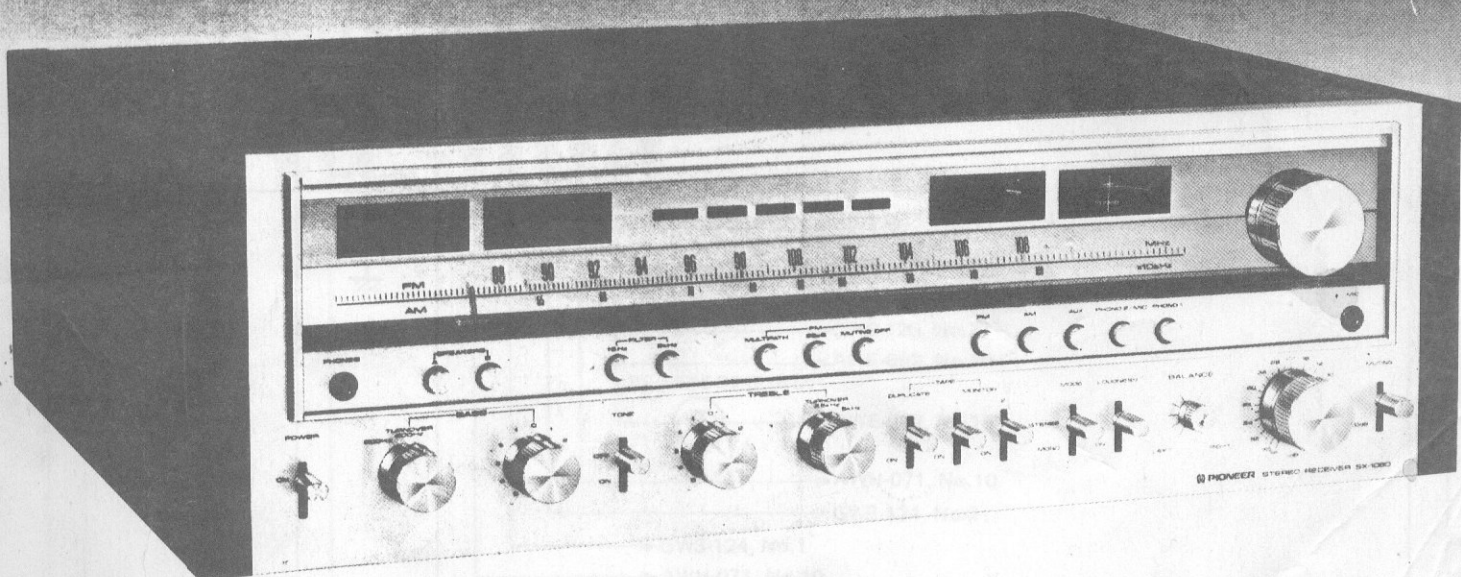


AM/FM STEREO RECEIVER

# SX-1080

## SERVICE MANUAL



**MODEL SX-1080 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	110V, 120V, 220V and 240V (Switchable)	General export model
S/G	110V, 120V, 220V and 240V (Switchable)	U.S. Military model

**NOTICE:**

- This service manual is applicable to the SX-1080/KU.
- The SX-1080/HG, S/G, S, KC service manual is issued as an appendix.

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# 1. SPECIFICATIONS

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## Power Amplifier Section

Continuous power output of 120 watts\* per channel, min. at 8 ohms or 150 watts\* per channel at 4 ohms from 20 Hertz to 20,000 Hertz with no more than 0.05% total harmonic distortion.

Total Harmonic Distortion (20 Hertz to 20,000 Hertz)  
 Continuous Rated Power Output . . No more than 0.05%  
 60 watts per channel power

output, 8 ohms . . . . . No more than 0.02%

1 watt per channel power  
 output, 8 ohms . . . . . No more than 0.02%

Intermodulation Distortion (50 Hertz: 7,000 Hertz = 4:1)  
 Continuous Rated Power Output . . No more than 0.05%  
 60 watts per channel power

output, 8 ohms . . . . . No more than 0.02%

1 watt per channel power  
 output, 8 ohms . . . . . No more than 0.02%

Frequency Response . . . . 5 Hertz to 100,000 Hertz  $\pm 0$ /<sub>3</sub> dB

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

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

Damping Factor  
 (20 Hertz to 20,000 Hertz, 8 ohms) . . . . . 30

Hum and Noise (IHF, short-circuited, A Network) . . 100dB

## Preamplifier Section

Input (Sensitivity/Impedance)

PHONO 1, 2 . . . . . 2.5mV/50 kilohms

MIC . . . . . 7.5mV/50 kilohms

AUX . . . . . 150mV/50 kilohms

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

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

PHONO Overload Level (1kHz; T.H.D: 0.05%)  
 PHONO 1, 2 . . . . . 200mV

Output Level/Impedance  
 TAPE REC 1 . . . . . 150mV  
 TAPE REC 2 . . . . . 150mV  
 PRE OUT . . . . . 1V/1 kilohms

Total Harmonic Distortion  
 (20Hz to 20,000Hz 1V output) . . . No more than 0.05%

Frequency Response  
 PHONO (RIAA equalization) . 20Hz to 20,000Hz  $\pm 0.2$ dB  
 AUX, TAPE PLAY . . . . . 5Hz to 80,000Hz  $\pm 1$ /<sub>1</sub> dB

Tone Control  
 BASS . . . . .  $\pm 7$ dB/ $\pm 10$ dB (100Hz)  
 Turnover Frequency 200Hz/400Hz  
 TREBLE . . . . .  $\pm 7$ dB/ $\pm 10$ dB (10kHz)  
 Turnover Frequency 5kHz/2.5kHz

Filter  
 LOW . . . . . 15Hz (6dB/oct.)  
 HIGH . . . . . 6kHz (6dB/oct.)

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

Hum and Noise  
 (IHF, short-circuited, A Network)  
 PHONO . . . . . 76dB  
 AUX, TAPE PLAY . . . . . 90dB  
 Muting . . . . . -20dB

## FM Section

Usable Sensitivity  
 MONO . . . . . 9.8dBf (1.7 $\mu$ V)  
 50dB Quieting Sensitivity

MONO . . . . . 14.2dBf (2.8 $\mu$ V)

STEREO . . . . . 37dBf (39 $\mu$ V)

Signal to Noise Ratio  
 (at 75dBf) . . . STEREO . . . . . 74dB  
 (at 65dBf) . . . MONO . . . . . 80dB  
 STEREO . . . . . 71dB

Distortion (at 65dBf)  
 100Hz MONO/STEREO . . . . . 0.1%/0.2%  
 1kHz MONO/STEREO . . . . . 0.1%/0.15%  
 6kHz MONO/STEREO . . . . . 0.1%/0.2%

Frequency Response . . . . . 30Hz to 15,000Hz  $\pm 0.5$ dB

Capture Ratio . . . . . 1.0dB

Alternate Channel Selectivity . . . . . 80dB

Spurious Response Ratio . . . . . 100dB

Image Response Ratio . . . . . 90dB

1F Response Ratio . . . . . 100dB

AM Suppression Ratio . . . . . 55dB

Muting Threshold . . . . . 19.2dBf (5 $\mu$ V)

Stereo Separation . . 50dB (1kHz), 35dB (30Hz - 15kHz)

Subcarrier Product Ratio . . . . . 65dB

SCA Rejection Ratio . . . . . 65dB

Antenna Input . . . . . 300 ohms balanced

75 ohms unbalanced

## AM Section

Sensitivity (IHF, Ferrite antenna) . . . . .	300 $\mu$ V/m
(IHF, Ext. antenna) . . . . .	15 $\mu$ V
Selectivity . . . . .	30dB
Signal-to-Noise Ratio . . . . .	50dB
Image Response Ratio . . . . .	40dB
IF Response Ratio . . . . .	40dB
Antenna . . . . .	Built-in Ferrite Loopstick Antenna

## Miscellaneous

Power Requirements . . . . .	120V 60Hz
Power Consumption . . . . .	350W (UL), 800W (CSA) 1100W (max.)
Dimensions . . . . .	526(W) x 176(H) x 440(D) mm 21-11/16(W) x 6-15/16(H) x 17-5/16(D) in
Weight Without Package . . . . .	21.3kg (47lb)
With Package . . . . .	24.2kg (53lb 6oz)

## Furnished Parts

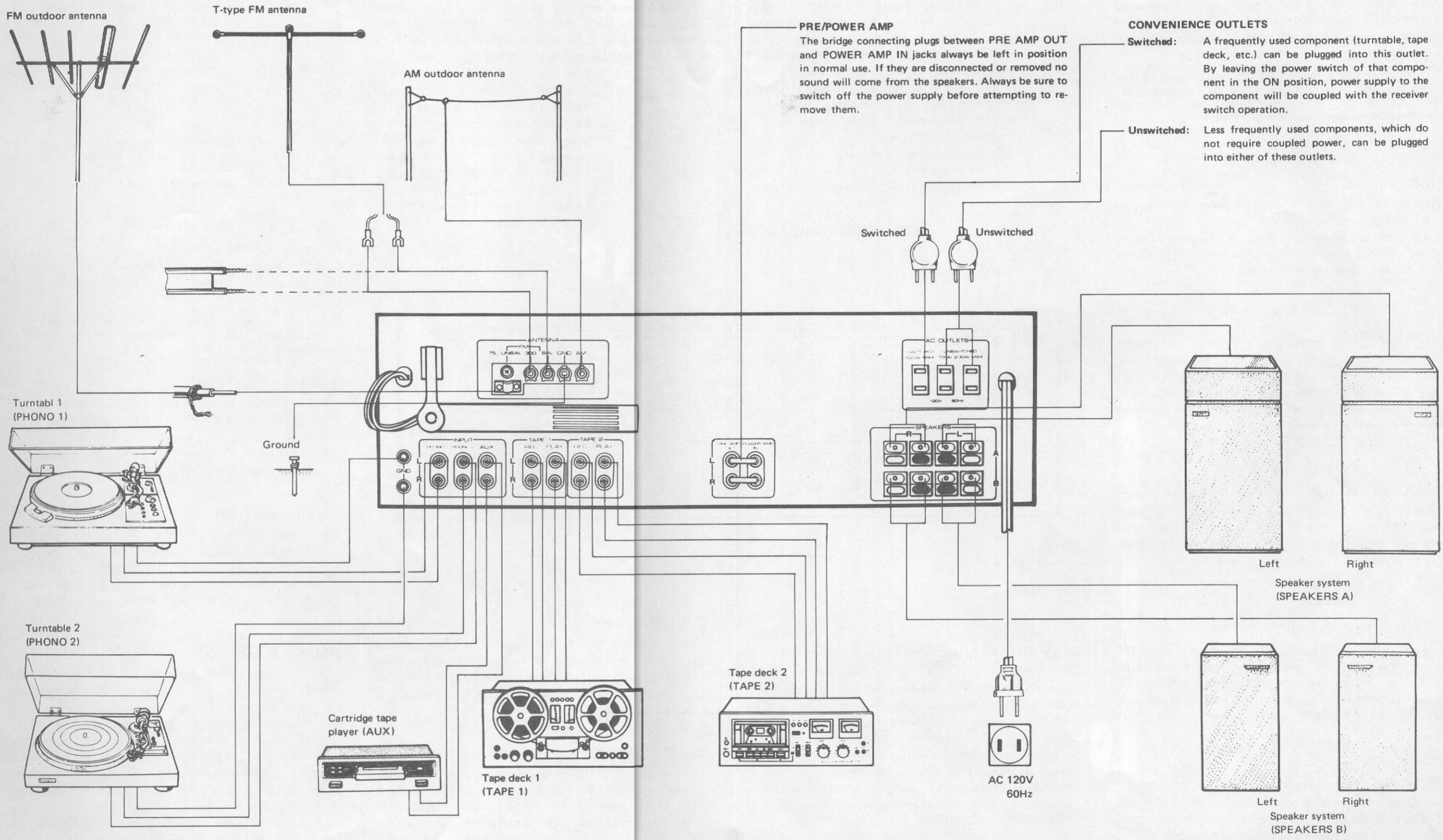
FM T-type Antenna . . . . .	1
Operating Instructions . . . . .	1
Hex. Wrench . . . . .	1

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

### NOTE:

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

## 2. CONNECTION DIAGRAM



# 3. FRONT PANEL FACILITIES

**POWER METERS**  
 These power meters allow you to read out the rated power level when speakers with a nominal impedance of 8 ohms are connected to the receiver's speaker terminals.

*NOTE:*  
 These values are related to the impedance of the speakers and they vary according to the frequency. In order to find out the exact output level, connect an 8-ohm dummy load instead of the speakers.

**PHONES JACK**  
 Plug the headphones into this jack when you want to listen through your stereo headphones. Release the all SPEAKERS buttons if you want to listen to the sound through your headphones only. (This means that all two buttons will be released).

**POWER SWITCH**  
 Flip this switch to the ON position to supply power to the stereo receiver. 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 switched on and off.

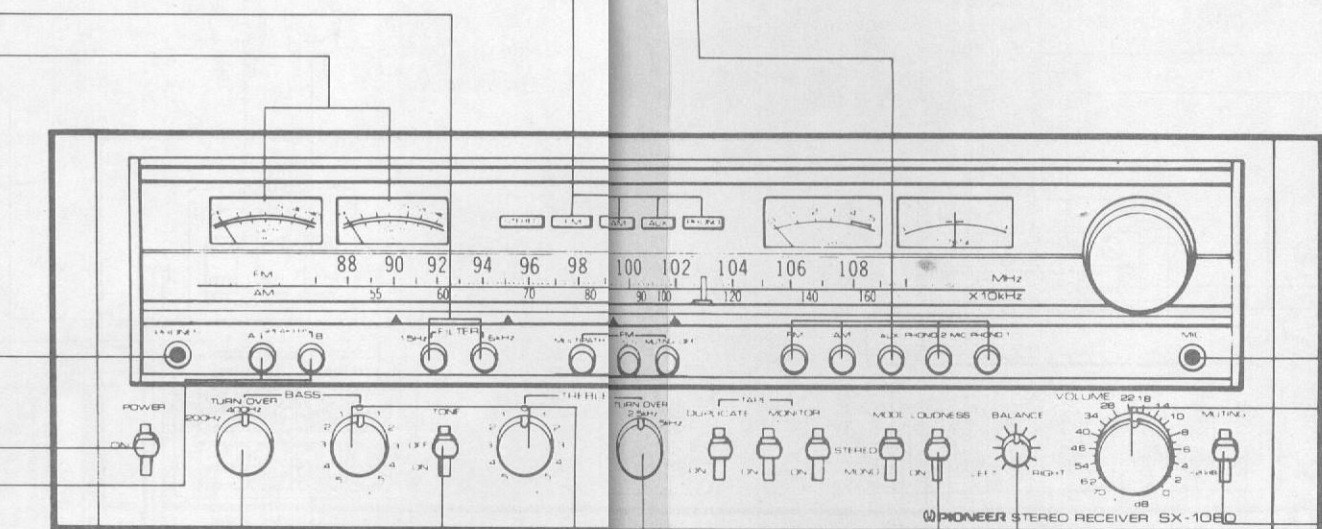
**SPEAKERS BUTTONS**  
 Press the button corresponding to the speakers connected to the SPEAKERS terminals (A, B) on the rear panel. You can press two of these buttons to listen to sound from two pairs of speaker systems at the same time.

**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.

**TONE 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.

**FILTER BUTTONS**  
 15Hz . . . When this button is pressed, a 6dB/oct attenuation can be provided for frequencies below 15Hz. This means that you can cancel out noise in the ultra-low frequencies which is generated by low-pitched rumble from a turntable and other forms of distortion. Although this noise cannot be heard, it can generate intermodulation distortion and damage the speakers.  
 6kHz . . . Press this button to provide a 6dB/oct attenuation at frequencies above 6kHz. Set it to this position when you find high-frequency noise, such as that from scratched records, unpleasant.

**FUNCTION INDICATOR**



**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 the right from its center position, you will be able to emphasize the sound in a frequency range which 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.

**FUNCTION BUTTONS**  
 Press the function button which corresponds to the program source. Turn the VOLUME control down first before selecting a different function button while the sound from one program source is being reproduced.  
 FM . . . . . Press this button for FM broadcasts. The FM STEREO indicators light up when the receiver is tuned into an FM stereo broadcast. The sound is automatically received monophonically during FM monophonic broadcasts.  
 AM . . . . . Press this button for AM broadcasts.  
 AUX . . . . . Press this button when listening to an audio component connected to the AUX input jacks.

**LOUDNESS SWITCH**  
 Set this switch to ON when listening at a low volume. The frequency response of the human ear varies according to the listening volume, and setting this switch to the ON position compensates for hearing response by emphasizing the bass and treble.  
**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.

**PHONO 2/MIC . .** Press this button when playing a record on the turntable connected to the PHONO 2 jacks, or when using a microphone which you have plugged into the MIC jack.  
**PHONO 1 . . . .** Press this button when playing a record on the turntable connected to the PHONO 1 jacks.

*NOTES:*  
 1. Unplug the microphone from the MIC jack when you do not intend to use the microphone otherwise you will not be able to use the PHONO 2 jacks.  
 2. Only one function button should be pressed at a time.

**MIC JACK**  
 Plug your microphone into this jack. The microphone signals are reproduced in mono through the left and right speakers.  
*NOTE:*  
 A high impedance (approx. 50 kilohms) dynamic type microphone with a standard plug can be connected to this jack.

**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 ∞. The scale is graduated in dB which indicate the attenuation when the maximum output level is 0dB.

**MUTING SWITCH**  
 Set this switch to the -20dB position 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.

**BALANCE CONTROL**  
 Use this control to balance the volume of the left and right channels. First, however, set the MODE switch to MONO, 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 switch to STEREO.

**FM MUTING BUTTON**

ON (released position) . . . Release this button to suppress unpleasant inter-station noise when tuning in to FM stations.

OFF (depressed position) . Depress this button to pick up weak stations.

**FM 25μS BUTTON**

Press this button when listening to a Dolby\* FM broadcast; otherwise keep this button at the released position.

**FM MULTIPATH BUTTON**

Use this switch to detect multipath sound when installing the FM antenna in a position which yields the minimum multipath interference.

**TUNING KNOB**

Use this to tune in to broadcasting stations. Select the station and tune for optimum reception by observing the SIGNAL meter for AM stations and both the SIGNAL and TUNING meters for FM stations.

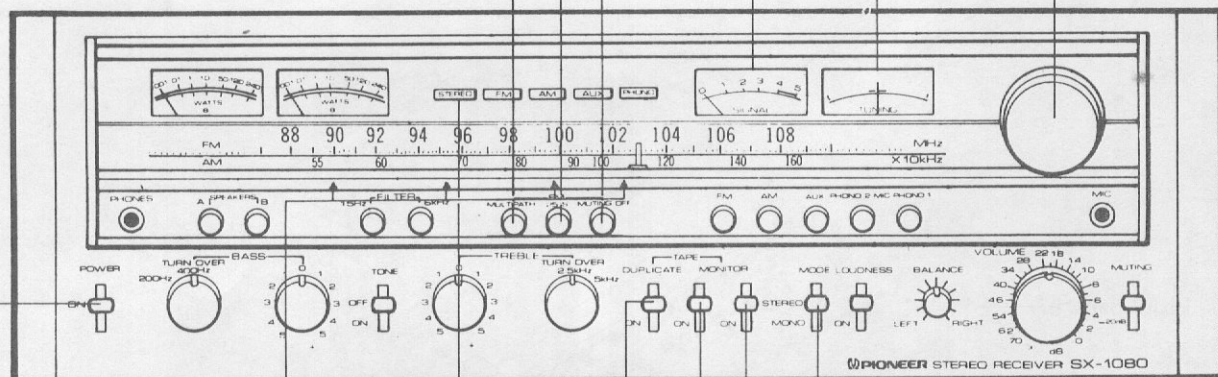
**SIGNAL METER**

When tuning in to an AM or FM station, the optimum reception position is indicated by the maximum deflection of the meter pointer to the right.

**TUNING METER**

When tuning in an FM station, the optimum reception position is indicated when the meter pointer deflects to dead center. Check that the SIGNAL meter pointer has deflected as far to the right as possible.

**POWER SWITCH**



**MEMORY MARKERS**

These are very convenient for frequent tuning in to the same broadcasting station.

**STEREO INDICATOR**

This indicator lights up when the receiver is tuned to receive a stereo broadcast.

**TAPE MONITOR SWITCHES (1, 2)**

Set switch 1 to ON with a tape deck which is connected to the TAPE 1 jacks (REC and PLAY) when you want to monitor the playback or recording of a tape. The tape on a deck which is connected to the TAPE 2 jacks (REC and PLAY) can be similarly monitored by setting switch 2 to ON.

**NOTE:**

Set these switches to the upper (off) position when listening to records or the broadcast.

**MODE SWITCH**

Use this switch for selecting mono or stereo performances. **STEREO:** Set to this position for normal stereo operation.

**MONO:** When set to this position, the left and right channel signals will be mixed and reproduced monophonically from both speaker systems.

**TAPE DUPLICATE SWITCH**

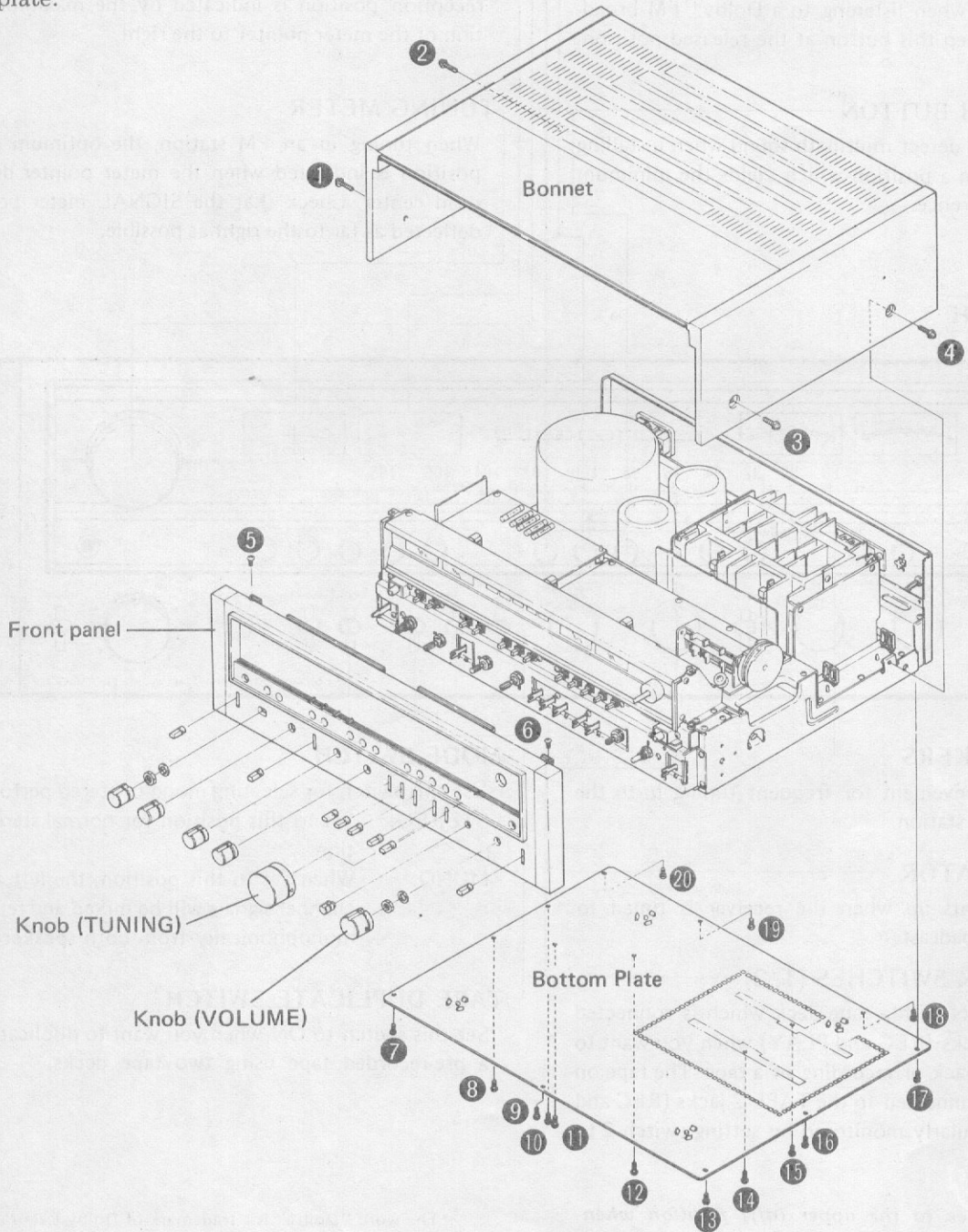
Set this switch to ON when you want to duplicate or edit a pre-recorded tape using two tape decks.

\*The word "Dolby" is a trademark of Dolby Laboratories Inc.



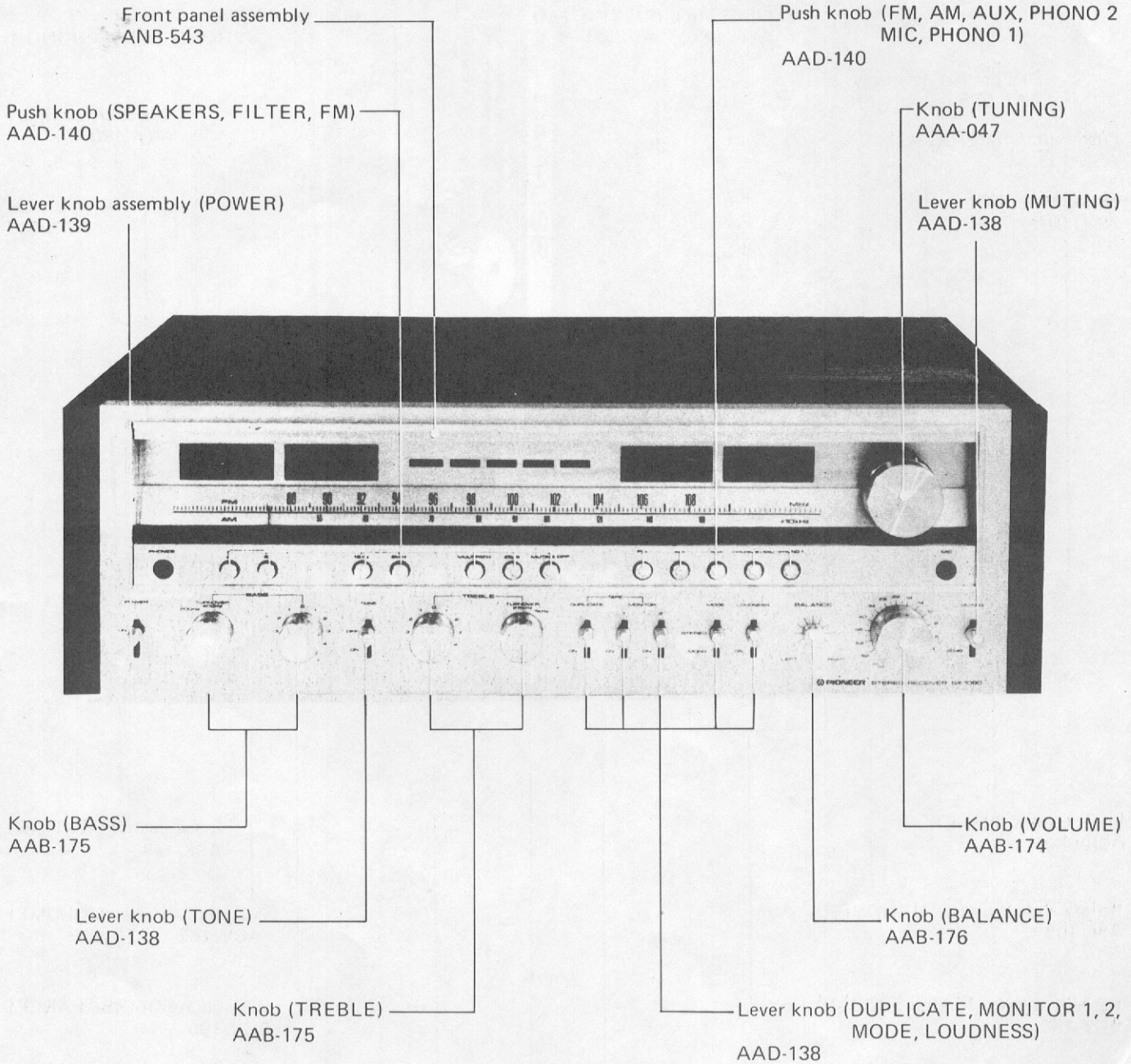
## 4. DISASSEMBLY

1. Remove screws ① ~ ④ and remove the bonnet.
2. Remove screws ⑤ ~ ⑥, all the knobs, and remove the two nuts and two washers at the front panel. (However, loosen the set screws with the accessory allen wrench before attempting to remove the TUNING and VOLUME knobs.)
3. Remove screws ⑦ ~ ⑳ and remove the bottom plate.

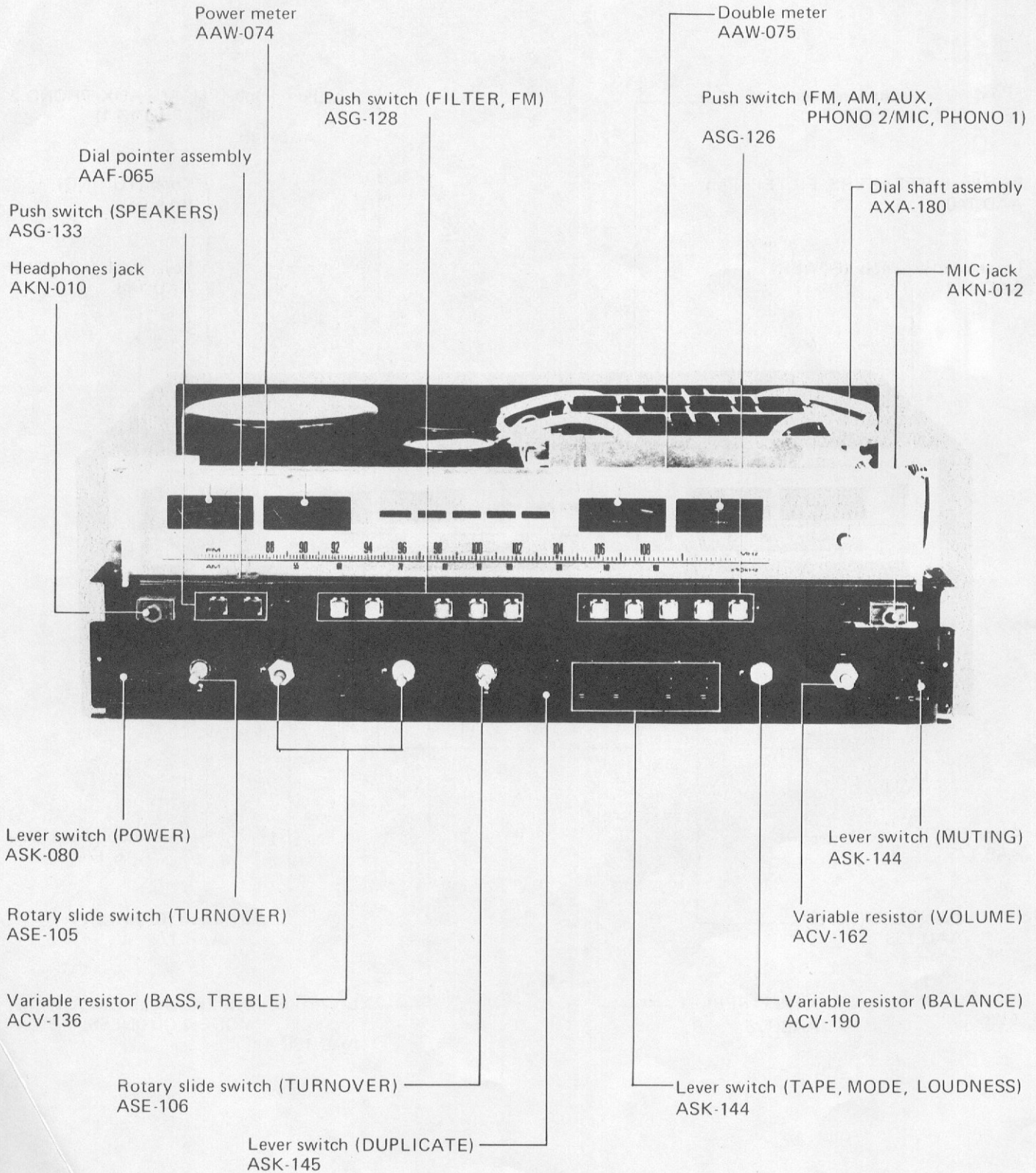


# 5. PARTS LOCATION

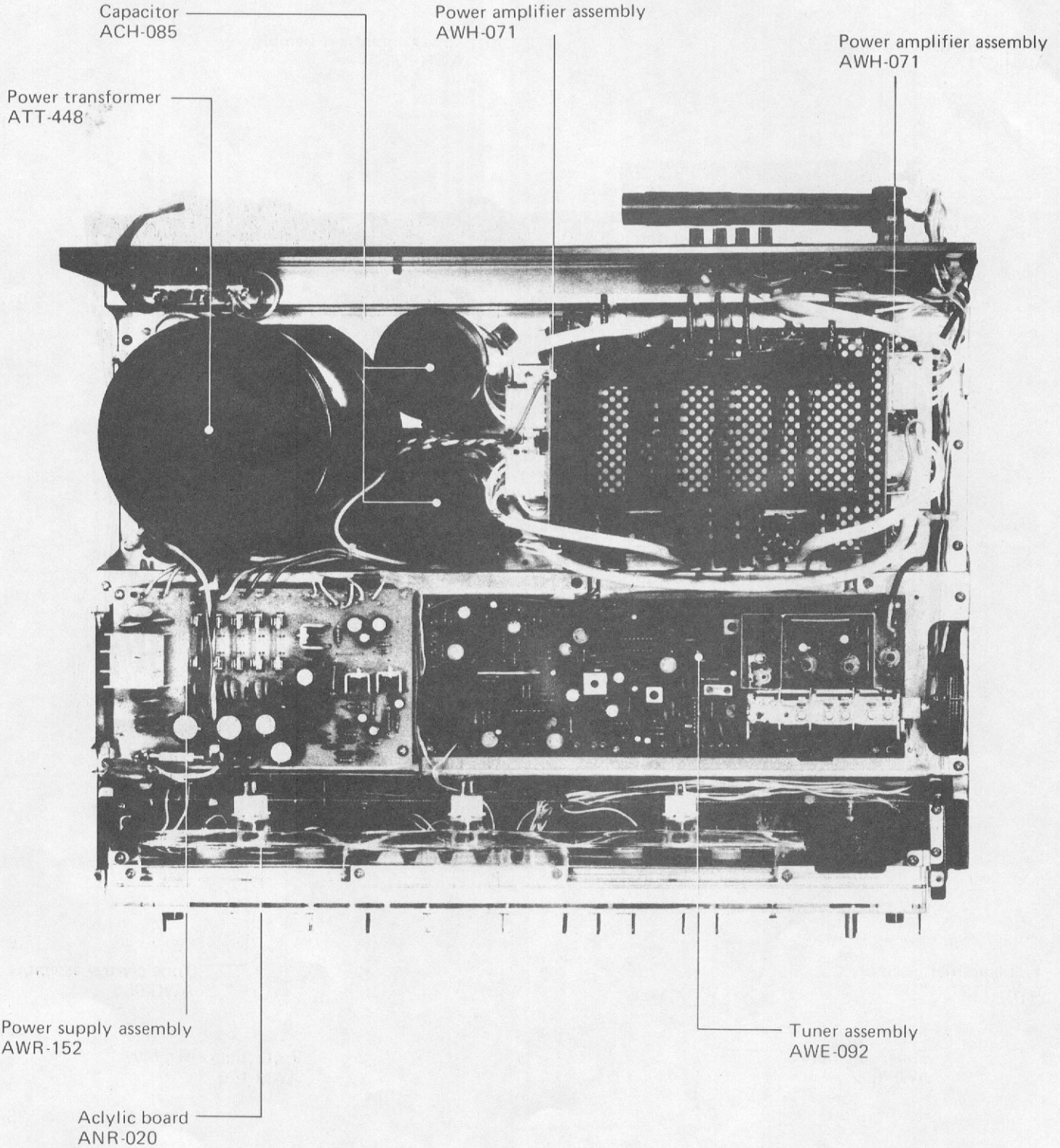
## 5.1 FRONT PANEL VIEW



## 5.2 FRONT VIEW WITH FRONT PANEL REMOVED



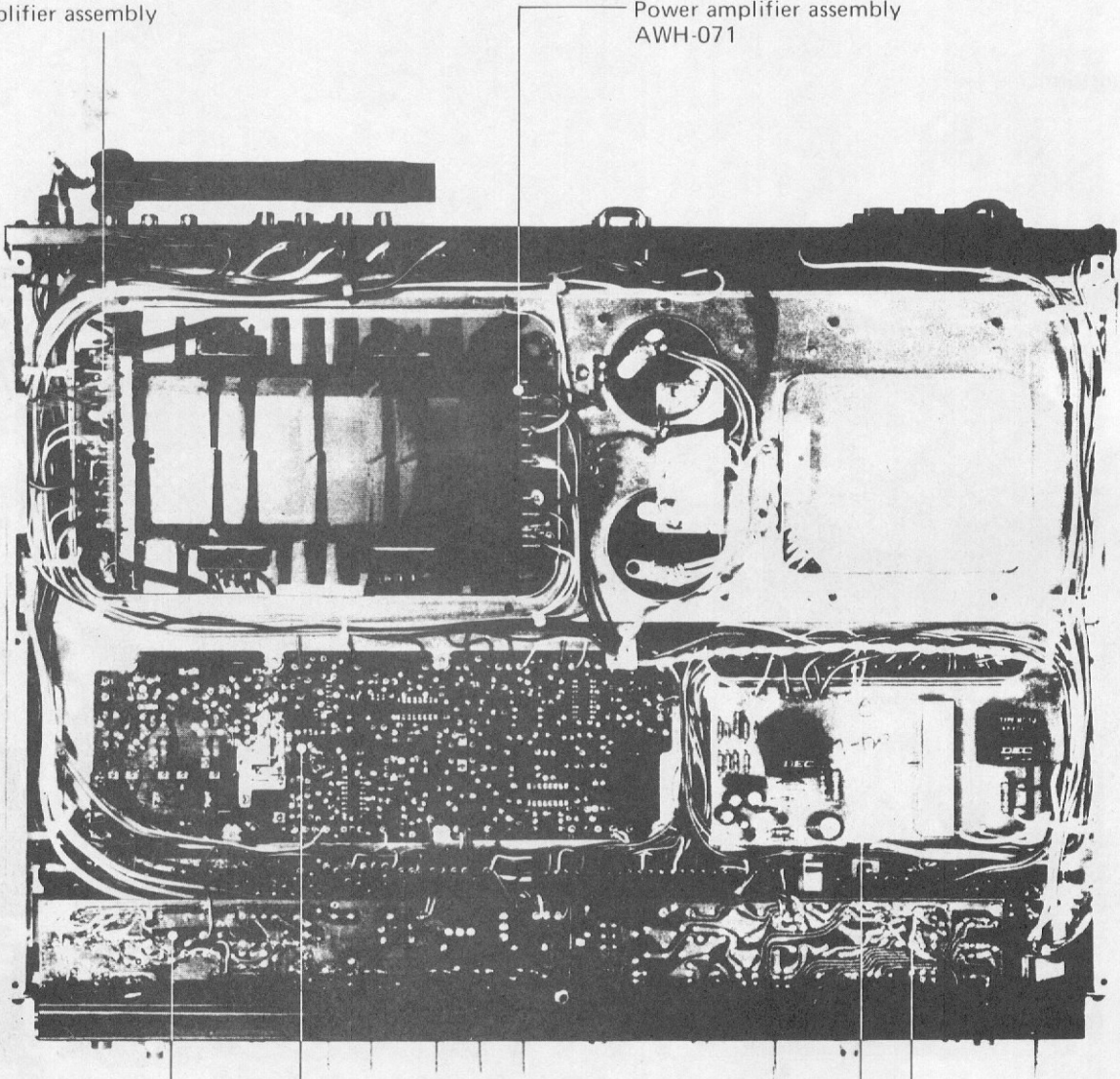
5.3 TOP VIEW WITH BONNET REMOVED



## 5.4 BOTTOM VIEW WITH BOTTOM PLATE REMOVED

Power amplifier assembly  
AWH-071

Power amplifier assembly  
AWH-071



Flat amplifier assembly  
GWG-112

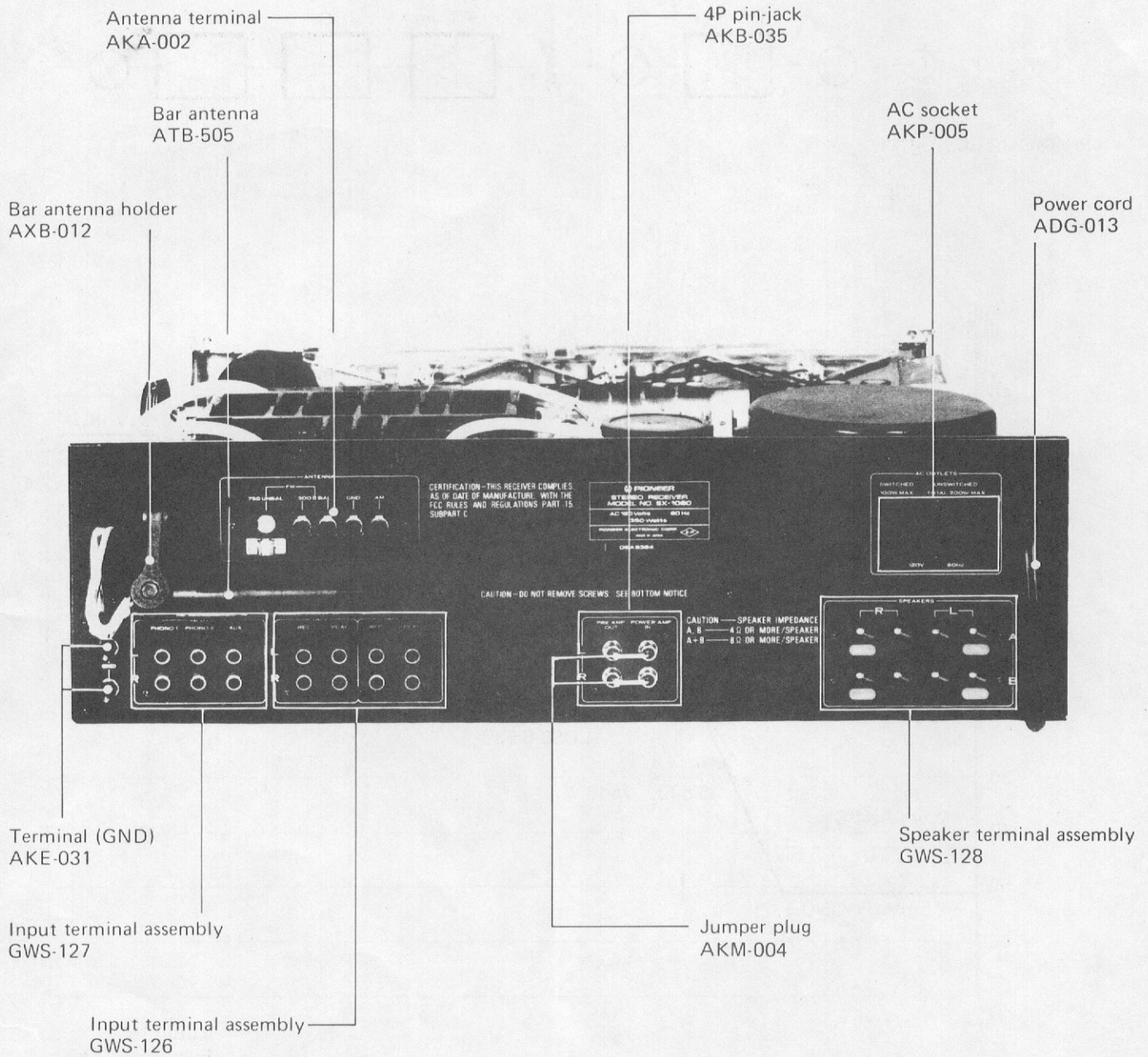
Tone control assembly  
AWG-056

Tuner assembly  
AWE-092

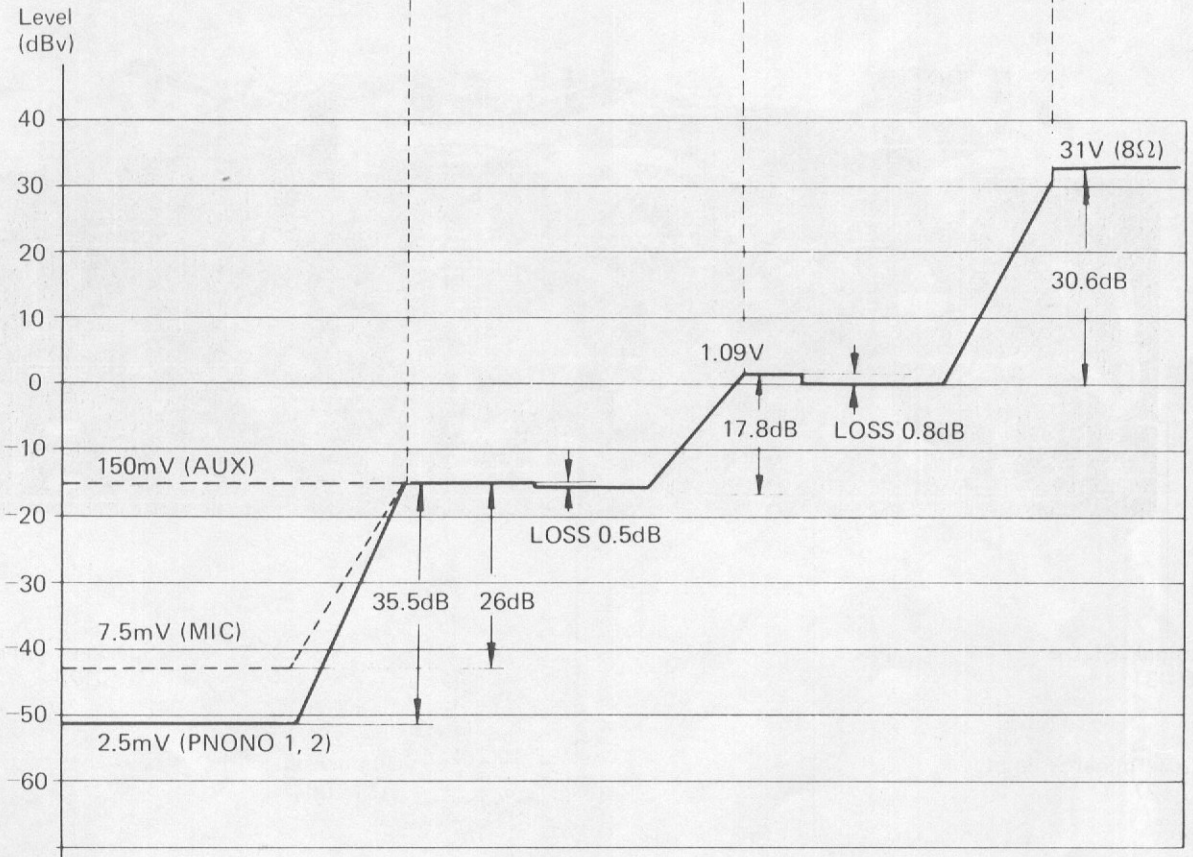
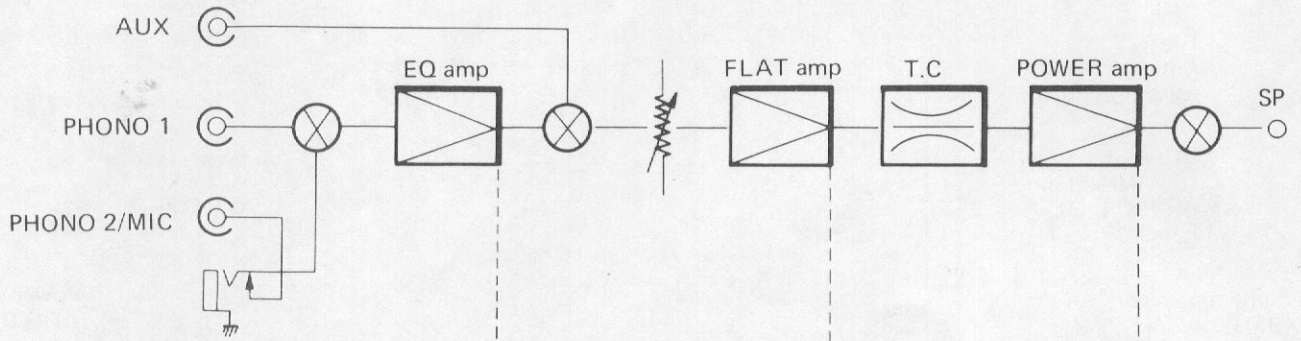
Protection assembly  
AWM-120

MARSHALL UNIVERSITY

5.5 REAR PANEL VIEW

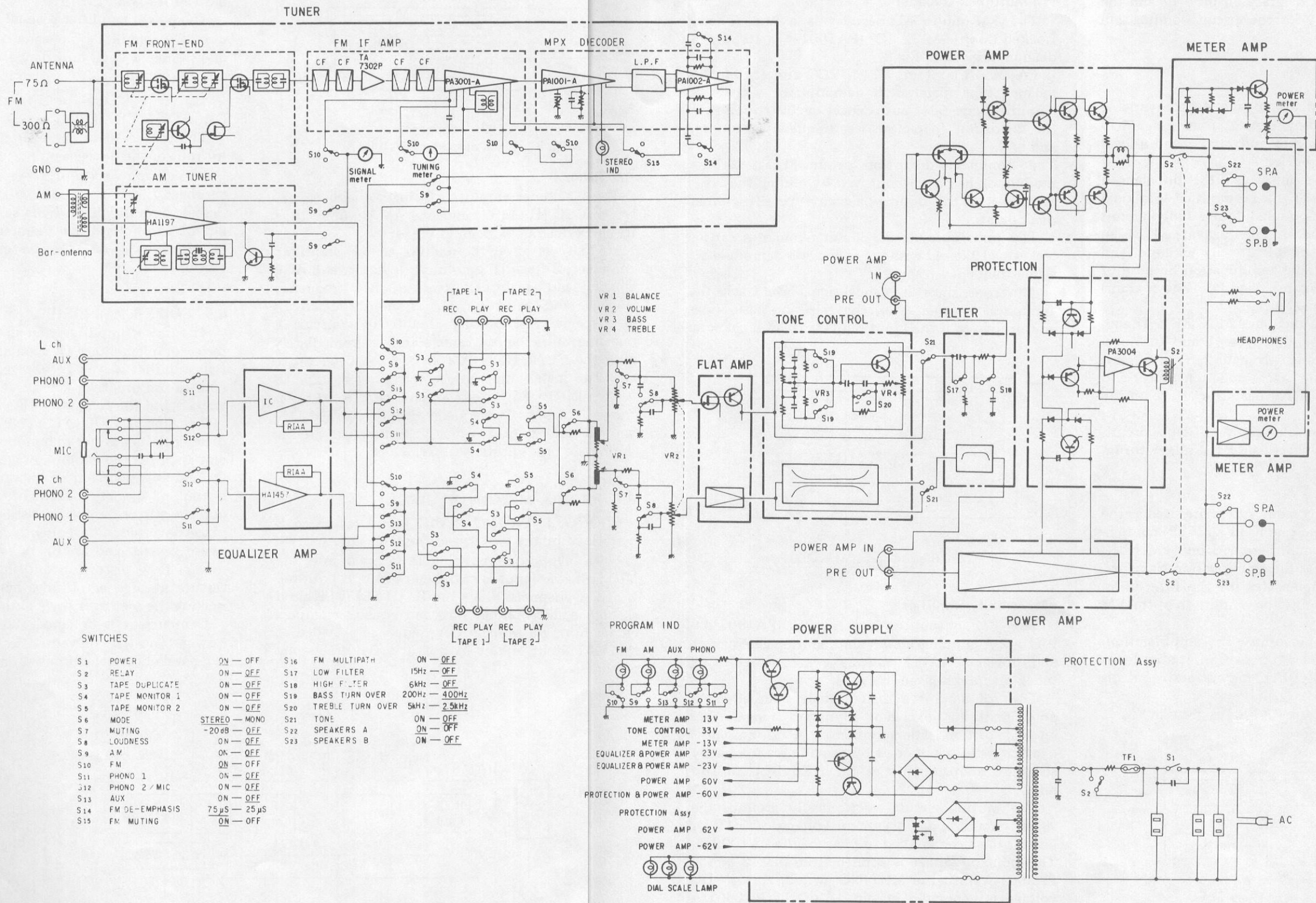


# 6. LEVEL DIAGRAM



0 dBv=1V  
Frequency: 1 kHz

# 7. BLOCK DIAGRAM





## 8. CIRCUIT DESCRIPTIONS

Refer to the block diagram on page 17 and the schematic on page 37 for the circuit composition of this unit.

### 8.1 FM TUNER

#### FM Front end

The FM front end employs a 4-stage variable capacitor in the tuning circuit, dual gate MOS FETs at the RF amplifier and mixer, and a local oscillator with J-FET buffer.

The FM front-end input is  $75\Omega$  unbalanced single-tuned circuit. The RF amplifier is a dual gate MOS FET. An M-coupled double-tuned circuit is inserted between stages. The dual gate FET is an amplifying element suitable for RF circuits, and features extremely stable amplification because of its low NF (Noise Figure), high PG (Power Gain) and low feedback capacitance.

The mixer is also a dual gate MOS FET. The reception signal is applied to gate 1 and the local oscillator signal is applied to gate 2. This circuit has low local oscillator signal injection power and the strong reception signal has little effect on the local oscillator.

The local oscillator is a modified Clapp circuit. Its output signal is injected into the mixer thru a J-FET buffer.

#### IF Amplifier

Four dual element ceramic filters are used as the selection elements, and one IC (TA7302P) containing two differential amplifiers and one FM IF IC (PA3001-A) are used as the amplification elements.

The TA7302P compensates for the filter insertion loss, and also limits the amplitude of the FM signal.

The PA3001-A performs IF amplification, amplitude limiting and FM detection. It also drives the TUNING and SIGNAL meters and controls muting.

The block diagram of the PA3001 is given in Fig. 1.

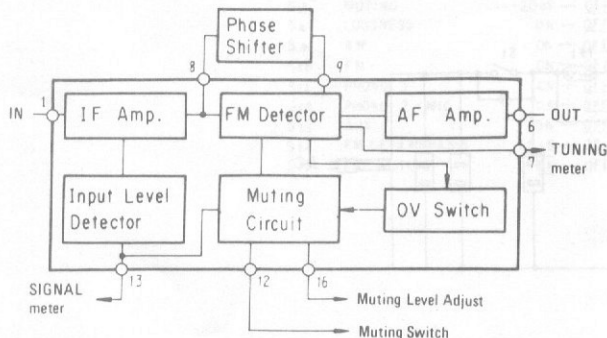


Fig. 1 Block diagram of PA3001-A

#### FM Multiplex Decoder

The FM multiplex decoder is a PLL (Phase-Locked-Loop) MPX IC (PA1001-A). Its block diagram is given in Fig. 2.

PA1001-A contains a PLL VCO circuit, double-balance type differential demodulator with NFB amplifier, and pilot auto-cancel circuit to improve the distortion characteristics, frequency response, and S/N.

The nonlinear distortion produced at the demodulator has been improved by adding the NFB amplifier to the double-balance type differential demodulator.

The pilot auto-cancel circuit eliminates carrier leakage (19kHz), without a loss of demodulated signal frequency response.

Moreover, since the cancel signal level tracks the input pilot signal level, the rejection ratio does not drop even if the input pilot signal level changes.

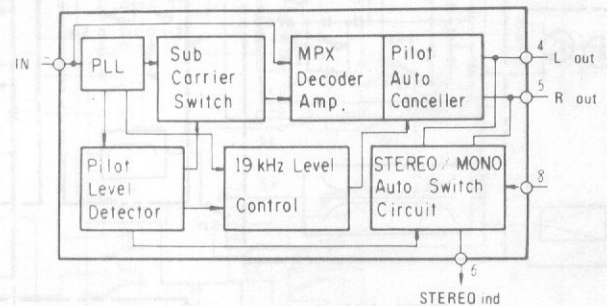


Fig. 2 Block diagram of PA1001-A

#### FM Output Amplifier

The FM output amp is an IC (PA1002-A). PA1002-A contains an AF amp, muting gate circuit and power ON/OFF muting control circuit. Its block diagram is given in Fig. 3.

The AF amp is a differentially coupled NFB amp featuring excellent dynamic range, S/N and distortion characteristics. A de-emphasis characteristic is obtained by providing a frequency selection characteristic at the NFB loop of this amp.

The muting circuit electronically grounds the signal circuit when a control voltage of 1.4V or greater has been applied to pin 8 of the PA1002-A. This control voltage is applied from pin 12 of the PA3001-A thru the MUTING switch. A 1.4V DC voltage is generated at pin 12 of the PA3001-A when de-tuned more than  $\pm 70\text{kHz}$  and at weak inputs (antenna input conversion  $5\mu\text{V}$  or less).

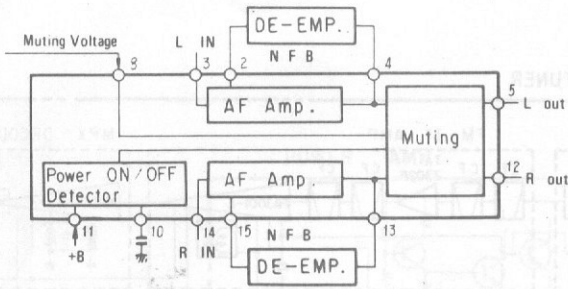


Fig. 3 Block diagram of PA1002-A

**AM Tuner**

The AM tuner employs a 2-stage variable capacitor, one IC (HA1197) and one AM ceramic filter. Its block diagram is given in Fig. 4.

HA1197 is an IC containing an RF amplifier, converter, 2-stage IF amplifier, detector, and AGC circuit, and features excellent AF frequency response and distortion. Q<sub>1</sub> of the output circuit is a special AM muting circuit. This circuit is operated until the AM tuner stabilizes immediately after the FUNCTION AM switch has been set to ON. The instant the AM switch is set to ON, +B is supplied to R<sub>8</sub>, thru C<sub>9</sub>, and the base of Q<sub>1</sub> is forward biased. Consequently, Q<sub>1</sub> is turned ON, and the AM output signal is shorted to ground during the time constant of C<sub>9</sub>, R<sub>8</sub>.

**8.2 PHONO, MIC INPUT CIRCUIT**

PHONO 1, PHONO 2/MIC input switching is performed by the switch and the MIC jack.

When a microphone plug is inserted into the MIC jack, the input is switched to MIC at both the L and R channels. Since the IC (HA1457) is used as both a microphone amp and equalizer amp, a circuit having a reverse RIAA curve is provided at the MIC input circuit to obtain a flat frequency response.

**8.3 FLAT AMPLIFIER**

The power amplifier is an all-stage direct-coupled circuit. It amplifies the signal to the required level and sends a low impedance signal to the tone control circuit.

**8.4 TONE CONTROL**

The tone control circuit is an NFB type inserted in front of the power amp.

Bass turnover (200Hz ↔ 400Hz) and treble turnover (2.5kHz ↔ 5kHz) switches and a tone defeat circuit which bypasses the tone control circuit to obtain a flat characteristic are provided, in addition to variable resistor which adjusts the rise and fall.

**8.5 POWER AMPLIFIER**

The power amplifier is an all-stage direct-coupled pure complementary OCL circuit having a differential amplifier at the first stage, current mirror circuit at the predriver stage and a parallel push-pull amplifier at the final stage (Fig.5).

The first stage (Q<sub>1</sub>) is a PNP type dual transistor differential amplifier that amplifies the input signal and stabilizes the center voltage of the power stage. Q<sub>3</sub> and Q<sub>4</sub> are driven by the opposite phases of the output of Q<sub>1</sub>. The output of Q<sub>4</sub> is applied to the current mirror circuit consisting of D<sub>2</sub> and Q<sub>5</sub> and phase inverted. Consequently, Q<sub>3</sub> and Q<sub>5</sub> are in-phase signals, and are operated as a push-pull pre-driver. Low distortion and improved rise characteristic at high amplitudes have been realized by making the predriver stage push-pull.

Overcurrent is detected and destruction of the power transistor prevented by Q<sub>8</sub>. The final stage is a parallel connected power amplifier.

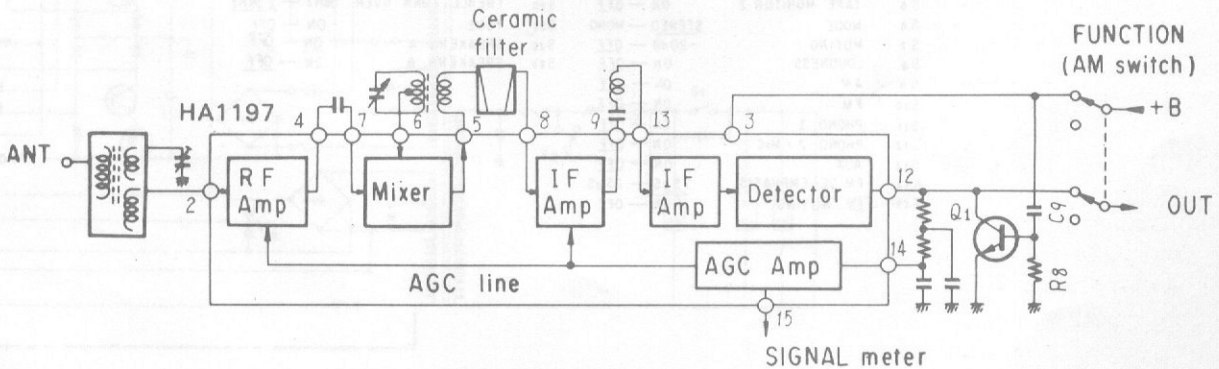


Fig. 4 Block diagram of AM tuner

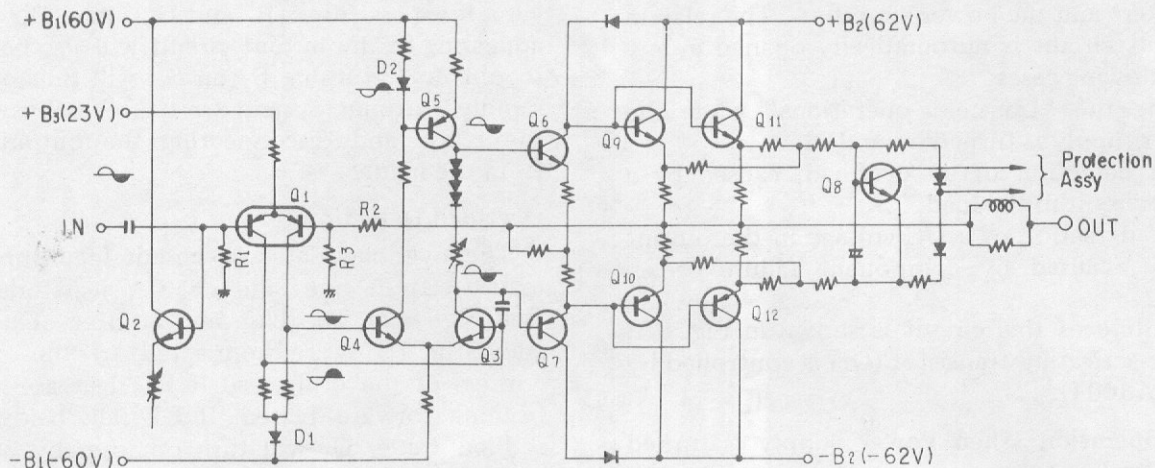


Fig. 5 Block diagram of power amplifier

Q<sub>2</sub> is a Q<sub>1</sub> temperature compensation transistor which prevents changes in the center voltage due to the temperature characteristic of Q<sub>1</sub>. Since the output center voltage is applied to the feedback side base of Q<sub>1</sub> by R<sub>2</sub> and R<sub>3</sub>, the input side base potential of Q<sub>1</sub> becomes the standard. Therefore, the input side base potential of Q<sub>1</sub> must be maintained constant at 0V. The voltage generated across R<sub>1</sub> by the input side base current of Q<sub>1</sub> is cancelled by the base current of Q<sub>2</sub> to maintain the input side base potential of Q<sub>1</sub> constant at 0V.

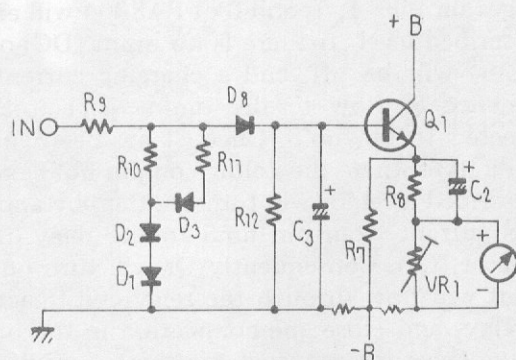


Fig. 6 Schematic diagram of meter amplifier

**8.6 METER AMPLIFIER**

In order to indicate the 0.01W - 120W range with one meter without range switching, a logarithmic indication type meter must be employed and the input signal must be logarithmically compressed. The meter amplifier circuit is shown in Fig. 6.

This circuit consists of a logarithmic compression circuit and a meter drive circuit. The output signal of the power amplifier is applied to the logarithmic compression circuit, and its dynamic range is compressed.

The principles of the logarithmic compression circuit are given in Fig. 7. The output voltage of this circuit is the value divided by R<sub>9</sub> and Z. The attenuation at low signal input is reduced and the attenuation at large signal input is increased, by using the rise of the diode current-voltage characteristic at Z.

The compressed signal is shaped by D<sub>8</sub> and applied to Q<sub>1</sub> of the meter drive circuit. Q<sub>1</sub> current amplifies the DC voltage from D<sub>8</sub> to drive the power meter.

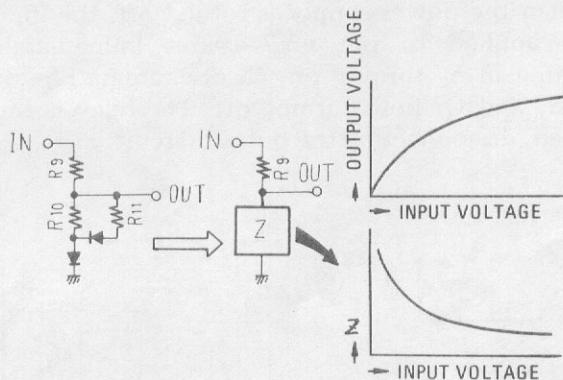


Fig. 7 Schematic diagram of logarithmic compressor

## 8.7 PROTECTION CIRCUIT

The purpose of this circuit is to protect both the speakers and the power amplifiers. 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 an overload, caused by a short circuit in the load.
3. Upon detection of a DC voltage in the output circuit, caused by component failure or accident.

An outline of this circuit is shown in Fig. 8-1. The relay-activating transistor ( $Q_r$ ) is controlled by the IC (PA3004).

### Muting Operation When Power Supply Is turned Off and On (Fig. 8-1)

When the power supply is first turned on, the voltages on pins 1, 7, and 6 of PA3004 will exceed a prescribed level. If there is no input (DC) on pin no.4,  $S_2$  will be off, and a charging current will commence to flow to the timing capacitor ( $C_t$ ) connected to pin no.8. Once  $C_t$  has been charged up to a level where the voltage on pin no.8 exceeds a prescribed level,  $S_1$  will turn on, thereby applying a bias current from pin no.3 to the relay driving transistor ( $Q_r$ ). Consequently  $Q_r$  will turn on, and current will flow through the relay coil to activate the relay, and close the connection in the output circuit. The time required for this connection to close after the power supply is first turned on is several seconds. During this period, any unwanted transient noises will be therefore muted.

When the power supply is turned off, the input (AC) applied to pin no.7 ceases immediately, resulting in  $S_2$  turning on,  $C_t$  discharging rapidly, and  $S_1$  and  $Q_r$  both turning off. The relay is thus opened, disconnecting the output circuit.

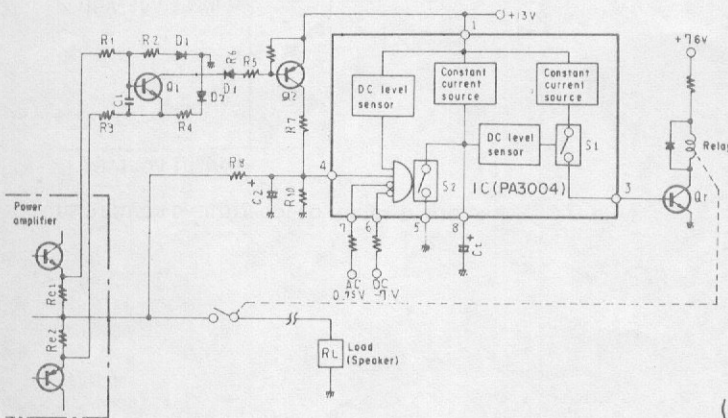


Fig. 8-1 Schematic diagram of protection

## DC Voltage Detector (Fig. 8-1)

The output circuit is connected to pin no.4 via a low-pass filter ( $R_8$  and  $C_2$ ). Any DC voltages appearing in the output circuit will also be applied to pin no.4, turning  $S_2$  on.  $C_t$  will thus discharge rapidly, turning  $S_1$  and  $Q_r$  off, thereby releasing the relay, and disconnecting the output circuit from the load.

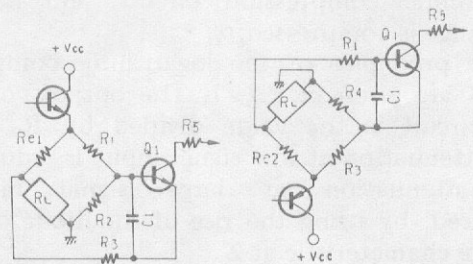
### Overload Detection

The overload detector circuit incorporates the load ( $RL$ ) in one side of a Wheatstone bridge (see Fig. 8-2). The base and emitter of a sensing transistor ( $Q_1$ ) are connected to the opposite corners of the bridge, so if  $RL$  decreases,  $Q_1$  will become forward biased. If  $RL$  falls below a prescribed value,  $Q_1$  will turn on, thereby passing a current through  $R_5$ ,  $D_3$  and  $R_6$ . Due to the voltage difference generated across  $R_6$ ,  $Q_2$  will become forward biased, and consequently turn on. A DC voltage will then be applied to pin no.4, turning  $S_2$  on, and resulting in the rapid discharge of  $C_t$ , and  $S_1$  and  $Q_r$  both turning off. The relay will again be released to disconnect the output circuit.

## 8.8 POWER SUPPLY

The power amplifier and power stage plus and minus supply voltages ( $\pm 62V$ ) are obtained by means of a bridge full-wave rectification system. 22000/71  $\times$  2 electrolytic capacitors are used.

Plus and minus voltages are supplied to the small signal circuit of the AF Section thru a constant voltage circuit by full-wave rectification from a winding separate from the power stage supply. Tuner section, lamp circuit and protection circuit power is supplied thru transistors Darlington connected ripple filter, after full-wave rectification.



(a) Positive half-cycle bridge (b) Negative half-cycle bridge

Fig. 8-2

## 9. ADJUSTMENT

### 9.1 AM TUNER

- Confirm that the dial pointer is at the start point.
  - Connect as shown in Fig. 9, and set the FUNCTION switch to "AM".
1. Set an AM signal generator to 400Hz, 30% modulation, 30dB output, at no input from AGC.
  2. Set the AM signal generator and the SX-1080 dial pointer to 600kHz, and adjust  $T_7$  for maximum output.
  3. Set the AM signal generator and the SX-1080 dial pointer to 1400kHz, and adjust  $TC_6$  for maximum output.
  4. Repeat steps 2 and 3 until reception is perfect at 600kHz and 1400kHz.
  5. Adjust  $F_6$  for maximum output.
  6. Adjust the core of the bar antenna (at 600kHz reception) and trimmer  $TC_5$  (at 1400kHz reception) for maximum output and minimum output deviation at 600kHz and 1400kHz.

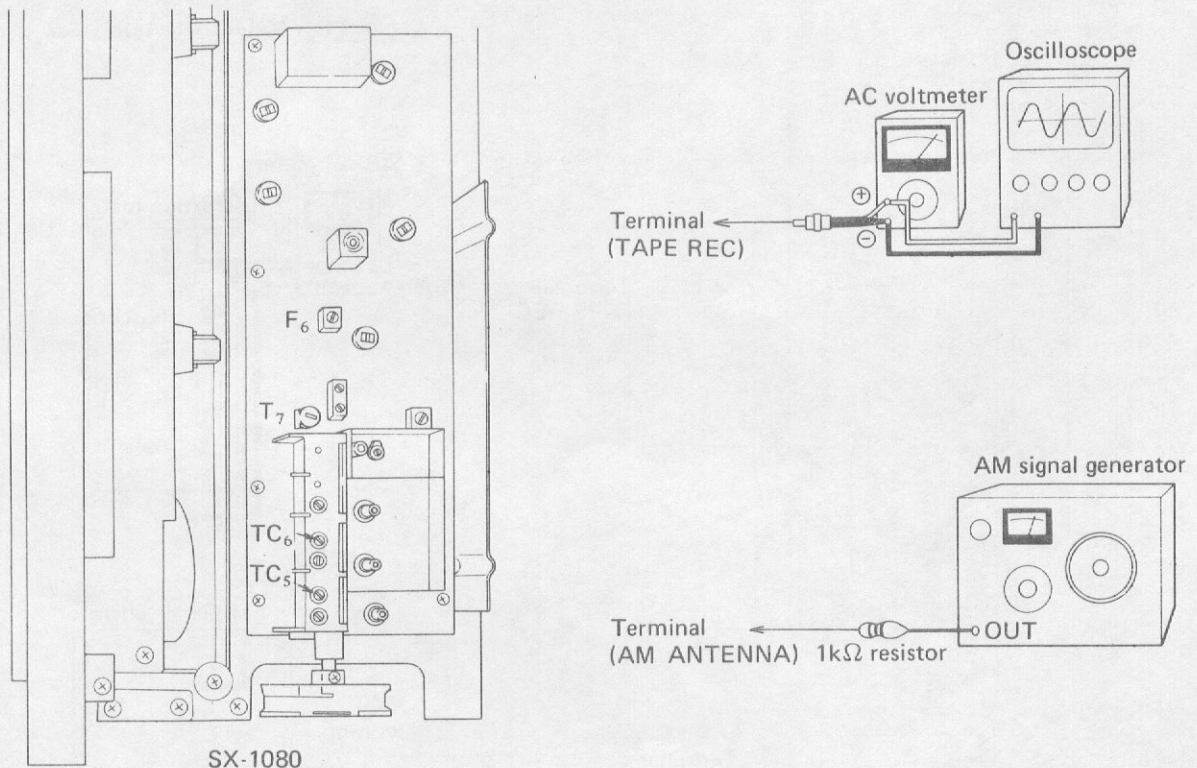


Fig. 9 Connection of AM tracking adjustment

## 9.2 FM TUNER

- Confirm that the dial is set to the start point.
- Connect as shown in Fig. 10, and set the FUNCTION switch to "FM" and the MUTING switch to "OFF".

1. Set an FM signal generator to 400Hz, 100% modulation 66dB output.
2. Set  $TC_4$  to near center capacitance, set the FM signal generator and the SX-1080 dial pointer to 90MHz, and adjust  $T_4$  for maximum deflection at the signal meter.
3. Under the state of "2" above, adjust the primary (bottom) core of  $T_6$  so that the pointer of the tuning meter deflects to the center of the scale.
4. Set the FM signal generator output to 15dB, and adjust  $T_1, T_2, T_3$  for maximum output.
5. Set the FM signal generator and the SX-1080 dial pointer to 106MHz, and adjust  $TC_4$  for maximum deflection at the signal meter. (Make the FM signal generator output 10dB).
6. Set the FM signal generator output to 15dB, and adjust  $TC_1, TC_2, TC_3$  for maximum output.
7. Repeat steps 2 - 6 until reception at 90MHz and 106MHz is perfect. At this time, adjust  $T_5$  for maximum output.

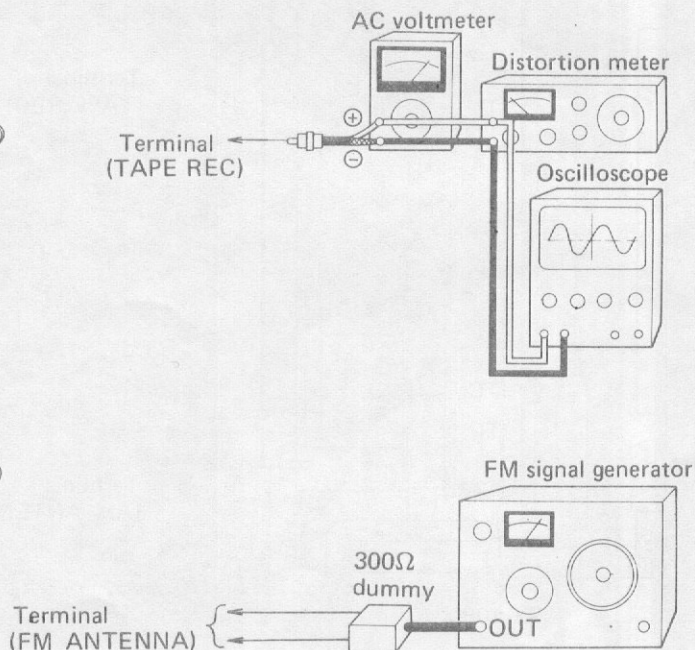
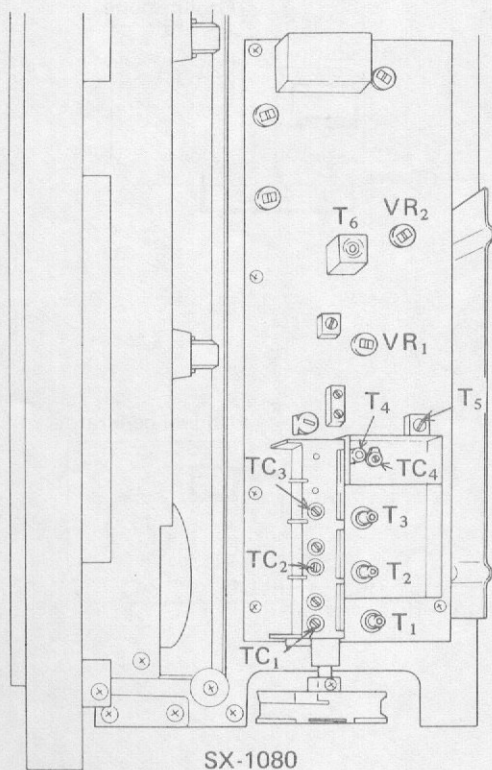


Fig. 10 Connection of FM tracking adjustment

8. Adjust the primary core (bottom) of  $T_6$  so that the pointer of the tuning meter deflects to the center of the scale in the untuned state (noise only).
9. Set the FM signal generator output to 66dB, set the SX-1080 dial pointer to 98MHz, and tune the FM signal generator at the tuning meter. (Pointer of tuning meter deflects to the center of the scale).
10. Adjust the secondary side (top) of  $T_6$  for minimum distortion.
11. Repeat steps 8 - 10 until the minimum distortion point does not change.
12. Set the FM signal generator output to 100dB, and adjust  $VR_2$  for maximum deflection at the signal meter (Fig. 11).
13. Set the FM signal generator output to 26 dB. Set the MUTING switch to "ON" and adjust  $VR_1$  so that the output waveform disappears.

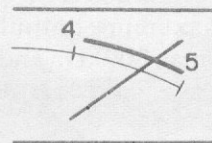


Fig. 11 Meter deflection

### 9.3 FM MPX

- Connect as shown in Fig. 12, and set the FUNCTION switch to "FM" and the MUTING switch to "OFF".
1. Set the FM signal generator to 98MHz unmodulated, 66dB output.
  2. Connect the output of the MPX SG PILOT OUT terminal to the horizontal axis input terminal of an oscilloscope and tuner ass'y terminal 13 to the vertical axis input.
  3. Set the SX-1080 dial pointer to 98MHz and adjust the FM signal generator so that the tuning meter deflects to the center of the scale.
  4. Adjust VR<sub>3</sub> so that a Lissajous pattern is traced on the oscilloscope (Fig. 13).
  5. Modulate the MPX SG at L+R (1kHz) to deviate the 67.5kHz pilot signal (19kHz) 7.5kHz.
  6. Adjust T<sub>5</sub> for minimum L channel or R channel distortion. (However, within ±90% of the core adjustment range).
  7. Make the MPX SG main signal L or R and adjust VR<sub>4</sub> for best separation.
  8. Next, set the MPX SG to 7.5kHz by pilot signal (19kHz).
  9. Adjust VR<sub>5</sub> for minimum output.

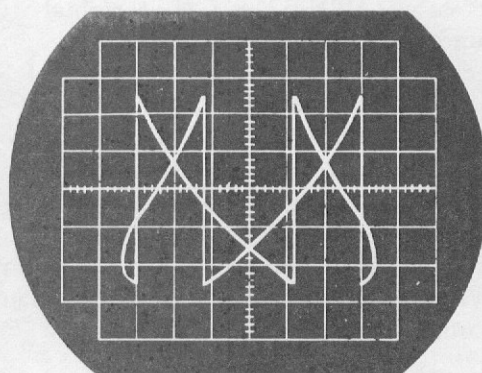


Fig. 13 Lissajous pattern

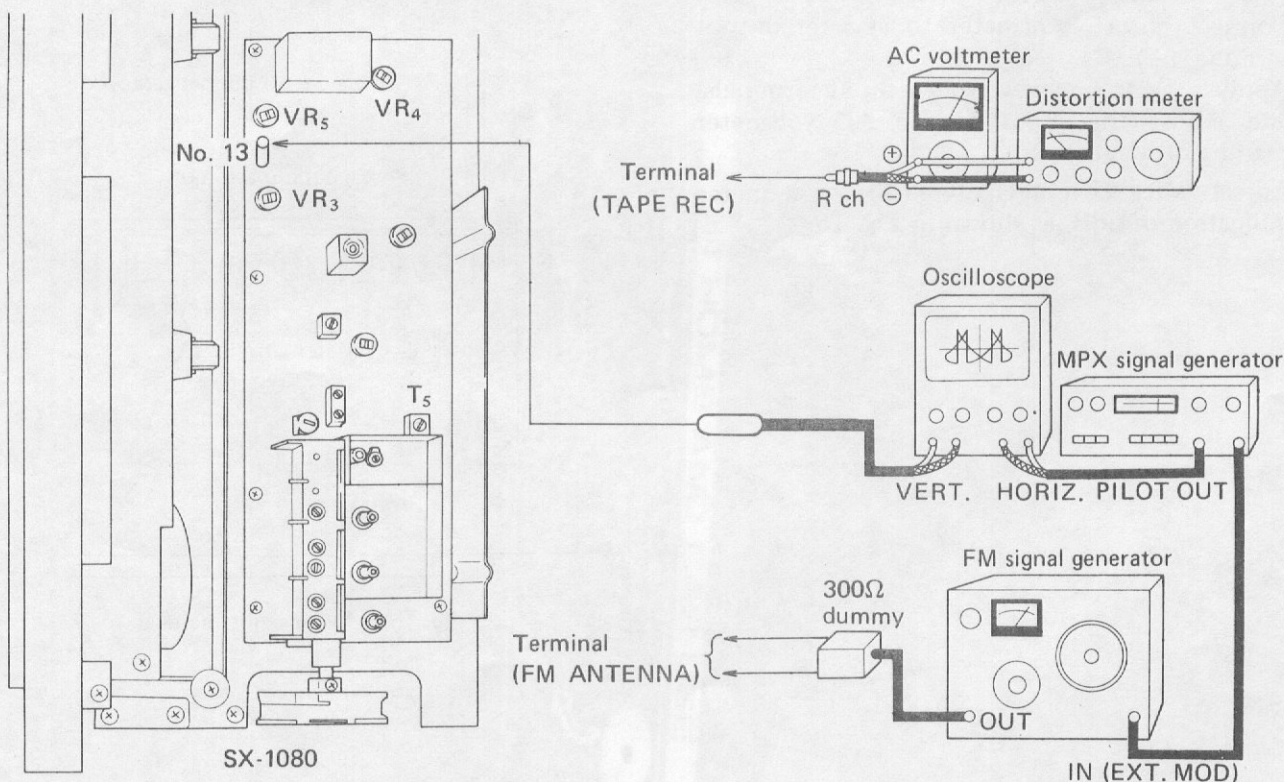


Fig. 12 Connection of FM MPX adjustment

## 9.4 POWER AMPLIFIER

### Center Voltage Adjustment

1. Connect a DC voltmeter between power amplifier ass'y (AWH-071) L-ch terminal 10 and ground .
2. Check if the voltage between terminal 10 and ground is 0V, adjust to 0V with VR<sub>2</sub>.
3. When 0V cannot be obtained by performing the adjustment of item 2 above, cut the jumper wire shown in Fig. 14 and adjust to 0V with VR<sub>2</sub>.
4. Thr R-ch also uses the power amplifier ass'y (AWH-071). Check and adjust this channel in accordance with items 1 - 3 above.

### Idle Current Adjustment

1. Connect a DC voltmeter between terminals 13-23 of the power amplifier ass'y (AWH-071) L-ch side .
2. Set the power switch to "ON", wait 10 minutes, and then check if the DC voltmeter reads 30mV. If it doesn't read 30mV, adjust to 30mV by turning VR<sub>1</sub>.
3. The R-ch also uses the power amplifier ass'y (AWH-071). Check and adjust this channel in accordance with items 1 - 4 above.

## 9.5 METER AMPLIFIER

1. Push speaker selector switch button "A".
2. Connect an AC voltmeter to speaker output terminal (A).
3. Apply a 1kHz sine wave to the input terminals, and adjust the input for an AC voltmeter reading of 31V.
4. Adjust VR<sub>1</sub> (L) and VR<sub>2</sub> (R) for a meter indication of 0dB, as shown in Fig. 15.

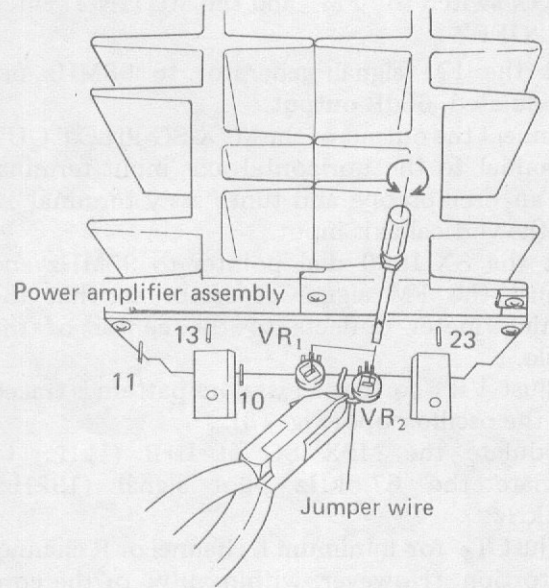


Fig. 14 Power amplifier adjustment

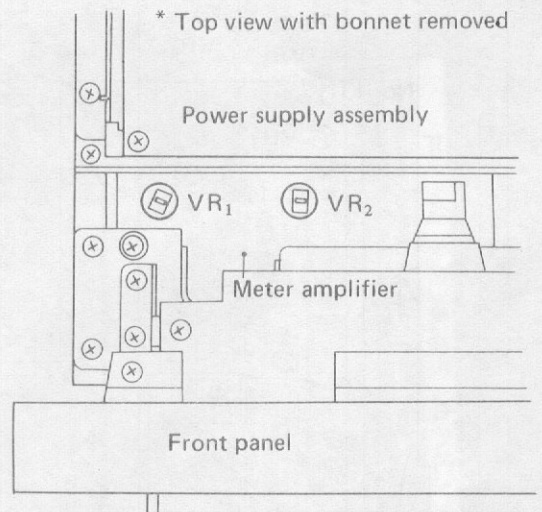


Fig. 15 Meter adjustment



# 10. DIAL CORD STRINGING

Remove the bonnet and front panel as described in "Disassembly" on page 10. Loosen screws ① - ③ and remove the blind sash as shown in Fig. 16.

1. Turn the front-end variable capacitor shaft fully clockwise (Vanes of capacitor fully inside.)
2. Tie one end of the string to the peg on the dial pulley.
3. Position the dial pulley so that the set screw is at the top and tighten the screw.
4. Pass the string through the notch in the dial pulley, wrap it 1/2 turn around the pulley and pass it thru pulley A → B pulley C → dial shaft (3 turns) → pulley D. Next, wrap the string two turns around the pulley, along the pulley grooves, and tie it to the spring hook.
5. Turn the dial shaft and confirm that the movement of the dial pulley and string is normal, and then cut off the surplus string.
6. Turn the dial shaft counter clockwise (variable capacitor vanes fully outside) and set the dial pointer to the start point of the scale and attach it to the string.

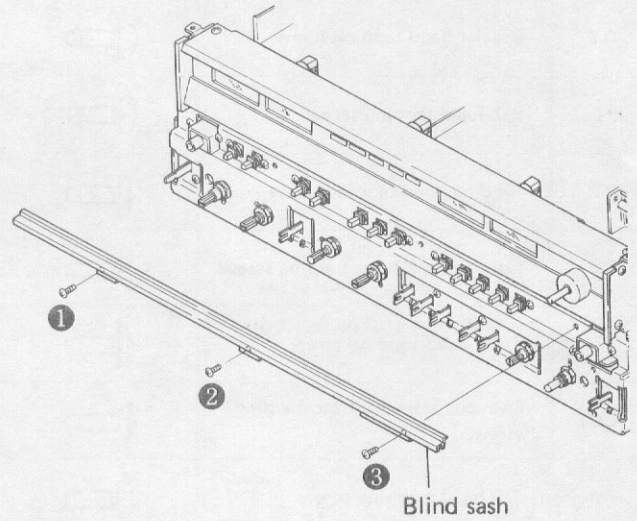


Fig. 16 Remove blind sash

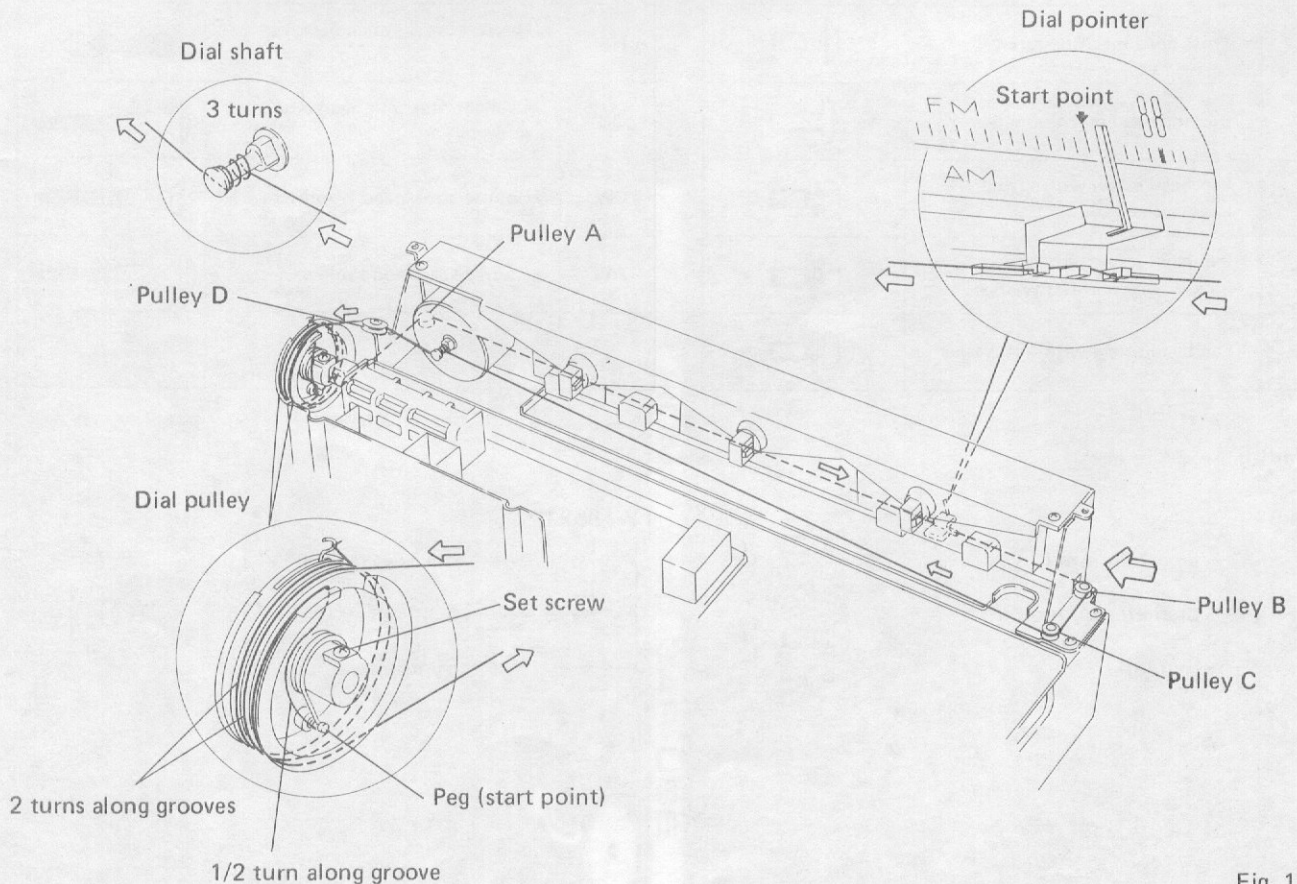














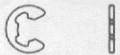






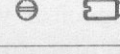
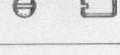
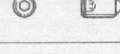

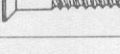
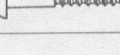


Fig. 17

# 11. EXPLODED VIEWS

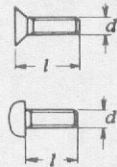
The following symbols stand for screws, washers and nuts as shown in exploded view.

Symbol	Description	Shape
RT	Brazier head tapping screw	
PT	Pan head tapping screw	
BT	Binding head tapping screw	
CT	Countersunk head tapping screw	
TT	Truss head tapping screw	
OCT	Oval countersunk head tapping screw	
PM	Pan head machine screw	
CM	Countersunk head machine screw	
OCM	Oval countersunk head machine screw	
TM	Truss head machine screw	
BM	Binding head machine screw	
PSA	Pan head screw with spring lock washer	
PSB	Pan head screw with spring lock washer and flat washer	
PSF	Pan head screw with flat washer	

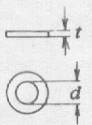
Symbol	Description	Shape
EW	E type washer	
FW	Flat washer	
SW	Spring lock washer	
N	Nut	
WN	Washer faced nut	
ITW	Internal toothed lock washer	
OTW	Outernal toothed lock washer	
SC	Slotted set screw (Cone point)	
SF	Slotted set screw (Flat point)	
HS	Hexagon socket headless set screw	
OCW	Oval countersunk head wood screw	
CW	Countersunk head wood screw	
RW	Round head wood screw	

## EXAMPLE

PM • 3x8  
 length in mm ( $l$ )  
 diameter in mm ( $d$ )  
 Symbol

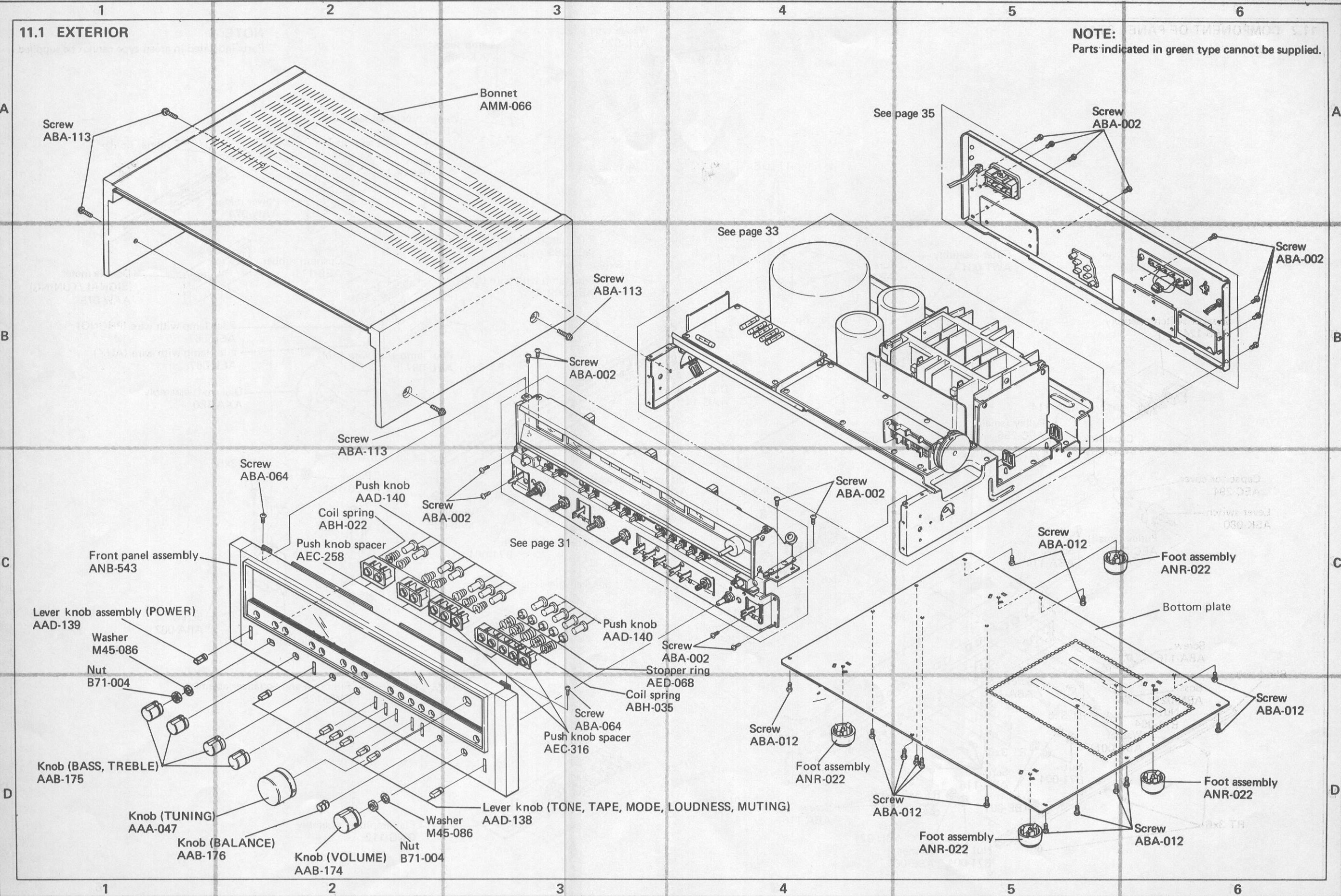


FW • 9φ × 1<sup>t</sup>  
 thickness in mm ( $t$ )  
 diameter in mm ( $d$ )  
 Symbol



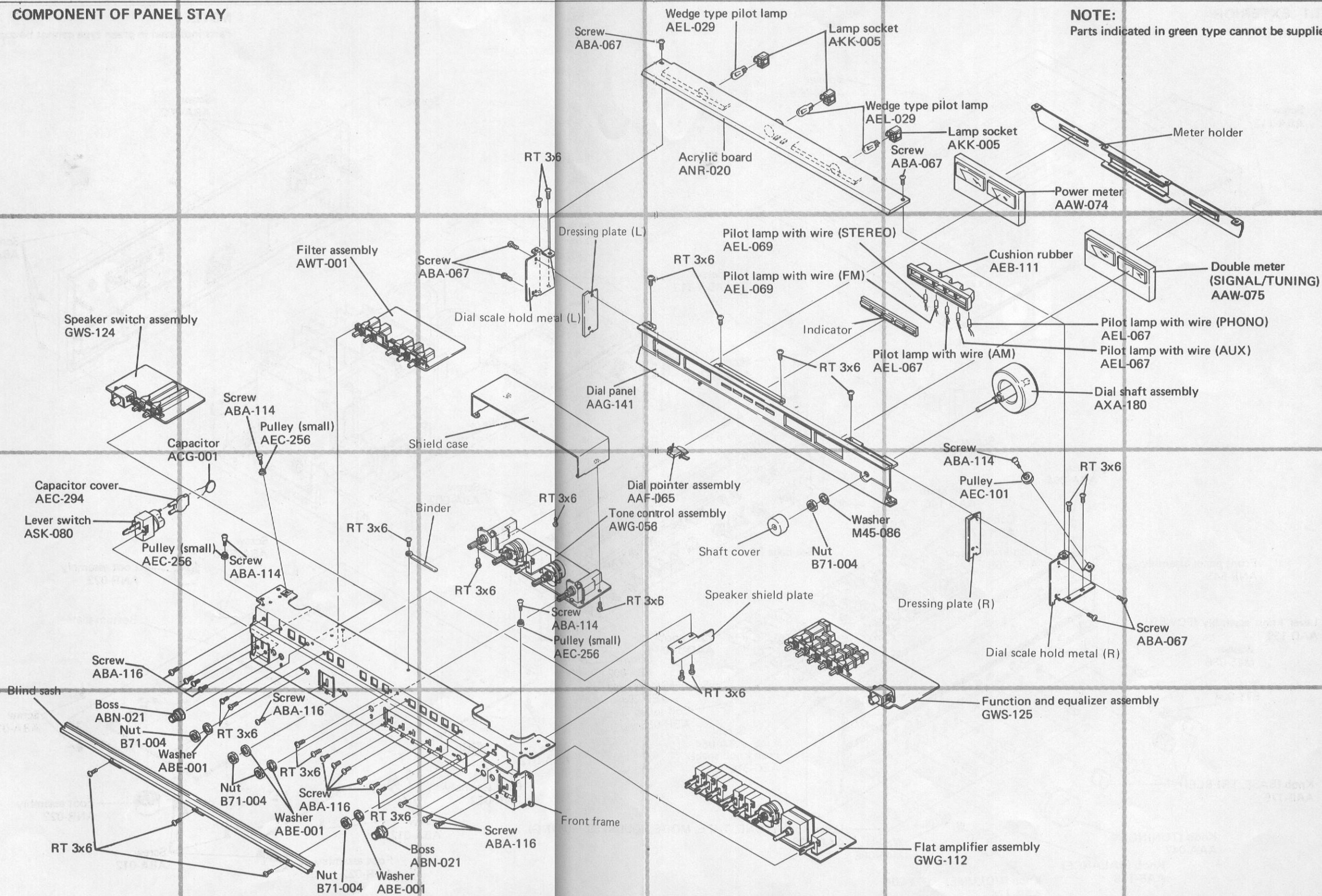
11.1 EXTERIOR

NOTE:  
Parts indicated in green type cannot be supplied.



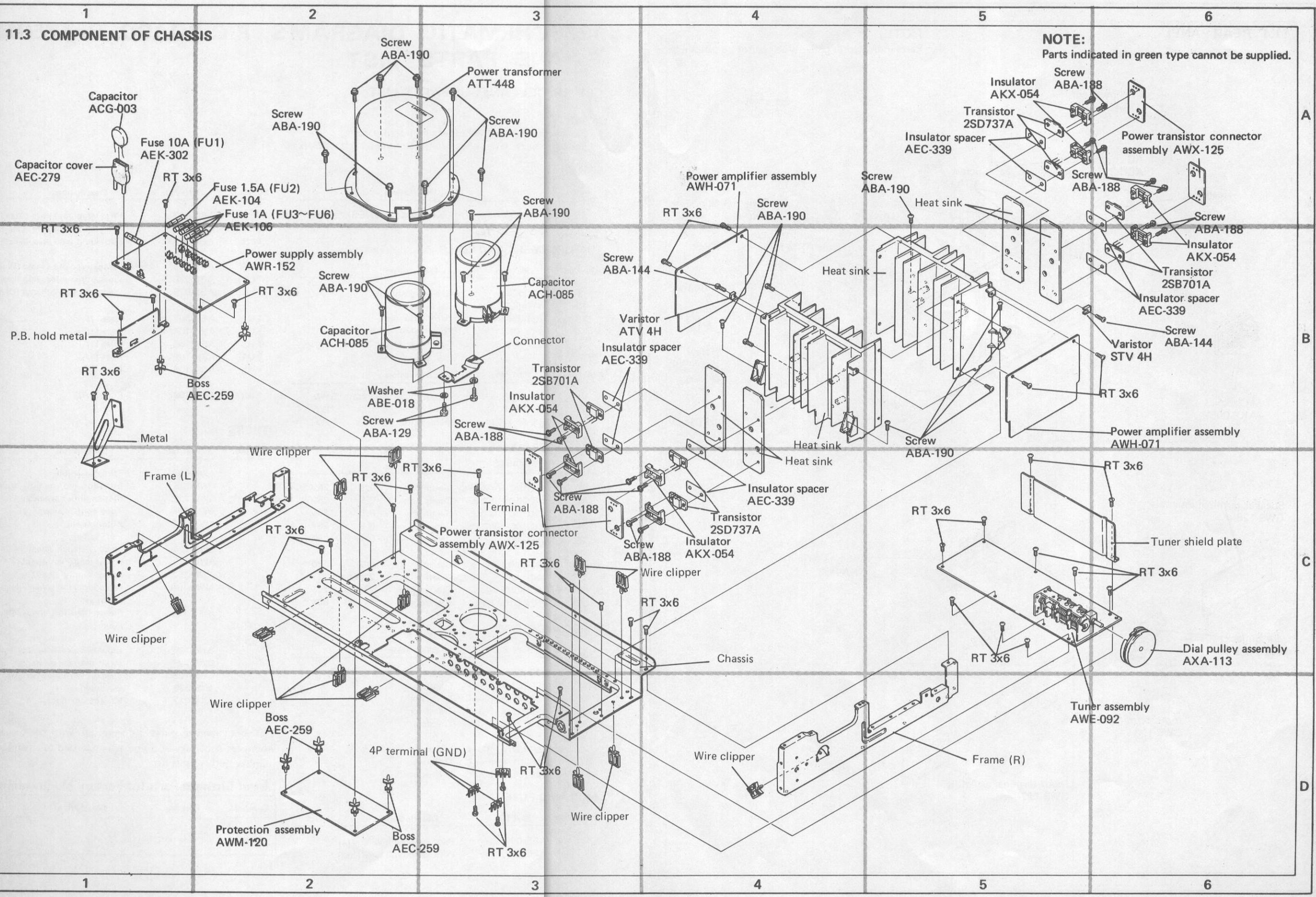
## 11.2 COMPONENT OF PANEL STAY

**NOTE:**  
Parts indicated in green type cannot be supplied.



11.3 COMPONENT OF CHASSIS

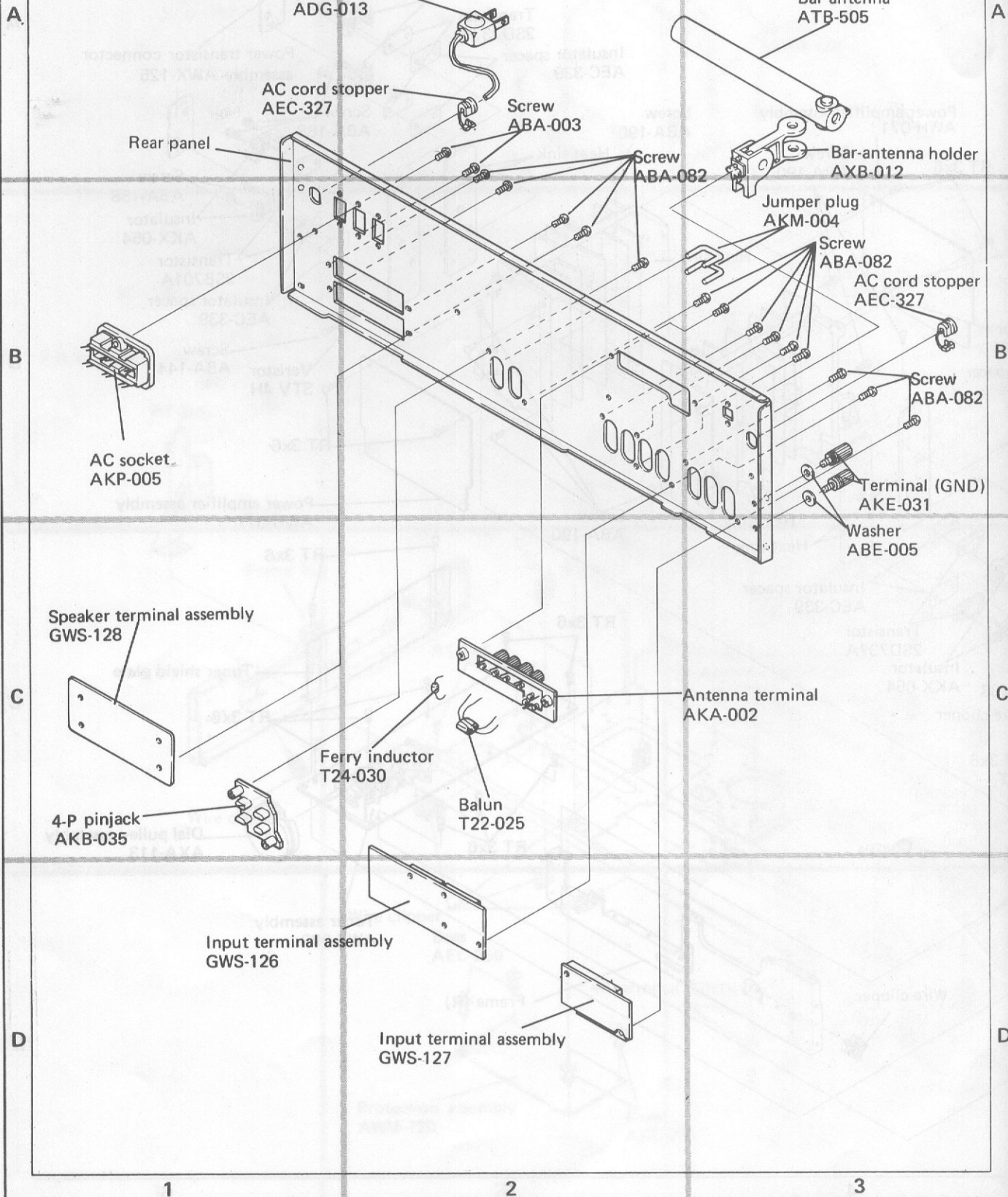
**NOTE:**  
Parts indicated in green type cannot be supplied.



# 11.4 REAR PANEL

## NOTE:

Parts indicated in green type cannot be supplied.



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

## 12.1 MISCELLANEOUS PARTS LIST

### NOTE:

- Capacitors: in  $\mu F$  unless otherwise noted p:pF
- Resistors: in  $\Omega$ ,  $\frac{1}{4}W$  unless otherwise noted k:k $\Omega$ , M:M $\Omega$

### SWITCH

Symbol	Part No.	Description	Symbol	Part No.	Description
S1	ASK-080	Lever Switch (POWER)	PL3	AEL-067	Pilot lamp with wire (AUX)
S2	ASR-046		PL4	AEL-067	Pilot lamp with wire (PHONO)
			PL5	AEL-069	Pilot lamp with wire (STEREO IND.)

### TRANSFORMERS AND COILS

Symbol	Part No.	Description	Symbol	Part No.	Description
T1	T22-025	Balun transformer	PL7	AEL-029	Wedge type pilot lamp (Dial scale)
T2	ATB-505	Bar antenna	PL8	AEL-029	Wedge type pilot lamp (Dial scale)
T3	T24-030	Ferry inductor	PL9	AEL-029	Wedge type pilot lamp (Dial scale)
T4	ATT-448	Power transformer	FU1	AEK-302	Fuse (10A)
			FU2	AEK-104	Fuse (1.5A)
			FU3	AEK-106	Fuse (1A)
			FU4	AEK-106	Fuse (1A)
			FU5	AEK-106	Fuse (1A)

### RESISTOR

Symbol	Part No.	Description
R1	RD $\frac{1}{2}$ PS 225J	Carbon film 2.2M $\frac{1}{4}W$
R2	RS 2P 122J	Metal oxide 1.2k 2W
R3	RS 2P 122J	Metal oxide 1.2k 2W

### OTHERS

Symbol	Part No.	Description
	AWE-092	Tuner assembly
	GWS-125	Function and equalizer assembly
	GWG-112	Flat amplifier assembly
	AWG-056	Tone control assembly
	AWT-001	Filter assembly
	GWS-124	Speaker switch assembly
	AWH-071	Power amplifier assembly
	AWR-152	Power supply assembly
	AWM-120	Protection and surge killer assembly
	AWX-125	Power transistor connector assembly
	GWS-126	Input terminal assembly
	GWS-127	Input terminal assembly
	GWS-128	Speaker terminal assembly
	ATB-505	Bar antenna
	AXB-012	Bar antenna holder

### CAPACITORS

Symbol	Part No.	Description
C1	CKDBC 104Z 25	Ceramic 0.1 25V
C2	CKDBC 104Z 25	Ceramic 0.1 25V
C3	CKDBC 104Z 25	Ceramic 0.1 25V
C4	CKDBC 104Z 25	Ceramic 0.1 25V
C5	ACG-001	Ceramic 0.01 250V
C6	ACG-003	Ceramic 0.01 125V
C7	ACH-085	Electrolytic 22000 71V
C8	ACH-085	Electrolytic 22000 71V
C9	CEA 010P 80	Electrolytic 1 80V

### SEMICONDUCTORS

Symbol	Part No.	Description
Q1	2SD737/A/-B or C	Transistor
Q2	2SD737/A/-B or C	Transistor
Q3	2SB701/A/-B or C	Transistor
Q4	2SB701/A/-B or C	Transistor
Q5	2SD737/A/-B or C	Transistor
Q6	2SD737/A/-B or C	Transistor
Q7	2SB701/A/-B or C	Transistor
Q8	2SB701/A/-B or C	Transistor

### LAMPS AND FUSES

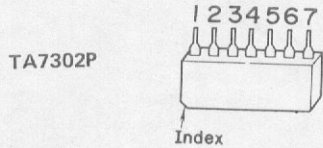
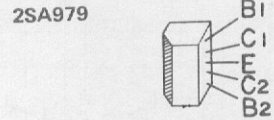
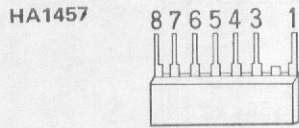
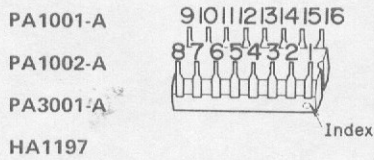
Symbol	Part No.	Description
PL1	AEL-069	Pilot lamp with wire (FM)
PL2	AEL-067	Pilot lamp with wire (AM)

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

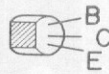
### List of Changed Parts for Factory Modification

Symbol	Part No.	Description

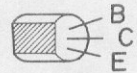
External Appearance of Transistor and ICs



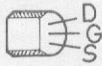
- 2SA733
- 2SA872A
- 2SC945A
- 2SC1438
- 2SC1775A
- 2SC1906
- 2SC1915



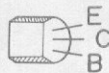
- 2SA684A
- 2SA912
- 2SC1384
- 2SC1885



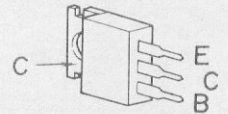
- 2SK34
- 2SK68A



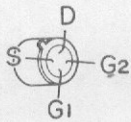
- 2SA726S
- 2SA904A
- 2SC869
- 2SC1312
- 2SC1914
- 2SC1919



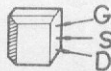
- 2SB536A
- 2SD381A



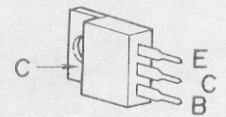
- 3SK45



- 2SK55



- 2SB682
- 2SD712

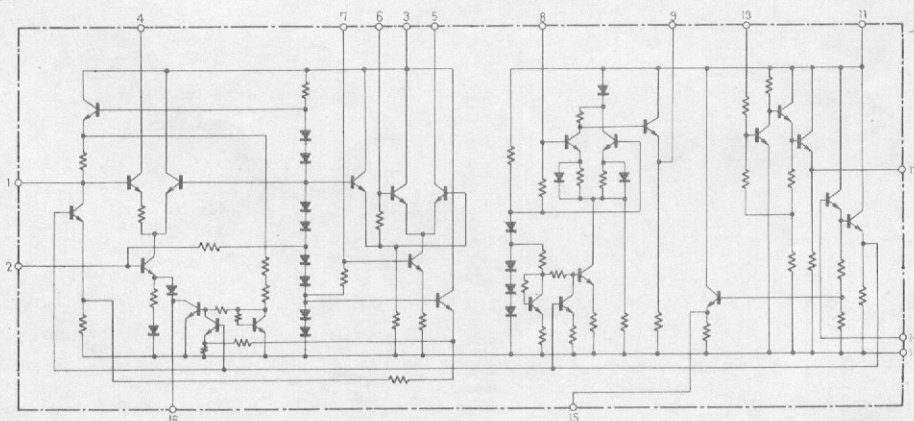


- 2SA850
- 2SC1735



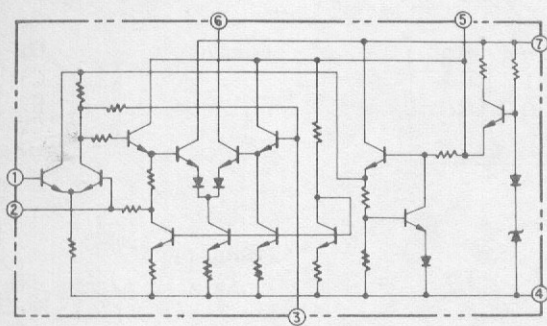
Circuit Diagram of IC

HA1197

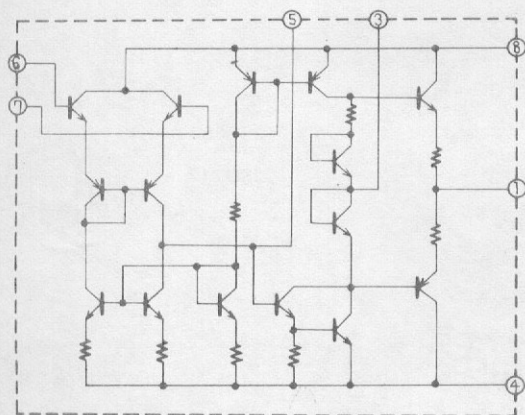




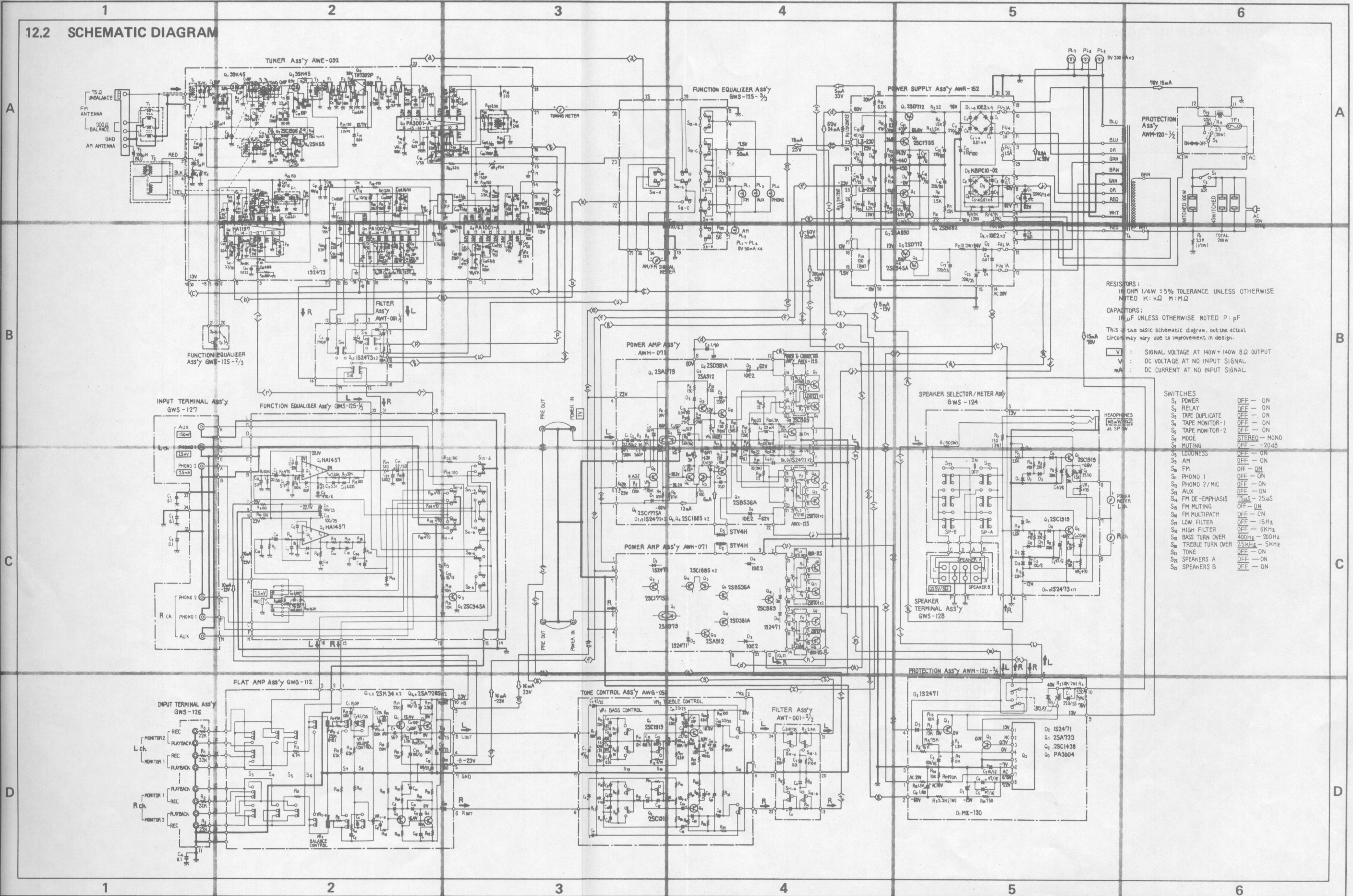
TA730P



HA1457



12.2 SCHEMATIC DIAGRAM



RESISTORS:  
 IN OHM 1/4W ± 5% TOLERANCE UNLESS OTHERWISE NOTED  
 K: kΩ M: MΩ

CAPACITORS:  
 IN μF UNLESS OTHERWISE NOTED P: pF

THIS IS THE BASIC SCHEMATIC DIAGRAM, BUT THE ACTUAL CIRCUITRY MAY VARY DUE TO IMPROVEMENT IN DESIGN.

V: SIGNAL VOLTAGE AT 140W + 140W 8Ω OUTPUT  
 V: DC VOLTAGE AT NO INPUT SIGNAL  
 mA: DC CURRENT AT NO INPUT SIGNAL

SWITCHES

S1 POWER	OFF - ON
S2 RELAY	OFF - ON
S3 TAPE DUPLICATE	OFF - ON
S4 TAPE MONITOR-1	OFF - ON
S5 TAPE MONITOR-2	OFF - ON
S6 MODE	STEREO - MONO
S7 MUTING	OFF - ON
S8 LOUDNESS	OFF - ON
S9 AM	OFF - ON
S10 PHONO 1	OFF - ON
S11 PHONO 2/MIC	OFF - ON
S12 AUX	OFF - ON
S13 FM DE-EMPHASIS	75μS
S14 FM MUTING	OFF - ON
S15 FM MULTIPATH	OFF - ON
S16 LOW FILTER	OFF - 15Hz
S17 HIGH FILTER	400Hz - 200Hz
S18 TREBLE TURN OVER	25kHz - 5kHz
S19 TONE	OFF - ON
S20 SPEAKERS A	OFF - ON
S21 SPEAKERS B	OFF - ON

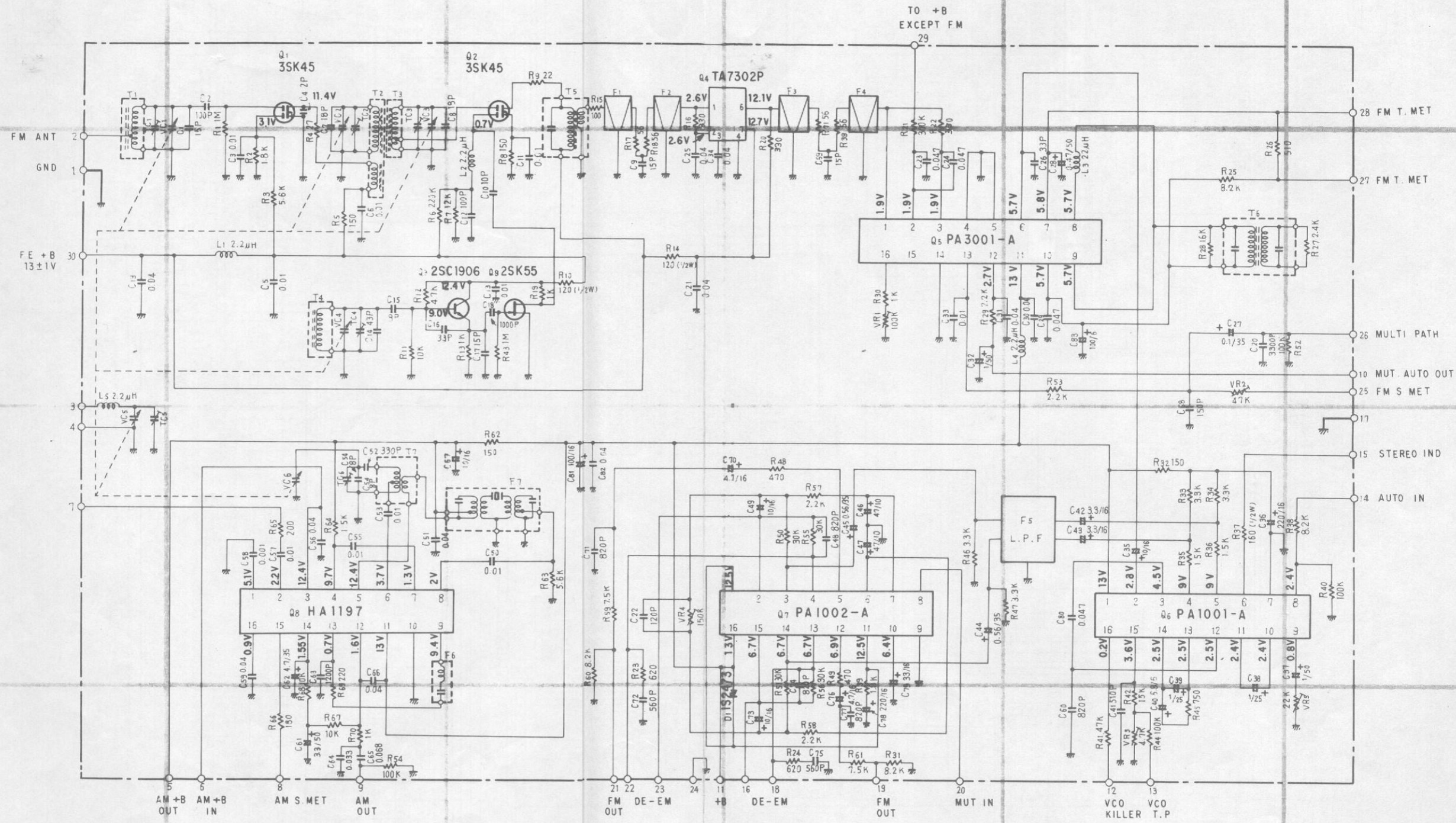
12.3 TUNER ASSEMBLY (AWE-092)

A

B

C

D



1 2 3 4 5 6

A

A

B

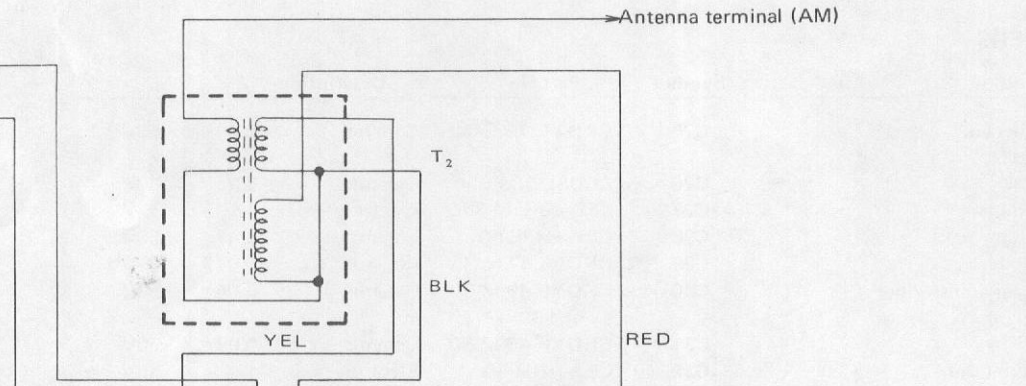
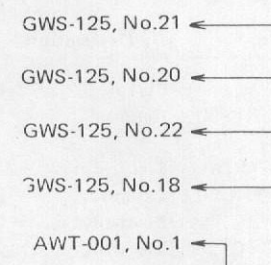
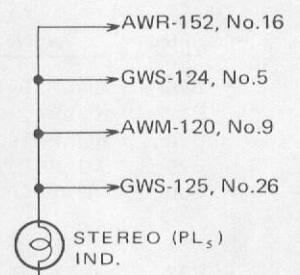
B

C

C

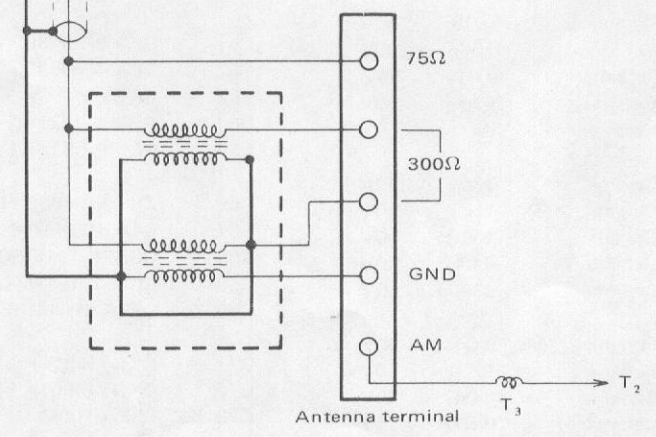
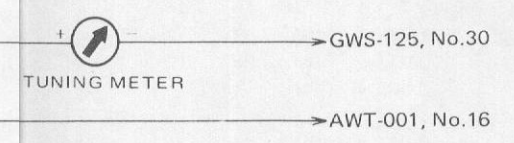
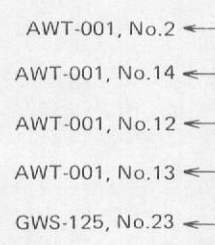
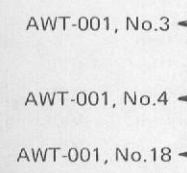
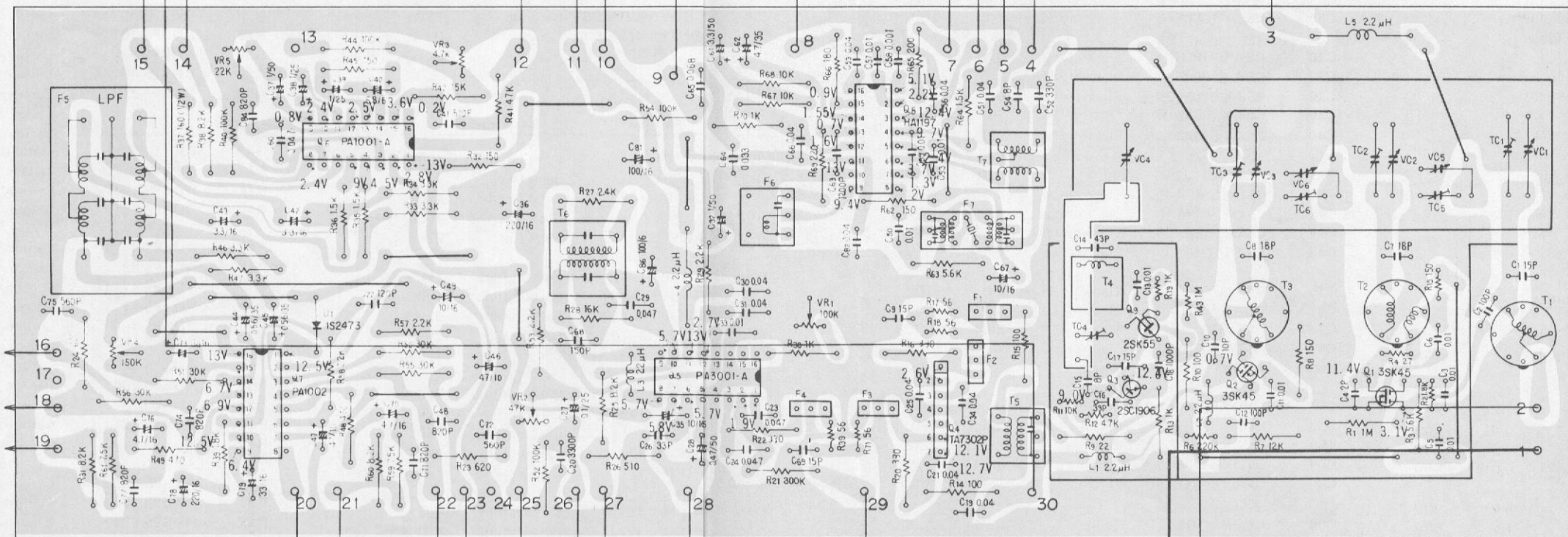
D

D



Foil side

AWT-001, No.9



1 2 3 4 5 6

# Parts List of Tuner Assembly (AWE-092)

(MA) Internal revision

## TRANSFORMER, COILS AND FILTERS

Symbol	Part No.	Description	Symbol	Part No.	Description			
T1	ATC-021	FM antenna coil	C25	CKDYF 403Z 50	Ceramic	0.04	50V	
T2	ATC-015	FM RF coil						
T3	ATC-016	FM RF coil	C26	CCDSL 330K 50	Ceramic	33p	50V	
T4	ATC-057	FM RF coil	C27	CSZA 0R1M 35	Electrolytic	0.1	35V	
T5	ATE-039	FM matching coil	C28	CEA R47P 50	Electrolytic	0.47	50V	
T6	ATE-030	FM detector transformer	C29	CKDBC 473Z 25	Ceramic	0.047	25V	
T7	ATB-013	AM OSC coil	C30	CKDYF 403Z 50	Ceramic	0.04	50V	
F1	ATF-018	FM ceramic filter	C31	CKDYF 403Z 50	Ceramic	0.04	50V	
F2	ATF-018	FM ceramic filter	C32	CEA 010P 50	Electrolytic	1	50V	
F3	ATF-018	FM ceramic filter	C33	CKDYF 103Z 50	Ceramic	0.01	50V	
F4	ATF-018	FM ceramic filter	C34	CKDYF 103Z 50	Ceramic	0.04	50V	
F5	ATF-047	Low pass filter	C35	CSZA 100M 16	Electrolytic	10	16V	
F6	ATF-038	455kHz filter	C36	CEA 221P 16	Electrolytic	220	16V	
F7	ATF-034	AM ceramic filter	C37	CEA 010P 50	Electrolytic	1	50V	
L1	T24-028	RF choke coil	C38	CSZA 010M 25	Electrolytic	0.1	25V	
L2	T24-028	RF choke coil	C39	CSZA 100M 16	Electrolytic	10	16V	
L3	ATH-014	Micro inductor	C40	CSZA 6R8M6	Electrolytic	6.8	6V	
L4	T24-028	RF choke coil	C41	CQSH 511J 50	Styrol	510p	50V	
L5	T24-028	RF choke coil	C42	CSZA 3R3M 16	Electrolytic	3.3	16V	
			C43	CSZA 3R3M 16	Electrolytic	3.3	16V	
			C44	CSZA R56K 35	Electrolytic	0.56	35V	
			C45	CSZA R56K 35	Electrolytic	0.56	35V	

## CAPACITORS

Symbol	Part No.	Description						
VC	ACK-022	Variable capacitor	C46	CEA 470P 10	Electrolytic	47	10V	
TC4	ACM-006	Ceramic trimmer	C47	CEA 470P 10	Electrolytic	47	10V	
C1	CCDTH 150K 50	Ceramic	C48	ACE-019	Styrol	880p		
C2	CCDSL 101K 50	Ceramic	C49	CSZA 100M 16	Electrolytic	10	16V	
C3	CKDYF 103Z 50	Ceramic	C50	CKDYF 103Z 50	Ceramic	0.01	50V	
C4	CCDSL 020C 50	Ceramic	C51	CKDYF 403Z 50	Ceramic	0.04	50V	
C5	CKDYF 103Z 50	Ceramic	C52	CQSA 331J 50	Styrol	330p	50V	
C6	CKDYF 103Z 50	Ceramic	C53	CKDYF 103Z 50	Ceramic	0.01	50V	
C7	CCDTH 180K 50	Ceramic	C54	CCDXL 080F 50	Ceramic	8p	50V	
C8	CCDTH 180K 50	Ceramic	C55	CKDYF 103Z 50	Ceramic	0.01	50V	
C9	CCDSL 150K 50	Ceramic	C56	CKDYF 403Z 50	Ceramic	0.04	50V	
C10	CCDSL 100F 50	Ceramic	C57	CKDYF 103Z 50	Ceramic	0.01	50V	
C11	CKDYB 103K 50	Ceramic	C58	CKDYB 102K 50	Ceramic	1000p	50V	
C12	CCDSL 101K 50	Ceramic	C59	CKDYF 403Z 50	Ceramic	0.04	50V	
C13	CKDYB 103K 50	Ceramic	C60	CKDYB 821K 50	Ceramic	820p	50V	
C14	CCDLH 430K 50	Ceramic	C61	CEA 3R3P 50	Electrolytic	3.3	50V	
C15	CCDCH 080F 50	Ceramic	C62	CEA 4R7P 35	Electrolytic	4.7	35V	
C16	CCDCH 330K 50	Ceramic	C63	CKDYB 122K 50	Ceramic	1200p	50V	
C17	CCDCH 150K 50	Ceramic	C64	CQMA 333J 50	Mylar	0.033	50V	
C18	CKDYB 102K 50	Ceramic	C65	CQMA 683J 50	Mylar	0.068	50V	
C19	CKDYF 403Z 50	Ceramic	C66	CKDYF 403Z 50	Ceramic	0.04	50V	
C20	CKDYA 332J 50	Ceramic	C67	CEA 100P 16	Electrolytic	10	16V	
C21	CKDYF 403Z 50	Ceramic	C68	CCDSL 151K 50	Ceramic	150p	50V	
C22	CCDSL 121K 50	Ceramic	C69	CCDSL 151K 50	Ceramic	150p	50V	
C23	CKDBC 473Z 25	Ceramic	C70	CSZA 4R7M 16	Electrolytic	4.7	16V	
C24	CKDBC 473Z 25	Ceramic	C71	CKDYB 821K 50	Ceramic	820p	50V	
			C72	CKDYB 561K 50	Ceramic	560p	50V	
			C73	CSZA 100M 16	Electrolytic	10	16V	

Symbol	Part No.	Description	Symbol	Part No.	Description
C74	ACE-019	Styrol	R26	RD%PS 511J	Carbon film 510
C75	CKDYB 561K 50	Ceramic	R27	RD%PS 242J	Carbon film 2.4k
C76	CSZA 4R7M 16	Electrolytic	R28	RD%PS 163J	Carbon film 16k
C77	CKDYB 821K 50	Ceramic	R29	RD%PS 222J	Carbon film 2.2k
C78	CEA 221P 16	Electrolytic	R30	RD%PS 102J	Carbon film 1k
C79	CEA 330P 16	Electrolytic	R31	RD%PS 822J	Carbon film 8.2k
C80	CQMA 473K 50	Mylar	R32	RD%PS 151J	Carbon film 150
C81	CEA 101P 16	Electrolytic	R33	RD%PS 332J	Carbon film 3.3k
C82	CKDYF 403Z 50	Ceramic	R34	RD%PS 332J	Carbon film 3.3k
C83	CEA 101P 6	Electrolytic	R35	RD%PS 152J	Carbon film 1.5k
C84	CKDYB 821K 50	Ceramic	R36	RD%PS 152J	Carbon film 1.5k
C85	CKDYF 403Z 50	Ceramic	R37	RD%PS 161J	Carbon film 160

### RESISTORS

Symbol	Part No.	Description	Symbol	Part No.	Description
VR1	C92-047	Semi fixed 100k	R41	RD%PS 473J	Carbon film 47k
VR2	C92-048	Semi fixed 47k	R42	RN <sup>1</sup> / <sub>2</sub> SQ 1502F	Metal film 15k
VR3	C92-051	Semi fixed 4.7k	R43	RD%VS 105J	Carbon film 1M
VR4	ACP-057	Semi fixed 150k	R44	RD%PS 104J	Carbon film 100k
VR5	ACP-056	Semi fixed 22k	R45	RD%PS 751J	Carbon film 750
R1	RD%PS 105J	Carbon film 1M	R46	RD%PS 332J	Carbon film 3.3k
R2	RD%VS 182J	Carbon film 1.8k	R47	RD%PS 332J	Carbon film 3.3k
R3	RD%PS 562J	Carbon film 5.6k	R48	RD%PS 471J	Carbon film 470
R4	RD%VS 270J	Carbon film 27	R49	RD%PS 471J	Carbon film 470
R5	RD%VS 151J	Carbon film 150	R50	RD%PS 303J	Carbon film 30k
R6	RD%VS 224J	Carbon film 220k	R51	RD%PS 303J	Carbon film 30k
R7	RD%PS 123J	Carbon film 12k	R52	RD%PS 104J	Carbon film 100k
R8	RD%PS 151J	Carbon film 150	R53	RD%PS 222J	Carbon film 2.2k
R9	RD%PS 220J	Carbon film 22	R54	RD%PS 104J	Carbon film 100k
R10	RD%PS 121J	Carbon film 120	R55	RD%PS 303J	Carbon film 30k
R11	RD%VS 103J	Carbon film 10k	R56	RD%PS 303J	Carbon film 30k
R12	RD%VS 472J	Carbon film 4.7k	R57	RD%PS 222J	Carbon film 2.2k
R13	RD%PS 102J	Carbon film 1k	R58	RD%PS 222J	Carbon film 2.2k
R14	RD%PS 121J	Carbon film 120	R59	RD%PS 752J	Carbon film 7.5k
R15	RD%PS 101J	Carbon film 100	R60	RD%PS 822J	Carbon film 8.2k
R16	RD%PS 331J	Carbon film 330	R61	RD%PS 752J	Carbon film 7.5k
R17	RD%VS 560J	Carbon film 56	R62	RD%PS 151J	Carbon film 150
R18	RD%VS 560J	Carbon film 56	R63	RD%PS 562J	Carbon film 5.6k
R19	RD%VS 102J	Carbon film 1k	R64	RD%PS 152J	Carbon film 1.5k
R20	RD%PS 331J	Carbon film 330	R65	RD%PS 201J	Carbon film 200
R21	RD%PS 304J	Carbon film 300k	R66	RD%PS 181J	Carbon film 180
R22	RD%PS 331J	Carbon film 330	R67	RD%PS 103J	Carbon film 10k
R23	RD%PS 621J	Carbon film 620	R68	RD%PS 103J	Carbon film 10k
R24	RD%PS 621J	Carbon film 620	R69	RD%PS 222J	Carbon film 2.2k
R25	RD%PS 822J	Carbon film 8.2	R70	RD%PS 102J	Carbon film 1k
			R71	RD%VS 560J	Carbon film 56
			R72	RD%VS 560J	Carbon film 56

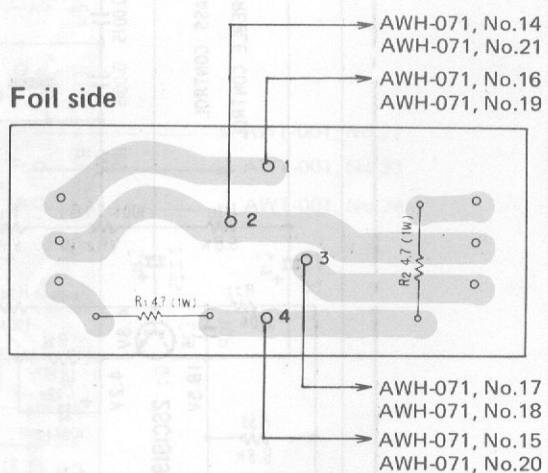
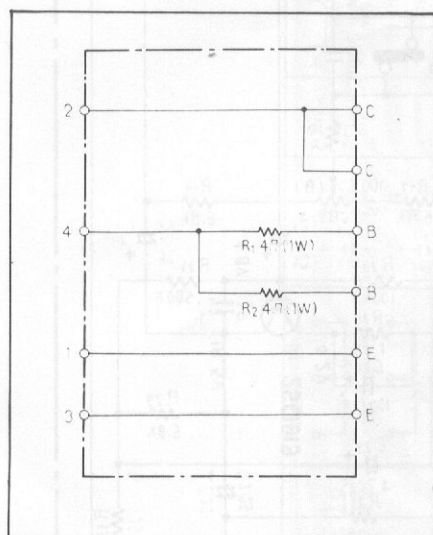
SEMICONDUCTORS

Symbol	Part No.	Description
Q1	3SK45-B	FET
Q2	3SK45-B	FET
Q3	2SC1906	Transistor
Q4	TA 7302P	IC
Q5	PA3001-A	IC
Q6	PA 1001-A	IC
Q7	PA 1002-A	IC
Q8	HA1197	IC
Q9	2SK55-D	FET
D1	1S2473	Diode

List of Changed Parts for Factory Modification

Symbol	Part No.	Description

12.4 POWER TRANSISTOR CONNECTOR ASSEMBLY (AWX-125)

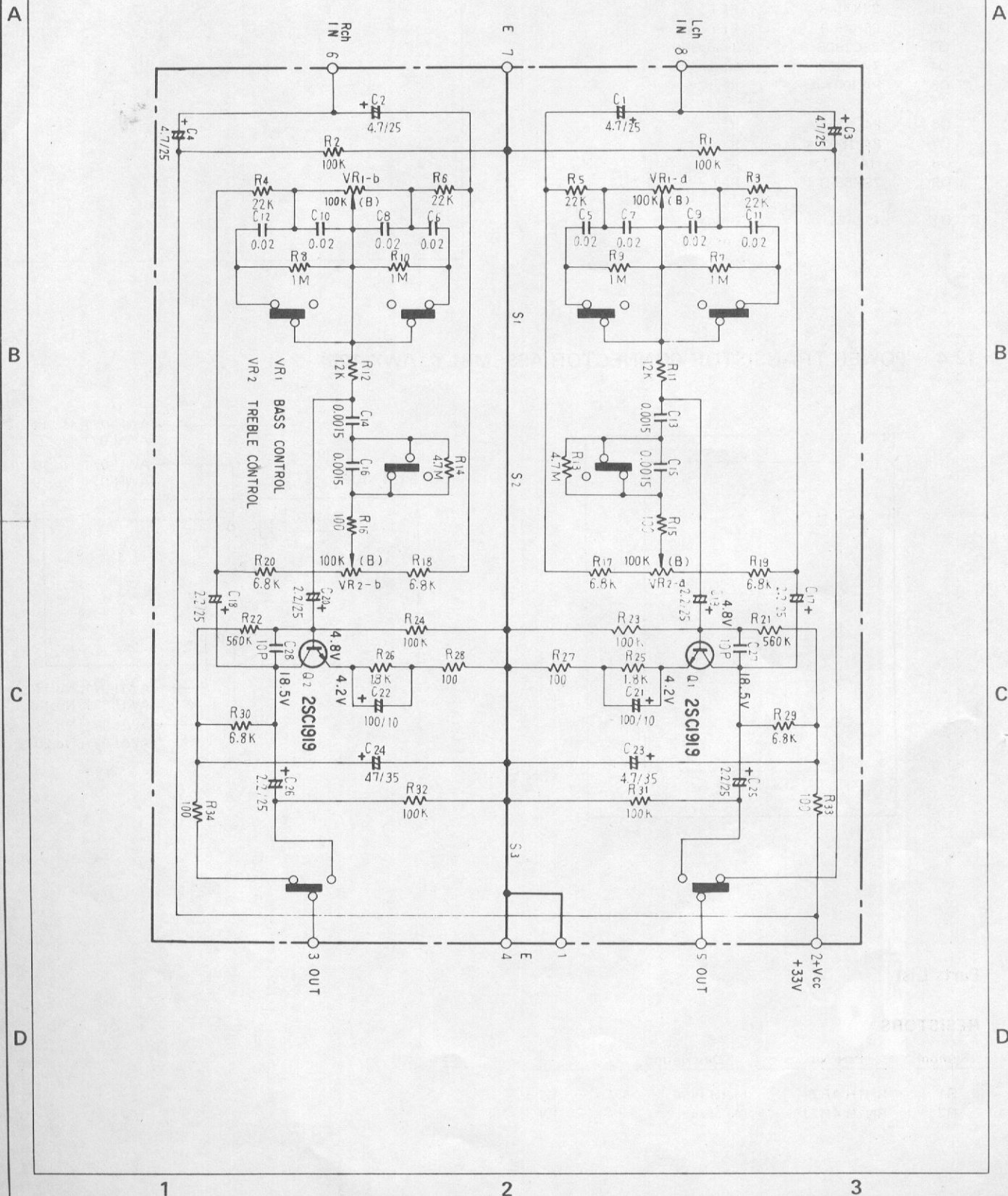


Parts List

RESISTORS

Symbol	Part No.	Description
R1	RN1H 4R7J	Metal film 4.7 1W
R2	RN1H 4R7J	Metal film 4.7 1W

# 12.5 TONE CONTROL ASSEMBLY (AWG-056)





1

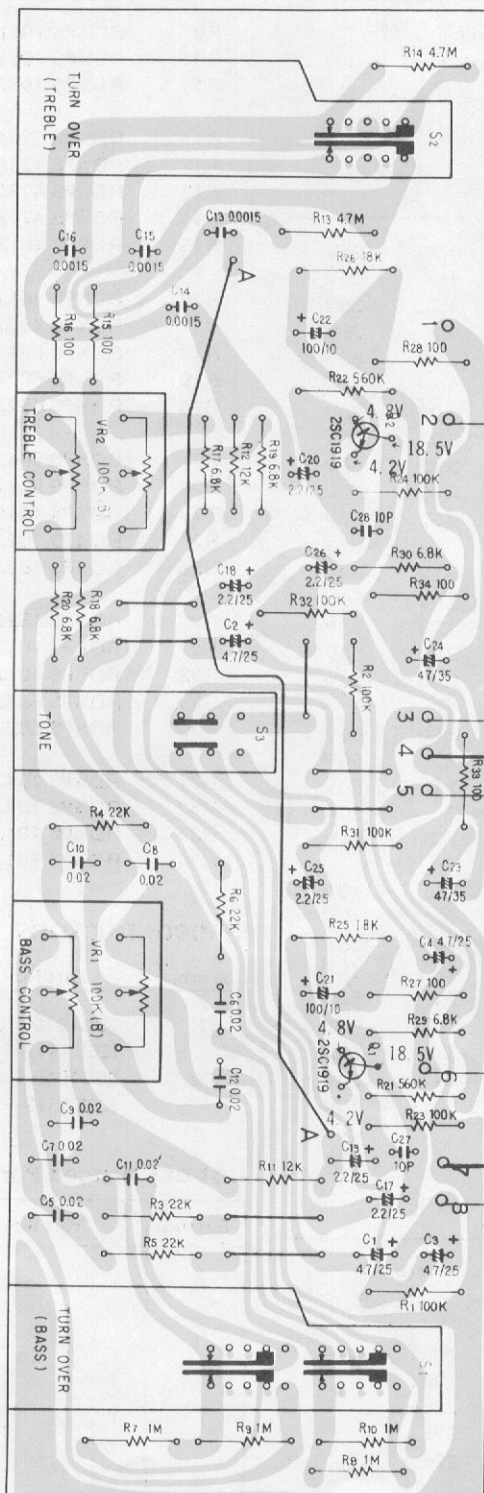
2

3

A

A

Foil side



AWR-152, No.20

AWT-001, No.22

AWT-001, No.23

AWT-001, No.24

GWG-112, No.6

GWG-112, No.7

GWG-112, No.8

1

2

3

D

D

# Parts List of Tone Amplifier Assembly (AWG-056)

## SWITCHES

Symbol	Part No.	Description
S1	ASE-105	Rotary slide switch
S2	ASE-106	Rotary slide switch
S3	ASK-144	Lever switch

Symbol	Part No.	Description
R8	RD $\frac{1}{4}$ PS 105J	Carbon film 1M
R9	RD $\frac{1}{4}$ PS 105J	Carbon film 1M
R10	RD $\frac{1}{4}$ PS 105J	Carbon film 1M
R11	RD $\frac{1}{4}$ PS 123J	Carbon film 12k
R12	RD $\frac{1}{4}$ PS 123J	Carbon film 12k
R13	RD $\frac{1}{4}$ PS 475J	Carbon film 4.7M
R14	RD $\frac{1}{4}$ PS 475J	Carbon film 4.7M
R15	RD $\frac{1}{4}$ PS 101J	Carbon film 100
R16	RD $\frac{1}{4}$ PS 101J	Carbon film 100
R17	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R18	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R19	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R20	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R21	RD $\frac{1}{4}$ PS 564J	Carbon film 560k
R22	RD $\frac{1}{4}$ PS 564J	Carbon film 560k
R23	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R24	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R25	RD $\frac{1}{4}$ PS 182J	Carbon film 1.8k
R26	RD $\frac{1}{4}$ PS 182J	Carbon film 1.8k
R27	RD $\frac{1}{4}$ PS 101J	Carbon film 100
R28	RD $\frac{1}{4}$ PS 101J	Carbon film 100
R29	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R30	RD $\frac{1}{4}$ PS 682J	Carbon film 6.8k
R31	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R32	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R33	RD $\frac{1}{4}$ PS 101J	Carbon film 100
R34	RD $\frac{1}{4}$ PS 101J	Carbon film 100

## CAPACITORS

Symbol	Part No.	Description
C1	CEANL 4R7P 25	Electrolytic 4.7 25V
C2	CEANL 4R7P 25	Electrolytic 4.7 25V
C3	CEANL 4R7P 25	Electrolytic 4.7 25V
C4	CEANL 4R7P 25	Electrolytic 4.7 25V
C5	CQMA 203J 50	Mylar 0.02 50V
C6	CQMA 203J 50	Mylar 0.02 50V
C7	CQMA 203J 50	Mylar 0.02 50V
C8	CQMA 203J 50	Mylar 0.02 50V
C9	CQMA 203J 50	Mylar 0.02 50V
C10	CQMA 203J 50	Mylar 0.02 50V
C11	CQMA 203J 50	Mylar 0.02 50V
C12	CQMA 203J 50	Mylar 0.02 50V
C13	CKDYA 152J 50	Ceramic 0.0015 50V
C14	CKDYA 152J 50	Ceramic 0.0015 50V
C15	CKDYA 152J 50	Ceramic 0.0015 50V
C16	CKDYA 152J 50	Ceramic 0.0015 50V
C17	CEANL 2R2P 50	Electrolytic 2.2 50V
C18	CEANL 2R2P 50	Electrolytic 2.2 50V
C19	CEANL 2R2P 50	Electrolytic 2.2 50V
C20	CEANL 2R2P 50	Electrolytic 2.2 50V
C21	CEA 101P 10	Electrolytic 100 10V
C22	CEA 101P 10	Electrolytic 100 10V
C23	CEA 470P 35	Electrolytic 47 35V
C24	CEA 470P 35	Electrolytic 47 35V
C25	CEANL 2R2P 50	Electrolytic 2.2 50V
C26	CEANL 2R2P 50	Electrolytic 2.2 50V
C27	CCDSL 100F 50	Ceramic 10p 50V
C28	CCDSL 100F 50	Ceramic 10p 50V

## SEMICONDUCTORS

Symbol	Part No.	Description
Q1	2SC1919-F or G (2SC1312-F or Q)	Transistor
Q2	2SC1919-F or G (2SC1312-F or Q)	Transistor

## RESISTORS

Symbol	Part No.	Description
VR1	ACV-136	Variable resistor 100k-B
VR2	ACV-136	Variable resistor 100k-B
R1	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R2	RD $\frac{1}{4}$ PS 104J	Carbon film 100k
R3	RD $\frac{1}{4}$ PS 223J	Carbon film 22k
R4	RD $\frac{1}{4}$ PS 223J	Carbon film 22k
R5	RD $\frac{1}{4}$ PS 223J	Carbon film 22k
R6	RD $\frac{1}{4}$ PS 223J	Carbon film 22k
R7	RD $\frac{1}{4}$ PS 105J	Carbon film 1M

## List of Changed Parts for Factory Modification

Symbol	Part No.	Description

12.6 FLAT AMPLIFIER ASSEMBLY (GWG-112)

Parts List

SWITCHES

Symbol	Part No.	Description
S1	ASK-145	Lever switch
S2	ASK-144	Lever switch
S3	ASK-144	Lever switch
S4	ASK-144	Lever switch
S5	ASK-144	Lever switch
S6	ASK-144	Lever switch

Symbol	Part No.	Description
R16	RD¼PS 101J	Carbon film 100
R17	RD¼PS 223J	Carbon film 22k
R18	RD¼PS 223J	Carbon film 22k
R19	RD¼PS 134J	Carbon film 130k
R20	RD¼PS 134J	Carbon film 130k
R21	RD¼PS 753J	Carbon film 75k
R22	RD¼PS 753J	Carbon film 75k
R23	RD¼PS 122J	Carbon film 1.2k
R24	RD¼PS 122J	Carbon film 1.2k
R25	RD¼PS 822J	Carbon film 8.2k
R26	RD¼PS 822J	Carbon film 8.2k
R27	RD¼PS 392J	Carbon film 3.9k
R28	RD¼PS 392J	Carbon film 3.9k
R29	RD¼PS 103J	Carbon film 10k
R30	RD¼PS 103J	Carbon film 10k
R31	RD¼PS 101J	Carbon film 100
R32	RD¼PS 101J	Carbon film 100

CAPACITORS

Symbol	Part No.	Description
C1	CCDSL 151K 50	Ceramic 150p 50V
C2	CCDSL 151K 50	Ceramic 150p 50V
C3	CSZA 0R1M 35	Electrolytic 0.1 35V
C4	CSZA 0R1M 35	Electrolytic 0.1 35V
C5	CSZA 010M 25	Electrolytic 1 25V
C6	CSZA 010M 25	Electrolytic 1 25V
C7	CCDSL 560K 50	Ceramic 56p 50V
C8	CCDSL 560K 50	Ceramic 56p 50V
C9	CCDSL 680K 50	Ceramic 68p 50V
C10	CCDSL 680K 50	Ceramic 68p 50V
C11	CCDSL 100F 50	Ceramic 10p 50V
C12	CCDSL 100F 50	Ceramic 10p 50V
C13	CEANL 101P 10	Electrolytic 100 10V
C14	CEANL 101P 10	Electrolytic 100 10V
C15	CEANL 101P 10	Electrolytic 100 10V
C16	CEANL 101P 10	Electrolytic 100 10V
C17	CEA 101P 25	Electrolytic 100 25V
C18	CEA 101P 25	Electrolytic 100 25V
C19	CEANL 4R7P 25	Electrolytic 4.7 25V
C20	CEANL 4R7P 25	Electrolytic 4.7 25V

SEMICONDUCTORS

Symbol	Part No.	Description
Q1	2SK34-C or D (2SK68A-L or M)	FET
Q2	2SK34-C or D (2SK68A-L or M)	FET
Q3	2SA726S-F or G (2SA872A-D or E)	Transistor
Q4	2SA726S-F or G (2SA872A-D or E)	Transistor

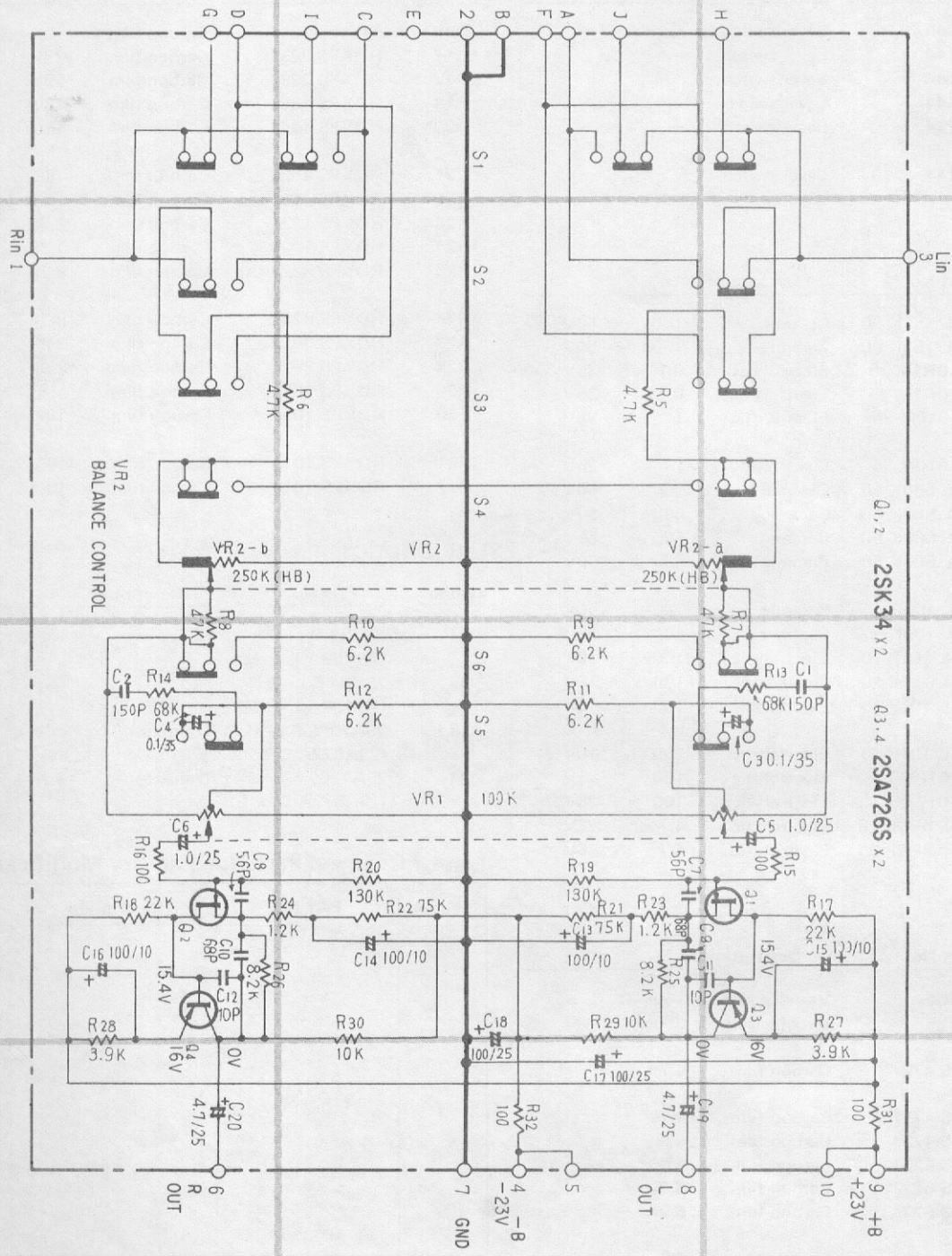
RESISTORS

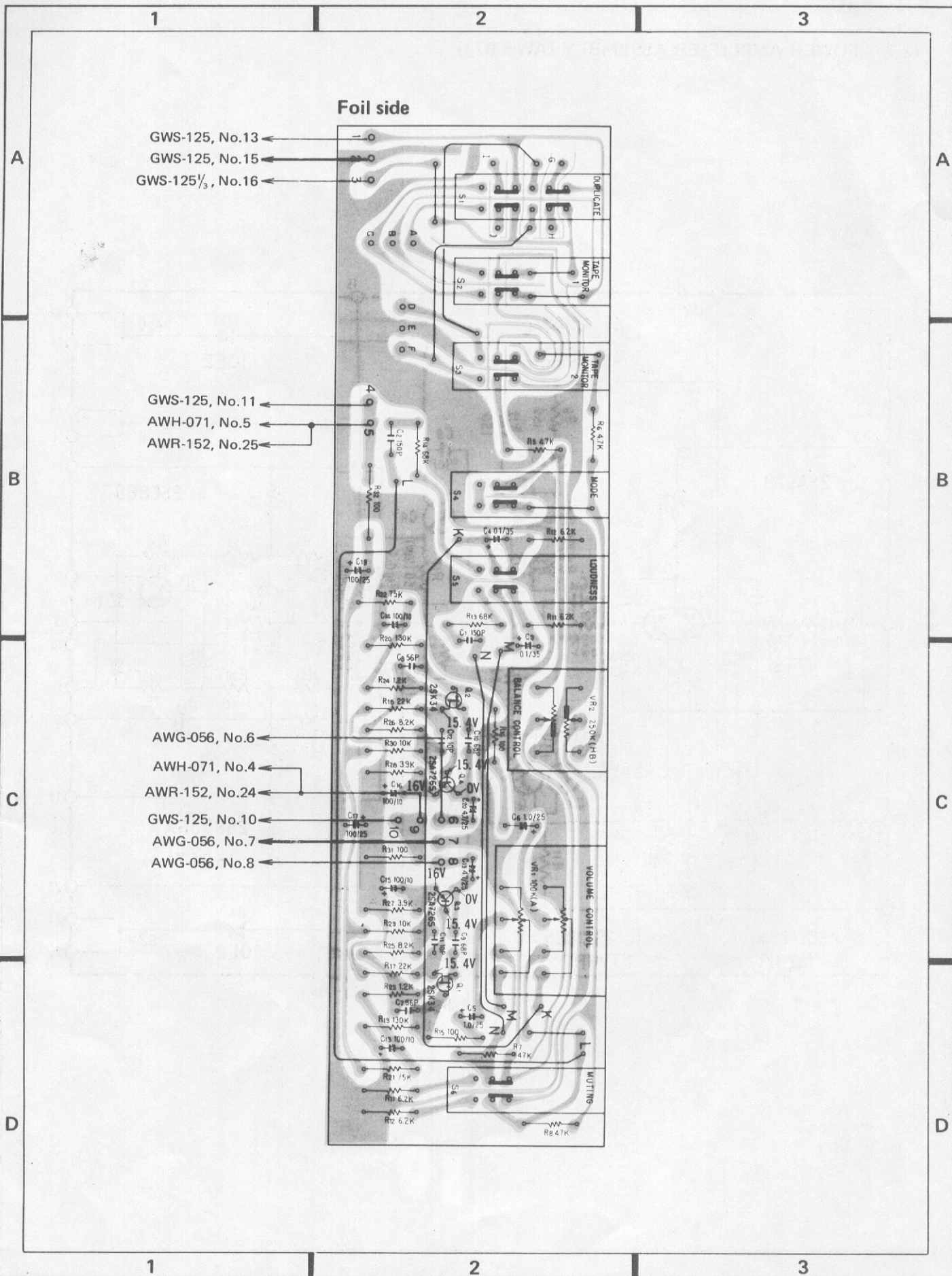
Symbol	Part No.	Description
VR1	ACV-162	Variable resistor 100k
VR2	ACV-190	Variable resistor 250k
R5	RD¼PS 472J	Carbon film 4.7k
R6	RD¼PS 472J	Carbon film 4.7k
R7	RD¼PS 473J	Carbon film 47k
R8	RD¼PS 473J	Carbon film 47k
R9	RD¼PS 622J	Carbon film 6.2k
R10	RD¼PS 622J	Carbon film 6.2k
R11	RD¼PS 622J	Carbon film 6.2k
R12	RD¼PS 622J	Carbon film 6.2k
R13	RD¼PS 683J	Carbon film 68k
R14	RD¼PS 683J	Carbon film 68k
R15	RD¼PS 101J	Carbon film 100

List of Changed Parts for Factory Modification

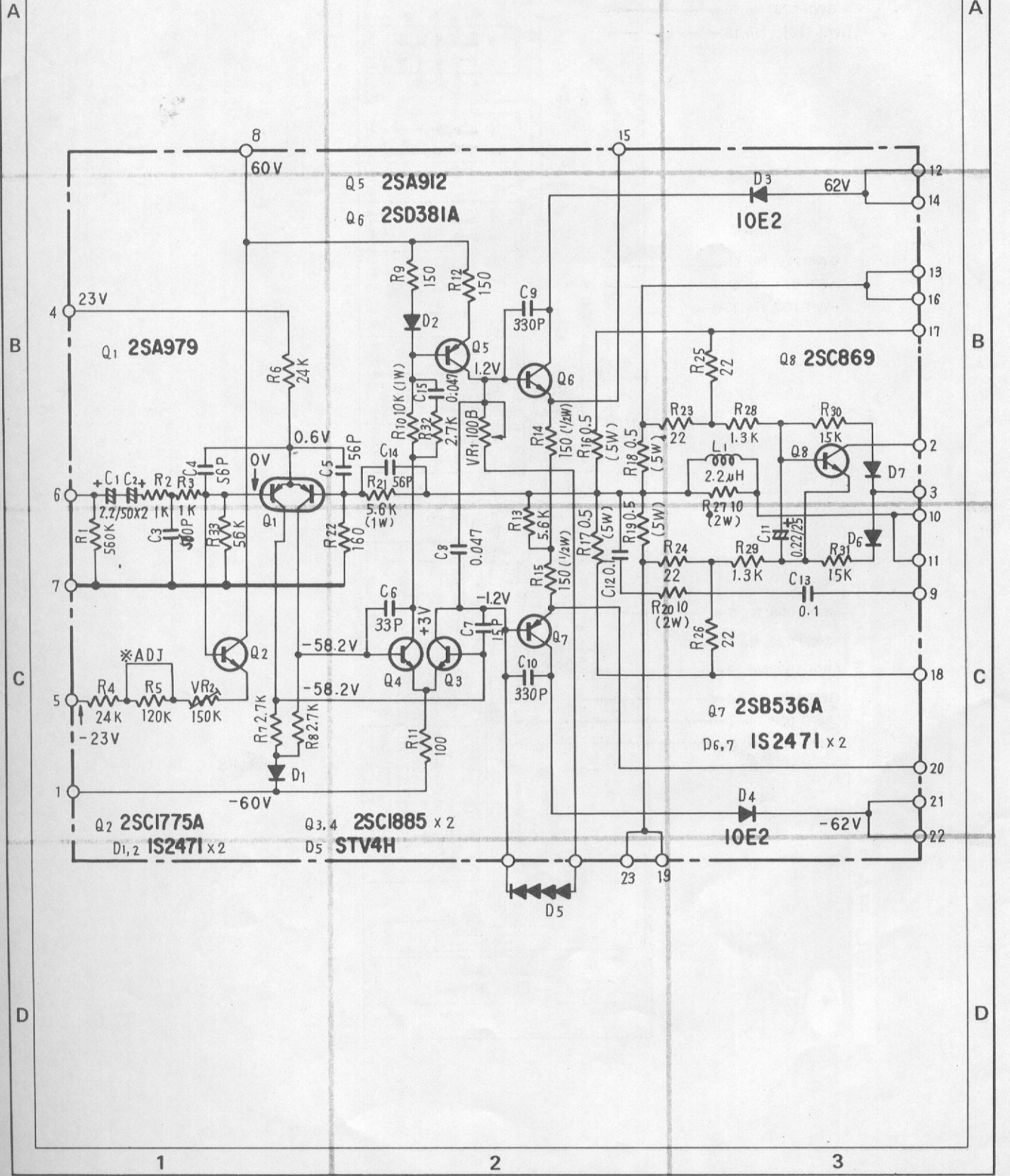
Symbol	Part No.	Description

# Flat Amplifier Assembly (GWG-112)



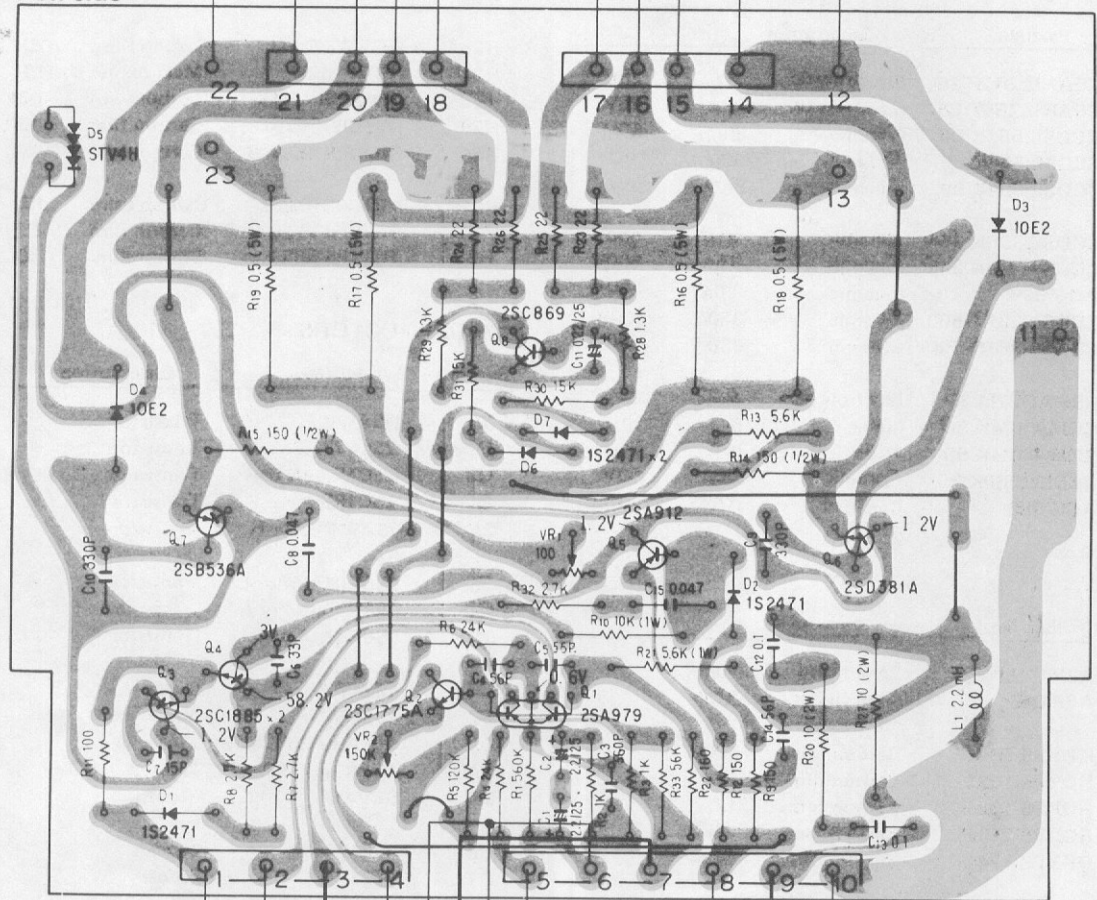


12.7 POWER AMPLIFIER ASSEMBLY (AWH-071)



- AWX-125, No.3 ←
- AWX-125, No.1 ←
- AWX-125, No.4 ←
- AWX-125, No.2 ←
- AWR-152, No.8 ←
- AWX-125, No.3
- AWX-125, No.1
- AWX-125, No.4
- AWX-125, No.2
- AWR-152, No.7

Foil side



- AWM-120, No.2 ←
- AWR-152, No.27 ←
- AWM-120, No.4 ←
- AWM-120, No.3 ←
- AWM-120, No.8
- AWR-152, No.22
- GWG-112, No.5
- AWR-152, No.25

- AWR-152, No.24 ←
- GWG-112, No.9 ←
- AWT-001, No.21 ←
- AWT-001, No.19



- AWT-001, No.20

# Parts List of Power Amplifier Assembly (AWH-071)

## COIL

Symbol	Part No.	Description
L1	T63-009	AF choke coil

Symbol	Part No.	Description
R22	RD¼PS 161J	Carbon film 160
R23	RD¼PS 220J	Carbon film 22
R24	RD¼PS 220J	Carbon film 22
R25	RD¼PS 220J	Carbon film 22

## CAPACITORS

Symbol	Part No.	Description
C1	CEANL 2R2P 25	Electrolytic 2.2 25V
C2	CEANL 2R2P 25	Electrolytic 2.2 25V
C3	CCDSL 561K 50	Ceramic 560p 50V
C4	CCDSL 560K 50	Ceramic 56p 50V
C5	CCDSL 560K 50	Ceramic 56p 50V
C6	CCDSL 330K 500	Ceramic 33p 500V
C7	CCDSL 150K 500	Ceramic 15p 500V
C8	ACG-009	Ceramic 0.047 150V
C9	CCDSL 331K 500	Ceramic 330p 500V
C10	CCDSL 331K 500	Ceramic 330p 500V
C11	CSSA R22M 25	Electrolytic 0.22 25V
C12	CQMA 104K 50	Mylar 0.1 50V
C13	CQMA 104K 50	Mylar 0.1 50V
C14	CCDSL 560K 50	Ceramic 56p 50V
C15	ACG-009	Ceramic 0.047 150V

R26	RD¼PS 220J	Carbon film 22
R27	RS2P 100J	Metal oxide 10 2W
R28	RD¼PSF 132J	Carbon film 1.3k
R29	RD¼PSF 132J	Carbon film 1.3k
R30	RD¼PS 153J	Carbon film 15k
R31	RD¼PS 153J	Carbon film 15k
R32	RD¼PS 272J	Carbon film 2.7k
R33	RD¼PS 563J	Carbon film 56k

## SEMICONDUCTORS

Symbol	Part No.	Description
Q1	2SA979-F	Transistor
Q2	2SC1775-E	Transistor
Q3	2SC1885-Q or R	Transistor
Q4	2SC1885-Q or R	Transistor
Q5	2SA912-Q or R	Transistor
Q6	2SD381A-M or L	Transistor
Q7	2SB536A-M or L	Transistor
Q8	2SC869-D or C	Transistor
D1	1S2471	Diode
D2	1S2471	Diode
D3	10EA or SIB01-02	Diode
D4	10EA or SIB01-02	Diode
D5	STV4H	Varistor
D6	1S2471	Diode
D7	1S2471	Diode

## RESISTORS

Symbol	Part No.	Description
VR1	ACP-019	Semi fixed 100-B
VR2	ACP-063	Semi fixed 150k
R1	RD¼PS 564J	Carbon film 560k
R2	RD¼PS 102J	Carbon film 1k
R3	RD¼PS 102J	Carbon film 1k
R4	RD¼PS 243J	Carbon film 24k
R5	RD¼PS 124J	Carbon film 120k
R6	RD¼PS 243J	Carbon film 24k
R7	RD¼PS 272J	Carbon film 2.7k
R8	RD¼PS 272J	Carbon film 2.7k
R9	RD¼PSF 151J	Carbon film 150
R10	RS1P 103J	Metal oxide 10k 1W
R11	RD¼PSF 101J	Carbon film 100
R12	RD¼PSF 151J	Carbon film 150
R13	RD¼PS 562J	Carbon film 5.6k
R14	RD¼PSF 151J	Carbon film 150 ½W
R15	RD½PSF 151J	Carbon film 150 ½W
R16	RT5B 0R5K	Wier wound 0.5 5W
R17	RT5B 0R5K	Wier wound 0.5 5W
R18	RT5B 0R5K	Wier wound 0.5 5W
R19	RT5B 0R5K	Wier wound 0.5 5W
R20	RS2P 100J	Metal oxide 10 2W
R21	RS1P 562J	Metal oxide 5.6k 1W

## OTHERS

Symbol	Part No.	Description
	AKM-022	4P plug
	AEC-410	Transistor cover
	ANH-203	Heat sink

## List of Changed Parts for Factory Modification

Symbol	Part No.	Description



12.8 SPEAKER SELECTOR ASSEMBLY (GWS-124)

Parts List

SWITCH

Symbol	Part No.	Description
	ASG-133	Push switch

Symbol	Part No.	Description
D11	1S2473 or 1S1555	Diode

CAPACITORS

Symbol	Part No.	Description		
C1	CSZA 4R7M 6	Electrolytic	4.7	6V
C2	CEA 330P 10	Electrolytic	33	10V
C3	CSZA 4R7M 6	Electrolytic	4.7	6V
C4	CEA 330P 10	Electrolytic	33	10V
C5	CEA 101P 6	Electrolytic	100	6V

OTHER

Symbol	Part No.	Description
	AKN-010	Headphone jack

RESISTORS

Symbol	Part No.	Description		
VR1	ACP-006	Semi fixed	470	
VR2	ACP-006	Semi fixed	470	
R1	RS3P 151J	Metal oxide	150	3W
R2	RS3P 151J	Metal oxide	150	3W
R3	RD $\frac{1}{4}$ PS 562J	Carbon film	5.6k	
R4	RD $\frac{1}{4}$ PS 471J	Carbon film	470	
R5	RD $\frac{1}{4}$ PS 391J	Carbon film	390	
R6	RD $\frac{1}{4}$ PS 204J	Carbon film	200k	
R7	RD $\frac{1}{4}$ PS 303J	Carbon film	30k	
R8	RD $\frac{1}{4}$ PS 152J	Carbon film	1.5k	
R9	RD $\frac{1}{4}$ PS 562J	Carbon film	5.6k	
R10	RD $\frac{1}{4}$ PS 471J	Carbon film	470	
R11	RD $\frac{1}{4}$ PS 391J	Carbon film	390	
R12	RD $\frac{1}{4}$ PS 204J	Carbon film	200k	
R13	RD $\frac{1}{4}$ PS 303J	Carbon film	30k	
R14	RD $\frac{1}{4}$ PS 152J	Carbon film	1.5k	
R15	RD $\frac{1}{4}$ PS 222J	Carbon film	2.2k	

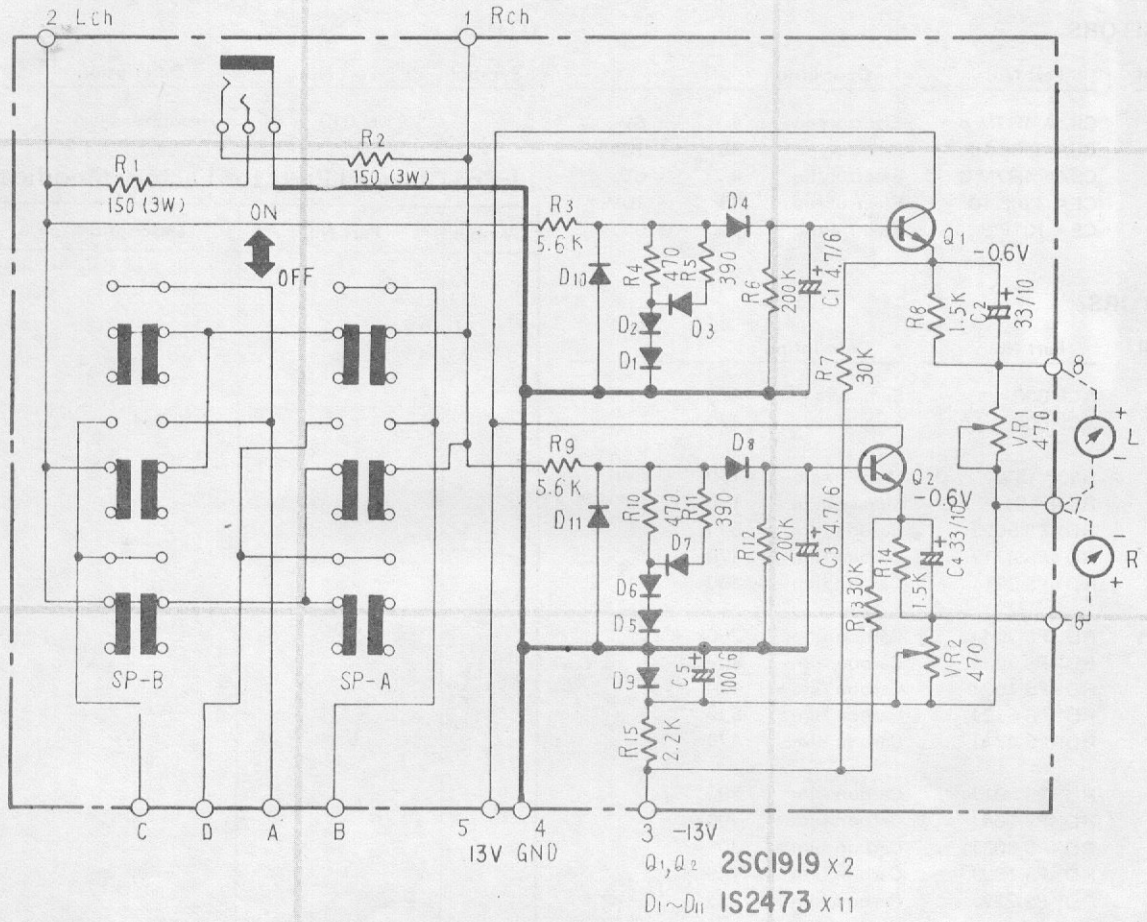
List of Changed Parts for Factory Modification

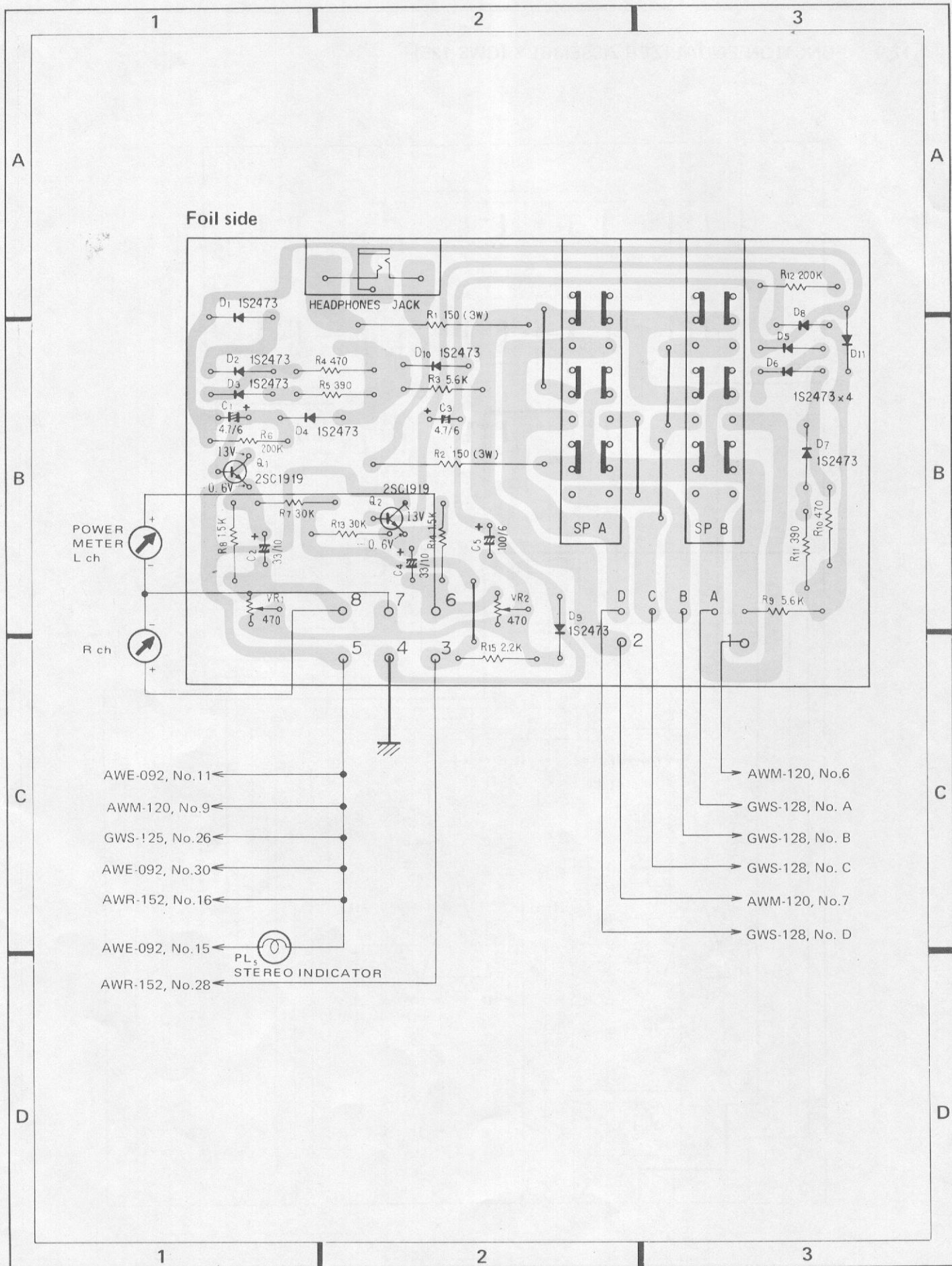
Symbol	Part No.	Description

SEMICONDUCTORS

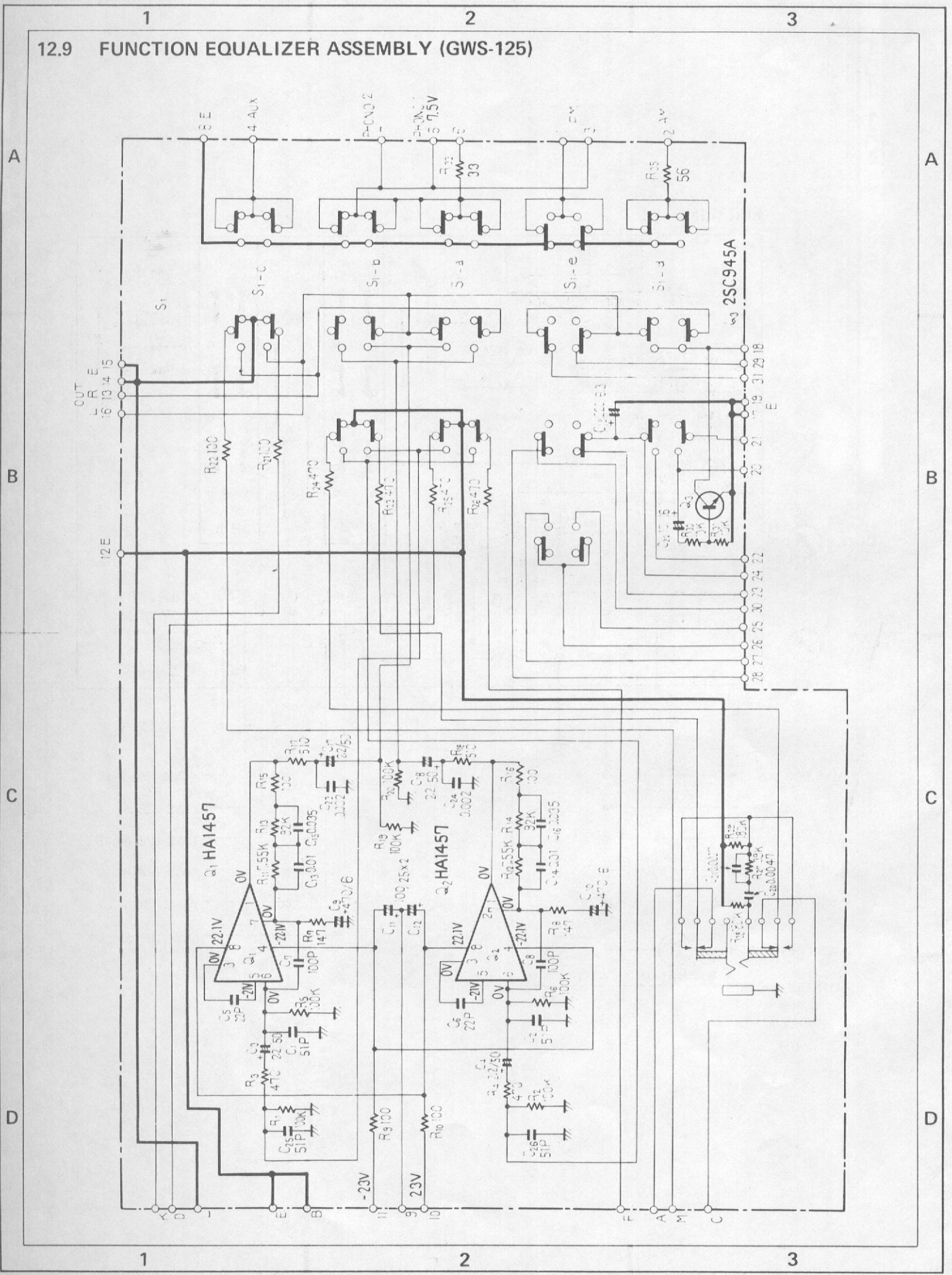
Symbol	Part No.	Description
Q1	2SC1919-G or F (2SC1312-F or G)	Transistor
Q2	2SC1919-G or F (2SC1312-F or G)	Transistor
D1	1S2473 or 1S1555	Diode
D2	1S2473 or 1S1555	Diode
D3	1S2473 or 1S1555	Diode
D4	1S2473 or 1S1555	Diode
D5	1S2473 or 1S1555	Diode
D6	1S2473 or 1S1555	Diode
D7	1S2473 or 1S1555	Diode
D8	1S2473 or 1S1555	Diode
D9	1S2473 or 1S1555	Diode
D10	1S2473 or 1S1555	Diode

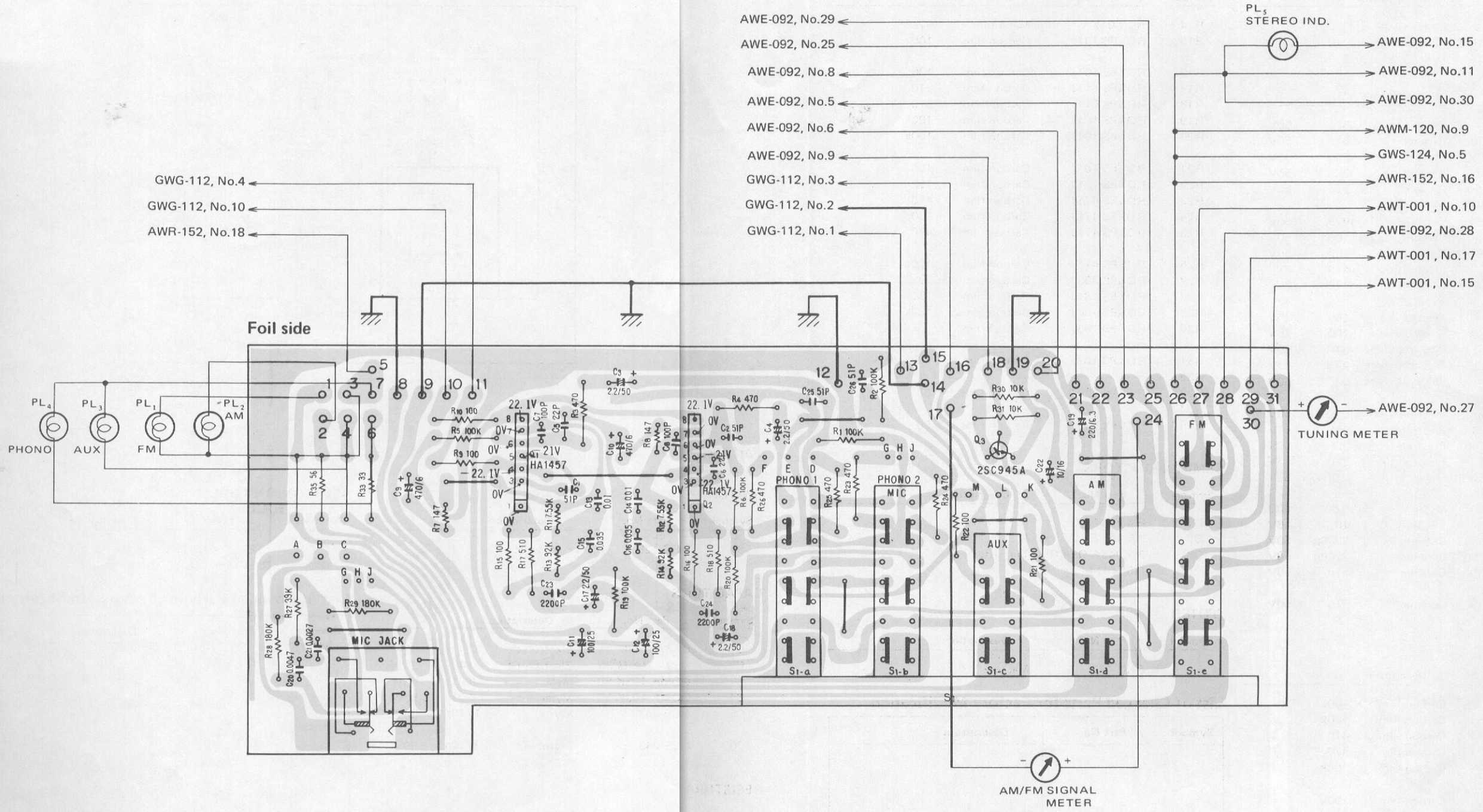
# Speaker Selector Assembly (GWS-124)





# 12.9 FUNCTION EQUALIZER ASSEMBLY (GWS-125)





GWG-112, No.4  
 GWG-112, No.10  
 AWR-152, No.18

AWE-092, No.29  
 AWE-092, No.25  
 AWE-092, No.8  
 AWE-092, No.5  
 AWE-092, No.6  
 AWE-092, No.9  
 GWG-112, No.3  
 GWG-112, No.2  
 GWG-112, No.1

PL<sub>5</sub> STEREO IND.  
 AWE-092, No.15  
 AWE-092, No.11  
 AWE-092, No.30  
 AWM-120, No.9  
 GWS-124, No.5  
 AWR-152, No.16  
 AWT-001, No.10  
 AWE-092, No.28  
 AWT-001, No.17  
 AWT-001, No.15

AWE-092, No.27

AM/FM SIGNAL METER

# Parts List of Function and Equalizer Assembly (GWS-125)

## SWITCH

Symbol	Part No.	Description	Symbol	Part No.	Description
S1	ASG-126	Push switch	R14	ACN-012	Metal film 92k
			R15	RD¼PS 101J	Carbon film 100

## CAPACITORS

Symbol	Part No.	Description	Symbol	Part No.	Description
C1	CCDSL 510J 50	Ceramic 51p 50V	R16	RD¼PS 101J	Carbon film 100
C2	CCDSL 510J 50	Ceramic 51p 50V	R17	RD¼PS 511J	Carbon film 510
C3	CEANL 2R2P 50	Electrolytic 2.2 50V	R18	RD¼PS 511J	Carbon film 510
C4	CEANL 2R2P 50	Electrolytic 2.2 50V	R19	RD¼PS 104J	Carbon film 100k
C5	CCDSL 220K 50	Ceramic 22p 50V	R20	RD¼PS 104J	Carbon film 100k
C6	CCDSL 220K 50	Ceramic 22p 50V	R21	RD¼PS 101J	Carbon film 100
C7	CCDSL 101K 50	Ceramic 100p 50V	R22	RD¼PS 101J	Carbon film 100
C8	CCDSL 101K 50	Ceramic 100p 50V	R23	RD¼PS 471J	Carbon film 470
C9	CEA 471P 6	Electrolytic 470 6V	R24	RD¼PS 471J	Carbon film 470
C10	CEA 471P 6	Electrolytic 470 6V	R25	RD¼PS 471J	Carbon film 470
C11	CEA 101P 25	Electrolytic 100 25V	R26	RD¼PS 471J	Carbon film 470
C12	CEA 101P 25	Electrolytic 100 25V	R27	RD¼PS 393J	Carbon film 39k
C13	CQPA 103G 50	Polypropylene 0.01 50V	R28	RD¼PS 184J	Carbon film 180k
C14	CQPA 103G 50	Polypropylene 0.01 50V	R29	RD¼PS 184J	Carbon film 180k
C15	CQPA 353G 50	Polypropylene 0.035 50V	R30	RD¼PS 103J	Carbon film 10k
C16	CQPA 353G 50	Polypropylene 0.035 50V	R31	RD¼PS 103J	Carbon film 10k
C17	CEANL 2R2P 50	Electrolytic 2.2 50V	R32	.....	.....
C18	CEANL 2R2P 50	Electrolytic 2.2 50V	R33	RD¼PS 330J	Carbon film 33
C19	CEA 221K 6.3	Electrolytic 220 6.3V	R34	.....	.....
C20	CQMA 472K 50	Mylar 0.0047 50V	R35	RD¼PS 560J	Carbon film 56
C21	CQMA 272K 50	Mylar 0.0027 50V			
C22	CEA 100P 16	Electrolytic 10 16V			
C23	CKDYF 222Z 50	Ceramic 2200p 50V			
C24	CKDYF 222Z 50	Ceramic 2200p 50V			
C25	CCDSL 510J 50	Ceramic 51p 50V			
C26	CCDSL 510J 50	Ceramic 51p 50V			

## SEMICONDUCTORS

Symbol	Part No.	Description
Q1	HA 1457	IC
Q2	HA 1457	IC
Q3	2SC945A-Q or R (2SC1914-F)	Transistor

## OTHER

Symbol	Part No.	Description
	AKN-012	Mic jack

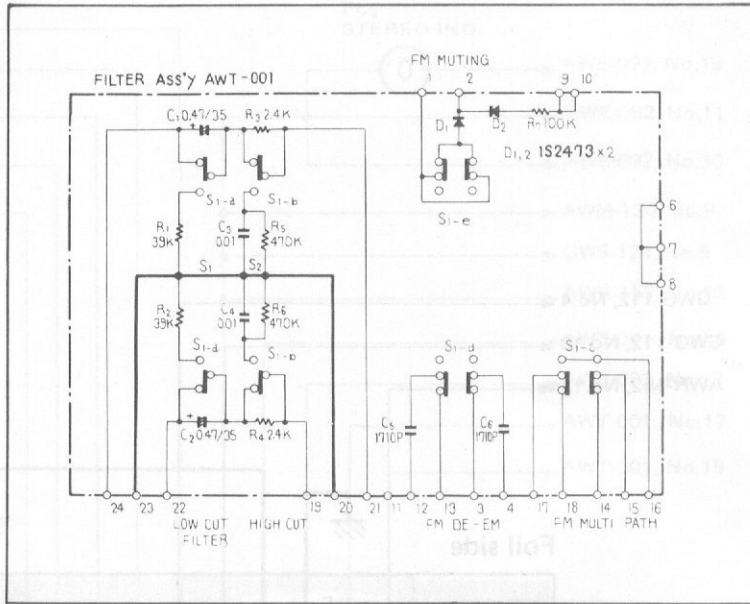
## RESISTORS

Symbol	Part No.	Description
R1	RD¼PS 104J	Carbon film 100k
R2	RD¼PS 104J	Carbon film 100k
R3	RD¼PS 471J	Carbon film 470
R4	RD¼PS 471J	Carbon film 470
R5	RD¼PS 104J	Carbon film 100k
R6	RD¼PS 104J	Carbon film 100k
R7	RN½ SQ 1470F	Metal film 147 ½W
R8	RN½ SQ 1470F	Metal film 147 ½W
R9	RD¼PS 101J	Carbon film 100
R10	RD¼PS 101J	Carbon film 100
R11	ACN-011	Metal film 7.55k
R12	ACN-011	Metal film 7.55k
R13	ACN-012	Metal film 92k

## List of Changed Parts for Factory Modification

Symbol	Part No.	Description

# 12.10 FILTER ASSEMBLY (AWT-001)



## Part List

### SWITCH

Symbol	Part No.	Description
S1	ASG-128	Push switch

### SEMICONDUCTORS

Symbol	Part No.	Description
D1	1S2473 or 1S1555	Diode
D2	1S2473 or 1S1555	Diode

### CAPACITORS

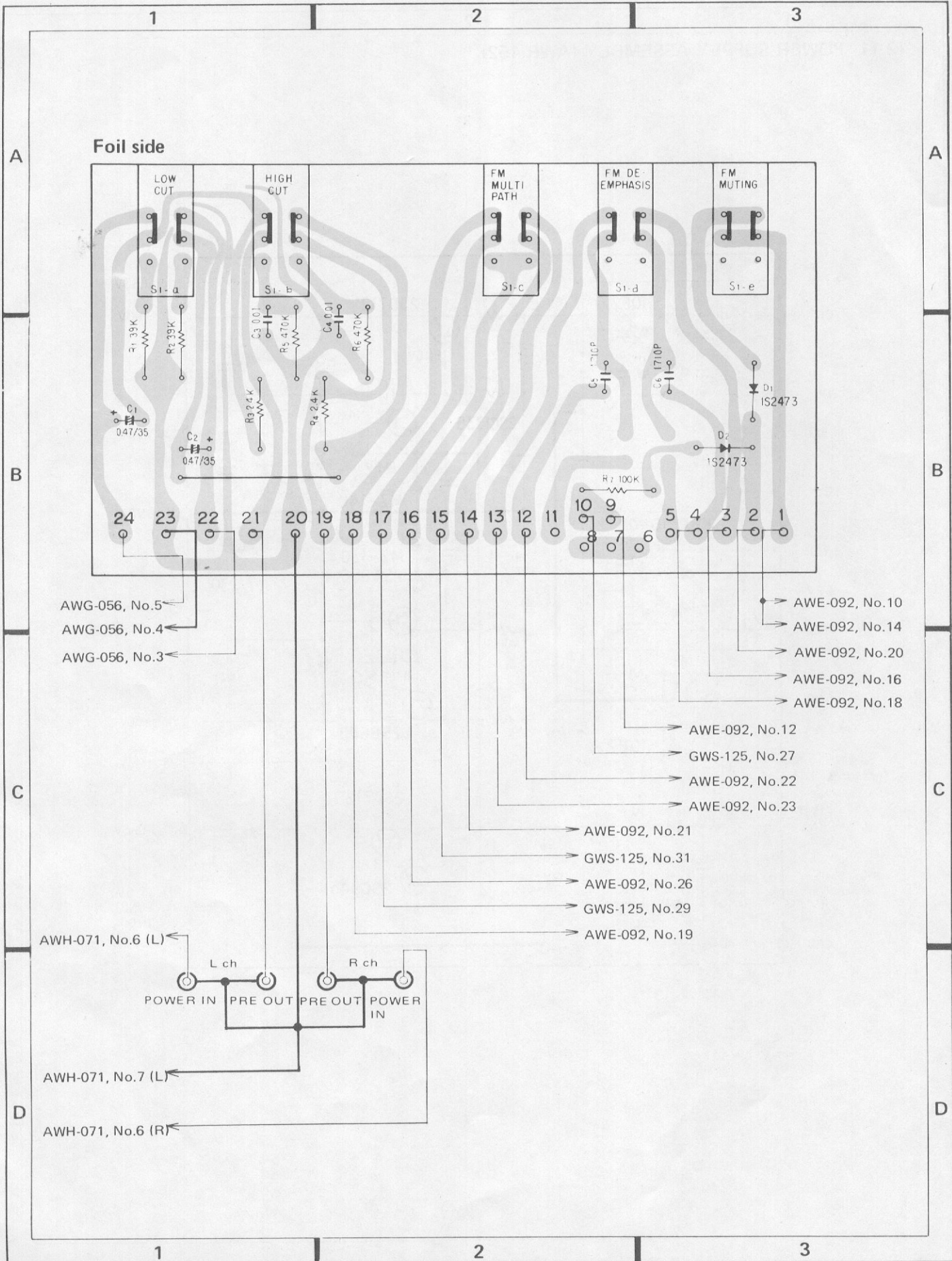
Symbol	Part No.	Description
C1	CSZA R47M 35	Electrolytic 0.47 35V
C2	CSZA R47M 35	Electrolytic 0.47 35V
C3	CQMA 103K 50	Mylar 0.01 50V
C4	CQMA 103K 50	Mylar 0.01 50V
C5	ACE-043	Styrol 1710p 50V
C6	ACE-043	Styrol 1710p 50V

### List of Changed Parts for Factory Modification

Symbol	Part No.	Description

### RESISTORS

Symbol	Part No.	Description
R1	RD¼PS 393J	Carbon film 39k
R2	RD¼PS 393J	Carbon film 39k
R3	RD¼PS 242J	Carbon film 2.4k
R4	RD¼PS 242J	Carbon film 2.4k
R5	RD¼PS 474J	Carbon film 470k
R6	RD¼PS 474J	Carbon film 470k
R7	RD¼PS 104J	Carbon film 100k



AWG-056, No.5  
 AWG-056, No.4  
 AWG-056, No.3

AWE-092, No.10  
 AWE-092, No.14  
 AWE-092, No.20  
 AWE-092, No.16  
 AWE-092, No.18

AWE-092, No.12  
 GWS-125, No.27  
 AWE-092, No.22  
 AWE-092, No.23  
 AWE-092, No.21  
 GWS-125, No.31  
 AWE-092, No.26  
 GWS-125, No.29  
 AWE-092, No.19

AWH-071, No.6 (L)

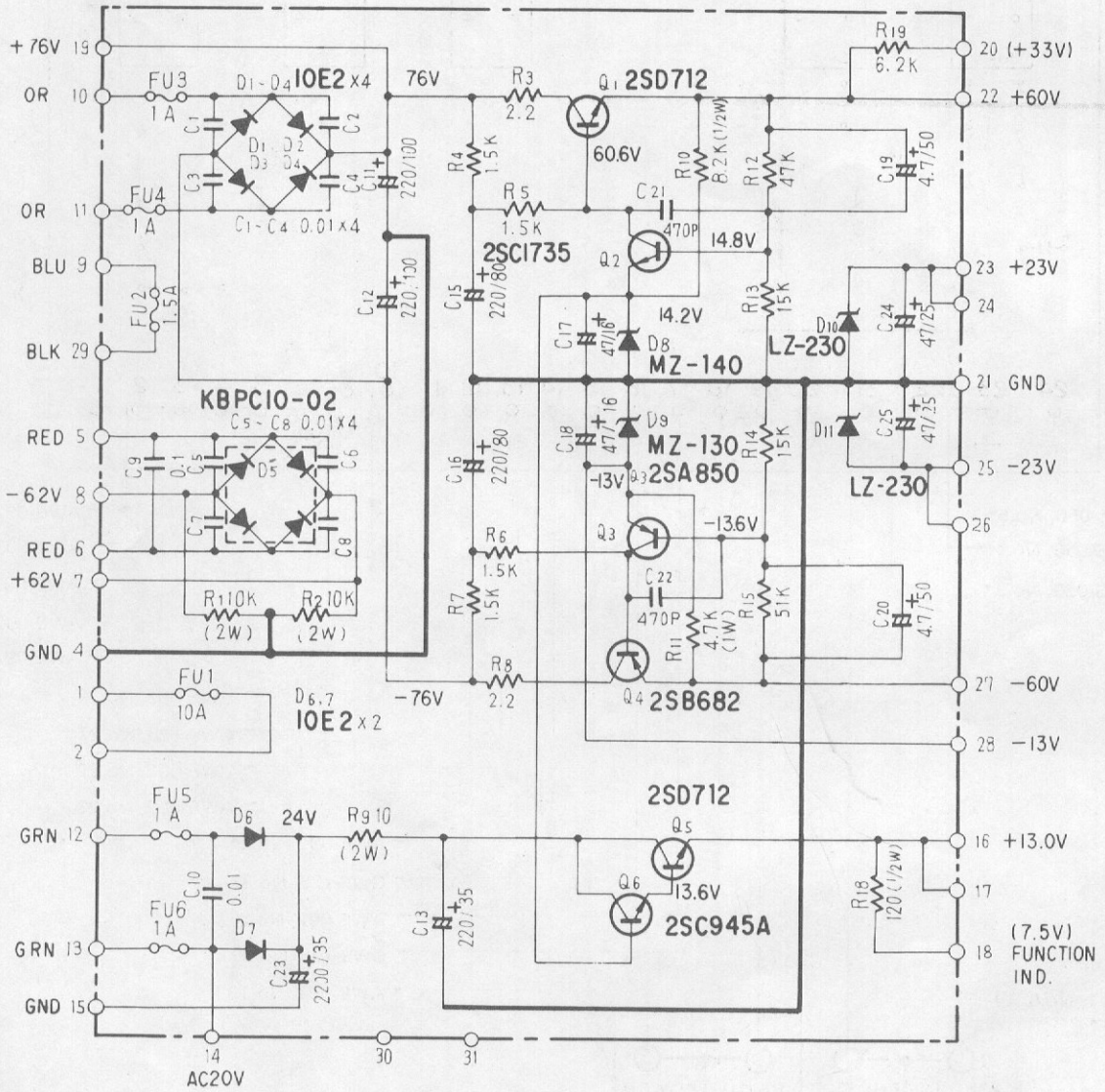


AWH-071, No.7 (L)

AWH-071, No.6 (R)



# 12.11 POWER SUPPLY ASSEMBLY (AWR-152)



A

B

C

D

A

B

C

D

1 2 3 4 5 6

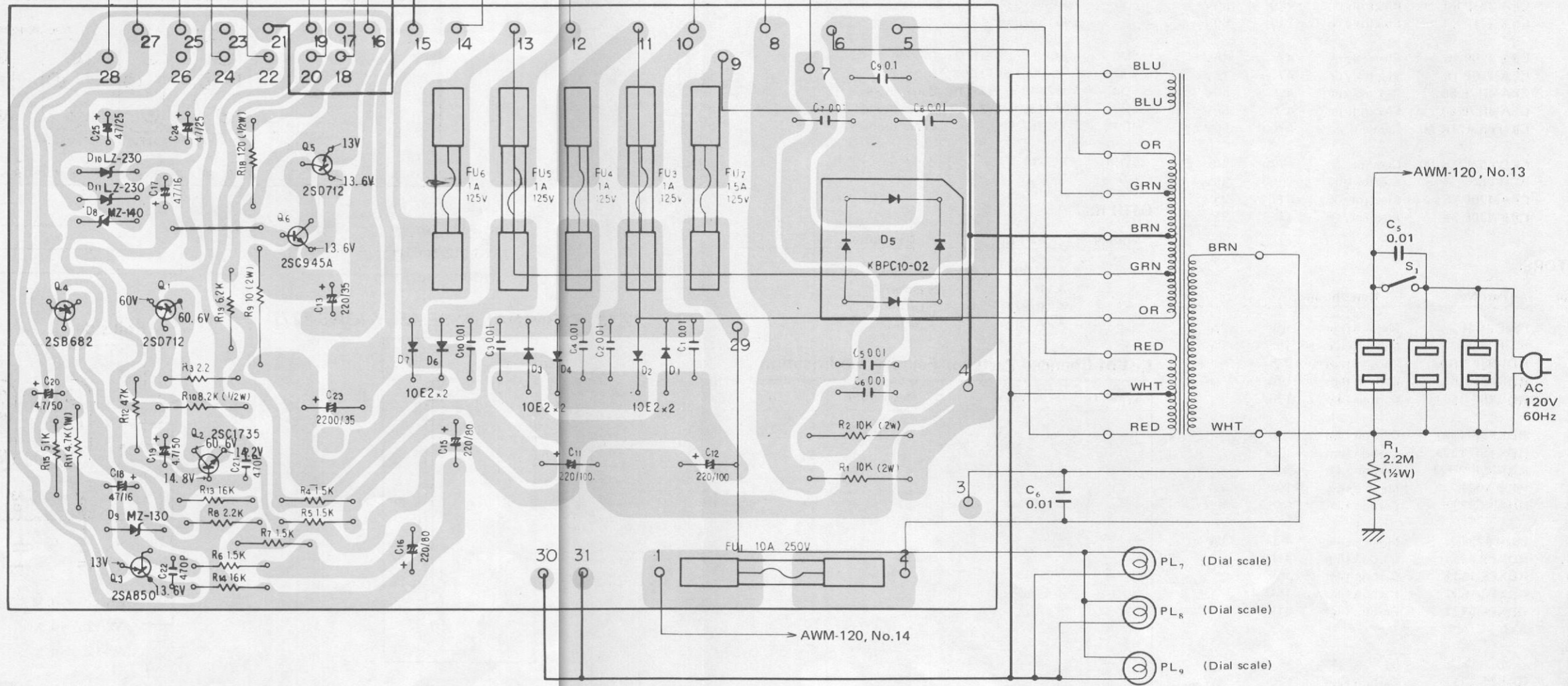
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- AWM-120, No.12 ←
- AWH-071, No.8 ←
- AWH-071, No.4 ←
- GWG-112, No.9 ←
- AWH-071, No.5 ←
- GWG-112, No.5 ←
- AWM-120, No.2 ←
- AWH-071, No.1 ←
- GWS-124, No.3 ←

- GWS-125, No.5 →
- GWS-124, No.5 →
- AWM-120, No.9 →
- AWE-092, No.15 →
- AWE-092, No.11 →
- GWS-125, No.26 →
- AWE-092, No.30 →
- AWM-120, No.1 →

- AWH-071, No.22 →
- AWH-071, No.12 →

- AWM-120, No.13 →

Foil side



1 2 3 4 5 6

# Parts List of Power Supply Assembly (AWR-152)

## CAPACITORS

Symbol	Part No.	Description
C1	ACG-004	Ceramic 0.01 150V
C2	ACG-004	Ceramic 0.01 150V
C3	ACG-004	Ceramic 0.01 150V
C4	ACG-004	Ceramic 0.01 150V
C5	ACG-004	Ceramic 0.01 150V
C6	ACG-004	Ceramic 0.01 150V
C7	ACG-004	Ceramic 0.01 150V
C8	ACG-004	Ceramic 0.01 150V
C9	CQMA 104K 250	Mylar 0.1 250V
C10	ACG-004	Ceramic 0.01
C11	CEA 221P 100	Electrolytic 220 100V
C12	CEA 221P 100	Electrolytic 220 100V
C13	CEA 221P 35	Electrolytic 220 35V
C15	CEA 221P 80	Electrolytic 220 80V
C16	CEA 221P 80	Electrolytic 220 80V
C17	CEA 470P 16	Electrolytic 47 16V
C18	CEA 470P 16	Electrolytic 47 16V
C19	CEA 4R7P 50	Electrolytic 4.7 50V
C20	CEA 4R7P 50	Electrolytic 4.7 50V
C21	CKDYB 471K 50	Ceramic 470p 50V
C22	CKDYB 471K 50	Ceramic 479p 50V
C23	ACH-060	Electrolytic 2200 35V
C24	CEA 470P 25	Electrolytic 47 25V
C25	CEA 470P 25	Electrolytic 47 25V

## RESISTORS

Symbol	Part No.	Description
R1	PS2P 103J	Metal oxide 10k 2W
R2	PS2P 103J	Metal oxide 10k 2W
R3	RD $\frac{1}{2}$ PSF 2R2J	Carbon film 2.2
R4	RD $\frac{1}{2}$ PSF 152J	Carbon film 1.5k
R5	RD $\frac{1}{2}$ PSF 152J	Carbon film 1.5k
R6	RD $\frac{1}{2}$ PSF 152J	Carbon film 1.5k
R7	RD $\frac{1}{2}$ PSF 152J	Carbon film 1.5k
R8	RD $\frac{1}{2}$ PSF 2R2J	Carbon film 2.2
R9	PS2P 100J	Metal oxide 10 2W
R10	RD $\frac{1}{2}$ PS 822J	Carbon film 8.2k $\frac{1}{2}$ W
R11	PS1P 472J	Metal oxide 4.7k 1W
R12	RD $\frac{1}{2}$ PS 473J	Carbon film 47k
R13	RD $\frac{1}{2}$ PS 153J	Carbon film 15k
R14	RD $\frac{1}{2}$ PS 153J	Carbon film 15k
R15	RD $\frac{1}{2}$ PS 513J	Carbon film 51k
R16		
R17		
R18	RD $\frac{1}{2}$ PS 121J	Carbon film 120 $\frac{1}{2}$ W
R19	RD $\frac{1}{2}$ PS 622J	Carbon film 6.2k

## SEMICONDUCTORS

Symbol	Part No.	Description
Q1	2SD712-D or C	Transistor
Q2	2SC1735-D or C	Transistor
Q3	(2SC1384-Q or R)	Transistor
Q4	2SA850-D or C	Transistor
Q5	(2SA684A-Q or R)	Transistor
Q6	2SB682-D or C	Transistor
Q7	2SD712-D or C	Transistor
Q8	2SC945A-Q or R	Transistor
Q9	(2SC1914-F)	Transistor
D1	10E2 or SIB01-02	Diode
D2	10E2 or SIB01-02	Diode
D3	10E2 or SIB01-02	Diode
D4	10E2 or SIB01-02	Diode
D5	KBPC10-02	Diode
D6	(S15VB20)	Diode
D7	10E2 or SIB01-02	Diode
D8	10E2 or SIB01-02	Diode
D9	MZ140 or WZ-140	Zener diode
D10	MZ130 or WZ-130	Zener diode
D11	LZ230	Zener diode

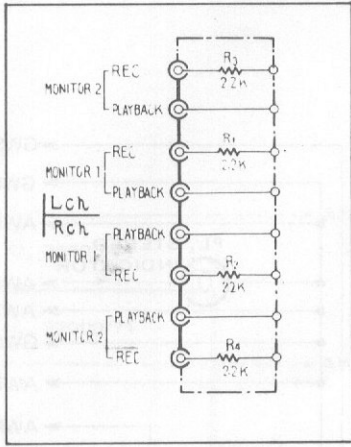
## OTHERS

Symbol	Part No.	Description
	ANH-395	Heat sink
	ANH-203	Heat sink
	AKR-013	Fuse holder
	AKR-030	Fuse holder

## List of Changed Parts for Factory Modification

Symbol	Part No.	Description

### 12.12 TERMINAL ASSEMBLY (GWS-126)



### Parts List

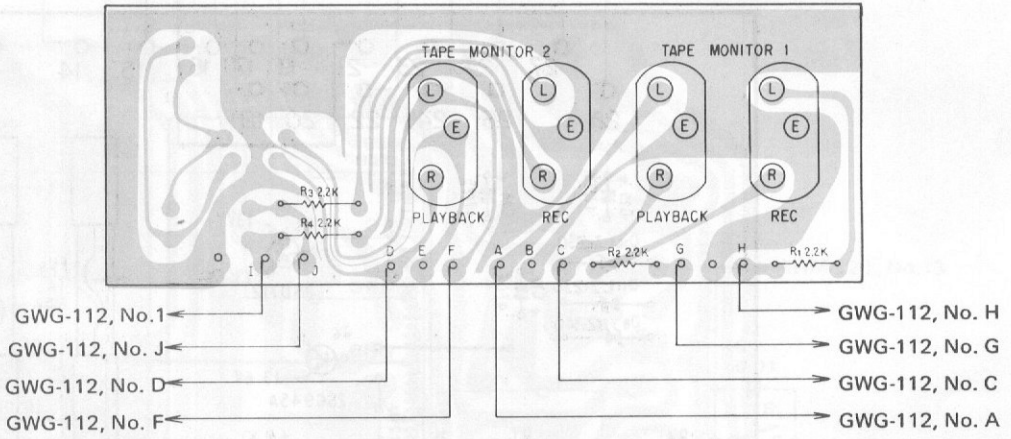
#### RESISTORS

Symbol	Part No.	Description
R1	RD¼PM 222J	Carbon film 2.2k
R2	RD¼PM 222J	Carbon film 2.2k
R3	RD¼PS 222J	Carbon film 2.2k
R4	RD¼PS 222J	Carbon film 2.2k

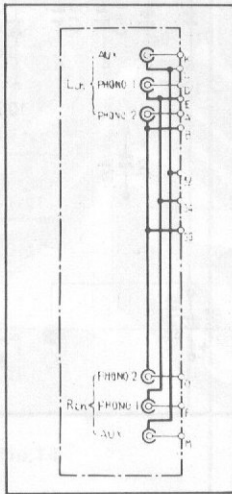
#### OTHER

Symbol	Part No.	Description
	AKB-027	4P pin jack

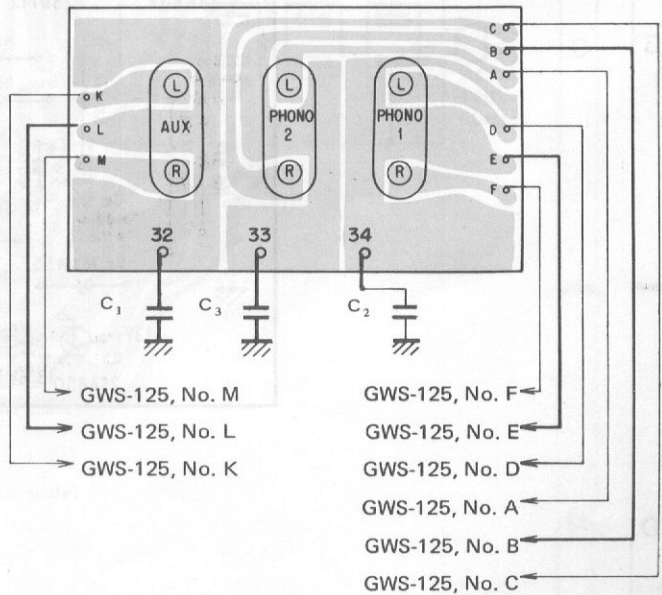
#### Foil side



### 12.13 TERMINAL ASSEMBLY (GWS-127)



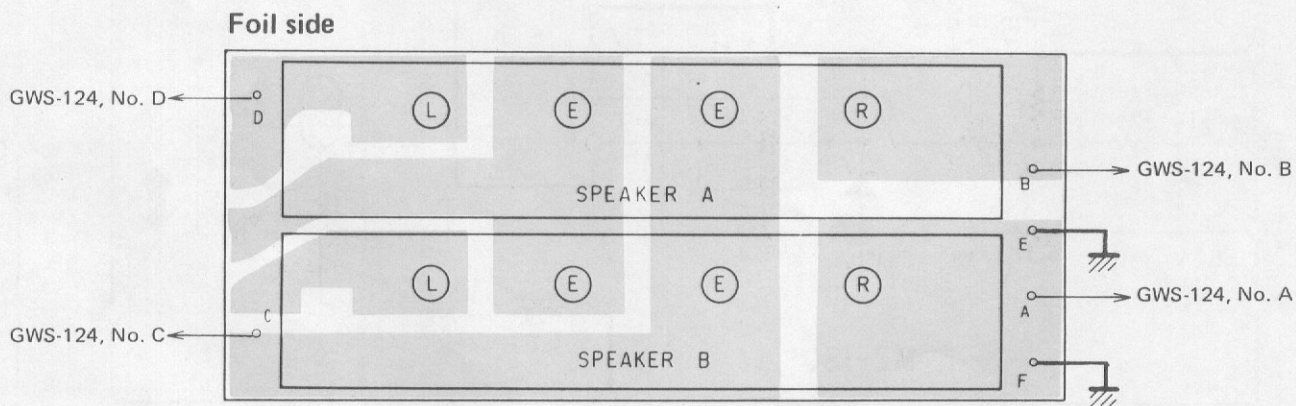
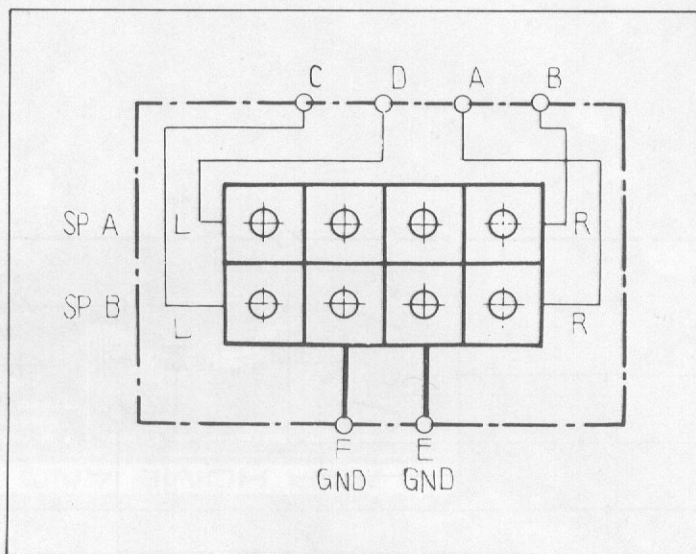
#### Foil side



### Part List

Symbol	Part No.	Description
	AKB-028	6-P pinJack

12.14 SPEAKER TERMINAL ASSEMBLY (GWS-128)



Parts List

Symbol	Part No.	Description
	AKE-029	Push terminal C

# 12.15 PROTECTION ASSEMBLY (AWM-120)

A

A

B

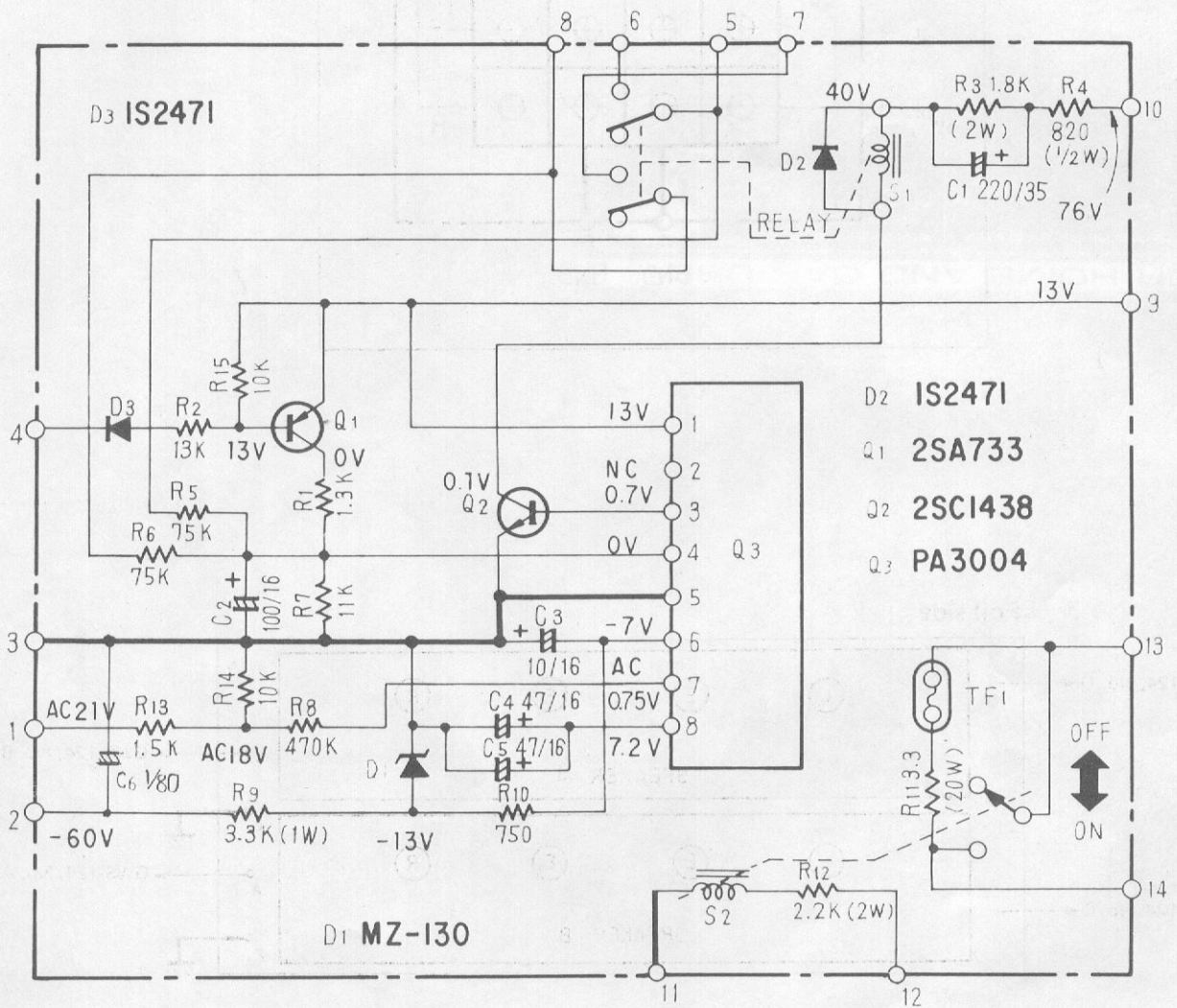
B

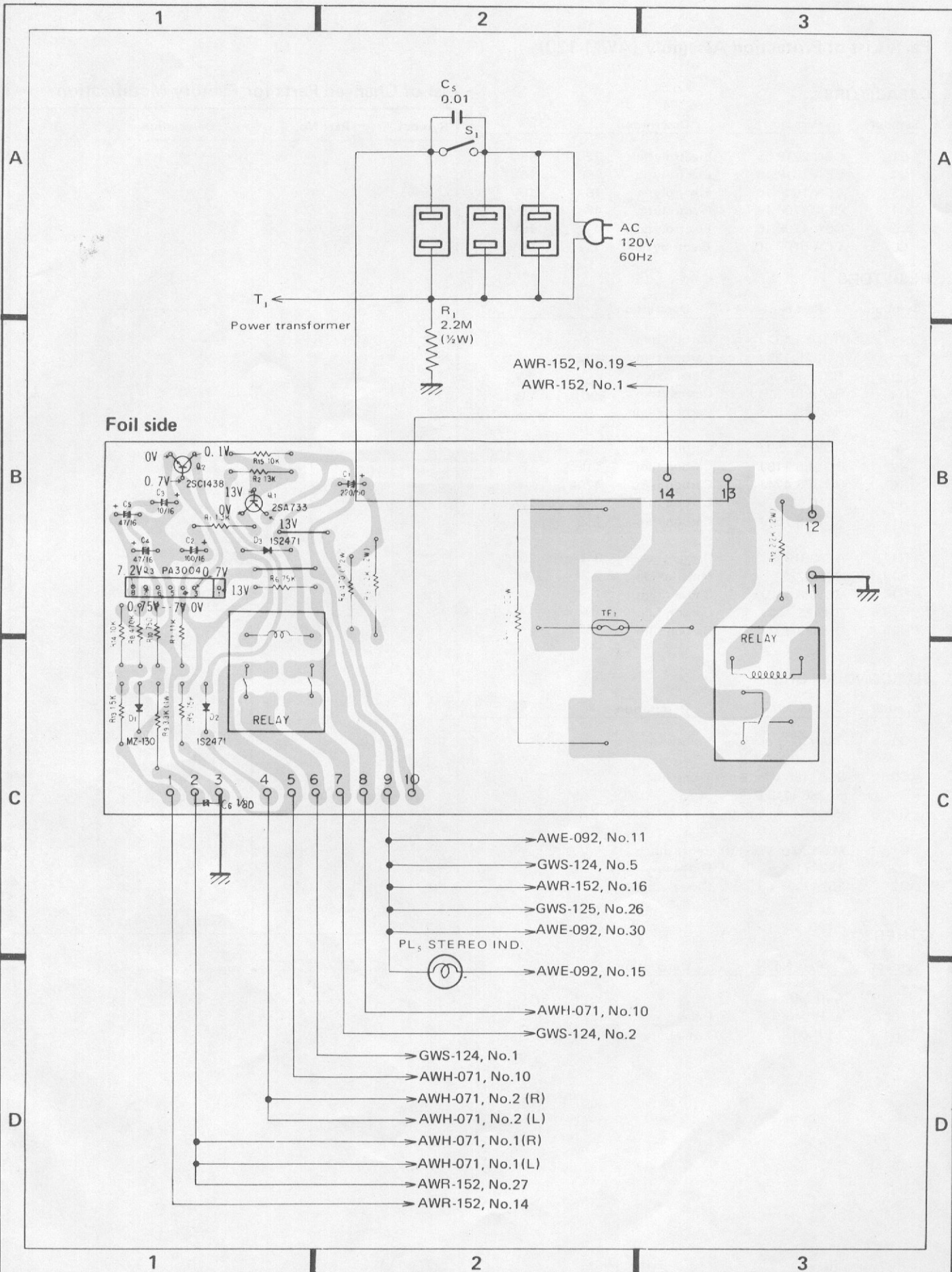
C

C

D

D









# 13. PACKING

