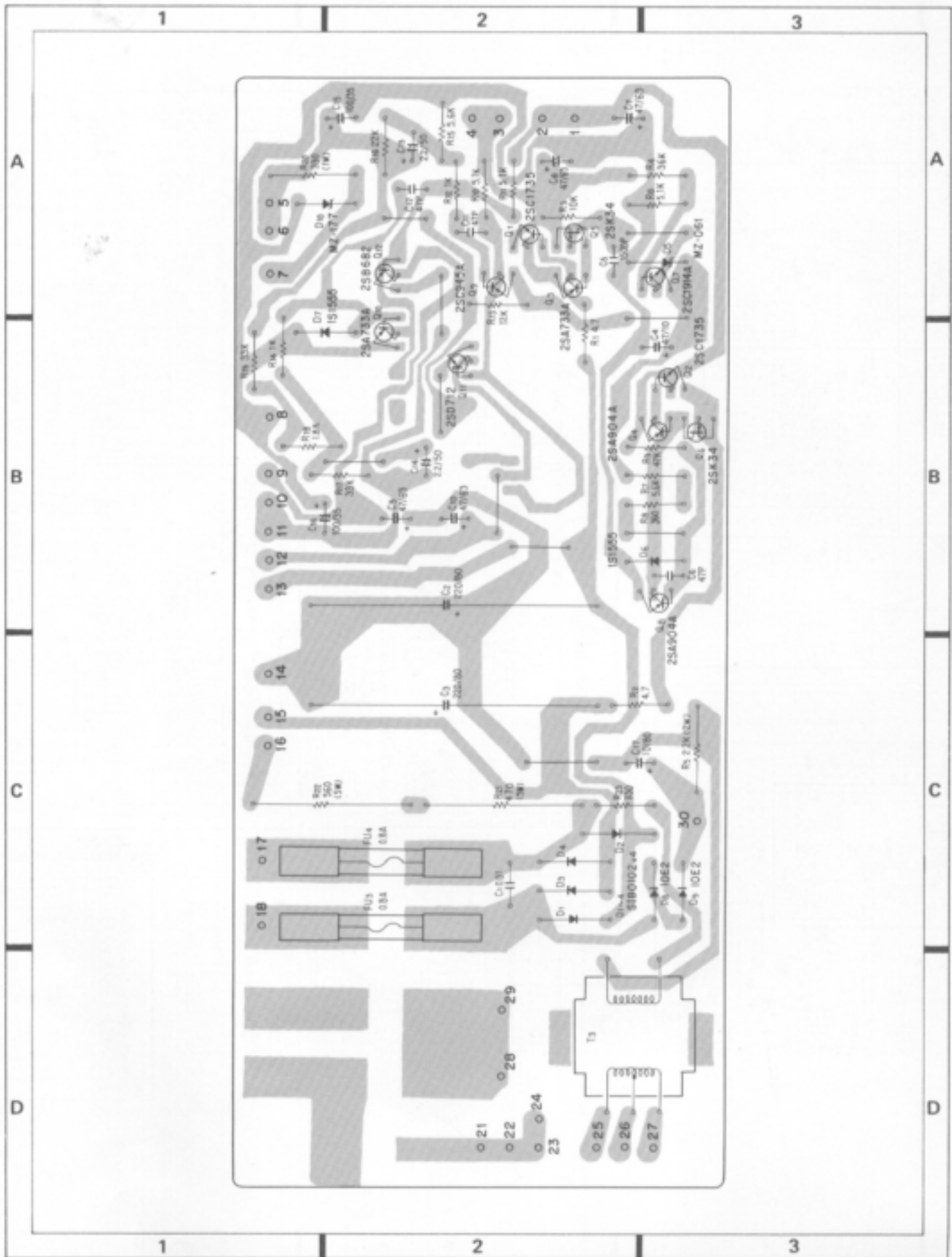
C

D

D







## Parts List of Power Supply Assembly (AWR-194)

## CAPACITORS

Part No.	Symbol & Description
COMA 103K 400	C1
CEB 221P 80	C2, C3
CEA 470P 10	C4
CKDYB 152K 50	C5
CCDSL 470K 50	C6, C11, C12
CEA 470P 63	C7-C10
CEA 2R2P 50	C13, C14
CEA 101P 35	C15, C16
CEA 100P 80	C17

*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%PMF 000 J	R1, R2, R23
RD%PM 000 J	R3, R4, R6-R19
RS2P 000 J	R5
RS1P 000 J	R20
RT5B 000 K	R21, R22

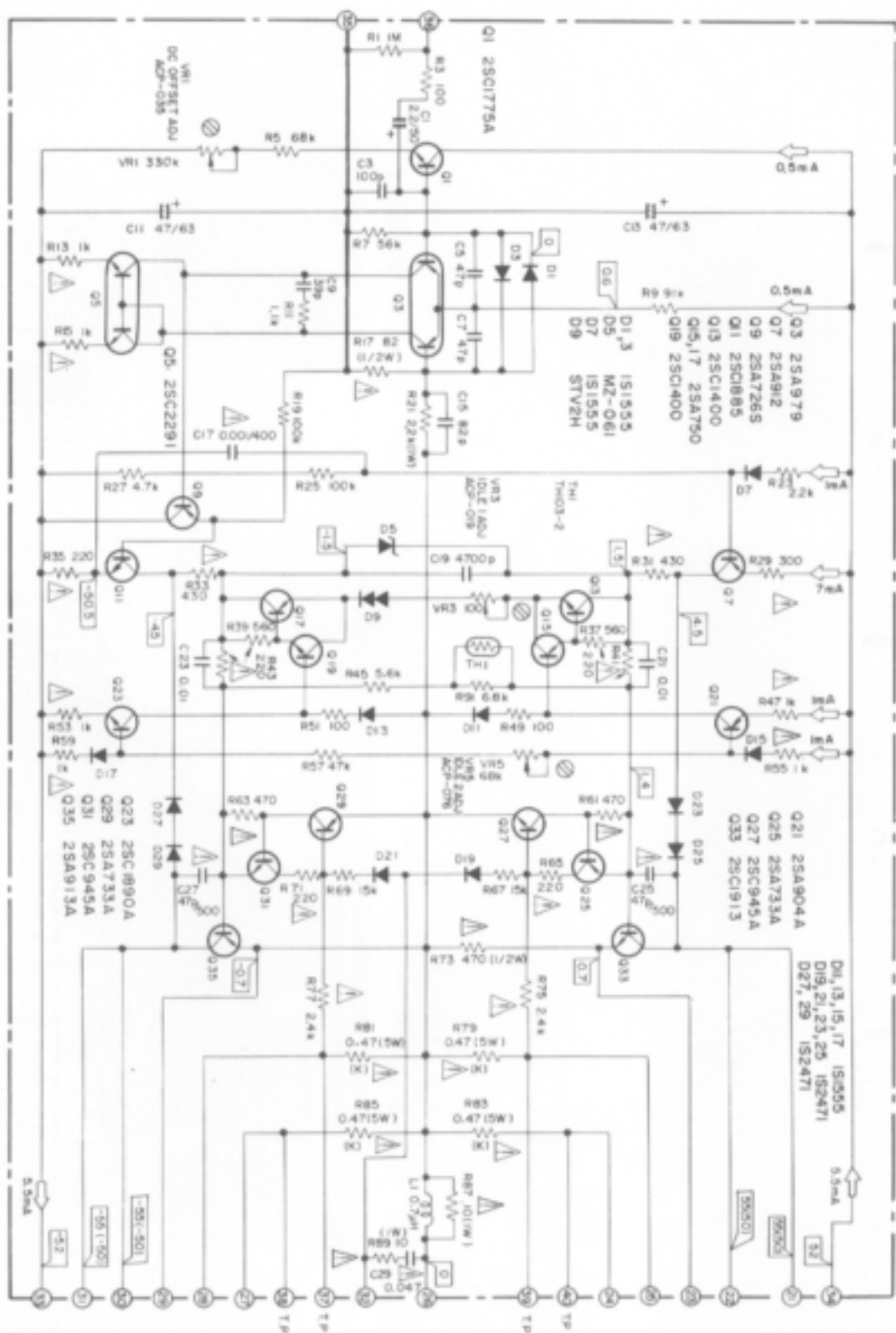
## SEMICONDUCTORS

Part No.	Symbol & Description
2SC1735	Q1, Q2
2SA733A	Q3, Q10
2SA904A (2SA893A)	Q4, Q8
2SK34	Q5, Q6
2SC1914A (2SC1890A)	Q7
2SC945A	Q9
2SD712 (2SD313P)	Q11
2SB682 (2SB507P)	Q12
S1B01-02 XZ-060	D1-D4 D5
1S1555 (1S2473)	D6, D7
10E2 MZ-177 (WZ-177)	D8, D9 D10

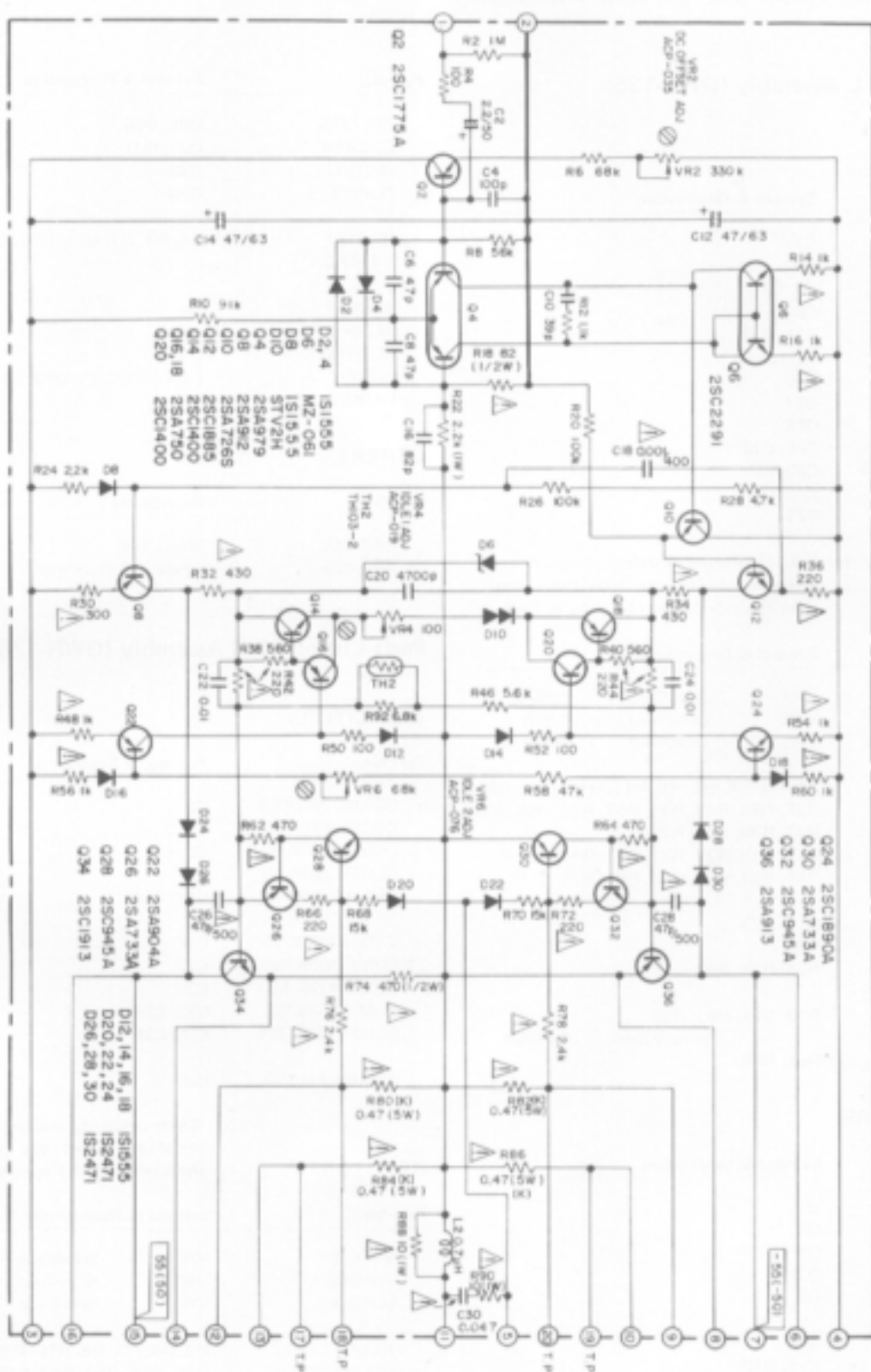
## OTHERS

Part No.	Symbol & Description
ATT-577	T3 Transformer
ABA-026	Pan head screw

**POWER AMPLIFIERS FOR S, S/G TYPES**  
**Schematic Diagram for PA-L Assembly (GWH-125)**



Schematic Diagram for PA-R Assembly (GWH-126)



- The circuitry of the PA-L (GWH-125) and PA-R (GWH-126) assemblies are the same as the GWH-119 and GWH-120 (for KU type), with exception of the circuit component specifications and the parts installation method.

## Parts List of PA-L Assembly (GWH-125)

### CAPACITORS

Part No.	Symbol & Description
CEANL 2R2P 50	C1
CCDSL 101K 50	C3
CCDSL 470K 50	C5, C7
CCDSL 390K 50	C9
CEA 470P 63	C11, C13
CCDSL 820K 50	C15
△CQMA 102K 400	C17
QOMA 472K 50	C19
QOMA 103K 50	C21, C23
△CCDSL 470 K 500	C25, C27
△CQMA 473J 100	C29

*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-035	VR1 Semifixed 330k-B
ACP-019	VR3 Semifixed 100-B
ACP-076	VR5 Semifixed 68k-B
RD%PM 000 J	R1, R3, R5, R7, R9, R11, R19, R23, R25
RD%PM 000 J	R27, R45, R49, R51, R57, R67, R69, R91
△RD%PM 000 J	R37, R39, R75, R77
△RD%PMF 000 J	R13, R15, R29, R31, R41, R47, R53
△RD%PMF 000 J	R55, R59, R61, R63, R65, R71
△RD%PS 000 J	R17, R73
RS1P 000 J	R21
△RD%PMF 000 J	R33, R35, R43
△ACN-041	R79, R81, R83, R85 Wire wound 0.47/5W
△RS1P 000 J	R87, R89

### SEMICONDUCTORS

Part No.	Symbol & Description
2SC1775A-E	Q1
2SA979-F	Q3
2SC2291	Q5
2SA912	Q7
2SA726S	Q9
2SC1885	Q11
2SC1400	Q13, Q19
2SA750	Q15, Q17
2SA904A	Q21
2SC1890A	Q23

Part No.	Symbol & Description
2SA733A	Q25, Q29
2SC945A	Q27, Q31
2SC1913	Q33
2SA913	Q35
1S1555 (1S2473)	D1, D3, D7, D11, D13, D15, D17
MZ-061 (WZ-061)	D5
STV2H-O	D9
1S2471	D19, D21, D23, D25, D27, D29
TH103-2	Th1

### OTHERS

Part No.	Description
ABA-048	Screw 3x6
ABA-026	Screw 3x6 (Pan head)

## Parts List of PA-R Assembly (GWH-126)

### CAPACITORS

Part No.	Symbol & Description
CEANL 2R2P 50	C2
CCDSL 101K 50	C4
CCDSL 470K 50	C6, C8
CCDSL 390K 50	C10
CEA 470P 63	C12, C14
CCDSL 820K 50	C16
△CQMA 102K 400	C18
QOMA 472K 50	C20
QOMA 103K 50	C22, C24
△CCDSL 470K 500	C26, C28
△CQMA 473J 100	C30

*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-035	VR2 Semifixed 330k-B
ACP-019	VR4 Semifixed 100-B
ACP-076	VR6 Semifixed 68k-B
RD%PM 000 J	R2, R4, R6, R8, R10, R12, R20, R24, R26
RD%PM 000 J	R28, R46, R50, R52, R58, R68, R70, R92
△RD%PM 000 J	R38, R40, R76, R78
△RD%PMF 000 J	R14, R16, R30, R32, R42, R48, R54
△RD%PMF 000 J	R56, R60, R62, R64, R66, R72

Part No.	Symbol & Description
RD%PS □□□ J	R18, R14
RS1P □□□ J	R22
RD%PMF □□□ J	R34, R36, R44
ACN-041	R80, R82, R84, R86
RS1P □□□ J	R88, R90
	Wire wound 0.47/5W

## SEMICONDUCTORS

Part No.	Symbol & Description
2SC1775A-E	Q2
2SA979-F	Q4
2SC2291	Q6
2SA912	Q8
2SA726S	Q10
2SC1885	Q12
2SC1400	Q14, Q20
2SA750	Q16, Q18
2SA904A	Q22
2SC1890A	Q24
2SA733A	Q26, Q30
2SC945A	Q28, Q32
2SC1913	Q34
2SA913	Q36
1S1555 (1S2473)	D2, D4, D8, D12, D14, D16, D18
MZ-061 (WZ-061)	D6
STV2H-O	D10
1S2471	D20, D22, D24, D26, D28, D30
TH103-2	Th2

## OTHERS

Part No.	Description
ABA-048	Screw 3x6
ABA-026	Screw 3x6 (Pan head)