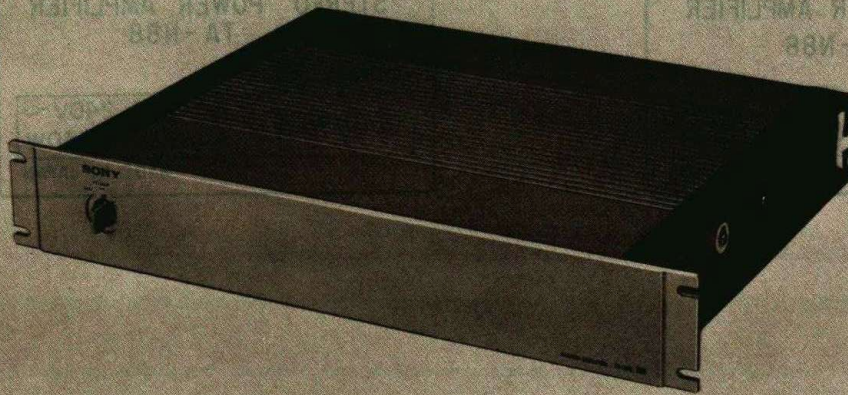


TA-N88

US Model
AEP Model



STEREO POWER AMPLIFIER

SPECIFICATIONS

GENERAL

Power Requirements:	90 – 130V ac, 50 – 400Hz (US model)
	220 – 240V ac, 50 – 400Hz (AEP model)
	110 – 140V dc (US model)
	240 – 300V dc (AEP model)
Power Consumption:	135W (US model)
	550W (AEP model)
Dimensions:	Approx. 480 (w) x 80 (h) x 360 (d) mm
	18 $\frac{7}{8}$ (w) x 3 $\frac{1}{8}$ (h) x 14 $\frac{1}{4}$ (d) inches
	Including projecting parts and controls
Weight:	Approx. 11kg, 23 lb 6oz (net)
	13kg, 28 lb 4oz (with shipping carton)

POWER AMPLIFIER

SECTION

Continuous RMS Power

Output (rated output) (Less than 0.5% total harmonic distortion):	Both channels driven simultaneously
	At 20 – 20,000Hz
	160 + 160W (8 Ω)
	According to DIN45500
Damping Factor:	160 + 160W (8 Ω)
	20 (8 Ω , 1000Hz)

Harmonic Distortion:	Less than 0.5% at rated output
IM Distortion: (60Hz : 7kHz = 4 : 1)	Less than 0.1% at rated output
Frequency Response:	5 – 40,000Hz $^{+0.5}_{-1}$ dB
S/N Ratio:	Greater than 110dB, short-circuited input
Residual Noise:	Less than 100 μ V (8 Ω , weighting network A)
Inputs:	INPUT
	Sensitivity 1.4V (for rated output)
	Impedance 50k Ω
Outputs:	SPEAKER
	Accept speakers of 8 – 16 Ω

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND  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.

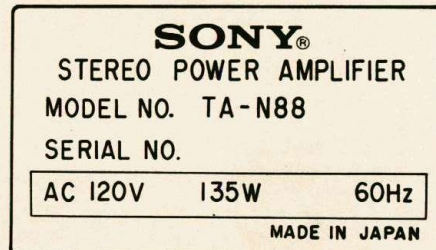
SONY[®]

SERVICE MANUAL

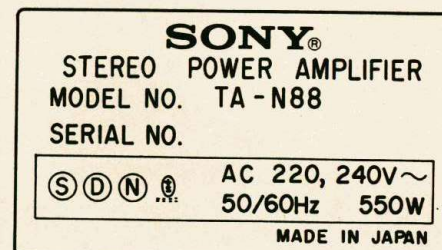
MODEL IDENTIFICATION

— Specification Label —

US model



AEP model



SECTION 1

OUTLINE

1-1. SERVICING NOTE

1. This set is utilizing pulse circuitry. Use an oscilloscope having a bandwidth of wider than 10MHz.
2. Be sure to discharge current completely before starting repair. This set uses V-FETs. Also this set utilizes 140-V voltage in the power supply and ± 120 -V voltage in the amplifier section. Accordingly, not only V-FETs but also many other components may easily be damaged if any com-

ponent lead wires or pattern foils are inadvertently shorted out by a screwdriver or a soldering iron due to the residual charge in the power-supply capacitors even when the power is turned off.

To prevent the damage of these components, be sure to discharge electrolytic capacitors, after turning the power off, in the power supply as shown in Fig. 1 every time the check or repair is required.

Note: All resistors are about 10 ohms.

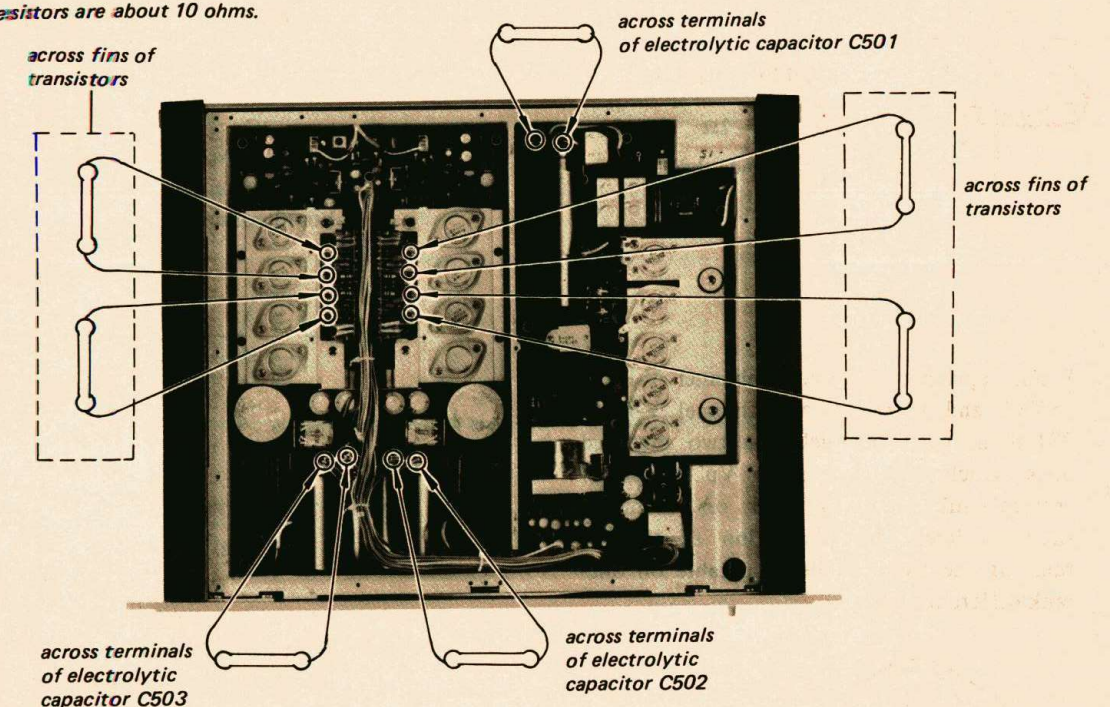


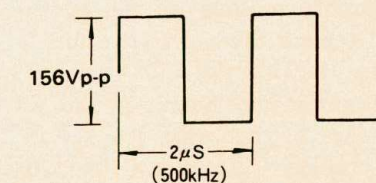
Fig. 1

3. Power Supply Checking

- a) ± 78 -V voltages should present on C502 and C503. Voltage adjustment can be made by RT401.
- b) If voltages on C502 and C503 cannot be adjusted by RT401 and higher voltages of about ± 100 V are present, check the switching transistor Q401 in the power supply.
- c) If voltages do not present on C502 and C503, check Q409 through Q412 of the inverter circuit in the power supply.

4. Power Amp Checking

- a) Check waveform at the drains of V-FETs of each channel. The following waveform should be obtained.



SECTION 1 OUTLINE

1-1. SERVICING NOTE

1. This set is utilizing pulse circuitry. Use an oscilloscope having a bandwidth of wider than 10MHz.
2. Be sure to discharge current completely before starting repair. This set uses V-FETs. Also this set utilizes 140-V voltage in the power supply and ± 120 -V voltage in the amplifier section. Accordingly, not only V-FETs but also many other components may easily be damaged if any com-

ponent lead wires or pattern foils are inadvertently shorted out by a screwdriver or a soldering iron due to the residual charge in the power-supply capacitors even when the power is turned off.

To prevent the damage of these components, be sure to discharge electrolytic capacitors, after turning the power off, in the power supply as shown in Fig. 1 every time the check or repair is required.

Note: All resistors are about 10 ohms.

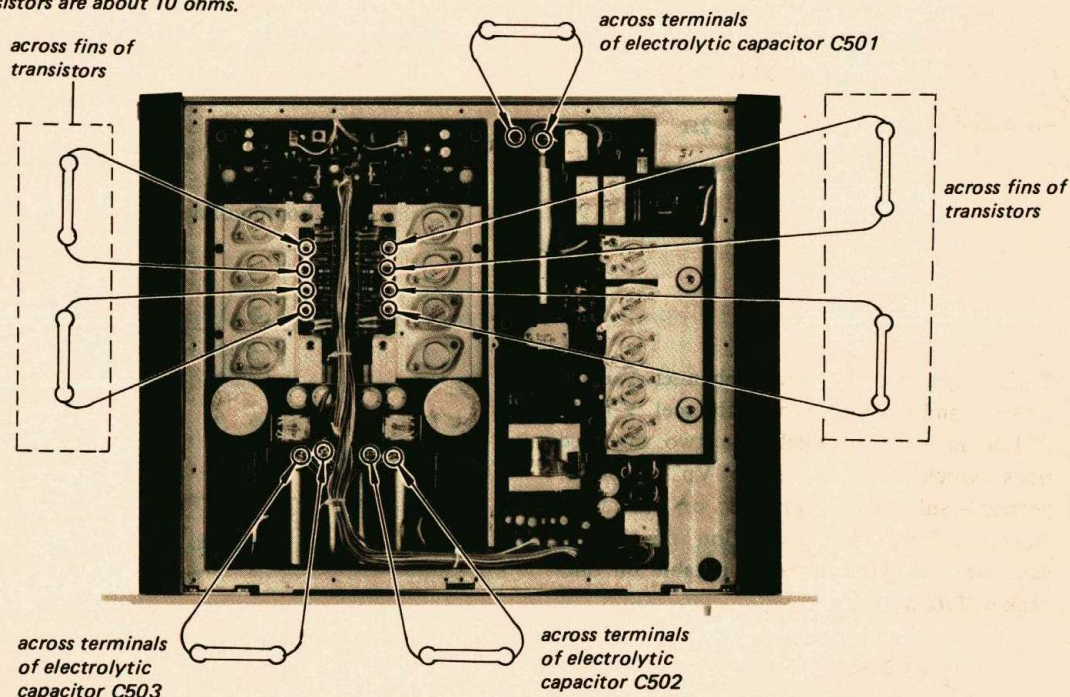


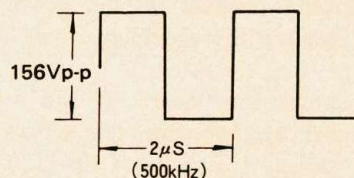
Fig. 1

3. Power Supply Checking

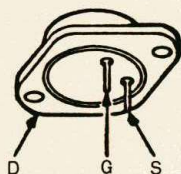
- a) ± 78 -V voltages should present on C502 and C503. Voltage adjustment can be made by RT401.
- b) If voltages on C502 and C503 cannot be adjusted by RT401 and higher voltages of about ± 100 V are present, check the switching transistor Q401 in the power supply.
- c) If voltages do not present on C502 and C503, check Q409 through Q412 of the inverter circuit in the power supply.

4. Power Amp Checking

- a) Check waveform at the drains of V-FETs of each channel. The following waveform should be obtained.

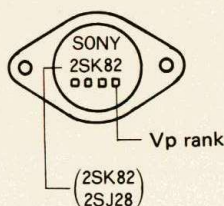


- b) If either of the L- or R-channels is out of order, the relay RY101 or RY151 of the associated channel opens. In this condition, no sound outputs come out from both channel's SPEAKER terminals.
5. Replacing V-FETs
- Completely discharge the power supply electrolytic capacitors as outlined in 2 above.
 - Remove V-FET by removing screws.
 - Check resistance readings of each two electrodes of V-FET using a VOM as follows.



VOM range: $\times 1\Omega$
 GOOD FETs show the following.
 S-D : $1 - 2\Omega$
 S-G } : diode characteristic
 D-G }

When replacing the two P-channel V-FETs 2SK82 and/or the two N-channel V-FETs 2SJ28 in each channel, use two matched ones which have the same V_p (pinch-off voltage)-rank figure printed on them as shown below. The fluctuation of the V_p rank of the two can be acceptable on one-rank-difference basis.

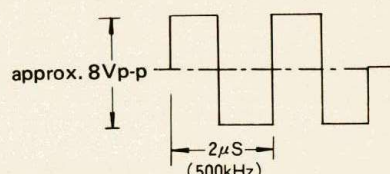


Do not install the new V-FETs yet until instructed to do so later.

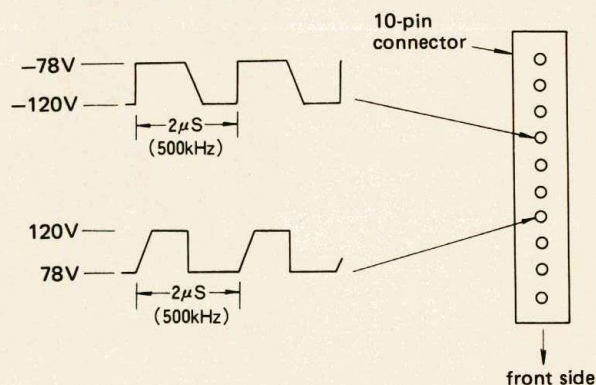
- Remove the power-drive board of the associated channel by removing two screws. Check the fusible resistors on the power-drive board. Replace those defective fusible resistors.
- Remove the power-amp board of the associated channel by removing ten screws. Replace the tantalum capacitor C104 220/6.3V (L-CH) or C154 220/6.3V (R-CH).
- Reattach the power amp board on the chassis.
- Temporarily make a solder connection to the lead of R119 100k Ω (L-CH) or R169 100k Ω (R-CH) for a checking purposes.

- h) Now the set has the power-drive board and V-FETs removed aside.
 Turn POWER ON.

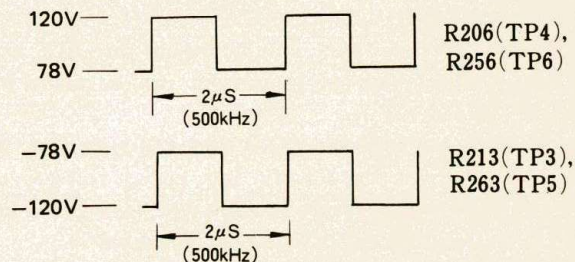
- i) Check the waveform at TP1 (L-CH) and TP2 (R-CH) for that shown below.
 Adjust RT101 (L-CH) or RT151 (R-CH) to make the levels of the positive and negative halves equal.
 Adjust T301 to obtain the specified pulse width.



- j) Check waveforms at pins 4 and 7 of the 10-pin connector to which the power-drive board connects.



- k) Turn POWER OFF.
- l) Install the power-drive board and V-FETs in place. Do not fasten V-FETs with screws yet, i.e., the drains are in the open-circuit condition.
- m) Turn POWER ON.
- n) Check waveforms at TP3, TP4 (L-CH) and TP5, TP6 (R-CH) as shown below.



- o) Turn POWER OFF and completely discharge electrolytic capacitors as outlined above.
- p) Fasten V-FETs with screws. Now the drains of V-FETs are electrically connected.
- q) Remove the solder joint made to R119 or R169 in step g).

1-2. CIRCUIT DESCRIPTION

1-2-1. Amplifier Section

a) High-Speed Input Attenuator

This attenuator is composed of FETs. This attenuator protects the amplifier by attenuating the input signal at a response speed of faster than $1\mu\text{sec}$ when SPEAKER terminals are erroneously shorted out or when an overloading input signal is applied, in both cases the current drain in the power-amplifier output stage V-FETs exceeds the rated value.

b) Carrier Oscillator

This oscillator is of the Colpits configuration, and generates a 500kHz signal.

This 500kHz signal is applied to the P-channel dual-transistor differential amplifier and this amplifier makes an even-duty square wave. This square-wave signal is then applied to the emitter followers for both the L and R channels. Thus the carrier signal is applied to the integrating circuit.

c) Integrating Circuit

To the input of the mirror integrating circuit, audio and 500kHz carrier signals are applied. In this integrator, a highly-accurate integration is made by subtracting the input and carrier signal component from the output signal.

Accordingly, this circuit has a very-wide bandwidth of dc – several MHz to transfer the audio and carrier signals. The first-stage of this integrator is composed of a dual FET which is connected to a current source. The second stage is composed of PNP-type transistors which has also a current source connected to it.

d) High-speed Comparator

An IC is used for the comparator to fit the very-high-speed response characteristics. This IC is composed of three differential amplifiers connected in series. This comparator functions with the input-level difference of less than 1mV, and the square-wave PWM output signal is obtained with the speed of less than 20nsec.

e) Power Driver

This circuit is to drive the final V-FETs for voltage amplification. This driver receives the PWM output signal of about 8Vp-p and amplifies it to 40Vp-p which is required to drive the gates of V-FETs in the power amplifier.

Transistors with a high f_T are used in a switching manner to maintain an ample driving capability, because the gate of V-FET has a rather large capacitive input load.

f) V-FET Switching Circuit

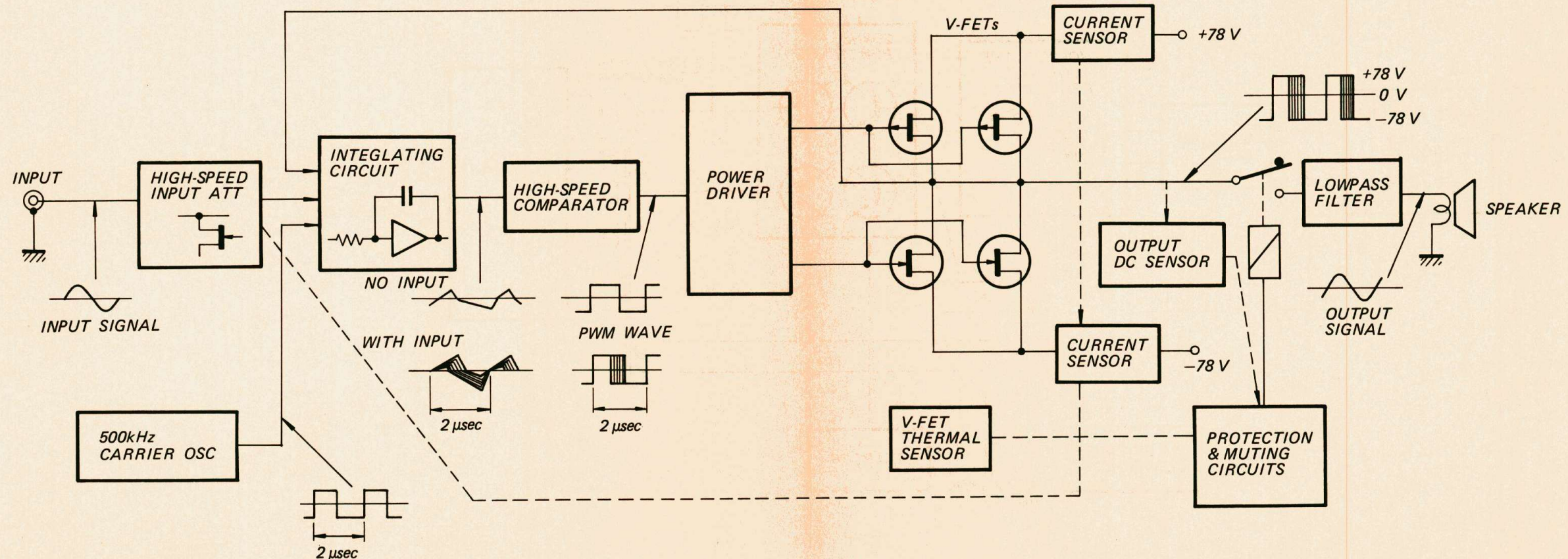
The newly-developed and high-power switching-purpose V-FETs are used in the parallel pushpull configuration. These V-FETs enable high-power switching of up to 160V/10A at a response time of 50n sec.

g) Lowpass Filter

This filter is to draw the audio signal out of the pulse-width-modulated signal. This filter is composed of choke coils and capacitors and has a low insertion loss. The frequency response of this set is determined by this filter.

h) Protectors

This amplifier is equipped with 1) current sensor to protect V-FETs from damaging in case of short circuiting, large-current output operation or a over-the-rating operation; 2) thermal sensor to cut the speaker circuit off when the temperature of V-FET exceeds 90°C (194°F) under a high ambient temperature, a long and continuous operation or during measurement; 3) dc sensor to protect speakers in case of generation of dc component under dc input or an abnormal circuit operation.



1-2-2. Pulse-locked Power Supply

The power transfer capability of the core-type power transformers increase in proportion to the line frequency used. However, most of the conventional core-type power transformers are used under the line frequency of 50Hz or 60Hz, and they are big in size and heavy in weight.

By utilizing the pulse-locked power supply technique, it is quite possible to make very-small, light-weight and large-capacity power supplies using built-in 20kHz generator.

a) Primary Rectifying Circuit

In ac operation, ac input of 90 to 130V or 220 to 240V is bridge-rectified and the output of 130 to 168V dc is obtained.

In dc operation, dc input of 110 to 140V or 240 to 300V is directly used regardless of the input polarities.

b) Chopper-type Voltage Regulator

The 20kHz control pulse drives the switching transistors and a constant output voltage of

110Vp-p is obtained.

c) Pulse-width Control Circuit

This circuit utilizes the square wave generated in the 20kHz power oscillator to make a triangle wave. The level of the triangle wave is compared with the internal reference voltage and a control pulse is made to maintain the output voltage of the chopper-type voltage regulator constant.

d) 20kHz Power Oscillator

This circuit generates a stable and high-power 20kHz pulse by using four high-power switching transistors in the full-bridge self-oscillating circuit configuration.

e) Ferrite-core Transformer

The ferrite-core transformer transfers the 20kHz pulse signal and this serves the functions of the conventional power transformer. This transformer features a low-loss,

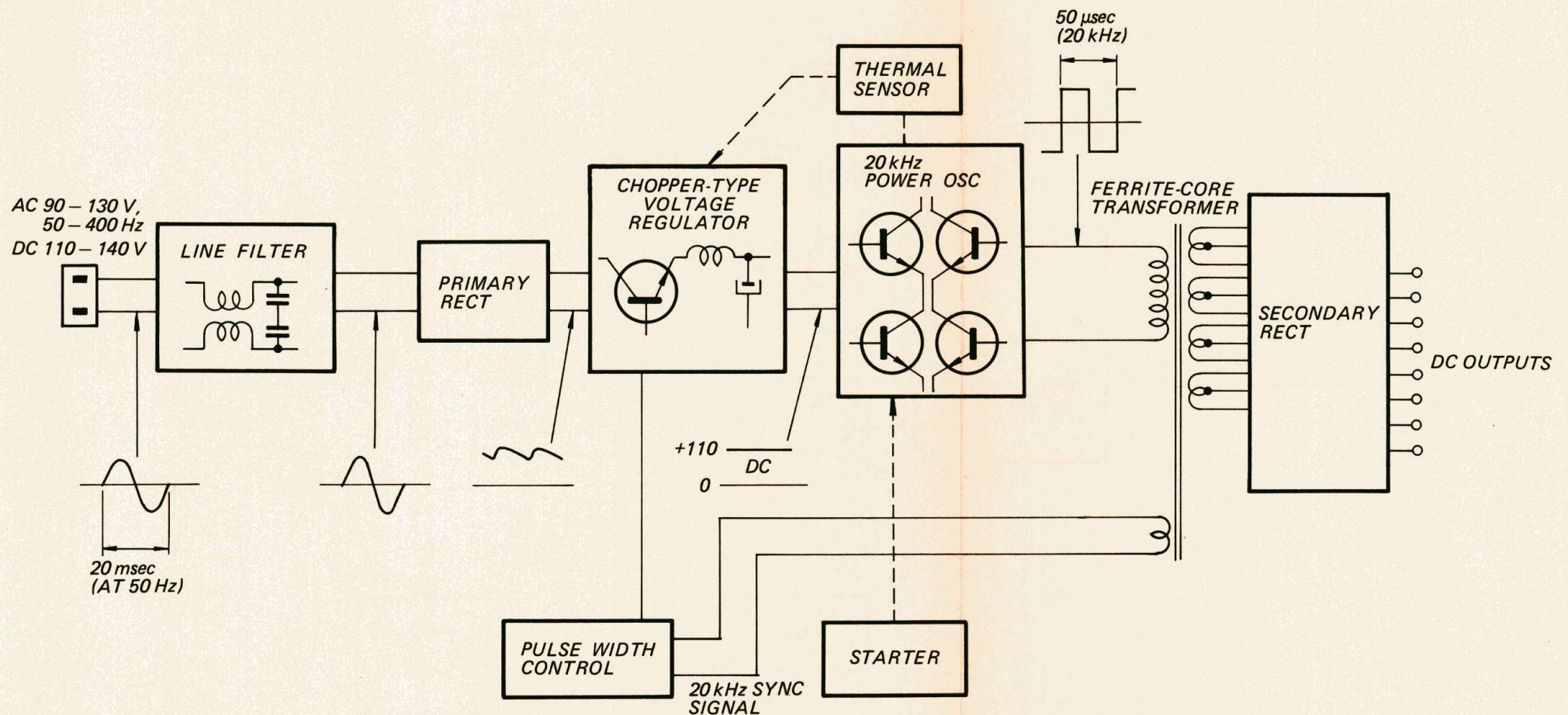
high-permeability and a high-saturation magnetic-flux density operation at the high frequency of 20kHz.

This transformer also has a doubled electrostatic shield in itself to reduce the radiation of the switching noise to a minimum possible value.

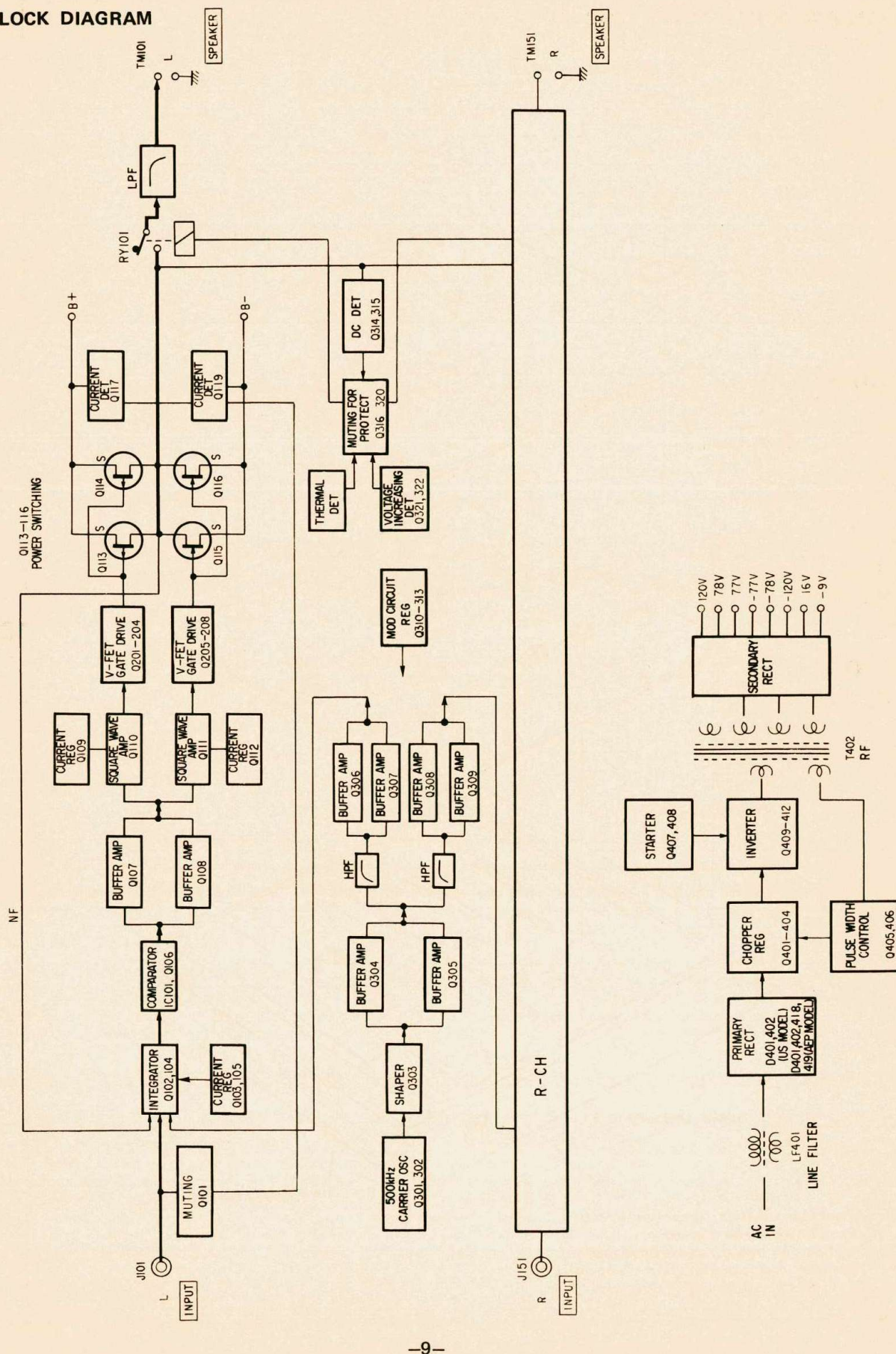
This transformer has a power-transfer capability of sixty times that of the conventional power transformers for 50Hz- or 60Hz-line use, and also has a superior voltage regulation between the primary and secondary windings by shortening the total length of wire of the windings.

f) Secondary Rectifying Circuit

This circuit provides several kinds of dc voltages needed for the respective stages of the power amplifier. These voltage are well regulated and very stable.



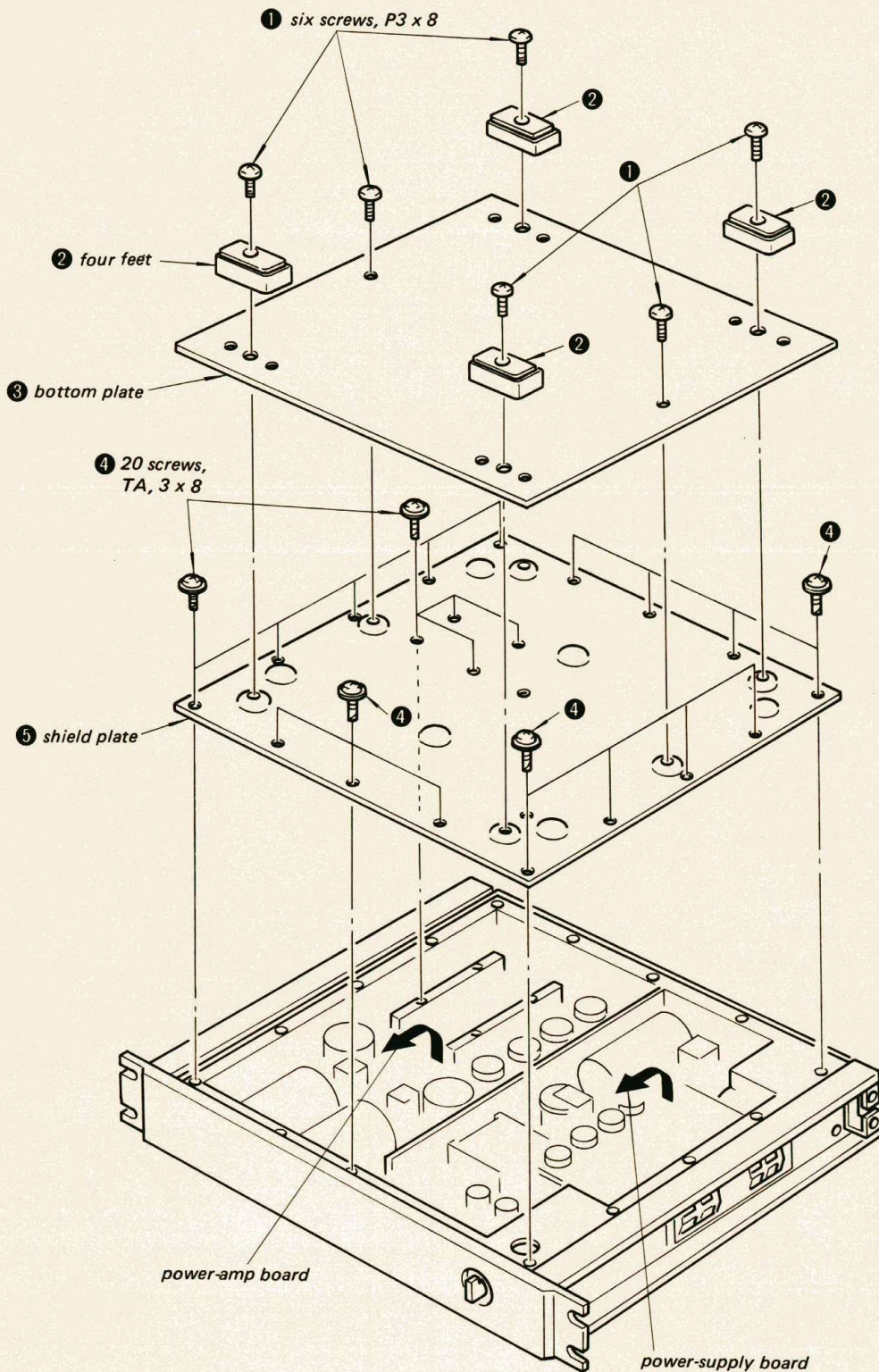
1-3. BLOCK DIAGRAM



SECTION 2 DISASSEMBLY

Note: Remove in the numerical order.

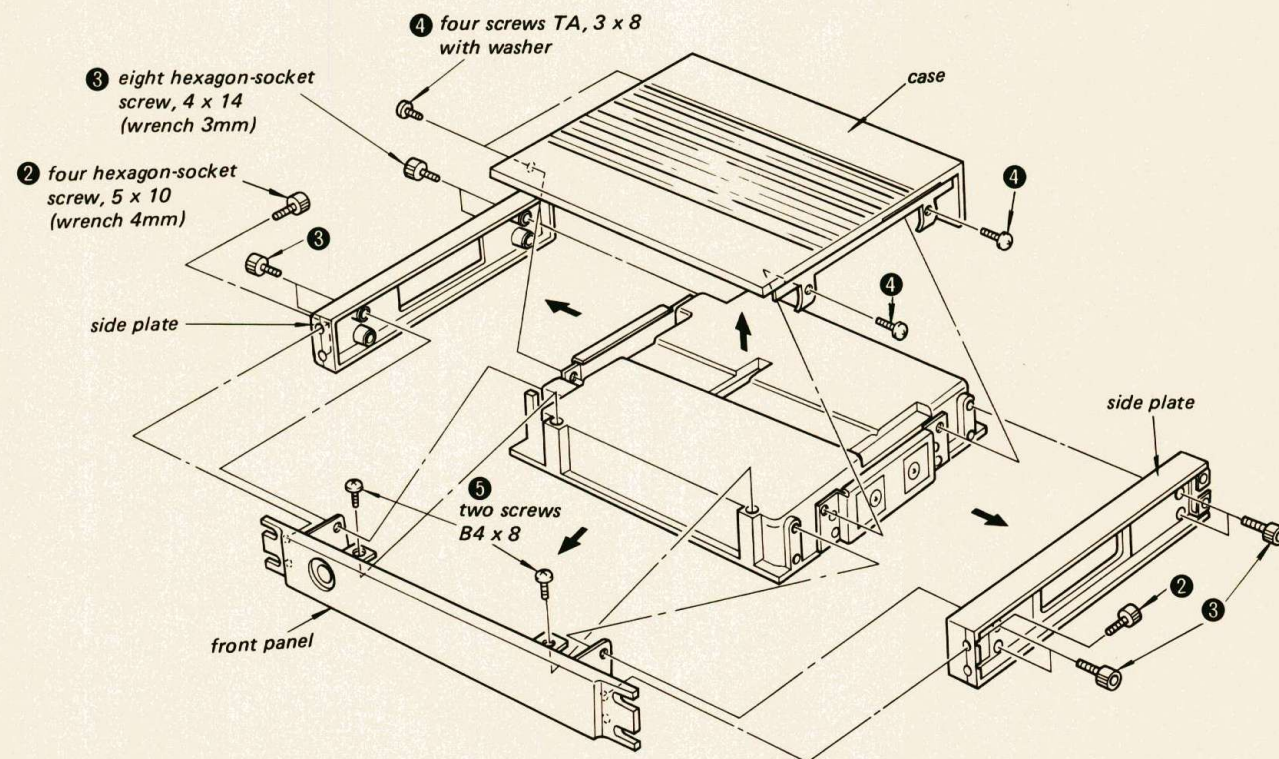
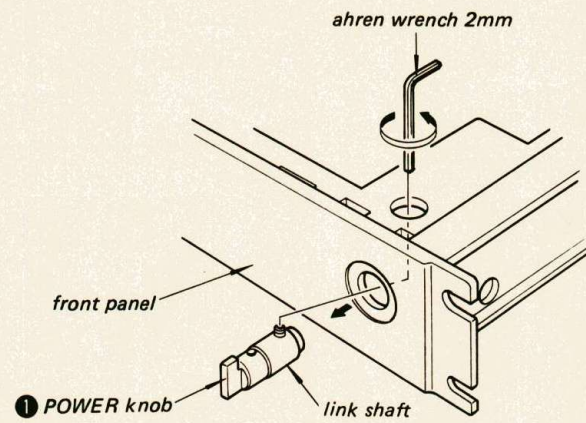
BOTTOM AND SHIELD PLATE REMOVAL



Note: Under this condition, component sides of circuit board can be checked.
To check foil side(s), remove screws which fasten circuit board(s) and turn the board(s) in the direction shown by the arrow(s).

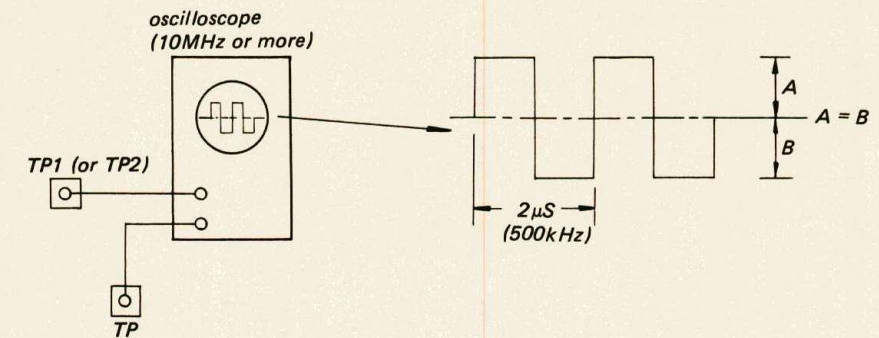
SECTION 3 ADJUSTMENTS

PANEL REMOVAL



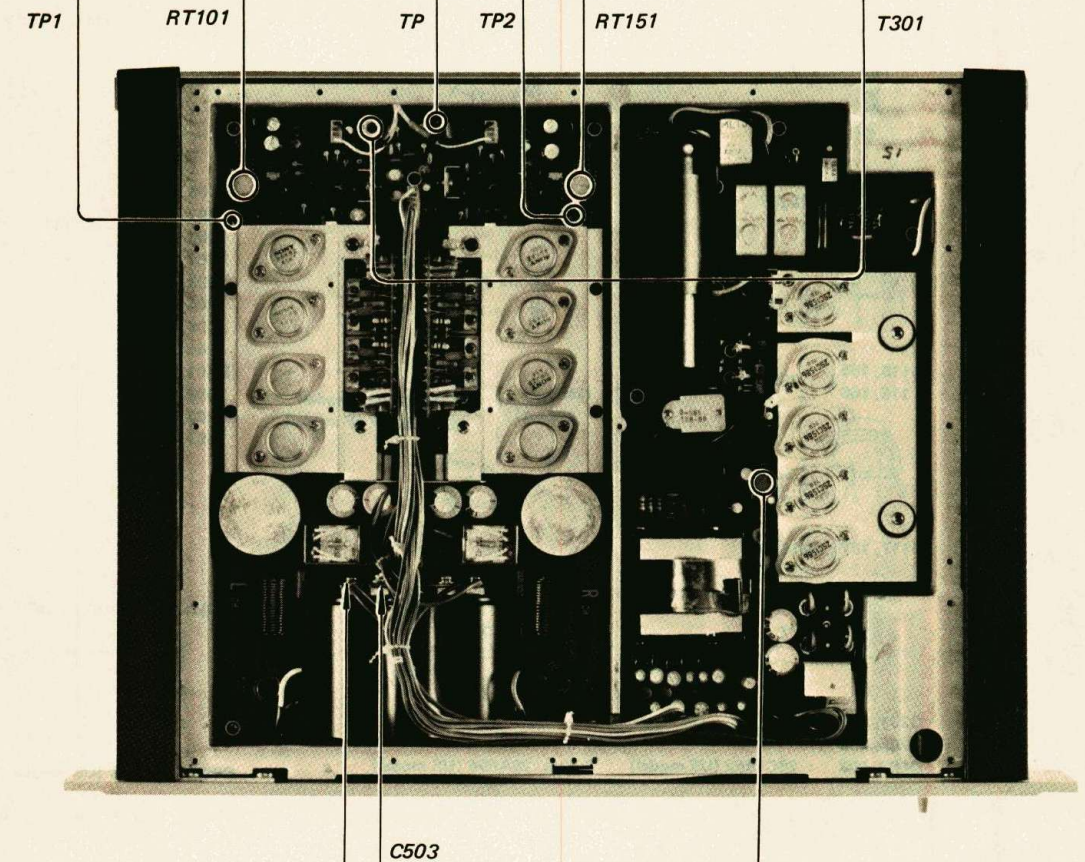
PULSE LEVEL ADJUSTMENT

Adjust RT101 (L-CH) and RT151 (R-CH) to make the positive and negative halves of the square wave at TP1 (L-CH) and TP2 (R-CH) equal.



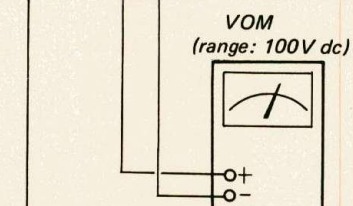
OSCILLATION FREQUENCY ADJUSTMENT

Adjust T301 so that the pulse width of the pulse at TP1 (L-CH) or TP2 (R-CH) becomes 2μsec (500kHz).



VOLTAGE ADJUSTMENT

Adjust RT401 for a 78V reading on the VOM.



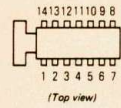
SECTION 4 DIAGRAMS

4-1. MOUNTING DIAGRAMS

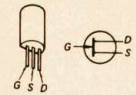
Replacement Semiconductors

For replacement, use semiconductors except in ().

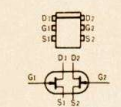
IC101, 151: CX034



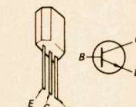
Q101, 151: 2SK43-5
(2SK43-6)



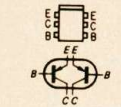
Q102, 152: 2SK58



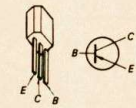
Q103, 153,
105, 155,
107, 157,
301, 304,
306, 308,
314-316,
321, 322,
408
119, 169 : 2SC926A



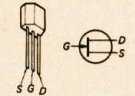
Q106, 156,
302, 406 : 2SA884



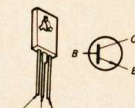
Q104, 154,
108, 158,
305, 307,
309,
317-320,
407 : 2SA678



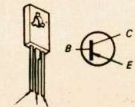
Q109, 159,
112, 162 : 2SK23A-940
310, 311 : 2SK23A-840 (blue)



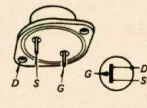
Q110, 160: 2SC1904



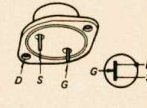
Q111, 161: 2SA899



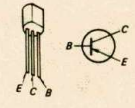
Q113, 163,
114, 164 : 2SJ28



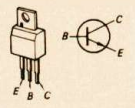
Q115, 165,
116, 166 : 2SK82



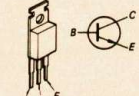
Q117, 167: 2SA639S



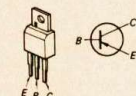
Q201, 251,
205, 255 : 2SC1124
Q402, 403 : 2SC1962 (US model)



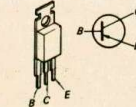
Q202, 252,
206, 256 : 2SC1173 (yellow)
Q313 : 2SC1061



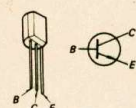
Q203, 253,
207, 257 : 2SA706



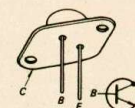
Q204, 254,
208, 258 : 2SA473 (yellow)
Q312 : 2SA671



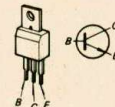
Q303: 2SC710



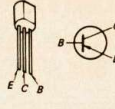
Q401,
409-412 : 2SC1586 (US model)
2SC2190 (AEP model)



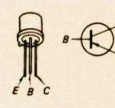
Q402, 403, 405: 2SC1810 (AEP model)



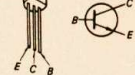
Q404: 2SA896 (US model)



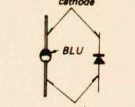
2SA911 (AEP model)



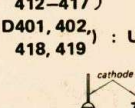
Q405: 2SC1811
(US model)



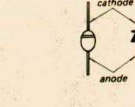
D101, 151: MV12N



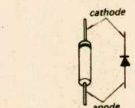
D102, 152,
103, 153,
412-417 : V09C



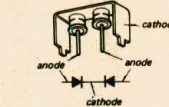
D401, 402,
418, 419 : U05G (AEP model)



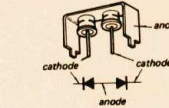
D106, 156,
107, 157,
201, 251,
202, 252 : 1S1587
D203, 253,
204, 254,
205, 255,
206, 256 : 1S1555
D301, 302,
306, 307,
D403, 406,
407



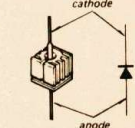
D401: S5151 (US model)



D402: S5151R (US model)



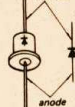
D404, 420: UF3



D405: EQB01-09

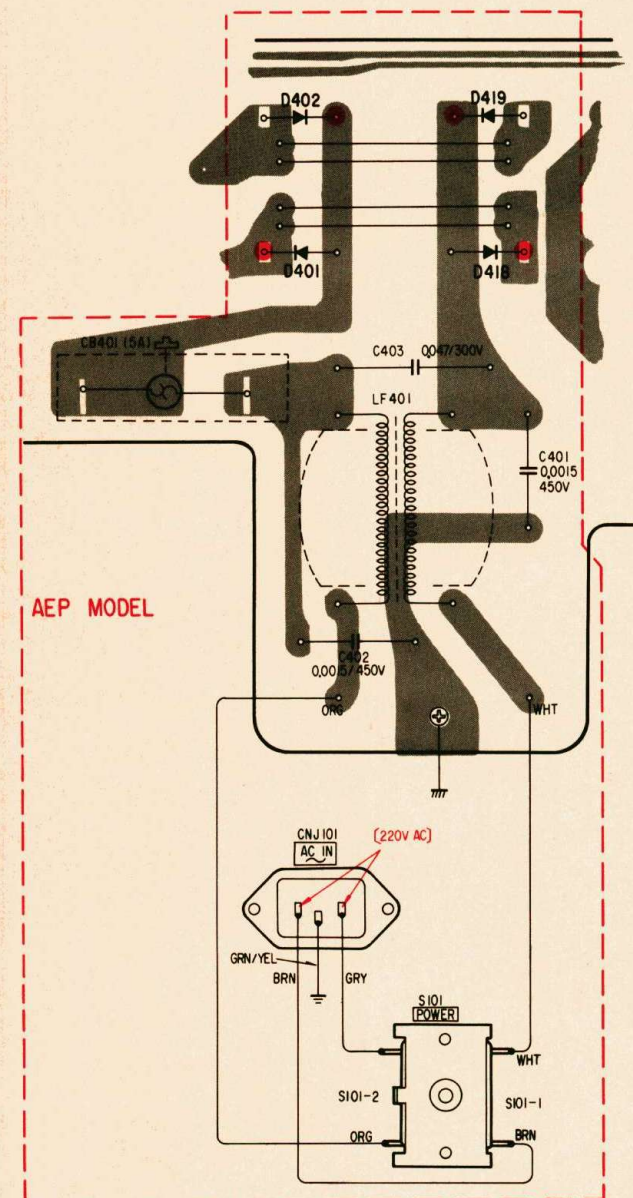


D408-411: S34

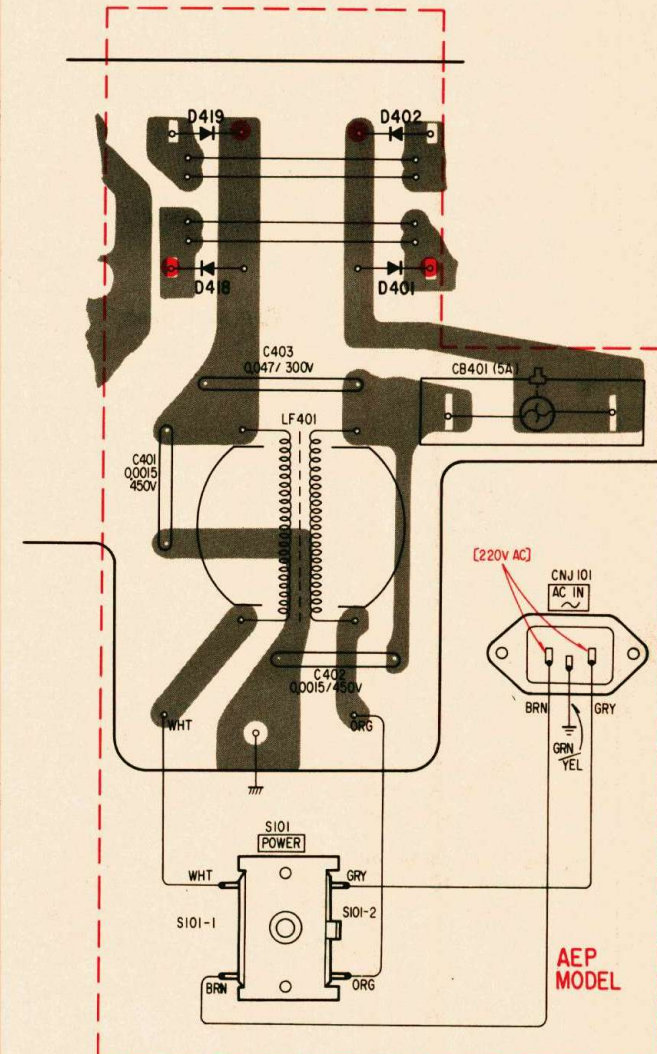


— Power Supply Input Section (AEP model) —

— Conductor Side —



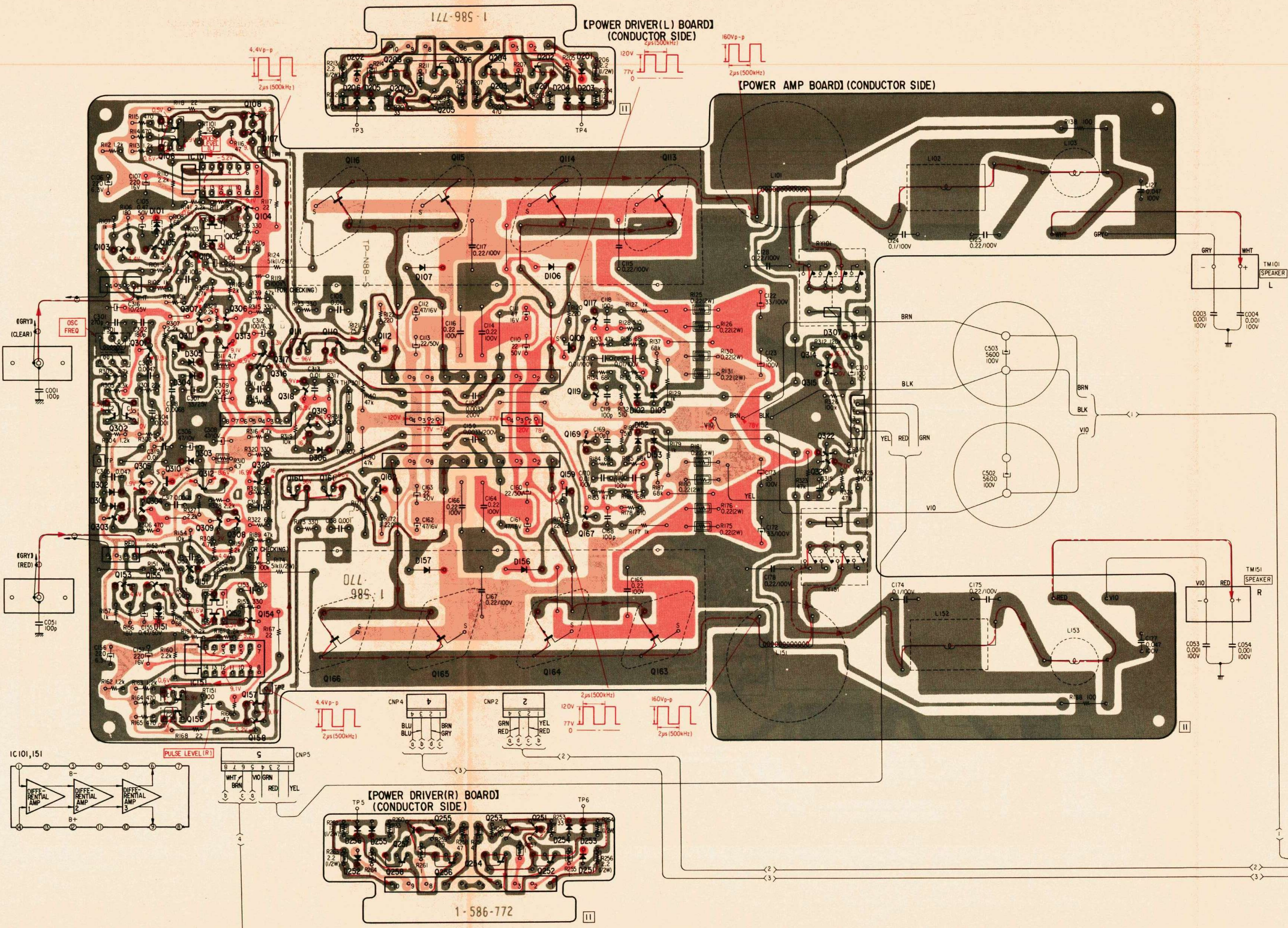
— Component Side —



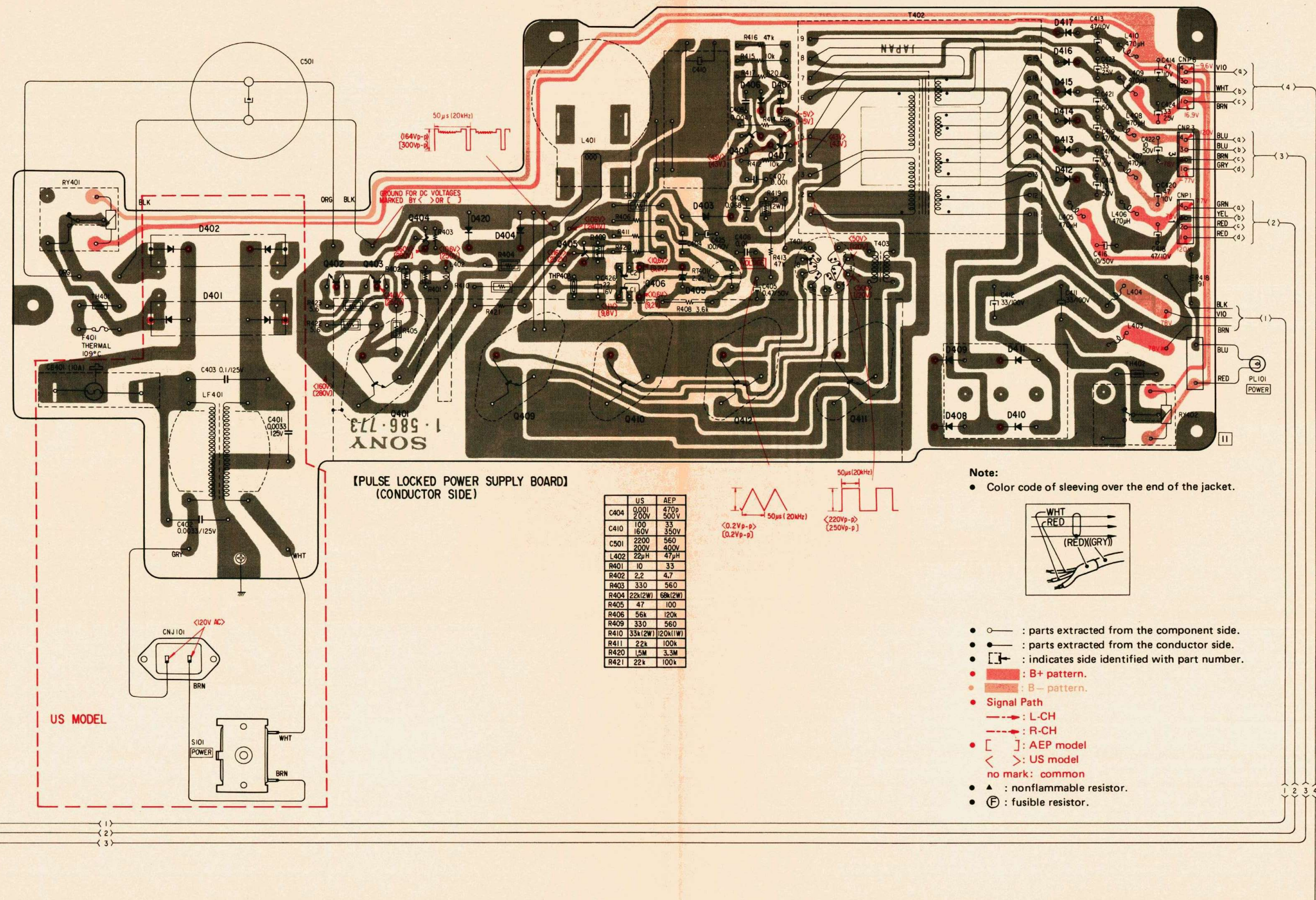
4-2. MOUNTING DIAGRAM (2)

— Conductor Side —

Q, IC	D
208, 204 206, 202	202, 201
207, 203 205, 201	206, 204 205, 203
106 107	
IC101	
116 115 114 113	
104	101
102	
103, 105 101	107, 106
307, 306 117	307
301, 311 315 109 112 316 314 315	305 304
318 119 102, 103	
302	
319	
169 152, 153 322 303	
305, 310 312, 320 160, 161	302
304 159 167	301
303, 308	
151 157, 156	
153, 155	
152	151
166 165 164 163	
IC151	
156 157	
158	
257, 253 255, 251	256, 254 255, 253
258, 254 256, 252	252, 251
Q, IC	D



Q	402 401	403 401	404	409 404	405 410	408 407	411	409 408	411 410	412 417	D
D											



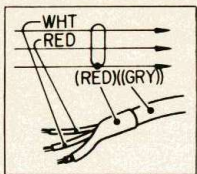
US MODEL

4-2. MOUNTING DIAGRAM

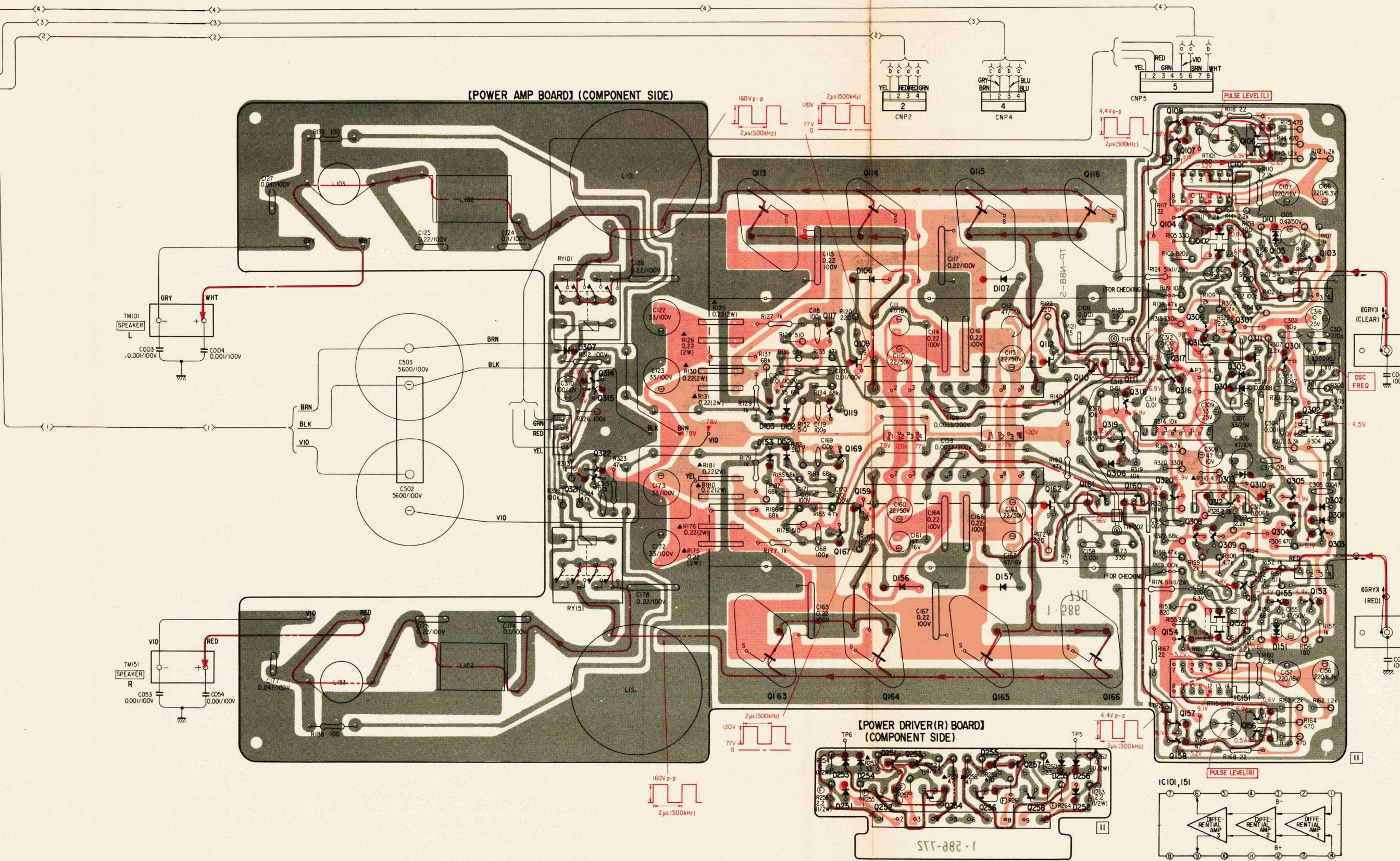
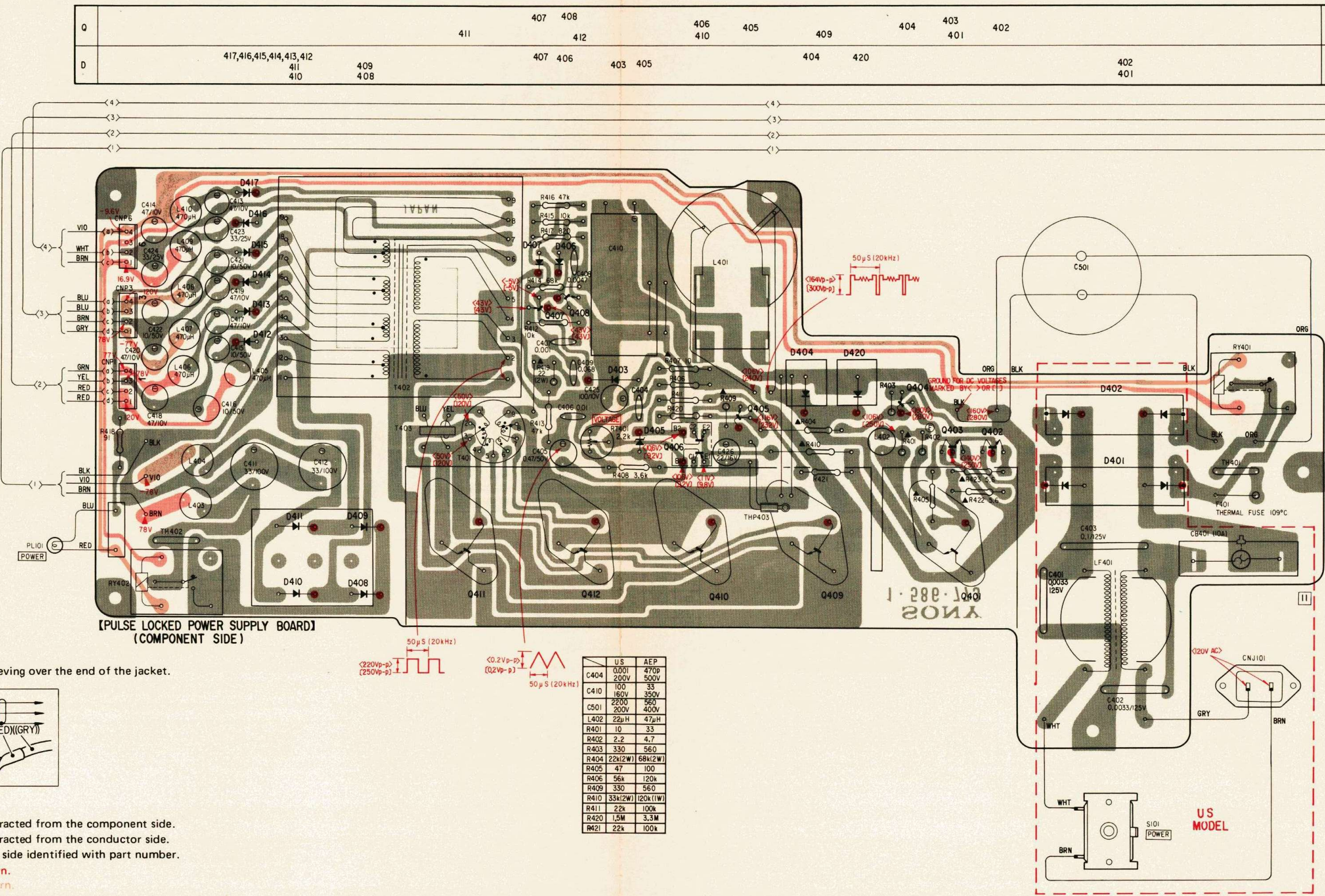
— Conductor Side —

Note:

- Color code of sleeving over the end of the jacket.

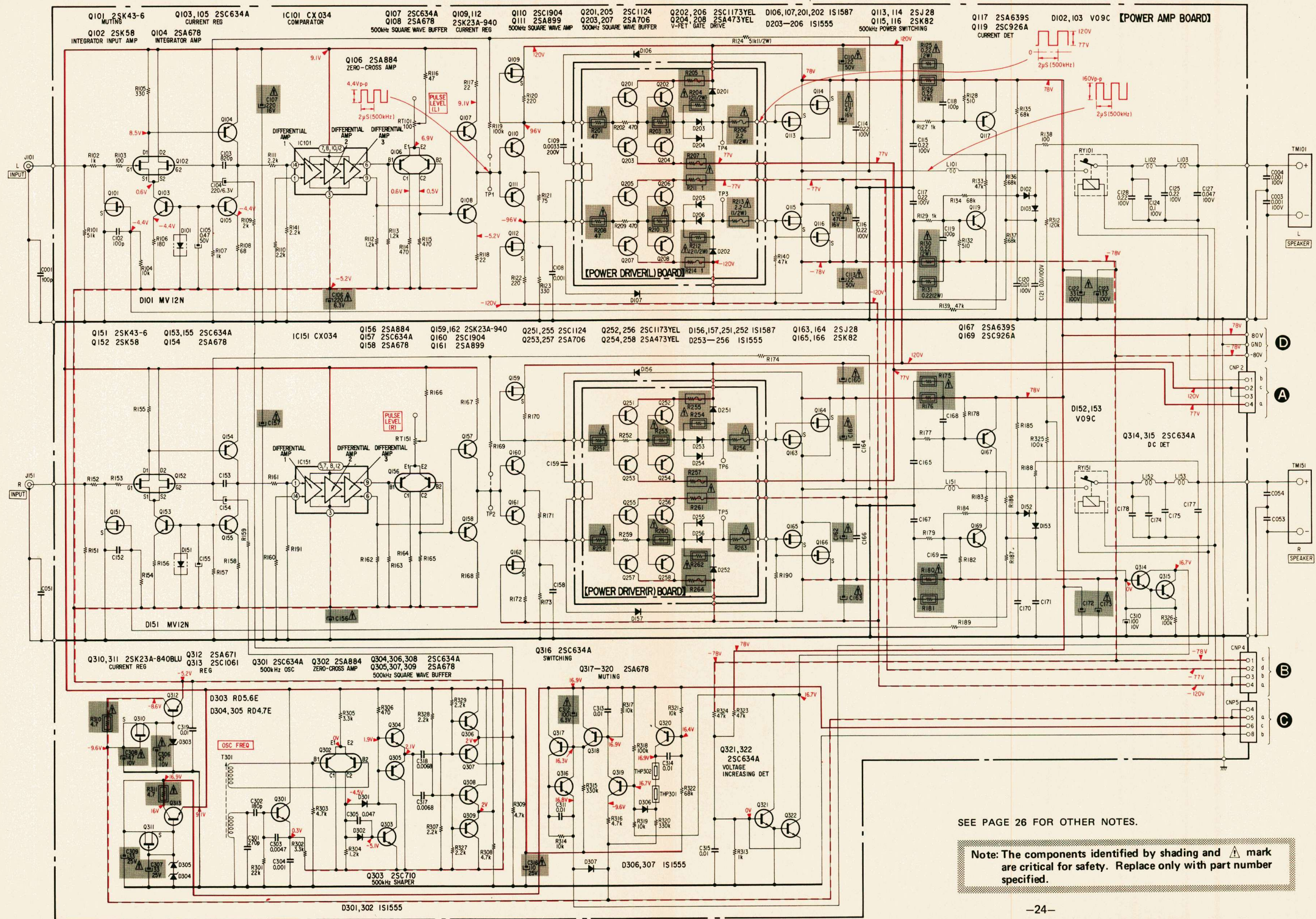


- ○ : parts extracted from the component side.
- ● : parts extracted from the conductor side.
- [] : indicates side identified with part number.
- [] : B+ pattern.
- [] : B- pattern.
- Signal Path
 - : L-CH
 - - - : R-CH
- [] : AEP model
- < > : US model
- no mark : common
- ▲ : nonflammable resistor.
- ⊕ : fusible resistor.



Q, IC	D
202, 206 204, 208	201, 202
201, 205 203, 207	203, 205 204, 206
108	
107, 106	
IC101	
103	104
102	101
105, 103	
101	106, 107
107	306, 307
303	307
109	310, 311
314	317
315	316
318	103, 102
319	302
169	153, 152
322	303
161, 160	302
312	310, 305
163	308, 309
164	303
165, 166	167
151	156, 157
155, 153	
152	151
154	
163	
164	
165, 166	
157, 156	
158	
251, 255 253, 257	253, 255 254, 256
252, 256 254, 258	251, 252
Q, IC	D

4-3. SCHEMATIC DIAGRAM — Amplifier Section —



SEE PAGE 26 FOR OTHER NOTES.

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

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

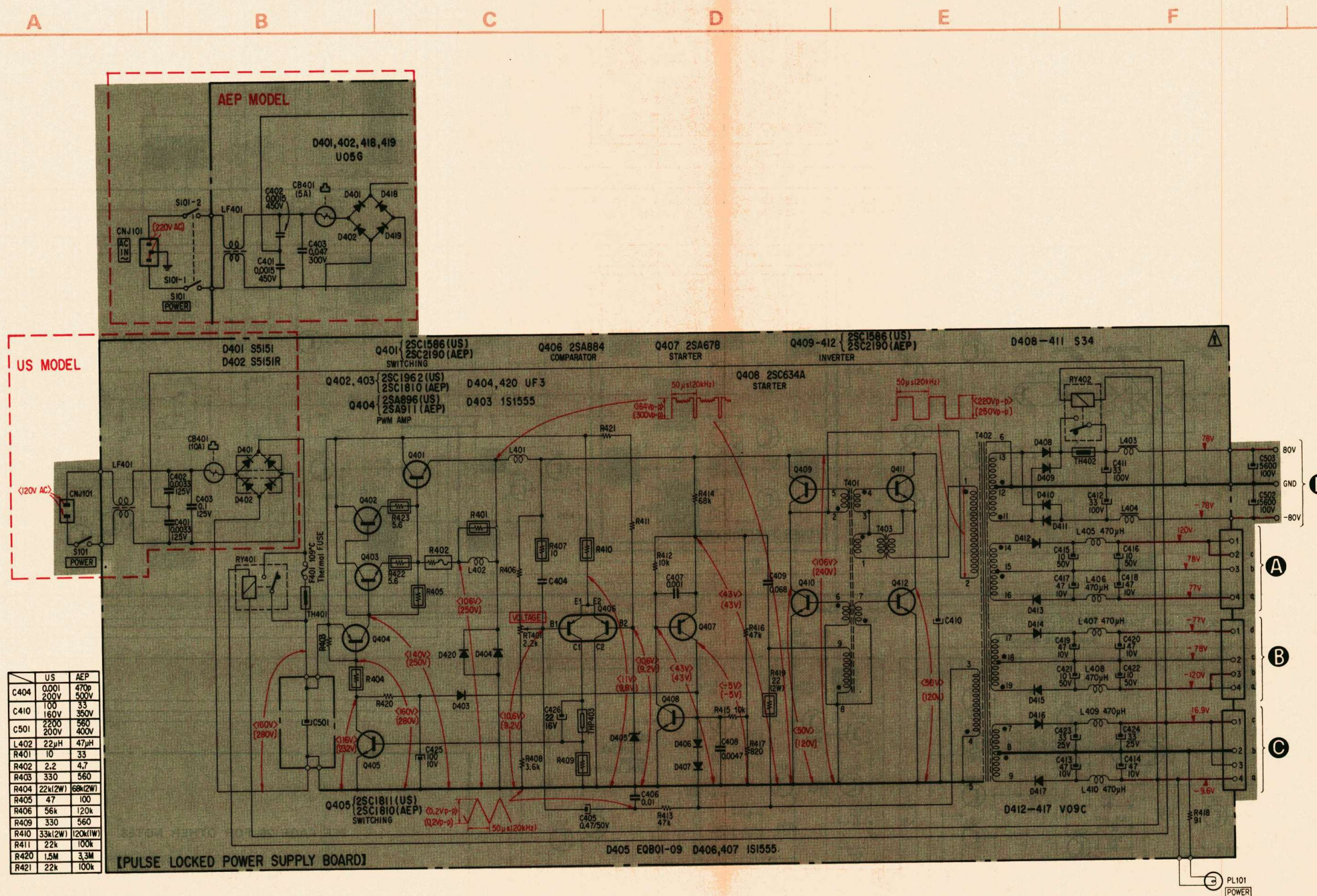
4-4. SCHEMATIC DIAGRAM — Power Supply Section —

Note:

- All capacitors are in μF unless otherwise noted. $\text{pF} = \mu\text{F}$ 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, $\frac{1}{4}\text{W}$ 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.
- $\square$: nonflammable resistor.
- $\square$: fusible resistor.
- --- : B+ bus.
- $\square$: panel designation.
- $\square$: adjustment for repair.
- --- : B- bus.
- Voltages are dc with respect to ground unless otherwise noted.

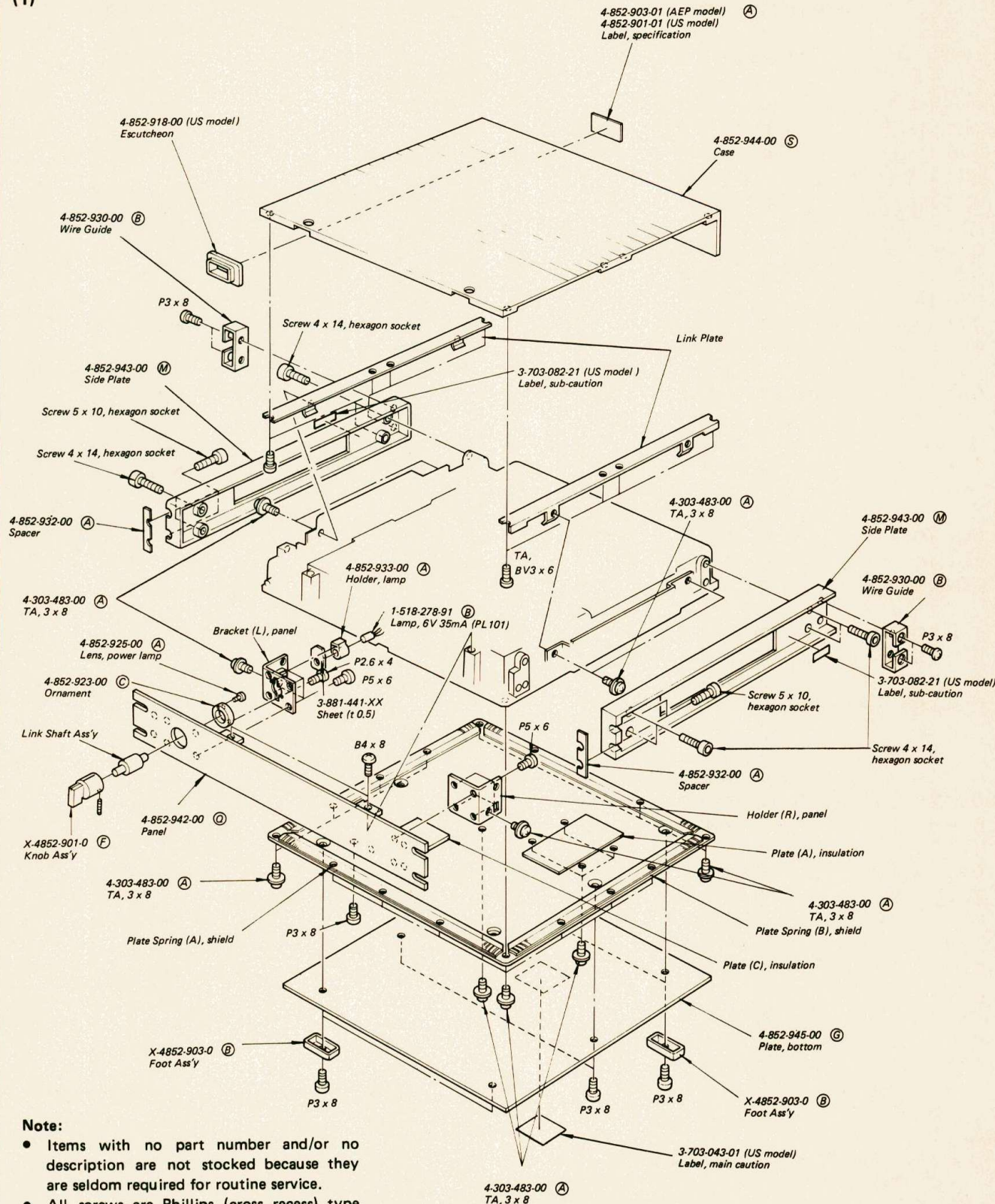
- Readings are taken under no signal conditions with a VOM (20k Ω /V).
- [] : AEP model
- < > : US model
- no mark: common
- Voltage variations may be noted due to normal production tolerances.
- Switch

Ref. No.	Switch	Position
S101	POWER	OFF



SECTION 5 EXPLODED VIEWS

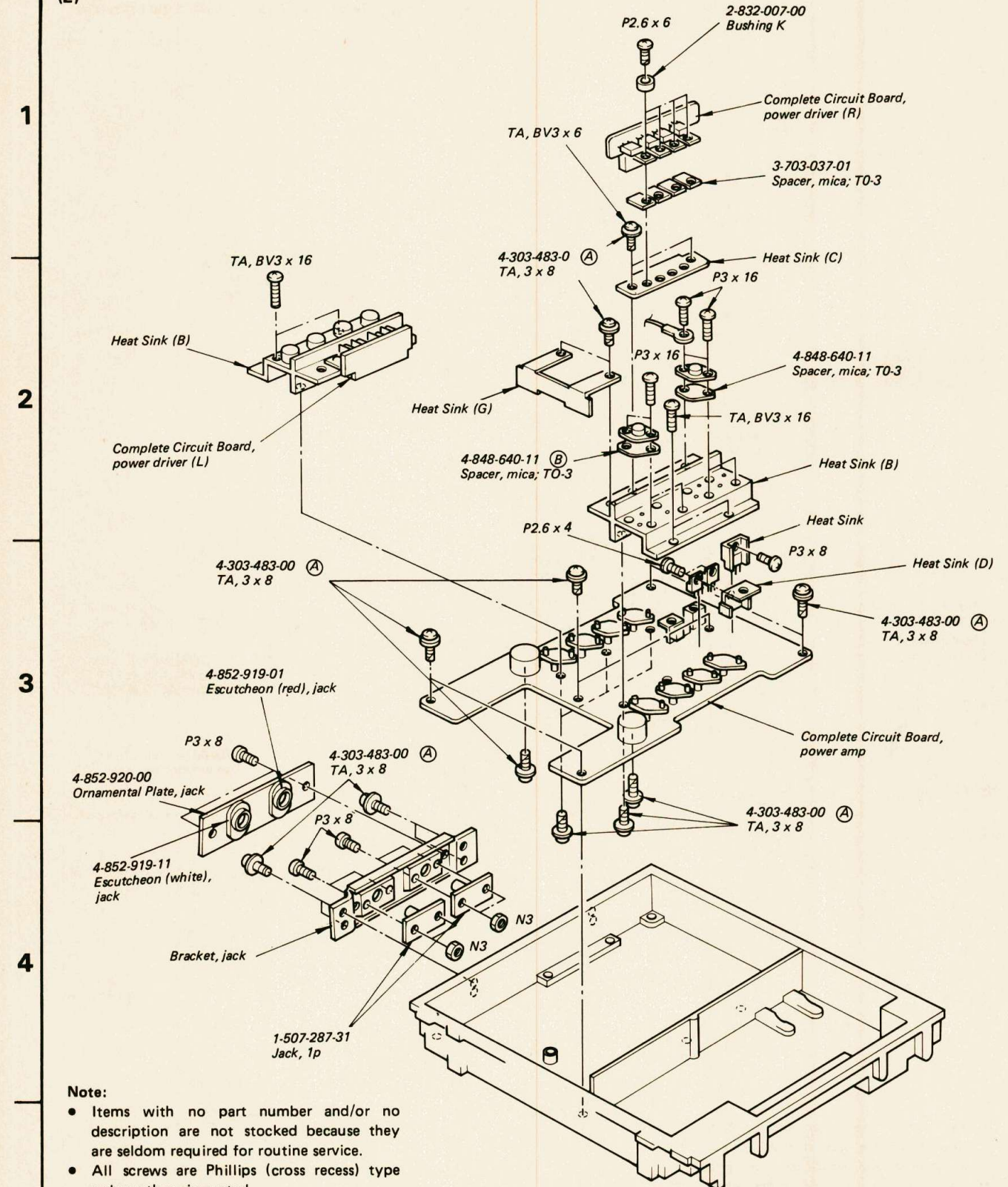
(1)



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.

(2)

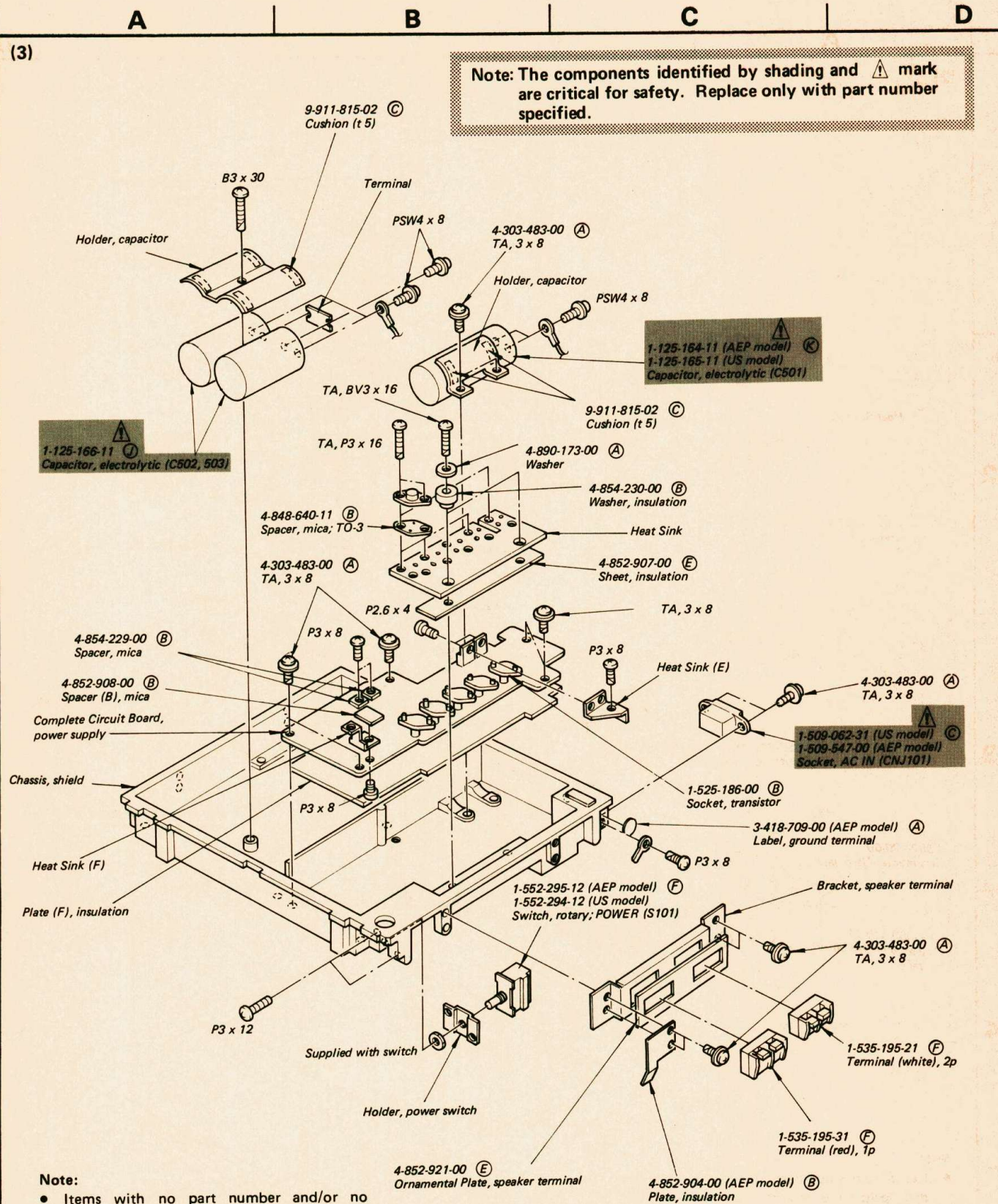


Note:

- 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:**
- 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.

<i>Ref. No.</i>	<i>Part No.</i>	<i>Description</i>
-----------------	-----------------	--------------------

SEMICONDUCTORS

Transistors

⇒ Q101, 151	Ⓒ 2SK43-5
Q102, 152	Ⓕ 2SK58
Q103, 153	Ⓓ 2SC634A
Q104, 154	Ⓒ 2SA678
Q105, 155	Ⓓ 2SC634A
Q106, 156	Ⓓ 2SA884
Q107, 157	Ⓓ 2SC634A
Q108, 158	Ⓒ 2SA678
Q109, 159	Ⓓ 2SK23A-940
Q110, 160	Ⓓ 2SC1904
Q111, 161	Ⓒ 2SA899
Q112, 162	Ⓓ 2SK23A-940
Q113, 163	Ⓐ 2SJ28
Q114, 164	Ⓐ 2SJ28
Q115, 165	Ⓓ 2SK82
Q116, 166	Ⓓ 2SK82
Q117, 167	Ⓒ 2SA639S
Q119, 169	Ⓓ 2SC926A
Q201, 251	Ⓒ 2SC1124
Q202, 252	Ⓒ 2SC1173 yellow
Q203, 253	Ⓓ 2SA706
Q204, 254	Ⓒ 2SA473 yellow
Q205, 255	Ⓒ 2SC1124
Q206, 256	Ⓒ 2SC1173 yellow
Q207, 257	Ⓓ 2SA706
Q208, 258	Ⓒ 2SA473 yellow
Q301	Ⓓ 2SC634A
Q302	Ⓓ 2SA884
Q303	Ⓓ 2SC710
Q304	Ⓓ 2SC634A
Q305	Ⓒ 2SA678
Q306	Ⓓ 2SC634A
Q307	Ⓒ 2SA678
Q308	Ⓓ 2SC634A
Q309	Ⓒ 2SA678

Note:

- $\Rightarrow$: Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.

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

<u>Ref. No.</u>	<u>Part No.</u>	<u>Description</u>
-----------------	-----------------	--------------------

Q310, 311	(C) 2SK23-840 blue
Q312	(E) 2SA671
Q313	(D) 2SC1061
Q314-316	(B) 2SC634A
Q317-320	(C) 2SA678

Q321, 322 (B) 2SC634A

Q401		(L) 2SC2190 (AEP model) 2SC1586 (US model)
Q402, 403		(E) 2SC1810 (AEP model) 2SC1962 (US model)
Q404		(H) 2SA911 (AEP model) 2SA896 (US model)
Q405		(E) 2SC1810 (AEP model) 2SC1811 (US model)
Q406		(D) 2SA884
Q407		(C) 2SA678
Q408		(B) 2SC634A
Q409-412		(L) 2SC2190

IC

IC101, 151 ① CX034

Diodes

D101, 151 Ⓑ MV12N
D102, 152 Ⓑ V09C
D103, 153 Ⓑ V09C
D106, 156 Ⓑ 1S1587
D107, 157 Ⓑ 1S1587

D201, 251	ⓑ	1S1587
D202, 252	ⓑ	1S1587
D203-206,		
D253-256	ⓑ	1S1555
	ⓑ	
D301, 302	ⓑ	1S1555
D303	ⓑ	RD5.6E
D304, 305	ⓑ	RD4.7E
D306, 307		1S1555

D401, 402		(C) U05G (AEP model)
D401		S5151 (US model)
D402		S5151R (US model)
D403		(B) 1S1555
D404		(E) UF3
D405		(B) EQB01-09
D406, 407		(B) 1S1555

Note:

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

Note:

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

Ref. No. Part No. Description

D408-411	⚠	(C) S34
D412-417	⚠	(B) V09C
D418, 419	⚠	(C) U05G (AEP model)
D420	⚠	(E) UF3

Thermistors

Th401, 402	⚠	1-800-356-00	(E) negative
ThP301, 302	⚠	1-800-340-21	(B) positive
ThP403	⚠	1-800-340-11	(B) positive

COILS

L101, 151	⚠	1-421-332-00	Choke (US model)
L401	⚠	1-421-331-00	Choke (US model)
L401	⚠	1-421-335-00	(H) Choke (AEP model)
L402	⚠	1-407-161-XX	22μH, microinductor (US model)
L402	⚠	1-407-165-XX	(A) 47μH, microinductor (AEP model)
L403, 404	⚠	1-421-329-00	(B) Choke
L405-410	⚠	1-407-488-31	(B) 470μH, microinductor

TRANSFORMERS

T301	⚠	1-405-391-11	(B) Coil, osc frequency adj.
T401	⚠	1-435-057-00	(E) Osc
T402	⚠	1-442-960-00	Converter (US model)
T402	⚠	1-442-961-00	(N) Converter (AEP model)
T403	⚠	1-543-098-00	(B) Core

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted. 50WV or less are not indicated except for electrolytics.

pF = μμF, elect = electrolytic

C1, 51	⚠	1-102-975-11	(A) 100p	
C3, 53	⚠	1-108-365-12	(A) 0.001	100V mylar
C4, 54	⚠			
C102, 152	⚠	1-102-975-11	(A) 100p	
C103, 153	⚠	1-104-075-11	(B) 820p	polystyrol
C104, 154	⚠	1-131-427-11	(F) 220	6.3V tantalum
C105, 155	⚠	1-121-726-11	(A) 0.47	50V elect
C106, 156	⚠	1-123-198-11	(B) 220	6.3V elect

Ref. No. Part No. Description

C107, 157	⚠	1-123-068-11	(B) 220	16V elect
C108, 158	⚠	1-102-074-11	(A) 0.001	
C109, 159	⚠	1-108-686-12	(A) 0.0033	200V mylar
C110, 160	⚠	1-123-056-11	(B) 22	50V elect
C111, 161	⚠	1-123-192-11	(A) 47	16V elect
C112, 162	⚠			
C113, 163	⚠	1-123-056-11	(B) 22	50V elect
C114-117	⚠	1-130-085-11	(B) 0.22	100V polyethylene
C164-167	⚠			
C118, 168	⚠	1-102-975-11	(A) 100p	
C119, 169	⚠			

C120, 170	⚠	1-106-196-12	(B) 0.01	100V mylar
C121, 171	⚠			
C122, 172	⚠	1-123-287-11	(C) 33	100V elect
C123, 173	⚠			
C124, 174	⚠	1-108-638-12	(B) 0.1	100V mylar
C125, 175	⚠	1-130-085-11	(B) 0.22	100V polyethylene
C127, 177	⚠	1-108-634-12	(A) 0.047	100V mylar
C128, 178	⚠	1-130-085-11	(B) 0.22	100V polyethylene

C301	⚠	1-104-063-11	(B) 270p	polystyrol
C302	⚠	1-104-059-11	(B) 180p	polystyrol
C303	⚠	1-108-234-12	(A) 0.0047	mylar
C304	⚠	1-108-227-12	(A) 0.001	mylar
C305	⚠	1-108-246-12	(A) 0.047	mylar

C306	⚠	1-123-195-11	(A) 47	10V elect
C307	⚠	1-123-189-11	(A) 33	25V elect
C308	⚠	1-123-195-11	(A) 47	10V elect
C309	⚠	1-123-189-11	(A) 33	25V elect
C310	⚠	1-123-196-11	(A) 100	10V elect

C311	⚠	1-108-239-12	(A) 0.01	mylar
C312	⚠	1-123-197-11	(A) 100	6.3V elect
C313-315	⚠	1-108-239-12	(A) 0.01	mylar
C316	⚠	1-123-187-11	(A) 10	25V elect
C317, 318	⚠	1-108-237-12	(A) 0.0068	mylar

C319	⚠	1-108-239-12	(A) 0.01	mylar
------	---	--------------	----------	-------

C401, 402	⚠	1-161-437-11	0.0033	125V US model)
C401, 402	⚠	1-115-149-11	(C) 0.0015	450V oil paper (AEP model)
C403	⚠	1-108-747-12	0.1	125V mylar (US model)

Ref. No. Part No. Description

C403	⚠	1-108-749-12	(C) 0.047	300V mylar (AEP model)
C404	⚠	1-108-409-12	0.001	200V mylar (US model)
C404	⚠	1-107-016-12	(A) 470p	500V mylar (AEP model)
C405	⚠	1-121-726-11	(A) 0.47	50V elect
C406	⚠	1-108-239-12	(A) 0.01	mylar
C407	⚠	1-108-227-12	(A) 0.001	mylar
C408	⚠	1-108-234-12	(A) 0.0047	mylar
C409	⚠	1-108-249-12	(A) 0.068	mylar
C410	⚠	1-123-283-11	100	160V elect (US model)
C410	⚠	1-123-280-11	(C) 33	350V elect (AEP model)
C411, 412	⚠	1-123-287-11	(C) 33	100V elect
C413, 414	⚠	1-123-195-11	(A) 47	10V elect
C415, 416	⚠	1-123-183-11	(A) 10	50V elect
C417-420	⚠	1-123-195-11	(A) 47	10V elect
C421, 422	⚠	1-123-183-11	(A) 10	50V elect
C423, 424	⚠	1-123-189-11	(A) 33	25V elect
C425	⚠	1-123-196-11	(A) 100	10V elect
C426	⚠	1-123-191-11	(A) 22	16V elect

C501	⚠	1-125-164-11	(K) 560	400V elect (AEP model)
C501	⚠	1-125-165-11	2200	200V elect (US model)
C502, 503	⚠	1-125-166-11	(J) 5600	100V elect

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on the last page for their part numbers.

R124	⚠	1-244-914-11	(A) 51k	¼W
R125, 126	⚠	1-217-151-11	(A) 0.22	2W wirewound
R130, 131	⚠			
R174	⚠	1-244-914-11	(A) 51k	¼W
R175, 176	⚠	1-217-151-11	(A) 0.22	2W wirewound
R180, 181	⚠			

R201	⚠	1-211-514-11	(A) 47	¼W carbon (nonflammable)
------	---	--------------	--------	--------------------------

Note:

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

Ref. No. Part No. Description

R203	⚠	1-211-510-11	(A) 33	¼W carbon (nonflammable)
R204	⚠	1-211-592-11	(A) 12	¼W carbon (nonflammable)
R205	⚠	1-217-375-11	(B) 1	¼W fusible
R206	⚠	1-217-426-11	(B) 2.2	2W fusible
R207	⚠	1-217-375-11	(B) 1	¼W fusible
R208	⚠	1-211-514-11	(A) 47	¼W carbon (nonflammable)
R210	⚠	1-211-510-11	(A) 33	¼W carbon (nonflammable)
R211	⚠	1-217-375-11	(B) 1	¼W fusible
R212	⚠	1-211-592-11	(A) 12	¼W carbon (nonflammable)
R213	⚠	1-217-426-11	(B) 2.2	¼W fusible
R214	⚠	1-217-375-11	(B) 1	¼W fusible
R251	⚠	1-211-514-11	(A) 47	¼W carbon (nonflammable)
R253	⚠	1-211-510-11	(A) 33	¼W carbon (nonflammable)
R254	⚠	1-211-592-11	(A) 12	¼W
R255	⚠	1-217-375-11	(B) 1	¼W fusible
R256	⚠	1-217-426-11	(B) 2.2	¼W fusible
R257	⚠	1-217-375-11	(B) 1	¼W fusible
R258	⚠	1-211-514-11	(A) 47	¼W carbon (nonflammable)
R260	⚠	1-211-510-11	(A) 33	¼W carbon (nonflammable)
R261	⚠	1-217-375-11	(B) 1	¼W fusible
R262	⚠	1-211-592-11	(A) 12	¼W
R263	⚠	1-217-426-11	(B) 2.2	¼W fusible
R264	⚠	1-217-375-11	(B) 1	¼W fusible
R310, 311	⚠	1-211-490-11	(A) 4.7	¼W carbon (nonflammable)
R401	⚠	1-211-498-11	10	¼W carbon (nonflammable) (US model)
R401	⚠	1-211-510-11	(A) 33	¼W carbon (nonflammable) (AEP model)
R402	⚠	1-217-379-11	2.2	¼W fusible (US model)

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

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.

Ref. No.	Part No.	Description
R402	△1-217-383-11 (B) 4.7	¼W fusible (AEP model)
R403	△1-242-661-11 330	¼W (US model)
R403	△1-242-667-11 (A) 560	¼W (AEP model)
R404	△1-206-696-11 22k	2W metal oxide (US model)
R404	△1-214-475-11 (A) 68k	2W metal oxide (AEP model)
R405	△1-211-514-11 47	¼W carbon (nonflammable (US model)
R405	△1-211-522-11 (A) 100	¼W carbon (nonflammable) (AEP model)
R406	△1-244-715-11 (A) 56k	¼W
R406	△1-244-723-11 (A) 120k	
R407	△1-211-498-11 (A) 10	¼W carbon (nonflammable)
R408	△1-224-686-11 (A) 3.6k	¼W
R409	△1-211-534-11 330	¼W carbon (nonflammable) (US model)
R409	△1-211-540-11 (A) 560	¼W carbon (nonflammable) AEP model)
R410	△1-206-700-11 33k	2W metal oxide (US model)
R410	△1-206-801-11 (B) 120k	1W composition (AEP model)
R411	△1-244-705-11 22k	¼W (US model)
R411	△1-244-721-11 (A) 100k	¼W (AEP model)
R412	△1-244-697-11 (A) 10k	¼W
R413	△1-244-713-11 (A) 47k	¼W
R414	△1-244-717-11 (A) 68k	¼W
R415	△1-244-697-11 (A) 10k	¼W
R416	△1-244-713-11 (A) 47k	¼W
R417	△1-244-671-11 (A) 820	¼W
R418	△1-244-648-11 (A) 91	¼W
R419	△1-206-471-11 (A) 22	2W metal oxide
R420	△1-210-817-11 1.5M	¼W (US model)
R420	△1-210-825-11 (A) 3.3M	¼W (AEP model)
R421	△1-244-705-11 22k	¼W (US model)
R421	△1-244-721-11 (A) 100k	¼W (AEP model)
R422, 423	△1-211-492-11 (A) 5.6	¼W

SWITCHES

S101	△1-552-294-12	Rotary, POWER (US model)
S101	△1-552-295-12	Rotary, POWER (AEP model)

Ref. No.	Part No.	Description
----------	----------	-------------

JACKS

J101, 151	1-507-287-31 (A) 1p	
CNJ101	△1-509-062-31	Socket, AC IN (US model)
CNJ101	△1-509-547-00 (C)	Socket, 3p AC IN (AEP model)

MISCELLANEOUS

CB401	△1-532-493-12	Circuit Breaker 10A (US model)
CB401	△1-532-533-11 (C)	Circuit Breaker 5A (AEP model)

F401	△1-532-496-00 (C)	Fuse, 190°C
------	-------------------	-------------

LF401	△1-421-259-00 (F)	Line Filter Coil
PL101	1-518-278-91 (B)	Lamp, 6V 35mA
RT101, 151	1-224-247-XX (C)	100, adjustable
RT401	1-224-249-XX (B)	1k, adjustable
RY101, 151	1-515-257-00 (H)	Relay
RY401, 402	△1-515-278-00 (F)	Relay
TM101	1-535-195-21 (F)	Terminal, 2p white
TM151	1-535-195-31 (F)	Terminal, 2p red
	1-525-186-00 (B)	Socket, transistor

ACCESSORIES & PACKING MATERIALS

Part No.	Description
△1-534-262-XX (E)	Cord, power
3-701-020-00 (A)	Bag, plastic; printed matters
3-770-082-21	Manual, instruction (US model)
3-770-282-11 (H)	Manual, instruction (AEP model)
4-809-251-00 (A)	Bag, plastic
4-852-949-00 (C)	Cushion
4-852-952-00 (F)	Carton

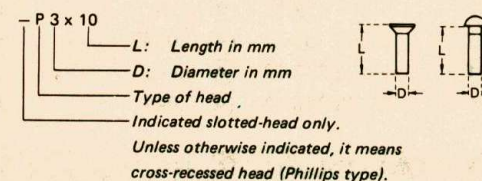
Note: The components identified by shading and △ mark are critical for safety. Replace only with part number specified.

1/4 WATT CARBON RESISTORS

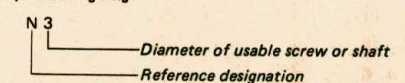
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11	1.0M	1-244-745-11		
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11	1.1M	1-244-746-11		
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	1.2M	1-244-747-11		
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	1.3M	1-244-748-11		
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	1.5M	1-244-749-11		
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	1.6M	1-244-750-11		
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	1-244-737-11	1.8M	1-244-751-11		
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	2.0M	1-244-752-11		
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	2.2M	1-244-753-11		
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	2.4M	1-244-754-11		
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	2.7M	1-244-755-11		
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	3.0M	1-244-756-11		
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	3.3M	1-244-757-11		
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	3.6M	1-244-758-11		
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	3.9M	1-244-759-11		
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	4.3M	1-244-760-11		
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	4.7M	1-244-761-11		
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	5.1M	1-244-762-11		
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:



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		braizer-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	

Sony Corporation

© 1977

9-958-440-11

-34-

TA-N88 / N88B



(TA-N88)

TA-N88 (Panel : Silver)

US Model
AEP Model

TA-N88B (Panel : Black)

UK Model
AEP Model
US Model
Canadian Model

STEREO POWER AMPLIFIER

SPECIFICATIONS

GENERAL

Power Requirements:	90 – 130V ac, 50 – 400Hz (US, Canadian model)
	220 – 240V ac, 50 – 400Hz (AEP, UK model)
	110 – 140V dc (US, Canadian model)
	240 – 300V dc (AEP, UK model)
Power Consumption:	135W (US, Canadian model)
	550W (AEP model)
	1030W (UK model)
Dimensions:	Approx. 480 (w) x 80 (h) x 360 (d) mm
	18 ⁷ / ₈ (w) x 3 ¹ / ₈ (h) x 14 ¹ / ₄ (d) inches including projecting parts and controls
Weight:	Approx. 11kg, 23 lb 6 oz (net)
	13kg, 28 lb 4 oz (with shipping carton)

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY SHADING AND  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.

ATTENTION AU COMPOSANT AYANT RAPPORT
À LA SÉCURITÉ !

LES COMPOSANTS IDENTIFIÉS PAR UN TRAMÉ ET UNE MARQUE  SUR LES DIAGRAMMES SCHÉMATIQUES, 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.

POWER AMPLIFIER

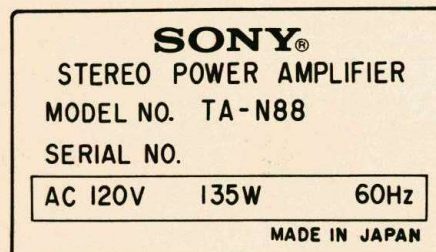
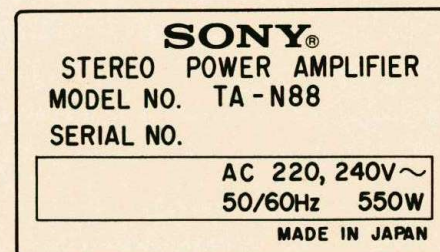
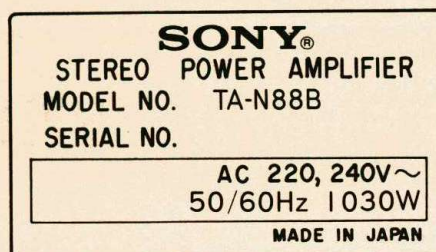
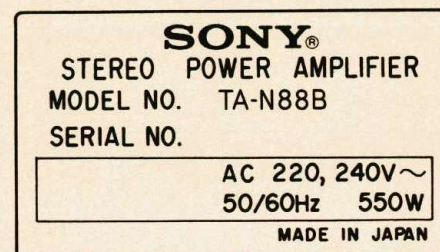
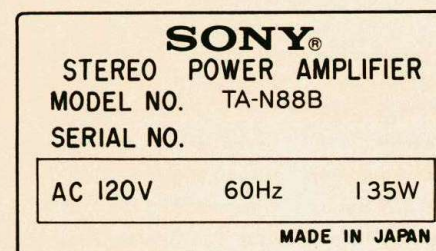
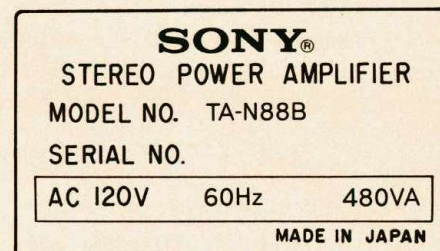
SECTION	
Continuous RMS Power	Output (rated output) Both channels driven simultaneously
	At 20 – 20,000Hz
	160 + 160W (8Ω)
	According to DIN45500
(Less than 0.5% total harmonic distortion):	160 + 160W (8Ω)
Damping Factor:	20 (8Ω, 1000Hz)
Harmonic Distortion:	Less than 0.5% at rated output
IM Distortion:	
(60Hz : 7kHz = 4 : 1)	Less than 0.1% at rated output
Frequency Response:	5 – 40,000Hz ^{+0.5} / ₋₁ dB
S/N Ratio:	Greater than 110dB, short-circuited input
Residual Noise:	Less than 100μV (8Ω, weighting network A)
Inputs:	INPUT
	Sensitivity 1.4V (for rated output)
	Impedance 50kΩ
Outputs:	SPEAKER
	Accept speakers of 8 – 16Ω

SONY®

SERVICE MANUAL

MODEL IDENTIFICATION

— Specification Label —

TA-N88
US modelTA-N88
AEP modelTA-N88B
UK modelTA-N88B
AEP modelTA-N88B
US modelTA-N88B
Canadian modelSECTION 1
OUTLINE

1-1. SERVICING NOTE

1. This set is utilizing pulse circuitry. Use an oscilloscope having a bandwidth of wider than 10MHz.
2. Be sure to discharge current completely before starting repair. This set uses V-FETs. Also this set utilizes 140-V voltage in the power supply and ± 120 -V voltage in the amplifier section. Accordingly, not only V-FETs but also many other components may easily be damaged if any com-

ponent lead wires or pattern foils are inadvertently shorted out by a screwdriver or a soldering iron due to the residual charge in the power-supply capacitors even when the power is turned off.

To prevent the damage of these components, be sure to discharge electrolytic capacitors, after turning the power off, in the power supply as shown in Fig. 1 every time the check or repair is required.

Note: All resistors are about 10 ohms.

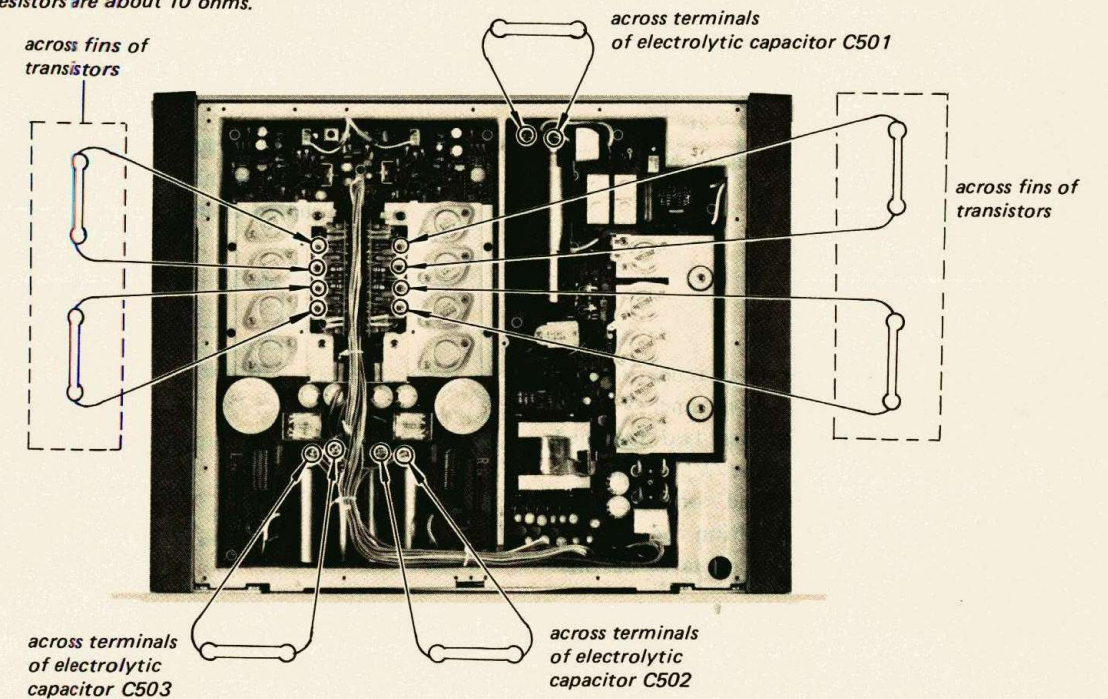


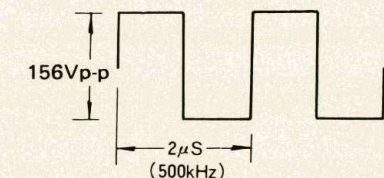
Fig. 1

3. Power Supply Checking

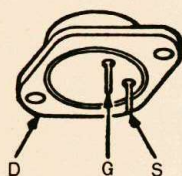
- a) ± 78 -V voltages should present on C502 and C503. Voltage adjustment can be made by RT401.
- b) If voltages on C502 and C503 cannot be adjusted by RT401 and higher voltages of about ± 100 V are present, check the switching transistor Q401 in the power supply.
- c) If voltages do not present on C502 and C503, check Q409 through Q412 of the inverter circuit in the power supply.

4. Power Amp Checking

- a) Check waveform at the drains of V-FETs of each channel. The following waveform should be obtained.

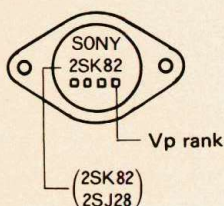


- b) If either of the L- or R-channels is out of order, the relay RY101 or RY151 of the associated channel opens. In this condition, no sound outputs come out from both channel's SPEAKER terminals.
5. Replacing V-FETs
- Completely discharge the power supply electrolytic capacitors as outlined in 2 above.
 - Remove V-FET by removing screws.
 - Check resistance readings of each two electrodes of V-FET using a VOM as follows.



VOM range: $\times 1\Omega$
 GOOD FETs show the following.
 S-D : $1 - 2\Omega$
 S-G } : diode characteristic
 D-G }

When replacing the two P-channel V-FETs 2SK82 and/or the two N-channel V-FETs 2SJ28 in each channel, use two matched ones which have the same V_p (pinch-off voltage)-rank figure printed on them as shown below. The fluctuation of the V_p rank of the two can be acceptable on one-rank-difference basis.

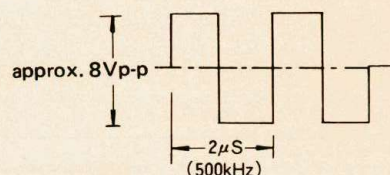


Do not install the new V-FETs yet until instructed to do so later.

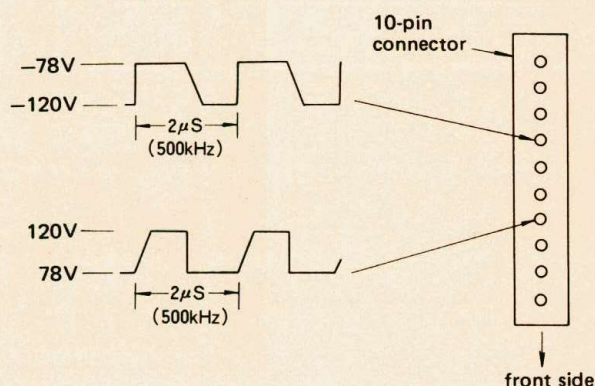
- Remove the power-drive board of the associated channel by removing two screws. Check the fusible resistors on the power-drive board. Replace those defective fusible resistors.
- Remove the power-amp board of the associated channel by removing ten screws. Replace the tantalum capacitor C104 220/6.3V (L-CH) or C154 220/6.3V (R-CH).
- Reattach the power amp board on the chassis.
- Temporarily make a solder connection to the lead of R119 100k Ω (L-CH) or R169 100k Ω (R-CH) for a checking purposes.

- h) Now the set has the power-drive board and V-FETs removed aside.
 Turn POWER ON.

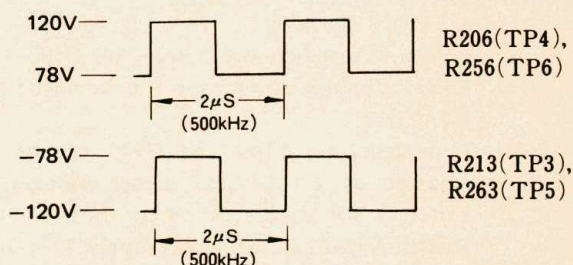
- Check the waveform at TP1 (L-CH) and TP2 (R-CH) for that shown below.
 Adjust RT101 (L-CH) or RT151 (R-CH) to make the levels of the positive and negative halves equal.
 Adjust T301 to obtain the specified pulse width.



- Check waveforms at pins 4 and 7 of the 10-pin connector to which the power-drive board connects.



- Turn POWER OFF.
- Install the power-drive board and V-FETs in place. Do not fasten V-FETs with screws yet, i.e., the drains are in the open-circuit condition.
- Turn POWER ON.
- Check waveforms at TP3, TP4 (L-CH) and TP5, TP6 (R-CH) as shown below.



- Turn POWER OFF and completely discharge electrolytic capacitors as outlined above.
- Fasten V-FETs with screws. Now the drains of V-FETs are electrically connected.
- Remove the solder joint made to R119 or R169 in step g).

1-2. CIRCUIT DESCRIPTION

1-2-1. Amplifier Section

a) High-Speed Input Attenuator

This attenuator is composed of FETs. This attenuator protects the amplifier by attenuating the input signal at a response speed of faster than $1\mu\text{sec}$ when SPEAKER terminals are erroneously shorted out or when an overloading input signal is applied, in both cases the current drain in the power-amplifier output stage V-FETs exceeds the rated value.

b) Carrier Oscillator

This oscillator is of the Colpits configuration, and generates a 500kHz signal.

This 500kHz signal is applied to the P-channel dual-transistor differential amplifier and this amplifier makes an even-duty square wave. This square-wave signal is then applied to the emitter followers for both the L and R channels. Thus the carrier signal is applied to the integrating circuit.

c) Integrating Circuit

To the input of the mirror integrating circuit, audio and 500kHz carrier signals are applied. In this integrator, a highly-accurate integration is made by subtracting the input and carrier signal component from the output signal.

Accordingly, this circuit has a very-wide bandwidth of dc – several MHz to transfer the audio and carrier signals. The first-stage of this integrator is composed of a dual FET which is connected to a current source. The second stage is composed of PNP-type transistors which has also a current source connected to it.

d) High-speed Comparator

An IC is used for the comparator to fit the very-high-speed response characteristics. This IC is composed of three differential amplifiers connected in series. This comparator functions with the input-level difference of less than 1mV , and the square-wave PWM output signal is obtained with the speed of less than 20nsec .

e) Power Driver

This circuit is to drive the final V-FETs for voltage amplification. This driver receives the PWM output signal of about 8Vp-p and amplifies it to 40Vp-p which is required to drive the gates of V-FETs in the power amplifier.

Transistors with a high f_T are used in a switching manner to maintain an ample driving capability, because the gate of V-FET has a rather large capacitive input load.

f) V-FET Switching Circuit

The newly-developed and high-power switching-purpose V-FETs are used in the parallel pushpull configuration. These V-FETs enable high-power switching of up to $160\text{V}/10\text{A}$ at a response time of 50nsec .

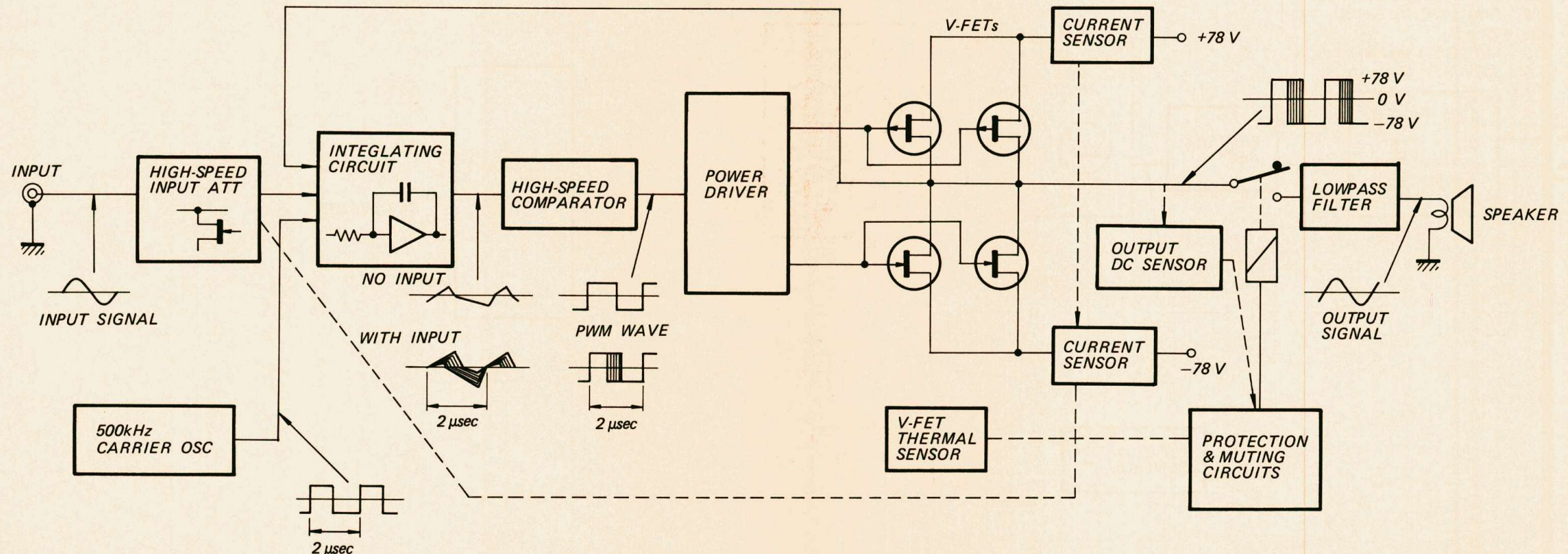
g) Lowpass Filter

This filter is to draw the audio signal out of the pulse-width-modulated signal. This filter is composed of choke coils and capacitors and has a low insertion loss. The frequency response of this set is determined by this filter.

h) Protectors

This amplifier is equipped with 1) current sensor to protect V-FETs from damaging in case of short circuiting, large-current output operation or a over-the-rating operation; 2) thermal sensor to cut the speaker circuit off when the temperature of V-FET exceeds 90°C (194°F) under a high ambient temperature, a long and continuous operation or during measurement;

3) dc sensor to protect speakers in case of generation of dc component under dc input or an abnormal circuit operation.



1-2-2. Pulse-locked Power Supply

The power transfer capability of the core-type power transformers increase in proportion to the line frequency used. However, most of the conventional core-type power transformers are used under the line frequency of 50Hz or 60Hz, and they are big in size and heavy in weight.

By utilizing the pulse-locked power supply technique, it is quite possible to make very-small, light-weight and large-capacity power supplies using built-in 20kHz generator.

a) Primary Rectifying Circuit

In ac operation, ac input of 90 to 130V or 220 to 240V is bridge-rectified and the output of 130 to 168V dc is obtained.

In dc operation, dc input of 110 to 140V or 240 to 300V is directly used regardless of the input polarities.

b) Chopper-type Voltage Regulator

The 20kHz control pulse drives the switching transistors and a constant output voltage of

110Vp-p is obtained.

c) Pulse-width Control Circuit

This circuit utilizes the square wave generated in the 20kHz power oscillator to make a triangle wave. The level of the triangle wave is compared with the internal reference voltage and a control pulse is made to maintain the output voltage of the chopper-type voltage regulator constant.

d) 20kHz Power Oscillator

This circuit generates a stable and high-power 20kHz pulse by using four high-power switching transistors in the full-bridge self-oscillating circuit configuration.

e) Ferrite-core Transformer

The ferrite-core transformer transfers the 20kHz pulse signal and this serves the functions of the conventional power transformer. This transformer features a low-loss,

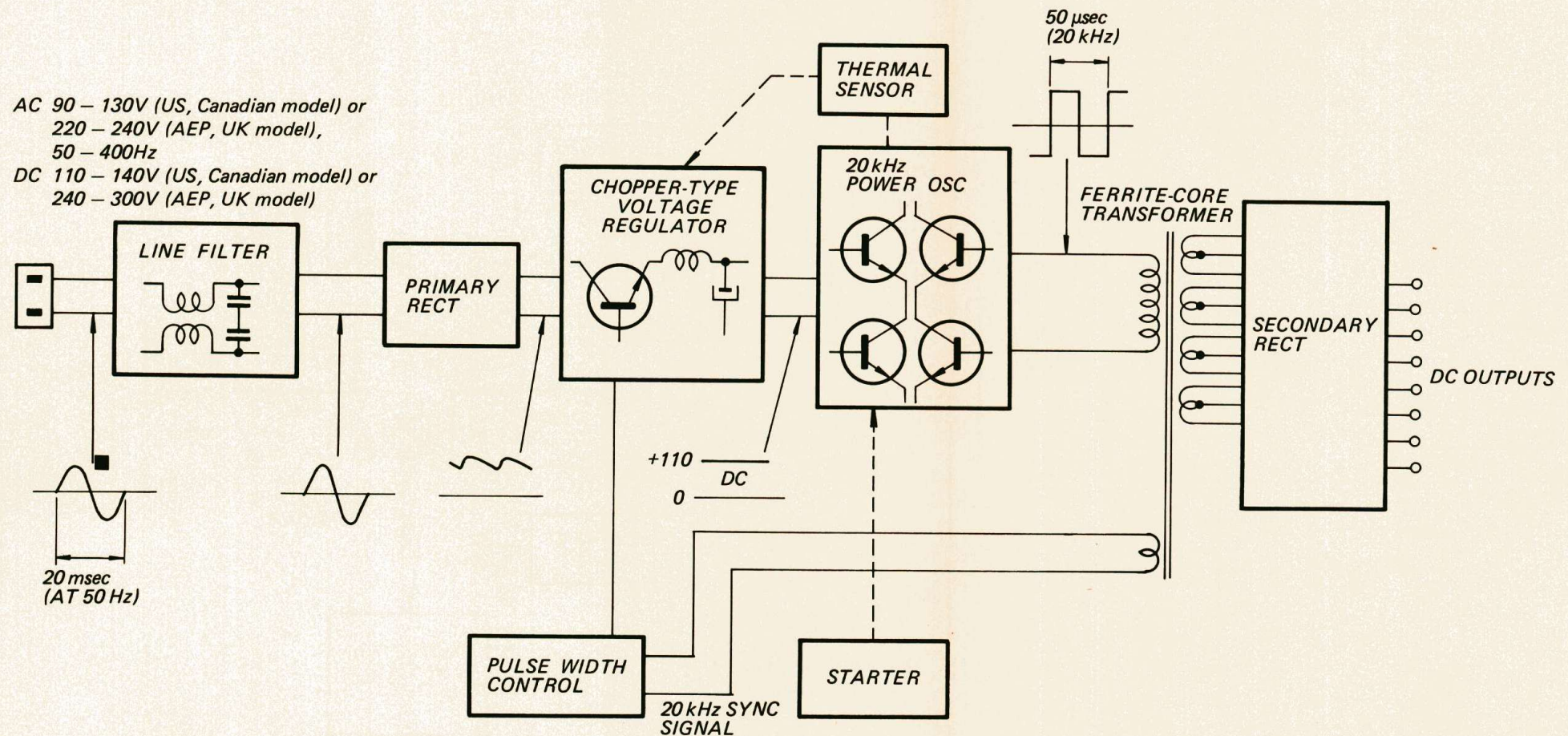
high-permeability and a high-saturation magnetic-flux density operation at the high frequency of 20kHz.

This transformer also has a doubled electrostatic shield in itself to reduce the radiation of the switching noise to a minimum possible value.

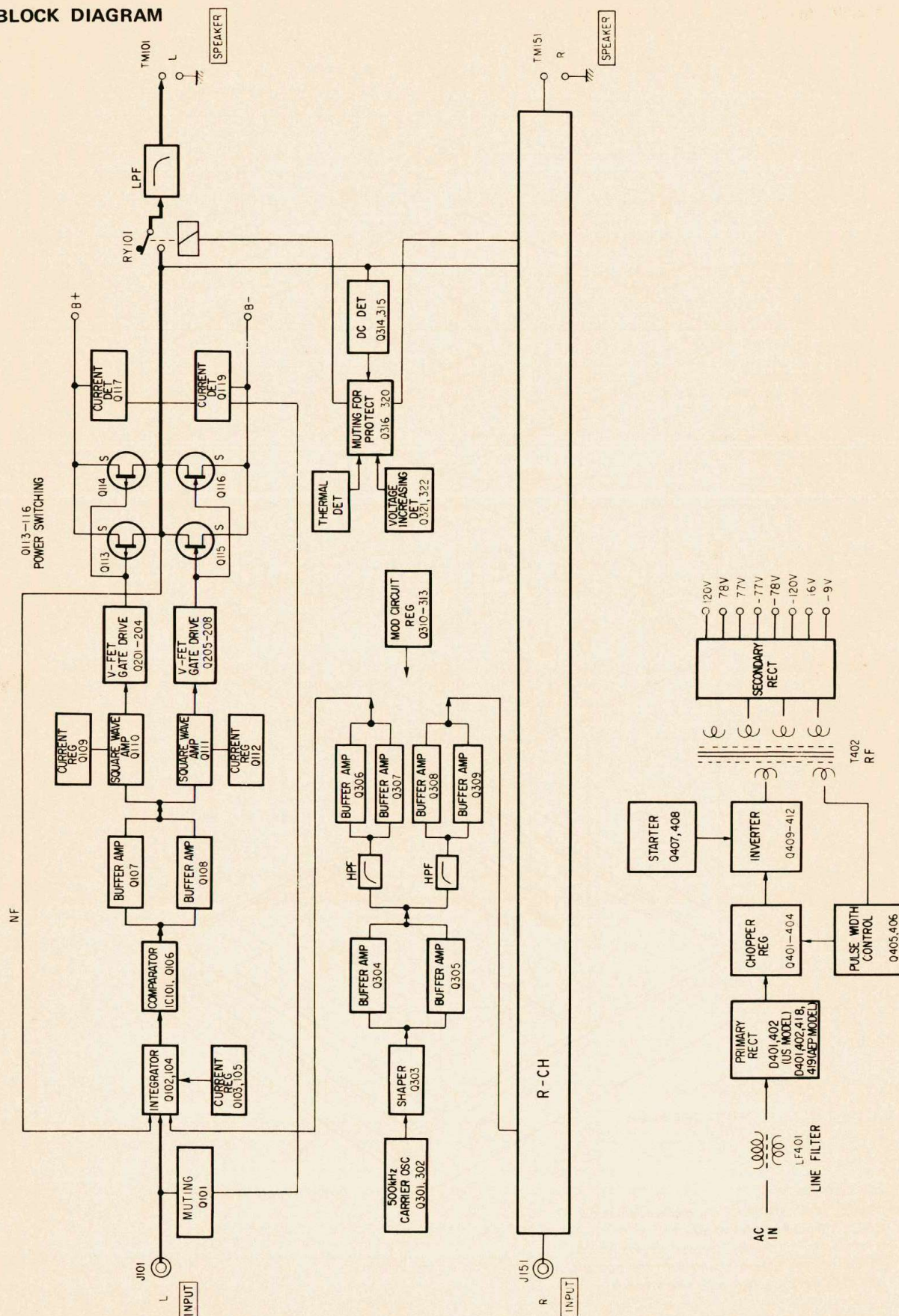
This transformer has a power-transfer capability of sixty times that of the conventional power transformers for 50Hz- or 60Hz-line use, and also has a superior voltage regulation between the primary and secondary windings by shortening the total length of wire of the windings.

f) Secondary Rectifying Circuit

This circuit provides several kinds of dc voltages needed for the respective stages of the power amplifier. These voltage are well regulated and very stable.



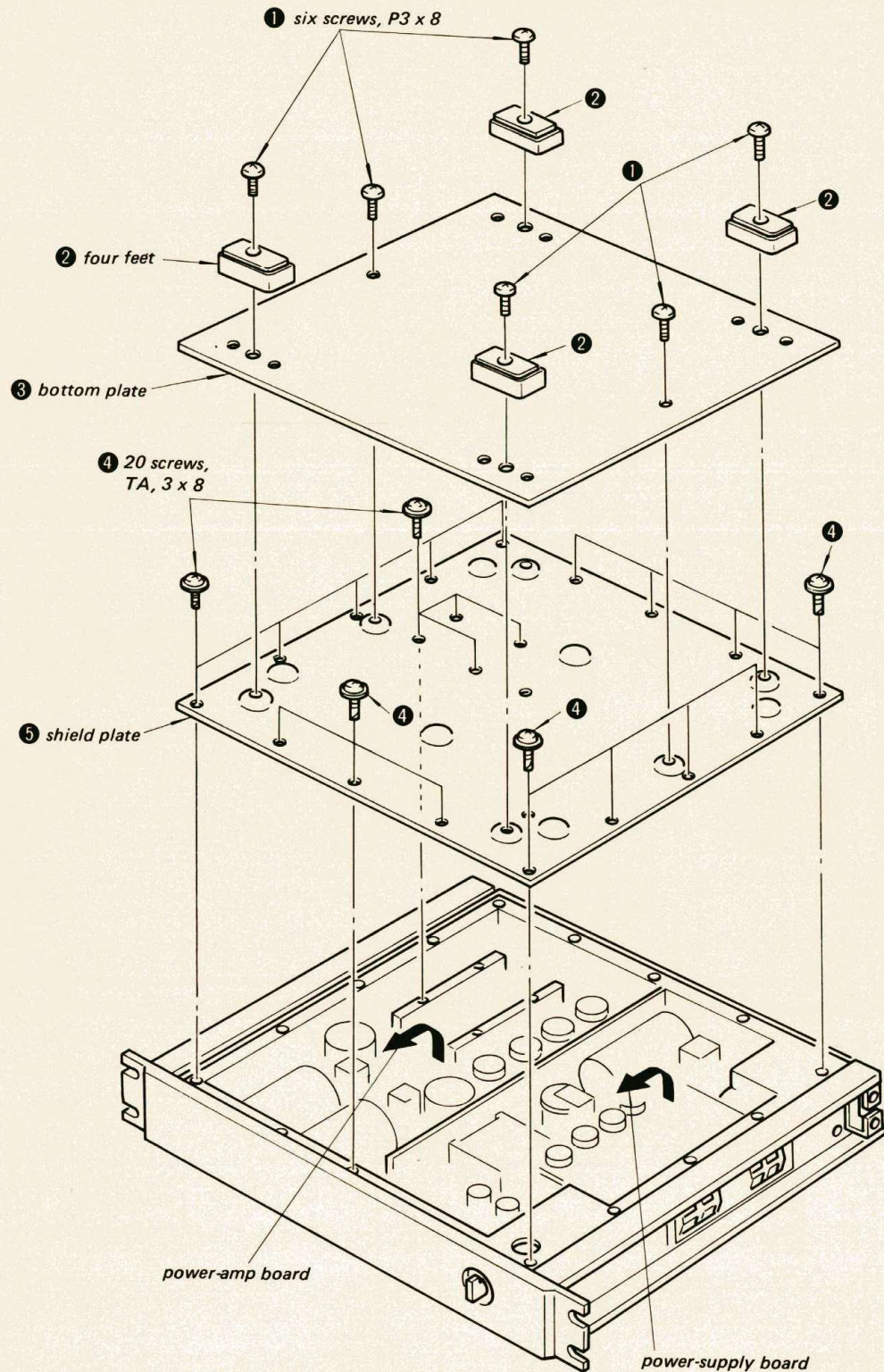
1-3. BLOCK DIAGRAM



SECTION 2 DISASSEMBLY

Note: Remove in the numerical order.

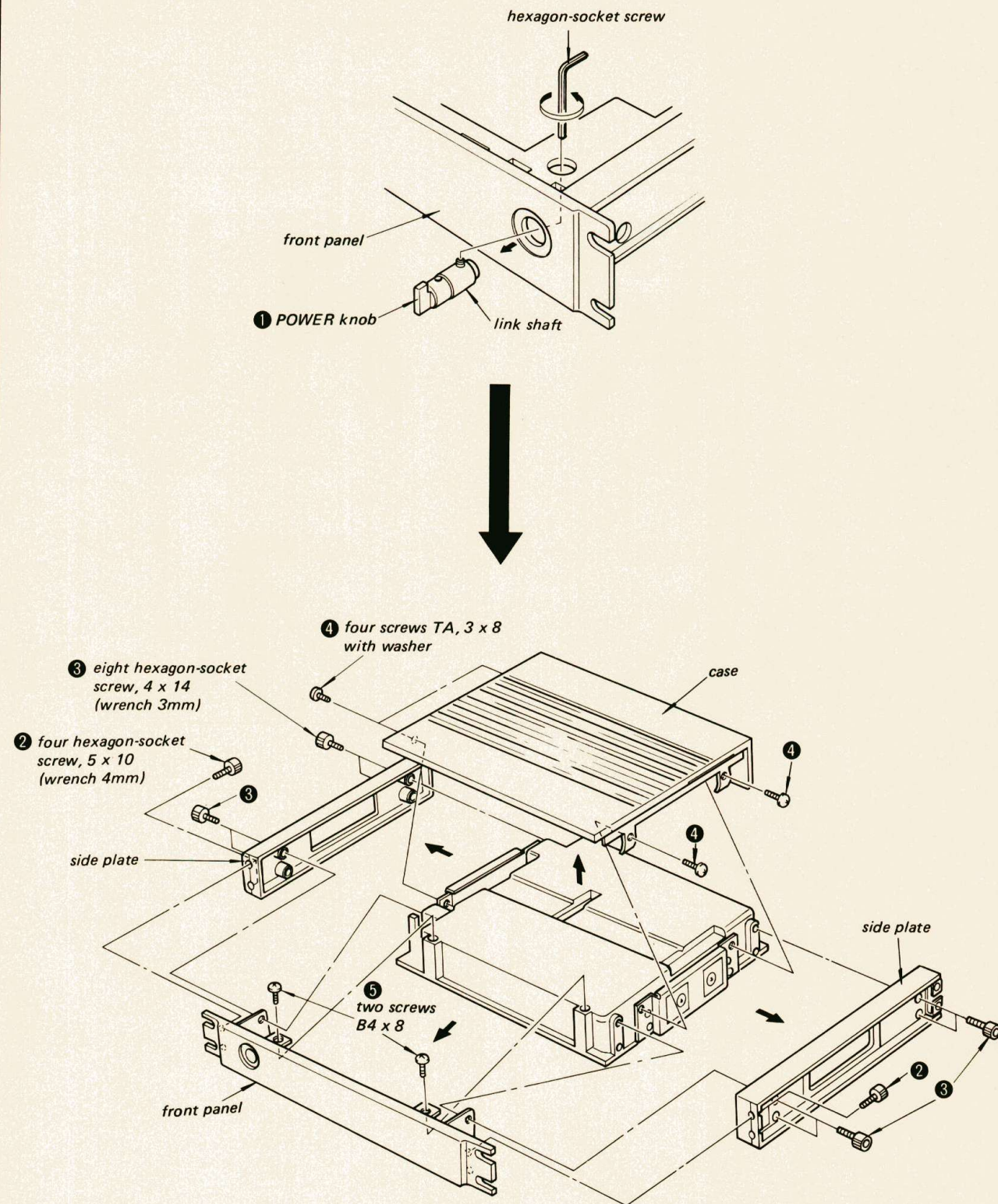
BOTTOM AND SHIELD PLATE REMOVAL



Note: Under this condition, component sides of circuit board can be checked.
To check foil side(s), remove screws which fasten circuit board(s) and turn the board(s) in the direction shown by the arrow(s).

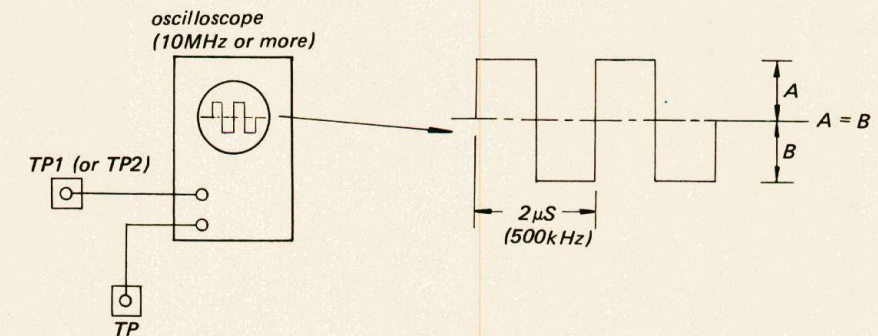
SECTION 3 ADJUSTMENTS

PANEL REMOVAL



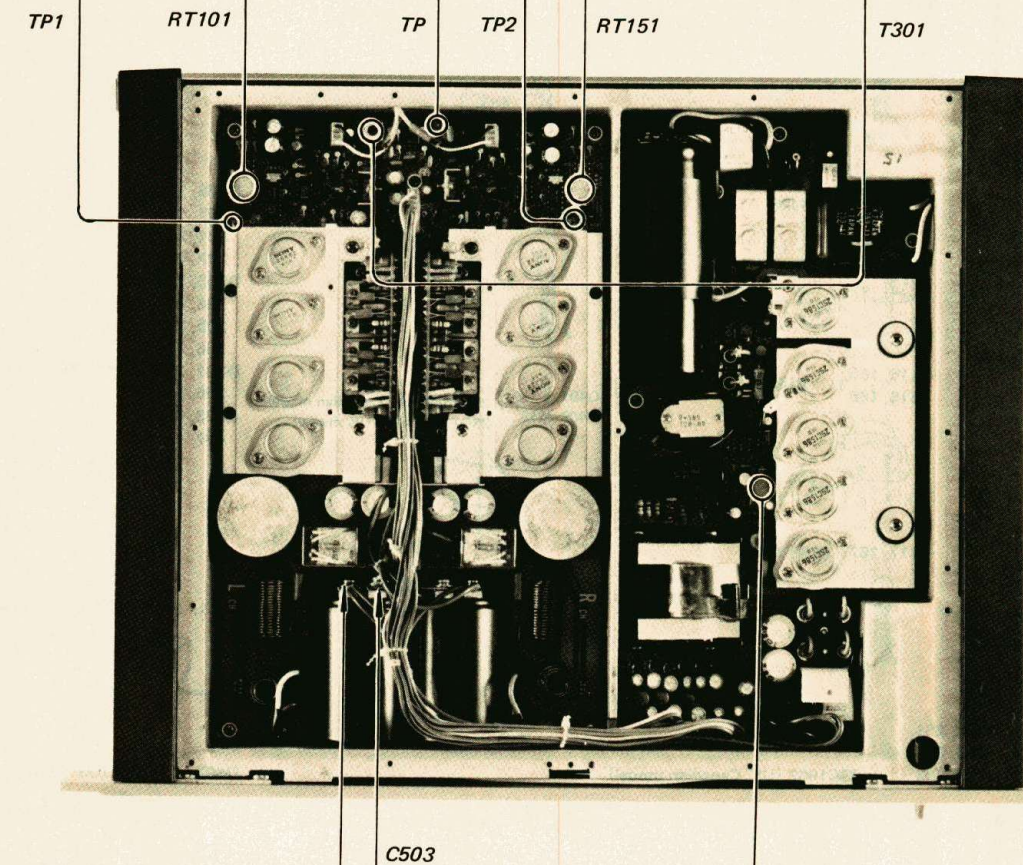
PULSE LEVEL ADJUSTMENT

Adjust RT101 (L-CH) and RT151 (R-CH) to make the positive and negative halves of the square wave at TP1 (L-CH) and TP2 (R-CH) equal.



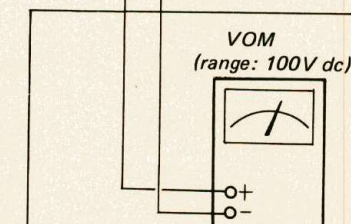
OSCILLATION FREQUENCY ADJUSTMENT

Adjust T301 so that the pulse width of the pulse at TP1 (L-CH) or TP2 (R-CH) becomes $2\mu s$ (500kHz).



VOLTAGE ADJUSTMENT

Adjust RT401 for a 78V reading on the VOM.



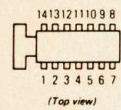
SECTION 4 DIAGRAMS

4-1. MOUNTING DIAGRAMS

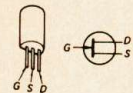
Replacement Semiconductors

For replacement, use semiconductors except in ().

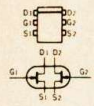
IC101, 151: CX034



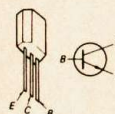
Q101, 151: 2SK43-5
(2SK43-6)



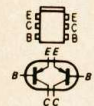
Q102, 152: 2SK58



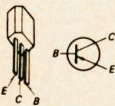
Q103, 153,
105, 155,
107, 157,
301, 304,
306, 308,
314-316,
321, 322,
408
119, 169 : 2SC926A



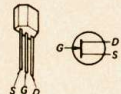
Q106, 156,
302, 406 : 2SA884



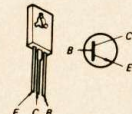
Q104, 154,
108, 158,
305, 307,
309,
317-320,
407 : 2SA678



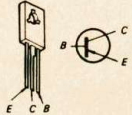
Q109, 159,
112, 162 : 2SK23A-940
310, 311 : 2SK23A-840 (blue)



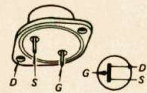
Q110, 160: 2SC1904



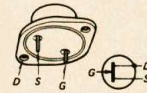
Q111, 161: 2SA899



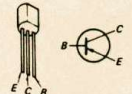
Q113, 163,
114, 164 : 2SJ28



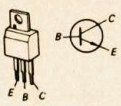
Q115, 165,
116, 166 : 2SK82



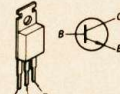
Q117, 167: 2SA639S



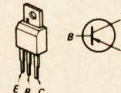
Q201, 251,
205, 255 : 2SC1124
Q402, 403 : 2SC1962 (US, Canadian model)



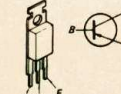
Q202, 252,
206, 256 : 2SC1173 (yellow)
Q313 : 2SC1061



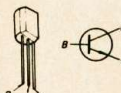
Q203, 253,
207, 257 : 2SA706



Q204, 254,
208, 258 : 2SA473 (yellow)
Q312 : 2SA671



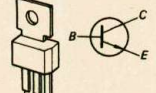
Q303: 2SC710



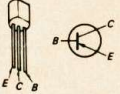
Q401,
409-412 : 2SC1586 (US, Canadian model)
2SC2190 (AEP, UK model)



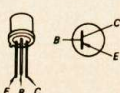
Q402, 403 : 2SC1723 (2SC1810)
405 (AEP, UK model)



Q404: 2SA896 (US, Canadian model)



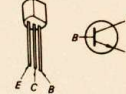
2SA911 (AEP, UK model)



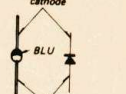
D405: EQB01-09 (TA-N88)
D405, 421: EQB01-05 (TA-N88B)
(EQA01-05R)



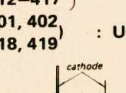
Q405: 2SC1811
(US, Canadian model)



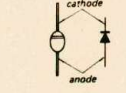
D101, 151: MV12N



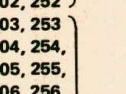
D102, 152,
103, 153,
412-417 : V09C



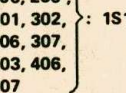
D401, 402 : U05G (AEP, UK model)
418, 419



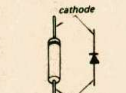
D106, 156,
107, 157,
201, 251,
202, 252 : 1S1587



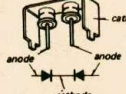
D203, 253
204, 254,
205, 255,
206, 256 : 1S1555



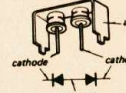
D301, 302,
306, 307,
D403, 406,
407



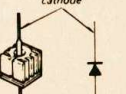
D401: S5151 (US, Canadian model)



D402: S5151R (US, Canadian model)

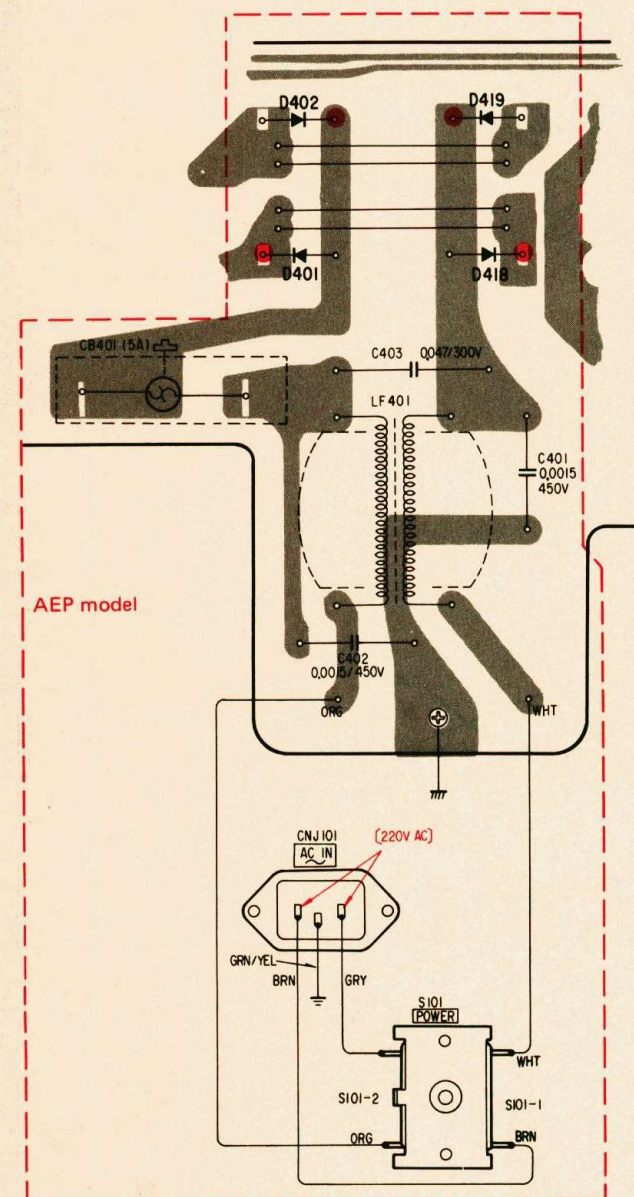


D404, 420: UF3

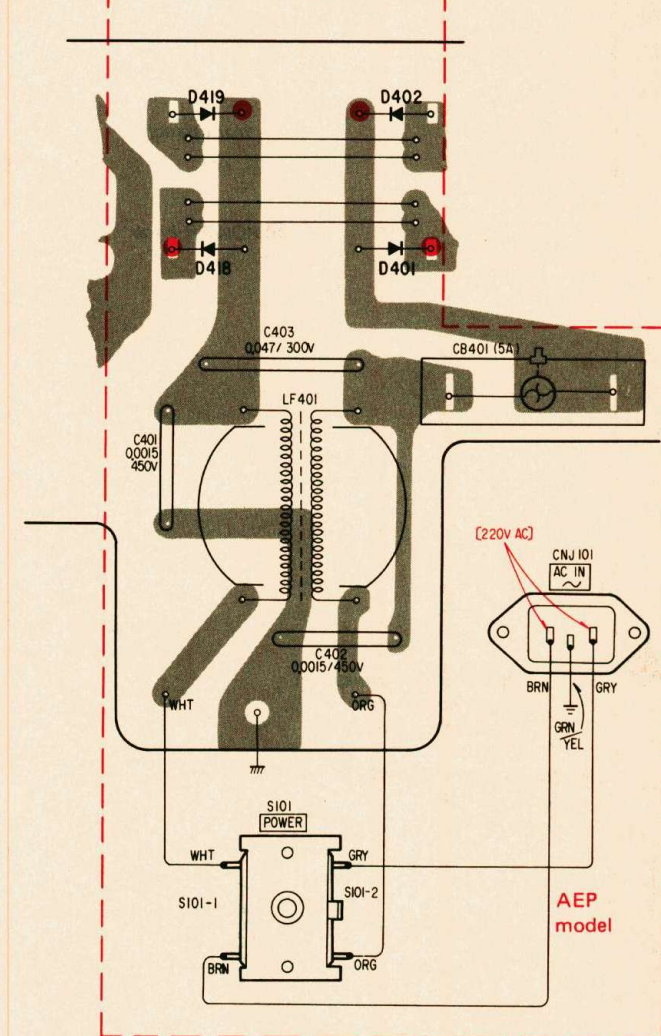


— Power Supply Input Section (TA-N88: AEP model) —

— Conductor Side —

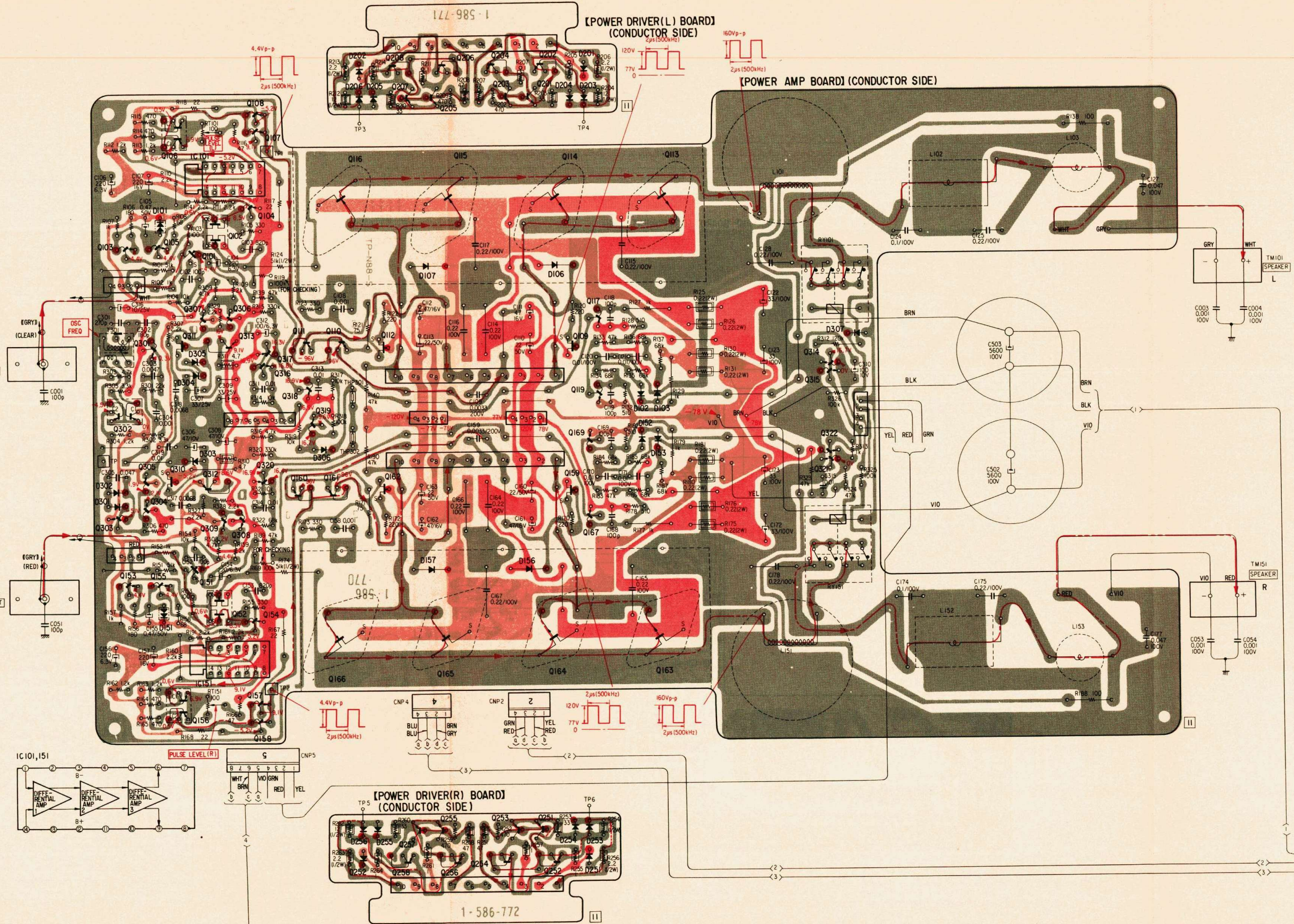


— Component Side —

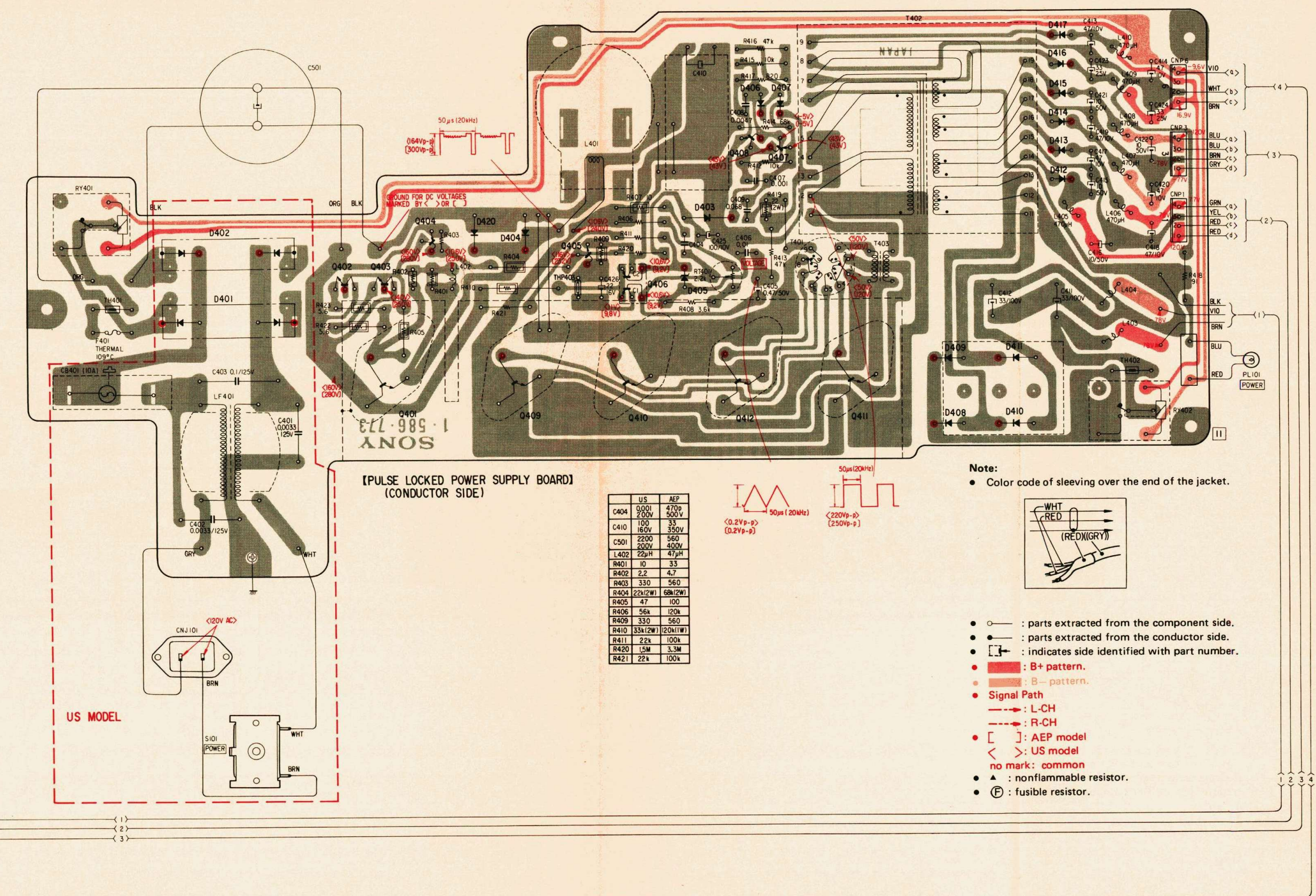


4.2. MOUNTING DIAGRAM (2)
- Conductor Side -

Q, IC	D
208, 204 206, 202	202, 201 205, 203
207, 203 205, 201 108	206, 204 205, 203
106 107	
IC101	116 114 113
104	101
102	
103, 105 101	107, 106
307, 306 117	307
301, 311 313 109 112 316 314 318 119, 103	305 304 302
302	
319	152, 153 306 303
169 322 321	302
305, 310 312, 320 160, 161 169 304 162 167 303, 308	301
151	157, 156
153, 155	
152	151
166 165 164 163	
IC151	
156 157 158	
257, 253 255, 251	256, 254 255, 253
258, 254 256, 252	252, 251
Q, IC	D



Q	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	Q
D	402	401		420	404		405	403	406	407		409	411	412	410	417	D



US	AF
C404	0.001 470p
C410	100 15
C501	2200 470p
L402	22uH 47uH
R401	10 33
R402	2.2 4.7
R403	330 560
R404	22k(2W) 68k(2W)
R405	47 100
R406	56k 120k
R408	330 560
R410	33k(2W) 20k(1W)
R411	22k 100k
R420	15M 3.3M
R421	22k 100k

- Note:
- Color code of sleeving over the end of the jacket.
 - WHT (RED/GRY)
 - parts extracted from the component side.
 - parts extracted from the conductor side.
 - indicates side identified with part number.
 - B+ pattern.
 - B- pattern.
 - Signal Path
 - L-CH
 - R-CH
 - AEP model
 - US model
 - no mark: common
 - nonflammable resistor.
 - fusible resistor.

Q_1, IC	D
02, 201, 202, 204, 208	201, 202
01, 205, 203, 207	203, 205, 204, 206
108	
107, 106	
IC101	
3, 11, 104	101
102	
05, 103, 101	
106, 107	
7, 306, 307, 311, 312, 301	307
4, 10, 111, 15, 316	305, 304
318	103, 102
302	
319	
169	153, 152
22	303
31, 160, 320, 310, 305, 312, 304, 159, 304, 308, 309, 303, 167	302, 301
151	156, 157
55, 153	
152	151
54	
153, 154, 151, 156	
7, 156	
58	
51, 255, 53, 257, 54, 258	253, 255, 254, 256
252, 256, 254, 258	251, 252
Q_1, IC	D

SONY

[PULSE LOCKED POWER SUPPLY BOARD]
(COMPONENT SIDE)

	U.S.	JEP
C404	0.001 200V	4705 500V
C410	100 160V	33 350V
C501	220V 200V	560 450V
L402	22μH	47μH
R401	10 33	
R402	2.2 4.7	
R403	320 60	
R404	22k(2W) 68k(2W)	
R405	47 100	
R406	56 120V	
R409	330 560	
R410	33k(2W) 120k(1W)	
R411	22k 100V	
R420	1.5M 3.3M	
R421	22k 100V	

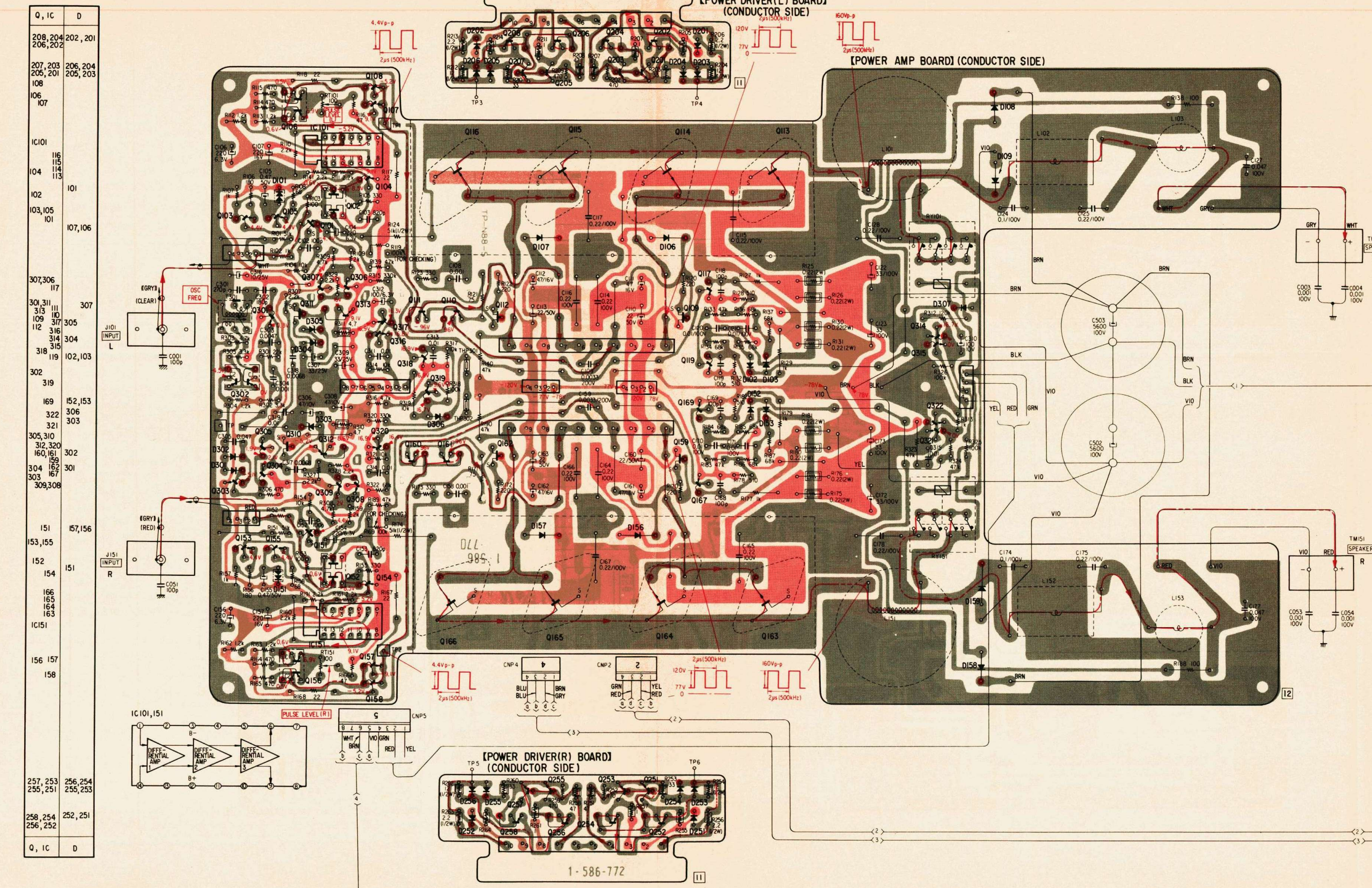
US MODEL

- 19—

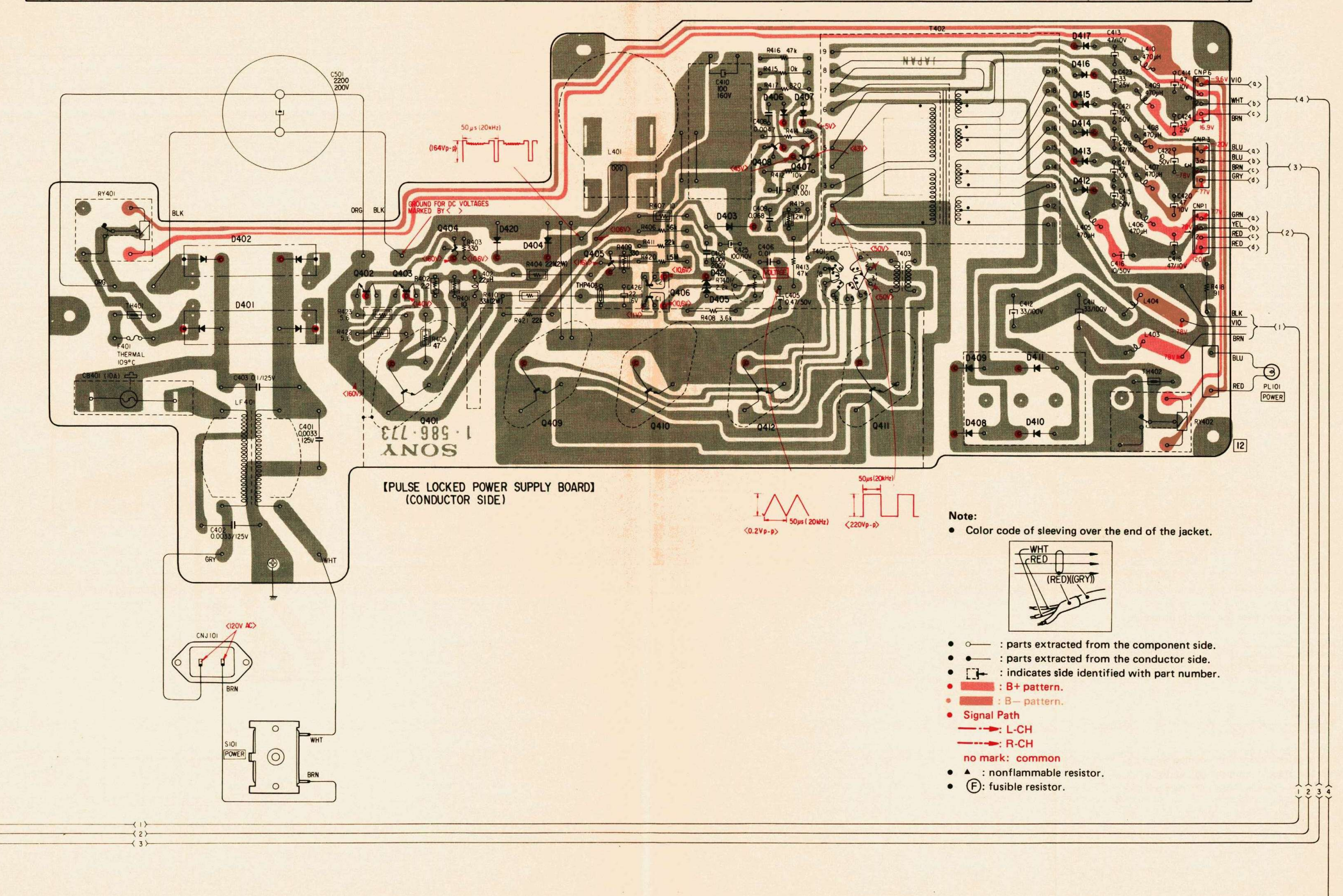


4-3. MOUNTING DIAGRAM (TA-N88B: US, Canadian model)

- Conductor Side -

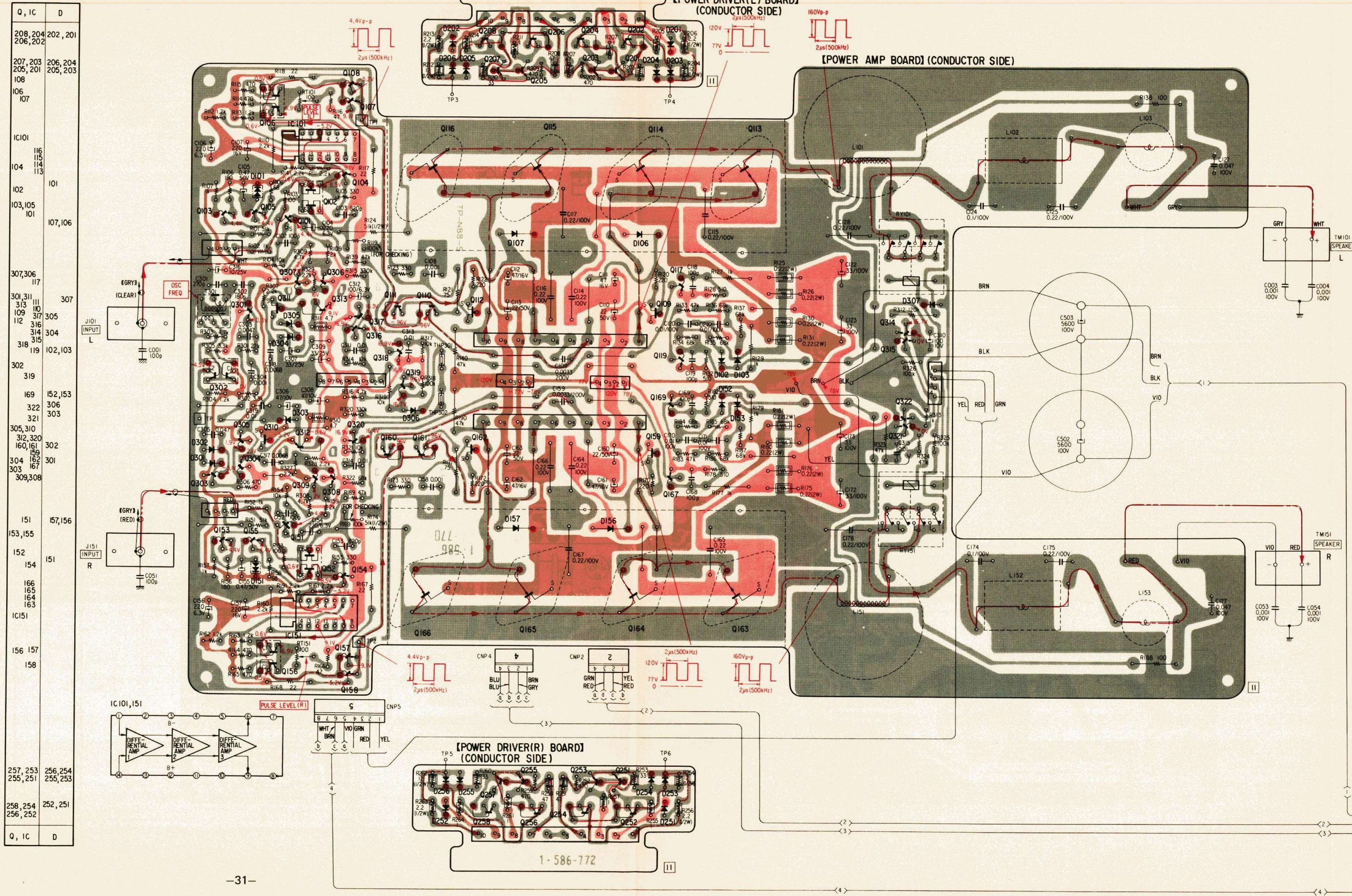


Q	402	403	404	405	406	408	407		Q
D	401	401	409	410	412	411	411	409	D
			420	404	421	403	406	407	
					405	408	410	412	
							417		

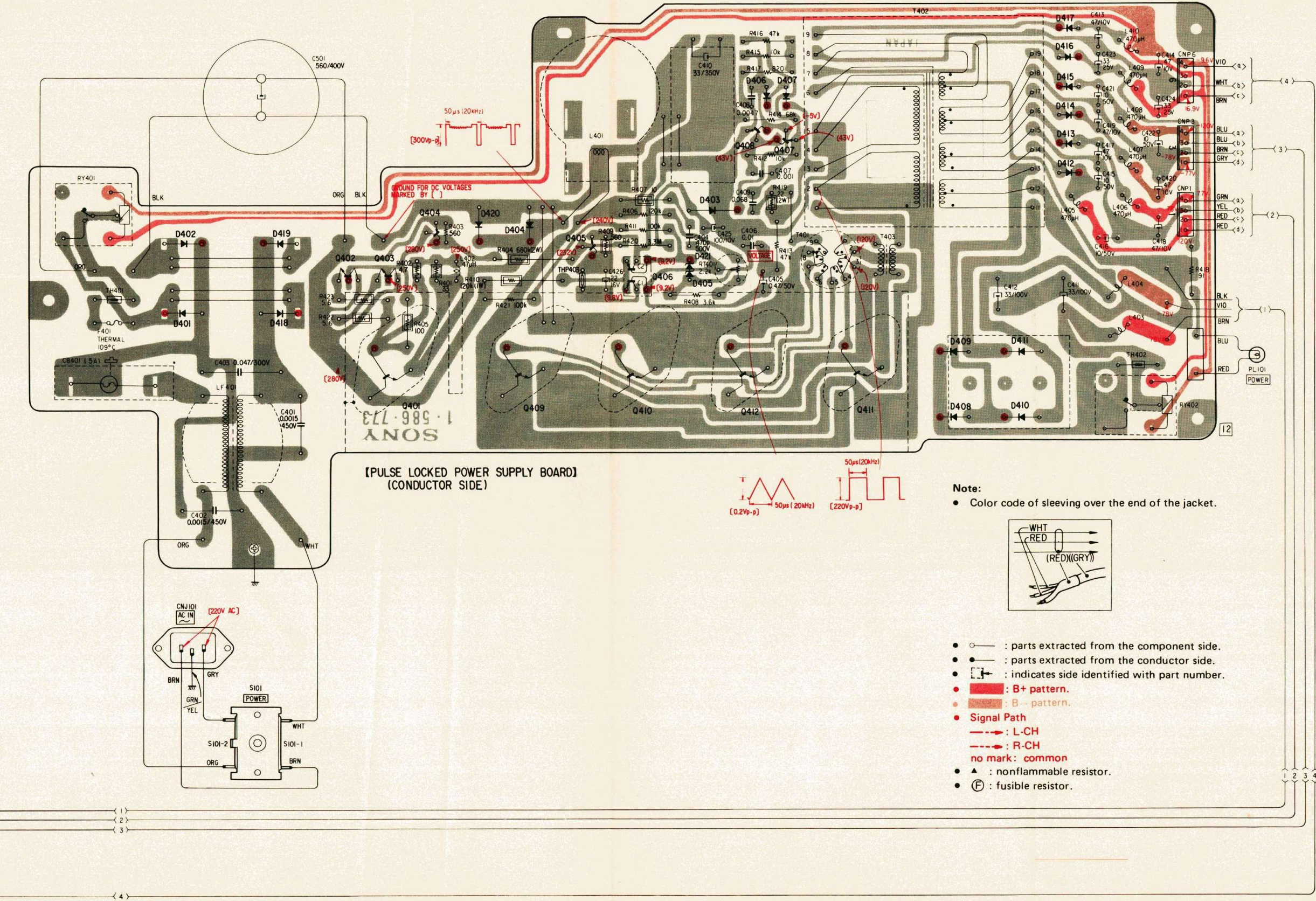


4-4. MOUNTING DIAGRAM (TA-N88B: AEP, UK model)

— Conductor Side —

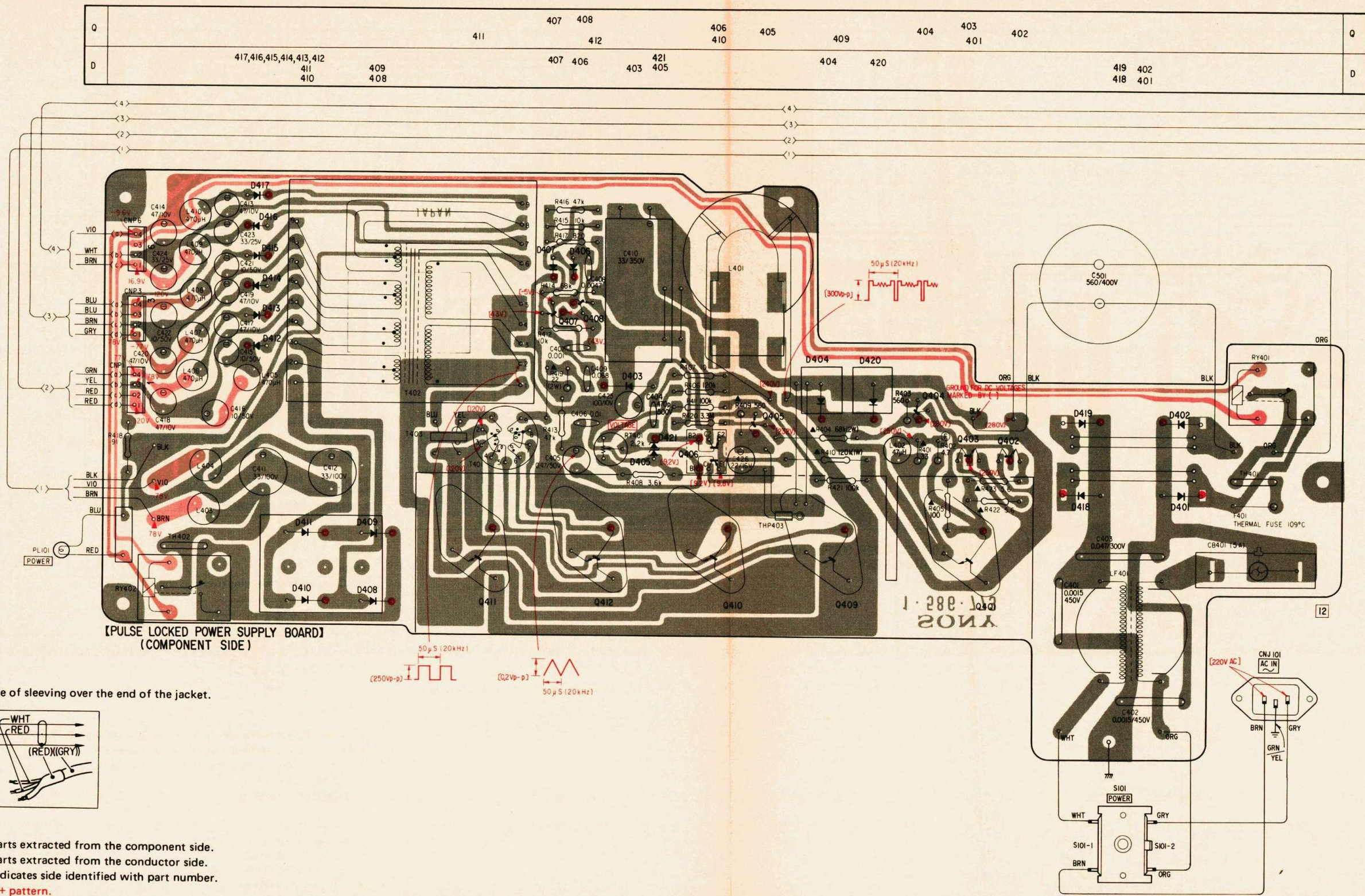


Q				402	403	404		405	406		408	407						Q
D				402	419			420	404		421	403	406	407		411		D
				401	418						405					409	411	
																408	410	
																	412	
																	417	

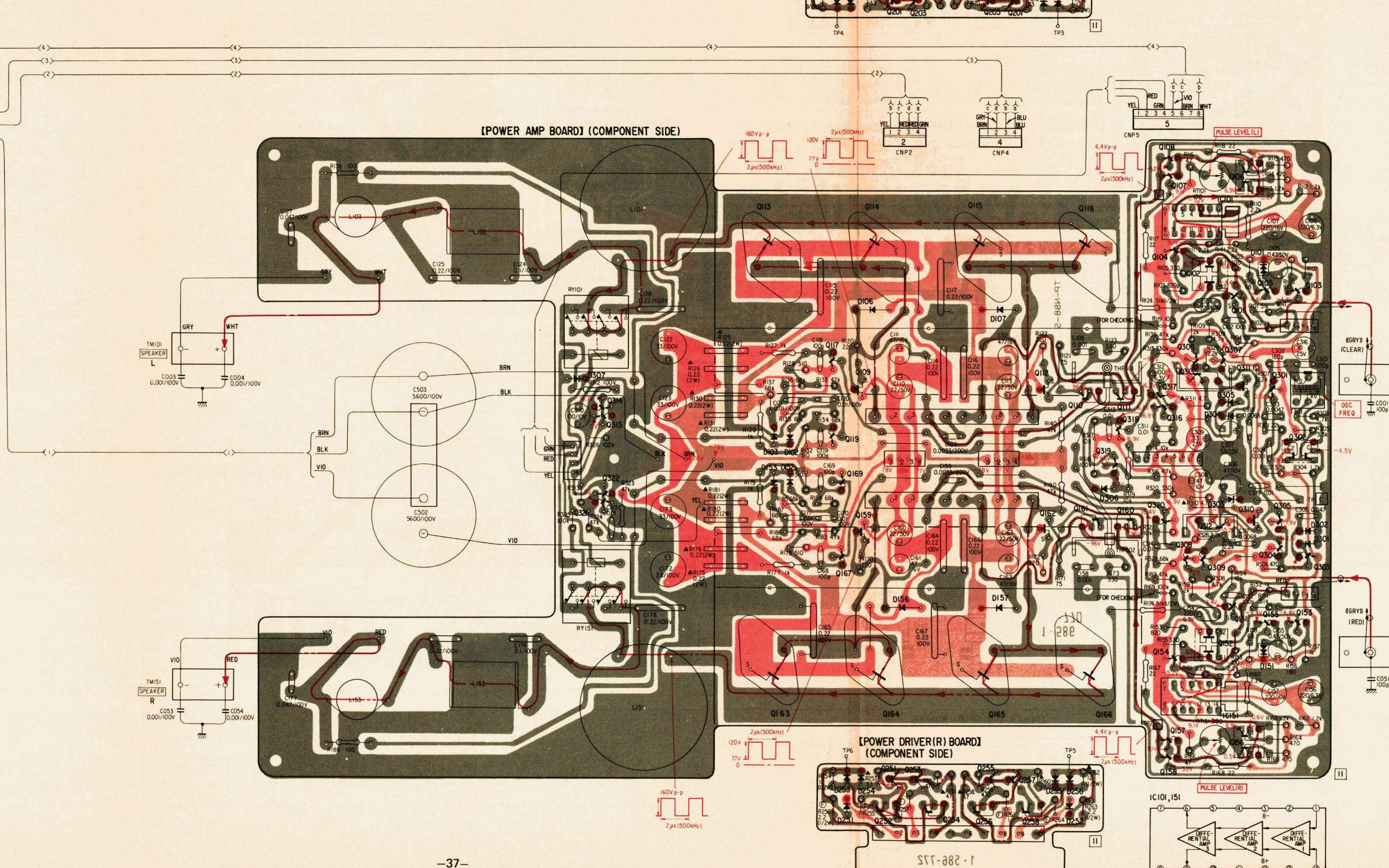


4-4. MOUNTING DIAGRAM (TA-N88B: AEP, UK model)

— Component Side —

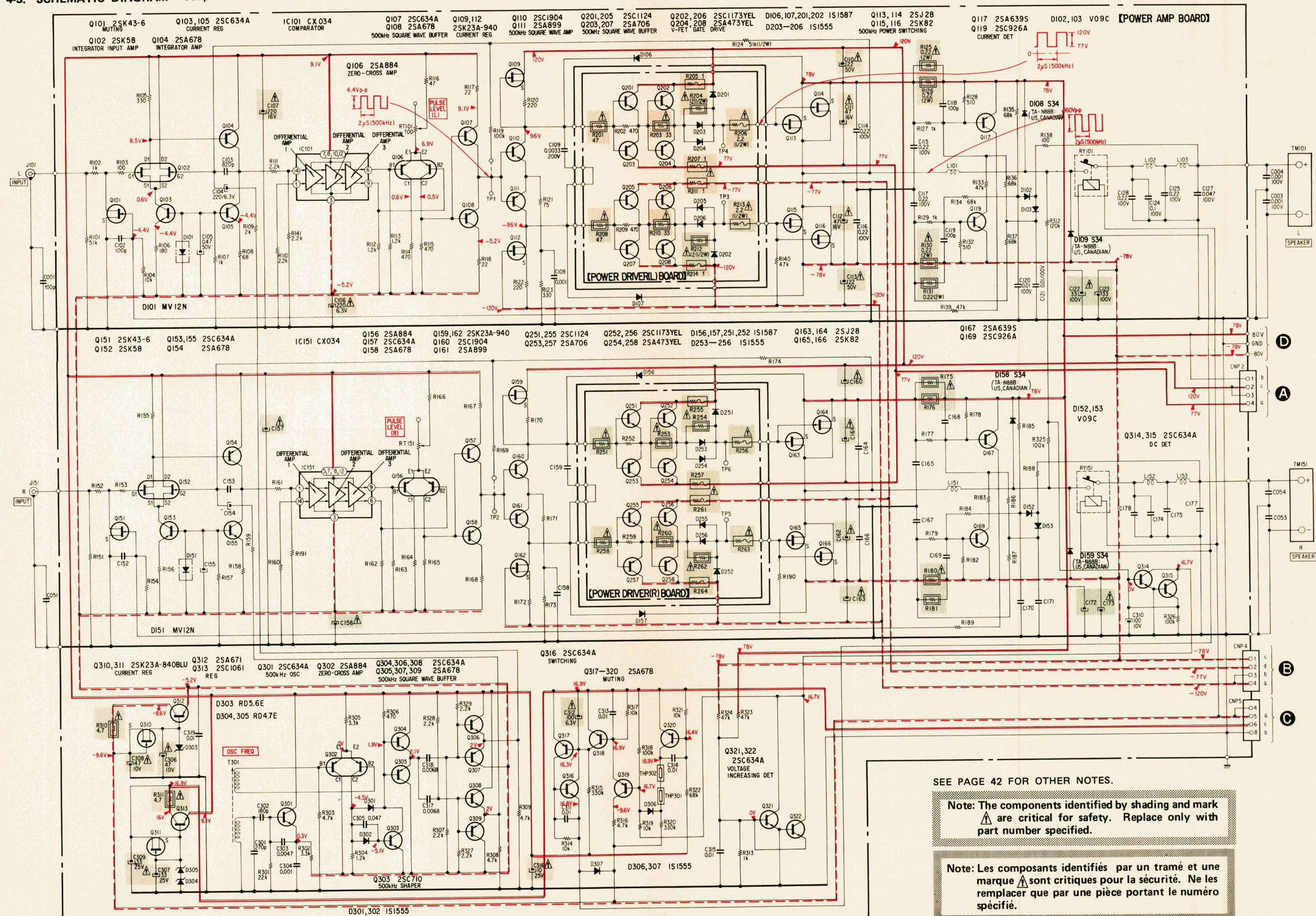


- Note:
- Color code of sleeving over the end of the jacket.
 - WHT (RED)
 - RED (GRY)
 - (RED)(GRY)
- : parts extracted from the component side.
 - : parts extracted from the conductor side.
 - : indicates side identified with part number.
 - : B+ pattern.
 - : B- pattern.
 - Signal Path
 - : L-CH
 - : R-CH
 - no mark : common
 - ▲ : nonflammable resistor.
 - ⊕ : fusible resistor.



Q, IC	D
202, 206	201, 202
204, 208	
201, 205	203, 205
203, 207	204, 206
108	
107, 106	
IC101	
103, 104	101
102	
105, 103	
101	106, 107
107, 307	
306, 307	
303	
304	
305	
306	
307	
308	
309	
310	
311	
312	
313	
314	
315	
316	
317	
318	
319	
320	
321	
322	
323	
324	
325	
326	
327	
328	
329	
330	
331	
332	
333	
334	
335	
336	
337	
338	
339	
340	
341	
342	
343	
344	
345	
346	
347	
348	
349	
350	
351	
352	
353	
354	
355	
356	
357	
358	
359	
360	
361	
362	
363	
364	
365	
366	
367	
368	
369	
370	
371	
372	
373	
374	
375	
376	
377	
378	
379	
380	
381	
382	
383	
384	
385	
386	
387	
388	
389	
390	
391	
392	
393	
394	
395	
396	
397	
398	
399	
400	
401	
402	
403	
404	
405	
406	
407	
408	
409	
410	
411	
412	
413	
414	
415	
416	
417	
418	
419	
420	
421	
422	
423	
424	
425	
426	
427	
428	
429	
430	
431	
432	
433	
434	
435	
436	
437	
438	
439	
440	
441	
442	
443	
444	
445	
446	
447	
448	
449	
450	
451	
452	
453	
454	
455	
456	
457	
458	
459	
460	
461	
462	
463	
464	
465	
466	
467	
468	
469	
470	
471	
472	
473	
474	
475	
476	
477	
478	
479	
480	
481	
482	
483	
484	
485	
486	
487	
488	
489	
490	
491	
492	
493	
494	
495	
496	
497	
498	
499	
500	

4-3. SCHEMATIC DIAGRAM – Amplifier Section –



4.4. SCHEMATIC DIAGRAM — Power Supply Section —

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

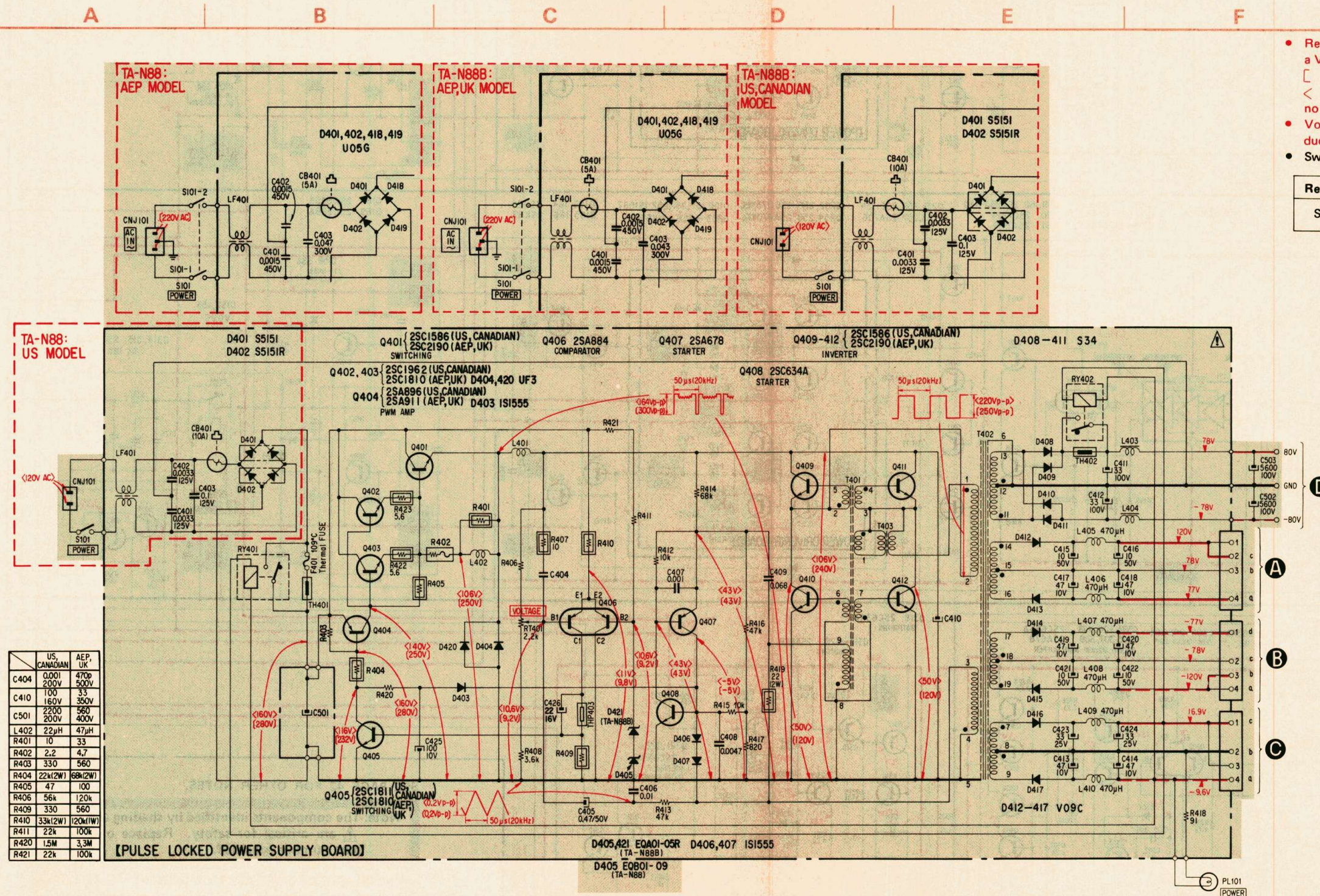
Note: Les composants identifiés par un tramé et une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

Note:

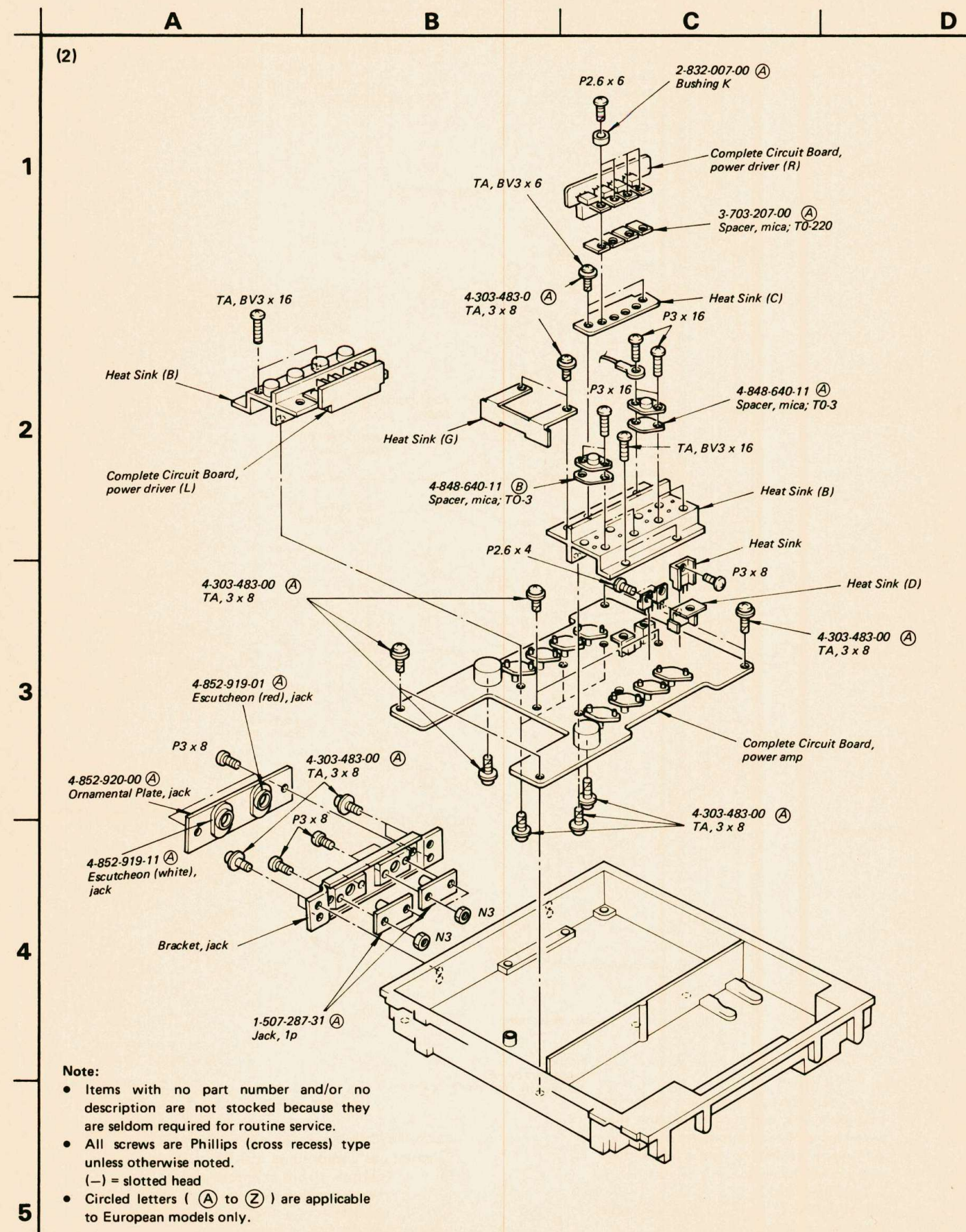
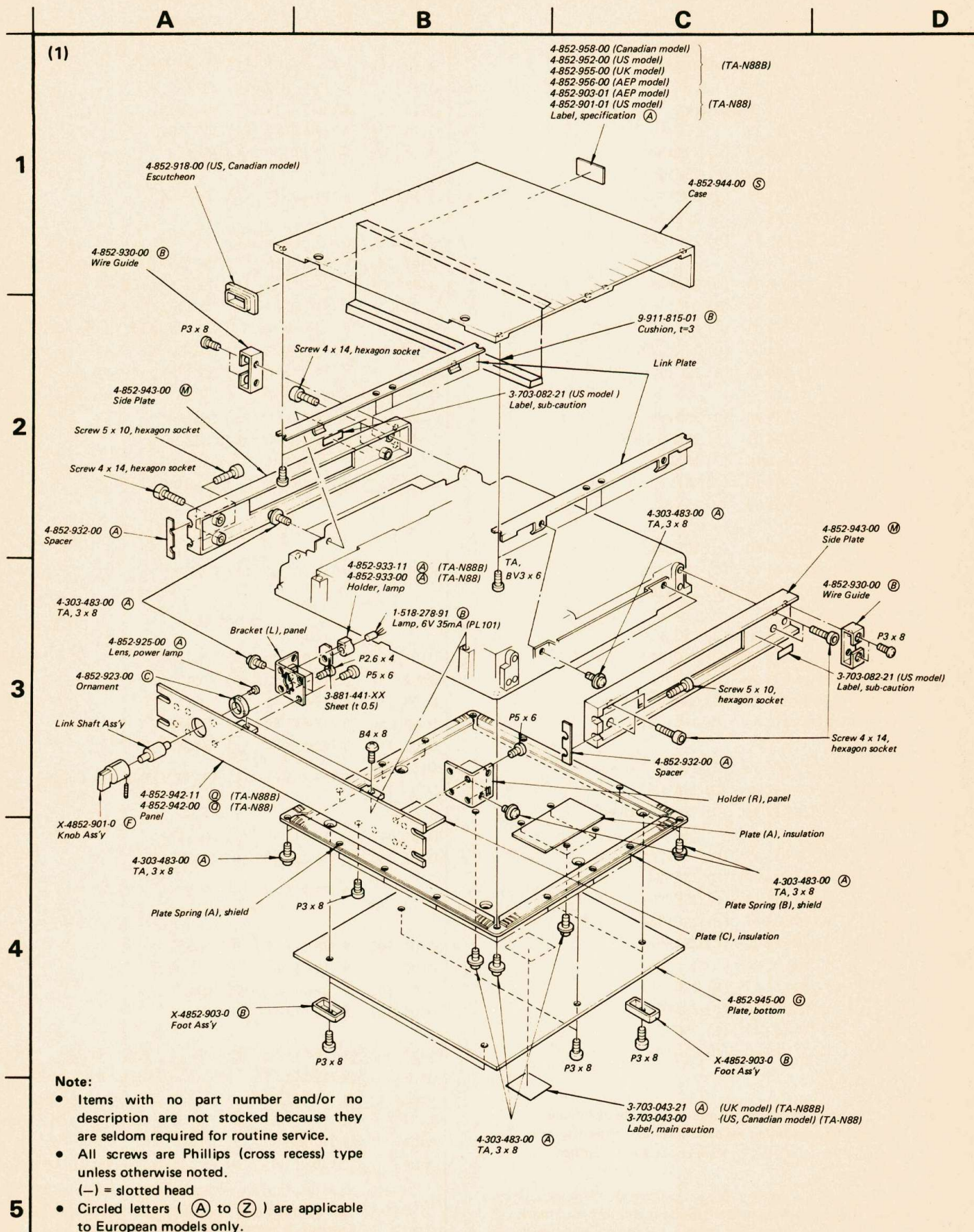
- All capacitors are in μF unless otherwise noted, $\text{pF} = \mu\text{F} / 100$. 50WV or less are not indicated except for electrolytics.
- All resistors are in ohms, $\frac{1}{4}\text{W}$ unless otherwise noted. $\text{k}\Omega = 1000\Omega$, $\text{M}\Omega = 1000\text{k}\Omega$.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
-  : nonflammable resistor.
-  : fusible resistor.
-  : B+ bus.
-  : panel designation.
-  : adjustment for repair.
-  : B- bus.
- Voltages are dc with respect to ground unless otherwise noted.

- Readings are taken under no signal conditions with a VOM (20k Ω /V).
- [] : AEP, UK model
- < > : US, Canadian model
- no mark: common
- Voltage variations may be noted due to normal production tolerances.
- Switch

Ref. No.	Switch	Position
S101	POWER	OFF

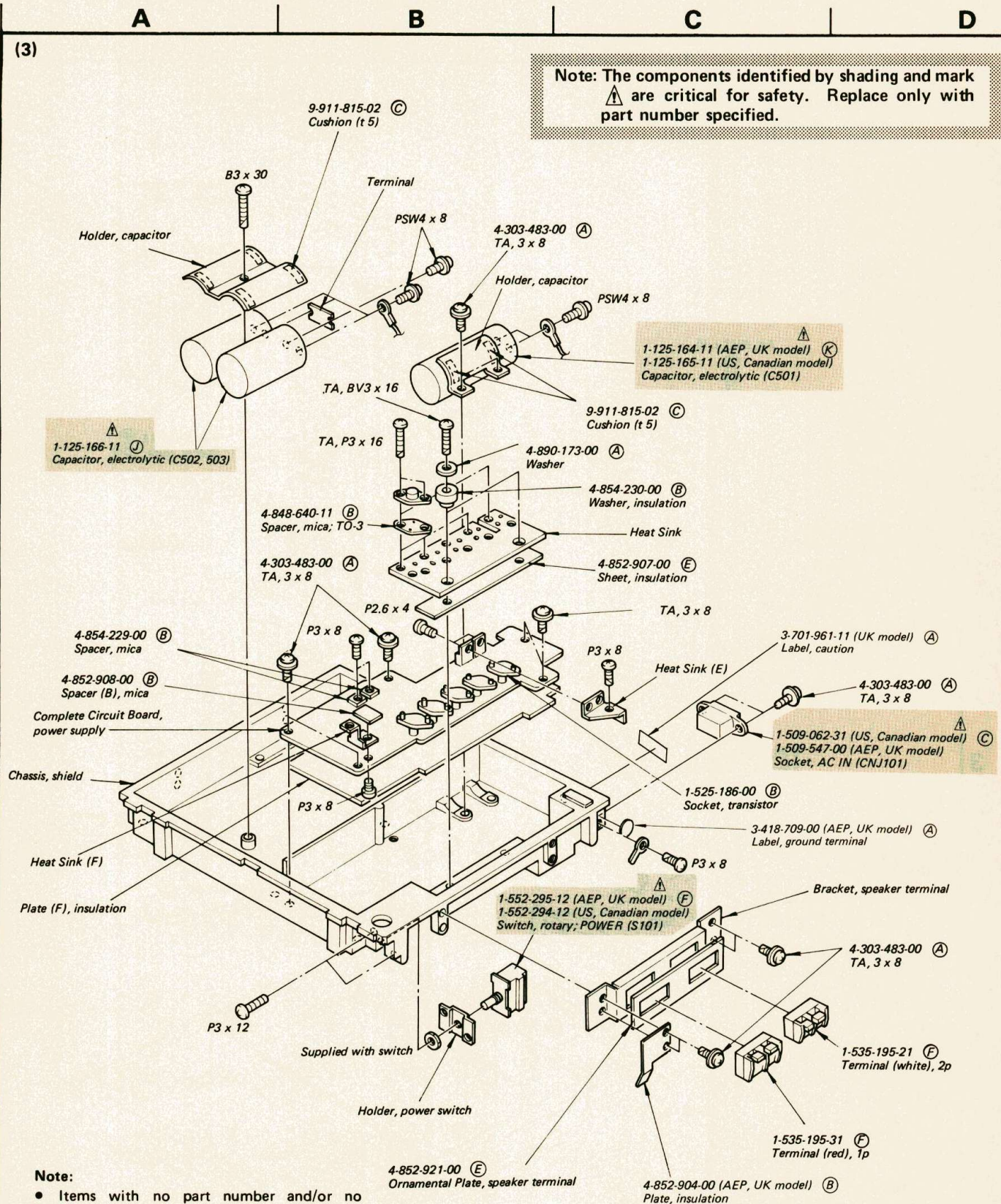


SECTION 5 EXPLODED VIEWS



SECTION 6

ELECTRICAL PARTS LIST



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.

<i>Ref. No.</i>	<i>Part No.</i>	<i>Description</i>
-----------------	-----------------	--------------------

SEMICONDUCTORS

Transistors

⇒ Q101, 151	8-723-305-00	(C)	2SK483-5
Q102, 152	8-761-510-06	(F)	2SK58
Q103, 153	8-729-663-47	(B)	2SC1364
Q104, 154	8-727-788-00	(C)	2SA678
Q105, 155	8-729-663-47	(B)	2SC1364
Q106, 156	8-765-020-00	(D)	2SA884
Q107, 157	8-729-663-47	(B)	2SC1364
Q108, 158	8-727-788-00	(C)	2SA678
Q109, 159	8-722-394-01	(B)	2SK23A-940
Q110, 160	8-729-990-43	(B)	2SC1904
Q111, 161	8-729-989-93	(C)	2SA899
Q112, 162	8-722-394-01	(B)	2SK23A-940
Q113, 163	8-720-061-10	(Q)	2SJ28
Q114, 164	8-720-061-10	(Q)	2SJ28
Q115, 165	8-720-061-00	(N)	2SK82
Q116, 166	8-720-061-00	(N)	2SK82
Q117, 167	8-729-163-93	(C)	2SA639S
Q119, 169	8-720-950-03	(D)	2SC926A
Q201, 251	8-725-412-00	(C)	2SC1124
Q202, 252	8-729-207-33	(C)	2SC1173 yellow
Q203, 253	8-727-632-00	(D)	2SA706
Q204, 254	8-729-227-33	(C)	2SA473 yellow
Q205, 255	8-725-412-00	(C)	2SC1124
Q206, 256	8-729-207-33	(C)	2SC1173 yellow
Q207, 257	8-727-632-00	(D)	2SA706
Q208, 258	8-729-227-33	(C)	2SA473 yellow
Q301	8-729-663-47	(B)	2SC1364
Q302	8-765-020-00	(D)	2SA884
Q303	8-729-671-13	(B)	2SC710
Q304	8-729-663-47	(B)	2SC1364
Q305	8-727-788-00	(C)	2SA678
Q306	8-729-663-47	(B)	2SC1364
Q307	8-727-788-00	(C)	2SA678
Q308	8-729-663-47	(B)	2SC1364
Q309	8-727-788-00	(C)	2SA678

Note:

- ⇒ : Due to standardization, interchangeable replacements may be substituted for parts specified in the diagrams.
- Circled letters (**A** to **Z**) are applicable to European models only.

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

Ref. No.	Part No.	Description
----------	----------	-------------

Q310, 311 8-722-384-01 (C) 2SA23-840 blue
Q312 8-729-317-12 (E) 2SA671
Q313 8-729-316-12 (D) 2SC1061
Q314-316 8-729-663-47 (B) 2SC1364
Q317-320 8-727-788-00 (C) 2SA678

Q321, 322 8-729-663-47 (B) 2SC1364

Q401 (A) 8-729-921-90 (L) 2SC2190 (AEP, UK model)
Q401 (A) 8-729-358-61 2SC1586 (US, Canadian model)
Q402, 403 (A) 8-729-372-30 (E) 2SC1713 (AEP, UK model)
Q402, 403 (A) 8-765-170-01 2SC1962 (US, Canadian model)
Q404 (A) 8-765-141-00 (H) 2SA911 (AEP, UK model)
Q404 (A) 8-765-082-20 2SA896 (US, Canadian model)
Q405 (A) 8-729-372-30 (E) 2SC1723 (AEP, UK model)
Q405 (A) 8-765-012-20 2SC1811 (US, Canadian model)
Q406 (A) 8-765-020-00 (D) 2SA884
Q407 (A) 8-727-788-00 (C) 2SA678
Q408 (A) 8-729-663-47 (B) 2SC1364
Q409-412 (A) 8-729-921-90 (L) 2SC2190

IC

IC101,151 8-750-340-00 ① CX034

Diodes

D101, 151	8-719-912-00	(B)	MV12N
D102, 152	8-719-900-93	(B)	V09C
D103, 153	8-719-900-93	(B)	V09C
D106, 156	8-719-815-80	(B)	1S1587
D107, 157	8-719-815-80	(B)	1S1587
D108, 158	8-719-303-41	(C)	S34 (TA-N88B: US, Canadian model)
D109, 159			
D201, 251	8-719-815-80	(B)	1S1587
D202, 252	8-719-815-80	(B)	1S1587
D203-206	8-719-815-55	(B)	1S1555
D253-256			
D301, 302	8-719-815-55	(B)	1S1555
D303	8-719-156-08	(B)	RD5.6E
D304, 305	8-719-147-77	(B)	RD4.7E
D306, 307	8-719-815-55	(B)	1S1555
D401, 402	(A) 8-719-911-55	(C)	U05G (AEP, UK model)
D401	(A) 8-719-851-51		S5151 (US, Canadian model)
D402	(A) 8-719-801-51		S5151R (US, Canadian model)
D403	(A) 8-719-815-55	(B)	1S1555
D404	(A) 8-719-300-30	(E)	UF3
D405	(A) 8-719-931-05	(B)	EQB01-05 (TA-N88B)

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

Note:

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

Ref. No.	Part No.	Description
D405	⚠ 8-719-931-09	(B) EQB01-09 (TA-N88)
D406, 407	⚠ 8-719-815-55	(B) 1S1555
D408-411	⚠ 8-719-303-41	(C) S34
D412-417	⚠ 8-719-900-93	(B) V09C
D418, 419	⚠ 8-719-911-55	(C) V05G (AEP, UK model)
D420	⚠ 8-719-300-00	(E) UF3
D421	⚠ 8-719-931-05	(B) EQB01-05 (TA-N88B)

Thermistors

Th401, 402	⚠ 1-800-356-00	(E) negative
ThP301, 302	1-800-427-00	(B) positive
ThP403	⚠ 1-800-427-00	(B) positive

COILS

L101, 151	⚠ 1-421-332-00	Choke (US, Canadian model)
L401	⚠ 1-421-331-00	Choke (US, Canadian model)
L401	⚠ 1-421-335-00	(H) Choke (AEP, UK model)
L402	⚠ 1-407-161-XX	22μH, microinductor (US, Canadian model)
L402	⚠ 1-407-165-XX	(A) 47μH, microinductor (AEP, UK model)
L403, 404	⚠ 1-421-329-00	(B) Choke
L405-410	⚠ 1-407-191-XX	(B) 470μH, microinductor

TRANSFORMERS

T301	1-405-391-11	(B) Coil, osc frequency adj.
T401	⚠ 1-435-057-00	(E) Osc
T402	⚠ 1-442-960-00	Converter (US, Canadian model)
T402	⚠ 1-442-961-00	(N) Converter (AEP, UK model)
T403	⚠ 1-543-098-00	(B) Core

CAPACITORS

All capacitors are in μF and ceramic unless otherwise noted.
50WV or less are not indicated except for electrolytics.
pF = μμF, elect = electrolytic

C1, 51	1-102-975-11	(A) 100p		
C3, 53	1-108-365-12	(A) 0.001	100V	mylar
C4, 54				
C102, 152	1-102-975-11	(A) 100p		
C103, 153	1-104-075-11	(B) 820p		polystyrol
C104, 154	1-131-427-11	(F) 220	6.3V	tantalum
C105, 155	1-121-726-11	(A) 0.47	50V	elect
C106, 156	⚠ 1-123-198-11	(B) 220	6.3V	elect

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

C107, 157	⚠ 1-123-068-11	(B) 220	16V	elect
C108, 158	1-102-074-11	(A) 0.001		
C109, 159	1-108-686-12	(A) 0.0033	200V	mylar
C110, 160	⚠ 1-123-056-11	(B) 22	50V	elect
C111, 161	⚠ 1-123-192-11	(B) 47	16V	elect
C112, 162				
C113, 163	⚠ 1-123-056-11	(B) 22	50V	elect
C114-117	1-130-085-11	(B) 0.22	100V	polyethylene
C164-167				
C118, 168	1-102-975-11	(A) 100p		
C119, 169				
C120, 170	1-106-196-12	(B) 0.01	100V	mylar
C121, 171				
C122, 172	1-123-287-11	(C) 33	100V	elect
C123, 173				
C124, 174	1-108-638-12	(B) 0.1	100V	mylar
C125, 175	1-130-085-11	(B) 0.22	100V	polyethylene
C127, 177	1-108-634-12	(A) 0.047	100V	mylar
C128, 178	1-130-085-11	(B) 0.22	100V	polyethylene
C301	1-104-063-11	(B) 270p		polystyrol
C302	1-104-059-11	(B) 180p		polystyrol
C303	1-108-234-12	(A) 0.0047		mylar
C304	1-108-227-12	(A) 0.001		mylar
C305	1-108-246-12	(A) 0.047		mylar

C306	⚠ 1-123-195-11	(A) 47	10V	elect
C307	⚠ 1-123-189-11	(A) 33	25V	elect
C308	⚠ 1-123-195-11	(A) 47	10V	elect
C309	⚠ 1-123-189-11	(A) 33	25V	elect
C310	⚠ 1-123-196-11	(A) 100	10V	elect

C311	1-108-239-12	(A) 0.01		mylar
C312	⚠ 1-123-197-11	(A) 100	6.3V	elect
C313-315	1-108-239-12	(A) 0.01		mylar
C316	⚠ 1-123-187-11	(A) 10	25V	elect
C317, 318	1-108-237-12	(A) 0.0068		mylar

C319	1-108-239-12	(A) 0.01		mylar
------	--------------	----------	--	-------

C401, 402	⚠ 1-161-437-11	0.0033	125V	(US, Canadian model)
C401, 402	⚠ 1-115-149-11	(C) 0.0015	450V	oil paper (AEP, UK model)
C403	⚠ 1-108-747-12	0.1	125V	mylar (US, Canadian model)

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.

C403	⚠ 1-108-749-12	(C) 0.047	300V	mylar (AEP, UK model)
C404	⚠ 1-108-409-12	0.001	200V	mylar (US, Canadian model)
C404	⚠ 1-107-016-12	(A) 470p	500V	mylar (AEP, UK model)
C405	⚠ 1-121-726-11	(A) 0.47	50V	elect
C406	⚠ 1-108-239-12	(A) 0.01		mylar
C407	⚠ 1-108-227-12	(A) 0.001		mylar
C408	⚠ 1-108-234-12	(A) 0.0047		mylar
C409	⚠ 1-108-249-12	(A) 0.068		mylar
C410	⚠ 1-123-283-11	100	160V	elect (US, Canadian model)
C410	⚠ 1-123-280-11	(C) 33	350V	elect (AEP, UK model)
C411, 412	⚠ 1-123-287-11	(C) 33	100V	elect
C413, 414	⚠ 1-123-195-11	(A) 47	10V	elect
C415, 416	⚠ 1-123-183-11	(A) 10	50V	elect
C417-420	⚠ 1-123-195-11	(A) 47	10V	elect
C421, 422	⚠ 1-123-183-11	(A) 10	50V	elect
C423, 424	⚠ 1-123-189-11	(A) 33	25V	elect
C425	⚠ 1-123-196-11	(A) 100	10V	elect
C426	⚠ 1-123-191-11	(A) 22	16V	elect

C501	1-125-164-11	(K) 560	400V	elect (AEP, UK model)
C501	1-125-165-11	(K) 2200	200V	elect (US, Canadian model)
C502, 503	1-125-166-11	(J) 5600	100V	elect

RESISTORS

All resistors are in ohms. Common ¼W carbon resistors are omitted. Refer to the list on the last page for their part numbers.

R109, 159	1-214-139-11	(A) 2k	¼W	metal-oxide
R120, 122	1-214-116-11	(A) 220	¼W	metal-oxide
R170, 172				
R123, 173	1-214-120-11	(A) 330	¼W	metal-oxide
R124	⚠ 1-244-914-11	(A) 51k	½W	carbon
R125, 126	⚠ 1-217-151-11	(A) 0.22	2W	wirewound
R130, 131				
R174	⚠ 1-244-914-11	(A) 51k	½W	carbon
R175, 176	⚠ 1-217-151-11	(A) 0.22	2W	wirewound
R180, 181				
R201	⚠ 1-211-514-11	(A) 47	¼W	carbon (nonflammable)

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:

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

R203	⚠ 1-211-510-11	(A) 33	¼W	carbon (nonflammable)
R204	⚠ 1-211-592-11	(A) 12	¼W	carbon (nonflammable)
R205	⚠ 1-217-375-11	(B) 1	¼W	fusible
R206	⚠ 1-217-426-11	(B) 2.2	¼W	fusible
R207	⚠ 1-217-375-11	(B) 1	¼W	fusible
R208	⚠ 1-211-514-11	(A) 47	¼W	carbon (nonflammable)
R210	⚠ 1-211-510-11	(A) 33	¼W	carbon (nonflammable)
R211	⚠ 1-217-375-11	(B) 1	¼W	fusible
R212	⚠ 1-211-592-11	(A) 12	¼W	carbon (nonflammable)
R213	⚠ 1-217-426-11	(B) 2.2	¼W	fusible
R214	⚠ 1-217-375-11	(B) 1	¼W	fusible
R251	⚠ 1-211-514-11	(A) 47	¼W	carbon (nonflammable)
R253	⚠ 1-211-510-11	(A) 33	¼W	carbon (nonflammable)
R254	⚠ 1-211-592-11	(A) 12	¼W	carbon
R255	⚠ 1-217-375-11	(B) 1	¼W	fusible
R256	⚠ 1-217-426-11	(B) 2.2	¼W	fusible
R257	⚠ 1-217-375-11	(B) 1	¼W	fusible
R258	⚠ 1-211-514-11	(A) 47	¼W	carbon (nonflammable)
R260	⚠ 1-211-510-11	(A) 33	¼W	carbon (nonflammable)
R261	⚠ 1-217-375-11	(B) 1	¼W	fusible
R262	⚠ 1-211-592-11	(A) 12	¼W	carbon
R263	⚠ 1-217-426-11	(B) 2.2	¼W	fusible
R264	⚠ 1-217-375-11	(B) 1	¼W	fusible
R310, 311	⚠ 1-211-490-11	(A) 4.7	¼W	carbon (nonflammable)
R401	⚠ 1-211-498-11	10	¼W	carbon (nonflammable) (US, Canadian model)
R401	⚠ 1-211-510-11	(A) 33	¼W	carbon (nonflammable) (AEP, UK model)
R402	⚠ 1-217-379-11	2.2	¼W	fusible (US, Canadian model)
R402	⚠ 1-217-383-11	(B) 4.7	¼W	fusible (AEP, UK model)

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

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

TA-N88/N88B

TA-N88/N88B

Note:

- Circled letters ( to ) are applicable to European models only.

Ref. No.	Part No.	Description
R403	 1-214-120-11	330 ¼W metal oxide (US, Canadian model)
R403	 1-214-126-11 	560 ¼W metal oxide (AEP, UK model)
R404	 1-206-696-11	22k 2W metal oxide (US, Canadian model)
R404	 1-214-475-11 	68k 2W metal oxide (AEP, UK model)
R405	 1-211-514-11	47 ¼W carbon (nonflammable) (US, Canadian model)
R405	 1-211-522-11 	100 ¼W carbon (nonflammable) (AEP, UK model)
R406	 1-244-715-11 	56k ¼W carbon (US, Canadian model)
R406	 1-244-723-11 	120k ¼W carbon (AEP, UK model)
R407	 1-211-498-11 	10 ¼W carbon (nonflammable)
R408	 1-244-686-11 	3.6k ¼W carbon
R409	 1-211-534-11	330 ¼W carbon (nonflammable) (US, Canadian model)
R409	 1-211-540-11 	560 ¼W carbon (nonflammable) (AEP, UK model)
R410	 1-206-700-11	33k 2W metal oxide (US, Canadian model)
R410	 1-206-801-11 	120k 1W composition (AEP, UK model)
R411	 1-244-705-11	22k ¼W carbon (US, Canadian model)
R411	 1-244-721-11 	100k ¼W (AEP, UK model)
R412	 1-244-697-11 	10k ¼W carbon
R413	 1-244-713-11 	47k ¼W carbon
R414	 1-244-717-11 	68k ¼W carbon
R415	 1-244-697-11 	10k ¼W carbon
R416	 1-244-713-11 	47k ¼W carbon
R417	 1-244-671-11 	820 ¼W carbon
R418	 1-244-648-11 	91 ¼W carbon
R419	 1-206-471-11 	22 2W metal oxide
R420	 1-210-817-11	1.5M ¼W (US, Canadian model)
R420	 1-210-825-11 	3.3M ¼W carbon (AEP, UK model)
R421	 1-244-705-11	22k ¼W carbon (US, Canadian model)
R421	 1-244-721-11 	100k ¼W (AEP, UK model)
R422, 423	 1-211-492-11 	5.6 ¼W carbon

SWITCHES

S101	 1-552-294-12	Rotary, POWER (US, Canadian model)
S101	 1-552-295-12 	Rotary, POWER (AEP, UK model)

Ref. No. Part No. Description

JACKS

J101, 151	1-507-287-XX	 1p
CNJ101	 1-509-062-31	Socket, AC IN (US, Canadian model)
CNJ101	 1-509-547-00 	Socket, 3p AC IN (SEP, UK model)

MISCELLANEOUS

CB401	 1-532-493-12	Circuit Breaker 10A (TA-N88: US model)
CB401	 1-532-533-11 	Circuit Breaker 5A (AEP, UK model)
CB401	 1-532-526-00	Circuit Breaker 10A (TA-N88B: US, Canadian model)
F401	 1-532-496-00 	Fuse, 190°C
LF401	 1-421-259-00 	Line Filter Coil
PL101	1-518-115-XX	 Lamp, 6V 35mA
RT101, 151	1-224-247-XX	 100, adjustable
RT401	1-224-250-XX	 2.2k, adjustable
RY101, 151	1-515-257-00	 Relay
RY401, 402	 1-515-278-00 	Relay
TM101	1-535-195-21	 Terminal, 2p white
TM151	1-535-195-31	 Terminal, 2p red
	1-525-186-00	 Socket, transistor

ACCESSORIES & PACKING MATERIALS

Part No.	Description
 1-534-262-XX	 Cord, power (US, Canadian model)
 1-534-819-00	 Cord, power (UK model)
3-701-020-00	 Bag, plastic; printed matters
3-701-622-00	 Bag, plastic; power cord (UK model)
3-770-282-11	 Manual, instruction (AEP, UK model)
3-770-282-21	Manual, instruction (US model)
3-770-282-21	Manual, instruction (Canadian model)
3-794-299-31	
3-794-156-12	 Booklet, technical information (AEP, UK model)
3-794-156-21	Booklet, technical information (TA-N88: US model)
4-809-251-00	 Bag, plastic
4-852-949-00	 Cushion
4-852-952-00	 Carton (TA-N88)
4-852-959-00	 Carton (TA-N88B)

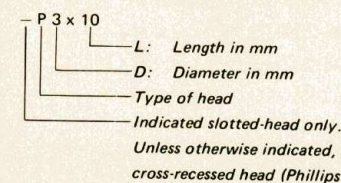
Note: The components identified by shading and mark  are critical for safety. Replace only with part number specified.

1/4 WATT CARBON RESISTORS

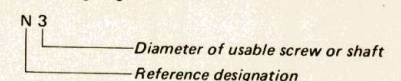
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11	1.0M	1-244-745-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11	1.1M	1-244-746-11
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	1.2M	1-244-747-11
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	1.3M	1-244-748-11
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	1.5M	1-244-749-11
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	1.6M	1-244-750-11
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	1.8M	1-244-751-11
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	2.0M	1-244-752-11
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	2.2M	1-244-753-11
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	2.4M	1-244-754-11
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	2.7M	1-244-755-11
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	3.0M	1-244-756-11
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	3.3M	1-244-757-11
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	3.6M	1-244-758-11
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	3.9M	1-244-759-11
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	4.3M	1-244-760-11
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	4.7M	1-244-761-11
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	5.1M	1-244-762-11
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:



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		braizer-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:

STEREO POWER AMPLIFIER

TA-N88 / N88B

CORRECTION

Please correct the TA-N88/N88B service manual
(Part No. 9-958-493-02).

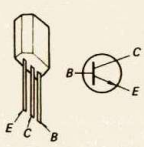
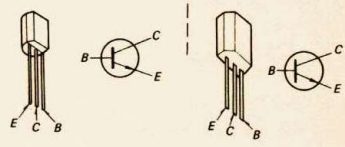
TA-N88 (Panel : Silver)

US Model
AEP Model

TA-N88B (Panel : Black)

UK Model
AEP Model
US Model
Canadian Model

June, 1978

PAGE AND SECTION	INCORRECT	CORRECT
P. 1 SPECIFICATIONS	Power Consumption: 135W (US, Canadian model)	Power Consumption: 135W (US model) 480VA (Canadian model)
P. 13 4-1. MOUNTING DIAGRAMS Replacement Semiconductors For replacement, use semiconductors except in ().	Q103, 153, 105, 155, 107, 157, 301, 304, 306, 308, 2SC1364 314-316, : (2SC634A) 321, 322, 408 119, 169 : 2SC926A 	Q103, 153, 105, 155, 107, 157, 301, 304, 306, 308, 2SC1364 (2SC634A) 314-316, 321, 322, 408  Q119, 169: 2SC926A 