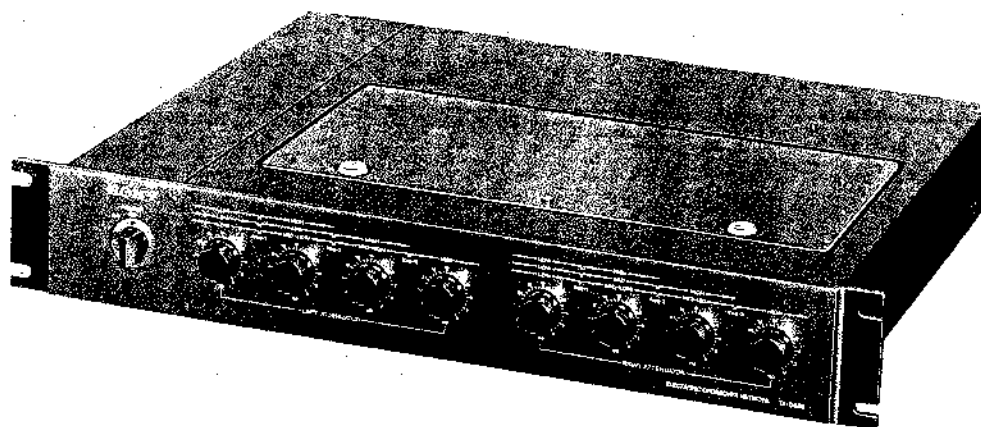


TA-D88B

Canadian Model
AEP Model



ELECTRONIC CROSSOVER NETWORK

General

SPECIFICATIONS

Power Requirements: 120 V ac~, 60 Hz (Canadian Model)
110 V, 120 V, 220 V, or
240 V ac~, 50/60 Hz (AEP model)

Power Consumption: 20 watts

Dimensions: Approx.
480 (w) x 80 (h) x 365 (d) mm
18 7/8 (w) x 3 1/8 (h) x 14 3/8 (d) inches
Including projection parts and controls.

Weight: Approx. 7.4kg, 16 lb 5 oz, net
Approx. 9.5kg, 20 lb 15 oz, in shipping
carton

System: Filter characteristics: 24 dB-per-octave
Bessel function high-pass and low-pass
Buffer amp: DC amp

Crossover Frequency: UNIT 1: 140 Hz, 225 Hz, 280 Hz
UNIT 2: 500 Hz, 800 Hz, 1 kHz
UNIT 3: 1.25 kHz, 2 kHz, 2.5 kHz
UNIT 4: 5 kHz, 8 kHz, 10 kHz

Bandpass Gain: 0 dB

Inputs: 1 volt rated/7 volts maximum, 50 k ohms

Outputs: 1 volt rated/7 volts maximum, 100 ohms

Harmonic Distortion: Less than 0.003 % at 1 volt output
Less than 0.005 % at 5 volts output

Signal-to-Noise Ratio: Better than 110 dB (1 volt rated input, short-circuited input, weighting network A)

Frequency Response: DC-100 kHz $\begin{matrix} +0 \\ -1 \end{matrix}$ dB

ATTENTION AU COMPOSANT AYANT RAPPORT
À LA SÉCURITÉ !

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET
UNE MARQUE \triangle SUR LES DIAGRAMMES SCHÉ-
MATIQUES, LES VUES EXPLOSÉES ET LA LISTE
DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ
DE FONCTIONNEMENT. NE REMPLACER CES
COMPOSANTS QUE PAR DES PIÈCES SONY DONT
LES NUMÉROS SONT DONNÉS DANS CE MANUEL
OU DES SUPPLÉMENTS PUBLIÉS PAR SONY.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND \triangle
MARK ON THE SCHEMATIC DIAGRAMS, EXPLODED
VIEWS AND IN THE PARTS LIST ARE CRITICAL TO
SAFE OPERATION. REPLACE THESE COMPONENTS
WITH SONY PARTS WHOSE PART NUMBERS APPEAR
AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS
PUBLISHED BY SONY.

SONY[®]

SERVICE MANUAL

• **MODEL IDENTIFICATION**
— Specification Label —

Canadian model

SONY
ELECTRONIC CROSSOVER NETWORK
MODEL NO TA-D88B
SERIAL NO
AC 120V 60Hz 20 W
MADE IN JAPAN

AEP model

SONY
ELECTRONIC CROSSOVER NETWORK
MODEL NO TA-D88B
SERIAL NO
AC 220V 20 W
50/60Hz
MADE IN JAPAN

SECTION 1
OUTLINE

1-1. CIRCUIT DESCRIPTION

The TA-D88B is an electronic crossover network designed for use in multi-amplifier stereo systems. The input audio signal is divided into a number of different frequency bands, each band being amplified independently and passed on to individual speakers. See fig. 3 for an outline of the circuit diagram.

Each set of crossover frequency filters have been incorporated into separate plug-in type units. Suitable crossover frequencies for a wide range of speakers available on the market may be set by plugging in an appropriate combination of the 4 different units.

The crossover frequency of each unit is determined by the capacitance of the filters, and the frequency selector switches S1-S4. For 2-way to 4-way multi-amplifier systems, the crossover frequencies are set by adjusting S1-S4, and by rearranging the filter units in accordance with the crossover frequencies of the speakers employed. Levels are also adjusted to match the efficiency of each speaker.

Note that the following description refers to a 4-way multi-amplifier system.

1. Pre-buffer Amplifier Stage (see Fig. 1)

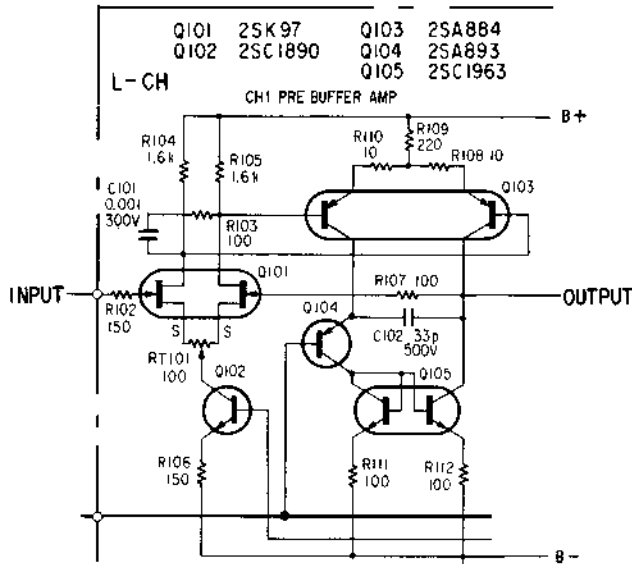


Fig. 1

The purpose of the pre-buffer amplifier (Q101-Q105) is to eliminate the influence of the preamplifier and connecting cord upon the filters. With 100% negative feedback applied to the first-stage differential amplifier (Q101) by resistor R107 (100 Ω), the pre-buffer amplifier has high input impedance and low

output impedance. In addition, a current-mirror loaded 2-stage differential amplifier structure reduces distortion to a very low level. Furthermore, in order to make the low channel amplifier a pure DC amplifier employing no coupling capacitors, a dual FET differential amplifier which suppresses DC drift has been used in the first stage (Q101). Dual transistors have also been used in the second stage differential amplifier (Q103) and current mirror (Q105) to further suppress DC drift. By connecting the base of Q104 to ground, the collector voltage of the PNP transistor on the left hand side of Q103 is reduced to almost 0V, thereby equalizing the collector voltage of both PNP transistors in Q103. The dual transistor P_c (power input dc to collector) are therefore very much the same, resulting in the amount of drift in both sides being balanced. The impedance-converted signal is then passed from the pre-buffer amplifier to CH1-CH4 where it is divided into 4 different frequency bands.

2. LOW Channel Stage (CH-1)

The low-pass filters employed in this stage achieve a very sharp cut-off slope of 24 dB/oct (12 dB/oct at filter 1-1 and again at filter 1-2). (See Fig. 3-1).

Each low-pass filter buffer amplifier has a high input impedance and low output impedance current-mirror loaded 2-stage differential amplifier, similar to the pre-buffer amplifier (Q101-Q105). The crossover frequency is selected by the freq-1 switch (S1), thereby defining the f₁ frequency band.

The filter output signal is then passed via the level adjustment control (RV601) on to the output buffer amplifier (Q106-Q110) where the impedance is again converted, and finally appearing on the J102 output terminal. The role of this output buffer amplifier is not to change the crossover-frequency and the input impedance of the power amplifier.

TA-D88B TA-D88B

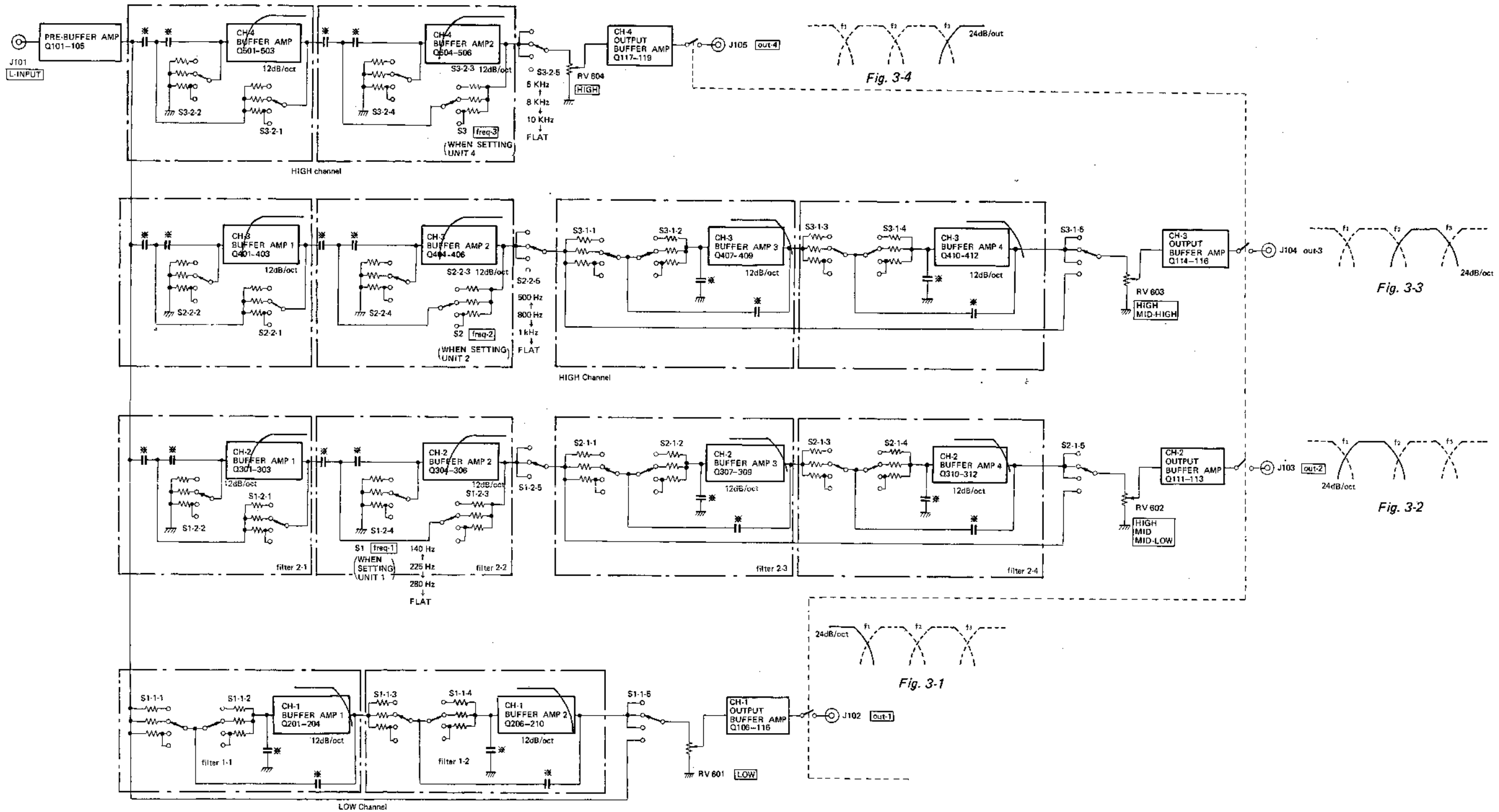


Fig. 3

The capacitance values marked * are decided by setting the units 1 to 4.

6. Muting Circuit (Fig. 4)

By activating a relay circuit, the muting circuit disconnects the signal line, and thereby prevents the appearance of any signals at the output terminals when the power switch is turned on and off. The "pop" noises generated at this time are therefore completely silenced. Note that this muting circuit is designed to close the signal line when the muting relays (RY1-RY8) are "on".

In addition, whenever the frequency response select cover is opened to exchange filter units, S7 is switched off, and again preventing the appearance of any signals at the output terminals.

1) When the power switch is turned on

(a) As soon as the power switch is turned on, both B+ and B- will commence to "charge up". C810 will also commence to charge up, requiring 2 to 3 seconds (as determined by the R803/C810 time constant) to be fully charged. During this period Q801 and Q802 will remain off, thereby keeping the muting relays (RY1-RV8) off as well. Therefore, no signals will appear at the output

terminals, effectively muting out the power switching noise.

(b) 2 to 3 seconds after turning the power switch on, the potential on the base of Q801 reaches "on" potential, resulting in this transistor turning on.

(c) As soon as Q801 is turned on, Q802 is also turned on, resulting in muting relays (RY1-RY8) being turned on, and the output signals appear at the output terminals.

2) When the power switch is turned off

(a) At the same time that the power switch is turned off, the positive potential which had been applied to the cathode of D803 via D802 decreases, resulting in the D803 diode being turned on by the forward biasing.

(b) The charge on C810 is consequently discharged via D803 and R802, resulting in Q801 and Q802 both being turned off. The muting relays are also turned off, preventing any output signals from appearing at the output terminals. The "pop" noise generated when the power switch is turned off is also effectively muted.

3) When the frequency response select cover is opened (Fig. 5).

When the frequency response select cover is opened, S7 is turned off, thereby cutting off the voltage being applied to the muting relays (RY1-RY8). These relays are therefore turned off, and no signals will appear at the output terminals. So none of the noise generated when exchanging units will reach the speakers.

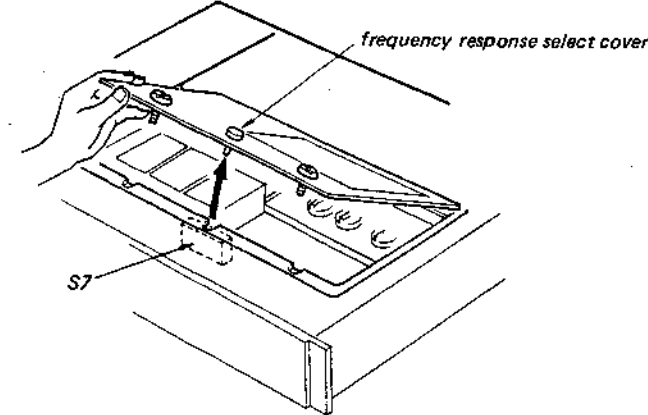


Fig. 5

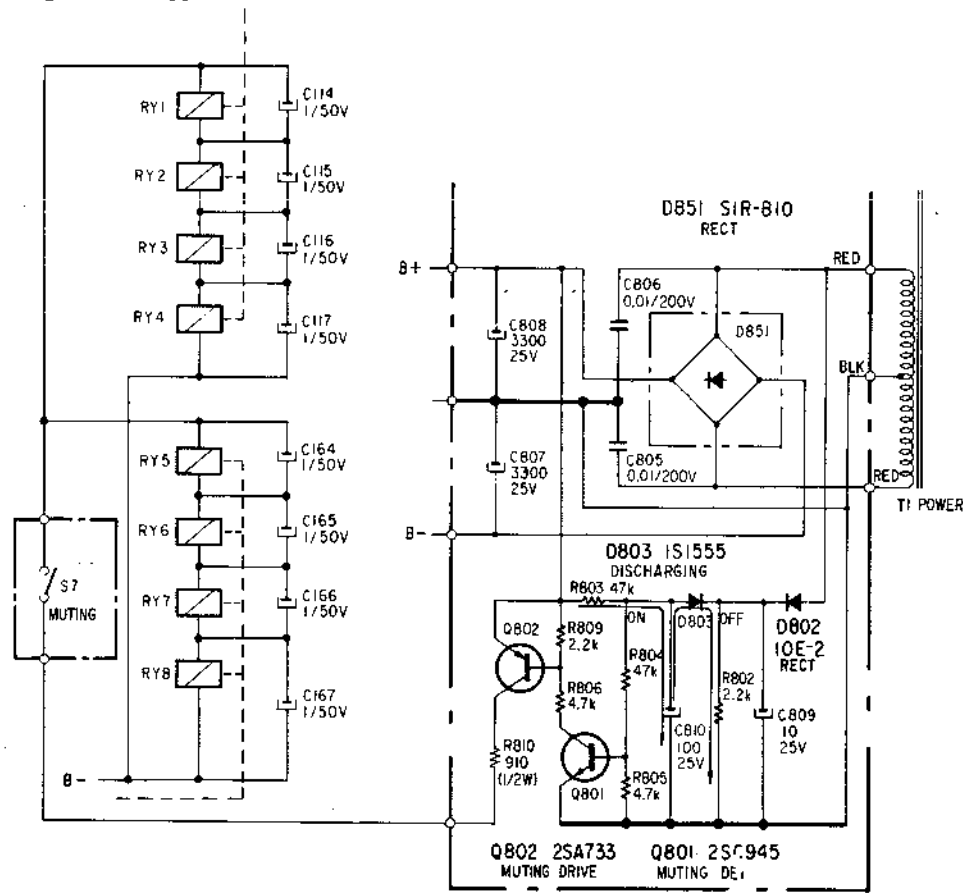
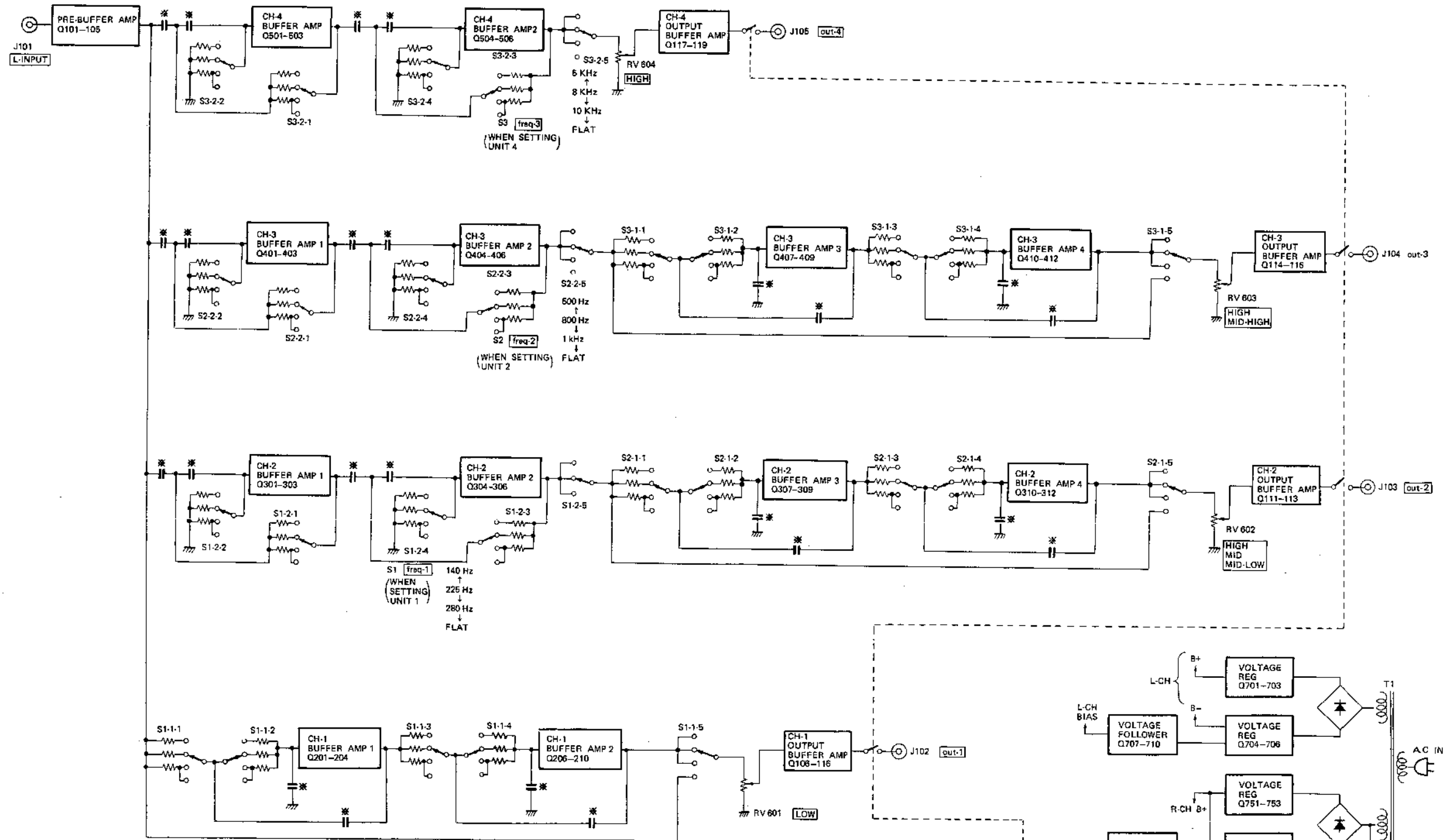
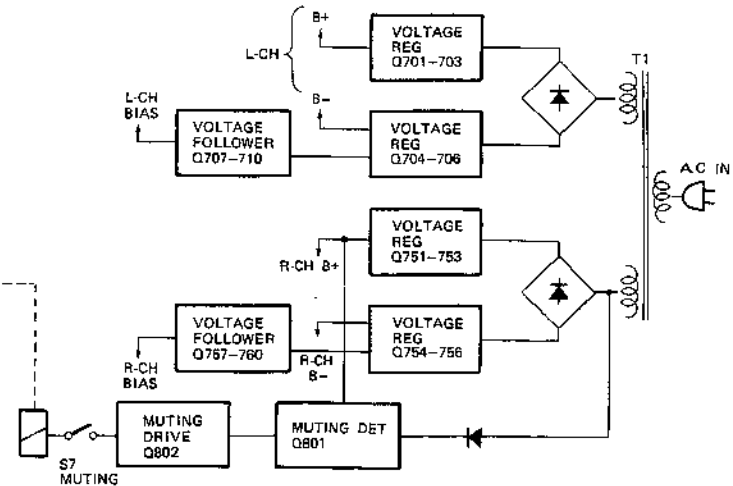


Fig. 4

1-2. BLOCK DIAGRAM



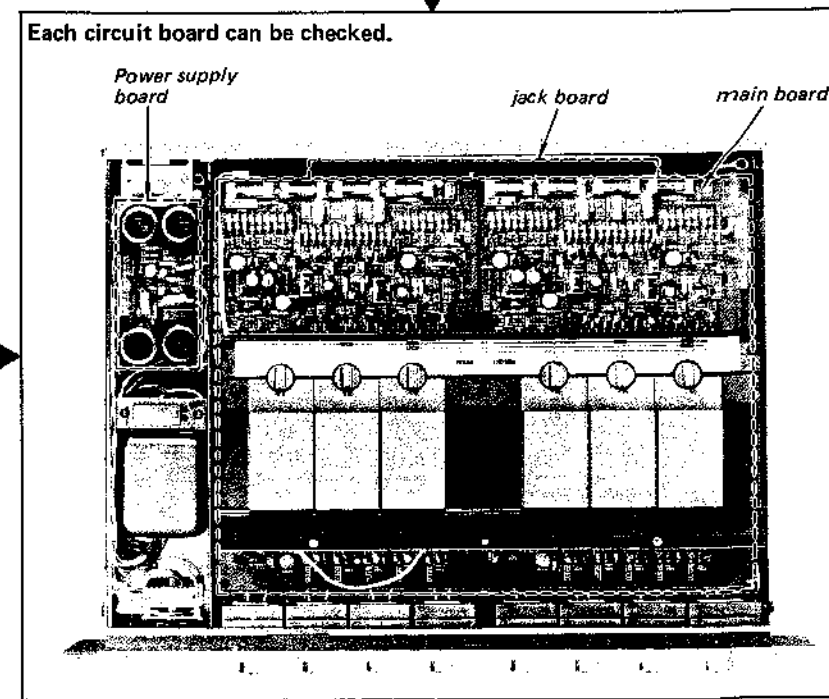
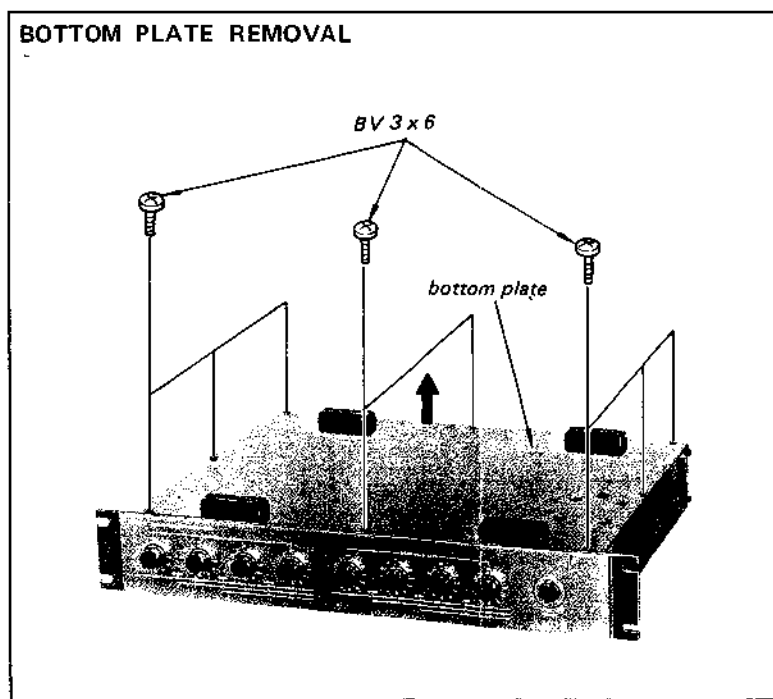
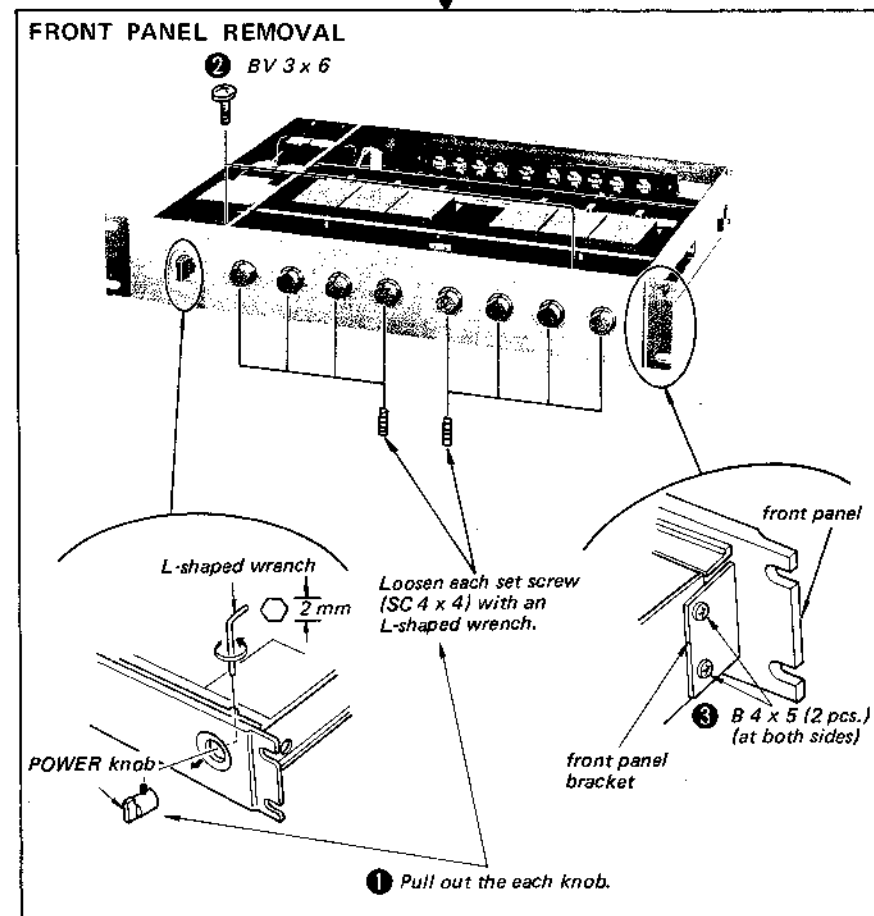
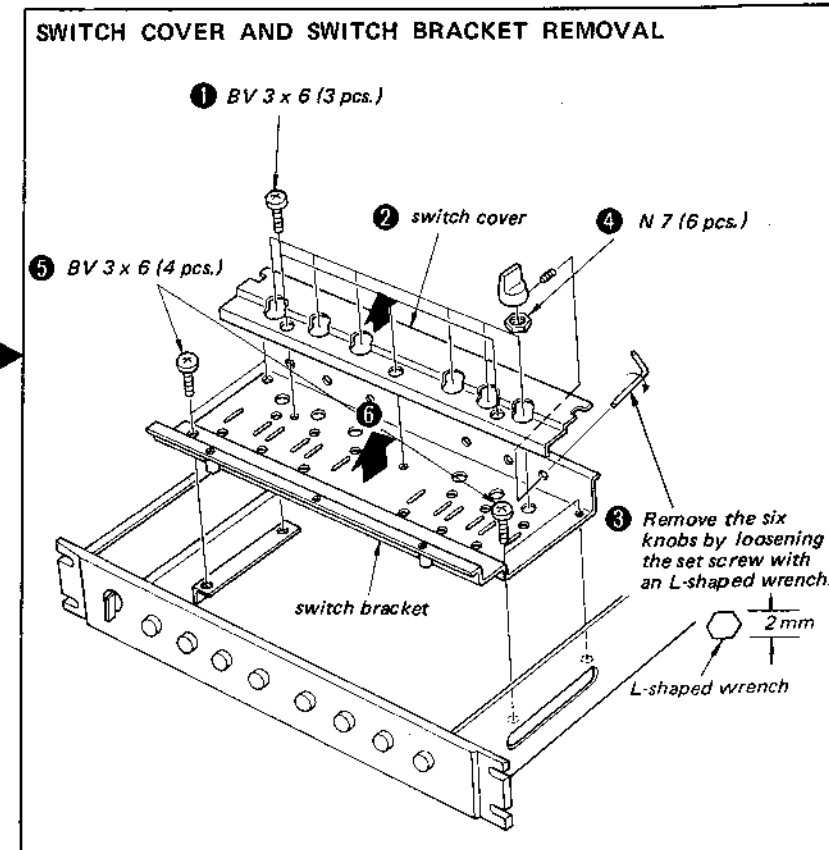
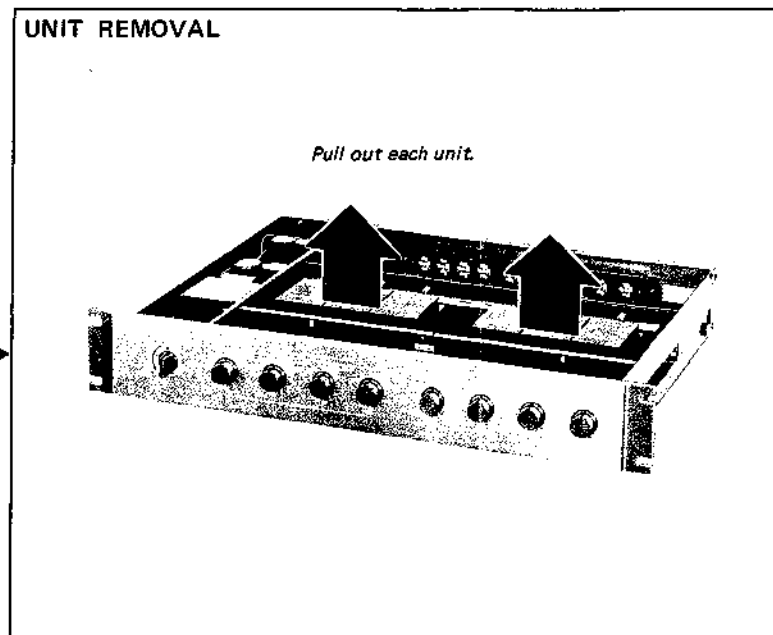
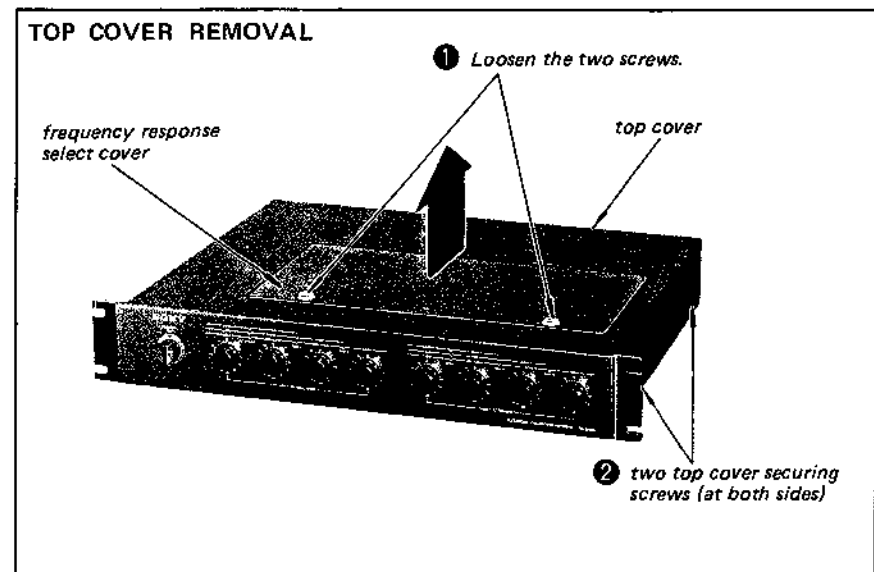
The capacitance values marked ※ are decided by setting the units 1 to 4.



SECTION 2
DISASSEMBLY

2-1. REMOVAL

Note: Follow the disassembly procedure in the numerical order given.



**SECTION 3
ADJUSTMENTS**

OFFSET ADJUSTMENT

● **Settings**

POWER switch: ON
LEFT, RIGHT ATTENUATOR: 0 dB (MAX)

● **Procedure**

1. Short-circuit both INPUT jacks.
2. Adjust each adjustable resistor in the numerical order (① - ④) so that the VOM reads 0 V at each test point (TP1-8).

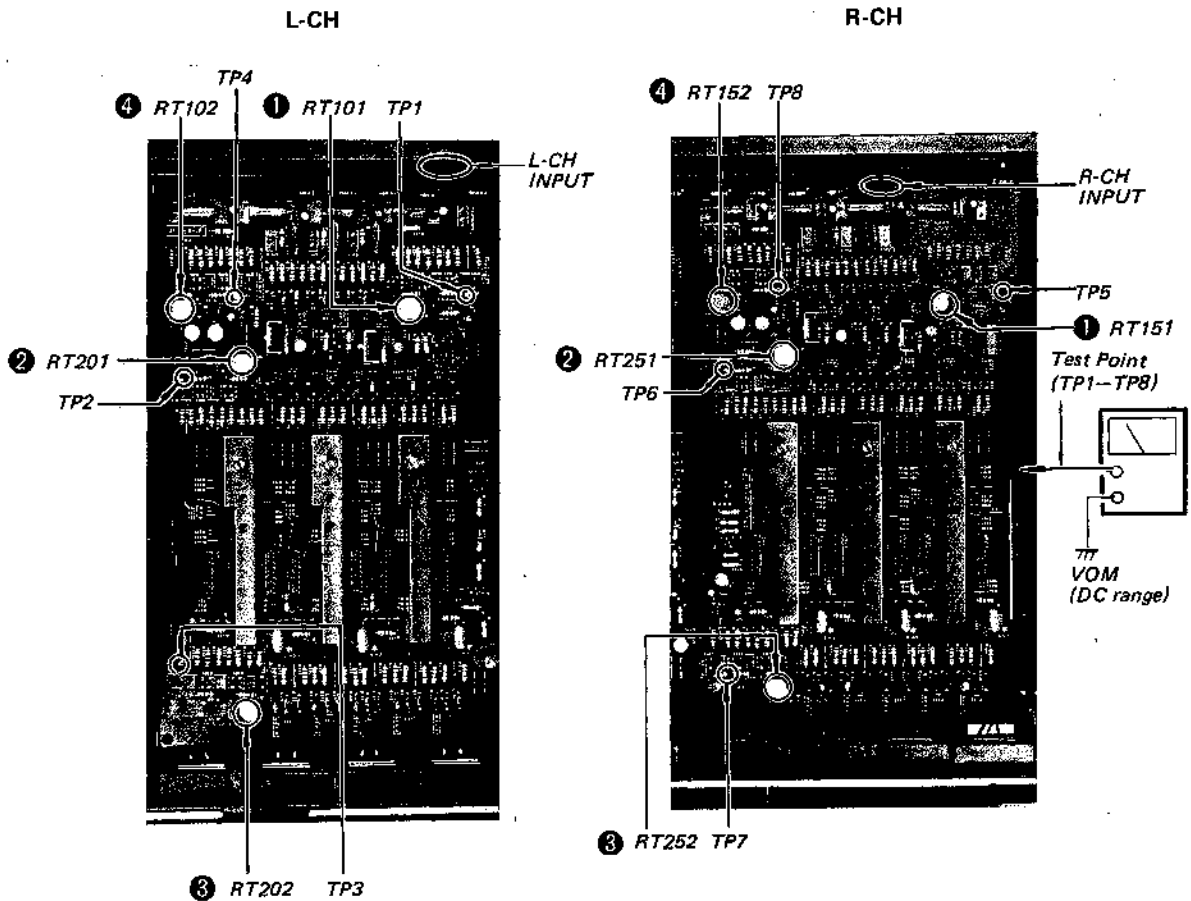
L-CH

- ① RT101 (TP1)
- ② RT201 (TP2)
- ③ RT202 (TP3)
- ④ RT102 (TP4)

R-CH

- ① RT151 (TP5)
- ② RT251 (TP6)
- ③ RT252 (TP7)
- ④ RT152 (TP8)

Specification: 0 V ± 0.1 mV



MUTING TIME CHECK

Check the operation of each relay (RY1-RY8).

1. POWER Switch ON

Two or three seconds after turning the power switch on, RY1-RY8 are energized.

2. POWER Switch OFF

RY1-RY8 are released at the moment POWER switch is turned off.

SECTION 4 DIAGRAMS

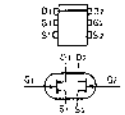
4-1. MOUNTING DIAGRAM

— Conductor Side —

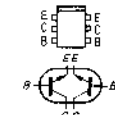
• Replacement Semiconductors

For replacement, use semiconductors except in ().

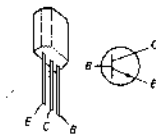
Q101, 151 } : 2SK97
Q106, 156 }
Q201, 251 }
Q206, 256 }



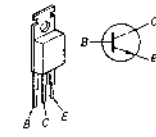
Q105, 155 } : 2SC1963
Q110, 160 }
Q205, 255 }
Q210, 260 }



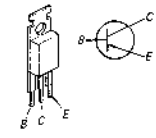
Q102, 152 } : 2SC926A
Q107, 157 }
Q112, 162 }
Q115, 165 }
Q118, 168 }
Q202, 252 }
Q207, 257 }
Q302, 352 }
Q305, 355 }
Q308, 358 }
Q311, 361 }
Q402, 252 }
Q405, 455 }
Q408, 458 }
Q411, 461 }
Q502, 552 }
Q505, 555 }
Q703, 753 }
Q708, 758 }
Q709, 759 }
Q710, 760 }



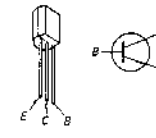
Q701, 751: 2SC1173



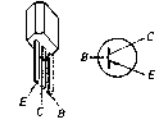
Q706, 756: 2SA473



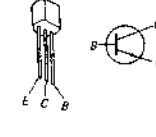
Q801: 2SC1364 (2SC945)



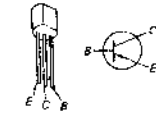
Q802: 2SA678



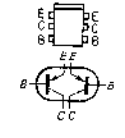
(2SC1890)



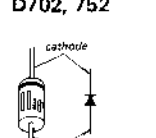
(2SA733)



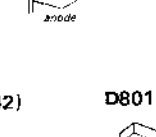
Q103, 153 } : 2SA884
Q108, 158 }
Q203, 253 }
Q208, 258 }



D701, 751: EQB01-16 (EQA01-16R)

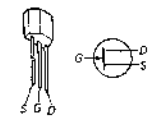


D702, 752: EQB01-16 (EQA01-16R)

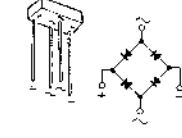


Q111, 161 } : 2SK42-4 (2SK42)
Q114, 164 }
Q117, 167 }
Q301, 351 }
Q304, 354 }
Q307, 357 }
Q310, 360 }
Q401, 451 }
Q404, 454 }
Q407, 457 }
Q410, 460 }
Q501, 551 }
Q504, 554 }

Q702, 752 } : 2SK42-2 (2SK42)
Q705, 755 }
Q707, 757 }

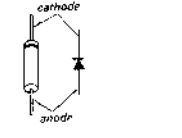


D801, 851: 1S1RB10

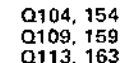


D802: 10E2

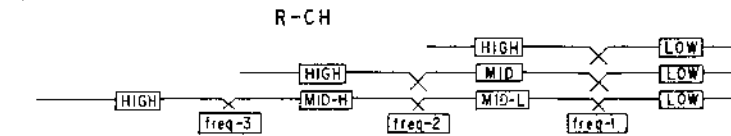
D803: 1S1555



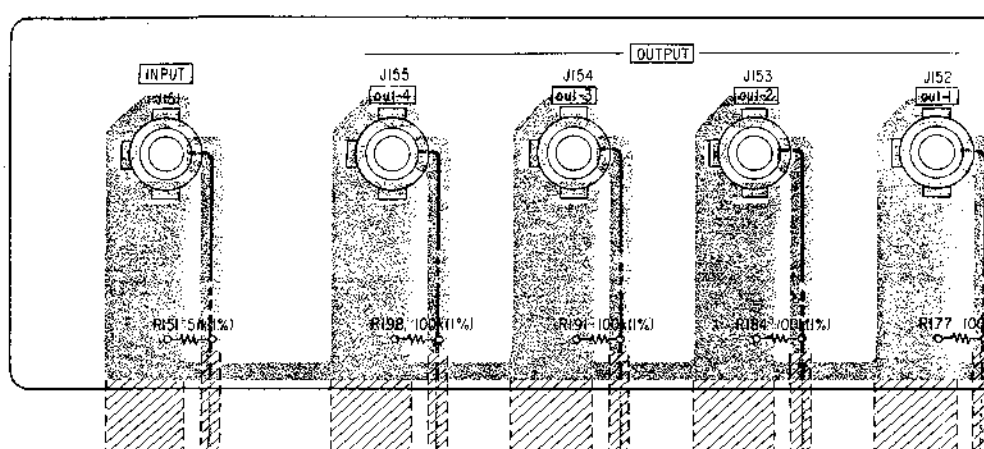
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Q109, 159 }
Q113, 163 }



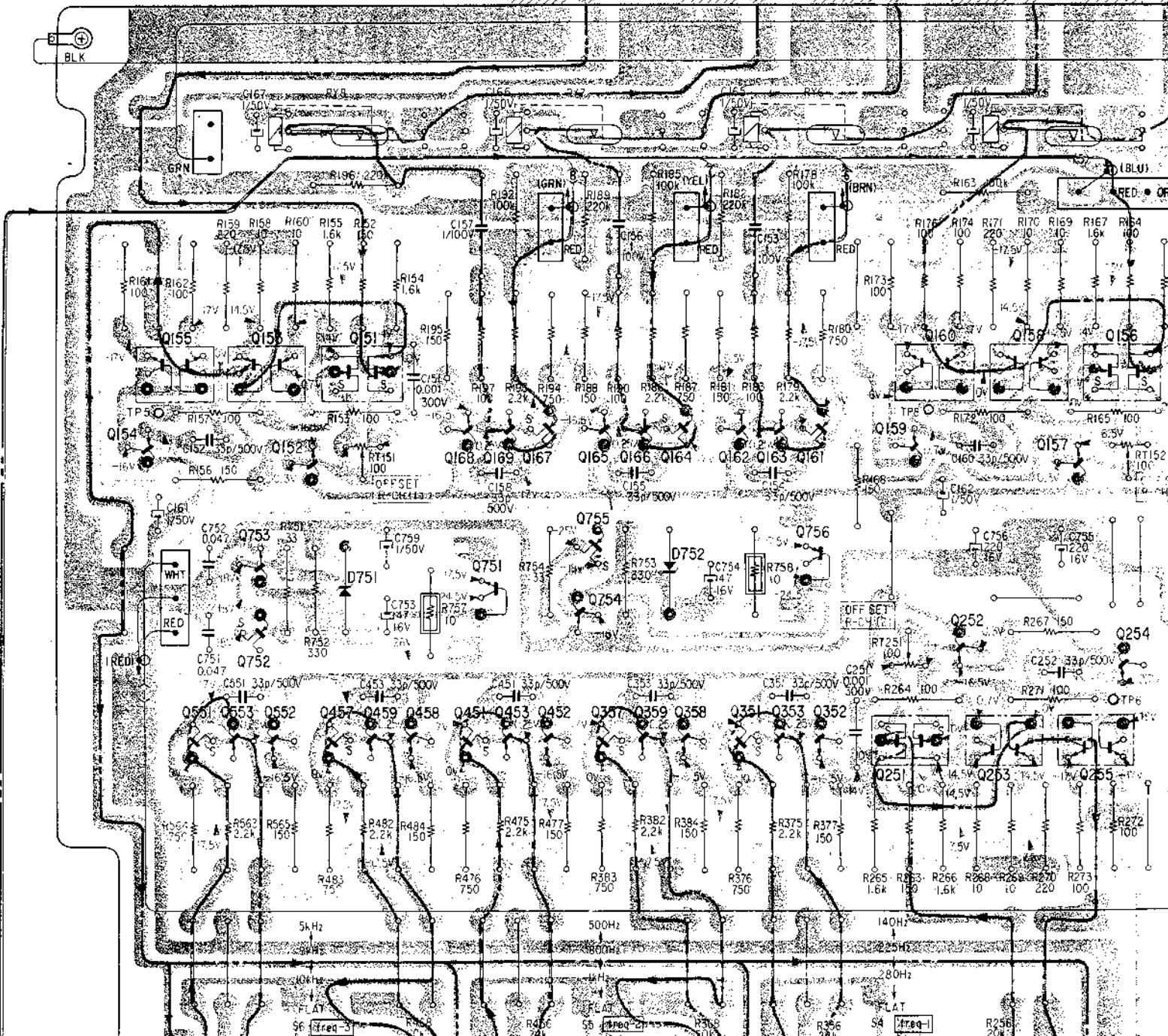
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	801, 802
753, 755, 756	703, 705, 706
751	754
	701
	704
	751
	702
	752
	801
	202, 204
	252, 254
551, 553, 552, 457, 459, 458, 451, 453, 452, 357, 359, 358, 351, 353, 352, 251, 253, 255	501, 503, 502, 407, 409, 408, 401, 403, 402, 307, 309, 308, 301, 303, 302, 201, 203, 205
	707
	709



[JACK BOARD]



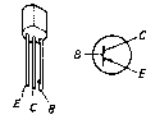
[MAIN BOARD]





- Q104, 154
- Q109, 159
- Q113, 163
- Q116, 166
- Q119, 169
- Q204, 254
- Q209, 259
- Q303, 353
- Q306, 356
- Q309, 359
- Q312, 362
- Q403, 453
- Q406, 456
- Q409, 459
- Q412, 462
- Q503, 553
- Q506, 556
- Q704, 754

2SA639S
(2SA893)



- Note:
- : parts extracted from the component side.
 - : parts extracted from the conductor side.
 - : nonflammable resistor.
 - with a dot : B + pattern
 - with a dash : B - pattern

707

709

757

759

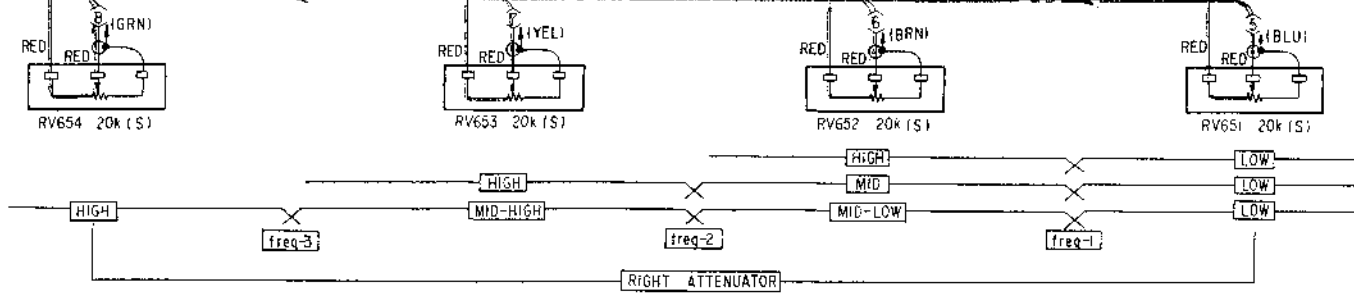
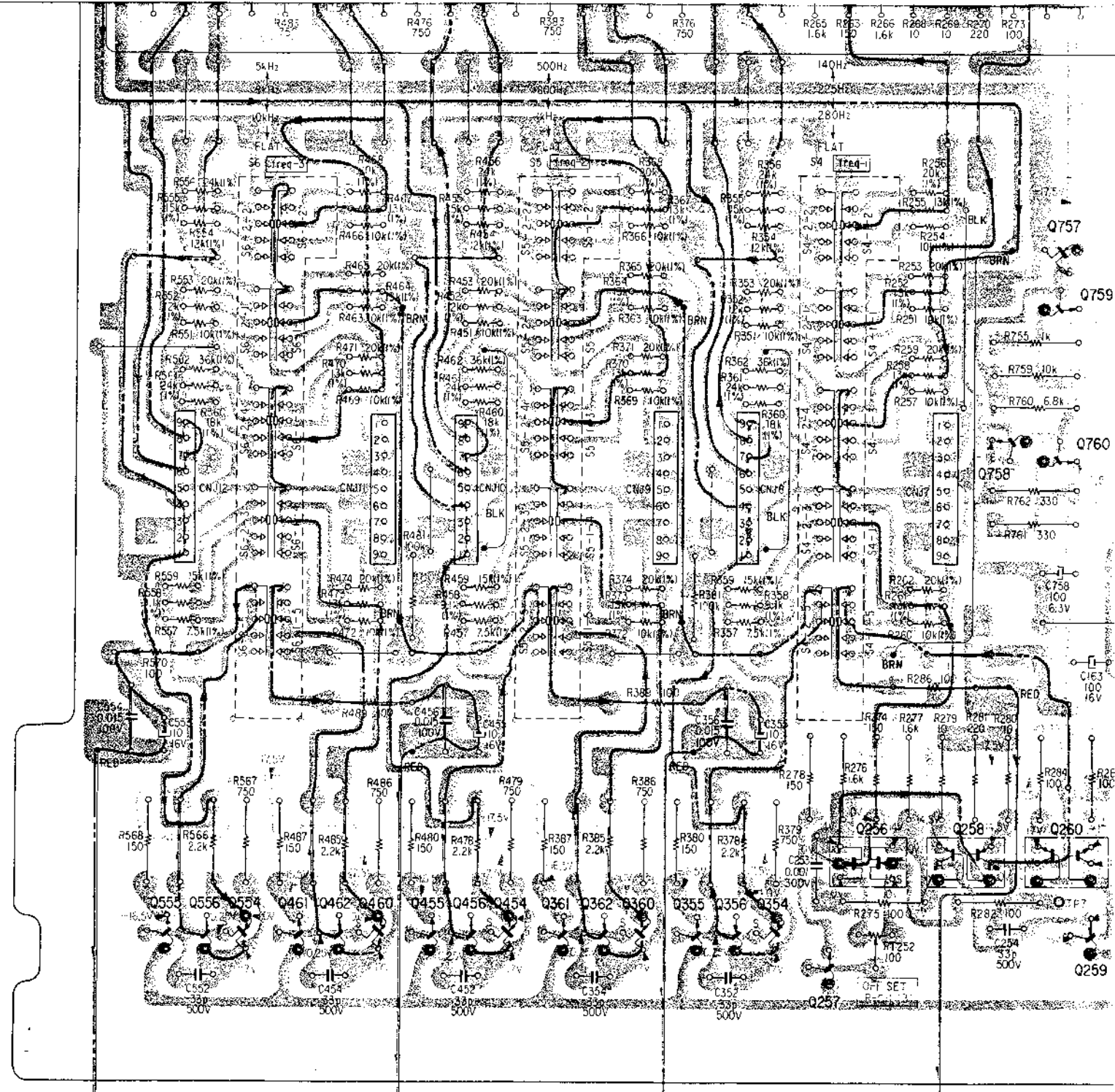
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710, 708

256, 258, 260

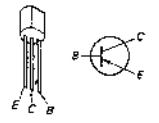
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- Q104, 154
 - Q109, 159
 - Q113, 163
 - Q116, 166
 - Q119, 169
 - Q204, 254
 - Q209, 259
 - Q303, 353
 - Q306, 356
 - Q309, 359
 - Q312, 362
 - Q403, 453
 - Q406, 456
 - Q409, 459
 - Q412, 462
 - Q503, 553
 - Q506, 556
 - Q704, 754
- : 2SA639S
(2SA893)



- Note:
- — : parts extracted from the component side.
 - — : parts extracted from the conductor side.
 - ⊞ : nonflammable resistor.
 - ⊞ : B + pattern
 - ⊞ : B - pattern

707

709

757

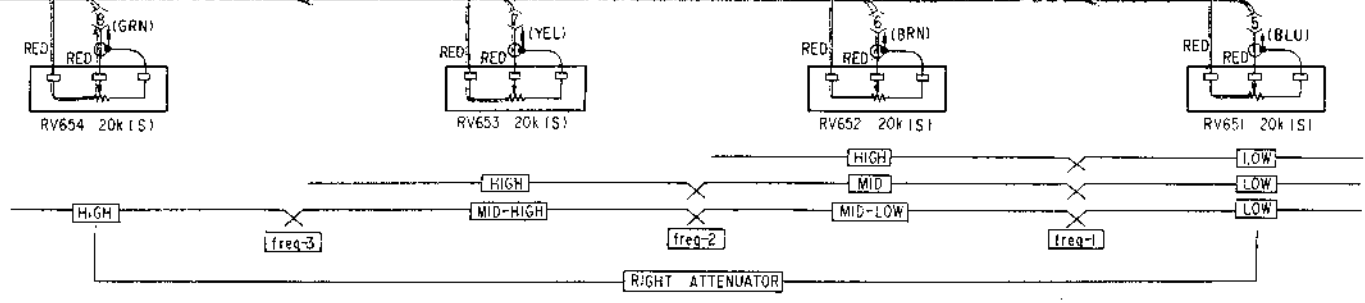
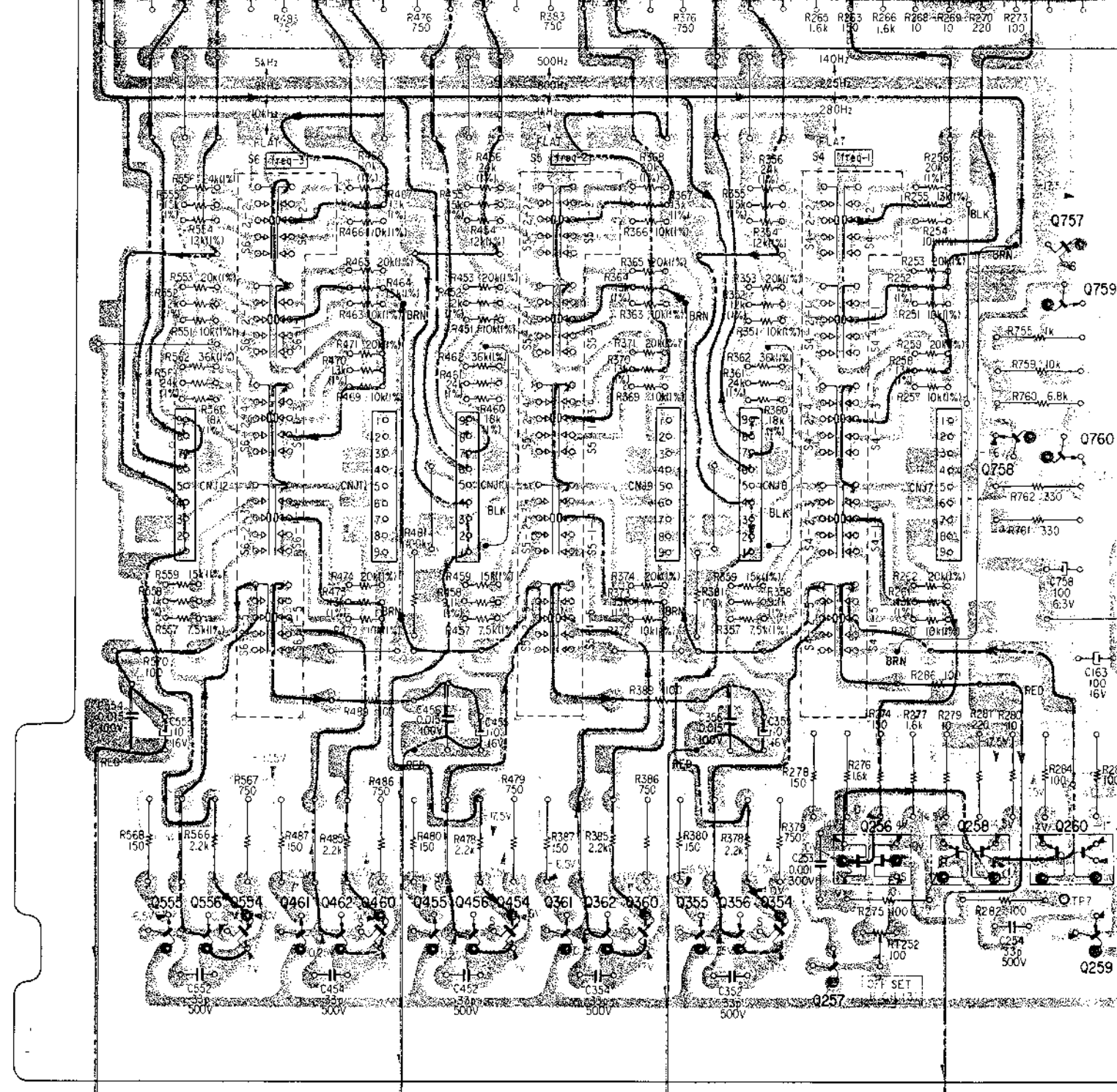
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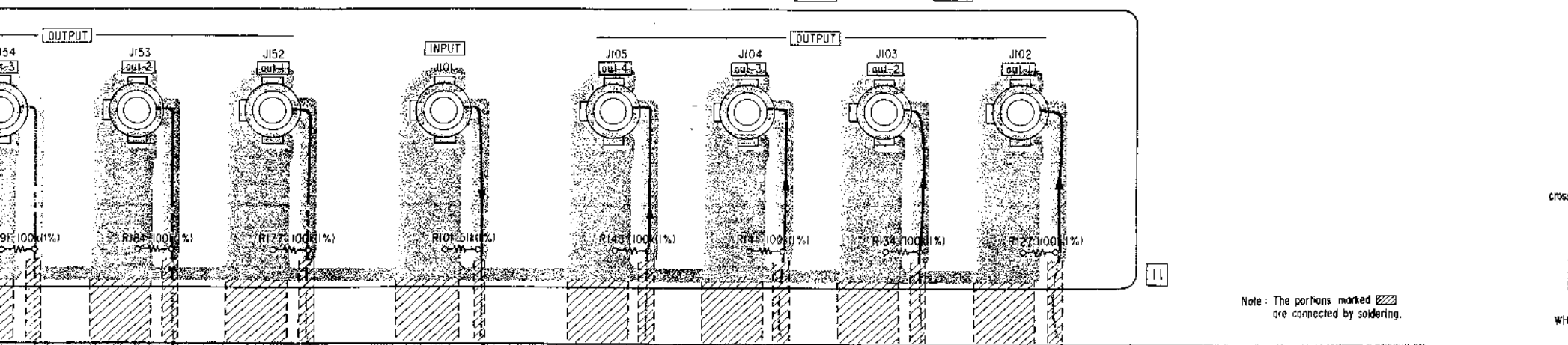
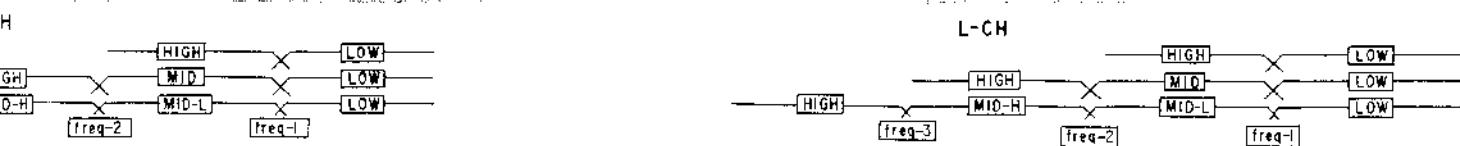
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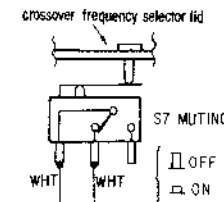
256, 258, 260 206, 208, 210

555, 556, 554, 461, 462, 460, 455, 456, 454, 361, 362, 360, 355, 356, 354, 257, 259
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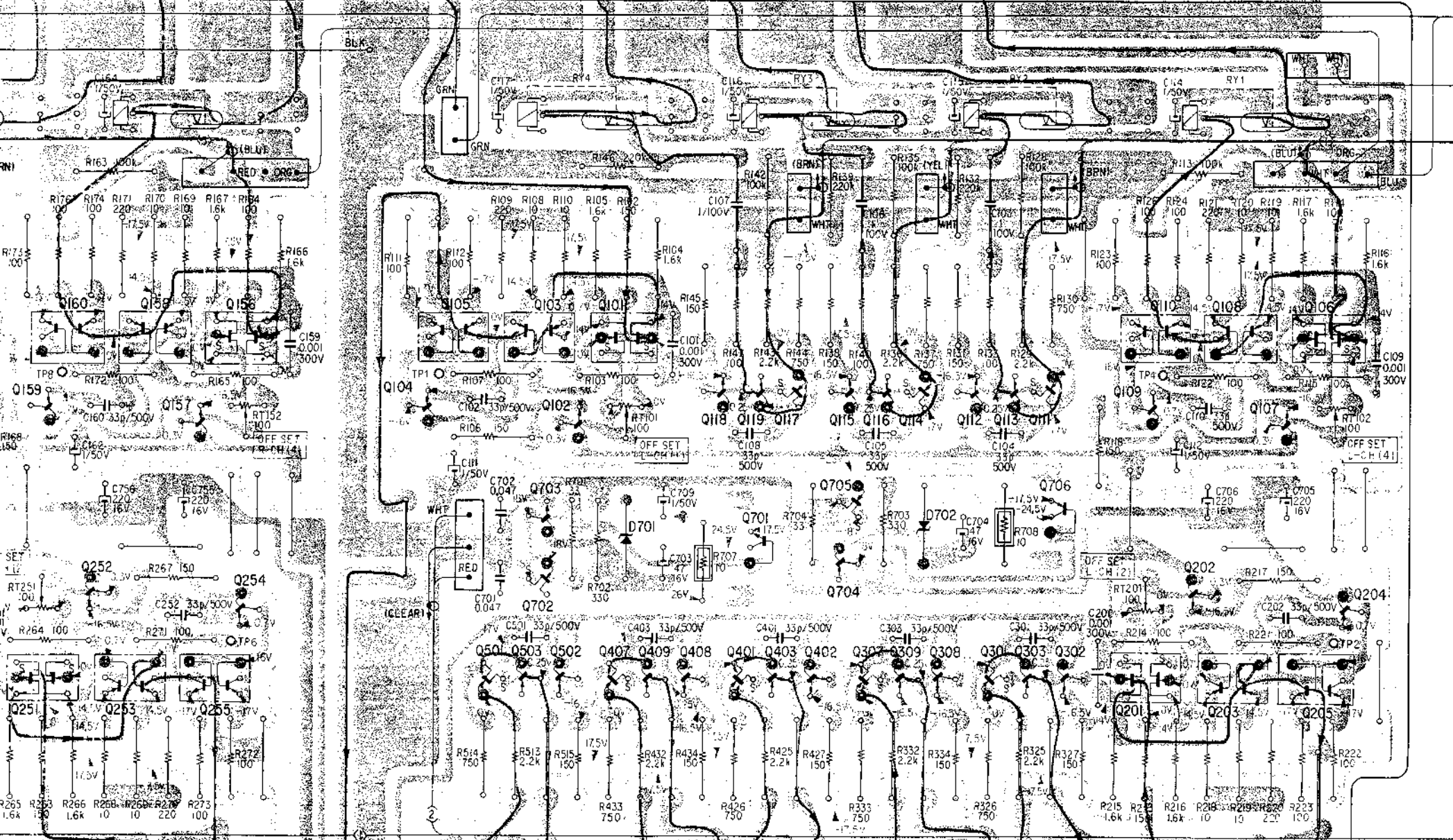




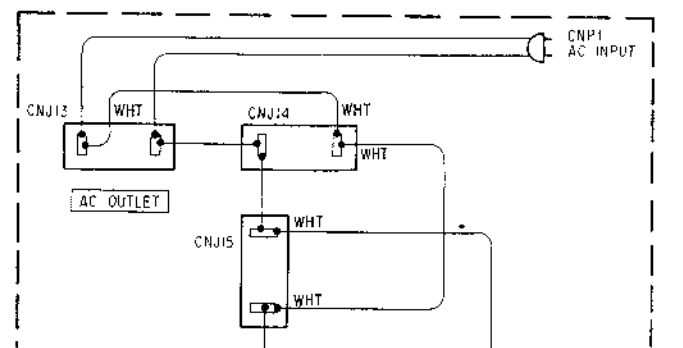
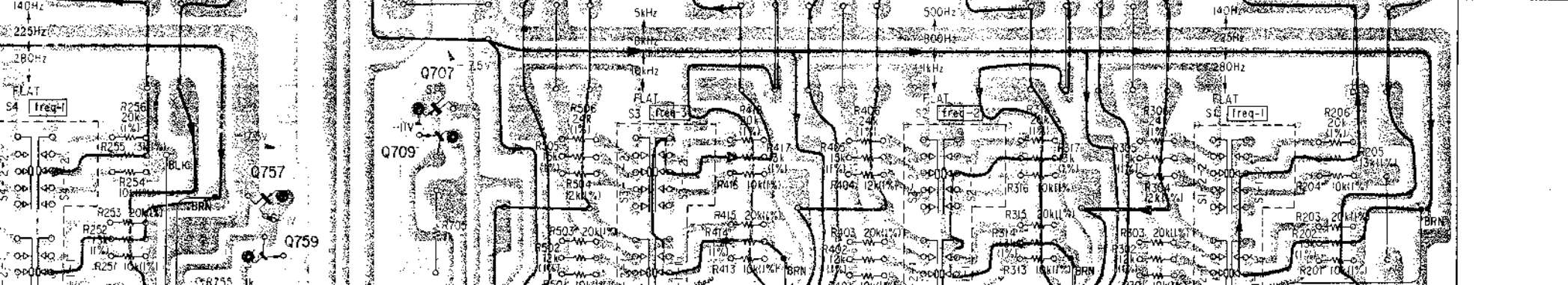
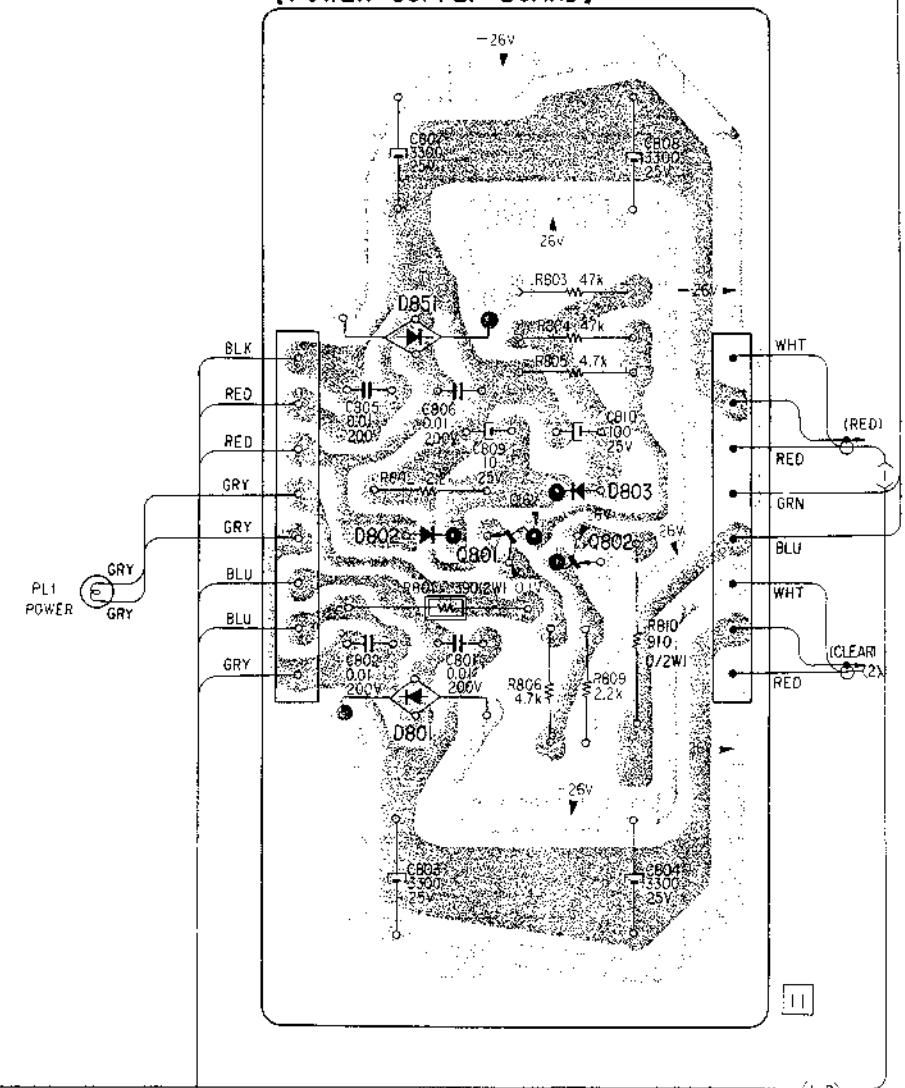
Note: The portions marked are connected by soldering.

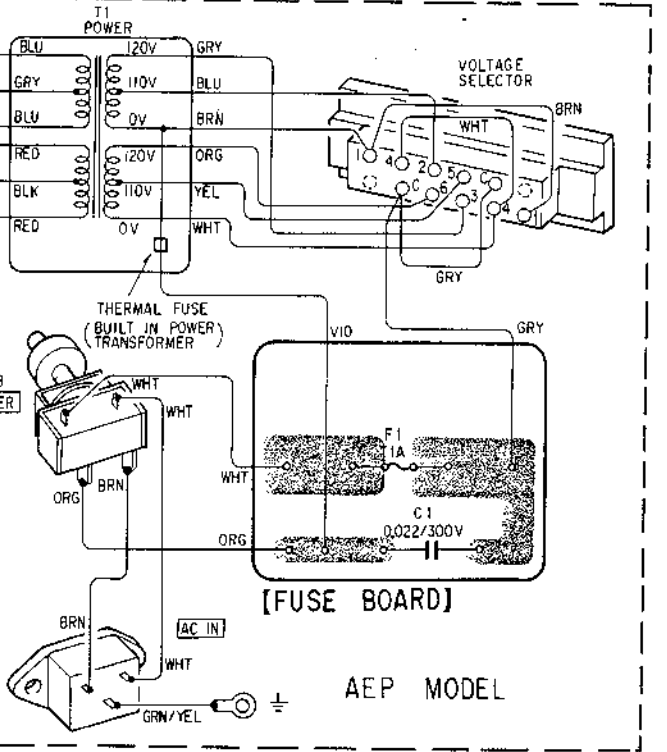
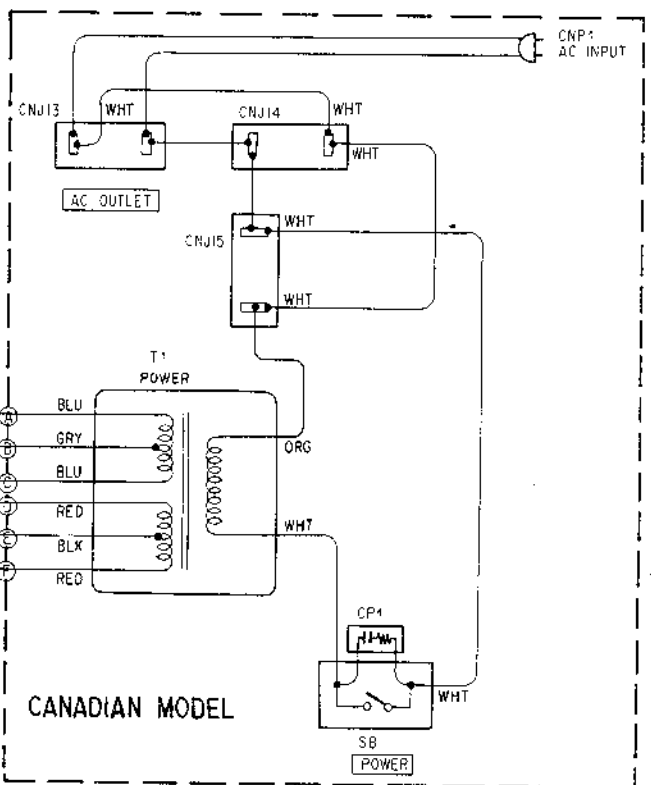
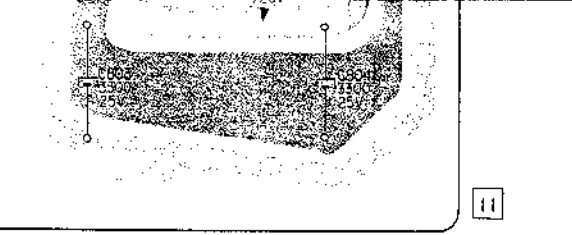
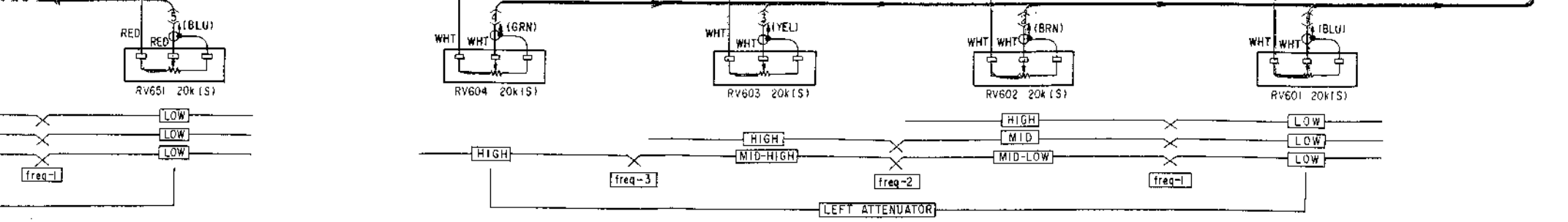
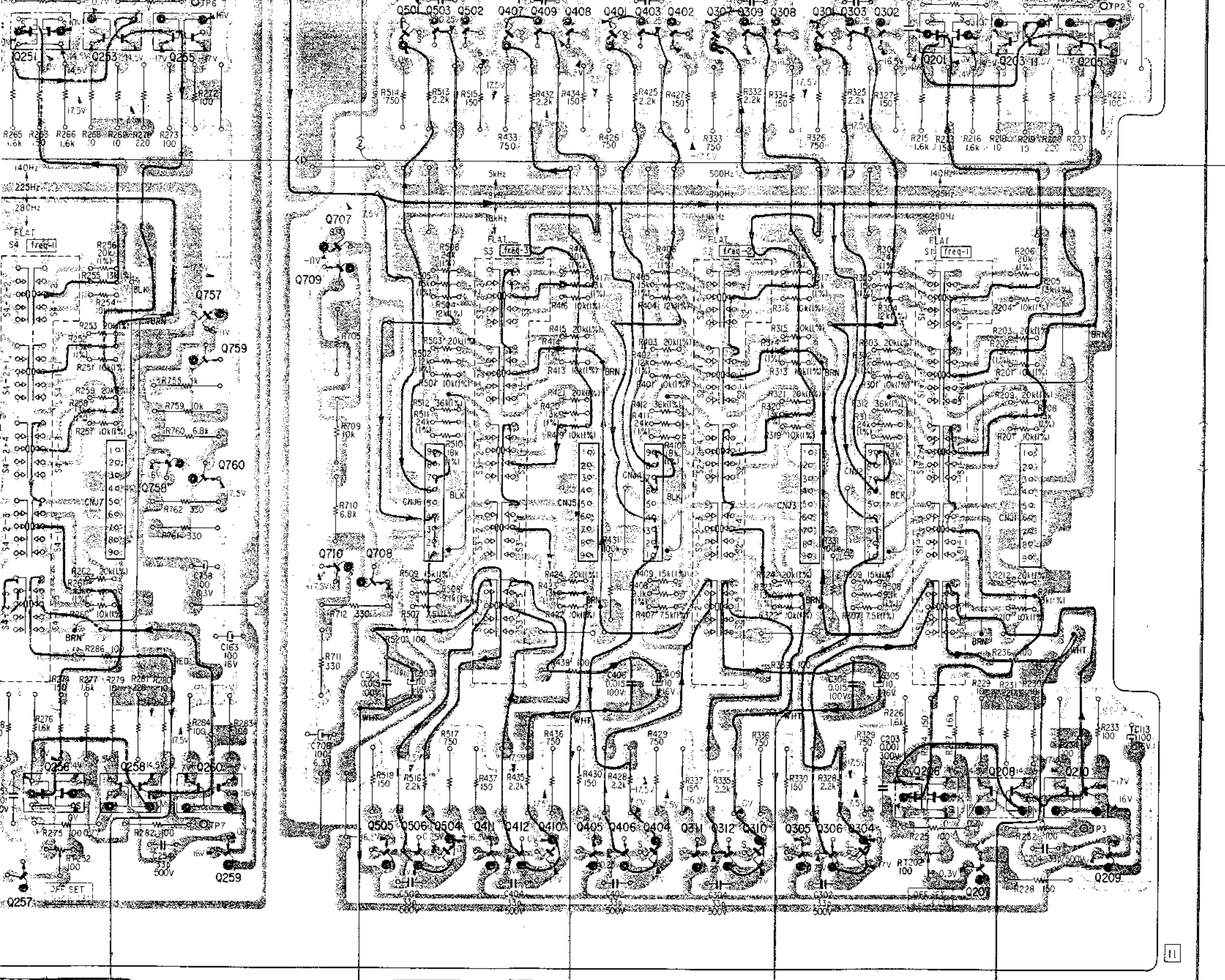


The input signal is muted by removing the crossover frequency selector lid. This is because S7 is turned off.

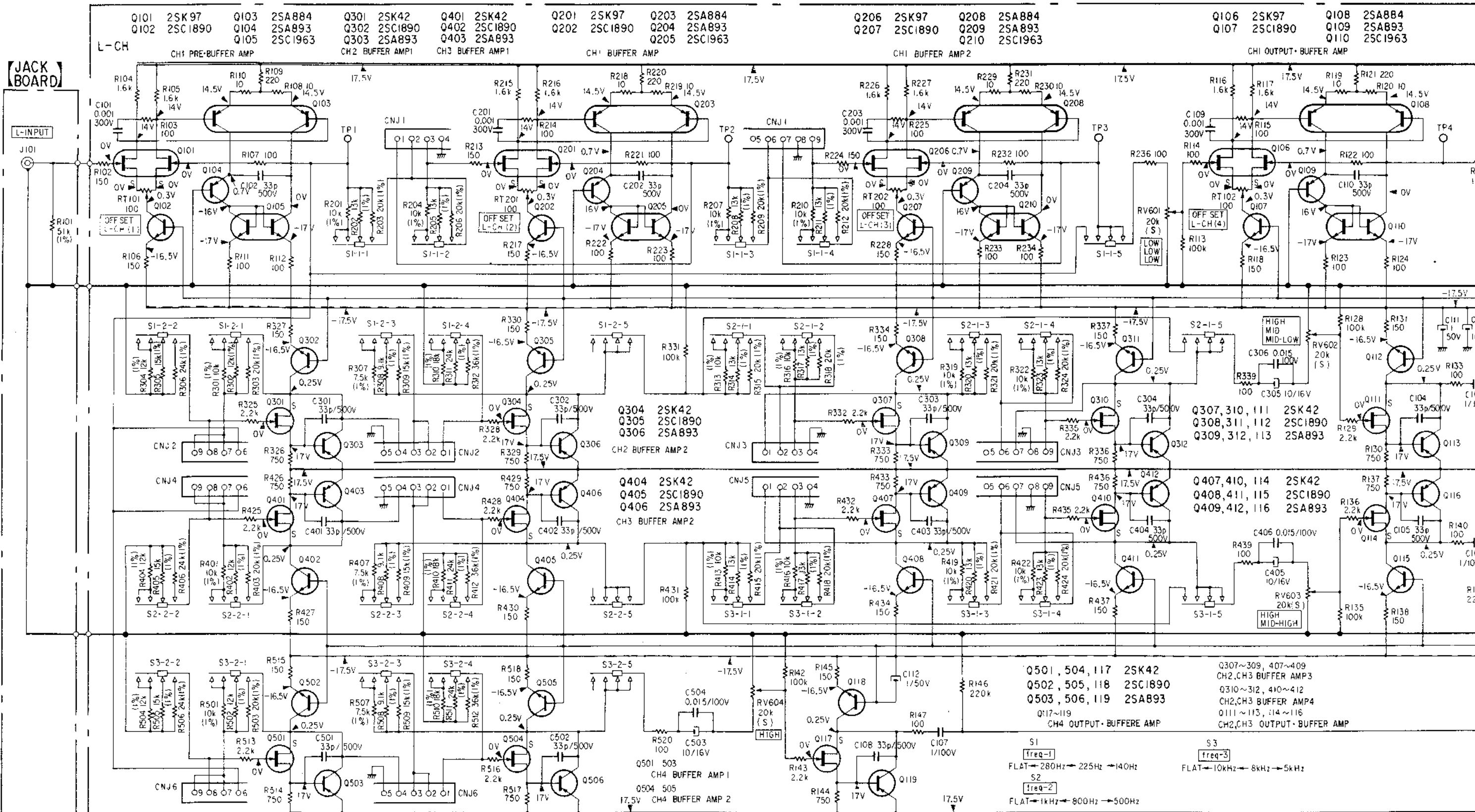
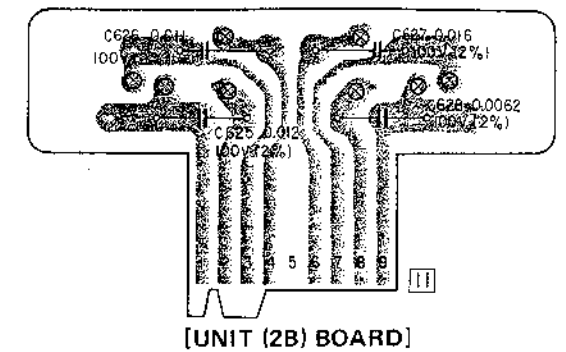
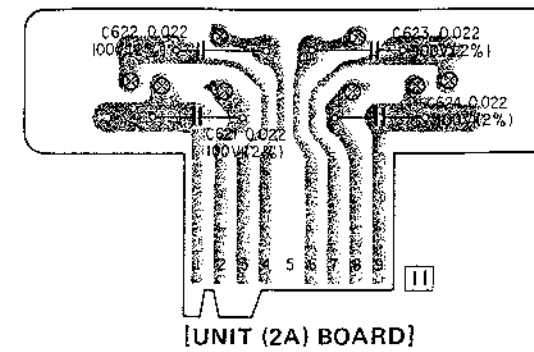
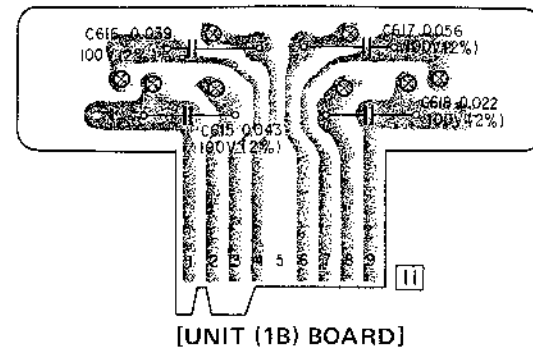
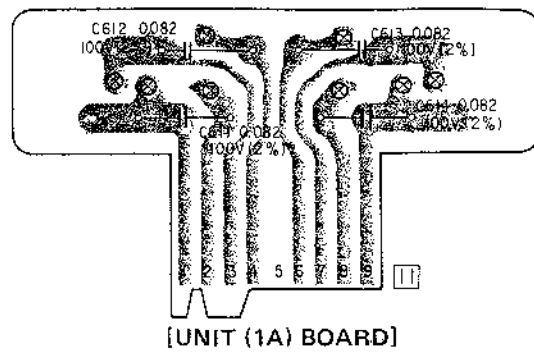


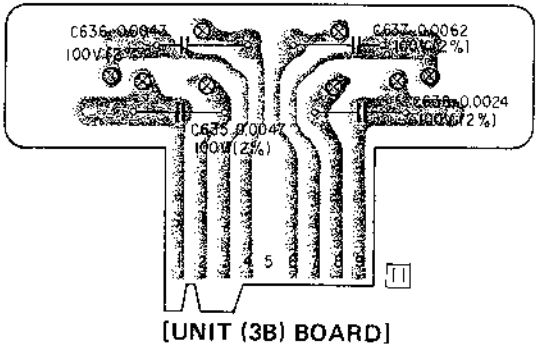
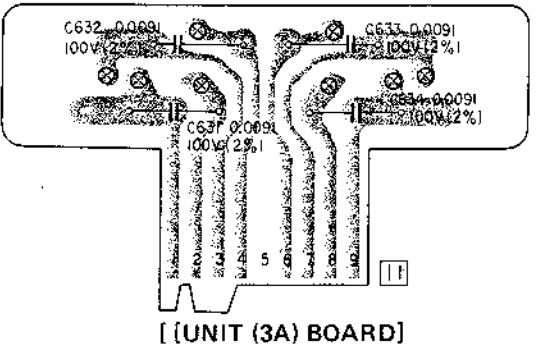
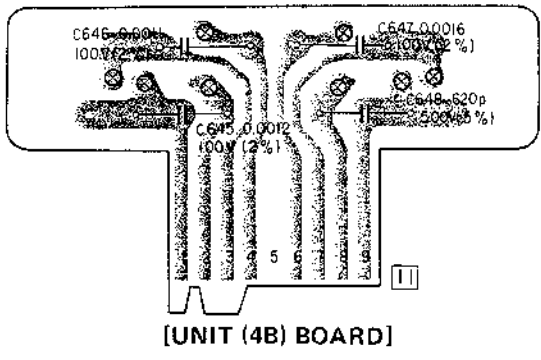
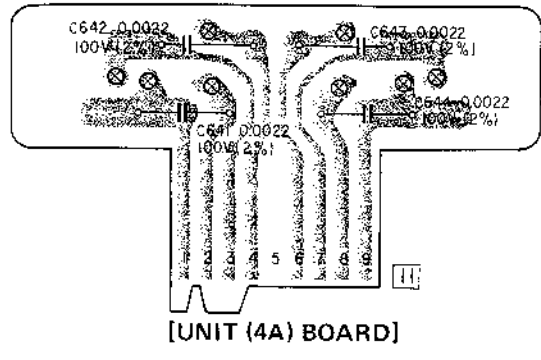
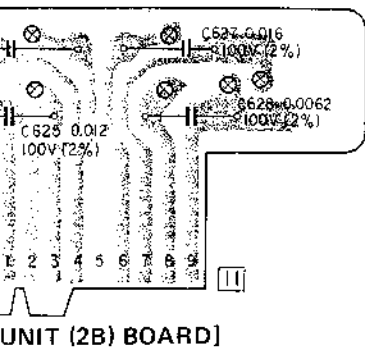
[POWER SUPPLY BOARD]



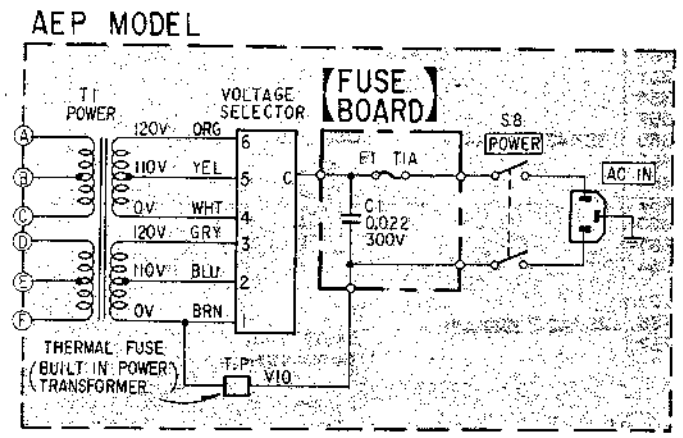
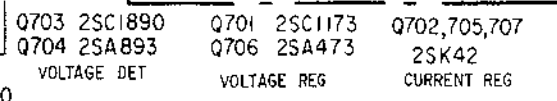
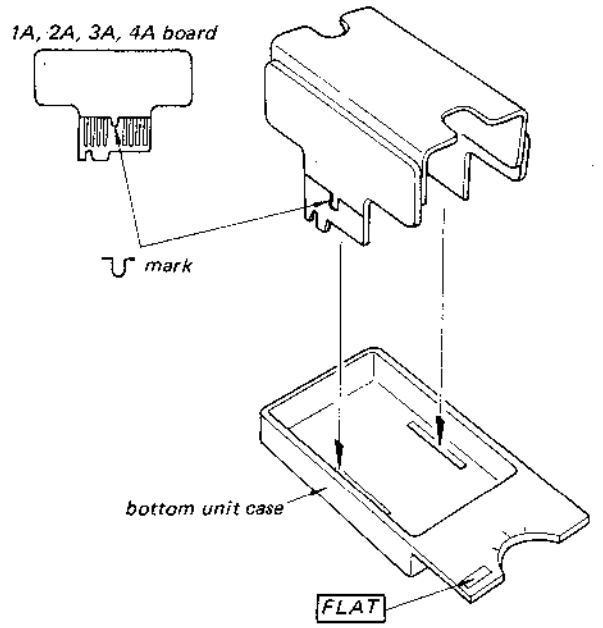
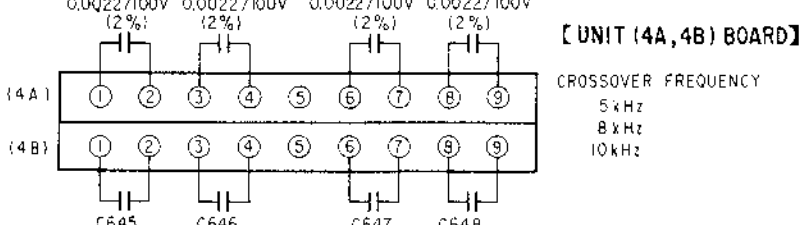
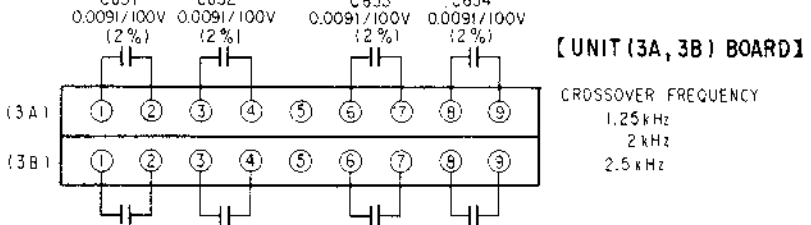
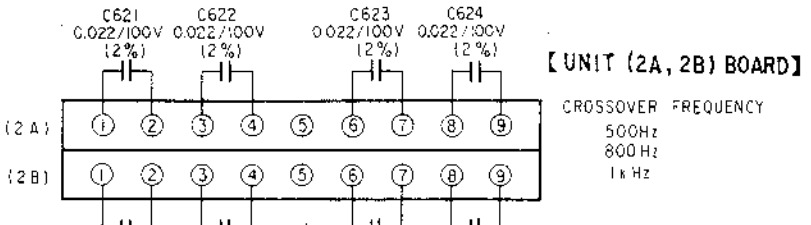
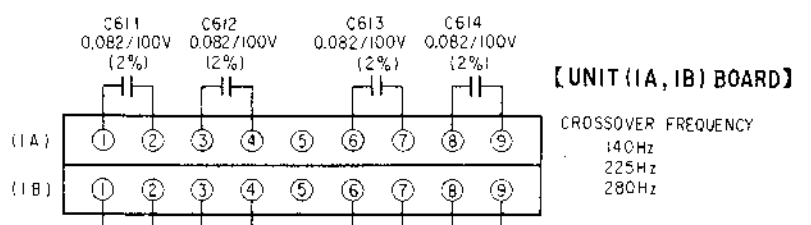
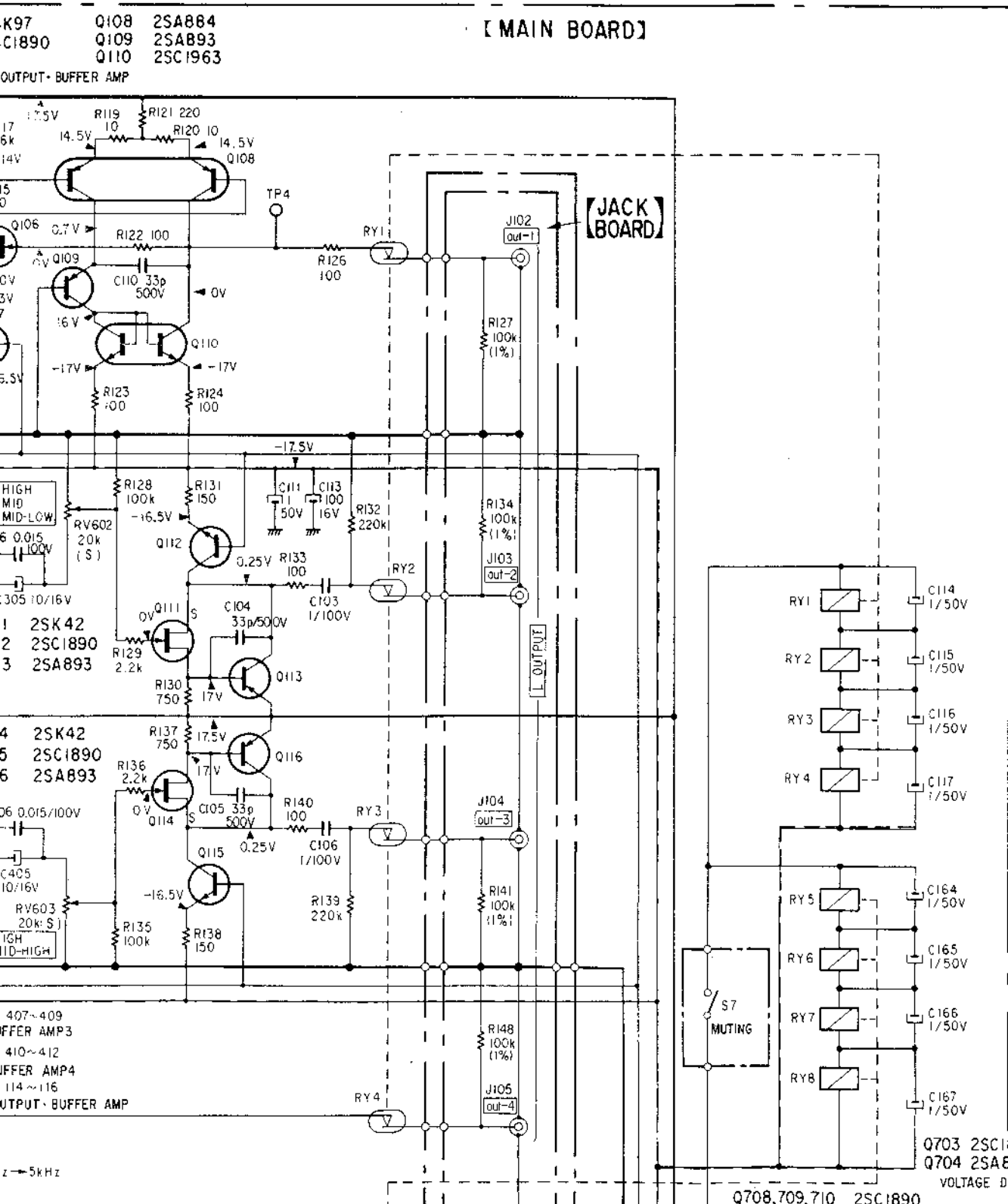


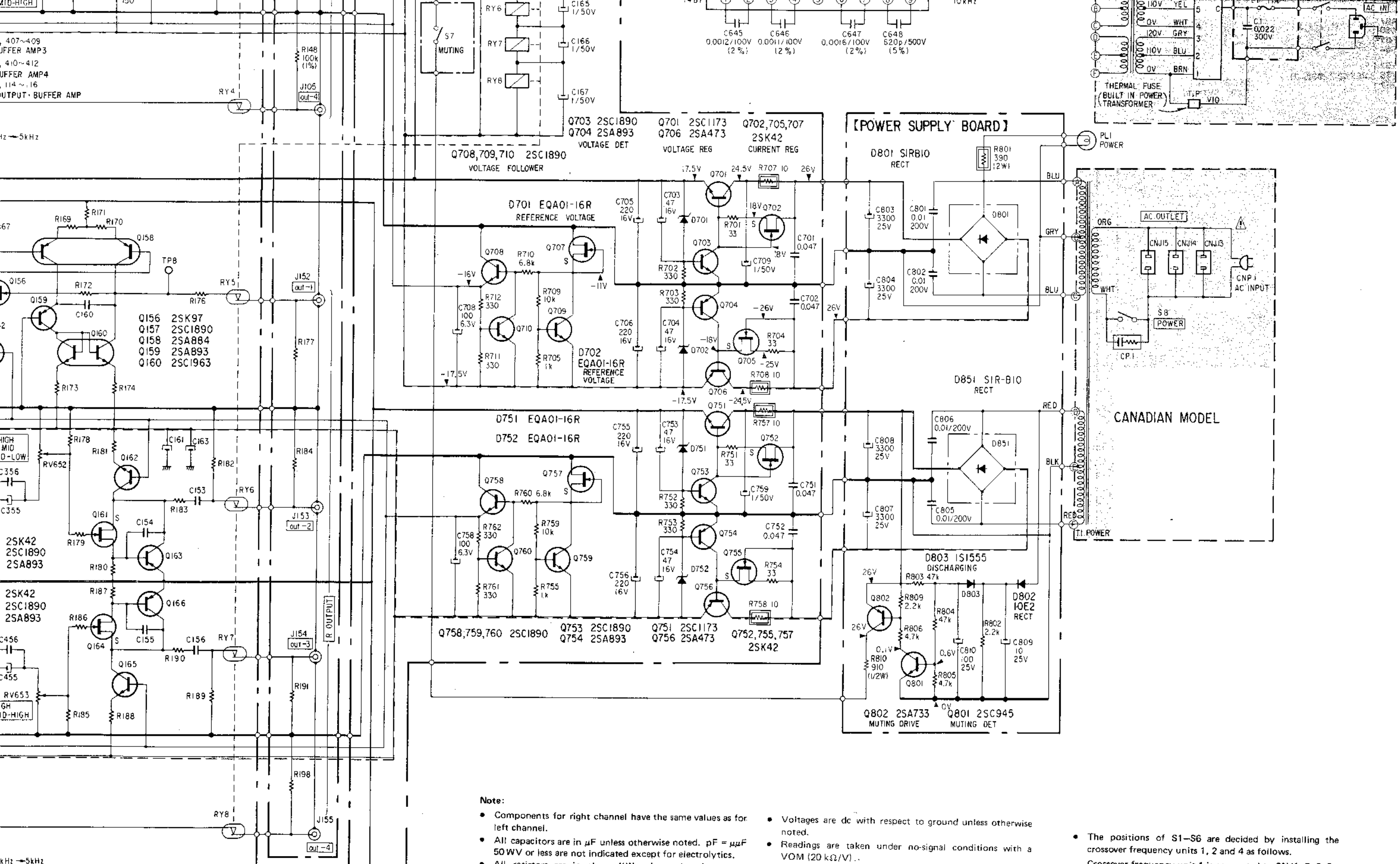
4-2. SCHEMATIC DIAGRAM





Note: Install the A board in the bottom unit case, face in the direction indicated.





Note:

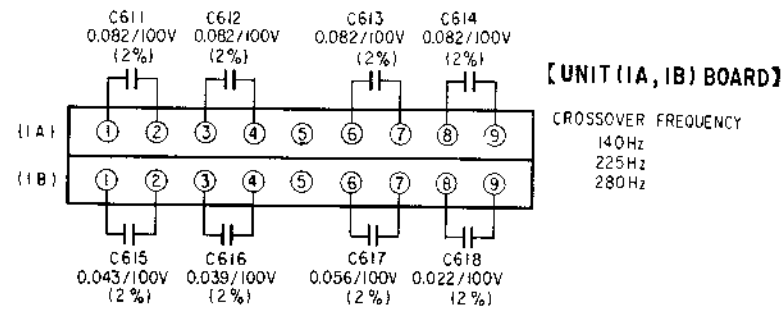
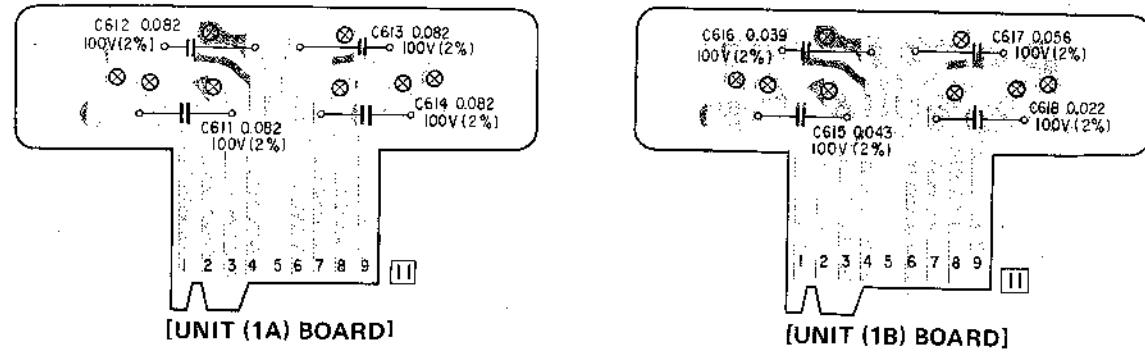
- Components for right channel have the same values as for left channel.
- All capacitors are in μF unless otherwise noted. $\text{pF} = \mu\mu\text{F}$. 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, $\frac{1}{2}\Omega$ unless otherwise noted. $\text{k}\Omega = 1000 \Omega$, $\text{M}\Omega = 1000 \text{k}\Omega$.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- NF : nonflammable resistor.
- (1%) : resistor tolerance $\pm 1\%$
- (2%) : capacitor tolerance $\pm 2\%$
- $\text{B}+$: B+ bus.
- $\text{B}-$: B- bus.
- P : panel designation.
- A : adjustment for repair.
- Voltages are dc with respect to ground unless otherwise noted.
- Readings are taken under no-signal conditions with a VOM (20 $\text{k}\Omega/\text{V}$).
- Switch

Ref. No.	Switch	Position
S1	FREQ 1	225 Hz
S2	FREQ 2	800 Hz
S3	FREQ 3	8 kHz
S4	FREQ 4	225 Hz
S5	FREQ 2	800 Hz
S6	FREQ 3	8 kHz
S7	MUTING	OFF
S8	POWER	OFF

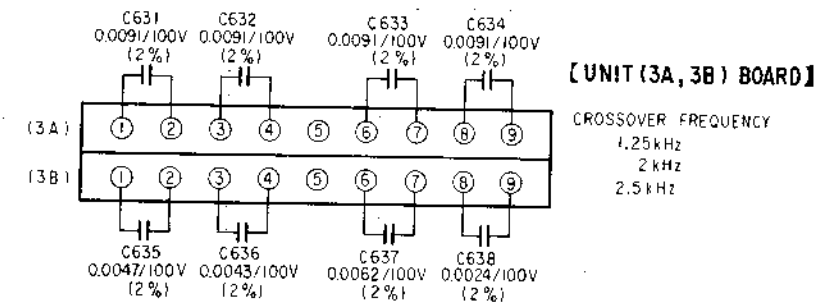
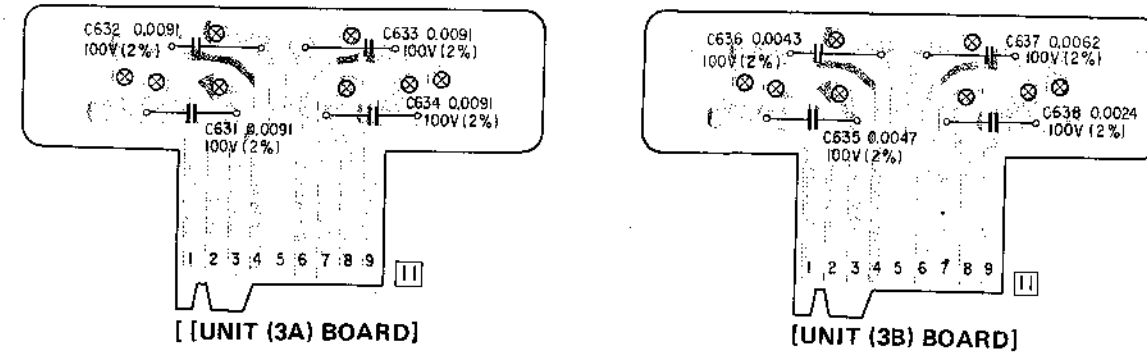
- The positions of S1-S6 are decided by installing the crossover frequency units 1, 2 and 4 as follows.
Crossover frequency unit 1 is connected to CNJ1, 7, 2, 8.
Crossover frequency unit 2 is connected to CNJ3, 9, 4, 10.
Crossover frequency unit 4 is connected to CNJ5, 11, 6, 12.

4-3. UNIT BOARD DIAGRAM

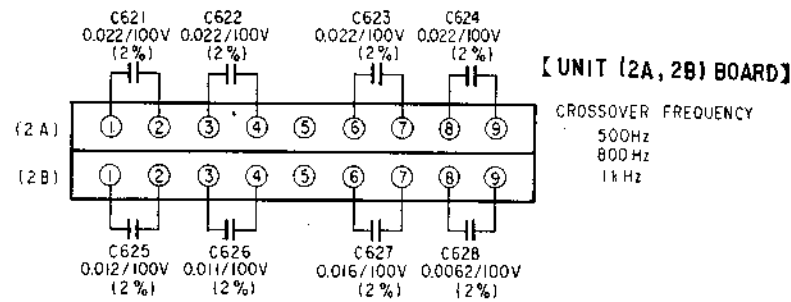
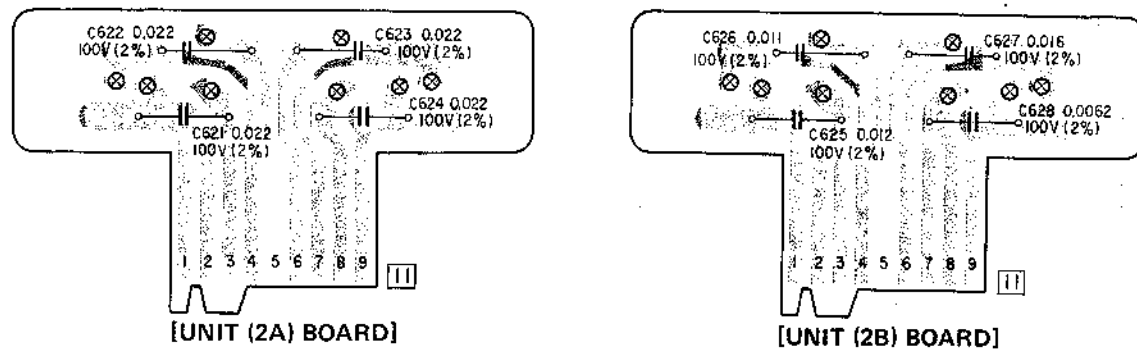
[UNIT (1A, 1B) BOARD]



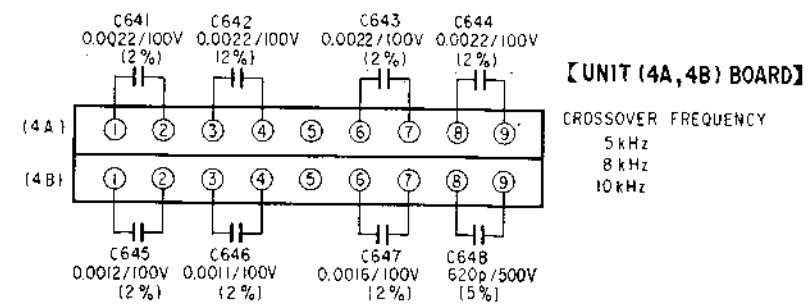
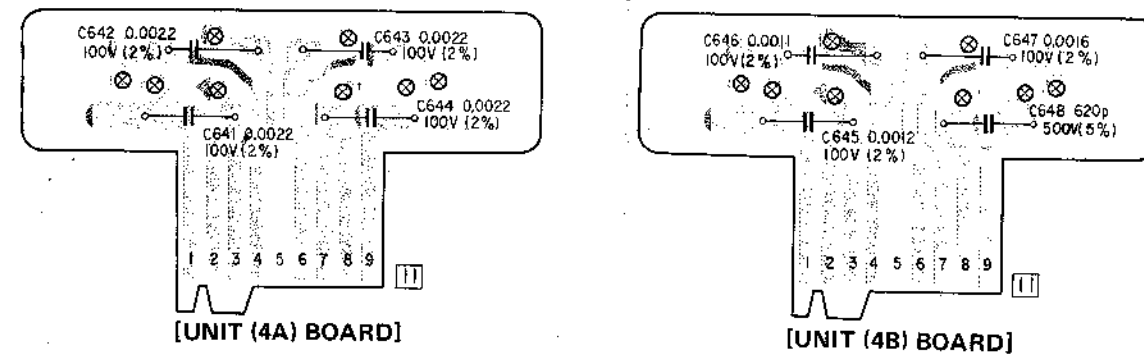
[UNIT (3A, 3B) BOARD]



[UNIT (2A, 2B) BOARD]



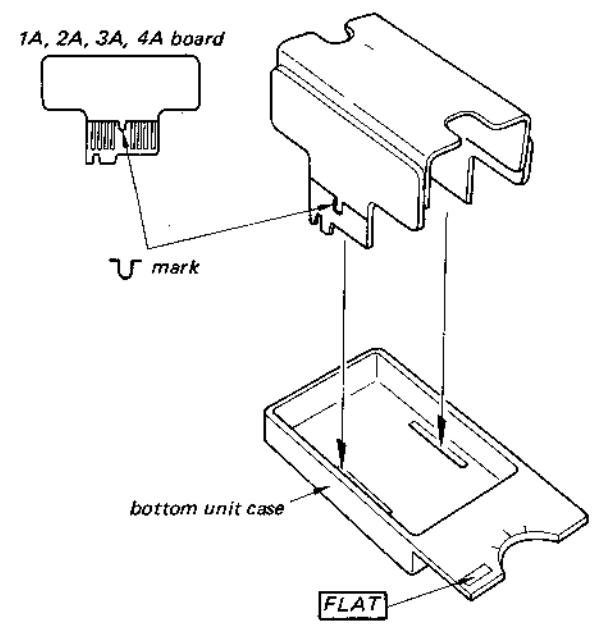
[UNIT (4A, 4B) BOARD]



Note:

1A, 2

Note: Install the A board in the bottom unit case, face in the direction indicated.



A

B

C

D

E

F

G

5-2.

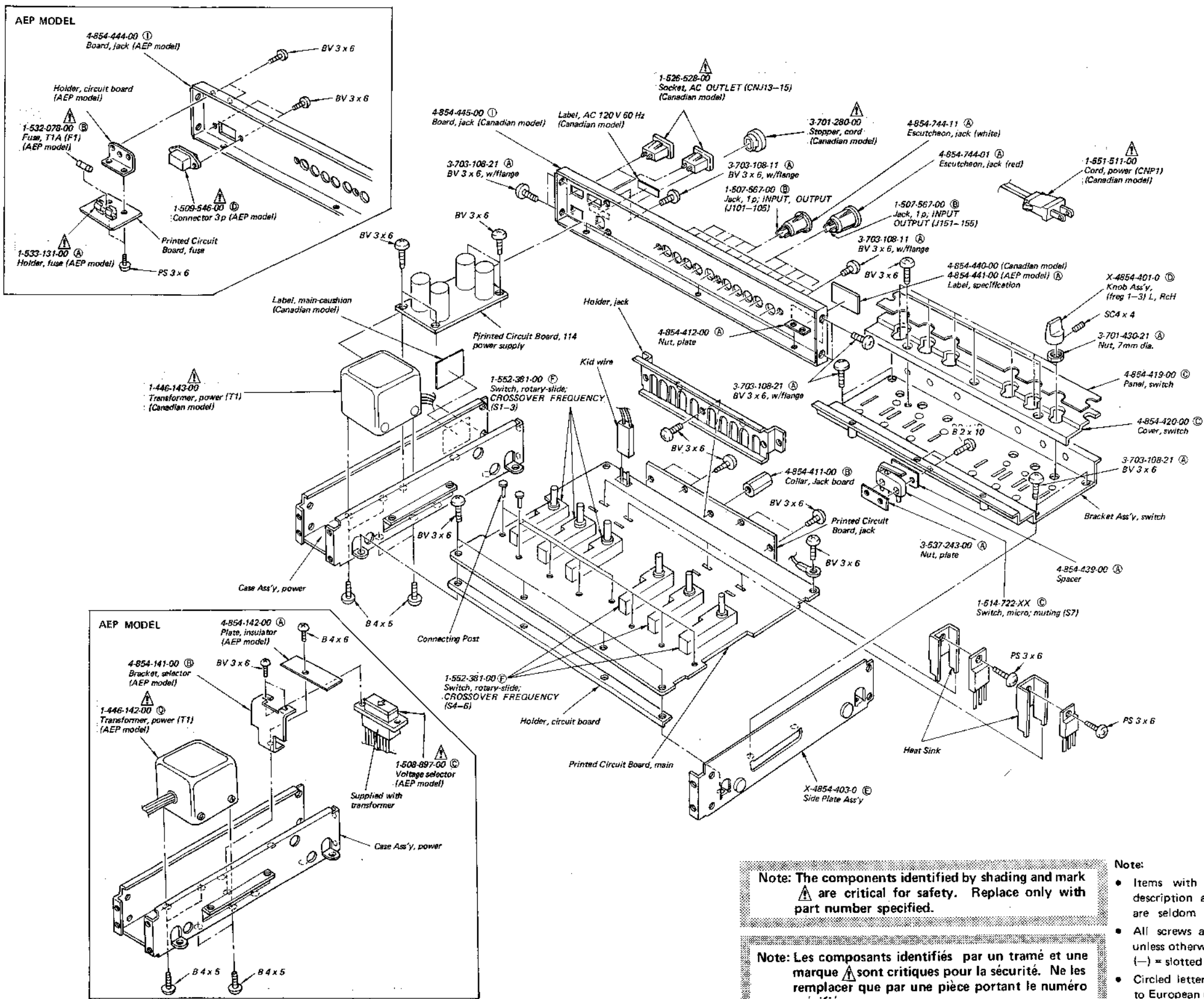
1


2


3

4

5



Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un trame et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Note:**
- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
 - All screws are Phillips (cross recess) type unless otherwise noted. (—) = slotted head
 - Circled letters (A to Z) are applicable to European models only.

**SECTION 6
ELECTRICAL PARTS LIST**

Note: Circled letters (A) to (Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
PRINTED CIRCUIT BOARDS		
	1-586-853-00	(E) Unit 1A
	1-586-854-00	(E) Unit 1B
	1-586-855-00	(E) Unit 2A
	1-586-856-00	(E) Unit 2B
	1-586-857-00	(E) Unit 3A
	1-586-858-00	(E) Unit 3B
	1-586-859-00	(E) Unit 4A
	1-586-860-00	(E) Unit 4B
SEMICONDUCTORS		
Transistors		
	Q101, 151	8-765-342-31 (F) 2SK97
⇒	Q102, 152	8-720-950-03 (C) 2SC926A
	Q105, 153	8-765-020-00 (D) 2SA884
⇒	Q104, 154	8-729-163-93 (C) 2SA639S
	Q105, 155	8-765-222-20 (D) 2SC1963
	Q106, 156	8-765-342-31 (F) 2SK97
⇒	Q107, 157	8-720-950-03 (C) 2SC926A
	Q108, 158	8-765-020-00 (D) 2SA884
⇒	Q109, 159	8-729-163-93 (C) 2SA639S
	Q110, 160	8-765-222-20 (D) 2SC1963
⇒	Q111, 161	8-727-314-00 (E) 2SK42-4
⇒	Q112, 162	8-720-950-03 (C) 2SC926A
⇒	Q113, 163	8-729-163-93 (C) 2SA639S
⇒	Q114, 164	8-727-314-00 (E) 2SK42-4
⇒	Q115, 165	8-720-950-03 (C) 2SC926A
⇒	Q116, 166	8-729-163-93 (C) 2SA639S
⇒	Q117, 167	8-727-314-00 (E) 2SK42-4
⇒	Q118, 168	8-720-950-03 (C) 2SC926A
⇒	Q119, 169	8-729-163-93 (C) 2SA639S
	Q201, 251	8-765-342-31 (F) 2SK97
⇒	Q202, 252	8-720-950-03 (C) 2SC926A
	Q203, 253	8-765-020-00 (D) 2SA884
⇒	Q204, 254	8-729-163-93 (C) 2SA639S
	Q205, 255	8-765-222-20 (D) 2SC1963
	Q206, 256	8-765-342-31 (F) 2SK97
⇒	Q207, 257	8-720-950-03 (C) 2SC926A
	Q208, 258	8-765-020-00 (D) 2SA884

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
⇒	Q209, 259	8-729-163-93 (C) 2SA639S
	Q210, 260	8-765-222-20 (D) 2SC1963
⇒	Q301, 351	8-727-314-00 (E) 2SK42-4
⇒	Q302, 352	8-720-950-03 (C) 2SC926A
⇒	Q303, 353	8-729-163-93 (C) 2SA639S
⇒	Q304, 354	8-727-314-00 (E) 2SK42-4
⇒	Q305, 355	8-720-950-03 (C) 2SC926A
⇒	Q306, 356	8-729-163-93 (C) 2SA639S
⇒	Q307, 357	8-727-314-00 (E) 2SK42-4
⇒	Q308, 358	8-720-950-03 (C) 2SC926A
⇒	Q309, 359	8-729-163-93 (C) 2SA639S
⇒	Q310, 360	8-727-314-00 (E) 2SK42-4
⇒	Q311, 361	8-720-950-03 (C) 2SC926A
⇒	Q312, 362	8-729-163-93 (C) 2SA639S
⇒	Q401, 451	8-727-314-00 (E) 2SK42-4
⇒	Q402, 452	8-720-950-03 (C) 2SC926A
⇒	Q403, 453	8-729-163-93 (C) 2SA639S
⇒	Q404, 454	8-727-314-00 (E) 2SK42-4
⇒	Q405, 455	8-720-950-03 (C) 2SC926A
⇒	Q406, 456	8-729-163-93 (C) 2SA639S
⇒	Q407, 457	8-727-314-00 (E) 2SK42-4
⇒	Q408, 458	8-720-950-03 (C) 2SC926A
⇒	Q409, 459	8-729-163-93 (C) 2SA639S
⇒	Q410, 460	8-727-314-00 (E) 2SK42-4
⇒	Q411, 461	8-720-950-03 (C) 2SC926A
⇒	Q412, 462	8-729-163-93 (C) 2SA639S
⇒	Q501, 551	8-727-314-00 (E) 2SK42-4
⇒	Q502, 552	8-720-950-03 (C) 2SC926A
⇒	Q503, 553	8-729-163-93 (C) 2SA639S
⇒	Q504, 554	8-727-314-00 (E) 2SK42-4
⇒	Q505, 555	8-720-950-03 (C) 2SC926A
⇒	Q506, 556	8-729-163-93 (C) 2SA639S

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Note: Circled letters (A to Z) are applicable to European models only.

Ref. No.	Part No.	Description
Q701, 751	8-729-217-33	Ⓒ 2SC1173
⇒Q702, 752	8-727-312-00	Ⓒ 2SK42-2
⇒Q703, 753	8-720-950-03	Ⓒ 2SC926A
⇒Q704, 754	8-729-163-93	Ⓒ 2SA639S
⇒Q705, 755	8-727-312-00	Ⓒ 2SK42-2
Q706, 756	8-729-247-33	Ⓒ 2SA473
⇒Q707, 757	8-727-312-00	Ⓒ 2SK42-2
⇒Q708-710 ⇒Q758-760	8-729-950-03	Ⓒ 2SC926A
⇒Q801	8-729-663-47	Ⓑ 2SC1364
⇒Q802	8-727-788-00	Ⓑ 2SA678

Diodes

⇒D701, 751 ⇒D702, 752	8-719-931-16	Ⓑ EQB01-16
D801, 851	8-719-510-10	Ⓒ S1RB10
D802	8-719-200-02	Ⓑ 10E2
D803	8-719-815-55	Ⓑ IS1555

CAPACITORS

All capacitors are in μF and polyethylene unless otherwise noted. 5WV or less are not indicated except for electrolytics. pF = $\mu\mu\text{F}$, elect = electrolytic

C1	Ⓐ 1-108-777-11	Ⓑ 0.022	300 V	metalized film (AEP model)
C101, 151	1-109-170-11	Ⓒ 0.001	300 V	mica
C102, 152	1-107-159-11	Ⓐ 33 p	500 V	silvered mica
C103, 153	1-130-083-11	Ⓒ 1	100 V	
C104, 154 C105, 155	1-107-159-11	Ⓐ 33 p	500 V	silvered mica
C106, 156 C107, 157	1-130-083-11	Ⓒ 1	100 V	
C108, 158	1-107-159-11	Ⓐ 33 p	500 V	silvered mica
C109, 159	1-109-170-11	Ⓒ 0.001	300 V	mica
C110, 160	1-107-159-11	Ⓐ 33 p	500 V	silvered mica
C111, 161 C112, 162	1-121-391-11	Ⓐ 1	50 V	elect
C113, 163	1-121-415-11	Ⓐ 100	16 V	elect

⇒: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

Ref. No.	Part No.	Description
C114-117 C164-167	1-121-391-11	Ⓐ 1 50 V elect
C201, 251	1-109-170-11	Ⓒ 0.001 300 V mica
C202, 252	1-107-159-11	Ⓐ 33 p 500 V silvered mica
C203, 253	1-109-170-11	Ⓒ 0.001 300 V mica
C204, 254	1-107-159-11	Ⓐ 33 p 500 V silvered mica
C301-304 C351-354	1-107-159-11	Ⓐ 33 p 500 V silvered mica
C305, 355	1-131-371-11	Ⓑ 10 16 V tantalum
C306, 356	1-130-127-11	Ⓑ 0.015 100 V
C401-404 C451-454	1-107-159-11	Ⓐ 33 p 500 V silvered mica
C405, 455	1-131-371-11	Ⓑ 10 16 V tantalum
C406, 456	1-130-127-11	Ⓑ 0.015 100 V
C501, 502 C551, 552	1-107-159-11	Ⓐ 33 p 500 V silvered mica
C503, 553	1-131-371-11	Ⓑ 10 16 V tantalum
C504, 554	1-130-127-11	Ⓑ 0.015 100 V
C611-614	1-130-175-11	Ⓑ 0.082 100 V
C615	1-130-174-11	Ⓑ 0.043 100 V
C616	1-130-173-11	Ⓑ 0.039 100 V
C617	1-130-126-11	Ⓑ 0.056 100 V
C618	1-130-172-11	Ⓑ 0.022 100 V
C621-624	1-130-172-11	Ⓑ 0.022 100 V
C625	1-130-171-11	Ⓑ 0.012 100 V
C626	1-130-170-11	Ⓑ 0.011 100 V
C627	1-130-125-11	Ⓑ 0.016 100 V
C628	1-130-168-11	Ⓑ 0.0062 100 V
C631-634	1-130-169-11	Ⓑ 0.0091 100 V
C635	1-130-167-11	Ⓑ 0.0047 100 V
C636	1-130-123-11	Ⓑ 0.0043 100 V
C637	1-130-168-11	Ⓑ 0.0062 100 V
C638	1-130-166-11	Ⓑ 0.0024 100 V
C641-644	1-130-165-11	Ⓑ 0.0022 100 V
C645	1-130-164-11	Ⓑ 0.0012 100 V
C646	1-130-163-11	Ⓑ 0.0011 100 V
C647	1-130-131-11	Ⓑ 0.0016 100 V
C648	1-109-692-11	Ⓓ 620 p 500 V mica

Note: Les composants identifiés par un trame et une marque Ⓐ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note: The components identified by shading and mark Ⓐ are critical for safety. Replace only with part number specified.

Note: Circled letters (A to Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
C701, 751 C702, 752 C703, 753 C704, 754	1-102-246-12	(A) 0.047		mylar
C705, 755 C706, 756	1-123-192-11	(A) 47	16 V	elect
C708, 758	1-123-068-11	(B) 220	16 V	elect
C709, 759	1-123-196-11	(A) 100	6.3 V	elect
	1-121-391-11	(A) 1	50 V	elect
C801, 802	1-108-421-12	(B) 0.01	200 V	mylar
C803, 804	1-123-246-11	(D) 3300	25 V	elect
C805, 806	1-108-421-12	(B) 0.01	200 V	mylar
C807, 808	1-123-246-11	(D) 3300	25	elect
C809	1-121-398-11	(A) 10	25 V	elect
C810	1-121-935-11	(B) 100	25 V	elect

RESISTORS

All resistors are in ohms. Common 1/4W carbon resistors are omitted. Refer to the list on page 31 for their part numbers.

R101, 151 R127, 177 R134, 184 R141, 191 R148, 198	1-214-173-11	(A) 51k	1/4 W	metal oxide
	1-214-180-11	(A) 100k	1/4 W	metal oxide
R201, 251	1-214-156-11	(A) 10k	1/4 W	metal oxide
R202, 252	1-214-159-11	(A) 13k	1/4 W	metal oxide
R203, 253	1-214-163-11	(A) 20k	1/4 W	metal oxide
R204, 254	1-214-156-11	(A) 10k	1/4 W	metal oxide
R205, 255	1-214-159-11	(A) 13k	1/4 W	metal oxide
R206, 256	1-214-163-11	(A) 20k	1/4 W	metal oxide
R207, 257	1-214-156-11	(A) 10k	1/4 W	metal oxide
R208, 258	1-214-159-11	(A) 13k	1/4 W	metal oxide
R209, 259	1-214-163-11	(A) 20k	1/4 W	metal oxide
R210, 260	1-214-156-11	(A) 10k	1/4 W	metal oxide
R211, 261	1-214-159-11	(A) 13k	1/4 W	metal oxide
R212, 262	1-214-163-11	(A) 20k	1/4 W	metal oxide
R301, 351	1-214-156-11	(A) 10k	1/4 W	metal oxide
R302, 352	1-214-158-11	(A) 12k	1/4 W	metal oxide
R303, 353	1-214-163-11	(A) 20k	1/4 W	metal oxide
R304, 354	1-214-158-11	(A) 12k	1/4 W	metal oxide
R305, 355	1-214-160-11	(A) 15k	1/4 W	metal oxide

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>		
R306, 356	1-214-165-11	(A) 24k	1/4 W	metal oxide
R307, 357	1-214-153-11	(A) 7.5k	1/4 W	metal oxide
R308, 358	1-214-155-11	(A) 9.1k	1/4 W	metal oxide
R309, 359	1-214-160-11	(A) 15k	1/4 W	metal oxide
R310, 360	1-214-162-11	(A) 18k	1/4 W	metal oxide
R311, 362	1-214-165-11	(A) 24k	1/4 W	metal oxide
R312, 362	1-214-169-11	(A) 36k	1/4 W	metal oxide
R313, 363	1-214-156-11	(A) 10k	1/4 W	metal oxide
R314, 364	1-214-159-11	(A) 13k	1/4 W	metal oxide
R315, 365	1-214-163-11	(A) 20k	1/4 W	metal oxide
R316, 366	1-214-156-11	(A) 10k	1/4 W	metal oxide
R317, 367	1-214-159-11	(A) 13k	1/4 W	metal oxide
R318, 368	1-214-163-11	(A) 20k	1/4 W	metal oxide
R319, 369	1-214-156-11	(A) 10k	1/4 W	metal oxide
R320, 370	1-214-159-11	(A) 13k	1/4 W	metal oxide
R321, 371	1-214-163-11	(A) 20k	1/4 W	metal oxide
R322, 372	1-214-156-11	(A) 10k	1/4 W	metal oxide
R323, 373	1-214-159-11	(A) 13k	1/4 W	metal oxide
R324, 374	1-214-163-11	(A) 20k	1/4 W	metal oxide
R401, 451	1-214-156-11	(A) 10k	1/4 W	metal oxide
R402, 452	1-214-158-11	(A) 12k	1/4 W	metal oxide
R403, 453	1-214-163-11	(A) 20k	1/4 W	metal oxide
R404, 454	1-214-158-11	(A) 12k	1/4 W	metal oxide
R405, 455	1-214-160-11	(A) 15k	1/4 W	metal oxide
R406, 456	1-214-165-11	(A) 24k	1/4 W	metal oxide
R407, 457	1-214-153-11	(A) 7.5k	1/4 W	metal oxide
R408, 458	1-214-155-11	(A) 9.1k	1/4 W	metal oxide
R409, 459	1-214-160-11	(A) 15k	1/4 W	metal oxide
R410, 460	1-214-162-11	(A) 18k	1/4 W	metal oxide
R411, 461	1-214-165-11	(A) 24k	1/4 W	metal oxide
R412, 462	1-214-169-11	(A) 36k	1/4 W	metal oxide
R413, 463	1-214-156-11	(A) 10k	1/4 W	metal oxide
R414, 464	1-214-159-11	(A) 13k	1/4 W	metal oxide
R415, 465	1-214-163-11	(A) 20k	1/4 W	metal oxide
R416, 466	1-214-156-11	(A) 10k	1/4 W	metal oxide
R417, 467	1-214-159-11	(A) 13k	1/4 W	metal oxide
R418, 468	1-214-163-11	(A) 20k	1/4 W	metal oxide
R419, 469	1-214-156-11	(A) 10k	1/4 W	metal oxide
R420, 470	1-214-159-11	(A) 13k	1/4 W	metal oxide

Note: Circled letters (A to Z) are applicable to European models only.

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
R421, 471	1-214-163-11 (A) 20k	¼ W metal oxide
R422, 472	1-214-156-11 (A) 10k	¼ W metal oxide
R423, 473	1-214-159-11 (A) 13k	¼ W metal oxide
R424, 474	1-214-163-11 (A) 20k	¼ W metal oxide
R501, 551	1-214-156-11 (A) 10k	¼ W metal oxide
R502, 552	1-214-158-11 (A) 12k	¼ W metal oxide
R503, 553	1-214-163-11 (A) 20k	¼ W metal oxide
R504, 554	1-214-158-11 (A) 12k	¼ W metal oxide
R505, 555	1-214-160-11 (A) 15k	¼ W metal oxide
R506, 556	1-214-165-11 (A) 24k	¼ W metal oxide
R507, 557	1-214-153-11 (A) 7.5k	¼ W metal oxide
R508, 558	1-214-155-11 (A) 9.1k	¼ W metal oxide
R509, 559	1-214-160-11 (A) 15k	¼ W metal oxide
R510, 560	1-214-162-11 (A) 18k	¼ W metal oxide
R511, 561	1-214-165-11 (A) 24k	¼ W metal oxide
R512, 562	1-214-169-11 (A) 36k	¼ W metal oxide
R707, 757 R708, 758	1-211-498-11 (A) 10	¼ W carbon (nonflammable)
R801	1-206-654-11 (A) 390	2 W metal oxide (nonflammable)
R810	1-244-872-11 (A) 910	½ W Carbon
RV601-604 RV651-654	1-226-216-11 (F) 20k/20k, variable; LEFT, RIGHT ATTENUATOR	
RT101, 151 RT102, 152 RT201, 251 RT202, 252	1-224-247-XX (C) 100 Ω, adjustable; offset	

SWITCHES

S1-6	1-552-381-00 (F) Rotary-Slide; CROSSOVER FREQUENCY
S7	1-514-722-XX (C) Microswitch; muting
S8	(A) 1-552-294-12 Rotary; POWER (Canadian model)
S8	(A) 1-552-295-12 (G) Rotary; POWER (AEP model)

Ref. No. Part No. Description

MISCELLANEOUS

CNJ1-12	1-561-141-00 (C) Connector, circuit board
CNJ13-15	(A) 1-526-528-00 Socket; AC OUTLET (Canadian model)
CNP1	(A) 1-551-511-00 Cord, power (Canadian model)
CP1	(A) 1-231-341-00 (D) Spark-killer (Canadian model)
F1	(A) 1-532-078-00 (B) Fuse T1A (AEP model)
J101-105 J151-155	1-507-567-00 (B) Jack, 1 P; INPUT, OUTPUT
PL1	1-518-331-81 (B) Lamp, 6.0 V 35 mA; power
RY1-8	1-515-314-00 (E) Relay
T1	(A) 1-446-143-00 Transformer, power (Canadian model)
T1	(A) 1-446-142-00 (Q) Transformer, power (AEP model)
	(A) 1-508-897-00 (C) Voltage Selector (AEP model)
	(A) 1-509-546-00 (D) Connector, 3 p AC IN (AEP model)
	(A) 1-533-131-00 (A) Holder, fuse (AEP model)

ACCESSORY AND PACKING MATERIALS

<u>Part No.</u>	<u>Description</u>
A-4464-086-A	(O) Unit (3) Ass'y
1-551-315-00	(H) Cord, connecting; RK-112
1-551-315-21	(H) Cord, connecting; RK-113
3-701-020-00	(A) Bag, check sheet
3-701-622-11	(A) Bag, polyethylene
3-770-360-11	Manual, instruction (AEP model)
3-770-360-21	Manual, instruction (Canadian model)
3-794-300-31	
4-809-251-00	(A) Bag, protection
4-852-949-00	(C) Cushion
4-854-431-00	(C) Box, accessory
4-854-432-00	(C) Case, unit

Note: The components identified by shading and mark (A) are critical for safety. Replace only with part number specified.

Note: Les composants identifiés par un tramé et une marque (A) sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

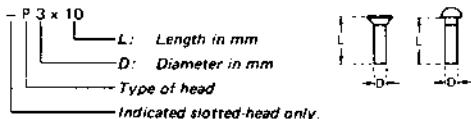
1/4 WATT CARBON RESISTORS (A)

Note: Circled letter (A) is applicable to European models only.

Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11
1.2	1-244-603-11	12	1-244-627-11	120	1-244-651-11	1.2k	1-244-675-11	12k	1-244-699-11	120k	1-244-723-11
1.3	1-244-604-11	13	1-244-628-11	130	1-244-652-11	1.3k	1-244-676-11	13k	1-244-700-11	130k	1-244-724-11
1.5	1-244-605-11	15	1-244-629-11	150	1-244-653-11	1.5k	1-244-677-11	15k	1-244-701-11	150k	1-244-725-11
1.6	1-244-606-11	16	1-244-630-11	160	1-244-654-11	1.6k	1-244-678-11	16k	1-244-702-11	160k	1-244-726-11
1.8	1-244-607-11	18	1-244-631-11	180	1-244-655-11	1.8k	1-244-679-11	18k	1-244-703-11	180k	1-244-727-11
2.0	1-244-608-11	20	1-244-632-11	200	1-244-656-11	2.0k	1-244-680-11	20k	1-244-704-11	200k	1-244-728-11
2.2	1-244-609-11	22	1-244-633-11	220	1-244-657-11	2.2k	1-244-681-11	22k	1-244-705-11	220k	1-244-729-11
2.4	1-244-610-11	24	1-244-634-11	240	1-244-658-11	2.4k	1-244-682-11	24k	1-244-706-11	240k	1-244-730-11
2.7	1-244-611-11	27	1-244-635-11	270	1-244-659-11	2.7k	1-244-683-11	27k	1-244-707-11	270k	1-244-731-11
3.0	1-244-612-11	30	1-244-636-11	300	1-244-660-11	3.0k	1-244-684-11	30k	1-244-708-11	300k	1-244-732-11
3.3	1-244-613-11	33	1-244-637-11	330	1-244-661-11	3.3k	1-244-685-11	33k	1-244-709-11	330k	1-244-733-11
3.6	1-244-614-11	36	1-244-638-11	360	1-244-662-11	3.6k	1-244-686-11	36k	1-244-710-11	360k	1-244-734-11
3.9	1-244-615-11	39	1-244-639-11	390	1-244-663-11	3.9k	1-244-687-11	39k	1-244-711-11	390k	1-244-735-11
4.3	1-244-616-11	43	1-244-640-11	430	1-244-664-11	4.3k	1-244-688-11	43k	1-244-712-11	430k	1-244-736-11
4.7	1-244-617-11	47	1-244-641-11	470	1-244-665-11	4.7k	1-244-689-11	47k	1-244-713-11	470k	1-244-737-11
5.1	1-244-618-11	51	1-244-642-11	510	1-244-666-11	5.1k	1-244-690-11	51k	1-244-714-11	510k	1-244-738-11
5.6	1-244-619-11	56	1-244-643-11	560	1-244-667-11	5.6k	1-244-691-11	56k	1-244-715-11	560k	1-244-739-11
6.2	1-244-620-11	62	1-244-644-11	620	1-244-668-11	6.2k	1-244-692-11	62k	1-244-716-11	620k	1-244-740-11
6.8	1-244-621-11	68	1-244-645-11	680	1-244-669-11	6.8k	1-244-693-11	68k	1-244-717-11	680k	1-244-741-11
7.5	1-244-622-11	75	1-244-646-11	750	1-244-670-11	7.5k	1-244-694-11	75k	1-244-718-11	750k	1-244-742-11
8.2	1-244-623-11	82	1-244-647-11	820	1-244-671-11	8.2k	1-244-695-11	82k	1-244-719-11	820k	1-244-743-11
9.1	1-244-624-11	91	1-244-648-11	910	1-244-672-11	9.1k	1-244-696-11	91k	1-244-720-11	910k	1-244-744-11

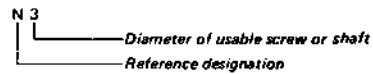
HARDWARE NOMENCLATURE

Screw:



Indicated slotted-head only.
Unless otherwise indicated, it means cross-recessed head (Phillips type).

Nut, Washer, Retaining ring:



Reference Designation	Shape	Description	Remarks
SCREWS			
P		pan-head screw	binding-head (B) screw for replacement
PWH		pan-head screw with washer face	binding-head (B) screw and flat washer for replacement
PS PSP		pan-head screw with spring washer	binding-head (B) screw and spring washer for replacement
PSW PSPW		pan-head screw with spring and flat washers	binding-head (B) screw and spring and flat washers for replacement
R		round-head screw	binding-head (B) screw for replacement
K		flat-countersunk-head screw	
RK		oval-countersunk-head screw	
B		binding-head screw	
T		truss-head screw	binding-head (B) screw for replacement
F		flat-fillister-head screw	
RF		fillister-head screw	
BV		brazer-head screw	

Reference Designation	Shape	Description	Remarks
SELF-TAPPING SCREWS			
TA		self-tapping screw	ex: TA, P 3 x 10
PTP		pan-head self-tapping screw	binding-head self-tapping (TA, B) screw for replacement
PTPWH		pan-head self-tapping screw with washer face	binding-head self-tapping (TA, B) screw and flat washer for replacement
PTTWH		pan-head thread-rolling screw with washer face	binding-head (B) screw and flat washer for replacement
SET SCREWS			
SC		set screw	
SC		hexagon-socket set screw	ex: SC 2.6 x 4, hexagon socket
NUT			
N		nut	
WASHERS			
W		flat washer	
SW		spring washer	
LW		internal-tooth lock washer	ex: LW3, internal
LW		external-tooth lock washer	ex: LW3, external
RETAINING RINGS			
E		retaining ring	
G		grip-type retaining ring	