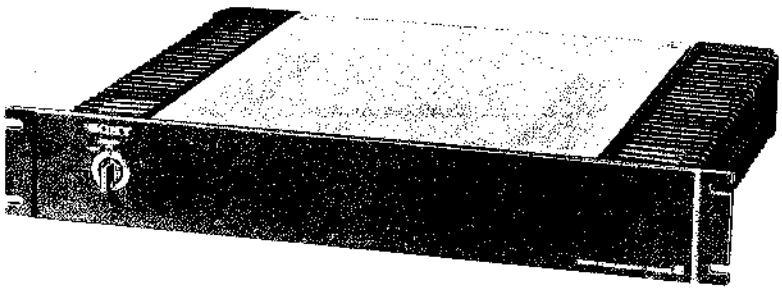
TA-N86B

US Model
Canadian Model
AEP Model
UK Model



STEREO POWER AMPLIFIER

SPECIFICATIONS

GENERAL

Power Requirements: 120 V ac, 60 Hz (US, Canadian model)
220 – 240 V ac, 50/60 Hz (AEP, UK model)

Power Consumption: 210 W (US model)
510 VA (Canadian model)
450 W (AEP, UK model)

Dimensions: Approx. 480 (w) x 80 (h) x 380 (d) mm
18⅞ (w) x 3⅛ (h) x 15 (d) inches
Including projecting parts and controls

Weight: Approx. 8.0 kg, 17 lb 10 oz (net)
Approx. 8.6 kg, 18 lb 15 oz (in shipping carton)

POWER AMPLIFIER SECTION

Continuous RMS Power Output:
(US, Canadian model)

Class A and B Operation: with 8 Ω loads, both channels driven, from 20–20,000 Hz, with no more than 0.007% total harmonic distortion

Mono Amp Operation: with 8 Ω loads, from 20–20,000 Hz, with no more than 0.015% THD

Class A	18 W + 18 W
Class B	80 W + 80 W (8 Ω) 90 W + 90 W (4 Ω)
Mono	180 W

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.

– Continued on page 2 –

SONY®
SERVICE MANUAL

(AEP, UK model)
Less than 0.007 % THD, both channels driven simultaneously, 8 Ω
(In mono amp operation: less than 0.015 %, 8 Ω)

	20 Hz – 20 kHz
Class A	18 W + 18 W
Class B	80 W + 80 W (8 Ω) 60 W + 60 W (4 Ω)
Mono	120 W

According to DIN 45500

Class A	18 W + 18 W
Class B	80 W + 80 W
Mono	120 W

Damping Factor: 70 (1 kHz, 8 Ω)

Harmonic Distortion:

		20 Hz–20 kHz	5 Hz–50 kHz
Rated output	Class A	0.007 %	0.02 %
	Class B	0.007 %	0.02 %
	Mono	0.015 %	0.07 %
½ rated output	Class A	0.0025 %	0.005 %
	Class B	0.0035 %	0.007 %
	Mono	0.008 %	0.03 %
1W output	Class A	0.001 %	0.006 %
	Class B	0.003 %	0.007%
	Mono	0.008 %	0.025 %

Intermodulation (IM) Distortion:
(60 Hz : 7 kHz = 4 : 1)

Rated output	Class A	0.004 %
	Class B	0.004 %
	Mono	0.005 %
½ rated output	Class A	0.002 %
	Class B	0.003 %
	Mono	0.004 %
1W output	Class A	0.002 %
	Class B	0.003 %
	Mono	0.004 %

Power Bandwidth (IHF): 5 Hz – 45 kHz (Class B, 8 Ω, 0.007 %)
5 Hz – 60 kHz (Class A, 8 Ω, 0.007 %)
5 Hz – 30 kHz (Mono, 8 Ω, 0.015 %)

Frequency Response: DC – 200 kHz $^{+0}_{-1}$ dB (DIRECT input)
7 Hz – 200 kHz $^{+0}_{-1}$ dB (C COUPLED input)

S/N Ratio: Greater than 120 dB, short-circuited input

Residual Noise: 25 μV (8 Ω, network A)

Inputs:

	Gain			Impedance		
	Class A	Class B	Mono	Class A	Class B	Mono
DIRECT	27.4 dB	27.4 dB	33.4 dB	50 kΩ	50 kΩ	50 kΩ
C COUPLED (3 Hz cutoff frequency 6 dB/oct slope)						

Outputs: SPEAKER terminals
Class B: Accept speakers of 4 – 16 Ω
Class A and Mono amp: Accept speakers of 8 – 16 Ω

0 dB = 0.775 V

MODEL IDENTIFICATION

Specification Label

US model

SONY
STEREO POWER AMPLIFIER
MODEL NO. TA-N86B
SERIAL NO.
AC 120 V 60 Hz 210 W
MADE IN JAPAN

Canadian model

SONY
STEREO POWER AMPLIFIER
MODEL NO. TA-N86B
SERIAL NO.
AC 120 V 60 Hz 510 VA
MADE IN JAPAN

AEP, UK model

SONY
STEREO POWER AMPLIFIER
MODEL NO. TA-N86B
SERIAL NO.
220 ~ 240 V
50/60 Hz 450 W
MADE IN JAPAN

SERVICING NOTES

1. REPLACEMENT OF THE TRANSFORMERS IN THE PULSE-LOCKED POWER-SUPPLY CIRCUIT

The lead wire arrangement for each of T601–603 in the inverter circuit are shown in Figs. 1 and 2.

As the repair parts, T603 is formed by an iron core and a coil winding, but T601 and T602 are only iron core. Thus, if the coils are defective, arrange a new transformers as shown in Fig. 1. Note that the lead lengths must be exact. Also wind the coil carefully.

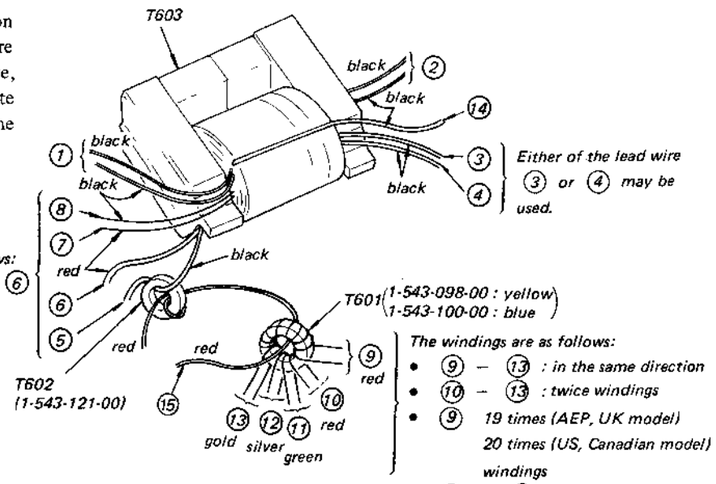


Fig. 1

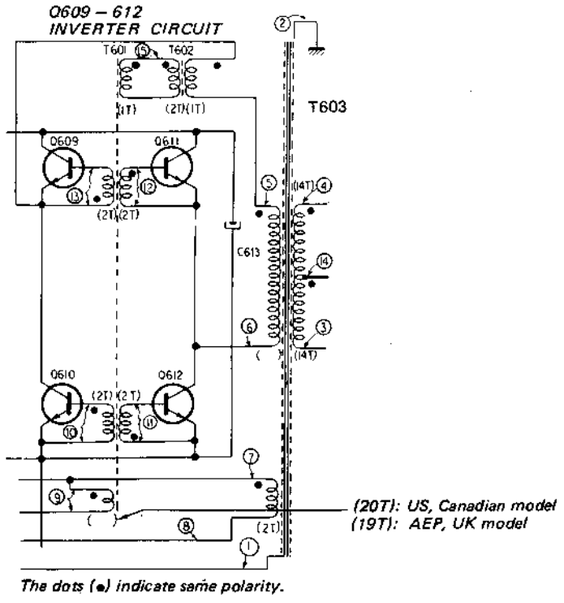
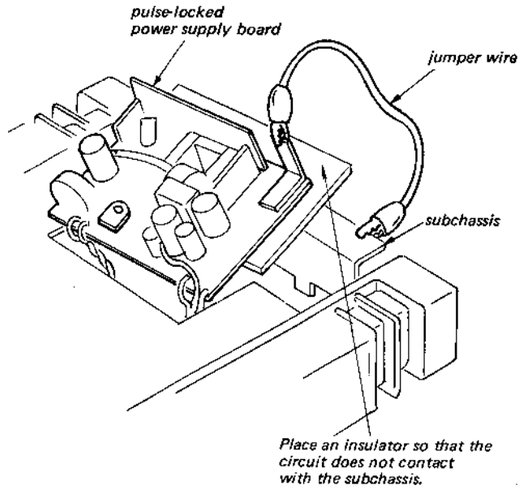


Fig. 2

2. PULSE-LOCKED POWER SUPPLY BOARD REPAIRING

This set has a pulse-locked power-supply circuit which is quite different from a conventional power-supply circuit. The pulse-locked power-supply directly rectifies and smooths the ac input power to produce the higher dc voltages required in the power supply circuit. When servicing this set, note the following.

1) To prevent unwanted radiation due to pulse signals in the pulse-locked power-supply circuit, the pulse-locked power-supply board is shielded by the aluminum diecast box.
2) The negative circuit of the secondary rectifier in the pulse-locked power-supply circuit is grounded by screws in the aluminum diecast box. When checking the pulse-locked power-supply board out of the box, use a jumper wire as shown.

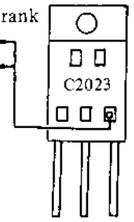


3. INVERTER CIRCUIT TRANSISTOR REPLACEMENT (Q609–612)

1) Be sure that there are no bits of solder and wire ends on the places marked *2 in Fig. 3.
2) Proceed the following items surely when replacing the transistors (Q609–612).
   *Apply thermal compound coat to the positions marked *1 and *2 in Fig. 3 before mounting the transistors.
   *Lay the F-shaped plate flat to ensure uniform contact with all 4 transistors (see Fig. 4).

AEP, UK model

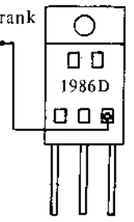
			hFE rank
Q609–612	8-729-302-31	2SC2023-R	R
	8-729-302-32	2SC2023-O	O



Note: When replacing Q609–Q612 in the pulse-locked power-supply circuit, use those which have the same hFE ranks.

US, Canadian model

			hFE rank
Q609–612	8-729-308-72	2SC1968D-O	O



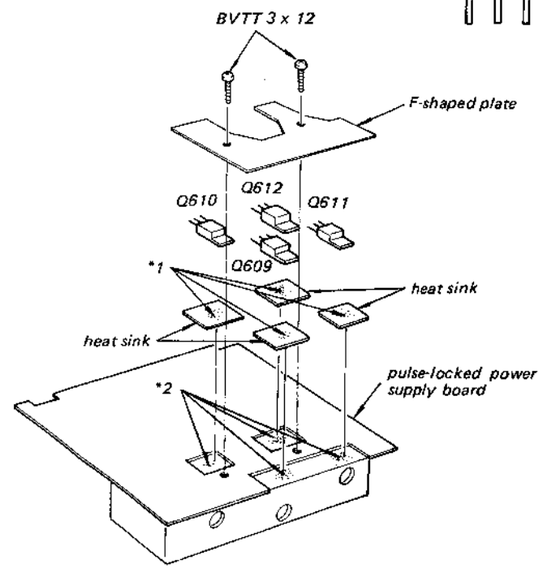


Fig. 3

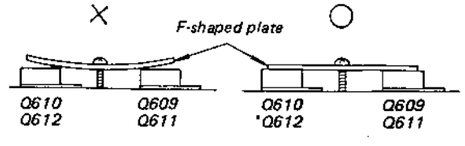


Fig. 4

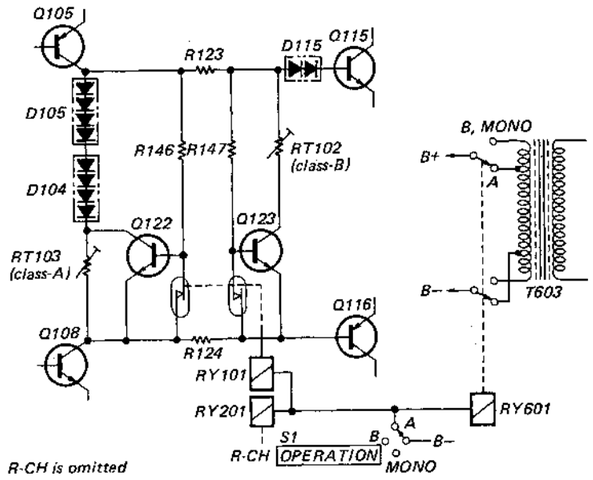
SECTION 1
OUTLINE

1-1. CIRCUIT DESCRIPTION

[Switching of Class-A and Class-B Amplifiers]

The switching between the class-A and the class-B amplifiers is done by switching the bias voltage of the amplifier.

1. For the class-A amplifier, Q122 and Q123 (Q222 and Q223) are turned off by operating the reed relay RY101 (RY201).
   Therefore, the bias voltage for the class-A amplifier is determined by RT103 (RT203). The B voltage is switched by RY601 to that for the class-A amplifier.
2. For the class-B amplifier, the reed relay RY101 (RY201) do not operate. RT103 (RT203) is short-circuited because Q122 and Q123 (Q222 and Q223) are turned on. As a result, the bias voltage for the class-B amplifier is determined by RT102 (RT202).



R-CH is omitted

Fig. 1-1.

[MONO Operation]

The left and right channel amplifiers are connected and operated in series (BTL) as shown in Fig. 1-2.

Note that the output forms a balanced push-pull circuit, thus the output power becomes approximately double. The balanced output is obtained by using the original power amplifier input-output phase inversion and inserting a load in series between the each output hot side.

Thus, same but opposite phase signal is supplied to the left and right channel power amplifier inputs simultaneously. As a result, the power applied to the load is doubled.

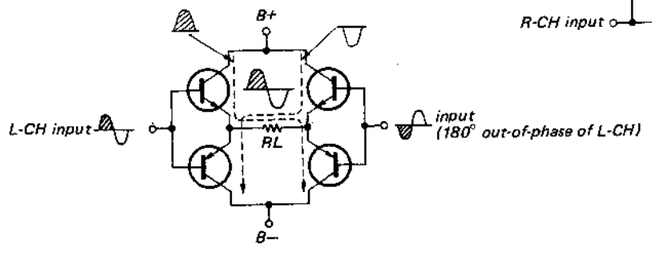


Fig. 1-2.

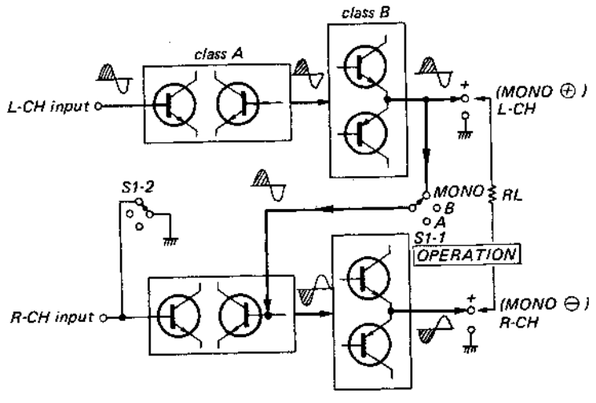
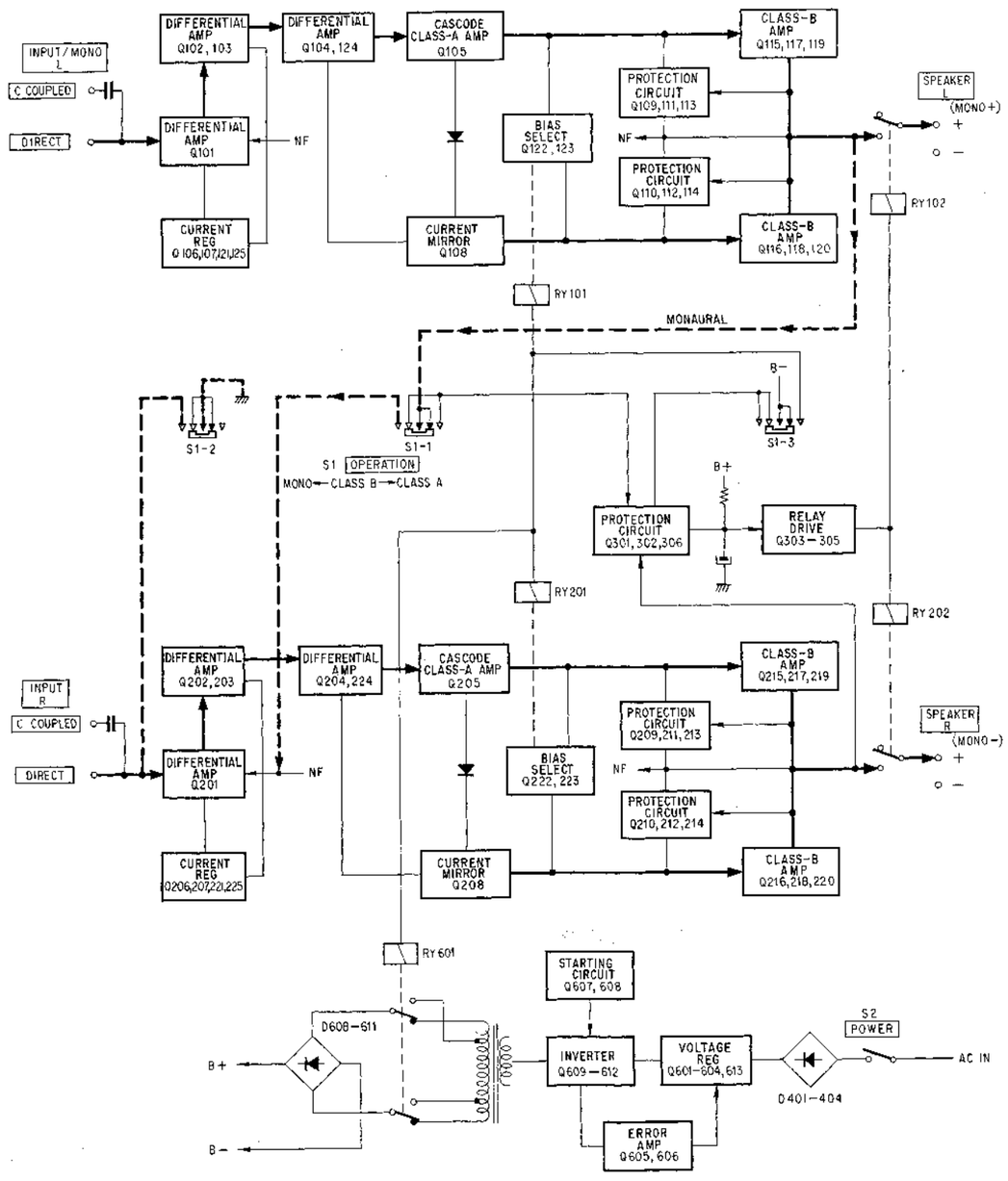


Fig. 1-3.

1-2. BLOCK DIAGRAM

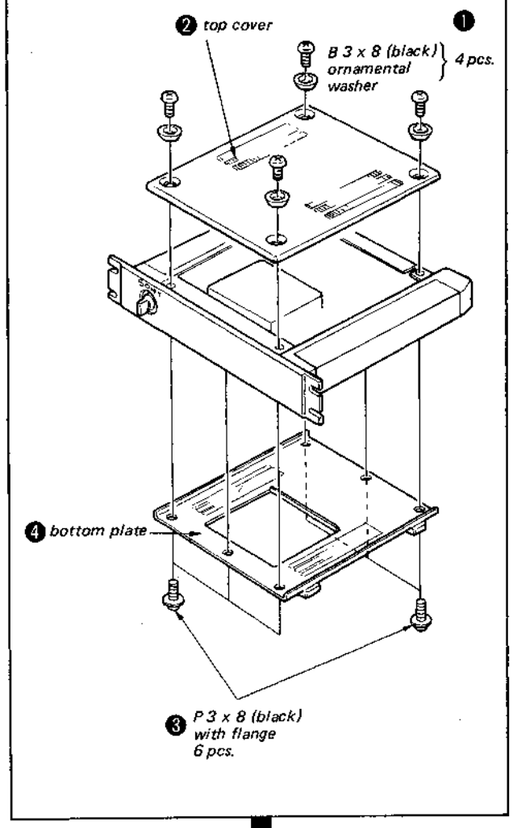


SECTION 2
DISASSEMBLY

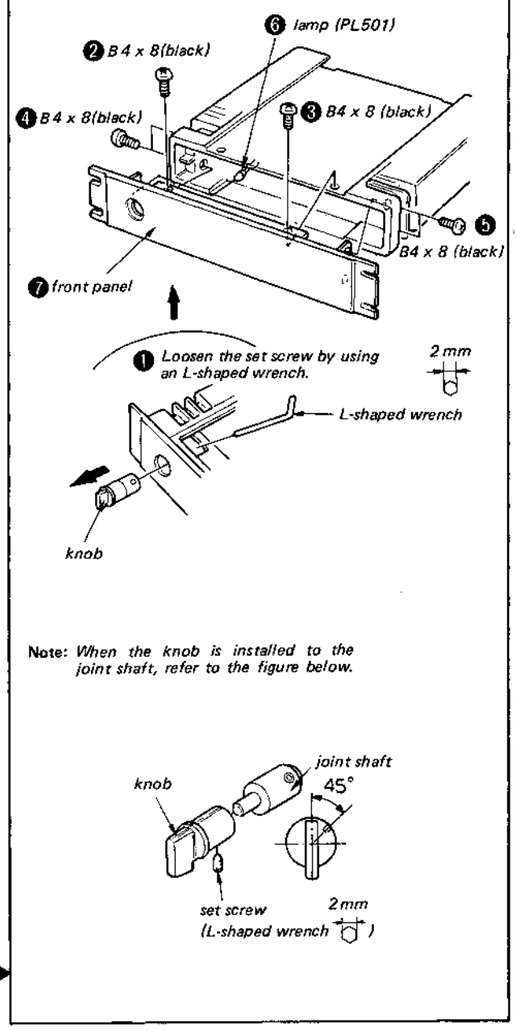
- Follow the disassembly procedure in the numerical order given.

Top Cover and Bottom Plate Removal

Note: *The power amp board can be checked by removing the top cover and the bottom plate.*

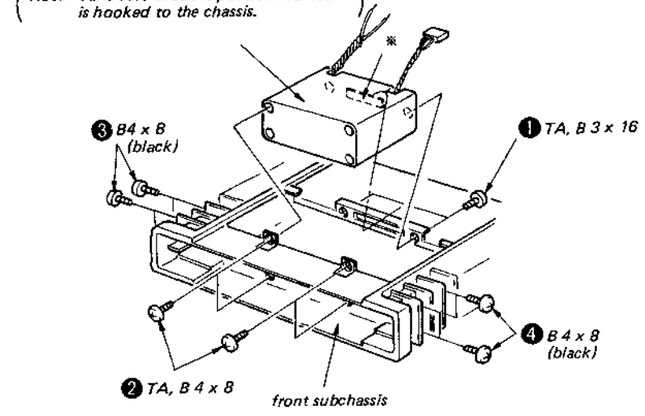


Front Panel Removal

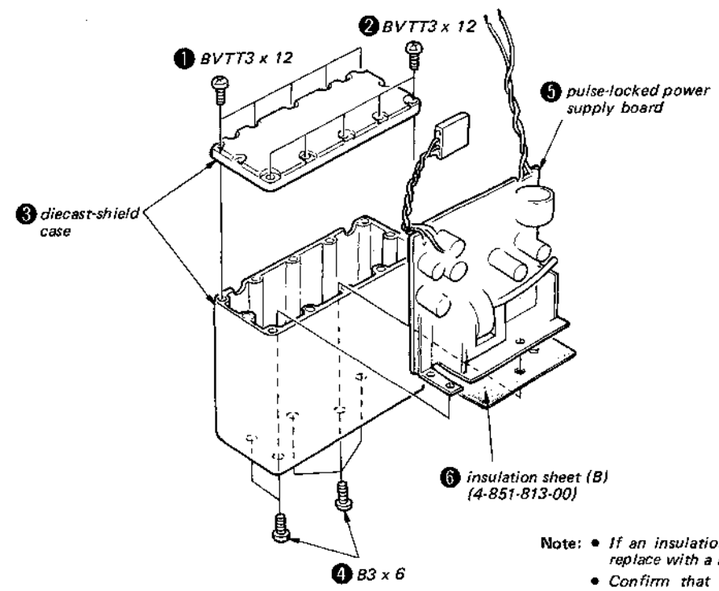


Note: *When the knob is installed to the joint shaft, refer to the figure below.*

Pulse-locked Power Supply Section Removal



Pulse-locked Power Supply Board Removal



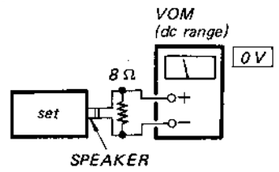
Note:
- *If an insulation sheet is defective, replace with a new one.*
- *Confirm that there are no scraps of solder or lead wire on any insulation sheet (B).*

SECTION 3
ADJUSTMENTS

Note: 1. DC BIAS and DC BALANCE adjustments should be performed about several minutes later after the POWER switch (S10) is turned on.
2. Repeat DC BIAS and DC BALANCE adjustments two or three times.
3. After replacing the power transistors, DC BIAS and DC BALANCE adjustments should be performed.

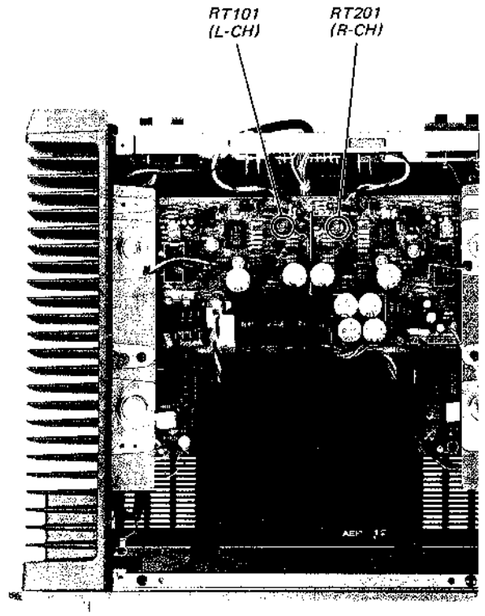
DC Balance Adjustment

Procedure:
– Power Amp Board –



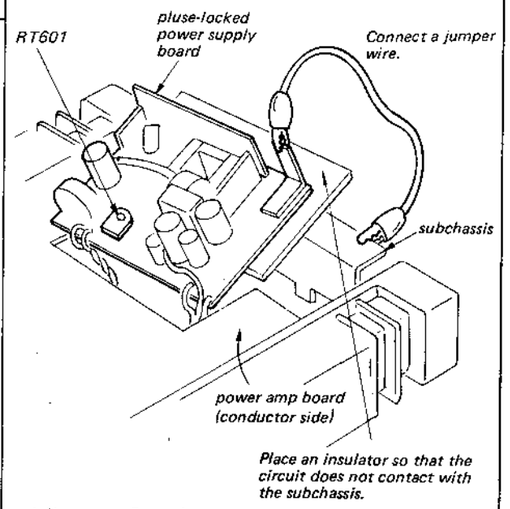
Adjust RT101 (L-CH) and RT201 (R-CH) for 0 V reading on the VOM.

Adjustment Location
– Power Amp Board –

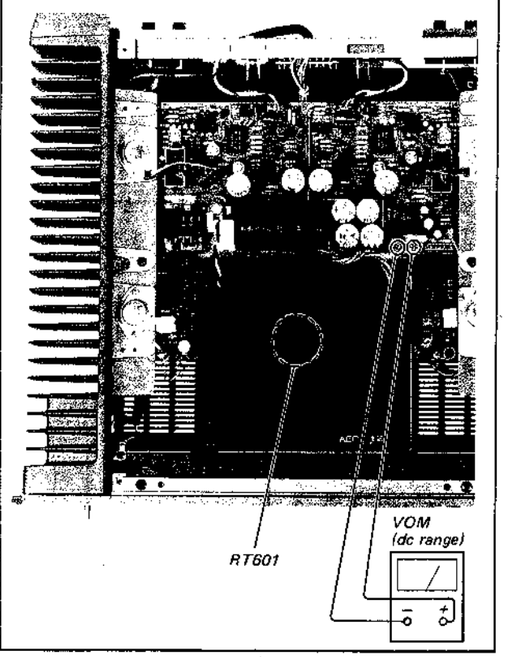


DC Voltage Adjustment

Procedure:
1. Connect a jumper wire.
2. Set the OPERATION switch (S1) to "CLASS B".
3. Adjust RT601 for 90 V reading on the VOM.



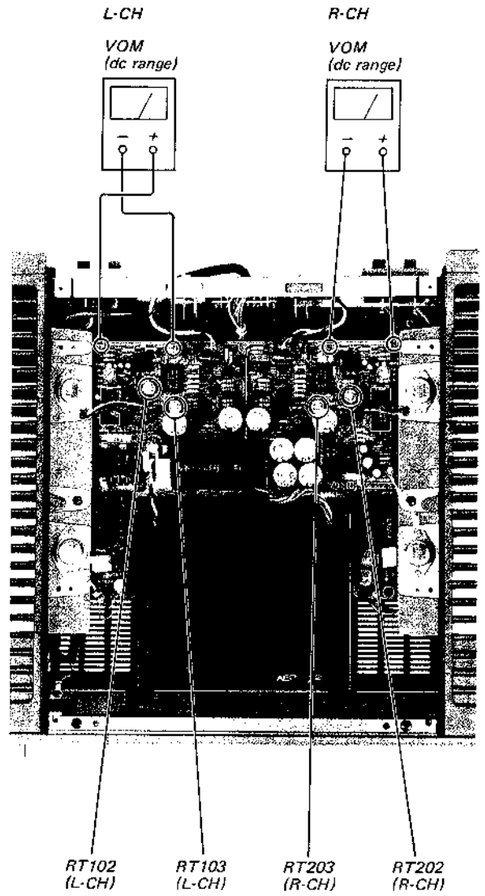
Adjustment Location
– Pulse-locked Power Supply Board –



DC Bias Adjustment

Procedure:
1. Set the OPERATION switch (S1) to "CLASS A".
2. Adjust RT103 (L-CH) and RT203 (R-CH) for 350 mV dc on the VOM.
3. Set the OPERATION switch (S1) to "CLASS B".
4. Adjust RT102 (L-CH) and RT202 (R-CH) for 20 mV dc on the VOM.

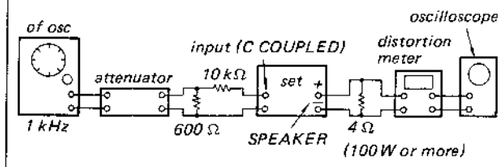
Adjustment Location
– Power Amp Board –



CLASS-B Amp Adjustments

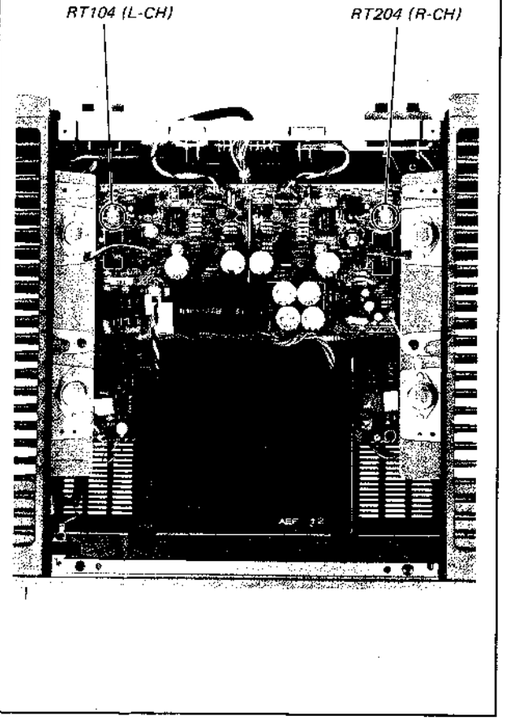
Setting:
OPERATION switch (S1): CLASS-B

Procedure:



1. Adjust the attenuator for specified reading as shown below.
   19 V . . . . . US, Canadian model
   15.5 V . . . . . AEP, UK model
2. Adjust RT104 (L-CH) and RT204 (R-CH) for 0.007 % or less on the distortion meter or for waveform with no clip on the oscilloscope.

Adjustment Location
– Power Amp Board –



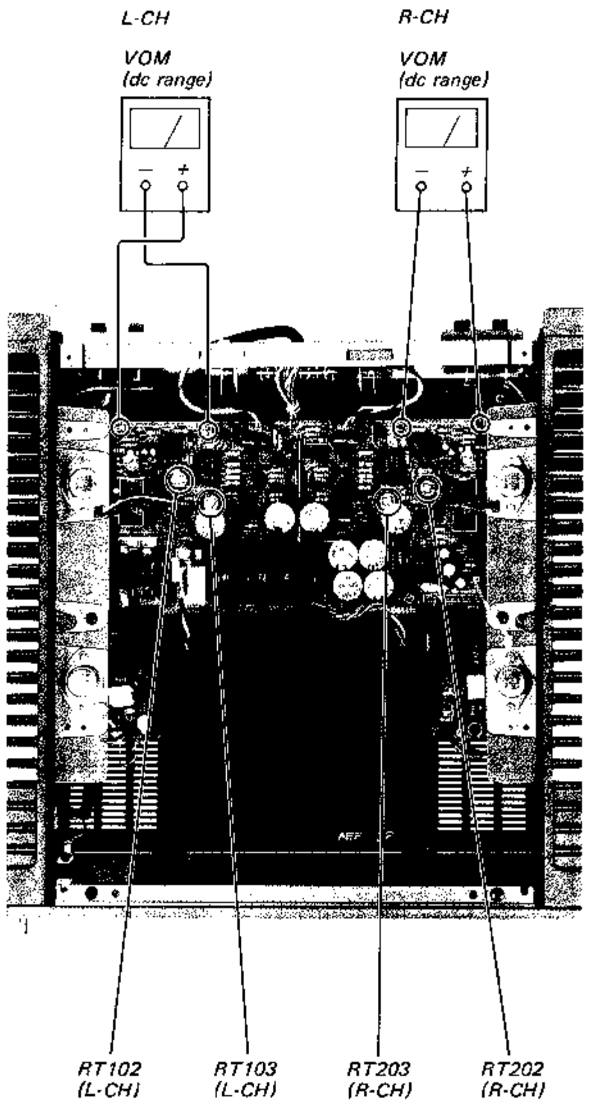
DC Bias Adjustment

Procedure:

1. Set the OPERATION switch (S1) to "CLASS A".
2. Adjust RT103 (L-CH) and RT203 (R-CH) for 350 mV dc on the VOM.
3. Set the OPERATION switch (S1) to "CLASS B".
4. Adjust RT102 (L-CH) and RT202 (R-CH) for 20 mV dc on the VOM.

Adjustment Location

– Power Amp Board –

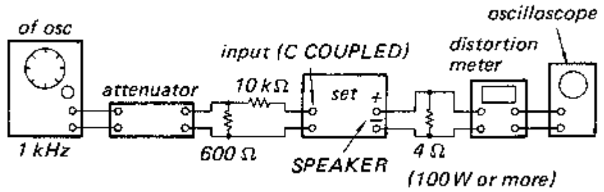


CLASS-B Amp Adjustments

Setting:

OPERATION switch (S1): CLASS-B

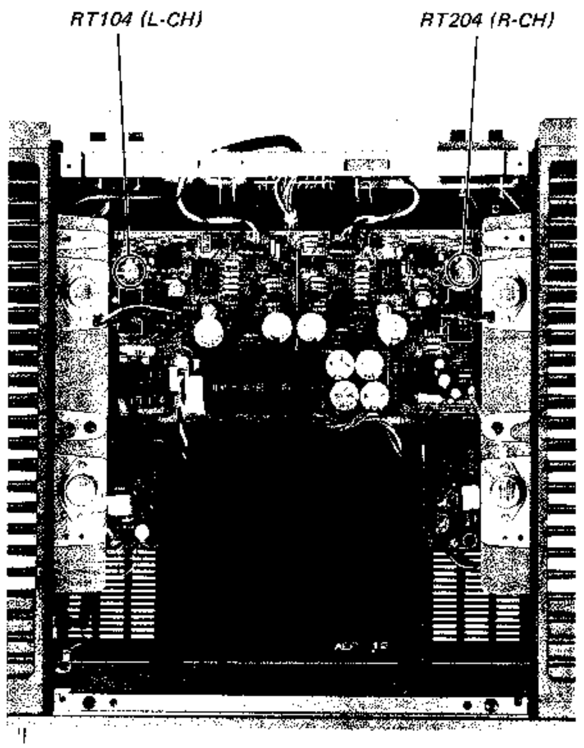
Procedure:



1. Adjust the attenuator for specified reading as shown below.
   19 V . . . . US, Canadian model
   15.5 V . . . . AEP, UK model
2. Adjust RT104 (L-CH) and RT204 (R-CH) for 0.007 % or less on the distortion meter or for waveform with no clip on the oscilloscope.

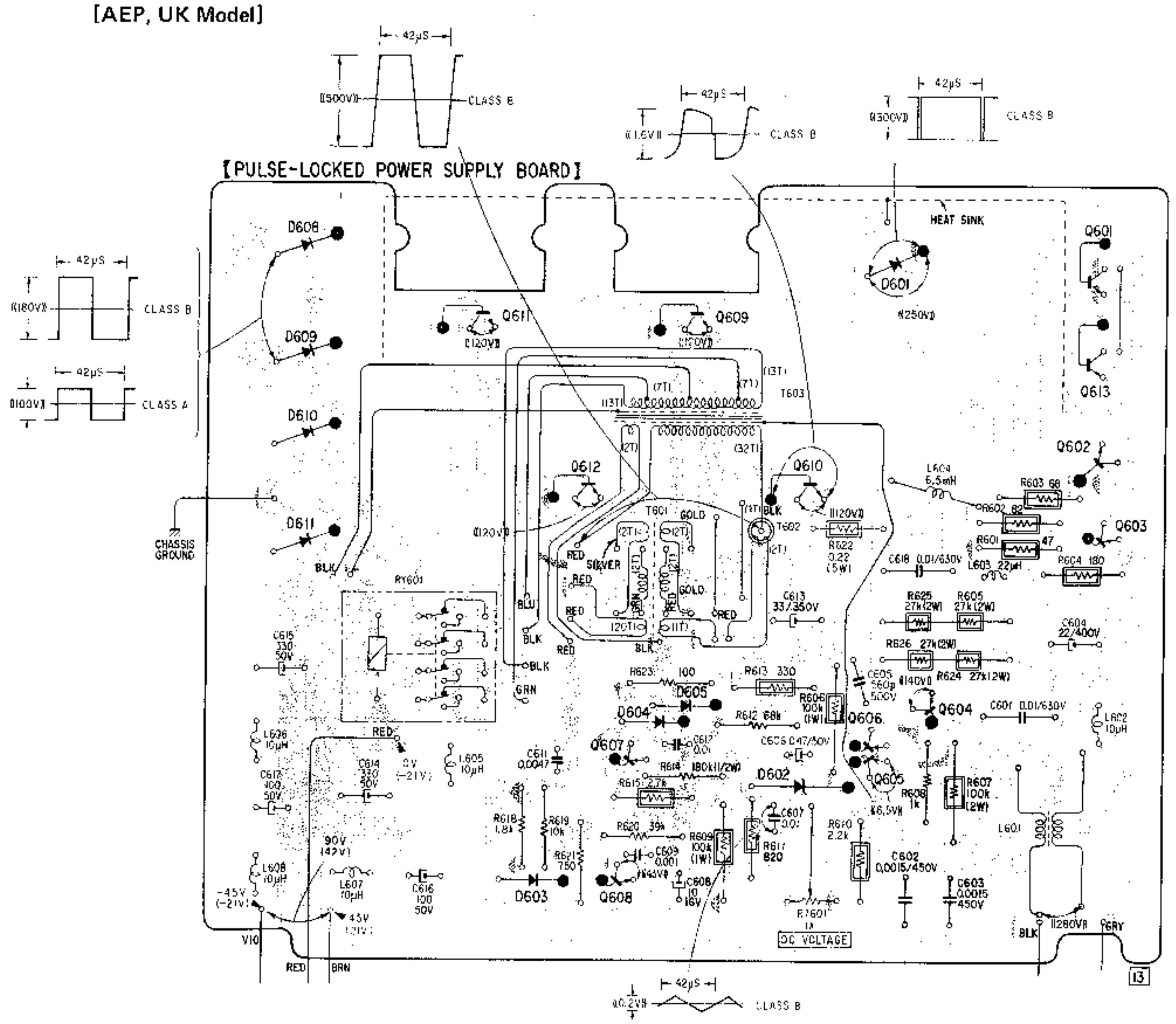
Adjustment Location

– Power Amp Board –



SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM – Pulse-locked Power Supply Board – [AEP, UK Model]



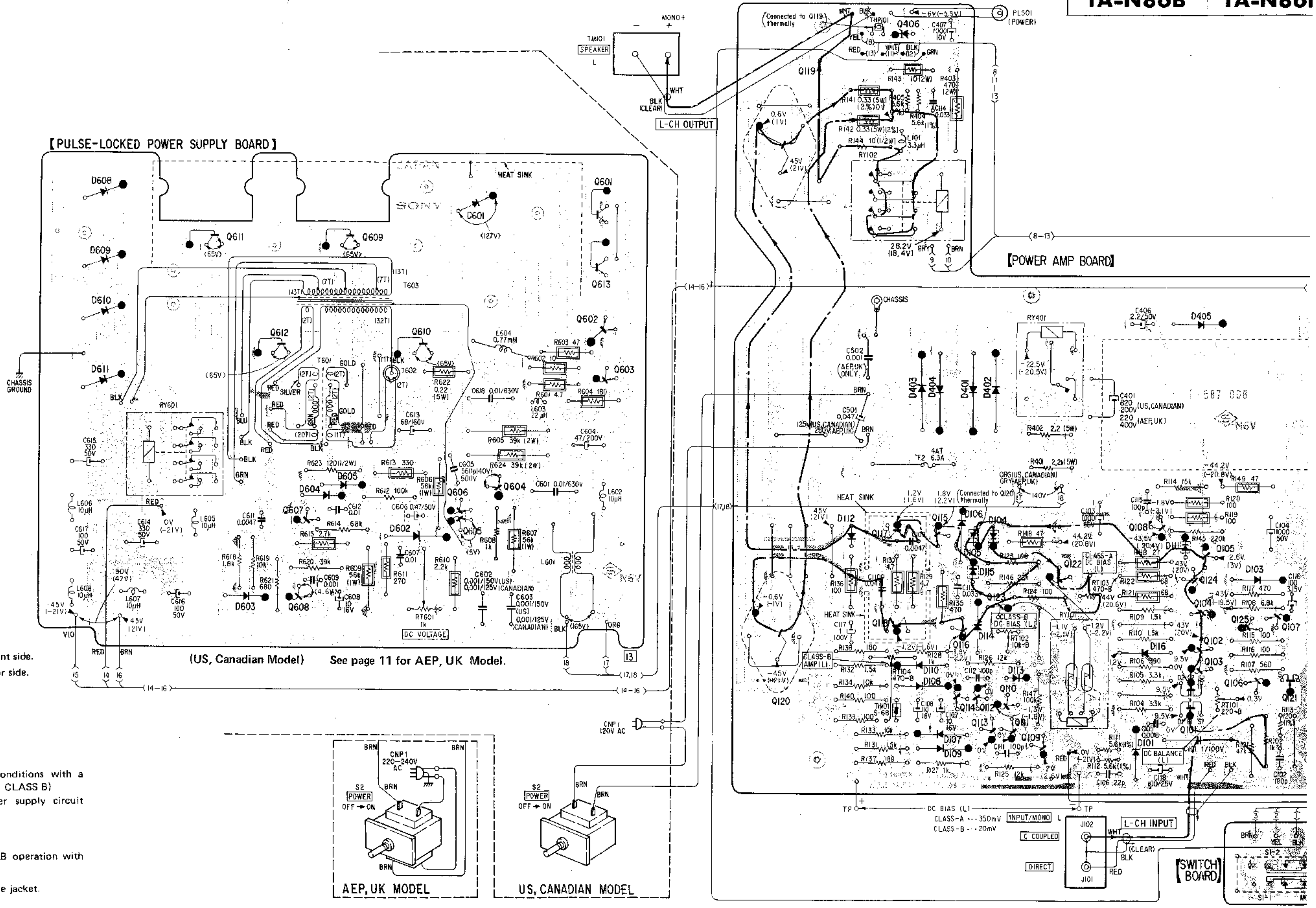
Q	611 612 607 608 609 610 606 605 604 601 613 602 603
D	608 609 610 611 603 604 605 602 601

Replacement Semiconductors
see page 18.

Note:

- ○— : parts extracted from the component side.
- : B + pattern
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V)
- Voltage values for pulse-locked power supply circuit
  ( ) class A
  (( )) with 220 V ac
  < > with 120 V ac
- The waveforms are taken under class-B operation with 220 V ac unless otherwise noted.

4-2. MOUNTING DIAGRAM

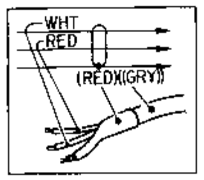


See page 11 for AEP, UK Model.

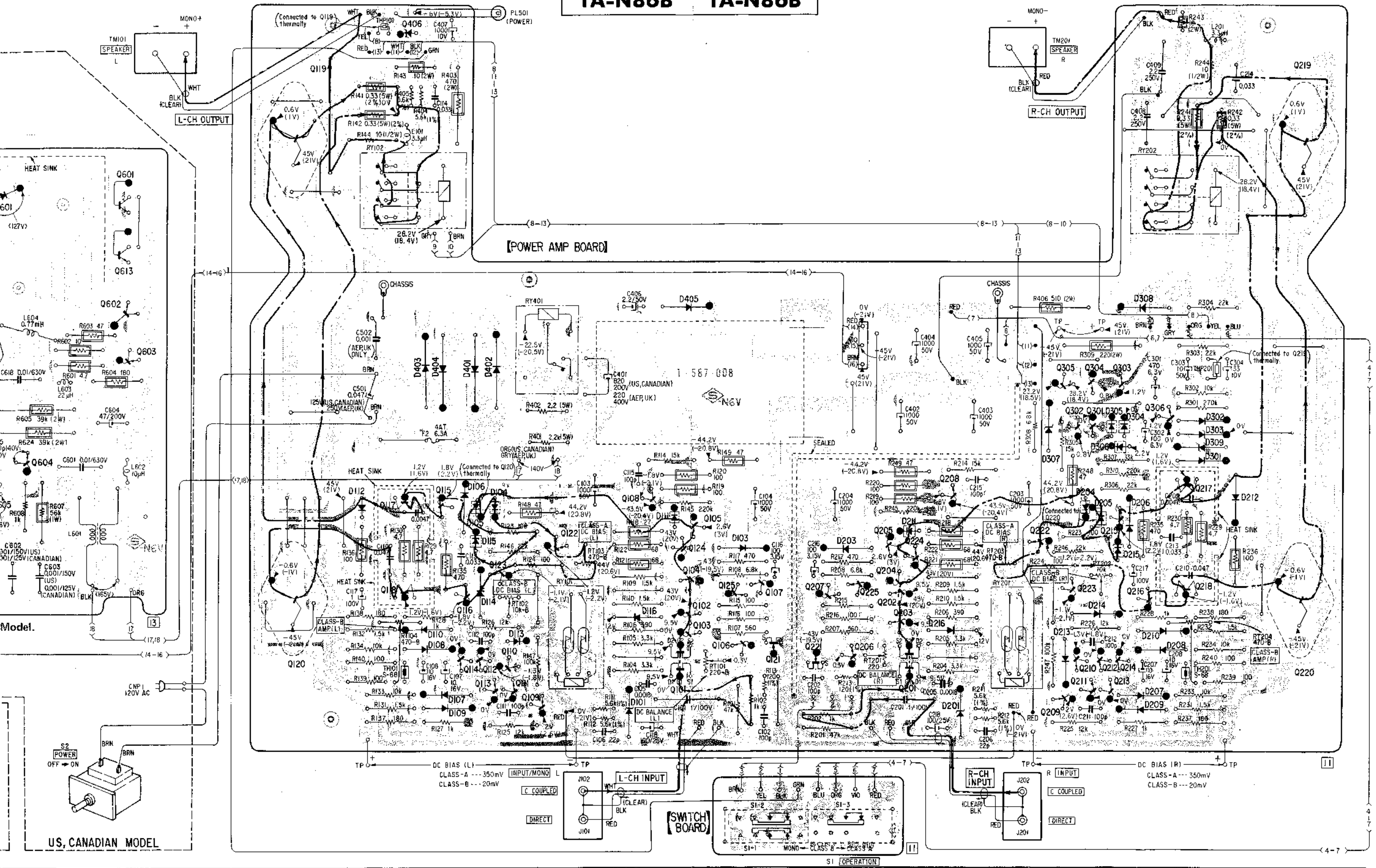
Replacement Semiconductors
see page 18.

Note:

- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- : B + pattern
- Signal Path
  —·—► : L-CH
  —·-·► : R-CH
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V) (OPERATION switch: CLASS B)
- Voltage values for pulse-locked power supply circuit
  ( ) class A
  (( )) with 220 V ac
  < > with 120 V ac
- The waveforms are taken under class-B operation with 220 V ac unless otherwise noted.
- Color code of sleeving over the end of the jacket.

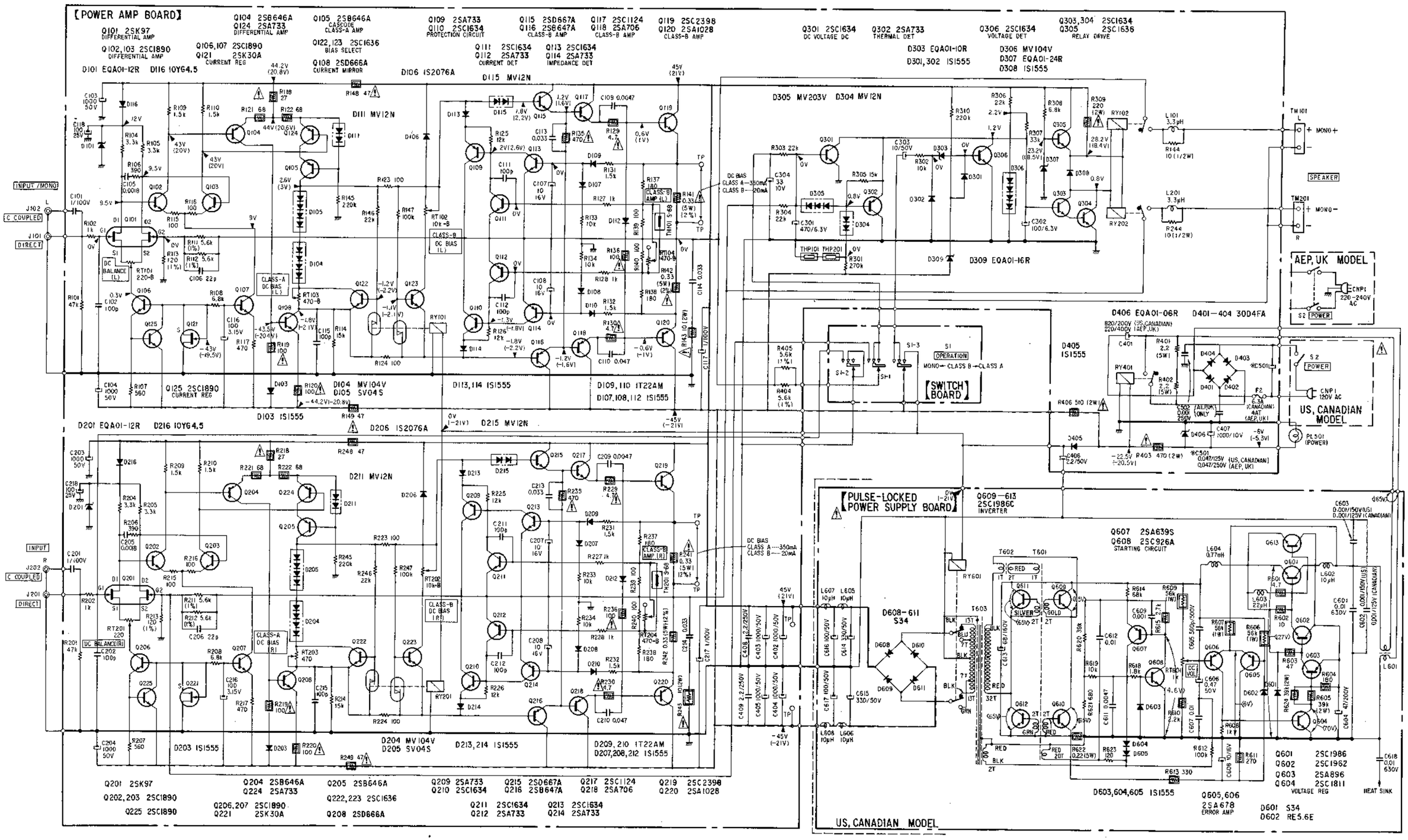


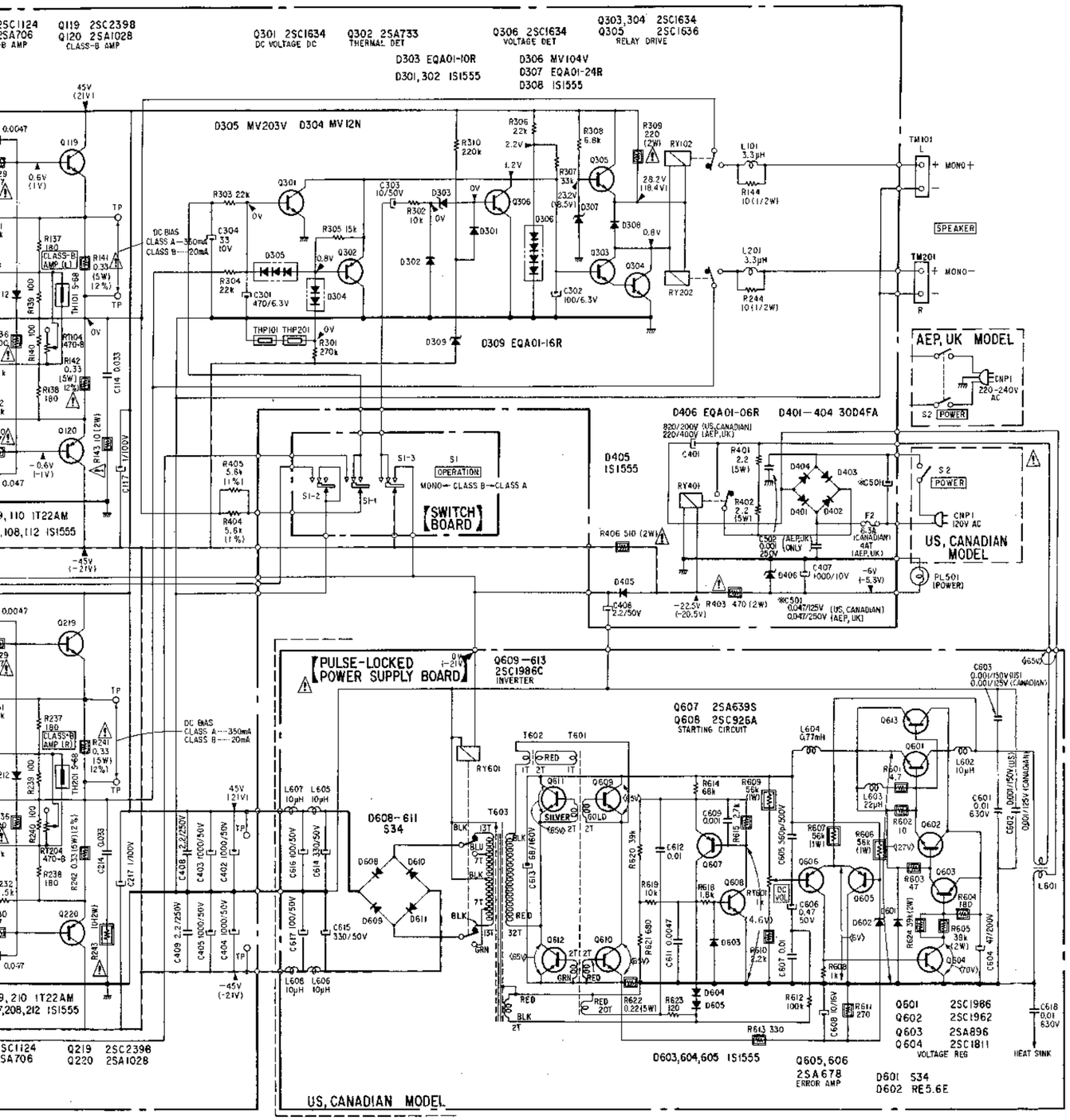
Q	611, 612, 607, 608, 609, 610, 606, 605, 604, 601, 613, 602, 603, 119, 120, 117, 118, 115, 116, 114, 112, 123, 110, 113, 111, 109, 122, 108, 124, 105, 104, 101, 102, 103, 125, 106, 107, 121
D	608 609 610 611, 603, 604, 605, 602, 601, 112, 406, 110, 108, 403, 404, 401, 107, 109, 106, 105, 115, 114, 104, 402, 113, 116, 101, 405, 111, 103



604	601 613 602 603	119 120	117 118	115	116 114	112	123 110 113,111	109	122	108	124,105 104 101,102,103	125	106	107 121	207 221	225 206	205,204 202,224 203,201	208	222	305,302 223 209,210	304 301,212,215 211,213,214	303	216	306	217 218	219 220		Q
601	112	406	403,404,401 110,108	106,105 107,109	104 115 114	402	113	116 101	405 111	103	203	211	216 201	307	213	204,205 214	305,304 306,215	206,308 207 209	210 208	302,303 309,301	212							D

4-3. SCHEMATIC DIAGRAM





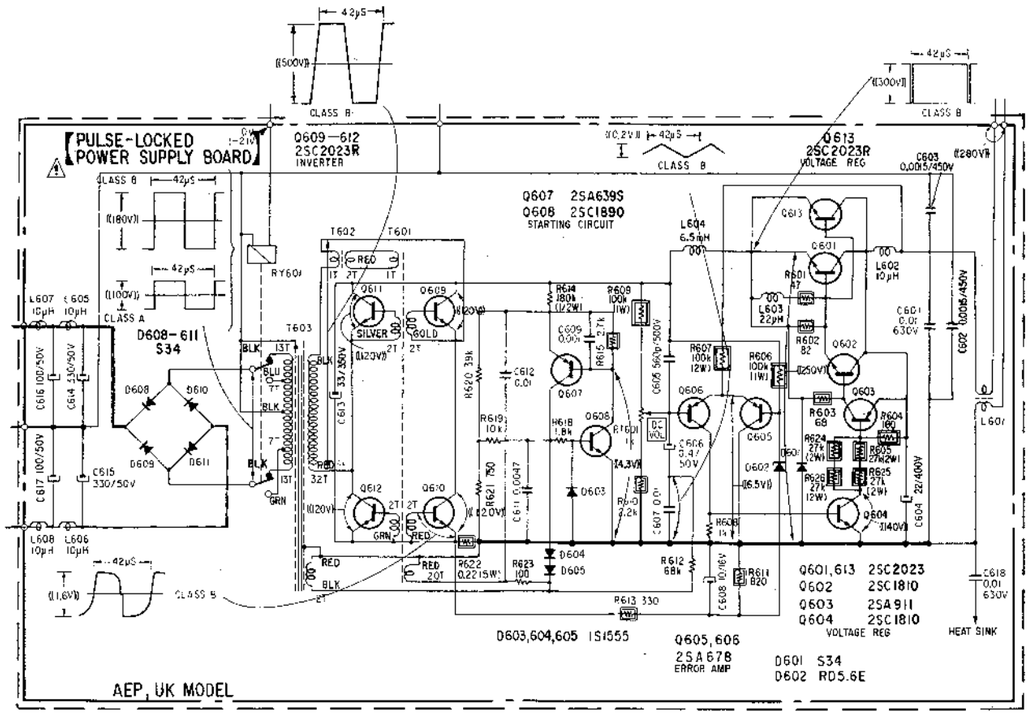
Note:

- All capacitors are in μF unless otherwise noted pF = μμF 50 WV or less are not indicated except for electrolytics.
- All resistors are in ohms, ¼ W unless otherwise noted. kΩ : 1000 Ω; MΩ = 1000 kΩ
- Voltages are dc with respect to ground unless otherwise noted.
- All adjustable resistors have characteristic curve B, unless otherwise noted.
- ▭ : nonflammable resistor.
- 1% indicates component tolerance.
- ▭ : panel designation.
- ▭ : adjustment for repair.
- Readings are taken under no-signal conditions with a VOM (20 kΩ/V) (OPERATION switch: CLASS B)
- Voltage values for pulse-locked power supply circuit
  ( ) class A
  {{ }} with 220 V ac
  < > with 120 V ac
- The waveforms are taken under class-B operation with 220 V ac unless otherwise noted.
- ——— : B+ bus.
- – – – : B– bus.
- Switch

Ref. No.	Switch	Position
S1	OPERATION	CLASS B
S2	POWER	OFF

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

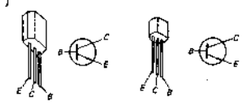
Note: Les composants identifiés par un tramé et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.



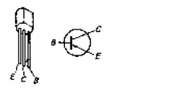
- **Replacement Semiconductors**
  For replacement, use semiconductors except in ( ).

Q101, Q201: 2SK97

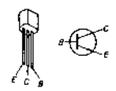
Q102, 202, Q103, 203, Q106, 206, Q107, 207, Q125, 225: 2SC926A (2SC1890)



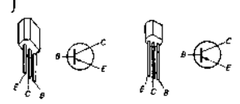
Q104, 204: 2SB646A
Q105, 205: 2SB647A
Q116, 216: 2SB647A
Q603: 2SA896
Q607: 2SA639S



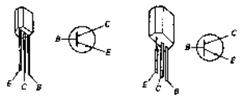
Q108, 208: 2SC1811 (2SD666A)
Q115, 215: 2SD667A
Q604: 2SC1811



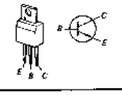
Q109, 209, Q112, 212, Q114, 214, Q124, 224, Q302: 2SA1027R (2SA733)



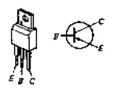
Q110, 210, Q111, 211, Q113, 213, Q301, Q303, 304, Q306: 2SC1364 (2SC1634)



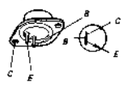
Q117, 217: 2SC1124
Q602: 2SC1962



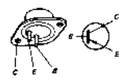
Q118, 218: 2SA706



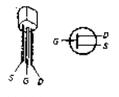
Q119, 219: 2SC2398



Q120, 220: 2SA1028

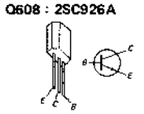


Q121, 221: 2SK30A

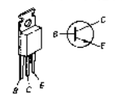


Q122, 222
Q123, 223 : 2SC1636
Q305

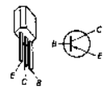
Q608 : 2SC926A



Q601: 2SC1986D (2SC1986)
Q609–613: 2SC1986D-O (2SC1986C)



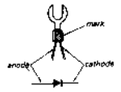
Q605, 606: 2SA1027R (2SA678)



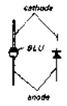
D101, 201: EQB01-12Z (EAB01-12R)
D303: EQB01-10 (EQA01-10R)
D307: EQB01-24 (EQA01-24R)
D309, D406: EQB01-16 (EQA01-16R)

D103, 203, D107, 207, D108, 208, D112–114, D212–214, D301, 302, D308, D405, D603–605: 1S1555
D106, 206: 1S2076A
D109, 209, D110, 210: 1T22AM
D602: RD5.6E

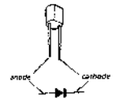
D104, 204, D306: MV104V
D105, 205: SV04S



D111, 211, D115, 215, D304 : MV12N

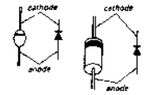


D116, 216: 10YG4.5

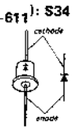


D305: MV203V

D401–404: U05G (30D4FA)

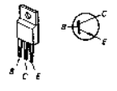


D601, D608–611: S34

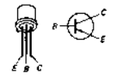


- **Pulse-Locked Power Supply Board (AEP, UK model)**
- **Replacement Semiconductors**
  For replacement, use semiconductors except in ( ).

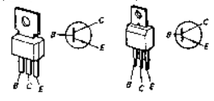
Q601, Q609–613: 2SC2023-R (2SC2023)-O



Q603: 2SA911

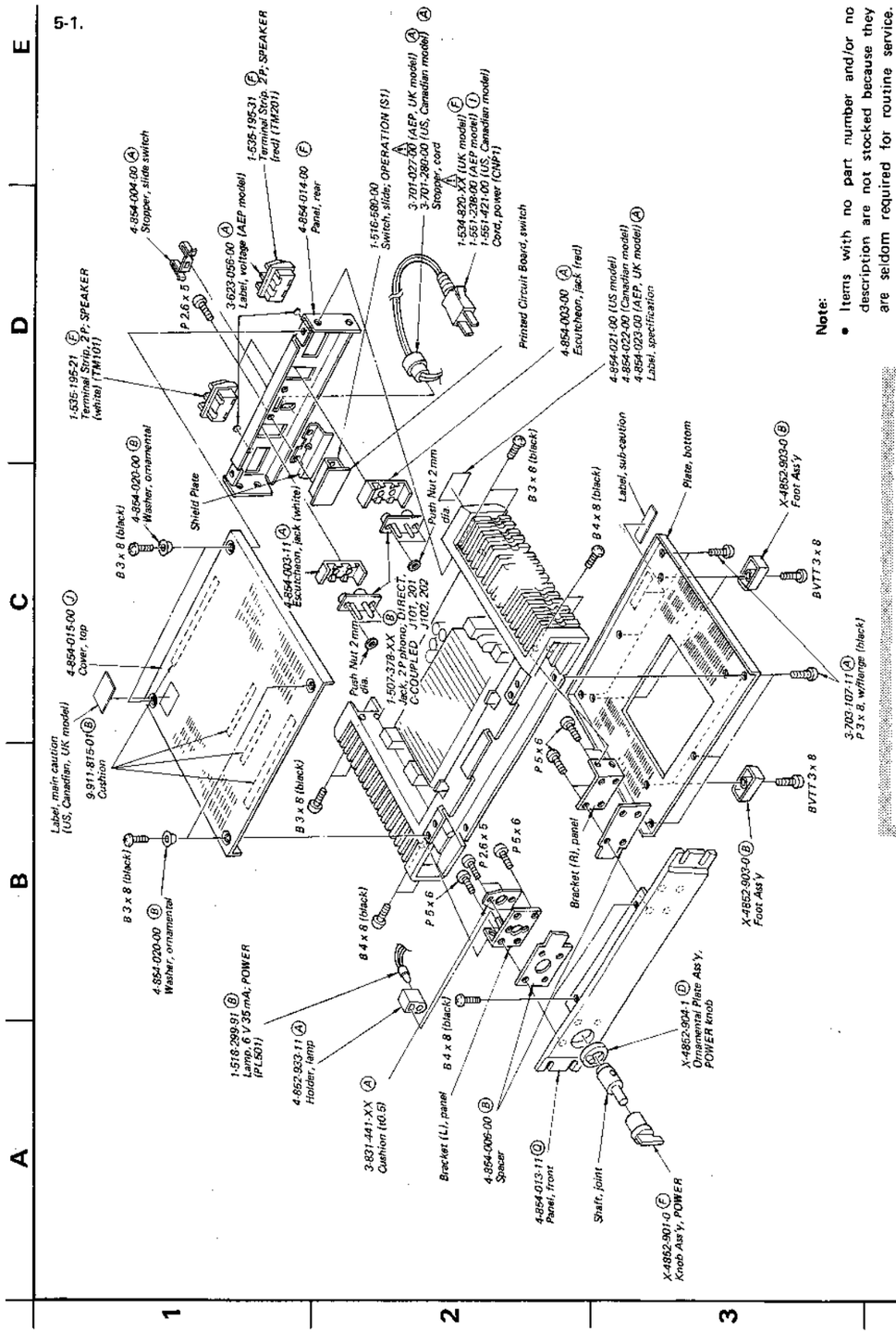


Q602, Q604: 2SC1723 (2SC1810)



SECTION 5
EXPLODED VIEWS

5-1.

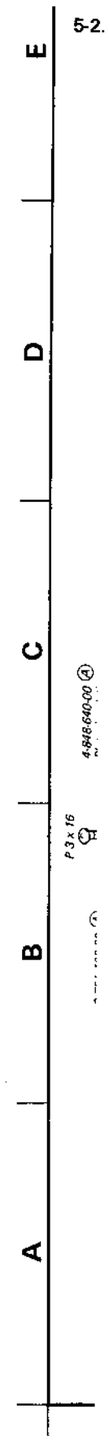


Note:
- Items with no part number and/or no description are not stocked because they are seldom required for routine service.
- All screws are Phillips (cross recess) type unless otherwise noted.
  (—) = slotted head
- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

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

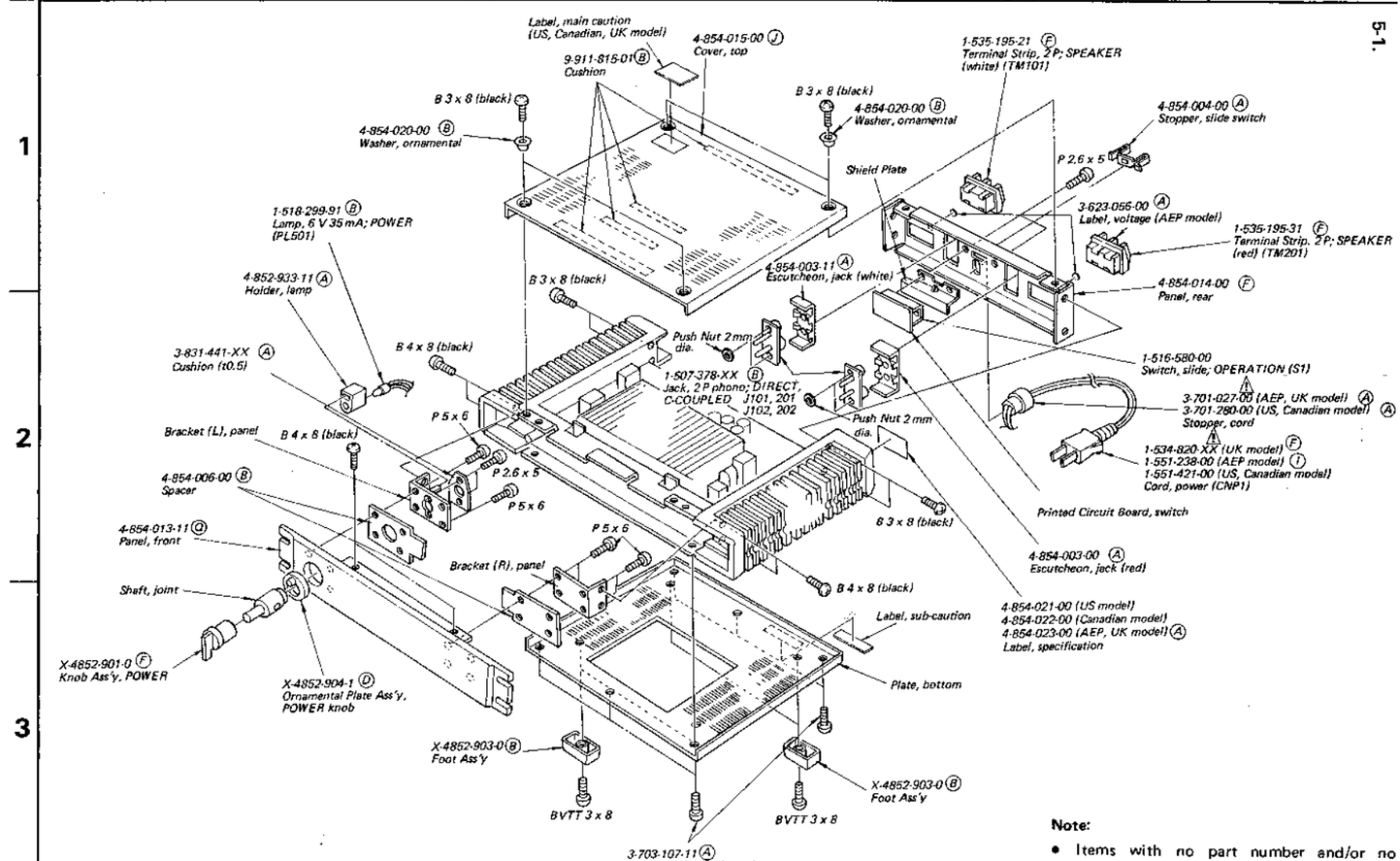
Note: Les composants identifiés par un tramé et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

5-2.



(30D4FA)

5-1.



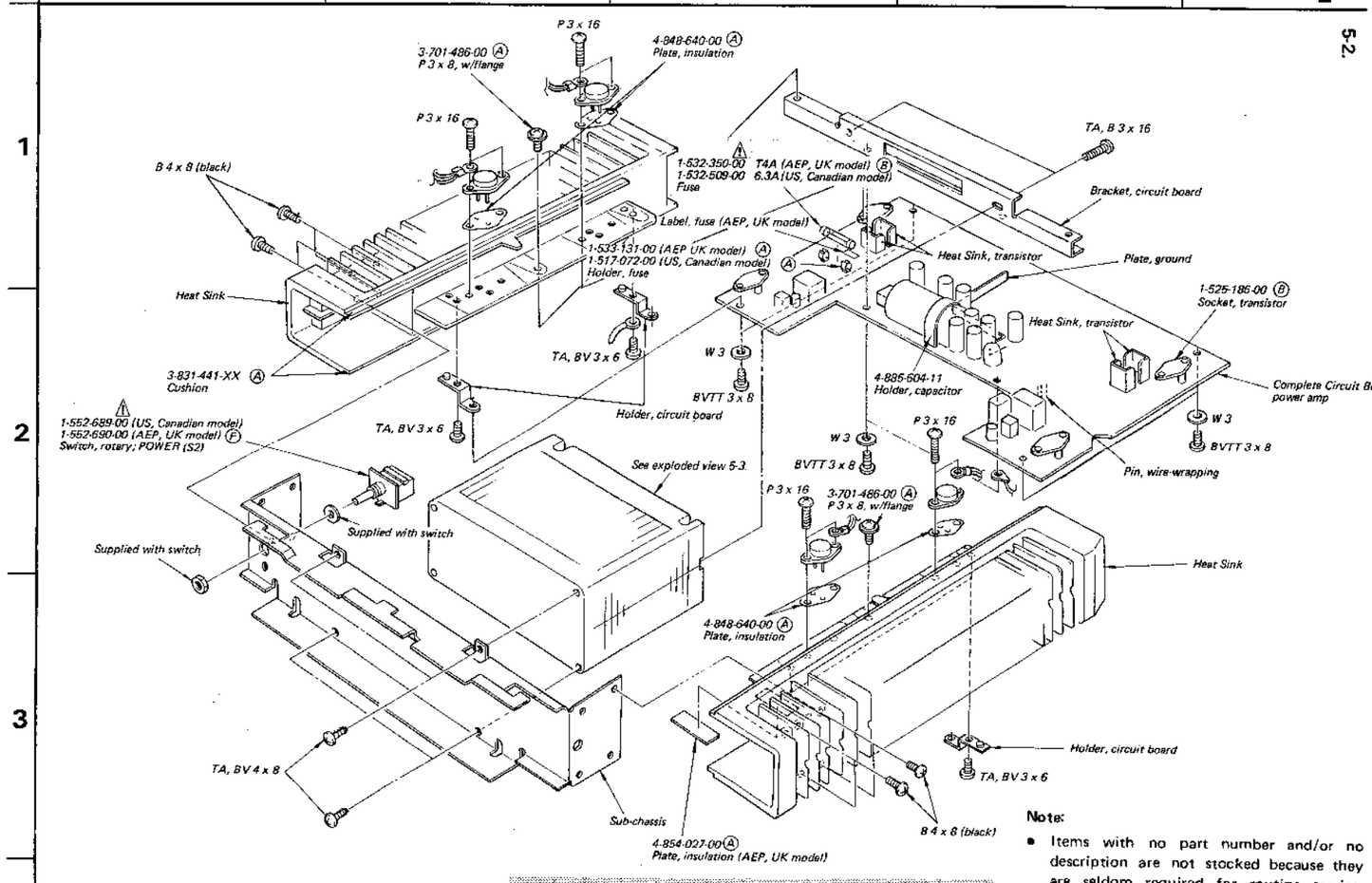
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

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:

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

5-2.

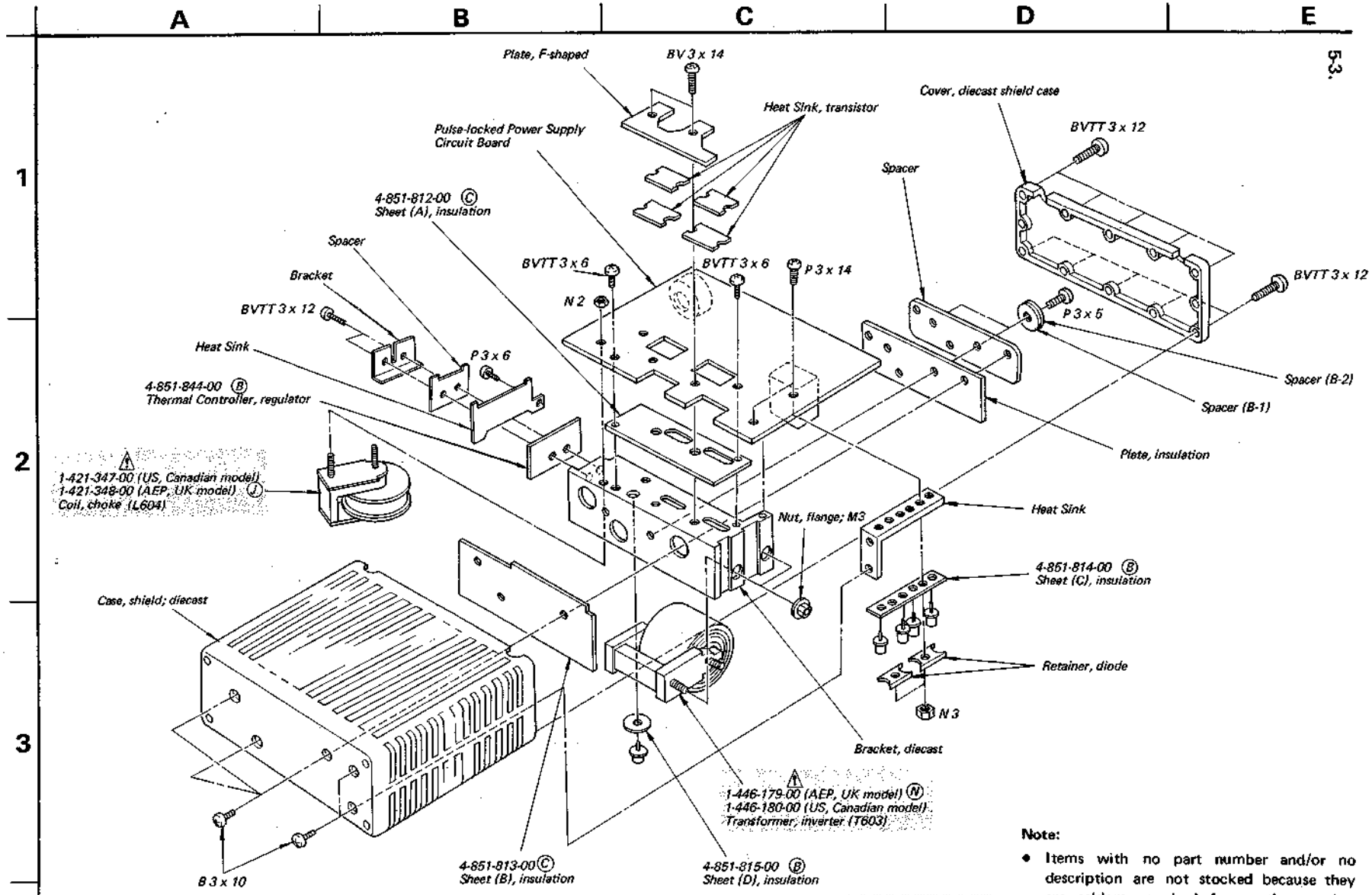


Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

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:

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



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:

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

SECTION 6

ELECTRICAL PARTS LIST

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

Ref. No.	Part No.	Description
		SEMICONDUCTORS
		Transistors
Q101, 201	8-765-342-10	Ⓕ 2SK97
⇒Q102, 202 ⇒Q103, 203	8-720-950-03	Ⓒ 2SC926A
Q104, 204 Q105, 205	8-729-304-62	Ⓑ 2SB646A
⇒Q106, 206 ⇒Q107, 207	8-720-950-03	Ⓒ 2SC926A
⇒Q108, 208	8-765-012-20	Ⓒ 2SC1811
⇒Q109, 209	8-729-612-77	Ⓑ 2SA1027R
⇒Q110, 210 ⇒Q111, 211	8-729-663-47	Ⓒ 2SC1364
⇒Q112, 212	8-729-612-77	Ⓑ 2SA1027R
⇒Q113, 213	8-729-663-47	Ⓒ 2SC1364
⇒Q114, 214	8-729-612-77	Ⓑ 2SA1027R
Q115, 215	8-729-306-72	Ⓑ 2SD667A
Q116, 216	8-729-300-72	Ⓑ 2SB647A
Q117, 217	8-725-412-00	Ⓒ 2SC1124
Q118, 218	8-727-632-00	Ⓒ 2SA706
Q119, 219	8-765-471-20	Ⓘ 2SC2398
Q120, 220	8-765-481-20	Ⓚ 2SA1028
Q121, 221	8-729-203-04	Ⓑ 2SK30A
Q122, 222 Q123, 223	8-761-622-00	Ⓑ 2SC1636
⇒Q124, 224	8-729-612-77	Ⓑ 2SA1027R
⇒Q125, 225	8-720-950-03	Ⓒ 2SC926A
⇒Q301	8-729-663-47	Ⓒ 2SC1364
⇒Q302	8-729-612-77	Ⓑ 2SA1027R
⇒Q303, 304	8-729-663-47	Ⓒ 2SC1364
Q305	8-761-622-00	Ⓑ 2SC1636
⇒Q306	8-729-663-47	Ⓒ 2SC1364
⇒Q601	⚠8-729-302-31	Ⓓ 2SC2023-R (AEP, UK model)
⇒Q601	⚠8-729-302-32	Ⓓ 2SC2023-O (AEP, UK model)
⇒Q601	⚠8-729-308-72	2SC1986D (US, Canadian model)
⇒Q602	⚠8-729-372-30	Ⓒ 2SC1723 (AEP, UK model)
Q602	⚠8-765-170-01	2SC1962 (US, Canadian model)
Q603	⚠8-765-082-20	2SA896 (US, Canadian model)
Q603	⚠8-765-141-00	Ⓙ 2SA911 (AEP, UK model)
⇒Q604	⚠8-729-372-30	Ⓒ 2SC1723 (AEP, UK model)
Q604	⚠8-765-012-20	2SC1811 (US, Canadian model)
⇒Q605, 606	⚠8-729-612-77	Ⓑ 2SA1027R
Q607	⚠8-729-163-04	Ⓒ 2SA639S
Q608	⚠8-720-950-03	Ⓒ 2SC926A
⇒Q609–613	⚠8-729-302-31	Ⓓ 2SC2023-R (AEP, UK model)
⇒Q609–613	⚠8-729-302-32	Ⓓ 2SC2023-O (AEP, UK model)
⇒Q609–613	⚠8-729-308-72	2SC1986D-O (US, Canadian model)
		Diodes
⇒D101, 201	8-719-930-12	Ⓑ EQB01-12Z
D103, 203	8-719-815-55	Ⓑ 1S1555
D104, 204	8-719-910-40	Ⓑ MV104V
D105, 205	8-719-300-11	Ⓑ SV04S
D106, 206	8-719-923-76	Ⓑ 1S2076A
D107, 207 D108, 208	8-719-815-55	Ⓑ 1S1555
D109, 209 D110, 210	8-719-422-21	Ⓑ 1T22AM
D111, 211	8-719-912-00	Ⓑ MV12N
D112–114 D212–214	8-719-815-55	Ⓑ 1S1555
D115, 215	8-719-912-00	Ⓑ MV12N
D116, 216	8-719-210-45	Ⓒ 10YG4.5
D301, 302	8-719-815-55	Ⓑ 1S1555
⇒D303	8-719-931-10	Ⓑ EQB01-10
D304	8-719-912-00	Ⓑ MV12N
D305	8-719-920-30	Ⓑ MV203V
D306	8-719-910-40	Ⓑ MV104V
⇒D307	8-719-931-24	Ⓑ EQB01-24
D308	8-719-815-55	Ⓑ 1S1555
⇒D309	8-719-931-16	Ⓑ EQB01-16
⇒D401–404	⚠8-719-911-55	Ⓑ U05G
D405	8-719-815-55	Ⓑ 1S1555
⇒D406	8-719-931-16	Ⓑ EQB01-16
D601	⚠8-719-303-41	Ⓒ S34
D602	⚠8-719-156-08	Ⓑ RD5.6E
D603–605	⚠8-719-815-55	Ⓑ 1S1555
D608–611	⚠8-719-303-41	Ⓒ S34

⇒: 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.

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 (Ⓐ to Ⓩ) are applicable to European models only.

Ref. No.	*Part No.*	*Description*		
		Thermistors		
TH101, 201	1-800-193-00	Ⓐ Thermistor, S-68		
THP101, 201	1-800-427-00	Ⓑ Thermistor, positive		
		COILS		
L601	⚠1-421-259-00	Line filter (US, Canadian model)		
L601	⚠1-421-349-00	Ⓕ Line filter (AEP, UK model)		
L602	⚠1-421-329-00	Ⓑ 10 μH, choke		
L603	⚠1-407-161-XX	Ⓐ 22 μH, microinductor		
L604	⚠1-421-347-00	0.77 mH, choke (US, Canadian model)		
L604	⚠1-421-348-00	Ⓙ 6.5 mH, choke (AEP, UK model)		
L605–608	⚠1-421-329-00	Ⓑ 10 μH, choke		
		TRANSFORMERS		
T601	⚠1-543-098-00	Core (US, Canadian model)		
T601	⚠1-543-100-00	Ⓑ Core (AEP, UK model)		
T602	⚠1-543-121-00	Ⓑ Core		
T603	⚠1-446-179-00	Ⓜ Inverter (AEP, UK model)		
T603	⚠1-446-180-00	Inverter (US, Canadian model)		
		CAPACITORS		

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

C101, 201	1-130-083-00	Ⓒ 1	100 V	polyethylene
C102, 202	1-102-975-00	Ⓐ 100 p		ceramic
C103, 203, C104, 204	1-123-061-00	Ⓒ 1000	50 V	
C105, 205	1-108-561-00	Ⓐ 0.0018		mylar
C106, 206	1-107-069-00	Ⓐ 22 p		mica
C107, 207, C108, 208	1-121-651-00	Ⓐ 10	16 V	
C109, 209	1-108-234-00	Ⓐ 0.0047		mylar
C110, 210	1-108-246-00	Ⓐ 0.047		mylar
C111, 211, C112, 212	1-102-975-00	Ⓐ 100 p		ceramic
C113, 213, C114, 214	1-108-244-00	Ⓐ 0.033		mylar
C115, 215	1-107-085-00	Ⓐ 100 p		mica
C116, 216	1-131-177-00	Ⓒ 100	3.15 V	tantalum
C117, 217	1-123-249-00	Ⓐ 1	100 V	
C118, 218	1-121-417-00	Ⓑ 100	25 V	
C301	1-121-424-00	Ⓑ 470	6.3 V	
C302	1-121-414-00	Ⓐ 100	6.3 V	
C303	1-121-738-00	Ⓐ 10	50 V	
C304	1-121-402-00	Ⓐ 33	10 V	
C401	⚠1-123-407-00	Ⓘ 220	400 V	(AEP, UK model)
C401	⚠1-123-408-00	820	200 V	(US, Canadian model)
C402–405	1-123-061-00	Ⓒ 1000	50 V	
C406	1-121-450-00	Ⓐ 2.2	50 V	
C407	1-121-736-00	Ⓑ 1000	10 V	
C408, 409	1-108-972-00	Ⓖ 2.2	250 V	mylar
C501	⚠1-108-749-00	0.047	125 V	mylar (US model)
C501	⚠1-130-159-00	Ⓒ 0.047	250 V	film (AEP, UK model)
C501	⚠1-130-197-00	0.047	125 V	polyethylene (Canadian model)
C502	⚠1-102-222-00	Ⓑ 0.001	250 V	ceramic (AEP, UK model)
C601	⚠1-130-141-00	Ⓐ 0.01	630 V	polyethylene
C602, 603	⚠1-115-149-00	Ⓒ 0.0015	450 V	paper (AEP, UK model)
C602, 603	⚠1-161-502-00	0.001	150 V	ceramic (US model)
C602, 603	⚠1-161-516-00	0.001	125 V	ceramic (Canadian model)
C604	⚠1-123-401-00	47	200 V	(US, Canadian model)
C604	⚠1-123-402-00	Ⓒ 22	400 V	(AEP, UK model)
C605	⚠1-161-438-00	Ⓐ 560 p	500 V	ceramic
C606	⚠1-121-726-00	Ⓐ 0.47	50 V	
C607	⚠1-108-239-00	Ⓐ 0.01		mylar
C608	⚠1-121-651-00	Ⓐ 10	16 V	
C609	⚠1-108-227-00	Ⓐ 0.001		mylar
C611	⚠1-108-234-00	Ⓐ 0.0047		mylar
C612	⚠1-108-239-51	Ⓐ 0.01		mylar
C613	⚠1-123-277-00	68	160 V	(US, Canadian 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.

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

Ref. No.	*Part No.*	*Description*		
C613	⚠1-123-280-00	Ⓒ33	350 V	(AEP, UK model)
C614, 615	⚠1-121-656-00	Ⓑ330	50 V	
C616, 617	⚠1-121-417-00	Ⓑ100	50 V	
C618	⚠1-130-141-00	Ⓐ0.01	630 V	polyethylene

RESISTORS

All resistors are in ohms. Common ¼ W carbon resistors are omitted. Refer to the list on page 27 for their part numbers. All adjustable resistors have characteristic curve B, unless otherwise noted. kΩ : 1000 Ω

R111, 211 R112, 212	1-214-150-11	Ⓐ5.6 k	¼ W(1 %)	metal oxide
R113, 213	1-214-110-00	Ⓐ120	¼ W(1 %)	metal oxide
R118, 218	⚠1-211-508-00	Ⓐ27	¼ W	carbon (nonflammable)
R119, 219 R120, 220	⚠1-211-522-00	Ⓐ100	¼ W	carbon (nonflammable)
R121, 221 R122, 222	⚠1-211-518-00	Ⓐ68	¼ W	carbon (nonflammable)
R129, 229 R130, 230	⚠1-211-490-00	Ⓐ4.7	¼ W	carbon (nonflammable)
R135, 235	⚠1-211-538-00	Ⓐ470	¼ W	carbon (nonflammable)
R136, 236	⚠1-211-522-00	Ⓐ100	¼ W	carbon (nonflammable)
R141, 241 R142, 242	⚠1-217-573-00	0.33	5 W(2 %)	wirewound (nonflammable)
R143, 243	⚠1-206-463-00	Ⓐ10	2 W	metal oxide (nonflammable)
R144, 244	⚠1-244-825-00	10	½ W	carbon
R148, 248 R149, 249	⚠1-211-514-00	Ⓐ47	¼ W	carbon (nonflammable)
R309	⚠1-206-648-00	Ⓐ220	2 W	metal oxide (nonflammable)
R401, 402	⚠1-217-570-00	2.2	5 W	metal plate
R403	⚠1-206-656-00	Ⓐ470	2 W	metal oxide (nonflammable)
R404, 405	1-214-150-00	5.6 k	¼ W(1 %)	metal oxide
R406	⚠1-206-657-00	Ⓐ510	2 W	metal oxide (nonflammable)
R601	⚠1-211-490-00	4.7	¼ W	carbon (nonflammable) (US, Canadian model)
R601	⚠1-211-514-00	Ⓐ47	¼ W	carbon (nonflammable) (AEP, UK model)
R602	⚠1-211-498-00	10	¼ W	carbon (nonflammable) (US, Canadian model)
R602	⚠1-211-520-00	Ⓐ82	¼ W	carbon (nonflammable) (AEP, UK model)
R603	⚠1-211-514-00	47	¼ W	carbon (nonflammable) (US, Canadian model)
R603	⚠1-211-518-00	Ⓐ68	¼ W	carbon (nonflammable) (AEP, UK model)
R604	⚠1-211-528-00	Ⓐ180	¼ W	carbon (nonflammable)
R605	⚠1-214-596-00	39 k	2 W	metal oxide (nonflammable) (US, Canadian model)
R605	⚠1-206-698-00	Ⓐ27 k	2 W	metal oxide (nonflammable) (AEP, UK model)
R606	⚠1-214-598-00	56 k	1 W	metal oxide (nonflammable) (US, Canadian model)
R606	⚠1-214-595-00	Ⓐ100 k	1 W	metal oxide (nonflammable) (AEP, UK model)
R607	⚠1-214-598-00	56 k	1 W	metal oxide (nonflammable) (US, Canadian model)
R607	⚠1-214-597-00	Ⓐ100 k	2 W	metal oxide (nonflammable) (AEP, UK model)
R608	⚠1-246-470-00	Ⓐ1 k	¼ W	carbon
R609	⚠1-214-598-00	56 k	1 W	metal oxide (nonflammable) (US, Canadian model)
R609	⚠1-214-595-00	Ⓐ100 k	1 W	metal oxide (nonflammable) (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.

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

Ref. No.	Part No.	Description
R610	⚠1-211-945-00 Ⓐ	2.2 k ¼ W carbon (nonflammable)
R611	⚠1-211-532-00	270 ¼ W carbon (nonflammable) (US, Canadian model)
R611	⚠1-211-544-00 Ⓐ	820 ¼ W carbon (nonflammable) (AEP, UK model)
R612	⚠1-246-517-00 Ⓐ	68 k ¼ W carbon (AEP, UK model)
R612	⚠1-246-521-00	100 k ¼ W carbon (US, Canadian model)
R614	⚠1-244-927-00 Ⓐ	180 k ½ W carbon (AEP, UK model)
R614	⚠1-246-517-00	68 k ¼ W carbon (US, Canadian model)
R615	⚠1-211-553-00 Ⓐ	2.7 k ¼ W carbon (nonflammable)
R618	⚠1-246-479-00 Ⓐ	1.8 k ¼ W carbon
R619	⚠1-246-497-00 Ⓐ	10 k ¼ W carbon
R620	⚠1-246-511-00 Ⓐ	39 k ¼ W carbon
R621	⚠1-246-469-00	680 ¼ W carbon (US, Canadian model)
R621	⚠1-246-470-00 Ⓐ	750 ¼ W carbon (AEP, UK model)
R622	⚠1-217-156-00 Ⓑ	0.22 5 W wirewound
R623	⚠1-246-449-00 Ⓐ	100 ¼ W carbon (AEP, UK model)
R623	⚠1-246-451-00	120 ¼ W carbon (US, Canadian model)
R624	⚠1-214-596-00	39 k 2 W (US, Canadian model)
R624–626	⚠1-206-698-00 Ⓐ	27 k 2 W metal oxide (AEP, UK model)
RT101, 201	1-224-550-21 Ⓑ	220, adjustable; dc balance
RT102, 202	1-224-252-XX Ⓑ	10 k, adjustable; class-B dc bias
RT103, 203	1-224-248-XX Ⓑ	470, adjustable; class-A dc bias
RT104, 204	1-224-641-XX Ⓑ	470, adjustable; class-B amp
RT601	⚠1-224-642-XX Ⓑ	1 k, adjustable; dc voltage

SWITCHES

S1	1-516-580-00 Ⓒ	Slide, OPERATION
S2	⚠1-552-689-00	Rotary, POWER (US, Canadian model)
S2	⚠1-552-690-00 Ⓕ	Rotary, POWER (AEP, UK model)

Ref. No.	Part No.	Description
MISCELLANEOUS		
CNP1	⚠1-551-238-00 Ⓘ	Cord, power (AEP model)
CNP1	⚠1-551-421-00	Cord, power (US, Canadian model)
CNP1	⚠1-534-820-XX Ⓕ	Cord, power (UK model)
F2	⚠1-532-350-00 Ⓑ	Fuse, 4AT (AEP, UK model)
F2	⚠1-532-509-00	Fuse, 6.3A (US, Canadian model)
J101, 201 J102, 202	1-507-378-XX Ⓑ	Jack, 2 p; DIRECT, C COUPLED
PL501	1-518-299-91 Ⓑ	Lamp, 6 V 35 mA; POWER
RY101, 201	1-515-294-00 Ⓕ	Relay
RY102, 202	1-515-302-00 Ⓕ	Relay
RY401	⚠1-515-278-00	Relay (US, Canadian model)
RY401	⚠1-515-278-00 Ⓕ	Relay (AEP, UK model)
RY601	⚠1-515-127-XX Ⓘ	Relay
TM101	1-535-195-21 Ⓕ	Terminal Strip, 2 p; SPEAKER (white)
TM201	1-535-195-31 Ⓕ	Terminal Strip, 2 p; SPEAKER (red)
	1-517-072-00	Holder, lamp (US, Canadian model)
	1-525-186-00 Ⓑ	Socket, transistor
	1-533-131-00 Ⓐ	Holder, fuse

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

ACCESSORIES AND PACKING MATERIALS

Part No.	*Description*
3-701-202-00	Ⓐ Bag, check sheet
3-770-353-11	Ⓕ Manual, instruction (AEP, UK model)
3-770-353-21	Manual, instruction (US, Canadian model)
3-794-233-21	Sheet (US model)
3-794-301-31	Sheet, instruction (Canadian model)
4-809-251-00	Ⓐ Bag, plastic
4-854-019-00	Ⓒ Cushion
4-854-024-00	Ⓕ Carton (AEP, UK model)
4-854-025-00	Ⓑ Sub-cushion (AEP, UK model)
4-854-026-00	Carton (US, Canadian model)

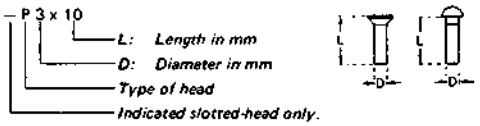
1/4 WATT CARBON RESISTORS Ⓐ

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

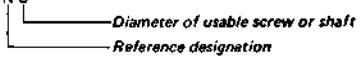
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-246-401-00	10	1-246-425-00	100	1-246-449-00	1.0k	1-246-473-00	10k	1-246-497-00	100k	1-246-521-00	1.0M	1-246-545-00
1.1	1-246-402-00	11	1-246-426-00	110	1-246-450-00	1.1k	1-246-474-00	11k	1-246-498-00	110k	1-246-522-00	1.1M	1-210-814-00
1.2	1-246-403-00	12	1-246-427-00	120	1-246-451-00	1.2k	1-246-475-00	12k	1-246-499-00	120k	1-246-523-00	1.2M	1-210-815-00
1.3	1-246-404-00	13	1-246-428-00	130	1-246-452-00	1.3k	1-246-576-00	13k	1-246-500-00	130k	1-246-524-00	1.3M	1-210-816-00
1.5	1-246-405-00	15	1-246-429-00	150	1-246-453-00	1.5k	1-246-577-00	15k	1-246-501-00	150k	1-246-525-00	1.5M	1-210-817-00
1.6	1-246-406-00	16	1-246-430-00	160	1-246-454-00	1.6k	1-246-578-00	16k	1-246-502-00	160k	1-246-526-00	1.6M	1-210-818-00
1.8	1-246-407-00	18	1-246-431-00	180	1-246-455-00	1.8k	1-246-579-00	18k	1-246-503-00	180k	1-246-527-00	1.8M	1-210-819-00
2.0	1-246-408-00	20	1-246-432-00	200	1-246-456-00	2.0k	1-246-580-00	20k	1-246-504-00	200k	1-246-528-00	2.0M	1-210-820-00
2.2	1-246-409-00	22	1-246-433-00	220	1-246-457-00	2.2k	1-246-581-00	22k	1-246-505-00	220k	1-246-529-00	2.2M	1-210-821-00
2.4	1-246-410-00	24	1-246-434-00	240	1-246-458-00	2.4k	1-246-582-00	24k	1-246-506-00	240k	1-246-530-00	2.4M	1-244-754-00
2.7	1-246-411-00	27	1-246-435-00	270	1-246-459-00	2.7k	1-246-583-00	27k	1-246-507-00	270k	1-246-531-00	2.7M	1-244-755-00
3.0	1-246-412-00	30	1-246-436-00	300	1-246-460-00	3.0k	1-246-584-00	30k	1-246-508-00	300k	1-246-532-00	3.0M	1-244-756-00
3.3	1-246-413-00	33	1-246-437-00	330	1-246-461-00	3.3k	1-246-585-00	33k	1-246-509-00	330k	1-246-533-00	3.3M	1-244-757-00
3.6	1-246-414-00	36	1-246-438-00	360	1-246-462-00	3.6k	1-246-586-00	36k	1-246-510-00	360k	1-246-534-00	3.6M	1-244-758-00
3.9	1-246-415-00	39	1-246-439-00	390	1-246-463-00	3.9k	1-246-587-00	39k	1-246-511-00	390k	1-246-535-00	3.9M	1-244-759-00
4.3	1-246-416-00	43	1-246-440-00	430	1-246-464-00	4.3k	1-246-488-00	43k	1-246-512-00	430k	1-246-536-00	4.3M	1-244-760-00
4.7	1-246-417-00	47	1-246-441-00	470	1-246-465-00	4.7k	1-246-489-00	47k	1-246-513-00	470k	1-246-537-00	4.7M	1-244-761-00
5.1	1-246-418-00	51	1-246-442-00	510	1-246-466-00	5.1k	1-246-490-00	51k	1-246-514-00	510k	1-246-538-00	5.1M	1-244-762-00
5.6	1-246-419-00	56	1-246-443-00	560	1-246-467-00	5.6k	1-246-491-00	56k	1-246-515-00	560k	1-246-539-00		
6.2	1-246-420-00	62	1-246-444-00	620	1-246-468-00	6.2k	1-246-492-00	62k	1-246-516-00	620k	1-246-540-00		
6.8	1-246-421-00	68	1-246-445-00	680	1-246-469-00	6.8k	1-246-493-00	68k	1-246-517-00	680k	1-246-541-00		
7.5	1-246-422-00	75	1-246-446-00	750	1-246-470-00	7.5k	1-246-494-00	75k	1-246-518-00	750k	1-246-542-00		
8.2	1-246-423-00	82	1-246-447-00	820	1-246-471-00	8.2k	1-246-495-00	82k	1-246-519-00	820k	1-246-543-00		
9.1	1-246-424-00	91	1-246-448-00	910	1-246-472-00	9.1k	1-246-496-00	91k	1-246-520-00	910k	1-246-544-00		

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	