

# **SERVICE MANUAL**

AM/FM STEREO RECEIVER

# **QX-949**

FUW

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# 1. SPECIFICATIONS

## SEMICONDUCTORS

FETs .....	14
ICs .....	7
Transistors .....	118
Diodes .....	69

## AMPLIFIER SECTION

Circuitry ..... Direct Coupled Complementary OCL

### Continuous Power Output

20Hz ~ 20kHz (4 channels driven) 40W x 4 (8Ω), 50W x 4 (4Ω)

1kHz (4 channels driven) ..... 44W x 4 (8Ω), 58W x 4 (4Ω)

1kHz (Each channel driven)..... 53W/CH (8Ω), 75W/CH (4Ω)

### Continuous Power Output

(2CH. POWER BOOSTING SWITCH set at "2 CH")

20Hz ~ 20kHz (2 channels driven) 60W+60W (8Ω), 75W+75W (4Ω)

1kHz (2 channels driven) ..... 65W+65W (8Ω), 85W+85W (4Ω)

1kHz (Each channel driven)..... 75W/CH (8Ω), 100W/CH (4Ω)

### Harmonic Distortion

(Continuous Power Output) ..... Less than 0.3%

(1W x 4, Power Output) ..... Less than 0.05%

### Intermodulation Distortion

(Continuous Power Output) ..... Less than 0.3%

(1W x 4, Power Output) ..... Less than 0.05%

### Power Bandwidth

(IHF, 4 channels driven) ..... 7Hz ~ 40kHz

### Output

Speaker ..... FRONT: A, B, A+B  
REAR: A, B, A+B (4 ~ 16Ω)

Headphones ..... FRONT & REAR

Damping Factor (1kHz, 8Ω) ..... More than 35

### Residual Hum & Noise

(8Ω, Pre & Power Amplifier) ..... Less than 1mV

### Input Sensitivity/Impedance

PHONO 1 ..... 2.5mV/50kΩ

PHONO 2 ..... 2.5mV/50kΩ

PHONO Overload Level (rms/p-p).. 100mV/280mV

AUX ..... 150mV/100kΩ

TAPE MONITOR (2CH, 4CH)..... 150mV/100kΩ

### Output Level/Impedance

TAPE REC (2CH, 4CH) ..... 150mV

### Frequency Response

PHONO (RIAA equalization)..... 30Hz ~ 15kHz ± 1dB

AUX, TAPE MON ..... 7Hz ~ 25kHz<sup>+0.5</sup><sub>-1</sub> dB

### Tone Control

BASS ..... ±10dB (100Hz)

TREBLE ..... ±10dB (10kHz)

Filter	
LOW .....	50Hz (6dB/oct.)
HIGH .....	10kHz (6dB/oct.)
Loudness Contour	
(Volume control set at -40dB position) +6dB(100Hz), +3dB(10kHz)	
Hum & Noise (IHF, Short-circuited, A Network)	
PHONO .....	More than 70dB
AUX, TAPE MON .....	More than 90dB
CD-4 Demodulator Section	
Input Sensitivity .....	2.5mV (1 ~ 5mV adjustable)
Input Impedance .....	100kΩ
Harmonic Distortion .....	0.07%
Signal-to-Noise Ratio	
(IHF, A Network) .....	More than 70dB
Separation (STD Test Signal at 1kHz)	
Left ~ Right .....	50dB
Front ~ Rear .....	30dB
Frequency Response .....	20Hz ~ 15kHz
<b>FM TURNER SECTION</b>	
Circuitry .....	2 MOS FETs, 1-stage RF Amplifier, 4-ganged Tuning Capacitor, 6-stage Limiter
Usable Sensitivity (IHF) .....	1.8μF
Capture Ratio (IHF) .....	1dB
Selectivity (IHF) .....	80dB
Signal-to-Noise Ratio .....	70dB
Image Rejection (98MHz) .....	More than 85dB
IF Rejection (98MHz) .....	More than 100dB
Spurious Rejection .....	More than 100dB
AM Suppression .....	55dB
Harmonic Distortion	
Mono .....	Less than 0.2%
Stereo .....	Less than 0.4%
Frequency Response .....	20Hz ~ 15kHz <sup>+0.2</sup> <sub>-2.0</sub> dB
	50Hz ~ 10kHz <sup>+0.2</sup> <sub>-0.5</sub> dB
Stereo Separation	
1kHz .....	More than 40dB
50Hz ~ 10kHz .....	More than 30dB
Sub-carrier Suppression .....	65dB
Antenna Input .....	300Ω Balanced, 75Ω Unbalanced
Muting .....	ON-OFF
MPX Noise Filter .....	ON-OFF
<b>AM SECTION</b>	
Circuitry .....	1 Stage RF Amplifier, 3-ganged Tuning Capacitor
Sensitivity	
(IHF, Ferrite Antenna) .....	300μV/m
(IHF, Ext. Antenna) .....	15μV
Selectivity .....	40dB
Signal-to-Noise Ratio .....	50dB

Image Rejection .....	More than 65dB
IF Rejection .....	More than 85dB
Antenna .....	Built-in Ferrite Loopstick Antenna

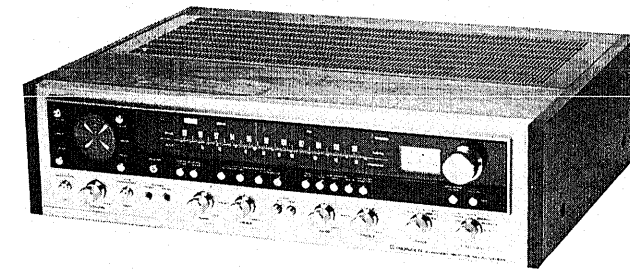
**MISCELLANEOUS**

Built-in CD-4 Demodulator, Regular Matrix Decoder, SQ Matrix Decoder	
Power Requirements .....	AC 120V 60Hz or 110, 120V, 130V, 220V and 240V (Switchable) 50/60Hz
Power Consumption .....	250W (UL approved model only) 530W (5-line Voltage model only)
AC Outlets .....	Unswitched 2, Switched 1
Dimensions .....	550(W) x 160(H) x 440(D)mm 22-1/16 x 6-5/16 x 17-5/16 in.
Weight: Without Package .....	22.4kg 49 lb 5 oz
With Package .....	27.2kg 59 lb 14 oz

**FURNISHED PARTS**

FM T-type Antenna .....	1
CD-4 Test Record (PQX-1011) .....	1
Polishing Cloth .....	1
Operating Instructions .....	1

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



## 2. FRONT PANEL FACILITIES

### POWER SWITCH

Push button switch for turning on AC power. Also activates switched AC outlets on rear panel. Depress once for power ON; depress again for power OFF.

### BALANCE CONTROLS

Individual balance controls for each of the four stereo channels.

### 4-CHANNEL LEVEL INDICATOR

All channels simultaneously displayed; relative intensity easily compared and adjusted.

### VOLUME CONTROL

Control for adjusting sound volume. When rotated clockwise, 4-channel speaker sound increases.

### CD-4 SEPARATION CONTROLS

Controls for adjusting front and rear separation when playing CD-4 records using a CD-4 cartridge.

After adjustment, 2-channel records and matrix 4-channel records can also be played at the same setting.

When playing records employing a conventional 2-channel cartridge, set these controls (left & right) to center position.

LEFT Control: Front left (CH 1) and rear left (CH 2) separation adjustment.

RIGHT Control: Front right (CH 3) and rear right (CH 4) separation adjustment.

Be sure to readjust when replacing cartridge or stylus.

### PHONES JACKS (FRONT & REAR)

Accept stereo headphone jacks. Front left and right (CH 1 & CH 3) can be heard when using FRONT jack.

Rear left and right (CH 2 & CH 4) can be heard when using REAR jack.

### INDICATOR LEVEL BUTTONS

Step attenuator switches convenient for reading of the 4-Channel Level Indicator. If both buttons are depressed, their values are added.

According to button positions, each attenuation of 0dB, -10dB, -20dB and -30dB can be selected:

0dB at released position, -10dB and -20dB pushed, and -30dB can be obtained by pushing -10dB and -20dB buttons.

### SPEAKER SWITCHES

Up to four pairs of speakers can be connected and switched on and off (in pairs) with the SPEAKERS SWITCH buttons. Button depressed: respective pair of speakers in operation.

Button released: respective pair of speakers off. By depressing all four buttons 2 sets of four-channel speaker systems can be used simultaneously (in different rooms, etc.).

### BASS & TREBLE CONTROLS

Separate controls are provided for front and rear bass and treble.

### FILTER BUTTON

LOW: Use this filter to cut out low-frequency noise (hum, rumble).

HIGH: Use this filter to cut out high-frequency noise (hiss).

### LOUDNESS BUTTON

Depress when listening at low volume levels for proper sound balance relative to human ear sensitivity.

**TAPE MONITOR BUTTONS (2CH, 4CH-1, 4CH-2)**  
These buttons are set to ON for checking the recording conditions or for playback with tape decks.

2CH: This button is set to ON for monitoring a recording in progress or for playback with a 2-channel tape deck connected to the 2CH TAPE MON and REC terminals.

4CH-1: This button is set to ON for monitoring a recording in progress or for playback with a 4-channel tape deck connected to the 4CH-1 TAPE MON and REC terminals.

4CH-2: This button is set to ON for monitoring a recording in progress or for playback with a 4-channel tape deck connected to the 4CH-2 TAPE MON and REC terminals.

**NOTE:**  
For record/playback or listening to broadcasts, leave these buttons set to the OFF position. With the button set to ON no sound will be heard.

### DOLBY NR ADAPTOR BUTTON

Depress when employing Dolby Noise Reduction Adaptor for recording or playback.

### MODE SWITCH

Selector switch for 2-channel and each type of four channel reproduction method.

2CH: During 2-channel stereo reproduction (sound does not emerge from rear speakers.)

4CH CD-4: For reproduction of discrete 4-channel tape, cartridge tape, or CD-4 records. 2-channel source can also be played in this position. At this time the same sounds are obtained from the rear left and right speakers as from the front left and right speakers (CH2 - CH1; CH4 - CH3).

RM: During 4-channel reproduction of Regular Matrix (RM) records and FM broadcasts. The matrix effect can also be obtained with a 2-channel program source.

SQ: For 4-channel reproduction of SQ system records and FM broadcasts. The matrix effect can also be obtained with a 2-channel program source.

**NOTE:**  
Sound will not be heard from the rear speakers (CH 2 & CH 4) at any setting of the Mode switch when the 2CH Power Boosting switch on the rear panel of the QX-949 has been set to 2CH.

### CD-4 INDICATOR LAMP

This lights to indicate that CD-4 record is being played (only when the MODE switch is set at 4CH CD-4).

### MODE & FUNCTION INDICATORS

Separately lighted indicators provide one-glance recognition of the QX-949 operating mode and function. Left to right: 2CH, 4CH, CD-4, RM, SQ, AM, FM, PHONO, AUX, STEREO (FM stereo indicator)

### TUNING/SIGNAL METER

When selecting an AM broadcast, tune so that the dial pointer of the lower meter deflects as far to the right as possible. For an FM broadcast, use the lower meter in the same way. Precise FM tuning is also possible by adjusting so that the dial pointer of the upper meter is centered.

### TUNING KNOB

Rotate to tune in AM or FM broadcasts.

### FM MUTING BUTTONS

Circuit for eliminating inter-station noise and weak interfering stations when tuning FM broadcast. Up position is ON; depress button (OFF) when weak station reception is desired.

### MPX NOISE FILTER BUTTON

Push this button to ON to eliminate high-frequency noise during FM stereo reception.

### FUNCTION SWITCH

Switch for selecting program source for playing.

AM: When listening to AM broadcasts

FM MONO: When listening to FM monophonic broadcasts

FM AUTO: Select when listening to FM stereo broadcasts. During FM monophonic broadcasts, automatically receives monophonic signals. Stereo indicator lights during FM stereo broadcasts.

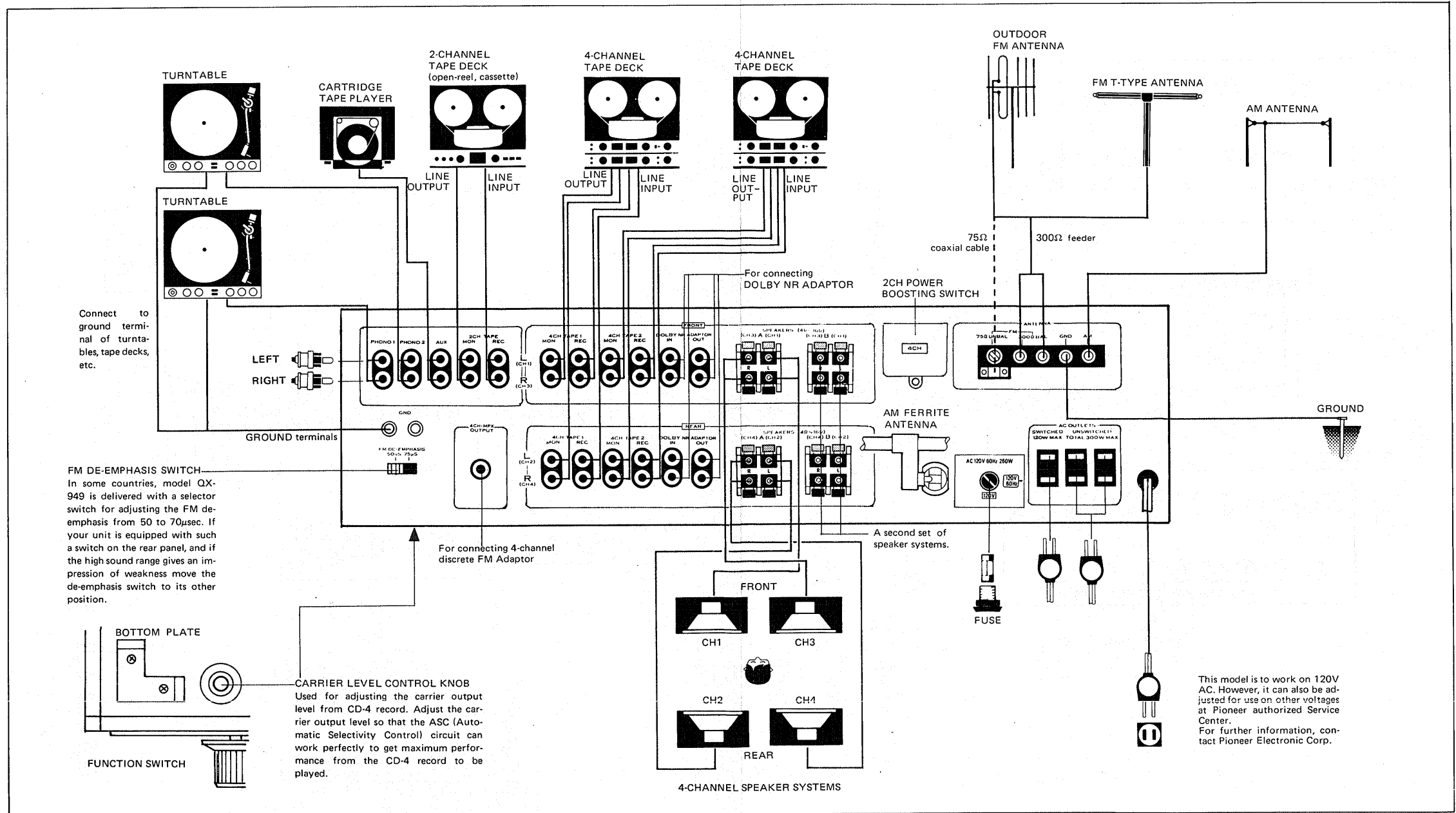
PHONO 1: When playing records on turntable connected to the PHONO 1 terminals.

PHONO 2: Same as above for PHONO 2 terminals.

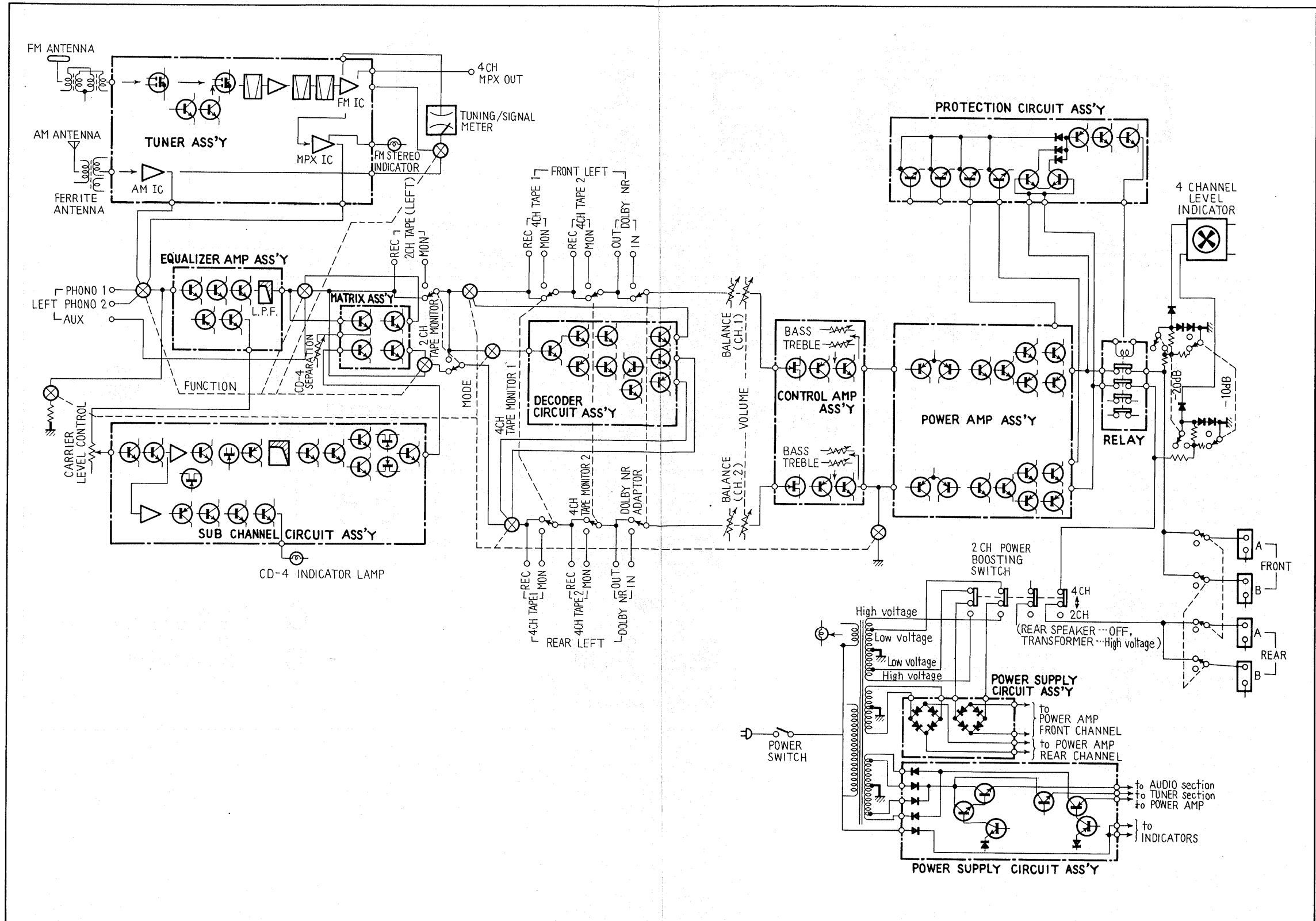
AUX: When playing component connected to the AUX terminals.

• The word "DOLBY" is a trademark of Dolby Laboratories Inc.

### 3. CONNECTION DIAGRAM



# 4. BLOCK DIAGRAM



## 5. CIRCUIT DESCRIPTION

### 5.1 RF STAGE

#### FM front end

The FM front end comprises a four-ganged tuning capacitor and a single-stage RF amplifier in which two MOS FETs are employed; one for an RF amplifier, and the other for a frequency converter.

The input signal from the antenna is amplified by Q1 (FET). The output signals from Q1 and from Q4 (local oscillator) are both applied to the gates of Q2 (frequency converter). From Q2, the signal enters transformer T5 tuned to the 10.7MHz intermediate frequency. From the transformer's secondary side, the signal goes to the IF amplifier stage.

#### FM IF amplifier stage

The FM IF stage comprises three ceramic filters and two ICs. After selective amplification through F1 (ceramic filter), Q5 (IC), F2 and F3

(ceramic filters), the signal enters the integrated circuit Q6. Fig. 1 shows the internal construction of Q6.

In the IC (Q6), the signal goes through three differential type limiters, a diode limiter stage and a quad limiter stage, whereupon detection takes place in the quadrature detector.

The output from the detector, after passing through the muting circuit also included in the IC (Q6), enters the MPX decoder.

In the muting circuit, the muting analog switch is turned on and off by means of the DC voltages obtained from the IF stage and the detector section. The muting control signal also serves from switching the automatic mono/stereo mode switch.

The detected signal from the Q6 is also available at the 4CH MPX OUT terminal on the rear panel. To this, a 4CH discrete decoder can be connected if and when discrete FM 4-channel broadcasts begin.

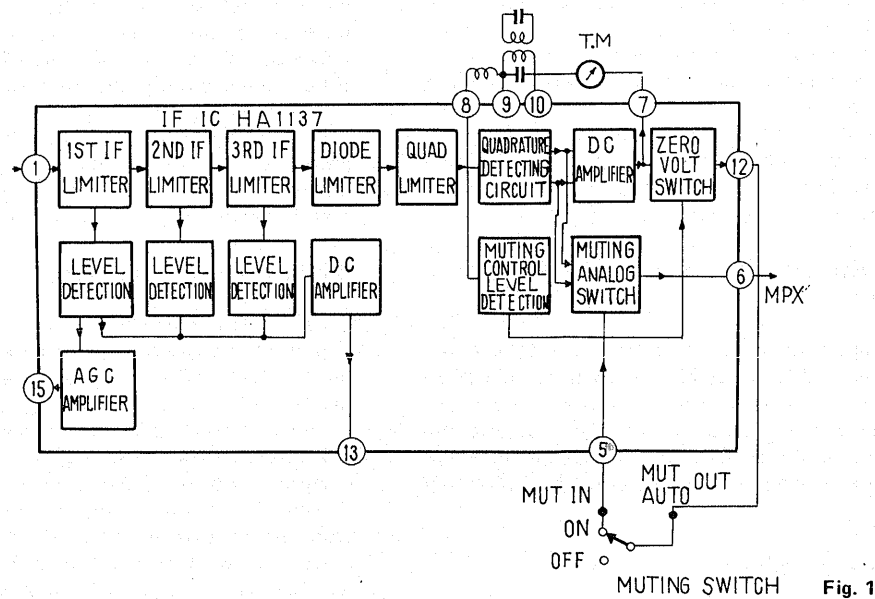


Fig. 1

#### MPX decoder section

The MPX decoder consists of a single IC (Q7). Its internal structure is shown in Fig. 2.

The signal is demodulated by two differential amplifiers in what is called a "double balanced differential amplifier circuit."

After detection, the audio signal undergoes single stage amplification and is then divided into pilot signal, main signal (L+R) and sub signal (L - R) portions. The pilot signal is converted into a 38kHz switching signal. Time-switching of the main and sub signals converts them into the desired left and right channel stereo signals.

Automatic switching to stereo mode is effected by turning the AND gate on and off by means of the FM muting control voltage and the 38kHz signal. At the same time, the stereo indicator lamp is controlled by a voltage originating from within the IC.

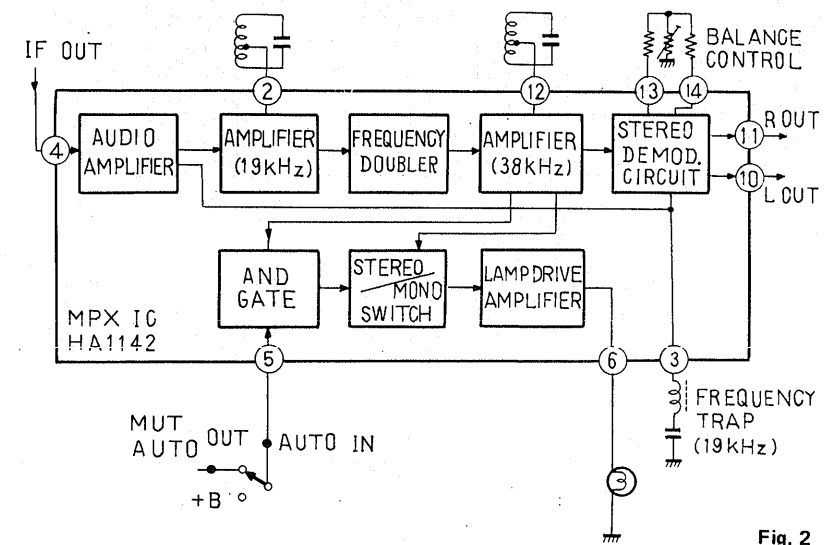


Fig. 2



## AM section

The circuit, which consists of a single IC as shown in Fig. 3, includes a single stage, tuned RF amplifier. Frequency conversion to IF is effected by a balanced type mixer. The signal from the antenna is first amplified and then converted to IF by combining it with the local oscillator output in the mixer stage.

The IF signal is selectively amplified by a combination of a single concentration filter and two amplifier stages. The signal is then detected to obtain the audio signal. Portions of the audio signal are used for AGC feedback and to drive the signal meter.

## 5.2 AF AMPLIFIER

### Equalizer stage

The equalizer amplifier comprises 5 transistors in each channel. Three of these operate as a negative feedback type equalizer amplifier to obtain standard RIAA equalization characteristics. The other two form a buffer amplifier which supplies the CD-4 subcarrier signal to the sub-channel assembly.

After phono equalization, the signal passes through a low pass filter and thence to the matrix assembly. The purpose of this low pass filter is to prevent leakage of the supersonic subcarrier signal of CD-4 discs into the main signal path.

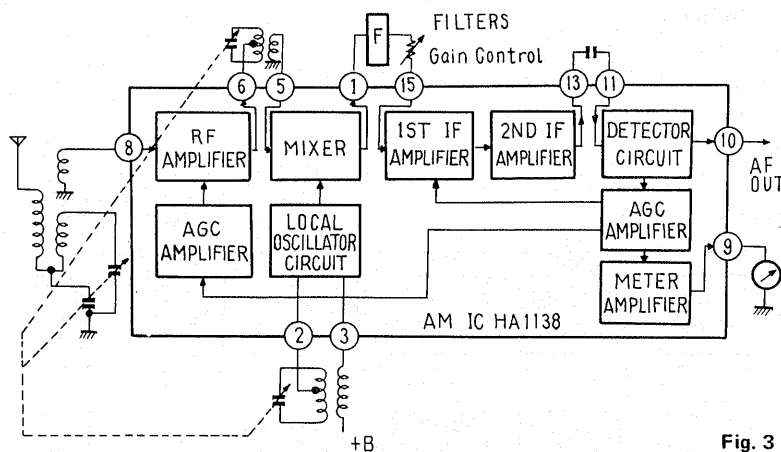


Fig. 3

### Sub-channel (CD-4) demodulator

The subcarrier signal from a CD-4 record first passes through the carrier level control and enters the sub-channel assembly.

This subcarrier is a 30kHz signal frequency-modulated with front-minus-rear difference information. Demodulation takes place in a PLL (Phase Locked Loop) circuit.

The resulting audio signal then passes through the ASC (Automatic Sensitivity Control), sub-equalizer and muting circuits, and thence through the ANRS (Automatic Noise Reduction System) circuit to the matrix circuit.

### Matrix circuit (in CD-4 signal path)

The main CD-4 signal (from the equalizer) and the sub-signal (from the sub-channel assembly) are added and subtracted in a series of algebraic operations to obtain four independent channel signals. This is done in the matrix circuit.

Different phono cartridges produce different output voltages and, therefore, main signals of different levels. The sub-signal, however, being FM modulated, does not vary in level (after demodulation, of course). To obtain optimum channel separation in the matrix operation, the main and sub-signals must therefore be first matched in level.

This is done by the separation control on the front panel which regulates the main signal level. It controls the amount of negative feedback current at the transistor's emitter.

### RM, SQ decoder circuits RM (Regular matrix)

The signal from the equalizer enters the decoder assembly if the MODE switch is at RM or SQ position. The decoder comprises two phase shifters and a matrix circuit. By changing the position of the MODE switch, the decoder can be made to operate according to the RM or SQ system.

### Control amplifier

The control amplifier is a negative feedback circuit comprising one FET and two transistors. To obtain stable operation, this two-stage direct coupled circuit constitutes a buffer amplifier of high input impedance but low output impedance.

### Power amplifier and protection circuit

The power amplifier is basically an all-stage direct coupled pure complementary design. Power supply is of course of the balanced positive and negative type.

With the mode switch in 2CH position, the rear channel inputs are grounded, only the front channel inputs remain operative.

The protection circuit incorporates 4 transistors (one for each channel) for four channels, which are used to detect overload. DC potential at the junction points of the output stage transistors is done by a differential amplifier consisting of two transistors. Additionally, three transistors are used to drive the cut-off relay. At the first sign of trouble, the relay contacts are opened to safeguard the output transistors and speakers. The protector circuit also serves as a muting circuit, keeping the unit silent during the first few seconds after switch-on.

### 2-channel power boosting circuit

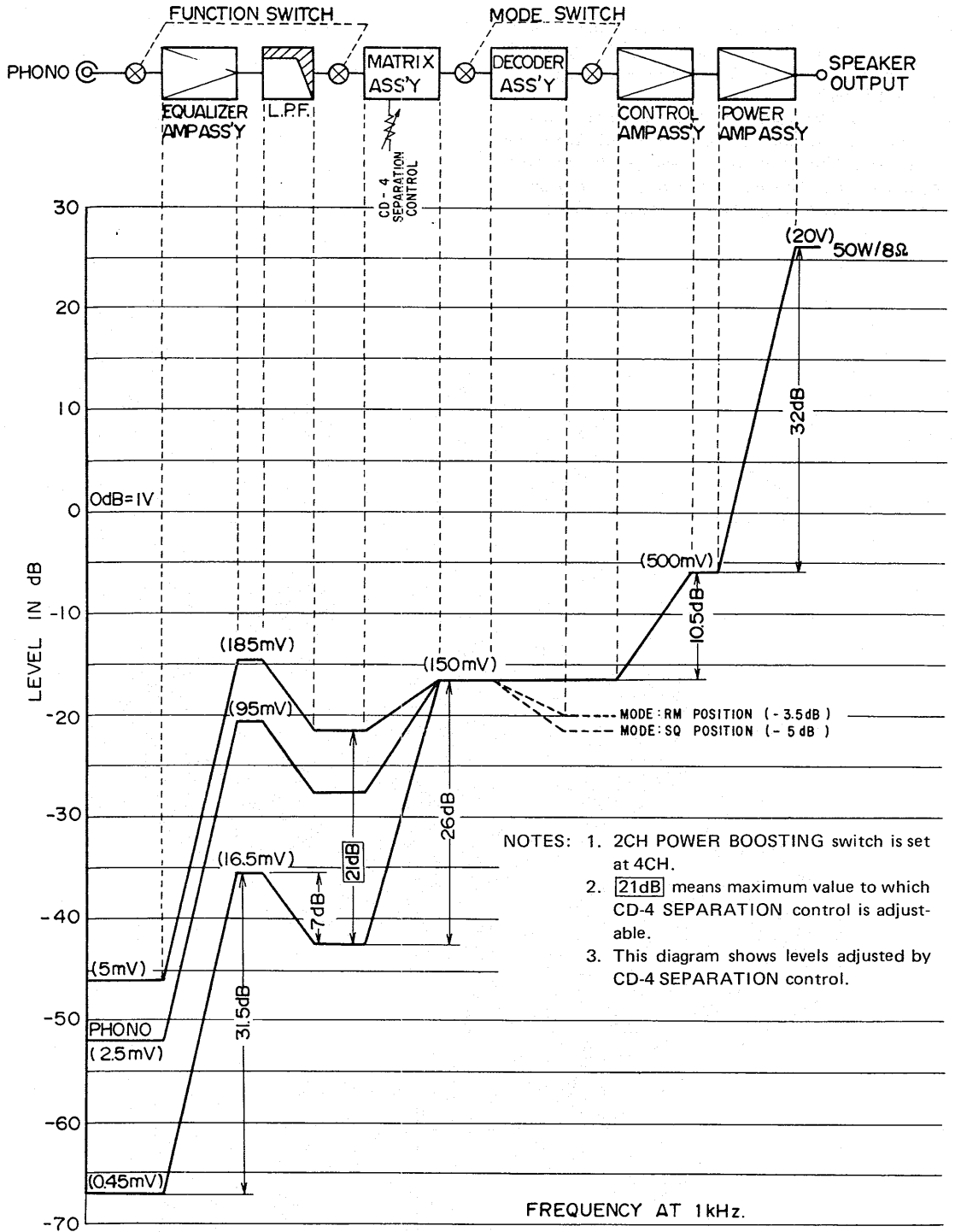
When the power boosting switch on the rear panel is set at "2CH," the output stages will operate in 2-channel mode, regardless of the position of the MODE switch. At the same time, power supply for the front channels only is switched to other taps on the power transformer, supplying a higher voltage to the power amps. As a result, available output power (per channel) in 2-channel operation is approximately twice that of 4-channel operation.

### 4-channel level indicators

An indicator is provided for each channel. The length of the bright line varies according to the output level of each channel, giving a kind of display effect. Its operating principle is as follows: A shutter is moved in accordance with the current flowing through a moving coil. This current is obtained from the power amplifiers. Output from the power amplifier is divided, and one portion is rectified. The resulting DC current flows through the indicator coil, moving the shutter. The above-mentioned voltage division is effected by the indicator level switch.

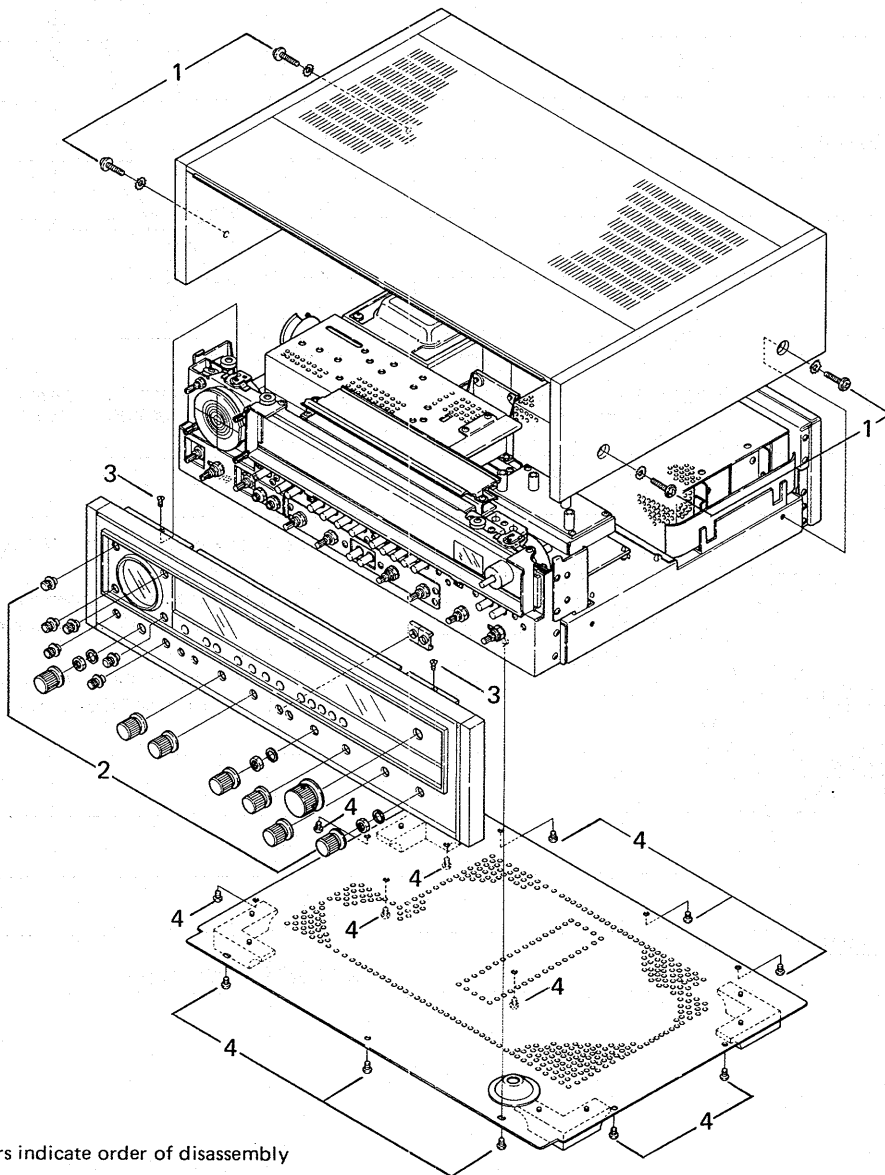
To protect the indicator coil against possible overload, two diodes are shunted in the circuit, operating as a limiter.

# 6. LEVEL DIAGRAM



## 7. DISASSEMBLY

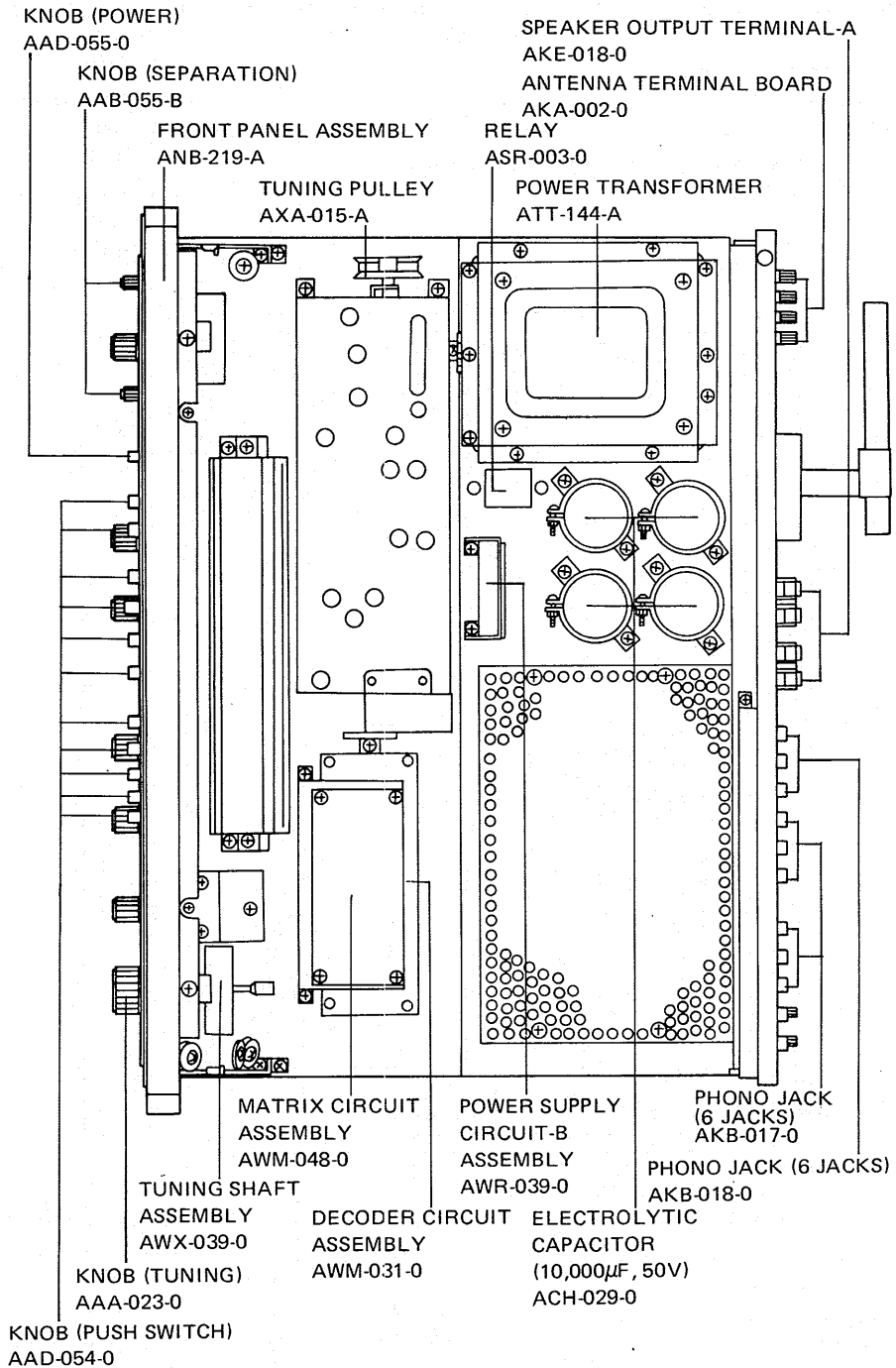
1. To remove the wooden cabinet, first remove the two screws holding each side, then lift the back of the wooden cabinet upward.
2. Pull off all knobs.
3. Remove the two screws in the upper edge of the front panel, and the three nuts from the shafts. Then pull the panel gently forward.
4. To remove the bottom plate, first remove a total of the 13 screws holding it in place.



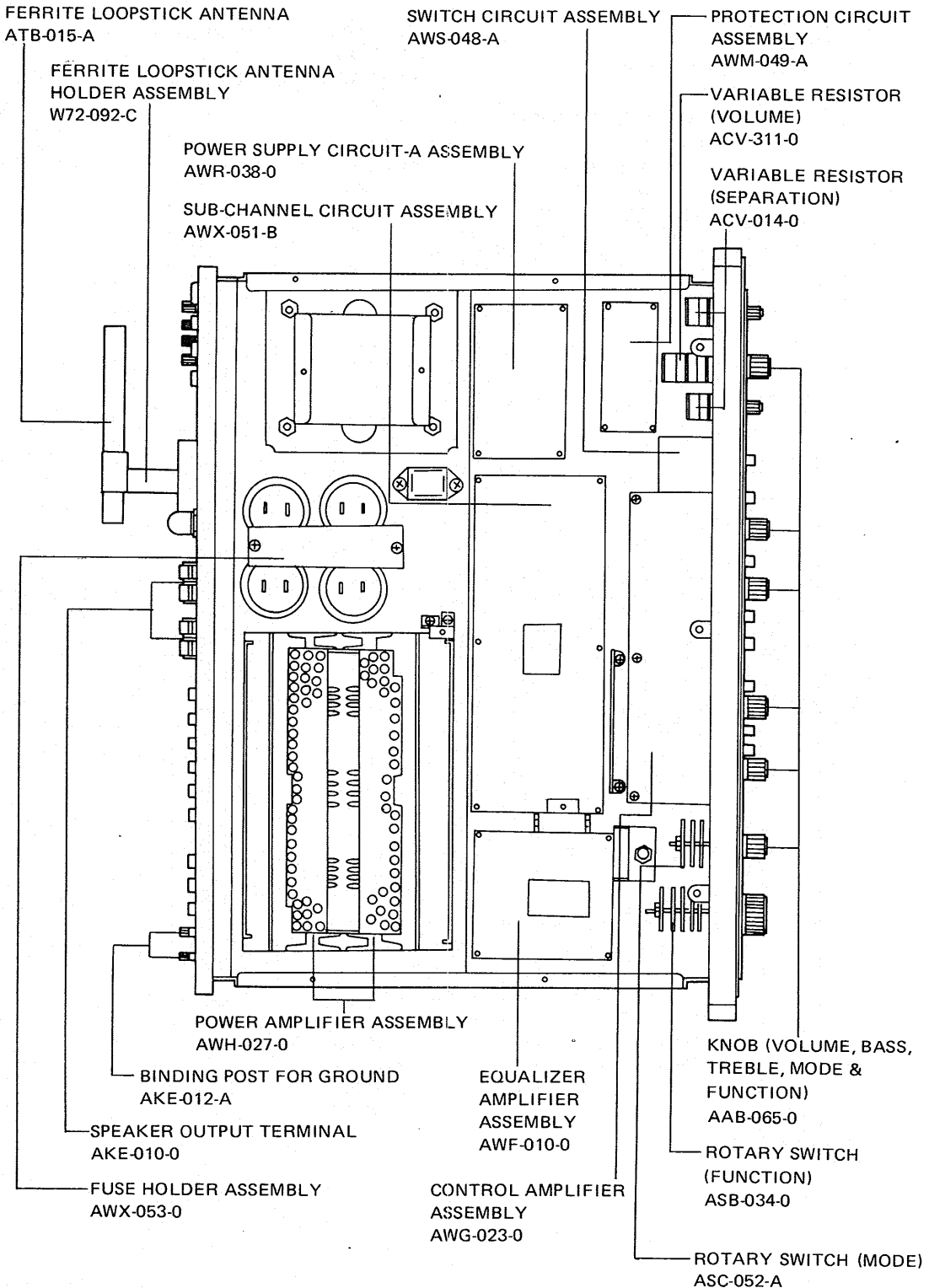
● Numbers indicate order of disassembly

# 8. PARTS AND P.C. BOARD LOCATION

## 8.1 TOP VIEW

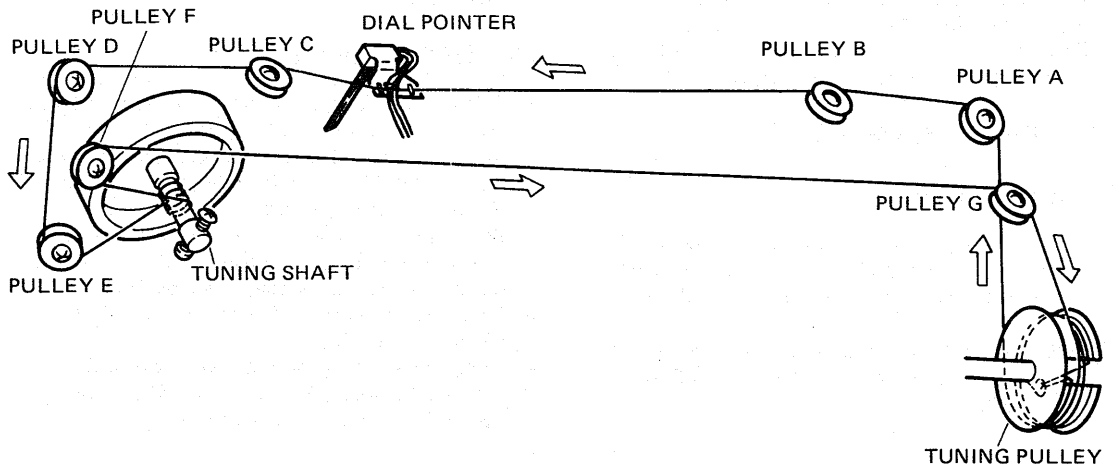


## 8.2 BOTTOM VIEW



## 9. DIAL CORD STRINGING

1. Turn the tuning capacitor so that its plates protrude as much as possible.
2. Tie one end of the string to the spring on the TUNING pulley (attached to the tuning capacitor).
3. Lead the string around pulleys A, B, C, D and E, then wind it 3 turns around the TUNING shaft.
4. Lead the string around pulleys F and G, then wind it 2 turns around the TUNING pulley.
5. Now tie the other end of the string to the spring on the TUNING pulley. Turn the tuning shaft and check for proper function. Then trim the ends of the string.
6. Turn the tuning shaft until the plates of the variable are all the way in. Move the pointer to the right-end starting point on the dial and fasten it to the string in that position.



# 10. ALIGNMENT PROCEDURE

## 10.1 REQUIRED MEASURING INSTRUMENTS

- FM Signal generator
- MPX signal generator
- AM signal generator
- Millivolt meter
- Distortion meter

## 10.2 AM ALIGNMENT

1. Set AM signal generator at 400Hz 30% modulation. Connect to AM antenna terminal via 1k-ohm dummy resistor.
2. Connect oscilloscope and millivolt meter in parallel to unit's TAPE REC terminals.
3. Tune signal generator and unit to 600kHz. Set signal generator output level at approx. 30dB.
4. Adjust T9 and T10 on tuner assembly and core of ferrite bar antenna for maximum output level reading.
5. Now tune unit and signal generator to 1,400kHz.
6. Adjust TC5, TC6 and TC7 on tuner assembly for maximum output level reading.
7. Repeat steps 3 thru 6 several times to obtain maximum readings at both frequencies.

## 10.3 FM ALIGNMENT

### Tracking Adjustment

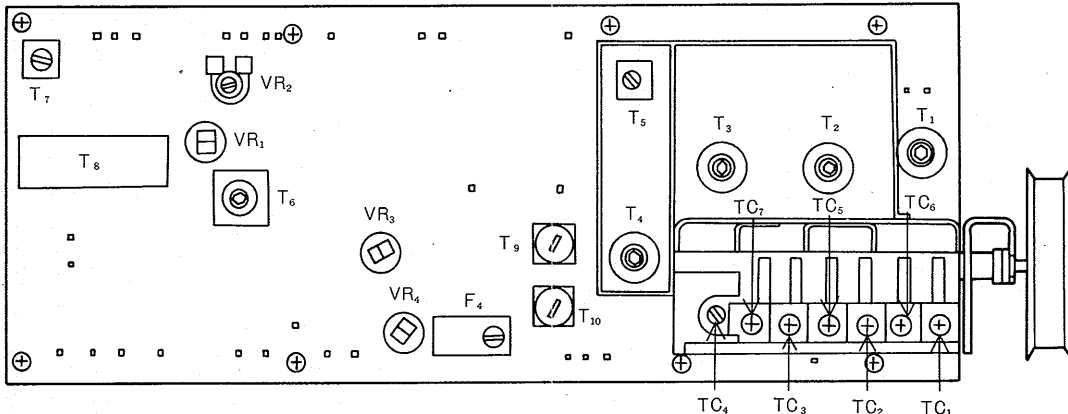
1. Set FM signal generator at 400Hz 100% modulation. Connect to unit's FM antenna terminals via 300-ohm balanced dummy antenna.
2. Connect oscilloscope, millivolt meter and distortion meter in parallel to TAPE REC terminal.

3. Set the signal generator output level to 8 ~ 10dB.  
Set the signal generator and set dials to 90MHz.
4. Adjust T1, T2, T3 and T4 cores for maximum output level reading.
5. Now, tune unit and signal generator to 106MHz.
6. Adjust TC4, TC1, TC2 and TC3 to obtain maximum output level reading.
7. Repeat steps 3 thru 6 several times for maximum level readings at both frequencies.
8. Then adjust core of T5 for maximum output level reading.
9. Detune so that only interstation noise is received.  
Adjust primary (bottom) core of T6 so that tuning meter is centered.
10. Tune unit and signal generator to 98MHz. Set signal generator level at 60dB. Tune precisely, observing tuning meter.
11. Adjust secondary (upper) core of T6 on tuner assembly to obtain minimum reading on distortion meter.

### FM MPX Alignment

1. Adjust MPX signal generator to obtain main signal modulation of 1kHz, 67.5kHz frequency deviation, and pilot signal modulation of 19kHz, 7.5kHz frequency, deviation. Set output level at 60dB.
2. Set signal generator for modulation of L (left) channel only. Adjust core of T7 to obtain maximum output level reading.
3. Now, adjust core of T5 to obtain minimum distortion reading.
4. Then set signal generator for modulation of L (later R) and pilot. Adjust VR1 to obtain maximum channel separation.

TUNER ASSEMBLY (AWE-027-0)



## 10.4 CD-4 DECODER CIRCUIT ALIGNMENT

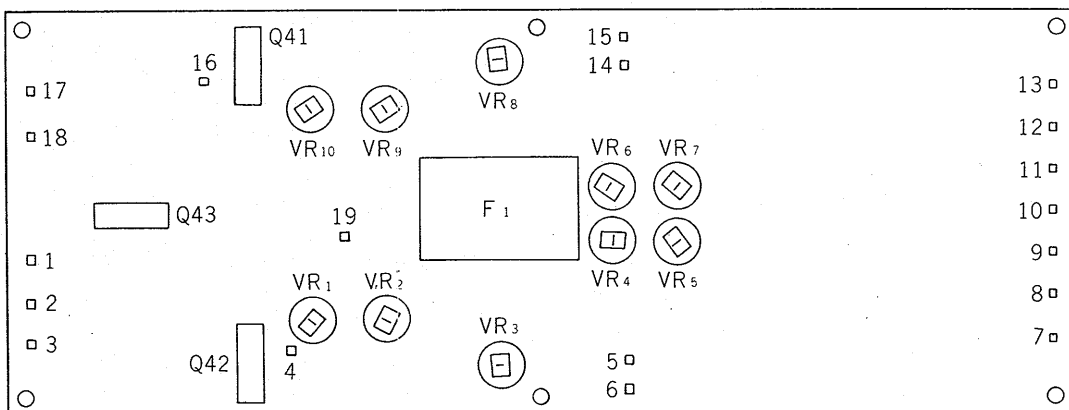
- When the PLL demodulator integrated circuit has been replaced (Q41, Q42: SL60505), adjustments should be made in the following order.
  - This method is both convenient and simple, but, if carried out carefully, is capable of adjustment over the practical range. Note, however, that unless the test record (PQX-1011) and the phono cartridge used for the audition are both new, adjustment is impossible.
1. Terminal 19 of the sub-channel assembly must be to ground. (This ensures that muting is inactivated.)
  2. Connect an oscilloscope to terminal 14 (L channel). (For the R channel use terminal 5.)
  3. Turn the carrier level control up to its maximum (fully clockwise).
  4. Play band 1 of the test record (Band 2 for the R channel). The warble-tone waveform will be displayed on the oscilloscope.
  5. Turn the carrier level control to the left until the point where the warble-tone waveform distorts is reached. This adjustment is extremely critical, and should be performed with great care.
  6. Adjust VR10 until the warble-tone distortion disappears. (For the R channel use VR1.)

It is preferable for the adjustment to be made with the lowest possible carrier level, so the oscilloscope used should have as high a vertical sensitivity as possible (approximately 10mV/cm).

## 10.5 POWER AMPLIFIER ADJUSTMENTS

1. Do not connect load to speaker terminals. Terminate input terminals of power amplifier assembly with a 5.1k-ohm resistor.
2. Set power boosting switch to 4CH position. Then energize unit.
3. For first approximately six seconds, the relay remains open, keeping the unit muted. Confirm that all voltages are as indicated in the circuit diagram on page 31.
4. If voltages are greatly different from rated values, shut off power immediately. Check suspicious areas, especially power supply unit.
5. If the relay opens immediately after the power amplifier has been come into operation, a defect in the output transistors can be suspected. Check the output stage.
6. After approx. 10 ~ 20 minutes of warming-up time, adjust VR3 so that the voltage across terminals 1 and 2 of the power amplifier assembly becomes 20mV.
7. In the same way, adjust VR4 to obtain 20mV voltage readings across the terminals 25 and 26.
8. Next, connect voltmeter between terminal 5 and ground. Adjust VR1 to obtain 0V reading.

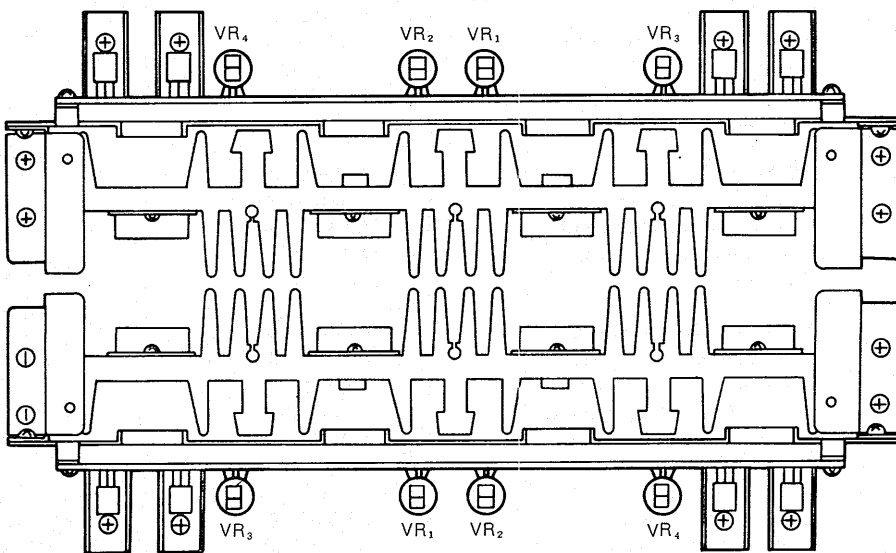
SUB-CHANNEL CIRCUIT ASSEMBLY (AWX-051-A)





9. In the same way, adjust VR2 to obtain zero readings between terminal 23 and ground.
10. After completing all adjustments, return all connections to normal, then replace the case and bottom plate.

POWER AMPLIFIER ASSEMBLY (AWH-027-0)



# 11. EXPLODED VIEW AND PARTS LIST

## 11.1 EXPLODED VIEW-1

NOTICE: Any parts asterisked (\*) are subject to being not supplied.

Key No.	Description	Part No.
1	Power transformer	ATT-144-A
2		
3*	Power transformer-held metal	ANF-156-0
4*	Wire supporter	ANK-056-0
5*	Shield cover	
6	Tuning pulley	AXA-015-A
7	Tuner assembly	AWE-027-0
8*	Tuner assembly-held metal (A)	ANF-157-A
9*	Tuner assembly-held metal (B)	ANF-158-A
10	Screw M4 x 15	ABA-010-A
11	Washer	B21-011-0
12	Wooden cabinet	AMM-028-A
13	Electrolytic capacitor 10,000 $\mu$ F, 50V	ACH-029-0
14	Relay	ASR-003-0
15*	Wire clip (C)	AEC-007-0
16	Ground terminal strip (2P)	K13-048-0
17	Power supply circuit-A assembly	AWR-038-0
18	Terminal strip (1L2P)	AKC-018-0
19*	Shield plate	ANH-168-A
20	Protection circuit assembly	AWM-049-A
21	Ground terminal strip (4P)	K13-047-0
22*	Bottom plate	ANE-033-A
23	Foot	AEC-027-B
24*	Shield plate	ANH-155-A
25*	Reinforced metal	ANK-055-0
26	Variable resistor	ACV-122-0
27*	Variable resistor-held metal	ANF-141-0
28	Fuse holder assembly	AWX-053-0
29	Power supply circuit-B assembly	AWR-039-0
30*	Wire clip (D)	AEC-024-0
31*	P.C. board holder	AEB-019-0
32	Matrix circuit assembly	AWM-048-0
33	Sub-channel circuit assembly	AWX-051-B
34*	Power amplifier-held metal (A)	ANF-148-0
35*	Heat sink	ANH-159-0
36*	Power amplifier-held metal	ANF-149-0
37*	Power amplifier-held metal	ANF-150-0
38	Power amplifier assembly	AWH-027-0
39*	Power amplifier-held metal (B)	ANF-149-0
40*	Wire guide	ANG-089-0
41		
42	Clip (P.C. Board holder)	AEC-036-A
43*	Cover (power amplifier)	ANH-163-0
44*	Chassis	ANA-051-A
45	Power amplifier assembly	AWH-027-0

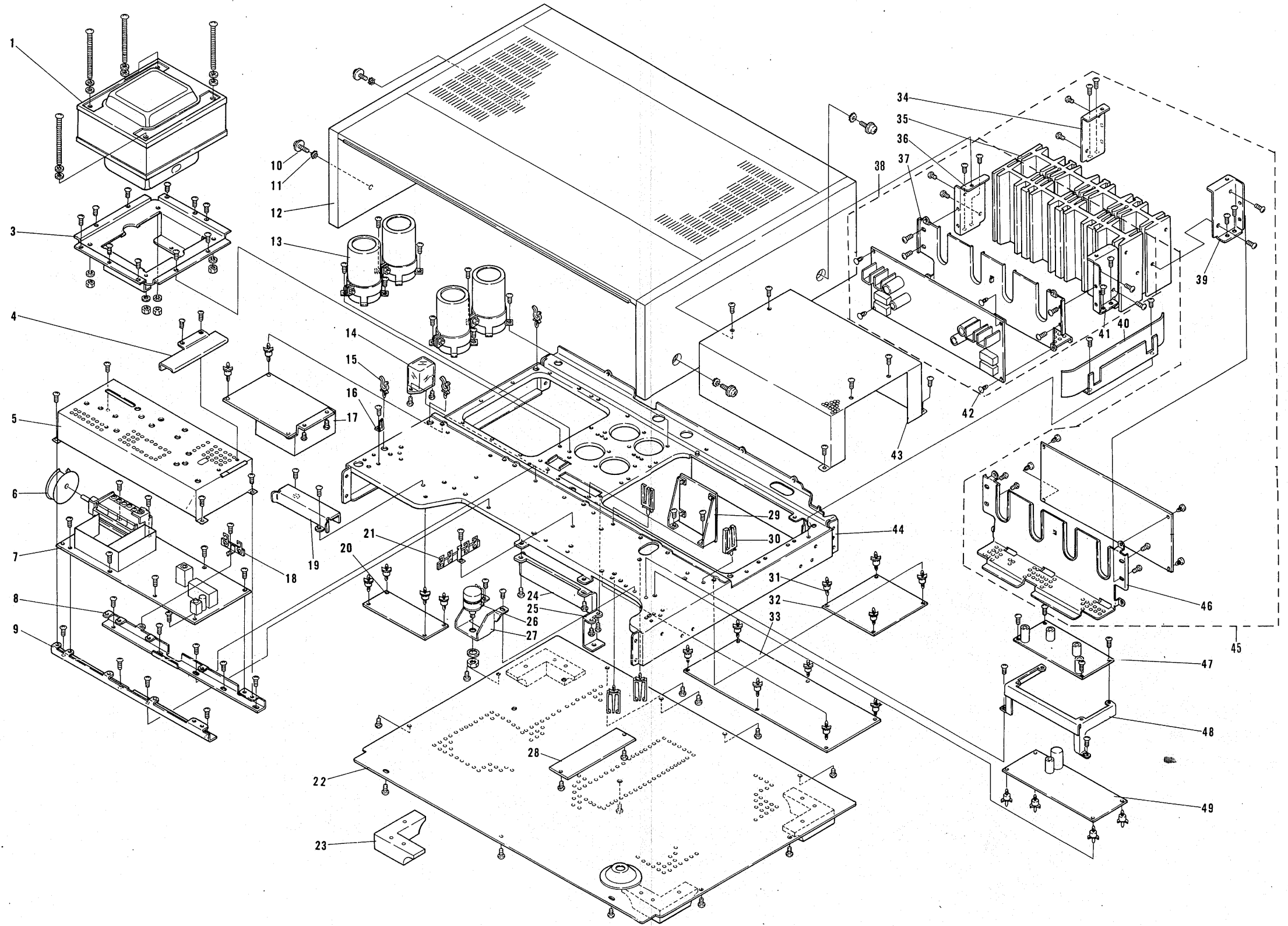
**Note:**

Parts number subject to change for the purpose of improvement with notice of service bulletin.

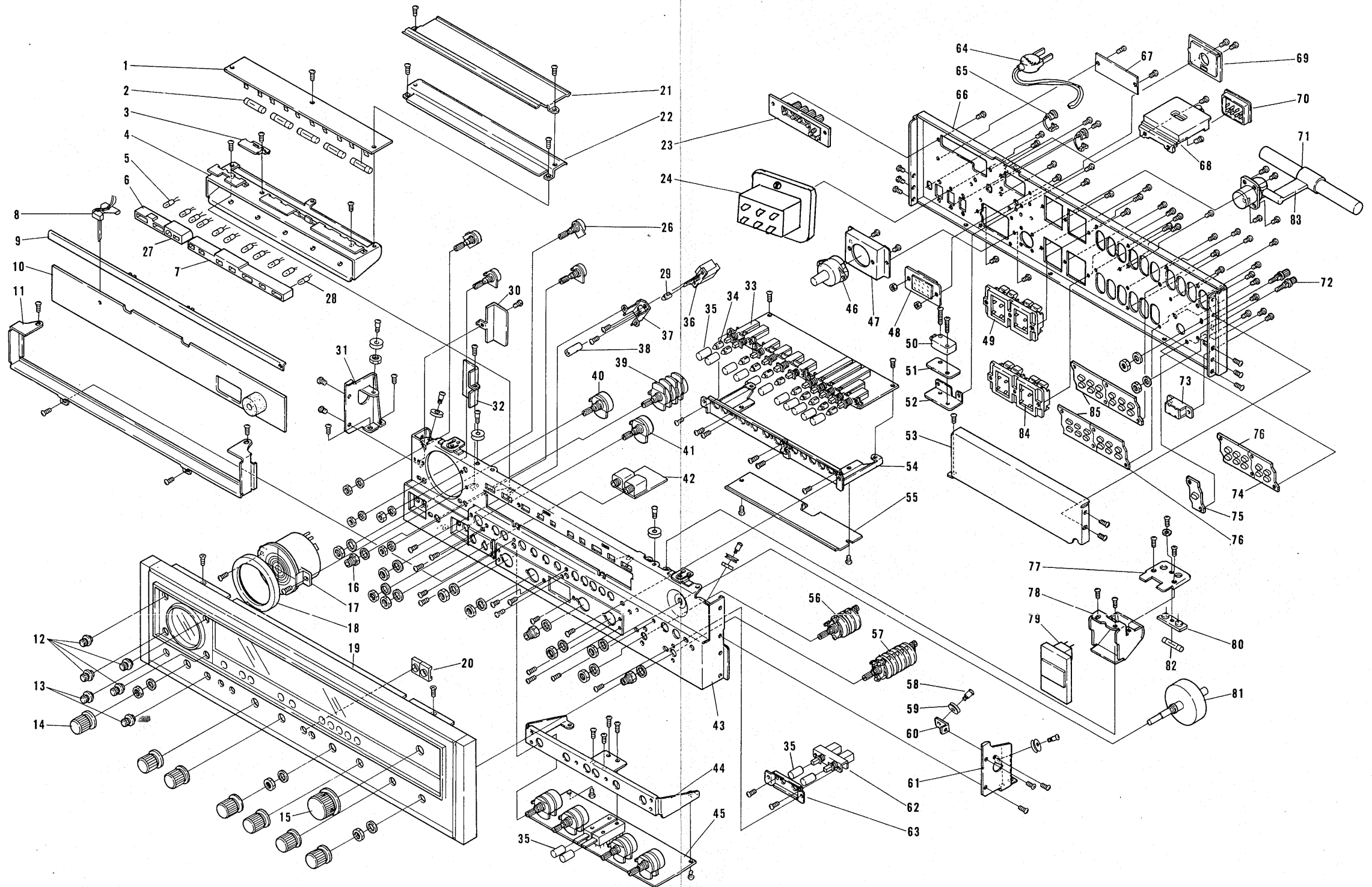
Service bulletin will be furnished whenever necessary and you are kindly requested to amend parts number in this manual according to the instructions.

Key No.	Description	Part No.	
46*	P.C. board-hold metal	ANF-150-0	
47	Equalizer amplifier assembly	AWF-010-0	
48*	P.C. board holder	ANF-159-0	
49	Decoder circuit assembly	AWM-031-0	

EXPLODED VIEW-1



11.2 EXPLODED VIEW-2



NOTICE: Any parts asterisked (\*) are subject to being not supplied.

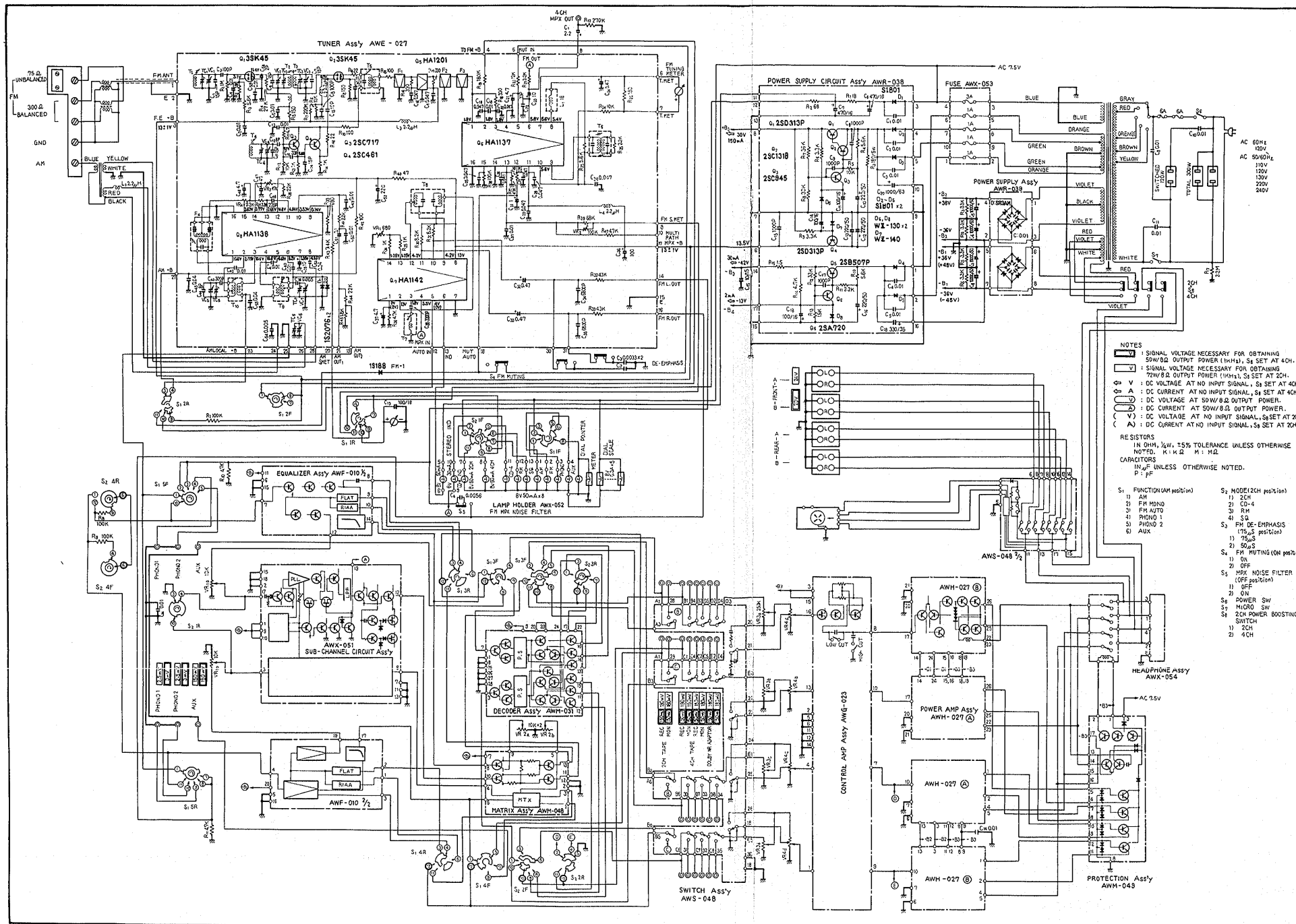
Key No.	Description	Part No.
1	Lamp board assembly	AWX-052-0
2	Pilot lamp 8V, 0,3A	E22-017-0
3*	Rubber bracket holder	ANF-164-0
4*	Lamp box	ANH-162-0
5	Pilot lamp 6V, 30mA	AEL-006-0
6*	Rubber bracket	AEB-043-0
7*	Rubber bracket	AEB-042-0
8	Dial pointer assembly	AAF-020-0
9*	Dial scale holder	ANF-162-0
10	Dial scale	AAG-063-A
11*	Dial scale holder	ANF-163-A
12	Knob (Level)	AAB-064-A
13	Knob (Separation)	AAB-055-B
14	Knob (Volume, Bass, Treble, Mode, Function)	AAB-065-0
15	Knob (Tuning)	AAA-023-0
16	Boss	ALA-006-0
17	4-Channel level indicator	AAW-021-0
18*	Shading plate	AEC-120-0
19	Front panel assembly	ANB-219-A
20	Spacer	AEC-116-0
21*	Wire cover	ANK-054-0
22*	P.C. board cover	ANK-053-0
23	Antenna terminal board	AKA-002-0
24	AC socket	AKP-005-0
25		
26	Variable resistor	ACT-009-0
27*	Rubber bracket	AEB-044-0
28	Pilot lamp 6V, 50mA	AEL-007-0
29	Coupler (knob-to-switch)	AAE-008-0
30*	Shield plate	ANH-169-0
31*	Reinforced metal(R)	ANK-057-A
32*	Shield plate	ANH-170-A
33	Switch circuit assembly	AWS-048-A
34	Coupler (Knob-to switch)	AAE-007-0
35	Knob (Push switch)	AAD-054-0
36	Push switch (Power)	ASG-043-0
37*	Switch-held metal	ANF-153-0
38	Knob (Power)	AAD-055-0
39	Variable resistor	ACV-311-0
40	Variabler resistor	ACV-014-0
41	Variable resistor	ACV-014-0
42	Headphone jack assembly	AWX-054-0
43*	Sub-panel	AND-064-A
44*	P.C. board-held metal	ANF-154-0
45	Control amplifier assembly	AWG-023-0

Key No.	Description	Part No.
46	Fuse holder	AKR-015-0
47*	Fuse holder-held metal	ANF-161-0
48	Multi-socket	AKP-006-0
49	Speaker output terminal-A	AKE-018-0
50	Microswitch	ASF-001-0
51*	Insulator	AEC-111-A
52*	Switch-held metal	ANF-142-0
53*	Shield plate	ANH-165-A
54*	P.C. board-held metal	ANF-166-0
55*	Shield plate	ANF-167-0
56	Rotary switch (Mode)	ASC-052-A
57	Rotary switch (Function)	ASB-034-0
58*	Pulley's shaft	M49-025-E
59*	Pulley	AEC-101-0
60*	Pulley-held metal	ANG-088-A
61*	Reinforced metal (L)	ANK-056-A
62	Push switch (MPX-noise filter, FM muting)	ASG-050-A
63*	Switch-held metal	ANF-160-0
64	AC power cord	ADG-003-0
65	AC cord grommet	AEC-079-0
66*	Rear panel	ANC-089-A
67*	Model name plate	AAL-168-0
68	Switch cover assembly	AEC-110-A
69*	Indicator plate	AAH-008-A
70	Multi-plug	AKM-006-0
71	Ferrite loopstick antenna	ATB-015-A
72	Binding post for ground	AKE 012-A
73	Slide switch (De-emphasis)	ASH-008-0
74	Phono Jack (4 jacks)	AKB-014-0
75	Phono jack (1 jack)	AKB-019-0
76	Phono jack (6 jacks)	AKB-017-0
77*	Lamp-held metal	ANF-014-A
78*	Lamp box	ANH-156-A
79	Twin meter	AAW-020-0
80	Fuse holder (1P)	AKK-002-0
81	Tuning shaft assembly	AXA-039-0
82	Pilot lamp 8V, 0,3A	AEL-015-0
83	Ferrite loopstick antenna holder assembly	W72-092-C
84	Speaker output terminal	AKE-010-0
85	Phono jack (6 jacks)	AKB-018-0

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

## 12.1 CIRCUIT CONNECTION DIAGRAM AND MISCELLANEOUS PARTS

NOTE: Please use an easy-to-see Schematic Diagram interleaved into the manual.



**NOTES**

⊖ V: SIGNAL VOLTAGE NECESSARY FOR OBTAINING 50W/8Ω OUTPUT POWER (1MHz), S<sub>1</sub> SET AT 4CH.

⊕ V: SIGNAL VOLTAGE NECESSARY FOR OBTAINING 72W/8Ω OUTPUT POWER (1MHz), S<sub>1</sub> SET AT 2CH.

⊖ V: DC VOLTAGE AT NO INPUT SIGNAL, S<sub>1</sub> SET AT 4CH.

⊕ V: DC CURRENT AT NO INPUT SIGNAL, S<sub>1</sub> SET AT 4CH.

⊖ V: DC VOLTAGE AT 50W/8Ω OUTPUT POWER.

⊕ V: DC CURRENT AT 50W/8Ω OUTPUT POWER.

⊖ V: DC VOLTAGE AT NO INPUT SIGNAL, S<sub>1</sub> SET AT 2CH.

⊕ V: DC CURRENT AT NO INPUT SIGNAL, S<sub>1</sub> SET AT 2CH.

**RESISTORS**  
 IN OHM, KΩ, ±5% TOLERANCE UNLESS OTHERWISE NOTED. K: K Ω M: M Ω

**CAPACITORS**  
 IN μF UNLESS OTHERWISE NOTED. P: pF

**S<sub>1</sub> FUNCTION (4CH position)**

- 1) AM
- 2) FM MAND
- 3) FM AUTO
- 4) PHONO 1
- 5) PHONO 2
- 6) AUX

**S<sub>2</sub> MODE (2CH position)**

- 1) 2CH
- 2) CD-4
- 3) FM
- 4) SΩ
- 5) FM DE-EMPHASIS (75.5 position)
- 6) 75.5
- 7) 50.5

**S<sub>3</sub> FM MUTING (ON position)**

- 1) ON
- 2) OFF

**S<sub>4</sub> MUX NOISE FILTER (OFF position)**

- 1) ON
- 2) OFF

**S<sub>5</sub> POWER SW**

- 1) MICRO SW
- 2) 2CH POWER BOOSTING SWITCH

**S<sub>6</sub> 2CH POWER BOOSTING SWITCH**

- 1) 2CH
- 2) 4CH

- 2SA720
- 2SC1327
- 2SA725
- 2SA726
- 2SB530
- 2SC869
- 2SC1312
- 2SA679
- 2SA745
- 2SB530
- 2SC1079
- 2SC1116
- 2SC1403
- 2SD370
- 2SA733
- 2SA763P
- 2SC945
- 2SB507P
- 2SD313P
- 2SB527
- 2SB528
- 2SD357
- 2SD358
- 2SC461
- 2SC717
- 2SC1344
- 2SC857K
- 2SC1384
- 2SC1451
- 2SK30A
- 2SK30AD
- 2SK40
- 3SK45
- HA1137
- HA1138
- HA1142
- M5101P
- M51361P
- SL60505
- HA1201



- CAPACITORS: IN  $\mu$ F UNLESS OTHERWISE NOTED p:pF
- RESISTORS: IN  $\Omega$ ,  $\frac{1}{4}$ W UNLESS OTHERWISE NOTED k:k  $\Omega$ , M:M  $\Omega$ .

**Miscellaneous Parts**

**CAPACITORS**

Symbol	Description			Part No.
C1	Electrolytic	2.2	16V	CSSA 2R2M 16
C2	Mylar	0.0033	50V	CQMA 332J 50
C3	Mylar	0.0033	50V	CQMA 332J 50
C4	Ceramic	0.0056	50V	CKDYB 562K 50
C5	Electrolytic	10,000	50V	ACH-029-0
C6	Electrolytic	10,000	50V	ACH-029-0
C7	Electrolytic	10,000	50V	ACH-029-0
C8	Electrolytic	10,000	50V	ACH-029-0
C9	Metallized mylar	0.01	250V	ACE-002-0
C10	Ceramic	0.01	250V	ACG-001-0
C11	Ceramic	0.01	250V	ACG-001-0
C12	Ceramic	0.01	250V	ACG-001-0
C13	Electrolytic	100	16V	CEA 101P 16
C14	Ceramic	0.01	50V	CKDYF 103Z 50
C15	Electrolytic	10	50V	CEA 100P 50
C16	Mylar	0.0039	50V	CQMA 392K 50
C17	Mylar	0.0039	50V	CQMA 392K 50
C18	Ceramic	0.01	50V	CKDYF 103Z 50

**RESISTORS AND POTENTIOMETERS**

Symbol	Description			Part No.
R1	Carbon film	270k		RD $\frac{1}{4}$ PS 274J
R2	Carbon film	100k		RD $\frac{1}{4}$ PS 104J
R3	Metal oxide	3.3k	3W	RS3P 332K
R4	Metal oxide	3.3k	3W	RS3P 332K
R5	Metal oxide	3.3k	3W	RS3P 332K
R6	Metal oxide	3.3k	3W	RS3P 332K
R7	Carbon film	2.2M	$\frac{1}{4}$ W	RD $\frac{1}{4}$ PS 225J
R8	Carbon film	100k		RD $\frac{1}{4}$ PS 104J
R9	Carbon film	100k		RD $\frac{1}{4}$ PS 104J
R10	Carbon film	4.7k		RD $\frac{1}{4}$ PS 472J
R11	Carbon film	4.7k		RD $\frac{1}{4}$ PS 472J
VR1a	Variable resistor 10k-C (CD-4 separation)			ACV-014-0
VR1b	Variable resistor 10k-C (CD-4 separation)			ACV-014-0
VR2	Variable resistor 10k-B <sub>2</sub> dual (Carrier level)			ACV-122-0
VR3a	Variable resistor 250k-B <sub>2</sub> (Level control)			ACT-009-0
VR3b	Variable resistor 250k-B <sub>2</sub> (Level control)			ACT-009-0

Continued on the next page

Symbol	Description	Part No.	
VR3c	Variable resistor 250k-B <sub>2</sub> (Level control)	ACT-009-0	
VR3d	Variable resistor 250k-B <sub>2</sub> (Level control)		
VR4	Variable resistor 250k-B <sub>1</sub> 4-gang (Volume)	ACV-311-0	

### SEMICONDUCTOR

Symbol	Description	Part No.	
	1S188 FM-1 Diode		

### SWITCHES

Symbol	Description	Part No.	
S1	Rotary switch (Function)	ASB-034-0	
S2	Rotary switch (Mode)	ASC-052-A	
	Fuse holder (AC power)	AKR-015-0	
	Push switch	ASG-050-A	
	Relay	ASR-003-0	
S3	Slide switch (De-emphasis)	ASH-008-0	
S6	Push switch (Power)	ASG-043-0	
S7	Micro switch	ASF-001-0	
S8	Multi-plug (Power boosting)	AKM-006-0	
	Multi-socket (Power boosting)	AKP-006-0	

### COIL AND TRANSFORMERS

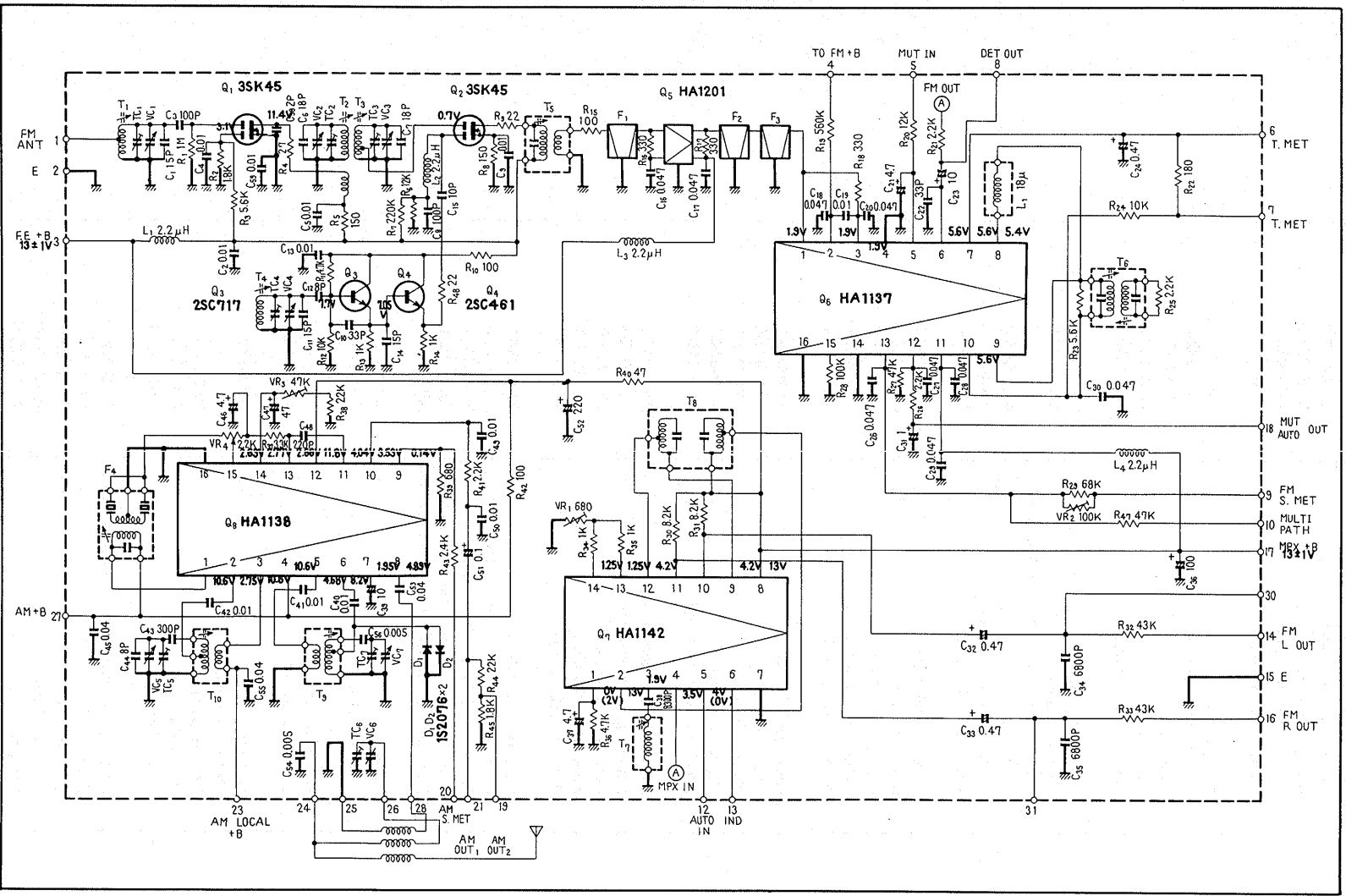
Symbol	Description	Part No.	
	RF choke coil	T24-028-A	
	Power transformer	ATT-144-A	
	Ferrite loopstick antenna	ATB-015-A	
	Balune	T22-025-A	

### OTHERS

Symbol	Description	Part No.	
	Tuner assembly	AWE-027-0	
	Equalizer amplifier assembly	AWF-010-0	
	Control amplifier assembly	AWG-023-0	
	Decoder circuit assembly	AWM-031-0	
	Sub-channel circuit assembly	AWX-051-B	
	Matrix circuit assembly	AWM-048-0	
	Protection circuit assembly	AWM-049-A	
	Power amplifier assembly	AWH-027-0	
	Headphone jack assembly	AWX-054-0	
	Switch circuit assembly	AWS-048-A	

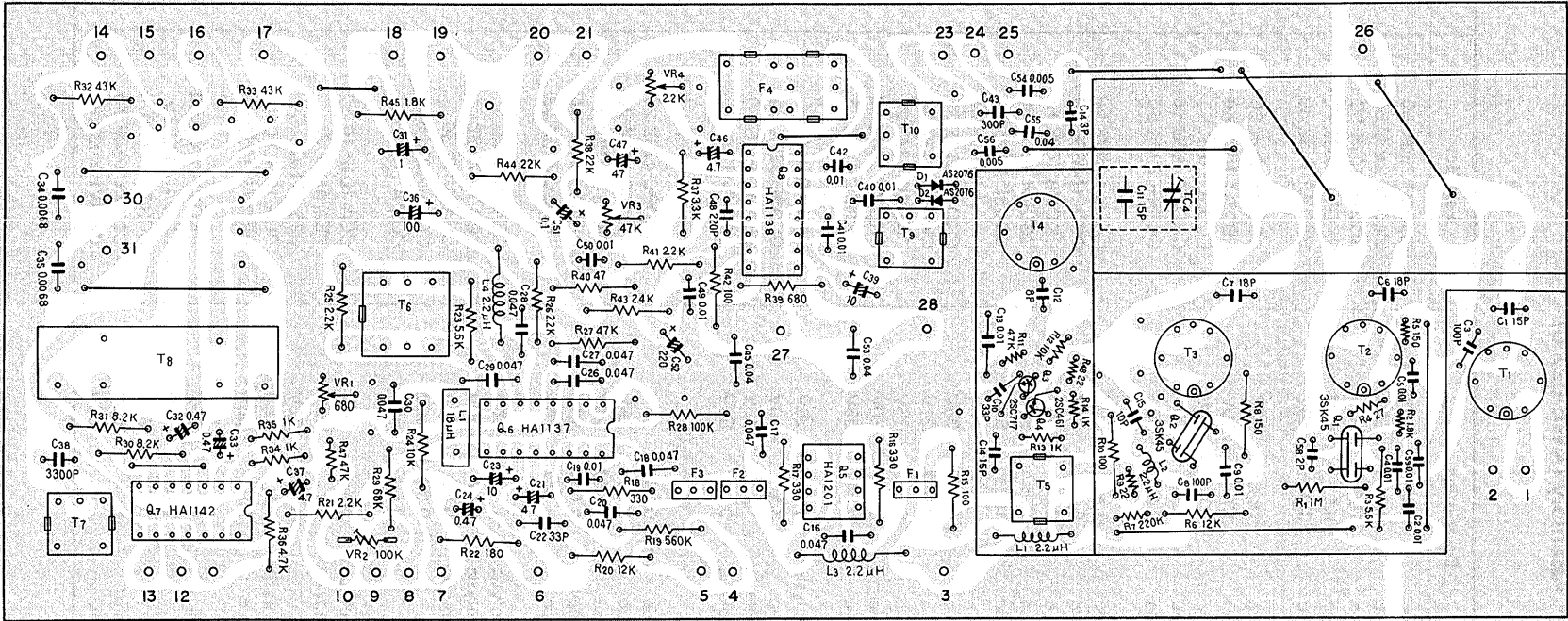
Symbol	Description	Part No.	
	Lamp holder assembly	AWX-052-0	
	Power supply circuit-A assembly	AWR-038-0	
	Power supply circuit-B assembly	AWR-039-0	
	Fuse holder assembly	AWX-053-0	
	Front panel assembly	ANB-219-A	
	Wooden case	AMM-028-A	
	Tuning shaft assembly	AXA-039-0	
	Tuning pully	AXA-015-A	
	Dial scale	AAG-063-A	
	Dial pointer assembly	AAF-020-0	
	Twin meter (Signal and Tuning)	AAW-020-0	
	Knob (Tuning)	AAA-023-0	
	Knob (Volume, Bass, Treble, Function and Mode)	AAB-065-0	
	Knob (CD-4 separation)	AAB-055-B	
	Knob (Level control)	AAB-064-A	
	Knob (Push button)	AAD-054-0	
	Knob (Power)	AAD-055-0	
	Lens (for CD-4 indicator)	AEC-121-0	
	4 channel level indicator	AAW-021-0	
	Antenna terminal board	AKA-002-0	
	Phono jack (4 jacks)	AKB-014-0	
	Phono jack (6 jacks)	AKB-017-0	
	Phono jack (6 jacks)	AKB-018-0	
	Phono jack (1 jack)	AKB-019-0	
	Speaker output terminal	AKE-010-0	
	Speaker output terminal-A	AKE-018-0	
	Binding post for ground	AKE-012-A	
	Fuse 1A (protection)	E21-034-A	
	Fuse 3A (protection)	E21-036-A	
	Fuse 6A (AC power)	AEK-033-0	
	Fuse 6A (protection)	AEK-034-0	
	Pilot lamp 8V 0.3A (twin meter)	AEL-015-0	
	Pilot lamp 8V 0.3A (dial scale)	E22-017-0	
	Pilot lamp 6V 30mA (Stereo indicator)	AEL-006-0	
	Pilot lamp 6V 50mA (Program indicator)	AEL-007-0	
	AC socket	AKP-005-0	
	Fuse holder (protection)	AKK-002-0	
	Foot	AEC-027-B	
	AC power cord	ADG-003-0	
	Connection cord	ADX-004-B	
	Operating instructions	ARB-087-0	
	Test record PQX-1011		
	FM T-type antenna	D52-013-0	
	Screw M4 x 15	ABA-010-A	
	Packing case	AHD-187-0	
	Packing case (with cord number printed)	AHD-186-0	
	Side pad (L)	AHA-038-0	
	Side pad (R)	AHA-039-0	
	Inside packing	AHC-006-0	
	Cardboard protector	AHB-012-0	

12.2 TUNER ASSEMBLY (AWE-027-0)



Tuner Assembly

Foil Side



## Parts List of Tuner Assembly (AWE-027-0)

### CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	15p	50V	CCDSH 150K 50
C2	Ceramic	0.01	50V	CKDYF 103Z 50
C3	Ceramic	100p	50V	CCDSL 101K 50
C4	Ceramic	0.01	50V	CKDYF 103Z 50
C5	Ceramic	0.01	50V	CKDYF 103Z 50
C6	Ceramic	18p	50V	CCDSH 180K 50
C7	Ceramic	18p	50V	CCDSH 180K 50
C8	Ceramic	100p	50V	CCDSL 101K 50
C9	Ceramic	0.01	50V	CKDYF 103Z 50
C10	Ceramic	33p	50V	CCDSH 330K 50
C11	Ceramic	15p	50V	CCDLH 150K 50
C12	Ceramic	8p	50V	CCDLH 080F 50
C13	Ceramic	0.01	50V	CKDYB 103K 50
C14	Ceramic	15p	50V	CCDCH 150K 50
C15	Ceramic	10p	50V	CCDSL 100F 50
C16	Ceramic	0.047	25V	CKDBC 473Z 25
C17	Ceramic	0.047	25V	CKDBC 473Z 25
C18	Ceramic	0.047	25V	CKDBC 473Z 25
C19	Ceramic	0.01	50V	CKDYF 103Z 50
C20	Ceramic	0.047	25V	CKDBC 473Z 25
C21	Electrolytic	4.7	25V	CEA 4R7P 25
C22	Ceramic	33p	50V	CCDSL 330K 50
C23	Electrolytic	10	16V	CEA 100P 16
C24	Electrolytic	0.47	50V	CEA R47P 50
C25				
C26	Ceramic	0.047	25V	CKDBC 473Z 25
C27	Ceramic	0.047	25V	CKDBC 473Z 25
C28	Ceramic	0.047	25V	CKDBC 473Z 25
C29	Ceramic	0.047	25V	CKDBC 473Z 25
C30	Ceramic	0.047	25V	CKDBC 473Z 25
C31	Electrolytic	1	50V	CEA 010P 50
C32	Electrolytic	0.47	50V	CEA R47P 50
C33	Electrolytic	0.47	50V	CEA R47P 50
C34	Mylar	0.0068	50V	CQMA 682J 50
C35	Mylar	0.0068	50V	CQMA 682J 50
C36	Electrolytic	100	16V	CEA 101P 16
C37	Electrolytic	4.7	25V	CEA 4R7P 25
C38	Styrol	0.0033	50V	C15-011-A
C39	Electrolytic	10	16V	CEA 100P 16
C40	Ceramic	0.01	50V	CKDYF 103Z 50
C41	Ceramic	0.01	50V	CKDYF 103Z 50
C42	Mylar	0.01	50V	CQMA 103K 50
C43	Styrol	300p	50V	CQSA 301J 50
C44	Ceramic	8p	50V	CCDXL 080F 50
C45	Ceramic	0.04	50V	CKDYF 403Z 50

Symbol	Description	Part No.
C46	Electrolytic 4.7 25V	CEA 4R7P 25
C47	Electrolytic 47 6V	CEA 470P 6
C48	Ceramic 220p 50V	CCDSL 221K 50
C49	Mylar 0.01 50V	CQMA 103K 50
C50	Mylar 0.01 50V	CQMA 103K 50
C51	Electrolytic 0.1 25V	CSSA 0R1M 25
C52	Electrolytic 220 16V	CEA 221P 16
C53	Ceramic 0.04 50V	CKDYF 403Z 50
C54	Ceramic 0.005 50V	CKDYF 502Z 50
C55	Ceramic 0.04 50V	CKDYF 403Z 50
C56	Ceramic 0.005 50V	CKDYF 502Z 50
C57		
C58	Ceramic 2p 50V	CCDSL 020C 50
C59	Ceramic 0.01 50V	CKDYF 103Z 50
VC1	Tuning capacitor	ACK-006-0
TC4	Ceramic trimmer	C43-007-A

**RESISTORS AND POTENTIOMETERS**

Symbol	Description	Part No.
R1	Carbon film 1M	RD½PS 105J
R2	Carbon film 1.8k	RD½VS 182J
R3	Carbon film 5.6k	RD½PS 562J
R4	Carbon film 27	RD½VS 270J
R5	Carbon film 150	RD½VS 151J
R6	Carbon film 12k	RD½PS 123J
R7	Carbon film 220k	RD½VS 224J
R8	Carbon film 150	RD½PS 151J
R9	Carbon film 22	RD½VS 220J
R10	Carbon film 100	RD½PS 101J
R11	Carbon film 4.7k	RD½VS 472J
R12	Carbon film 10k	RD½VS 103J
R13	Carbon film 1k	RD½VS 102J
R14	Carbon film 1k	RD½VS 102J
R15	Carbon film 100	RD½PS 101J
R16	Carbon film 330	RD½PS 331J
R17	Carbon film 330	RD½PS 331J
R18	Carbon film 330	RD½PS 331J
R19	Carbon film 180k	RD½PS 184J
R20	Carbon film 12k	RD½PS 123J
R21	Carbon film 2.2k	RD½PS 222J
R22	Carbon film 180	RD½PS 181J
R23	Carbon film 5.6k	RD½PS 562J
R24	Carbon film 10k	RD½PS 103J
R25	Carbon film 2.2k	RD½PS 222J
R26	Carbon film 2.2k	RD½PS 222J
R27	Carbon film 47k	RD½PS 473J
R28	Carbon film 100k	RD½PS 104J
R29	Carbon film 68k	RD½PS 683J
R30	Carbon film 8.2k	RD½PS 822J

Symbol	Description	Part No.
R31	Carbon film 8.2k	RD¼PS 822J
R32	Carbon film 43k	RD¼PS 433J
R33	Carbon film 43k	RD¼PS 433J
R34	Carbon film 1k	RD¼VS 102J
R35	Carbon film 1k	RD¼VS 102J
R36	Carbon film 4.7k	RD¼PS 472J
R37	Carbon film 3.3k	RD¼PS 332J
R38	Carbon film 22k	RD¼PS 223J
R39	Carbon film 680	RD¼PS 681J
R40	Carbon film 47	RD¼PS 470J
R41	Carbon film 2.2k	RD¼PS 222J
R42	Carbon film 100	RD¼PS 101J
R43	Carbon film 2.4k	RD¼PS 242J
R44	Carbon film 22k	RD¼PS 223J
R45	Carbon film 1.8k	RD¼PS 182J
R46		
R47	Carbon film 47k	RD¼PS 473J
R48	Carbon film 22	RD¼VS 220J
VR1	Variable resistor, semi-fixed	ACP-013-0
VR2	Variable resistor, semi-fixed	ACP-021-0
VR3	Variable resistor, semi-fixed	C92-048-0
VR4	Variable resistor, semi-fixed	ACP-001-0

#### SEMICONDUCTORS

Symbol	Description	Part No.
Q1	3SK45-B FET	
Q2	3SK45-B FET	
Q3	2SC717 Transistor	
Q4	2SC461-B Transistor	
Q5	HA1201 IC	
Q6	HA1137 IC	
Q7	HA1142 IC	
Q8	HA1138 IC	
D1	1S2076 Diode	

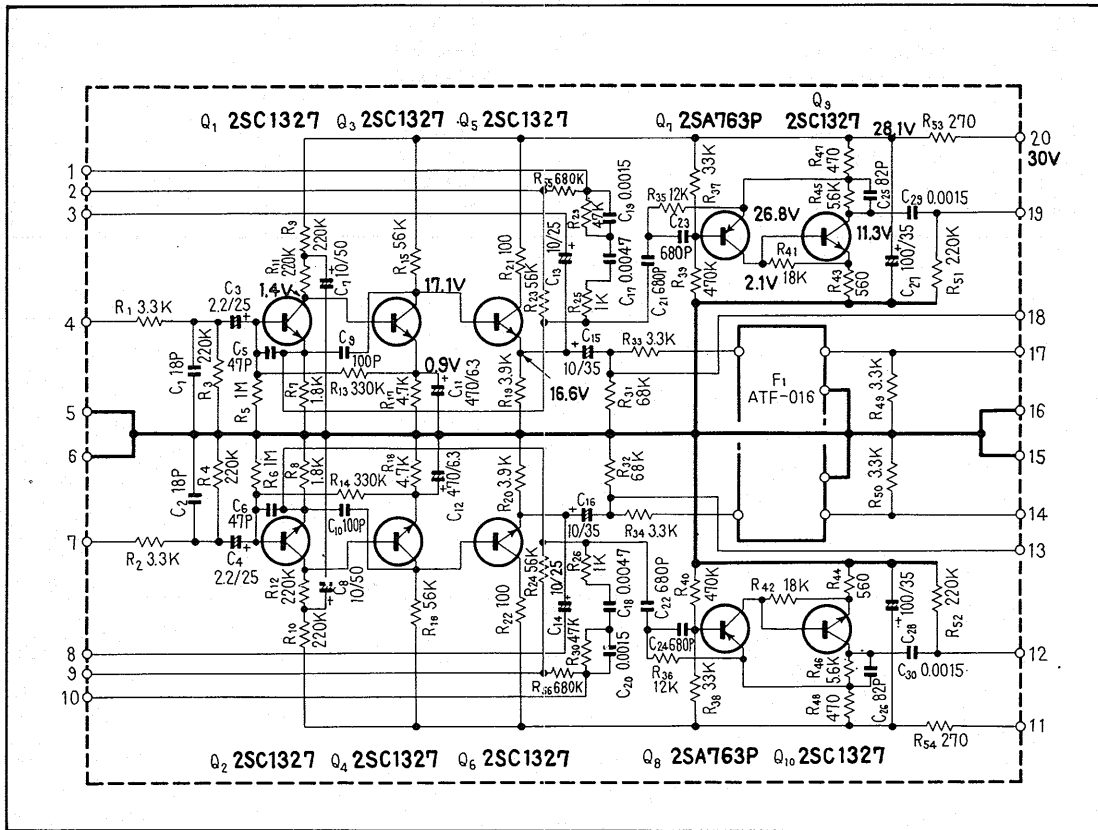
#### COILS, TRANSFORMERS AND FILTERS

Symbol	Description	Part No.
T1	FM antenna coil	ATC-021-0
T2	FM RF coil	ATC-015-0
T3	FM RF coil	ATC-016-0
T4	FM OSC coil	ATC-022-0
T5	FM matching transformer	ATE-008-0
T6	FM IF transformer	T73-035-A
T7	19kHz transformer	T75-023-B
T8	MPX transformer	ATM-011-0
T9	AM RF coil	ATB-014-0
T10	AM OSC coil	ATB-013-0

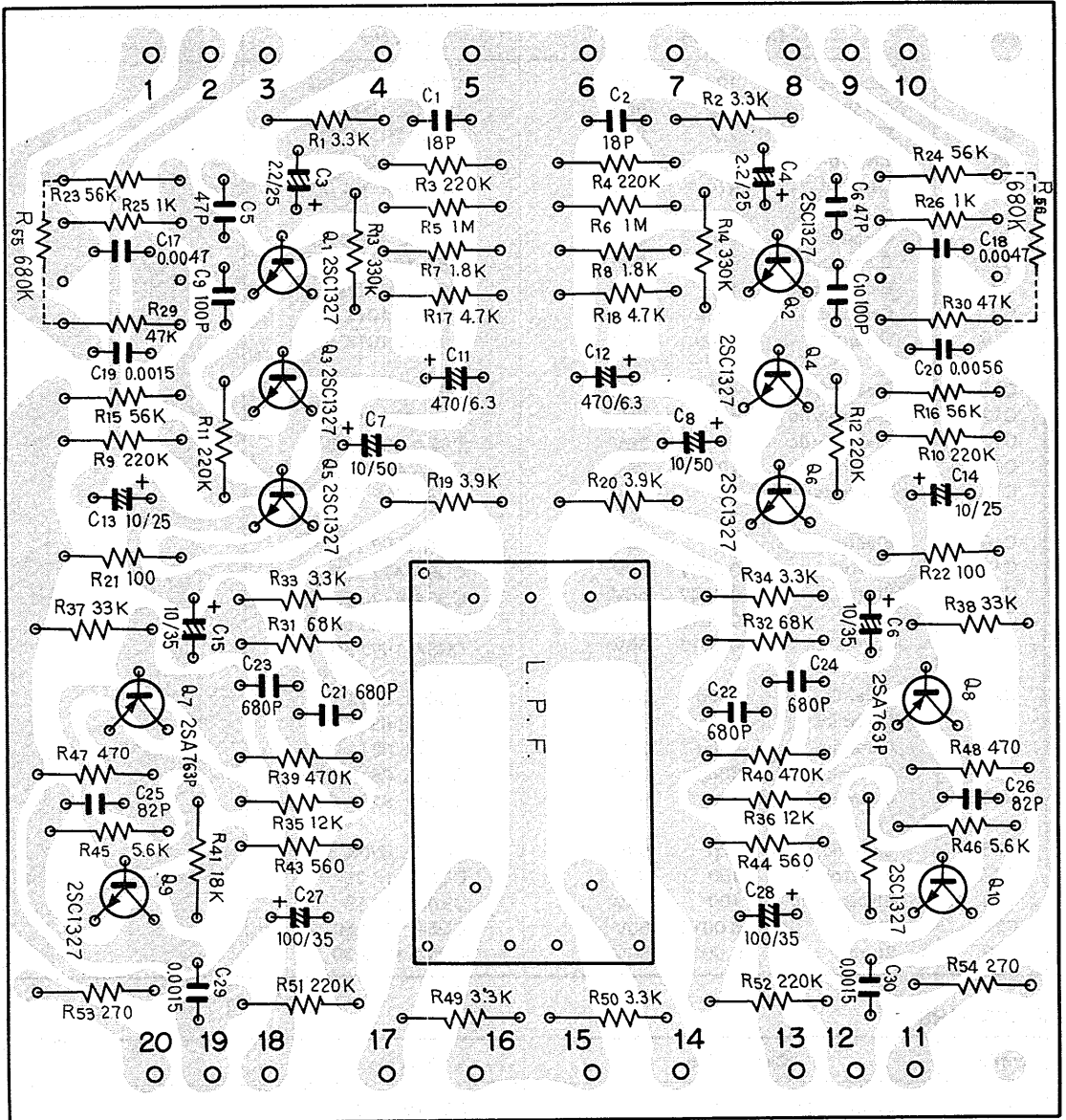


<b>Symbol</b>	<b>Description</b>	<b>Part No.</b>	
F1	FM ceramic filter	ATF-013-B	
F2	FM ceramic filter	ATF-013-B	
F3	FM ceramic filter	ATF-013-B	
F4	AM ceramic filter	ATF-009-0	
L1	RF choke coil	T24-028-A	
L2	RF choke coil	T24-028-A	
L3	RF choke coil	T24-028-A	
L4	RF choke coil	T24-028-A	

# 12.3 EQUALIZER AMPLIFIER ASSEMBLY (AWF-010-0)



Foil Side



## Parts List of Equalizer Amplifier Assembly (AWF-010-0)

### CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	18p	50V	CCDSL 180K 50
C2	Ceramic	18p	50V	CCDSL 180K 50
C3	Electrolytic	2.2	25V	CSSA 2R2M 25
C4	Electrolytic	2.2	25V	CSSA 2R2M 25
C5	Ceramic	47p	50V	CCDSL 470K 50
C6	Ceramic	47p	50V	CCDSL 470K 50
C7	Electrolytic	10	50V	CEA 100P 50
C8	Electrolytic	10	50V	CEA 100P 50
C9	Ceramic	100p	50V	CCDSL 101K 50
C10	Ceramic	100p	50V	CCDSL 101K 50
C11	Electrolytic	470	6V	CEA 471P 6
C12	Electrolytic	470	6V	CEA 471P 6
C13	Electrolytic	10	25V	CSZA 100M 25
C14	Electrolytic	10	25V	CSZA 100M 25
C15	Electrolytic	10	35V	CEA 100P 35
C16	Electrolytic	10	35V	CEA 100P 35
C17	Styrol	0.0047	50V	CQSA 472J 50
C18	Styrol	0.0047	50V	CQSA 472J 50
C19	Styrol	0.0015	50V	CQSA 152J 50
C20	Styrol	0.0015	50V	CQSA 152J 50
C21	Ceramic	680p	50V	CCDSL 681K 50
C22	Ceramic	680p	50V	CCDSL 681K 50
C23	Ceramic	680p	50V	CCDSL 681K 50
C24	Ceramic	680p	50V	CCDSL 681K 50
C25	Ceramic	82p	50V	CCDSL 820K 50
C26	Ceramic	82p	50V	CCDSL 820K 50
C27	Electrolytic	100	35V	CEA 101P 35
C28	Electrolytic	100	35V	CEA 101P 35
C29	Styrol	0.0015	50V	CQSA 152J 50
C30	Styrol	0.0015	50V	CQSA 152J 50

### RESISTORS

Symbol	Description		Part No.
R1	Carbon film	3.3k	RD¼PM 332J
R2	Carbon film	3.3k	RD¼PM 332J
R3	Carbon film	220k	RD¼PM 224J
R4	Carbon film	220k	RD¼PM 224J
R5	Carbon film	1M	RD¼PM 105J
R6	Carbon film	1M	RD¼PM 105J
R7	Carbon film	1.8k	RD¼PM 182J
R8	Carbon film	1.8k	RD¼PM 182J
R9	Carbon film	220k	RD¼PM 224J
R10	Carbon film	220k	RD¼PM 224J
R11	Carbon film	220k	RD¼PM 224J
R12	Carbon film	220k	RD¼PM 224J
R13	Carbon film	330k	RD¼PM 334J
R14	Carbon film	330k	RD¼PM 334J
R15	Carbon film	56k	RD¼PM 563J

Symbol	Description	Part No.
R16	Carbon film 56k	RD¼PS 563J
R17	Carbon film 4.7k	RD¼PS 472J
R18	Carbon film 4.7k	RD¼PS 472J
R19	Carbon film 3.9k	RD¼PS 392J
R20	Carbon film 3.9k	RD¼PS 392J
R21	Carbon film 100	RD¼PM 101J
R22	Carbon film 100	RD¼PM 101J
R23	Carbon film 56k	RD¼PM 563J
R24	Carbon film 56k	RD¼PM 563J
R25	Carbon film 1k	RD¼PM 102J
R26	Carbon film 1k	RD¼PM 102J
R29	Carbon film 47k	RD¼PM 473J
R30	Carbon film 47k	RD¼PM 473J
R31	Carbon film 68k	RD¼PM 683J
R32	Carbon film 68k	RD¼PM 683J
R33	Carbon film 3.3k	RD¼PM 332J
R34	Carbon film 3.3k	RD¼PM 332J
R35	Carbon film 12k	RD¼PM 123J
R36	Carbon film 12k	RD¼PM 123J
R37	Carbon film 33k	RD¼PM 333J
R38	Carbon film 33k	RD¼PM 333J
R39	Carbon film 470k	RD¼PM 474J
R40	Carbon film 470k	RD¼PM 474J
R41	Carbon film 18k	RD¼PM 183J
R42	Carbon film 18k	RD¼PM 183J
R43	Carbon film 560	RD¼PM 561J
R44	Carbon film 560	RD¼PM 561J
R45	Carbon film 5.6k	RD¼PM 562J
R46	Carbon film 5.6k	RD¼PM 562J
R47	Carbon film 470	RD¼PM 471J
R48	Carbon film 470	RD¼PM 471J
R49	Carbon film 3.3k	RD¼PM 332J
R50	Carbon film 3.3k	RD¼PM 332J
R51	Carbon film 220k	RD¼PM 224J
R52	Carbon film 220k	RD¼PM 224J
R53	Carbon film 270	RD¼PM 271J
R54	Carbon film 270	RD¼PM 271J
R55	Carbon film 680k	RD¼PM 684J
R56	Carbon film 680k	RD¼PM 684J

### SEMICONDUCTORS

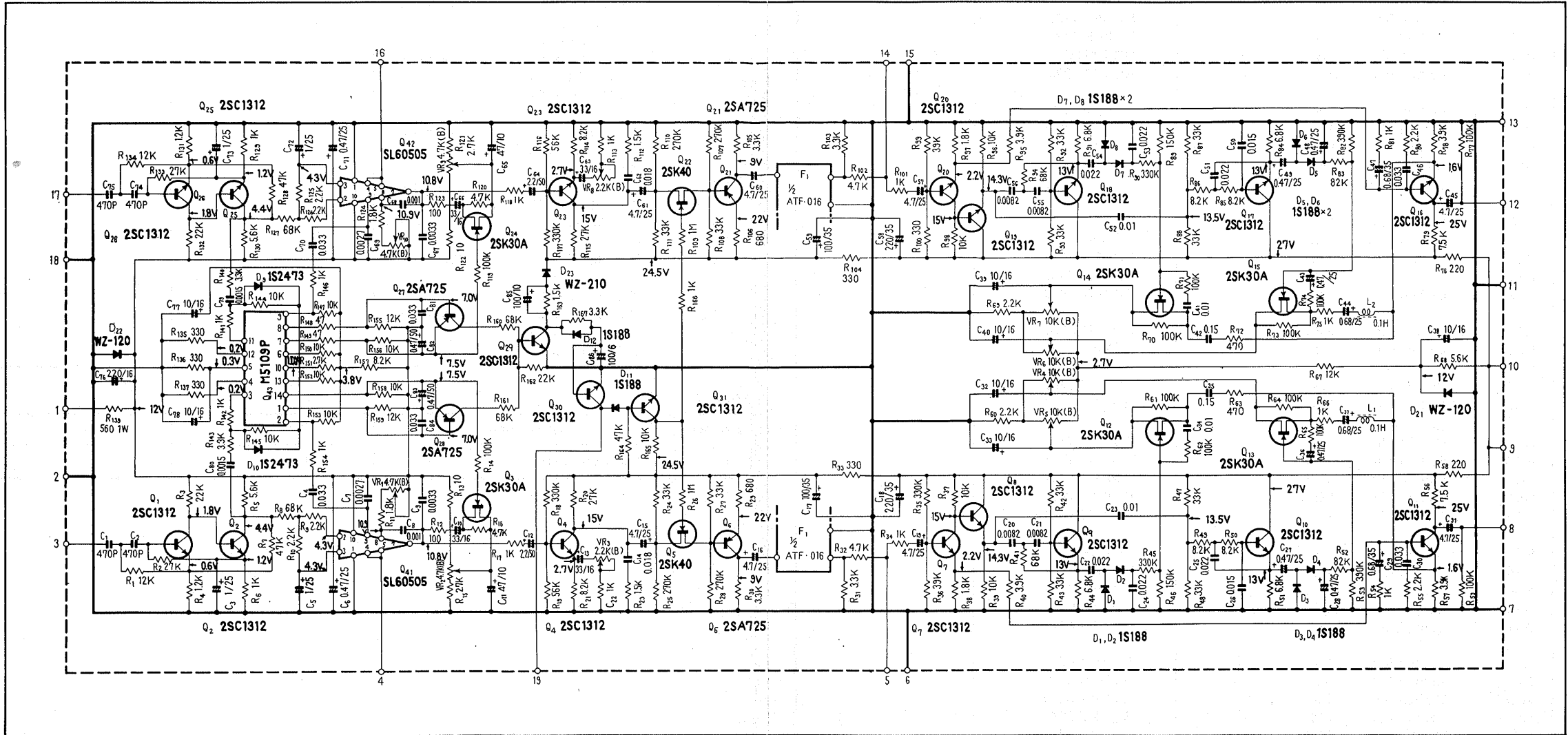
Symbol	Description	Part No.
Q1	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q2	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q3	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor

Symbol	Description	Part No.
Q4	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q5	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q6	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q7	2SA763P-5 or 6 (2SA725-G or F)	Transistor
Q8	2SA763P-5 or 6 (2SA725-G or F)	Transistor
Q9	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor
Q10	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor

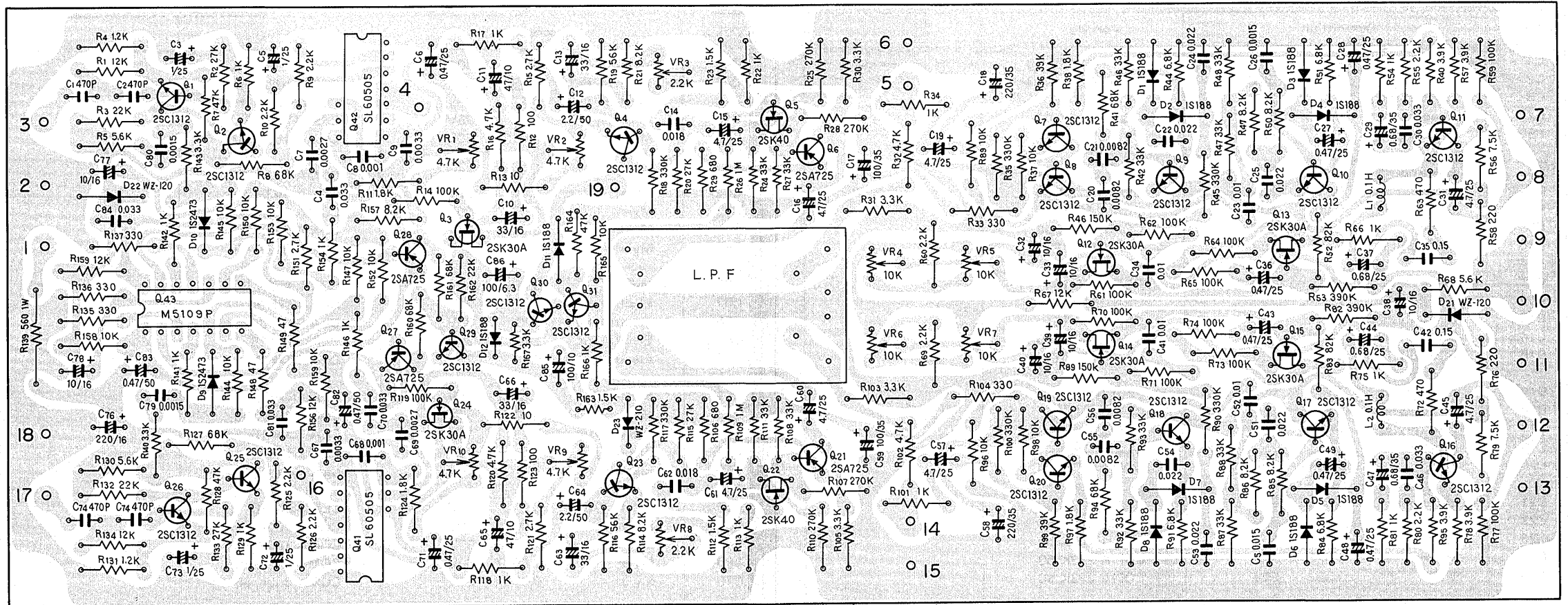
**FILTER**

Symbol	Description	Part No.
F1	Low pass filter	ATF-016-0

12.4 SUB-CHANNEL CIRCUIT ASSEMBLY (AWX-051-B)



Foil Side





## Parts List of Sub-Channel Circuit Assembly (AWX-051-B)

### CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	470p	50V	CKDYB 471K 50
C2	Ceramic	470p	50V	CKDYB 471K 50
C3	Electrolytic	1	25V	CEA 010P 25
C4	Mylar	0.033	50V	CQMA 333K 50
C5	Electrolytic	1	25V	CEA 010P 25
C6	Electrolytic	0.47	25V	CSSA R47M 25
C7	Mylar	0.0027	50V	CQMA 272K 50
C8	Mylar	0.001	50V	CQMA 102K 50
C9	Mylar	0.0033	50V	CQMA 332K 50
C10	Electrolytic	33	16V	CEA 330P 16
C11	Electrolytic	220	10V	CEA 221P 10
C12	Electrolytic	2.2	50V	CEA 2R2P 50
C13	Electrolytic	33	16V	CEA 330P 16
C14	Mylar	0.018	50V	CQMA 183K 50
C15	Electrolytic	4.7	25V	CEA 4R7P 25
C16	Electrolytic	4.7	25	CEA 4R7P 25
C17	Electrolytic	100	35V	CEA 101P 35
C18	Electrolytic	220	35V	CEA 221P 35
C19	Electrolytic	4.7	25V	CEA 4R7P 25
C20	Mylar	0.0082	50V	CQMA 822K 50
C21	Mylar	0.0082	50V	CQMA 822K 50
C22	Mylar	0.022	50V	CQMA 223K 50
C23	Mylar	0.01	50V	CQMA 103K 50
C24	Mylar	0.022	50V	CQMA 223K 50
C25	Mylar	0.022	50V	CQMA 223K 50
C26	Mylar	0.015	50V	CQMA 153K 50
C27	Electrolytic	0.47	25V	CSSA R47M 25
C28	Electrolytic	0.47	25V	CSSA R47M 25
C29	Electrolytic	0.68	35V	CSZA R68K 35
C30	Mylar	0.033	50V	CQMA 333K 50
C31	Electrolytic	4.7	25V	CEA 4R7P 25
C32	Electrolytic	10	16V	CEA 100P 16
C33	Electrolytic	10	16V	CEA 100P 16
C34	Mylar	0.01	50V	CQMA 103K 50
C35	Mylar	0.15	50V	CQMA 154K 50
C36	Electrolytic	0.47	25V	CSSA R47M 25
C37	Electrolytic	0.68	25V	CSSA R68M 25
C38	Electrolytic	10	16V	CEA 100P 16
C39	Electrolytic	10	16V	CEA 100P 16
C40	Electrolytic	10	16V	CEA 100P 16
C41	Mylar	0.01	50V	CQMA 103K 50
C42	Mylar	0.15	50V	CQMA 154K 50
C43	Electrolytic	0.47	25V	CSSA R47M 25
C44	Electrolytic	0.68	25V	CSSA R68M 25
C45	Electrolytic	4.7	25V	CEA 4R7P 25

Symbol	Description			Part No.
C46	Mylar	0.033	50V	CQMA 333K 50
C47	Electrolytic	0.68	35V	CSZA R68K 35
C48	Electrolytic	0.47	25V	CSSA R47M 25
C49	Electrolytic	0.47	25V	CSSA R47M 25
C50	Mylar	0.015	50V	CQMA 153K 50
C51	Mylar	0.022	50V	CQMA 223K 50
C52	Mylar	0.01	50V	CQMA 103K 50
C53	Mylar	0.022	50V	CQMA 223K 50
C54	Mylar	0.022	50V	CQMA 223K 50
C55	Mylar	0.0082	50V	CQMA 822K 50
C56	Mylar	0.0082	50V	CQMA 822K 50
C57	Electrolytic	4.7	25V	CEA 4R7P 25
C58	Electrolytic	220	35V	CEA 221P 35
C59	Electrolytic	100	35V	CEA 101P 35
C60	Electrolytic	4.7	25V	CEA 4R7P 25
C61	Electrolytic	4.7	25V	CEA 4R7P 25
C62	Mylar	0.018	50V	CQMA 183K 50
C63	Electrolytic	33	16V	CEA 330P 16
C64	Electrolytic	2.2	50V	CEA 2R2P 50
C65	Electrolytic	220	10V	CEA 221P 10
C66	Electrolytic	33	16V	CEA 330P 16
C67	Mylar	0.0033	50V	CQMA 332K 50
C68	Mylar	0.001	50V	CQMA 102K 50
C69	Mylar	0.0027	50V	CQMA 272K 50
C70	Mylar	0.033	50V	CQMA 333K 50
C71	Electrolytic	0.47	25V	CSSA R47M 25
C72	Electrolytic	1	25V	CEA 010P 25
C73	Electrolytic	1	25V	CEA 010P 25
C74	Ceramic	470p	50V	CKDYB 471K 50
C75	Ceramic	470p	50V	CKDYB 471K 50
C76	Electrolytic	220	16V	CEA 221P 16
C77	Electrolytic	10	16V	CEA 100P 16
C78	Electrolytic	10	16V	CEA 100P 16
C79	Mylar	0.0015	50V	CQMA 152K 50
C80	Mylar	0.0015	50V	CQMA 152K 50
C81	Mylar	0.033	50V	CQMA 333K 50
C82	Electrolytic	0.47	50V	CEA R47P 50
C83	Electrolytic	0.47	50V	CEA R47P 50
C84	Mylar	0.033	50V	CQMA 333K 50
C85	Electrolytic	100	10V	CEA 101P 10
C86	Electrolytic	100	6V	CEA 101P 6

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 12k	RD¼PM 123J
R2	Carbon film 27k	RD¼PM 273J
R3	Carbon film 22k	RD¼PM 223J
R4	Carbon film 1.2k	RD¼PM 122J
R5	Carbon film 5.6k	RD¼PM 562J
R6	Carbon film 1k	RD¼PM 102J
R7	Carbon film 47k	RD¼PM 473J
R8	Carbon film 68k	RD¼PM 683J
R9	Carbon film 2.2k	RD¼PM 222J
R10	Carbon film 2.2k	RD¼PM 222J
R11	Carbon film 1.8k	RD¼PM 182J
R12	Carbon film 100	RD¼PM 101J
R13	Carbon film 1.5k	RD¼PM 152J
R14	Carbon film 100k	RD¼PM 104J
R15	Carbon film 3.3k	RD¼PM 332J
R16	Carbon film 4.7k	RD¼PM 472J
R17	Carbon film 1k	RD¼PM 102J
R18	Carbon film 330k	RD¼PM 334J
R19	Carbon film 56k	RD¼PM 563J
R20	Carbon film 27k	RD¼PM 273J
R21	Carbon film 8.2k	RD¼PM 822J
R22	Carbon film 1k	RD¼PM 102J
R23	Carbon film 1.5k	RD¼PM 152J
R24	Carbon film 33k	RD¼PM 333J
R25	Carbon film 270k	RD¼PM 274J
R26	Carbon film 1M	RD¼PM 105J
R27	Carbon film 33k	RD¼PM 333J
R28	Carbon film 270k	RD¼PM 274J
R29	Carbon film 680	RD¼PM 681J
R30	Carbon film 3.3k	RD¼PM 332J
R31	Carbon film 3.3k	RD¼PM 332J
R32	Carbon film 4.7k	RD¼PM 472J
R33	Carbon film 330	RD¼PM 331J
R34	Carbon film 1k	RD¼PM 102J
R35	Carbon film 330k	RD¼PM 334J
R36	Carbon film 39k	RD¼PM 393J
R37	Carbon film 10k	RD¼PM 103J
R38	Carbon film 1.8k	RD¼PM 182J
R39	Carbon film 10k	RD¼PM 103J
R40	Carbon film 3.9k	RD¼PM 392J
R41	Carbon film 68k	RD¼PM 683J
R42	Carbon film 33k	RD¼PM 333J
R43	Carbon film 33k	RD¼PM 333J
R44	Carbon film 6.8k	RD¼PM 682J
R45	Carbon film 330k	RD¼PM 334J
R46	Carbon film 150k	RD¼PM 154J
R47	Carbon film 33k	RD¼PM 333J
R48	Carbon film 33k	RD¼PM 333J
R49	Carbon film 8.2k	RD¼PM 822J
R50	Carbon film 8.2k	RD¼PM 822J

Symbol	Description	Part No.
R51	Carbon film 6.8k	RD¼PM 682J
R52	Carbon film 82k	RD¼PM 823J
R53	Carbon film 390k	RD¼PM 394J
R54	Carbon film 1k	RD¼PM 102J
R55	Carbon film 2.2k	RD¼PM 222J
R56	Carbon film 7.5k	RD¼PM 752J
R57	Carbon film 3.9k	RD¼PM 392J
R58	Carbon film 220	RD¼PM 221J
R59	Carbon film 100k	RD¼PM 104J
R60	Carbon film 2.2k	RD¼PM 222J
R61	Carbon film 100k	RD¼PM 104J
R62	Carbon film 100k	RD¼PM 104J
R63	Carbon film 470	RD¼PM 471J
R64	Carbon film 100k	RD¼PM 104J
R65	Carbon film 100k	RD¼PM 104J
R66	Carbon film 1k	RD¼PM 102J
R67	Carbon film 12k	RD¼PM 123J
R68	Carbon film 5.6k	RD¼PM 562J
R69	Carbon film 2.2k	RD¼PM 222J
R70	Carbon film 100k	RD¼PM 104J
R71	Carbon film 100k	RD¼PM 104J
R72	Carbon film 470	RD¼PM 471J
R73	Carbon film 100k	RD¼PM 104J
R74	Carbon film 100k	RD¼PM 104J
R75	Carbon film 1k	RD¼PM 102J
R76	Carbon film 220	RD¼PM 221J
R77	Carbon film 100k	RD¼PM 104J
R78	Carbon film 3.9k	RD¼PM 392J
R79	Carbon film 7.5k	RD¼PM 752J
R80	Carbon film 2.2k	RD¼PM 222J
R81	Carbon film 1k	RD¼PM 102J
R82	Carbon film 390k	RD¼PM 394J
R83	Carbon film 82k	RD¼PM 823J
R84	Carbon film 6.8k	RD¼PM 682J
R85	Carbon film 8.2k	RD¼PM 822J
R86	Carbon film 8.2k	RD¼PM 822J
R87	Carbon film 33k	RD¼PM 333J
R88	Carbon film 33k	RD¼PM 333J
R89	Carbon film 150k	RD¼PM 154J
R90	Carbon film 330k	RD¼PM 334J
R91	Carbon film 6.8k	RD¼PM 682J
R92	Carbon film 33k	RD¼PM 333J
R93	Carbon film 33k	RD¼PM 333J
R94	Carbon film 68k	RD¼PM 683J
R95	Carbon film 3.9k	RD¼PM 392J
R96	Carbon film 10k	RD¼PM 103J
R97	Carbon film 1.8k	RD¼PM 182J
R98	Carbon film 10k	RD¼PM 103J
R99	Carbon film 39k	RD¼PM 393J
R100	Carbon film 330k	RD¼PM 334J

Symbol	Description	Part No.
R101	Carbon film 1k	RD¼PM 102J
R102	Carbon film 4.7k	RD¼PM 472J
R103	Carbon film 3.3k	RD¼PM 332J
R104	Carbon film 330	RD¼PM 331J
R105	Carbon film 3.3k	RD¼PM 332J
R106	Carbon film 680	RD¼PM 681J
R107	Carbon film 270k	RD¼PM 274J
R108	Carbon film 33k	RD¼PM 333J
R109	Carbon film 1M	RD¼PM 105J
R110	Carbon film 270k	RD¼PM 274J
R111	Carbon film 33k	RD¼PM 333J
R112	Carbon film 1.5k	RD¼PM 152J
R113	Carbon film 1k	RD¼PM 102J
R114	Carbon film 8.2k	RD¼PM 822J
R115	Carbon film 27k	RD¼PM 273J
R116	Carbon film 56k	RD¼PM 563J
R117	Carbon film 330k	RD¼PM 334J
R118	Carbon film 1k	RD¼PM 102J
R119	Carbon film 100k	RD¼PM 104J
R120	Carbon film 4.7k	RD¼PM 472J
R121	Carbon film 10k	RD¼PM 103J
R122	Carbon film 1.5k	RD¼PM 152J
R123	Carbon film 100	RD¼PM 101J
R124	Carbon film 1.8k	RD¼PM 182J
R125	Carbon film 2.2k	RD¼PM 222J
R126	Carbon film 2.2k	RD¼PM 222J
R127	Carbon film 68k	RD¼PM 683J
R128	Carbon film 47k	RD¼PM 473J
R129	Carbon film 1k	RD¼PM 102J
R130	Carbon film 5.6k	RD¼PM 562J
R131	Carbon film 1.2k	RD¼PM 122J
R132	Carbon film 22k	RD¼PM 223J
R133	Carbon film 27k	RD¼PM 273J
R134	Carbon film 12k	RD¼PM 123J
R135	Carbon film 330	RD¼PM 331J
R136	Carbon film 330	RD¼PM 331J
R137	Carbon film 330	RD¼PM 331J
R138		
R139	Metal oxide 560 1W	RS1P 561J
R140	Carbon film 3.3k	RD¼PM 332J
R141	Carbon film 1k	RD¼PM 102J
R142	Carbon film 1k	RD¼PM 102J
R143	Carbon film 3.3k	RD¼PM 332J
R144	Carbon film 10k	RD¼PM 103J
R145	Carbon film 10k	RD¼PM 103J
R146	Carbon film 1k	RD¼PM 102J
R147	Carbon film 10k	RD¼PM 103J
R148	Carbon film 47	RD¼PM 470J
R149	Carbon film 47	RD¼PM 470J
R150	Carbon film 10k	RD¼PM 103J

Continued on the Next Page

Symbol	Description	Part No.
R151	Carbon film 2.7k	RD¼PM 272J
R152	Carbon film 10k	RD¼PM 103J
R153	Carbon film 10k	RD¼PM 103J
R154	Carbon film 1k	RD¼PM 102J
R155	Carbon film 12k	RD¼PM 123J
R156	Carbon film 10k	RD¼PM 103J
R157	Carbon film 8.2k	RD¼PM 822J
R158	Carbon film 10k	RD¼PM 103J
R159	Carbon film 12k	RD¼PM 123J
R160	Carbon film 68k	RD¼PM 683J
R161	Carbon film 68k	RD¼PM 683J
R162	Carbon film 22k	RD¼PM 223J
R163	Carbon film 1.5k	RD¼PM 152J
R164	Carbon film 47k	RD¼PM 473J
R165	Carbon film 10k	RD¼PM 103J
R166	Carbon film 1k	RD¼PM 102J
R167	Carbon film 3.3k	RD¼PM 332J

#### POTENTIOMETERS

Symbol	Description	Part No.
VR1	Semi-fixed 4.7k-B	C92-051-0
VR2	Semi-fixed 4.7k-B	C92-051-0
VR3	Semi-fixed 2.2k-B	ACP-001-0
VR4	Semi-fixed 10k-B	C92-049-0
VR5	Semi-fixed 10k-B	C92-049-0
VR6	Semi-fixed 10k-B	C92-049-0
VR7	Semi-fixed 10k-B	C92-049-0
VR8	Semi-fixed 2.2k-B	ACP-001-0
VR9	Semi-fixed 4.7k-B	C92-051-0
VR10	Semi-fixed 4.7k-B	C92-051-0

#### SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC1327-T, S or U Transistor (2SC1312-F, G or H) (2SC1344-D, E or F)	
Q2	2SC1327-T, S or U Transistor (2SC1312-F, G or H) (2SC1344-D, E or F)	
Q3	2SK30A-Y or GR FET (2SK30AD)	
Q4	2SC1327-T, S or U Transistor (2SC1312-F, G or H) (2SC1344-D, E or F)	
Q5	2SK40-D or C FET (2SK30A-Y or GR)	

Symbol	Description	Part No.	
Q6	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q7	2SC1327-S or T (2SC1327-F or G) (2SC1344-D or E)	Transistor	
Q8	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q9	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q10	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q11	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q12	2SK30A-Y or GR (2SK30AD)	FET	
Q13	2SK30A-GR	FET	
Q14	2SK30A-Y or GR (2SK30AD)	FET	
Q15	2SK30A-Y or GR (2SK30AD)	FET	
Q16	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q17	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q18	2SC1327-S or T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q19	2SC1327-T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q20	2SC1327-T (2SC1312-F or G) (2SC1344-D or E)	Transistor	
Q21	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q22	2SK40-D or C (2SK30A-Y or GR)	FET	
Q23	2SC1327-T, S or U (2SC1312-F, G or H) (2SC1344-D, E or F)	Transistor	
Q24	2SK30A-GR	FET	
Q25	2SC1327-T, S or U (2SC1312-F, G or H) (2SC1344-D, E or F)	Transistor	

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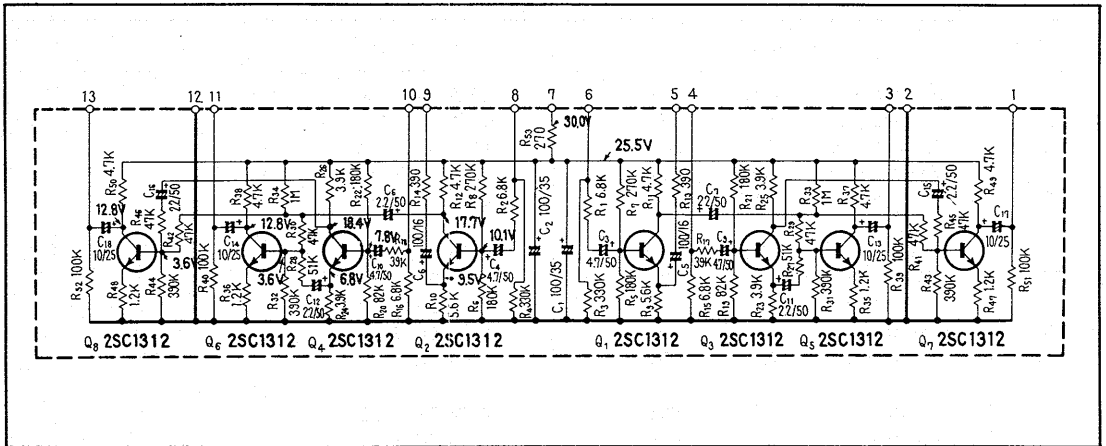
Symbol	Description	Part No.	
Q26	2SC1327-T, S or U (2SC1312-F, G or H) (2SC1344-D, E or F)	Transistor	
Q27	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q28	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q29	2SC1327-T, S or U (2SC1312-F, G or H) (2SC1344-D, E or F)		
Q30	2SC1327-U (2SC1312-H) (2SC1344-F)	Transistor	
Q31	2SC1327-T, S or U (2SC1312-F, G or H) (2SC1344-D, E or F)	Transistor	
Q41	SL60505 (M51361P)	IC	
Q42	SL60505 (M51361P)	IC	
Q43	M5109P	IC	
D1	1S188 FM-1	Diode	
D2	1S188 FM-1	Diode	
D3	1S188 FM-1	Diode	
D4	1S188 FM-1	Diode	
D5	1S188 FM-1	Diode	
D6	1S188 FM-1	Diode	
D7	1S188 FM-1	Diode	
D8	1S188 FM-1	Diode	
D9	1S2473	Diode	
D10	1S2473	Diode	
D11	1S188 FM-1	Diode	
D12	1S188 FM-1	Diode	
D21	WZ-120	Zener diode	
D22	WZ-120	Zener diode	
D23	WZ-210	Zener diode	

#### COILS AND FILTER

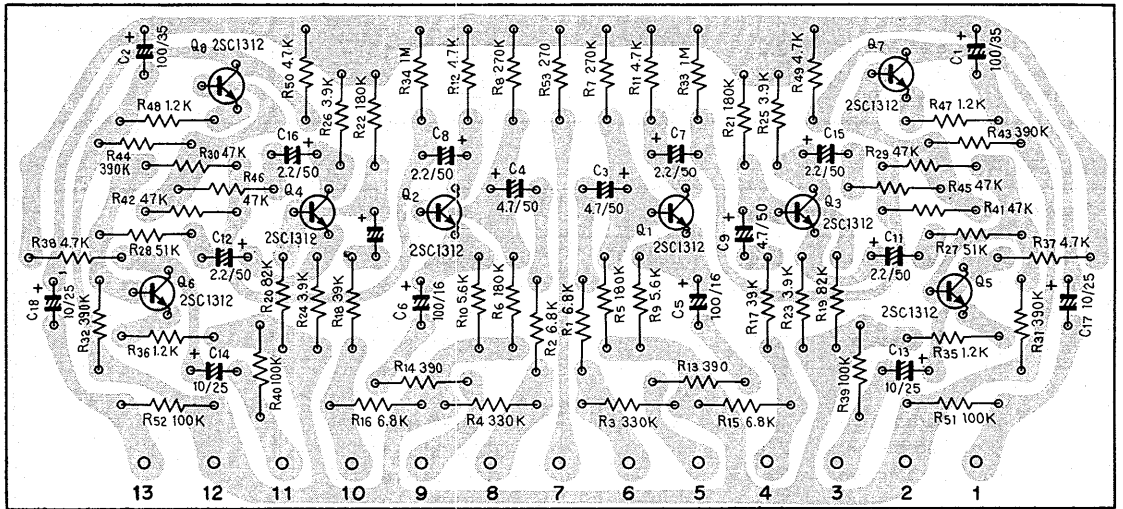
Symbol	Description	Part No.	
F1	Low pass filter	ATF-016-0	ATF-019-0
L1	Choke coil 104k	ATM-008-0	
L2	Choke coil 104k	ATM-008-0	



12.5 MATRIX CIRCUIT ASSEMBLY (AWM-048-0)



Foil Side



## Parts List of Matrix Circuit Assembly (AWM-048-0)

### CAPACITORS

Symbol	Description	Part No.
C1	Electrolytic 100 35V	CEA 101P 35
C2	Electrolytic 100 35V	CEA 101P 35
C3	Electrolytic 4.7 50V	CEA 4R7P 50
C4	Electrolytic 4.7 50V	CEA 4R7P 50
C5	Electrolytic 100 16V	CEA 101P 50
C6	Electrolytic 100 16V	CEA 101P 50
C7	Electrolytic 2.2 50V	CEA 2R2P 50
C8	Electrolytic 2.2 50V	CEA 2R2P 50
C9	Electrolytic 4.7 50V	CEA 4R7P 50
C10	Electrolytic 4.7 50V	CEA 4R7P 50
C11	Electrolytic 2.2 50V	CEA 2R2P 50
C12	Electrolytic 2.2 50V	CEA 2R2P 50
C13	Electrolytic 10 25V	CEA 100P 25
C14	Electrolytic 10 25V	CEA 100P 25
C15	Electrolytic 2.2 50V	CEA 2R2P 50
C16	Electrolytic 2.2 50V	CEA 2R2P 50
C17	Electrolytic 10 25V	CEA 100P 25
C18	Electrolytic 10 25V	CEA 100P 25

### RESISTORS

Symbol	Description	Part No.
R1	Carbon film 6.8k	RD $\frac{1}{2}$ PM 682J
R2	Carbon film 6.8k	RD $\frac{1}{2}$ PM 682J
R3	Carbon film 330k	RD $\frac{1}{2}$ PM 334J
R4	Carbon film 330k	RD $\frac{1}{2}$ PM 334J
R5	Carbon film 180k	RD $\frac{1}{2}$ PM 184J
R6	Carbon film 180k	RD $\frac{1}{2}$ PM 184J
R7	Carbon film 270k	RD $\frac{1}{2}$ PM 274J
R8	Carbon film 270k	RD $\frac{1}{2}$ PM 274J
R9	Carbon film 5.6k	RD $\frac{1}{2}$ PM 562J
R10	Carbon film 5.6k	RD $\frac{1}{2}$ PM 562J
R11	Carbon film 4.7k	RD $\frac{1}{2}$ PM 472J
R12	Carbon film 4.7k	RD $\frac{1}{2}$ PM 472J
R13	Carbon film 390	RD $\frac{1}{2}$ PM 391J
R14	Carbon film 390	RD $\frac{1}{2}$ PM 391J
R15	Carbon film 6.8k	RD $\frac{1}{2}$ PM 682J
R16	Carbon film 6.8k	RD $\frac{1}{2}$ PM 682J
R17	Carbon film 39k	RD $\frac{1}{2}$ PM 393J
R18	Carbon film 39k	RD $\frac{1}{2}$ PM 393J
R19	Carbon film 82k	RD $\frac{1}{2}$ PM 823J
R20	Carbon film 82k	RD $\frac{1}{2}$ PM 823J
R21	Carbon film 180k	RD $\frac{1}{2}$ PM 184J
R22	Carbon film 180k	RD $\frac{1}{2}$ PM 184J
R23	Carbon film 3.9k	RD $\frac{1}{2}$ PM 392J
R24	Carbon film 3.9k	RD $\frac{1}{2}$ PM 392J
R25	Carbon film 3.9k	RD $\frac{1}{2}$ PM 392J

Symbol	Description	Part No.
R26	Carbon film 3.9k	RD¼PM 392J
R27	Carbon film 51k	RD¼PM 513J
R28	Carbon film 51k	RD¼PM 513J
R29	Carbon film 47k	RD¼PM 473J
R30	Carbon film 47k	RD¼PM 473J
R31	Carbon film 390k	RD¼PM 394J
R32	Carbon film 390k	RD¼PM 394J
R33	Carbon film 1M	RD¼PM 105J
R34	Carbon film 1M	RD¼PM 105J
R35	Carbon film 1.2k	RD¼PM 122J
R36	Carbon film 1.2k	RD¼PM 122J
R37	Carbon film 4.7k	RD¼PM 472J
R38	Carbon film 4.7k	RD¼PM 472J
R39	Carbon film 100k	RD¼PM 104J
R40	Carbon film 100k	RD¼PM 104J
R41	Carbon film 47k	RD¼PM 473J
R42	Carbon film 47k	RD¼PM 473J
R43	Carbon film 390k	RD¼PM 394J
R44	Carbon film 390k	RD¼PM 394J
R45	Carbon film 47k	RD¼PM 473J
R46	Carbon film 47k	RD¼PM 473J
R47	Carbon film 1.2k	RD¼PM 122J
R48	Carbon film 1.2k	RD¼PM 122J
R49	Carbon film 4.7k	RD¼PM 472J
R50	Carbon film 4.7k	RD¼PM 472J
R51	Carbon film 100k	RD¼PM 104J
R52	Carbon film 100k	RD¼PM 104J
R53	Carbon film 270	RD¼PM 271J

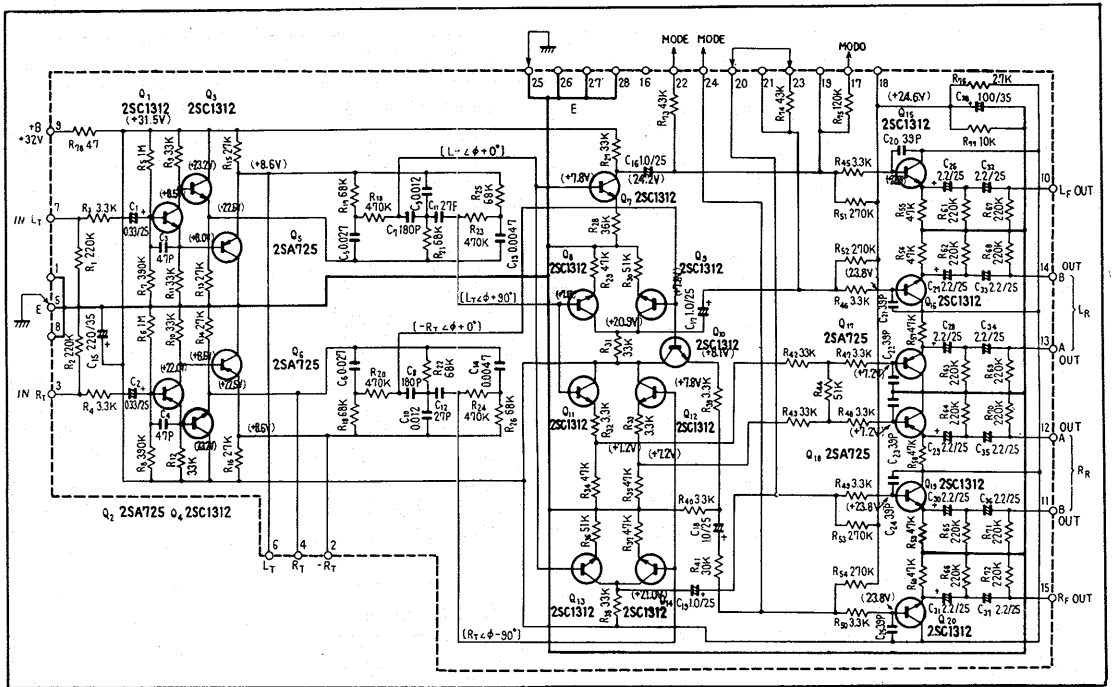
**SEMICONDUCTORS**

Symbol	Description	Part No.
Q1	2SC1327-T or U Transistor (2SC1312-G or H, 2SC1344-E or F)	
Q2	2SC1327-T or U Transistor (2SC1312-G or H, 2SC1344-E or F)	
Q3	2SC1327-T or U Transistor (2SC1312-G or H, 2SC1344-E or F)	
Q4	2SC1327-T or U Transistor (2SC1312-G or H, 2SC1344-E or F)	
Q5	2SC1327-T or U Transistor (2SC1312-G or H, 2SC1344-E or F)	

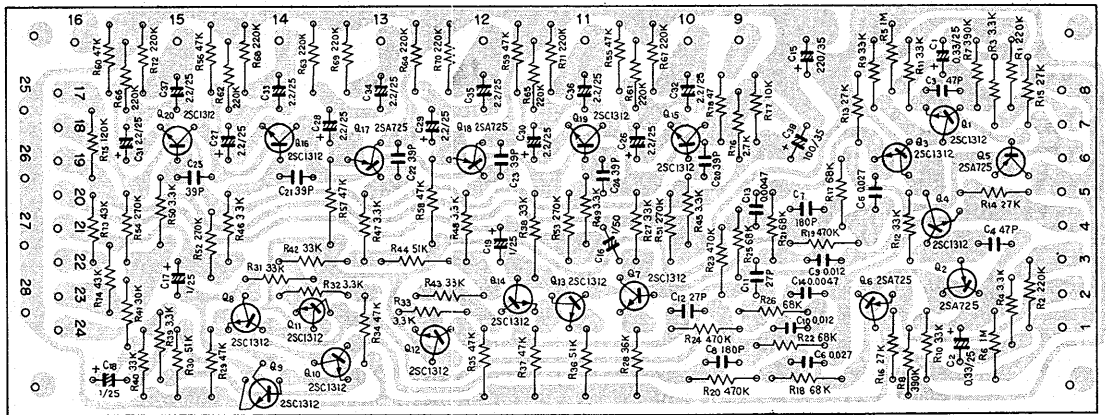
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Symb.	Description	Part No.	
Q6	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor	
Q7	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor	
Q8	2SC1327-T or U (2SC1312-G or H, 2SC1344-E or F)	Transistor	

12.6 DECODER CIRCUIT ASSEMBLY (AWM-031-0)



Foil Side



## Parts List of Decoder Circuit Assembly (AWM-031-0)

### CAPACITORS

Symbol	Description			Part No.
C1	Electrolytic	0.33	25V	CSSA R33M 25
C2	Electrolytic	0.33	25V	CSSA R33M 25
C3	Ceramic	47p	50V	CCDSL 470K 50
C4	Ceramic	47p	50V	CCDSL 470K 50
C5	Mylar	0.027	50V	CQMA 273J 50
C6	Mylar	0.027	50V	CQMA 273J 50
C7	Ceramic	180p	50V	CCDSL 181J 50
C8	Ceramic	180p	50V	CCDSL 181J 50
C9	Mylar	0.012	50V	CQMA 123J 50
C10	Mylar	0.012	50V	CQMA 123J 50
C11	Ceramic	27p	50V	CCDSL 270J 50
C12	Ceramic	27p	50V	CCDSL 270J 50
C13	Mylar	0.0047	50V	CQMA 472J 50
C14	Mylar	0.0047	50V	CQMA 472J 50
C15	Electrolytic	220	35V	CEA 221P 35
C16	Electrolytic	1	25V	CEA 010M 25NP
C17	Electrolytic	1	25V	CEA 010M 25NP
C18	Electrolytic	1	25V	CEA 010M 25NP
C19	Electrolytic	1	25V	CEA 010M 25NP
C20	Ceramic	39p	50V	CCDSL 390K 50
C21	Ceramic	39p	50V	CCDSL 390K 50
C22	Ceramic	39p	50V	CCDSL 390K 50
C23	Ceramic	39p	50V	CCDSL 390K 50
C24	Ceramic	39p	50V	CCDSL 390K 50
C25	Ceramic	39p	50V	CCDSL 390K 50
C26	Electrolytic	2.2	25V	CSSA 2R2M 25
C27	Electrolytic	2.2	25V	CSSA 2R2M 25
C28	Electrolytic	2.2	25V	CSSA 2R2M 25
C29	Electrolytic	2.2	25V	CSSA 2R2M 25
C30	Electrolytic	2.2	25V	CSSA 2R2M 25
C31	Electrolytic	2.2	25V	CSSA 2R2M 25
C32	Electrolytic	2.2	25V	CEA 2R2M 25NP
C33	Electrolytic	2.2	25V	CEA 2R2M 25NP
C34	Electrolytic	2.2	25V	CEA 2R2M 25NP
C35	Electrolytic	2.2	25V	CEA 2R2M 25NP
C36	Electrolytic	2.2	25V	CEA 2R2M 25NP
C37	Electrolytic	2.2	25V	CEA 2R2M 25NP
C38	Electrolytic	100	35V	CEA 101P 35

RESISTORS

Symbol	Description	Part No.
R1	Carbon film 220k	RD¼PM 224J
R2	Carbon film 220k	RD¼PM 224J
R3	Carbon film 3.3k	RD¼PM 332J
R4	Carbon film 3.3k	RD¼PM 332J
R5	Carbon film 1M	RD¼PM 105J
R6	Carbon film 1M	RD¼PM 105J
R7	Carbon film 390k	RD¼PM 394J
R8	Carbon film 390k	RD¼PM 394J
R9	Carbon film 33k	RD¼PM 333J
R10	Carbon film 33k	RD¼PM 333J
R11	Carbon film 33k	RD¼PM 333J
R12	Carbon film 33k	RD¼PM 333J
R13	Carbon film 27k	RD¼PM 273J
R14	Carbon film 27k	RD¼PM 273J
R15	Carbon film 27k	RD¼PM 273J
R16	Carbon film 27k	RD¼PM 273J
R17	Carbon film 68k	RD¼PM 683J
R18	Carbon film 68k	RD¼PM 683J
R19	Carbon film 470k	RD¼PM 474J
R20	Carbon film 470k	RD¼PM 474J
R21	Carbon film 68k	RD¼PM 683J
R22	Carbon film 68k	RD¼PM 683J
R23	Carbon film 470k	RD¼PM 474J
R24	Carbon film 470k	RD¼PM 474J
R25	Carbon film 68k	RD¼PM 683J
R26	Carbon film 68k	RD¼PM 683J
R27	Carbon film 33k	RD¼PM 333J
R28	Carbon film 36k	RD¼PM 363J
R29	Carbon film 47k	RD¼PM 473J
R30	Carbon film 51k	RD¼PM 513J
R31	Carbon film 33k	RD¼PM 333J
R32	Carbon film 3.3k	RD¼PM 332J
R33	Carbon film 3.3k	RD¼PM 332J
R34	Carbon film 47k	RD¼PM 473J
R35	Carbon film 47k	RD¼PM 473J
R36	Carbon film 51k	RD¼PM 513J
R37	Carbon film 47k	RD¼PM 473J
R38	Carbon film 33k	RD¼PM 333J
R39	Carbon film 3.3k	RD¼PM 332J
R40	Carbon film 33k	RD¼PM 333J
R41	Carbon film 30k	RD¼PM 303J
R42	Carbon film 33k	RD¼PM 333J
R43	Carbon film 33k	RD¼PM 333J
R44	Carbon film 51k	RD¼PM 513J
R45	Carbon film 3.3k	RD¼PM 332J
R46	Carbon film 3.3k	RD¼PM 332J
R47	Carbon film 3.3k	RD¼PM 332J
R48	Carbon film 3.3k	RD¼PM 332J
R49	Carbon film 3.3k	RD¼PM 332J
R50	Carbon film 3.3k	RD¼PM 332J

Symbol	Description	Part No.
R51	Carbon film 270k	RD¼PM 274J
R52	Carbon film 270k	RD¼PM 274J
R53	Carbon film 270k	RD¼PM 274J
R54	Carbon film 270k	RD¼PM 274J
R55	Carbon film 47k	RD¼PM 473J
R56	Carbon film 47k	RD¼PM 473J
R57	Carbon film 47k	RD¼PM 473J
R58	Carbon film 47k	RD¼PM 473J
R59	Carbon film 47k	RD¼PM 473J
R60	Carbon film 47k	RD¼PM 473J
R61	Carbon film 220k	RD¼PM 224J
R62	Carbon film 220k	RD¼PM 224J
R63	Carbon film 220k	RD¼PM 224J
R64	Carbon film 220k	RD¼PM 224J
R65	Carbon film 220k	RD¼PM 224J
R66	Carbon film 220k	RD¼PM 224J
R67	Carbon film 220k	RD¼PM 224J
R68	Carbon film 220k	RD¼PM 224J
R69	Carbon film 220k	RD¼PM 224J
R70	Carbon film 220k	RD¼PM 224J
R71	Carbon film 220k	RD¼PM 224J
R72	Carbon film 220k	RD¼PM 224J
R73	Carbon film 43k	RD¼PM 433J
R74	Carbon film 43k	RD¼PM 433J
R75	Carbon film 120k	RD¼PM 124J
R76	Carbon film 2.7k	RD¼PM 272J
R77	Carbon film 10k	RD¼PM 103J
R78	Carbon film 47	RD¼PM 470J

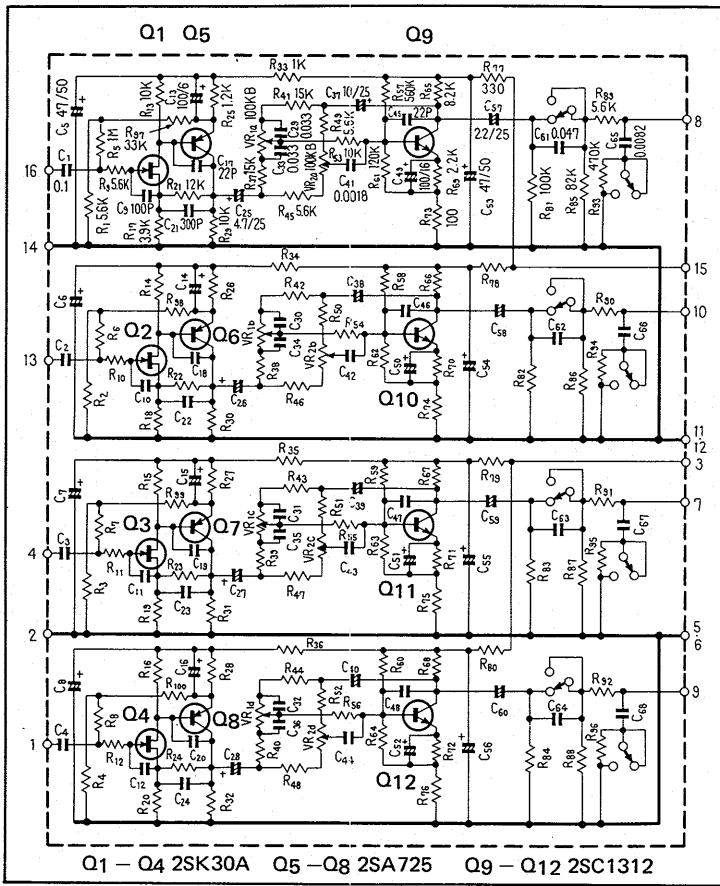
## SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC1327-S or T (2SC1312-F or G) Transistor	
Q2	2SA763P-5 or 6 (2SA725-F or G) Transistor	
Q3	2SC1327-S or T (2SC1312-F or G) Transistor	
Q4	2SC1327-S or T (2SC1312-F or G) Transistor	
Q5	2SA763P-5 or 6 (2SA725-F or G) Transistor	
Q6	2SA763P-5 or 6 (2SA725-F or G) Transistor	
Q7	2SC1327-T or U (2SC1312-G or H) Transistor	
Q8	2SC1327-T or U (2SC1312-G or H) Transistor	
Q9	2SC1327-T or U (2SC1312-G or H) Transistor	
Q10	2SC1327-T or U (2SC1312-G or H) Transistor	

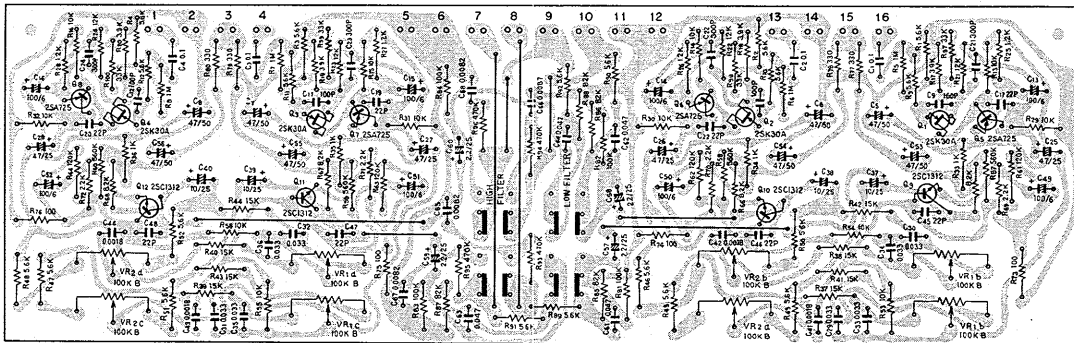


Symbol	Description	Part No.	
Q11	2SC1327-T or U (2SC1312-G or H)	Transistor	
Q12	2SC1327-T or U (2SC1312-G or H)	Transistor	
Q13	2SC1327-T or U (2SC1312-G or H)	Transistor	
Q14	2SC1327-T or U (2SC1312-G or H)	Transistor	
Q15	2SC1327-S or T (2SC1312-F or G)	Transistor	
Q16	2SC1327-S or T (2SC1312-F or G)	Transistor	
Q17	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q18	2SA763P-5 or 6 (2SA725-F or G)	Transistor	
Q19	2SC1327-S or T (2SC1312-F or G)	Transistor	
Q20	2SC1327-S or T (2SC1312-F or G)	Transistor	

# 12.7 CONTROL AMPLIFIER ASSEMBLY (AWG-023-0)



Foil Side



**Parts List of Control Amplifier Assembly (AWG-023-0)**

**CAPACITORS**

Symbol	Description			Part No.
C1	Mylar	0.1	50V	CQMA 104K 50
C2	Mylar	0.1	50V	CQMA 104K 50
C3	Mylar	0.1	50V	CQMA 104K 50
C4	Mylar	0.1	50V	CQMA 104K 50
C5	Electrolytic	47	50V	CEA 470P 50
C6	Electrolytic	47	50V	CEA 470P 50
C7	Electrolytic	47	50V	CEA 470P 50
C8	Electrolytic	47	50V	CEA 470P 50
C9	Ceramic	100p	50V	CCDSL 101K 50
C10	Ceramic	100p	50V	CCDSL 101K 50
C11	Ceramic	100p	50V	CCDSL 101K 50
C12	Ceramic	100p	50V	CCDSL 101K 50
C13	Electrolytic	100	6V	CEA 101P 6
C14	Electrolytic	100	6V	CEA 101P 6
C15	Electrolytic	100	6V	CEA 101P 6
C16	Electrolytic	100	6V	CEA 101P 6
C17	Ceramic	22p	50V	CCDSL 220K 50
C18	Ceramic	22p	50V	CCDSL 220K 50
C19	Ceramic	22p	50V	CCDSL 220K 50
C20	Ceramic	22p	50V	CCDSL 220K 50
C21	Ceramic	300p	50V	CKDYB 301K 50
C22	Ceramic	300p	50V	CKDYB 301K 50
C23	Ceramic	300p	50V	CKDYB 301K 50
C24	Ceramic	300p	50V	CKDYB 301K 50
C25	Electrolytic	4.7	25V	CSSA 4R7P 25
C26	Electrolytic	4.7	25V	CSSA 4R7P 25
C27	Electrolytic	4.7	25V	CSSA 4R7P 25
C28	Electrolytic	4.7	25V	CSSA 4R7P 25
C29	Mylar	0.033	50V	CQMA 333K 50
C30	Mylar	0.033	50V	CQMA 333K 50
C31	Mylar	0.033	50V	CQMA 333K 50
C32	Mylar	0.033	50V	CQMA 333K 50
C33	Mylar	0.033	50V	CQMA 333K 50
C34	Mylar	0.033	50V	CQMA 333K 50
C35	Mylar	0.033	50V	CQMA 333K 50
C36	Mylar	0.033	50V	CQMA 333K 50
C37	Electrolytic	10	25V	CEA 100P 25
C38	Electrolytic	10	25V	CEA 100P 25
C39	Electrolytic	10	25V	CEA 100P 25
C40	Electrolytic	10	25V	CEA 100P 25
C41	Mylar	0.0018	50V	CQMA 182K 50
C42	Mylar	0.0018	50V	CQMA 182K 50
C43	Mylar	0.0018	50V	CQMA 182K 50
C44	Mylar	0.0018	50V	CQMA 182K 50
C45	Ceramic	22p	50V	CCDSL 220K 50

Continued on the Next Page

Symbol	Description			Part No.
C46	Ceramic	22p	50V	CCDSL 220K 50
C47	Ceramic	22p	50V	CCDSL 220K 50
C48	Ceramic	22p	50V	CCDSL 220K 50
C49	Electrolytic	100	6V	CEA 101P 6
C50	Electrolytic	100	6V	CEA 101P 6
C51	Electrolytic	100	6V	CEA 101P 6
C52	Electrolytic	100	6V	CEA 101P 6
C53	Electrolytic	47	50V	CEA 470P 50
C54	Electrolytic	47	50V	CEA 470P 50
C55	Electrolytic	47	50V	CEA 470P 50
C56	Electrolytic	47	50V	CEA 470P 50
C57	Electrolytic	2.2	25V	CSSA 2R2P 25
C58	Electrolytic	2.2	25V	CSSA 2R2P 25
C59	Electrolytic	2.2	25V	CSSA 2R2P 25
C60	Electrolytic	2.2	25V	CSSA 2R2P 25
C61	Mylar	0.047	50V	CQMA 473K 50
C62	Mylar	0.047	50V	CQMA 473K 50
C63	Mylar	0.047	50V	CQMA 473K 50
C64	Mylar	0.047	50V	CQMA 473K 50
C65	Mylar	0.0082	50V	CQMA 822K 50
C66	Mylar	0.0082	50V	CQMA 822K 50
C67	Mylar	0.0082	50V	CQMA 822K 50
C68	Mylar	0.0082	50V	CQMA 822K 50

#### SWITCHES

Symbol	Description	Part No.
S1	Push switch	ASG-019-0
S2	Push switch	ASG-019-C

#### RESISTORS

Symbol	Description	Part No.
R1	Carbon film 5.6k	RD¼PM 562J
R2	Carbon film 5.6k	RD¼PM 562J
R3	Carbon film 5.6k	RD¼PM 562J
R4	Carbon film 5.6k	RD¼PM 562J
R5	Carbon film 1M	RD¼PM 105J
R6	Carbon film 1M	RD¼PM 105J
R7	Carbon film 1M	RD¼PM 105J
R8	Carbon film 1M	RD¼PM 105J
R9	Carbon film 5.6k	RD¼PM 562J
R10	Carbon film 5.6k	RD¼PM 562J
R11	Carbon film 5.6k	RD¼PM 562J
R12	Carbon film 5.6k	RD¼PM 562J
R13	Carbon film 10k	RD¼PM 103J
R14	Carbon film 10k	RD¼PM 103J
R15	Carbon film 10k	RD¼PM 103J
R16	Carbon film 10k	RD¼PM 103J
R17	Carbon film 3.9k	RD¼PM 392J
R18	Carbon film 3.9k	RD¼PM 392J
R19	Carbon film 3.9k	RD¼PM 392J
R20	Carbon film 3.9k	RD¼PM 392J

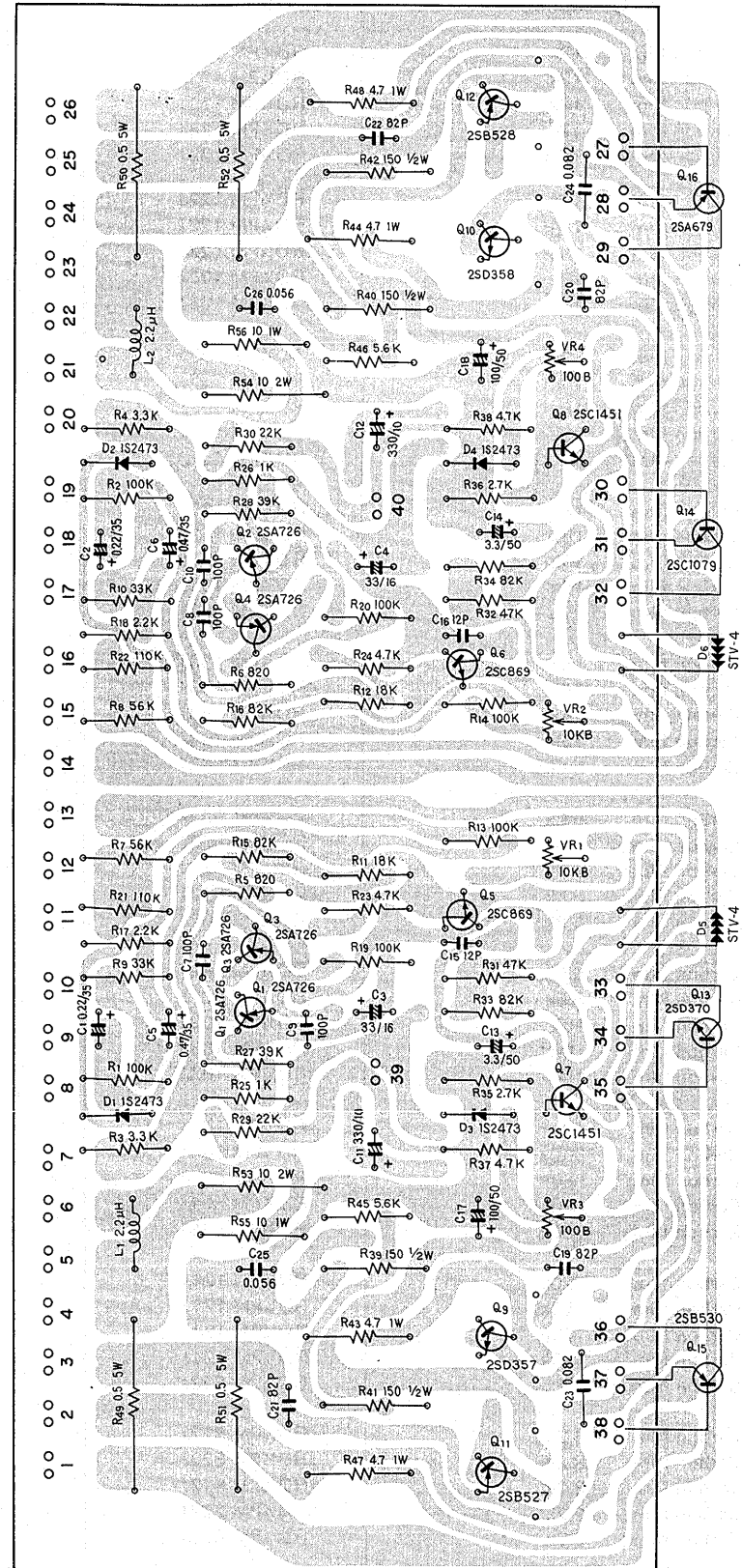
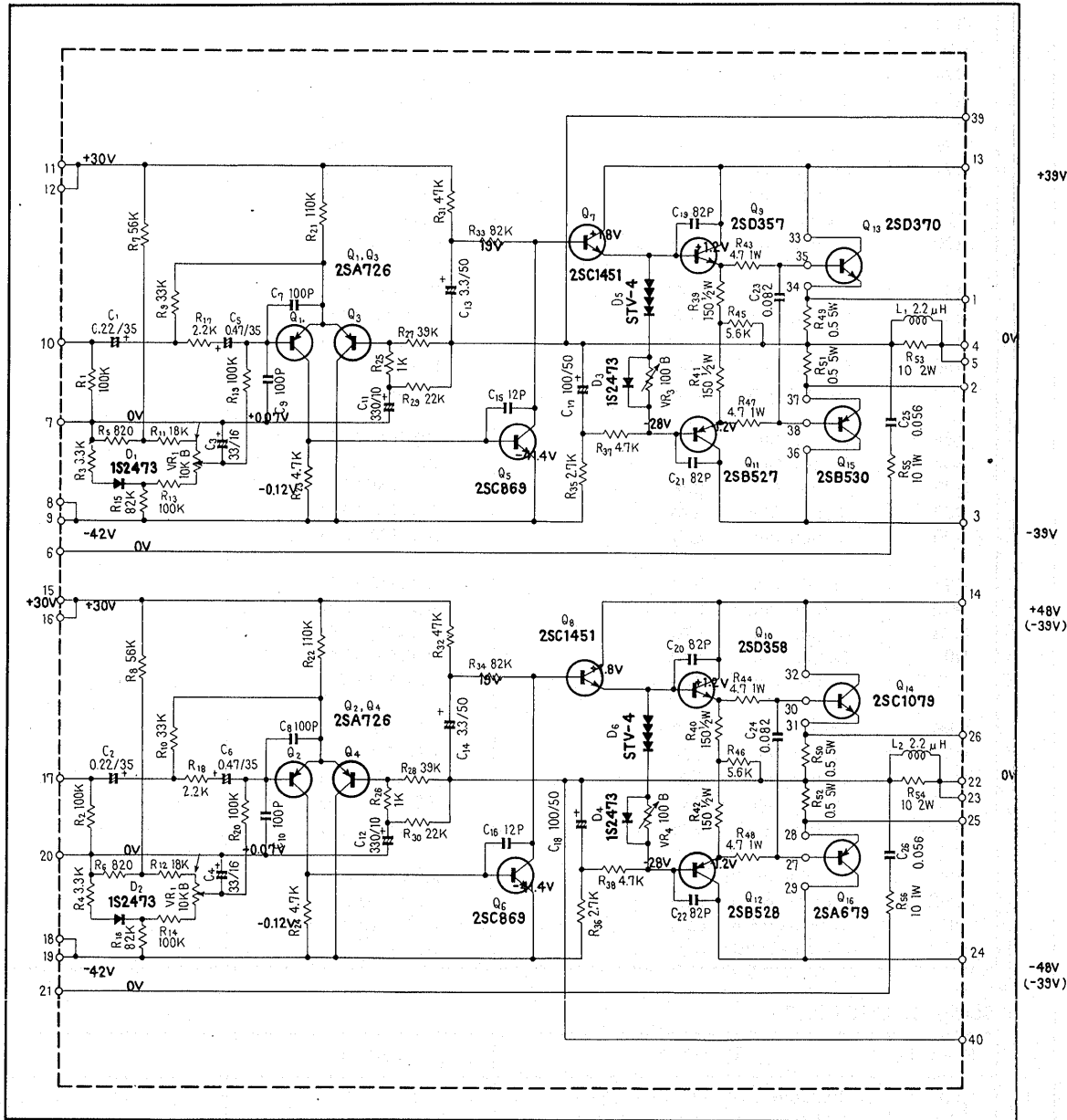
Symbol	Description	Part No.
R21	Carbon film 12k	RD¼PM 123J
R22	Carbon film 12k	RD¼PM 123J
R23	Carbon film 12k	RD¼PM 123J
R24	Carbon film 12k	RD¼PM 123J
R25	Carbon film 1.2k	RD¼PM 122J
R26	Carbon film 1.2k	RD¼PM 122J
R27	Carbon film 1.2k	RD¼PM 122J
R28	Carbon film 1.2k	RD¼PM 122J
R29	Carbon film 10k	RD¼PM 103J
R30	Carbon film 10k	RD¼PM 103J
R31	Carbon film 10k	RD¼PM 103J
R32	Carbon film 10k	RD¼PM 103J
R33	Carbon film 1k	RD¼PM 102J
R34	Carbon film 1k	RD¼PM 102J
R35	Carbon film 1k	RD¼PM 102J
R36	Carbon film 1k	RD¼PM 102J
R37	Carbon film 15k	RD¼PM 153J
R38	Carbon film 15k	RD¼PM 153J
R39	Carbon film 15k	RD¼PM 153J
R40	Carbon film 15k	RD¼PM 153J
R41	Carbon film 15k	RD¼PM 153J
R42	Carbon film 15k	RD¼PM 153J
R43	Carbon film 15k	RD¼PM 153J
R44	Carbon film 15k	RD¼PM 153J
R45	Carbon film 5.6k	RD¼PM 562J
R46	Carbon film 5.6k	RD¼PM 562J
R47	Carbon film 5.6k	RD¼PM 562J
R48	Carbon film 5.6k	RD¼PM 562J
R49	Carbon film 5.6k	RD¼PM 562J
R50	Carbon film 5.6k	RD¼PM 562J
R51	Carbon film 5.6k	RD¼PM 562J
R52	Carbon film 5.6k	RD¼PM 562J
R53	Carbon film 10k	RD¼PM 103J
R54	Carbon film 10k	RD¼PM 103J
R55	Carbon film 10k	RD¼PM 103J
R56	Carbon film 10k	RD¼PM 103J
R57	Carbon film 560k	RD¼PM 564J
R58	Carbon film 560k	RD¼PM 564J
R59	Carbon film 560k	RD¼PM 564J
R60	Carbon film 560k	RD¼PM 564J
R61	Carbon film 120k	RD¼PM 124J
R62	Carbon film 120k	RD¼PM 124J
R63	Carbon film 120k	RD¼PM 124J
R64	Carbon film 120k	RD¼PM 124J
R65	Carbon film 8.2k	RD¼PM 822J
R66	Carbon film 8.2k	RD¼PM 822J
R67	Carbon film 8.2k	RD¼PM 822J
R68	Carbon film 8.2k	RD¼PM 822J
R69	Carbon film 2.2k	RD¼PM 222J
R70	Carbon film 2.2k	RD¼PM 222J

Symbol	Description	Part No.
R71	Carbon film 2.2k	RD¼PM 222J
R72	Carbon film 2.2k	RD¼PM 222J
R73	Carbon film 100	RD¼PM 101J
R74	Carbon film 100	RD¼PM 101J
R75	Carbon film 100	RD¼PM 101J
R76	Carbon film 100	RD¼PM 101J
R77	Carbon film 330	RD¼PM 331J
R78	Carbon film 330	RD¼PM 331J
R79	Carbon film 330	RD¼PM 331J
R80	Carbon film 330	RD¼PM 331J
R81	Carbon film 100k	RD¼PM 104J
R82	Carbon film 100k	RD¼PM 104J
R83	Carbon film 100k	RD¼PM 104J
R84	Carbon film 100k	RD¼PM 104J
R85	Carbon film 82k	RD¼PM 823J
R86	Carbon film 82k	RD¼PM 823J
R87	Carbon film 82k	RD¼PM 823J
R88	Carbon film 82k	RD¼PM 823J
R89	Carbon film 5.6k	RD¼PM 562J
R90	Carbon film 5.6k	RD¼PM 562J
R91	Carbon film 5.6k	RD¼PM 562J
R92	Carbon film 5.6k	RD¼PM 562J
R93	Carbon film 470k	RD¼PM 474J
R94	Carbon film 470k	RD¼PM 474J
R95	Carbon film 470k	RD¼PM 474J
R96	Carbon film 470k	RD¼PM 474J
R97	Carbon film 33k	RD¼PM 333J
R98	Carbon film 33k	RD¼PM 333J
R99	Carbon film 33k	RD¼PM 333J
R100	Carbon film 33k	RD¼PM 333J
VR1	Variable resistor dual	ACV-110-0
VR2	Variable resistor dual	ACV-110-0
VR3	Variable resistor dual	ACV-110-0
VR4	Variable resistor dual	ACV-110-0

**SEMICONDUCTORS**

Symbol	Description	Part No.
Q1	2SK30A-Y or GR FET	
Q2	2SK30A-Y or GR FET	
Q3	2SK30A-Y or GR FET	
Q4	2SK30A-Y or GR FET	
Q5	2SA725-F or G Transistor	
Q6	2SA725-F or G Transistor	
Q7	2SA725-F or G Transistor	
Q8	2SA725-F or G Transistor	
Q9	2SC1312-F or G Transistor	
Q10	2SC1312-F or G Transistor	
Q11	2SC1312-F or G Transistor	
Q12	2SC1312-F or G Transistor	

12.8 POWER AMPLIFIER ASSEMBLY (AWH-027-0)



Foil Side

**Parts List of Power Amplifier Assembly (AWH-027-0)**

**CAPACITORS**

Symbol	Description			Part No.
C1	Electrolytic	0.22	35V	CSZA R22M 35
C2	Electrolytic	0.22	35V	CSZA R22M 35
C3	Electrolytic	33	16V	CEA 330P 16
C4	Electrolytic	33	16V	CEA 330P 16
C5	Electrolytic	0.47	35V	CSZA R47M 35
C6	Electrolytic	0.47	35V	CSZA R47M 35
C7	Ceramic	100p	50V	CCDSL 101K 50
C8	Ceramic	100p	50V	CCDSL 101K 50
C9	Ceramic	100p	50V	CCDSL 101K 50
C10	Ceramic	100p	50V	CCDSL 101K 50
C11	Electrolytic	330	10V	CEA 331P 10
C12	Electrolytic	330	10V	CEA 331P 10
C13	Electrolytic	3.3	50V	CEA 3R3P 50
C14	Electrolytic	3.3	50V	CEA 3R3P 50
C15	Ceramic	12p	50V	CCDSL 120K 50
C16	Ceramic	12p	50V	CCDSL 120K 50
C17	Electrolytic	100	50V	CEA 101P 50
C18	Electrolytic	100	50V	CEA 101P 50
C19	Ceramic	82p	50V	CCDSL 820K 50
C20	Ceramic	82p	50V	CCDSL 820K 50
C21	Ceramic	82p	50V	CCDSL 820K 50
C22	Ceramic	82p	50V	CCDSL 820K 50
C23	Mylar	0.082	50V	CQMA 823M 50
C24	Mylar	0.082	50V	CQMA 823M 50
C25	Mylar	0.056	50V	CQMA 563M 50
C26	Mylar	0.056	50V	CQMA 563M 50

**RESISTORS AND POTENTIOMETERS**

Symbol	Description			Part No.
R1	Carbon film	100k		RD¼PS 104J
R2	Carbon film	100k		RD¼PS 104J
R3	Carbon film	3.3k		RD¼PS 332J
R4	Carbon film	3.3k		RD¼PS 332J
R5	Carbon film	820		RD¼PS 821J
R6	Carbon film	820		RD¼PS 821J
R7	Carbon film	56k		RD¼PS 563J
R8	Carbon film	56k		RD¼PS 563J
R9	Carbon film	33k		RD¼PS 333J
R10	Carbon film	33k		RD¼PS 333J
R11	Carbon film	18k		RD¼PS 183J
R12	Carbon film	18k		RD¼PS 183J
R13	Carbon film	100k		RD¼PS 104J
R14	Carbon film	100k		RD¼PS 104J
R15	Carbon film	82k		RD¼PS 823J

Continued on the Next Page



Symbol	Description	Part No.
R16	Carbon film 82k	RD¼PS 823J
R17	Carbon film 2.2k	RD¼PS 222J
R18	Carbon film 2.2k	RD¼PS 222J
R19	Carbon film 100k	RD¼PS 104J
R20	Carbon film 100k	RD¼PS 104J
R21	Carbon film 110k	RD¼PS 114J
R22	Carbon film 110k	RD¼PS 114J
R23	Carbon film 4.7k	RD¼PS 472J
R24	Carbon film 4.7k	RD¼PS 472J
R25	Carbon film 1k	RD¼PS 102J
R26	Carbon film 1k	RD¼PS 102J
R27	Carbon film 39k	RD¼PS 393J
R28	Carbon film 39k	RD¼PS 393J
R29	Carbon film 22k	RD¼PS 223J
R30	Carbon film 22k	RD¼PS 223J
R31	Carbon film 47k	RD¼PS 473J
R32	Carbon film 47k	RD¼PS 473J
R33	Carbon film 82k	RD¼PS 823J
R34	Carbon film 82k	RD¼PS 823J
R35	Carbon film 2.7k	RD¼PS 272J
R36	Carbon film 2.7k	RD¼PS 272J
R37	Carbon film 4.7k	RD¼PS 472J
R38	Carbon film 4.7k	RD¼PS 472J
R39	Carbon film 150 ½W	RD½PS 151J
R40	Carbon film 150 ½W	RD½PS 151J
R41	Carbon film 150 ½W	RD½PS 151J
R42	Carbon film 150 ½W	RD½PS 151J
R43	Metal film 4.7 1W	RN1H 4R7K
R44	Metal film 4.7 1W	RN1H 4R7K
R45	Carbon film 5.6k	RD¼PS 562J
R46	Carbon film 5.6k	RD¼PS 562J
R47	Metal film 4.7 1W	RN1H 4R7K
R48	Metal film 4.7 1W	RN1H 4R7K
R49	Wire wound 0.5 5W	RT5B 0R5K
R50	Wire wound 0.5 5W	RT5B 0R5K
R51	Wire wound 0.5 5W	RT5B 0R5K
R52	Wire wound 0.5 5W	RT5B 0R5K
R53	Metal oxide 10 2W	RS2P 100J
R54	Metal oxide 10 2W	RS2P 100J
R55	Metal oxide 10 1W	RS1P 100J
R56	Metal oxide 10 1W	RS1P 100J
VR1	Variable resistor (Semi-fixed) 10k-B	ACP-029-0
VR2	Variable resistor (Semi-fixed) 10k-B	ACP-029-0
VR3	Variable resistor (Semi-fixed) 100-B	ACP-019-A
VR4	Variable resistor (Sem-fixed) 100-B	ACP-019-A

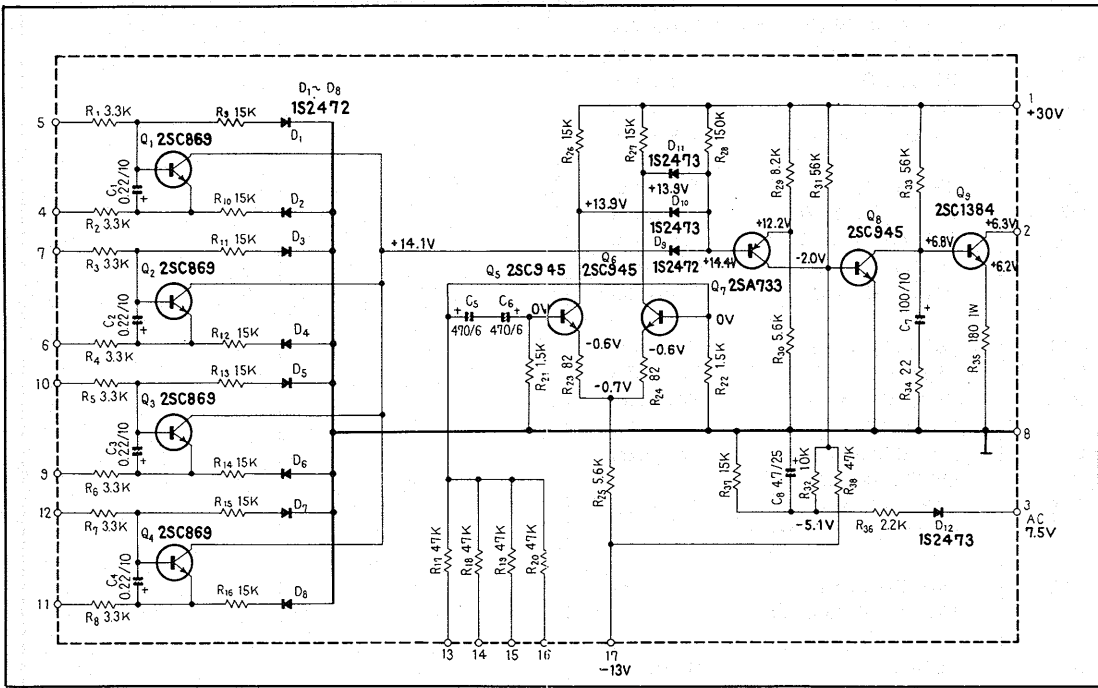
**SEMICONDUCTORS**

Symbol	Description	Part No.
Q1	2SA726-G or F Transistor	
Q2	2SA726-G or F Transistor	
Q3	2SA726-G or F Transistor	
Q4	2SA726-G or F Transistor	
Q5	2SC869-C or D Transistor	
Q6	2SC869-C or D Transistor	
Q7	2SC1451-V or B Transistor	
Q8	2SC1451-V or B Transistor	
Q9	2SD357-C or D Transistor	
Q10	2SD358-C or D Transistor	
Q11	2SB527-C or D Transistor	
Q12	2SB528-C or D Transistor	
Q13	2SD370-R or O Transistor	
Q14	(2SC1403-R, O or Y) 2SC1079-R or Y Transistor	
Q15	(2SC1116-R, O or Y) 2SB530-R or O (2SA745-R, O or Y) Transistor	
Q16	2SA679-R or T (2SA747-R, O or Y) Transistor	
D1	1S2473 Diode	
D2	1S2473 Diode	
D3	1S2473 Diode	
D4	1S2473 Diode	
D5	STV-4 Varistor	
D6	STV-4 Varistor	

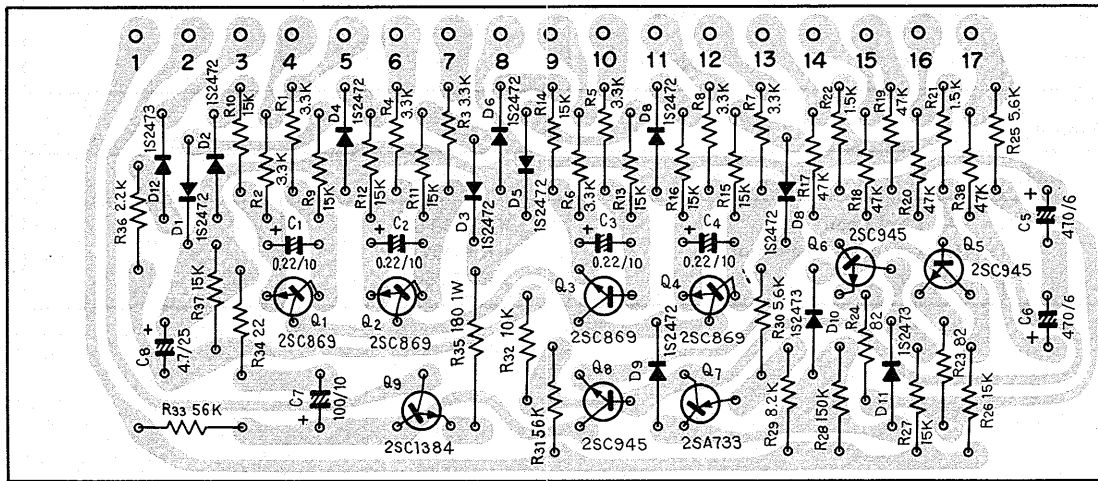
**OTHERS**

Symbol	Description	Part No.
	AF Choke coil	T63-009-0
	Socket (power transistor)	AKH-001-0
	Spacer	AEC-076-0

# 12.9 PROTECTION CIRCUIT ASSEMBLY (AWM-049-A)



Foil Side



**Parts List of Protection Circuit Assembly (AWM-049-A)**

**CAPACITORS**

Symbol	Description	Part No.
C1	Electrolytic 0.22 10V	CSSA R22M 10
C2	Electrolytic 0.22 10V	CSSA R22M 10
C3	Electrolytic 0.22 10V	CSSA R22M 10
C4	Electrolytic 0.22 10V	CSSA R22M 10
C5	Electrolytic 470 6V	CEA 471P 6
C6	Electrolytic 470 6V	CEA 471P 6
C7	Electrolytic 100 10V	CEA 101P 10
C8	Electrolytic 4.7 25V	CEA 4R7P 25

**RESISTORS**

Symbol	Description	Part No.
R1	Carbon film 3.3k	RD¼PM 332J
R2	Carbon film 3.3k	RD¼PM 332J
R3	Carbon film 3.3k	RD¼PM 332J
R4	Carbon film 3.3k	RD¼PM 332J
R5	Carbon film 3.3k	RD¼PM 332J
R6	Carbon film 3.3k	RD¼PM 332J
R7	Carbon film 3.3k	RD¼PM 332J
R8	Carbon film 3.3k	RD¼PM 332J
R9	Carbon film 15k	RD¼PM 153J
R10	Carbon film 15k	RD¼PM 153J
R11	Carbon film 15k	RD¼PM 153J
R12	Carbon film 15k	RD¼PM 153J
R13	Carbon film 15k	RD¼PM 153J
R14	Carbon film 15k	RD¼PM 153J
R15	Carbon film 15k	RD¼PM 153J
R16	Carbon film 15k	RD¼PM 153J
R17	Carbon film 47k	RD¼PM 473J
R18	Carbon film 47k	RD¼PM 473J
R19	Carbon film 47k	RD¼PM 473J
R20	Carbon film 47k	RD¼PM 473J
R21	Carbon film 1.5k	RD¼PM 152J
R22	Carbon film 1.5k	RD¼PM 152J
R23	Carbon film 82	RD¼PM 820J
R24	Carbon film 82	RD¼PM 820J
R25	Carbon film 5.6k	RD¼PM 562J
R26	Carbon film 15k	RD¼PM 153J
R27	Carbon film 15k	RD¼PM 153J
R28	Carbon film 150k	RD¼PM 154J
R29	Carbon film 8.2k	RD¼PM 822J
R30	Carbon film 5.6k	RD¼PM 562J
R31	Carbon film 56k	RD¼PM 563J
R32	Carbon film 10k	RD¼PM 103J
R33	Carbon film 56k	RD¼PM 563J
R34	Carbon film 22	RD¼PM 220J
R35	Metal oxide 180 1W	RS1P 181J

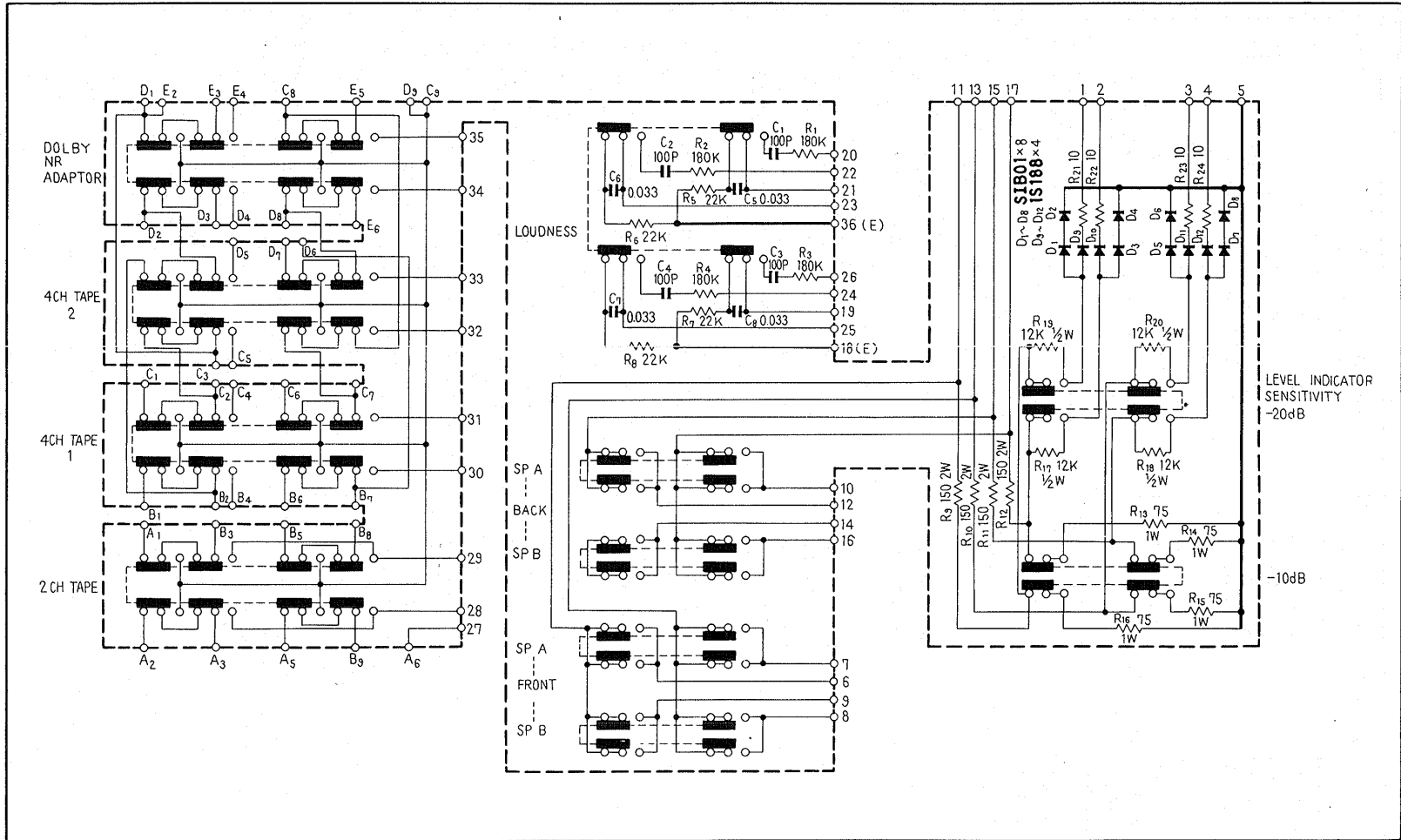
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Symbol	Description	Part No.
R36	Carbon film 2.2k	RD¼PM 222J
R37	Carbon film 15k	RD¼PM 153J
R38	Carbon film 47k	RD¼PM 473J

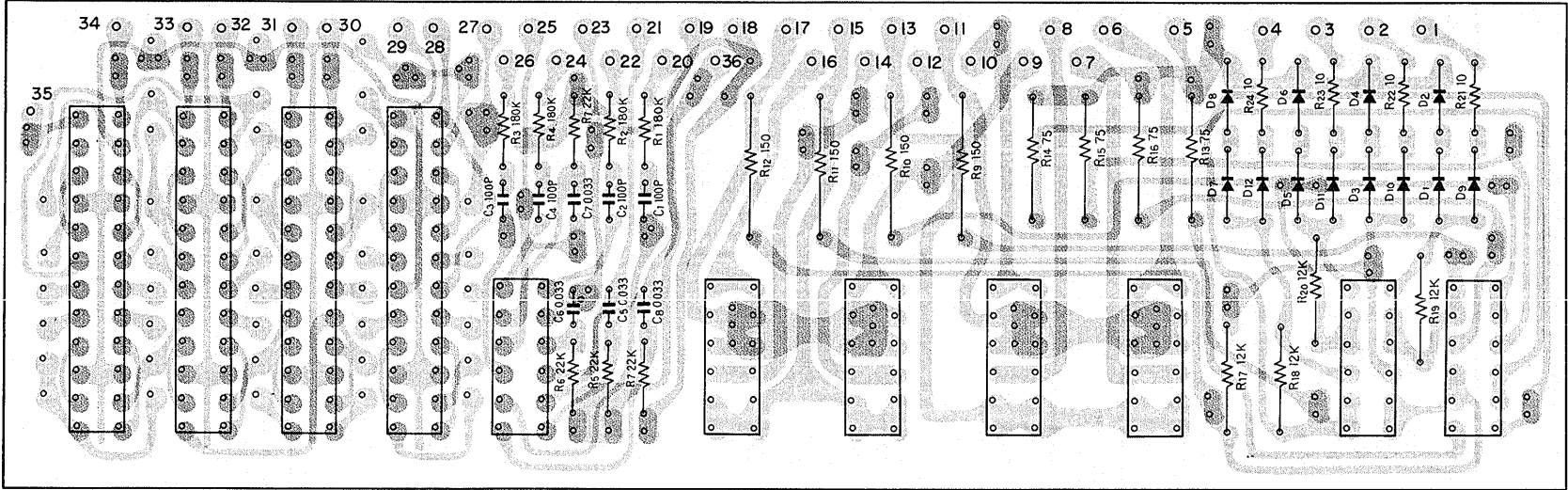
### SEMICONDUCTORS

Symbol	Description	Part No.
Q1	2SC869-C, D or B Transistor (2SC857K-A or 2SC1515K)	
Q2	2SC869-C, D or B Transistor (2SC857K-A or 2SC1515K)	
Q3	2SC869-C, D or B Transistor (2SC857K-A or 2SC1515K)	
Q4	2SC869-C, D or B Transistor (2SC857K-A or 2SC1515K)	
Q5	2SC945-R or Q Transistor	
Q6	2SC945-R or Q Transistor	
Q7	2SA733-R or Q Transistor	
Q8	2SC945-R or Q Transistor	
Q9	2SC1384-Q or R Transistor	
D1	1S2472 Diode	
D2	1S2472 Diode	
D3	1S2472 Diode	
D4	1S2472 Diode	
D5	1S2472 Diode	
D6	1S2472 Diode	
D7	1S2472 Diode	
D8	1S2472 Diode	
D9	1S2472 Diode	
D10	1S2473 Diode	
D11	1S2473 Diode	
D12	1S2473 Diode	

12.10 SWITCH CIRCUIT ASSEMBLY (AWS-048-A)



Foil Side



## Parts List of Switch Circuit Assembly (AWS-048-A)

### CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	100p	50V	CKDSL 101K 50
C2	Ceramic	100p	50V	CKDSL 101K 50
C3	Ceramic	100p	50V	CKDSL 101K 50
C4	Ceramic	100p	50V	CKDSL 101K 50
C5	Mylar	0.033	50V	CQMA 333K 50
C6	Mylar	0.033	50V	CQMA 333K 50
C7	Mylar	0.033	50V	CQMA 333K 50
C8	Mylar	0.033	50V	CQMA 333K 50

### RESISTORS

Symbol	Description			Part No.
R1	Carbon film	180k		RD $\frac{1}{4}$ PM 184J
R2	Carbon film	180k		RD $\frac{1}{4}$ PM 184J
R3	Carbon film	180k		RD $\frac{1}{4}$ PM 184J
R4	Carbon film	180k		RD $\frac{1}{4}$ PM 184J
R5	Carbon film	22k		RD $\frac{1}{4}$ PM 223J
R6	Carbon film	22k		RD $\frac{1}{4}$ PM 223J
R7	Carbon film	22k		RD $\frac{1}{4}$ PM 223J
R8	Carbon film	22k		RD $\frac{1}{4}$ PM 223J
R9	Metal oxide	150	2W	RS2P 151K
R10	Metal oxide	150	2W	RS2P 151K
R11	Metal oxide	150	2W	RS2P 151K
R12	Metal oxide	150	2W	RS2P 151K
R13	Metal oxide	75	1W	RS1P 750K
R14	Metal oxide	75	1W	RS1P 750K
R15	Metal oxide	75	1W	RS1P 750K
R16	Metal oxide	75	1W	RS1P 750K
R17	Carbon film	12k	$\frac{1}{2}$ W	RD $\frac{1}{2}$ PS 123J
R18	Carbon film	12k	$\frac{1}{2}$ W	RD $\frac{1}{2}$ PS 123J
R19	Carbon film	12k	$\frac{1}{2}$ W	RD $\frac{1}{2}$ PS 123J
R20	Carbon film	12k	$\frac{1}{2}$ W	RD $\frac{1}{2}$ PS 123J
R21	Carbon film	10		RD $\frac{1}{4}$ PM 100J
R22	Carbon film	10		RD $\frac{1}{4}$ PM 100J
R23	Carbon film	10		RD $\frac{1}{4}$ PM 100J
R24	Carbon film	10		RD $\frac{1}{4}$ PM 100J

### SWITCHES

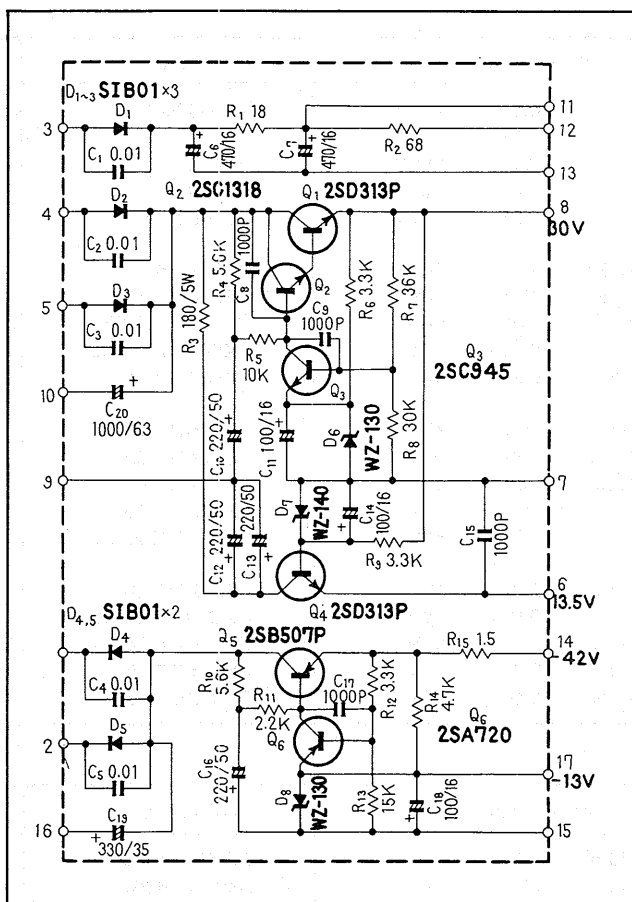
Symbol	Description	Part No.
	Push switch	ASG-049-0
	Push switch	ASG-047-0
	Push switch	ASG-046-0



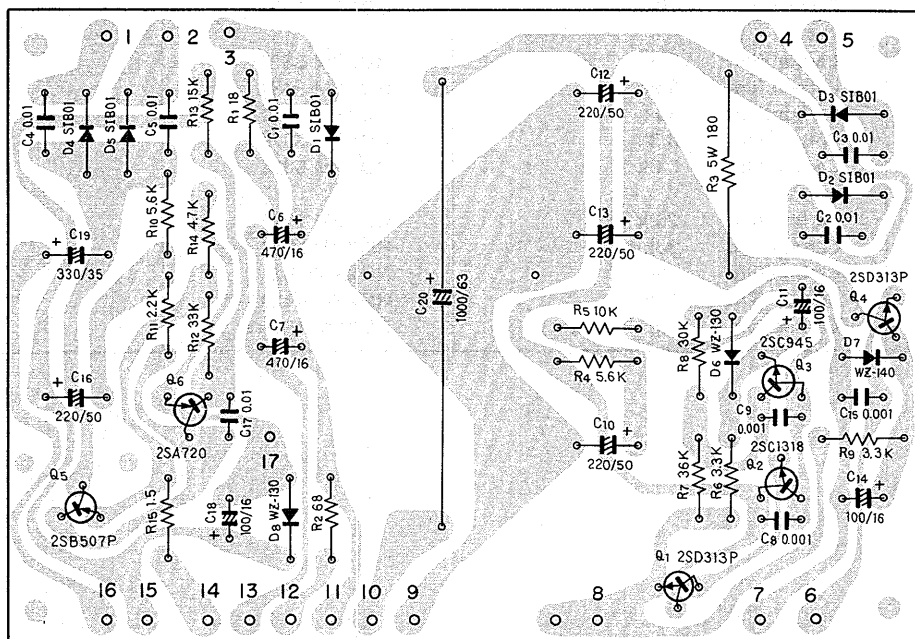
**SEMICONDUCTORS**

<b>Symbol</b>	<b>Description</b>	<b>Part No.</b>	
D1	SIB01-01	Diode	
D2	SIB01-01	Diode	
D3	SIB01-01	Diode	
D4	SIB01-01	Diode	
D5	SIB01-01	Diode	
D6	SIB01-01	Diode	
D7	SIB01-01	Diode	
D8	SIB01-01	Diode	
D9	1S188 FM-1	Diode	
D10	1S188 FM-1	Diode	
D11	1S188 FM-1	Diode	
D12	1S188 FM-1	Diode	

12.11 POWER SUPPLY CIRCUIT ASSEMBLY (AWR-038-0)



Foil Side



## Parts List of Power Supply Circuit Assembly (AWR-038-0)

### CAPACITORS

Symbol	Description			Part No.
C1	Ceramic	0.01	150V	ACG-004-0
C2	Ceramic	0.01	150V	ACG-004-0
C3	Ceramic	0.01	150V	ACG-004-0
C4	Ceramic	0.01	150V	ACG-004-0
C5	Ceramic	0.01	150V	ACG-004-0
C6	Electrolytic	470	16V	CEA 471P 16
C7	Electrolytic	470	16V	CEA 471P 16
C8	Ceramic	0.001	50V	CKDYF 102Z 50
C9	Ceramic	0.001	50V	CKDYF 102Z 50
C10	Electrolytic	220	50V	CEA 221P 50
C11	Electrolytic	100	16V	CEA 101P 16
C12	Electrolytic	220	50V	CEA 221P 50
C13	Electrolytic	220	50V	CEA 221P 50
C14	Electrolytic	100	16V	CEA 101P 16
C15	Ceramic	0.001	50V	CKDYF 102Z 50
C16	Electrolytic	220	50V	CEA 221P 50
C17	Ceramic	0.001	50V	CKDYF 102Z 50
C18	Electrolytic	100	16V	CEA 101P 16
C19	Electrolytic	330	35V	CEA 331P 35
C20	Electrolytic	1,000	63V	CEB 102P 63

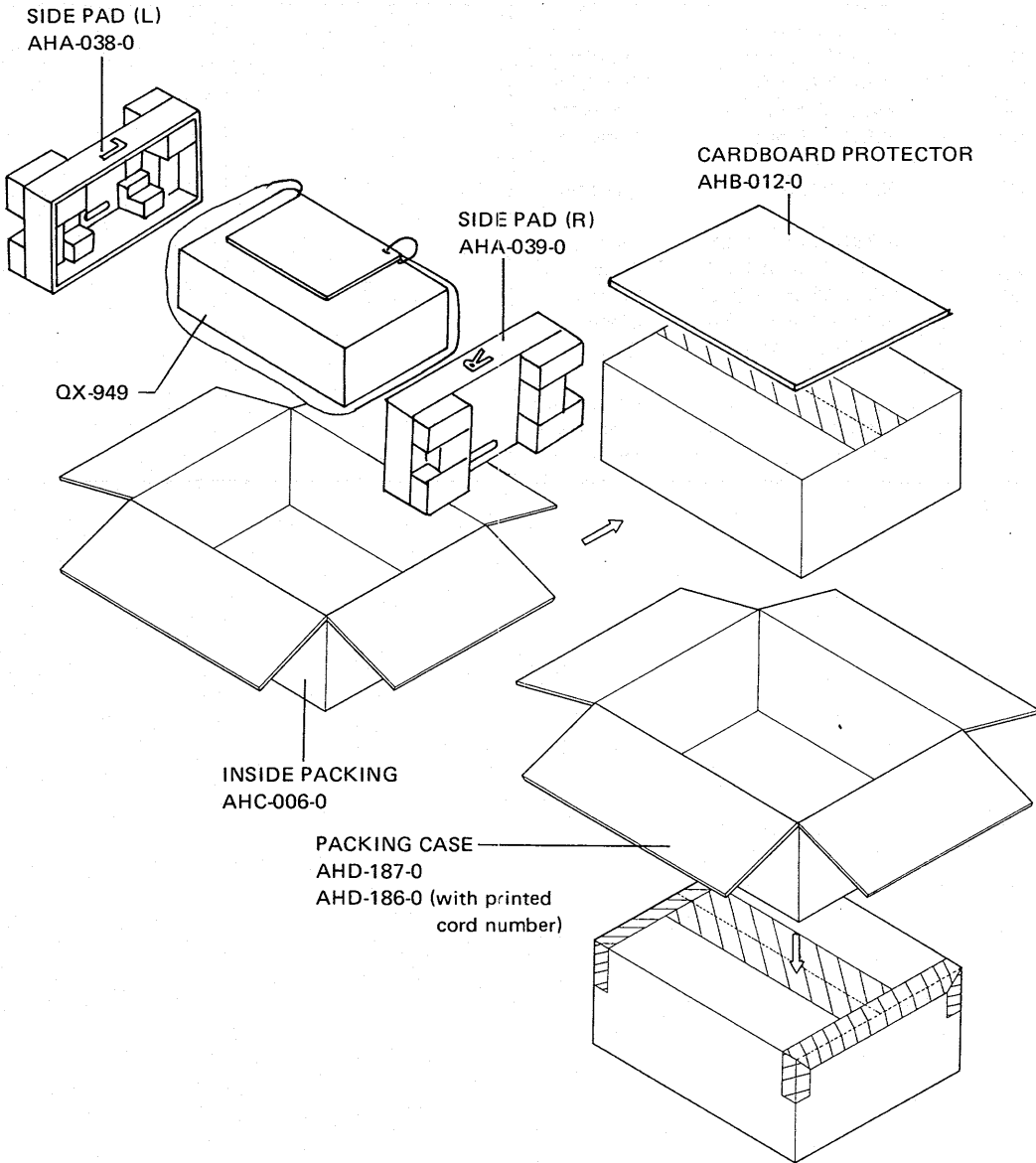
### RESISTORS

Symbol	Description			Part No.
R1	Carbon film	18		RD¼PM 180J
R2	Carbon film	68		RD¼PM 680J
R3	Wire wound	180	5W	RT5B 181K
R4	Carbon film	5.6k		RD¼PM 562J
R5	Carbon film	10k		RD¼PM 103J
R6	Carbon film	3.3k		RD¼PM 332J
R7	Carbon film	36k		RD¼PM 363J
R8	Carbon film	30k		RD¼PM 303J
R9	Carbon film	3.3k		RD¼PM 332J
R10	Carbon film	5.6k		RD¼PM 562J
R11	Carbon film	2.2k		RD¼PM 222J
R12	Carbon film	33k		RD¼PM 333J
R13	Carbon film	15k		RD¼PM 153J
R14	Carbon film	4.7k		RD¼PM 472J
R15	Carbon film	1.5		RD¼PM 1R5J

**SEMICONDUCTORS**

Symbol	Description		Part No.
Q1	2SD313P-E or D	Transistor	
Q2	2SC1318-Q or R	Transistor	
Q3	2SC945-R or Q	Transistor	
Q4	2SD313P-E or D	Transistor	
Q5	2SB507P-E or D	Transistor	
Q6	2SA720-Q or R	Transistor	
D1	SIB01-01 or 1S1885	Diode	
D2	SIB01-02 or 1S1886	Diode	
D3	SIB01-02 or 1S1886	Diode	
D4	SIB01-02 or 1S1886	Diode	
D5	SIB01-02 or 1S1886	Diode	
D6	WZ-130	Zener diode	
D7	WZ-140	Zener diode	
D8	WZ-130	Zener diode	

# 13. PACKING METHOD AND PART NUMBERS



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