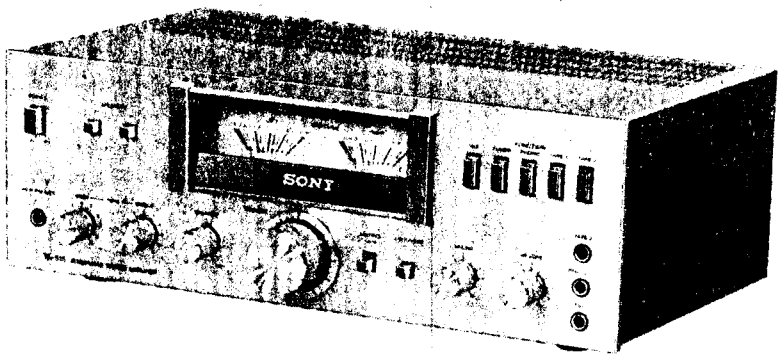
TA-515

AEP Model
E Model
UK Model
Canadian Model



INTEGRATED STEREO AMPLIFIER

SPECIFICATIONS

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 A 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.

GENERAL

System: Direct output coupling, pure-complementary symmetry power amplifier circuit (SEPP OTL)

Power Requirements:
120 V ac, 60 Hz (Canadian model)
220 V ac (or 120 or 240 V ac adjustable by Sony personnel), 50 Hz (AEP model)
240 V ac, 50 Hz (UK model)
120, 220, or 240 V ac adjustable, 50/60 Hz (E model)

Power Consumption:
125 W (Canadian model)
250 W (AEP, E model)
325 W (UK model)

AC Outlets:
1 switched, 100 W
2 unswitched, total 200 W } (Canadian model)

Dimensions: Approx. 410 (w) x 145 (h) x 280 (d) mm
16 1/8 (w) x 5 3/4 (h) x 11 1/8 (d) inches
Including projecting parts and controls

Weight: Approx. 7.1 kg, 15 lb 10 oz (net)
Approx. 7.9 kg, 17 lb 7 oz (in shipping carton)

-- Continued on page 2 --

SONY
SERVICE MANUAL

TA-515

AMPLIFIER SECTION

Continuous RMS Power Output: (Less than 0.3 % (8 Ω) or 0.7 % (4 Ω) THD, both channels driven simulataneously)
At 1 kHz
43 W + 43 W (8 Ω or 4 Ω)
At 20 Hz–20 kHz
40 W + 40 W (8 Ω or 4 Ω)
According to DIN 45500
40 W + 40 W (8 Ω or 4 Ω)

Power Bandwidth: 10 Hz – 40 kHz (8 Ω), IHF

Damping Factor: 30 (8 Ω, 1 kHz)

Frequency Response:

PHONO	RIAA equalization curve ± 0.3 dB
MIC	100 Hz – 10 kHz $^{+0}_{-3}$ dB
TUNER AUX TAPE 1 TAPE 2	10 Hz – 50 kHz $^{+0}_{-3}$ dB

Harmonic Distortion:
Less than 0.3 % at rated output (8 Ω)
Less than 0.7 % at rated output (4 Ω)
Less than 0.2 % at 1 W output

IM Distortion: (60 Hz : 7 kHz = 4 : 1)
Less than 0.5 % at rated output
Less than 0.2 % 1 W output

Tone Controls:
BASS ± 9 dB at 100 Hz
TREBLE ± 9 dB at 10 kHz

Loudness: (att. 30 dB)
+ 9 dB at 100 Hz
+ 4 dB at 10 kHz

Inputs:

	Sensitivity	Impedance	Maximum Input Capability (at 1 kHz, 0.5 % distortion)	S/N (weighting network, input level)
PHONO	2.5 mV (–50 dB)	50 kΩ	240 mV	80 dB (A, 2.5 mV)
MIC	2 mV (–51.7 dB)	10 kΩ	———	———
TUNER AUX TAPE 1 TAPE 2	150 mV (–14.5 dB)	50 kΩ	———	95 dB (A, 150 mV)

Outputs:

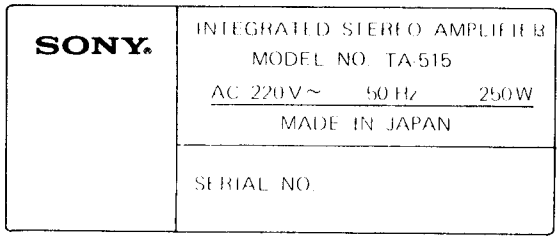
REC OUT 1, 2	Voltage 150 mV (–14.5 dB), Impedance 10 kΩ
HEADPHONES	Accepts low and high impedance headphones
SPEAKER	Accepts speakers of 8 – 16 Ω (Canadian model) or 4 – 16 Ω (AEP, UK, E model)

0 dB = 0.775 V

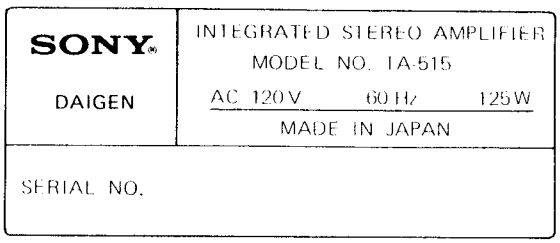
MODEL IDENTIFICATIONS

– Specification Labels –

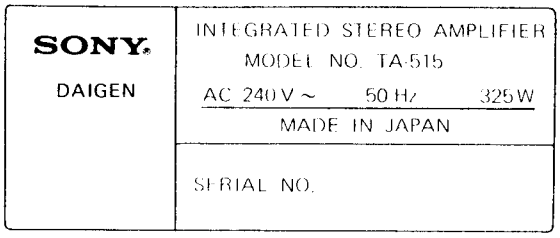
AEP model



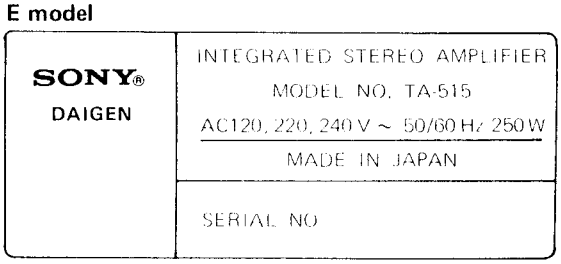
Canadian model



UK model

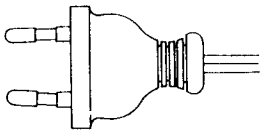


E model

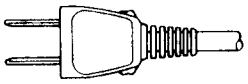


– Power Cord –

E1 model: euro-plug
(1-551-530-00)



E2 model: parallel-blade plug
(1-534-487-XX)



IC201, 251 (CX171) HANDLING PRECAUTIONS

IC201, 251 (CX171) used for this unit are not MOS ICs, but it is necessary to handle them as same as MOS IC. Proceed the following steps when replacing them.

1. Maintain all the pins at the same potential by wrapping the IC in aluminum foil or other similar material (See Fig. 1).

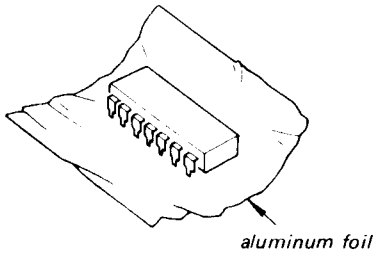


Fig. 1

2. Ground the work bench for static electricity (See Fig. 2) (Place a sheet of aluminum onto the bench.)

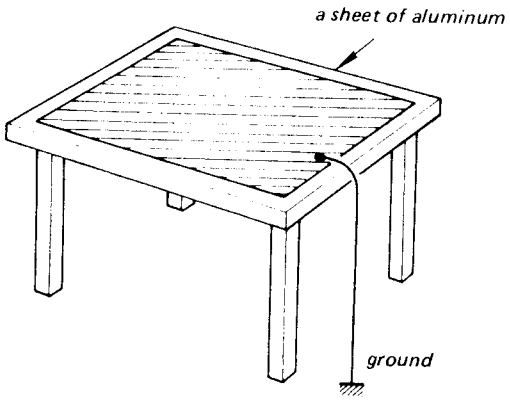


Fig. 2

3. If necessary to touch the IC direct, grasp the IC at a point other than the pins. Moreover, wear cotton gloves or a cotton finger sack. (Gloves made of nylon or other similar material are undesirable. The static electricity on your body can be easily discharged by wrapping a ground wire around your wrist.)

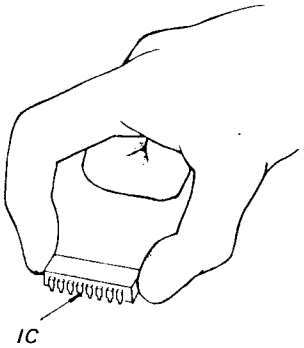


Fig. 3

4. Short all the pins of the IC before beginning any work. Also ground the soldering iron.

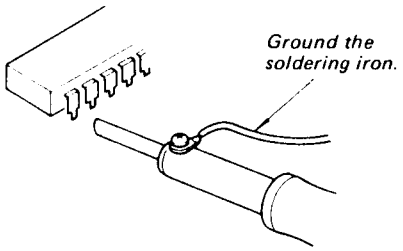


Fig. 4

5. After soldering the IC, apply a suitable adhesive to insulate terminals ① to ④ of the IC.

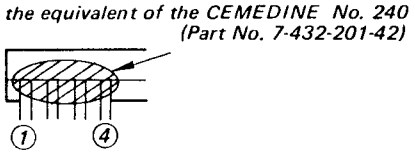
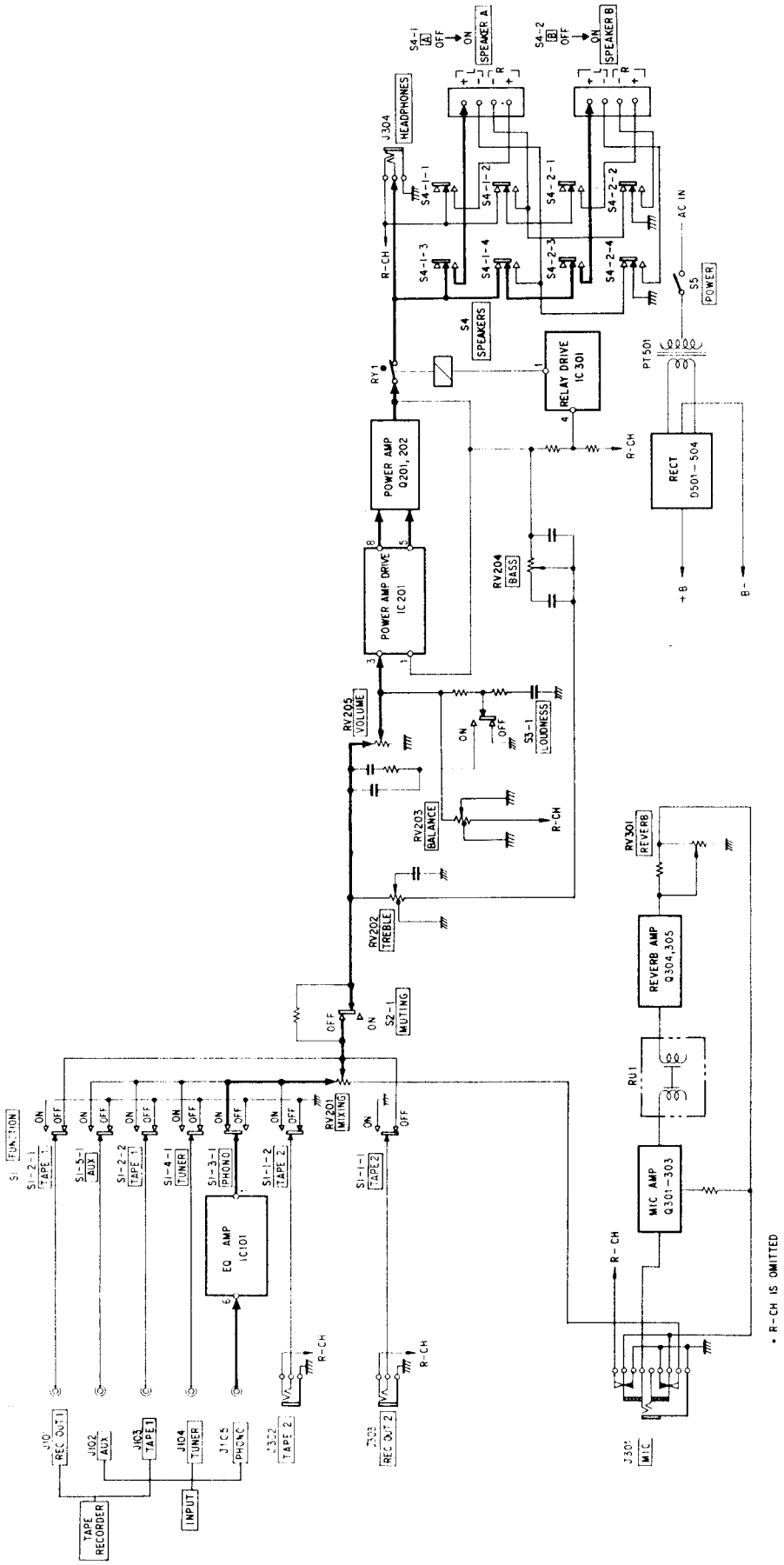


Fig. 5

SECTION 1

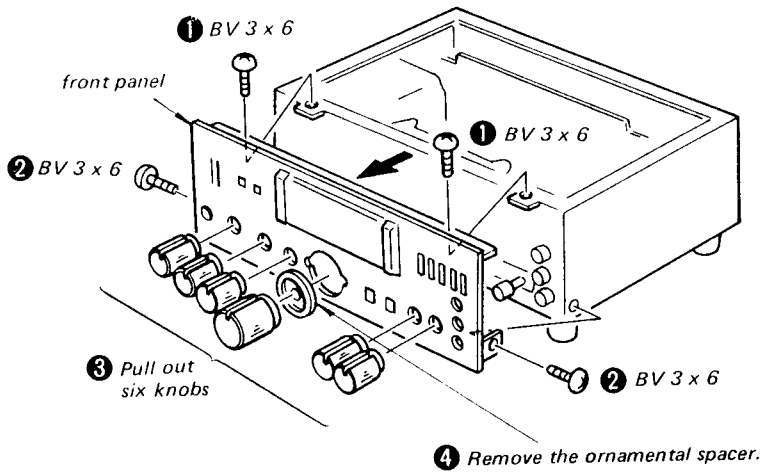
BLOCK DIAGRAM



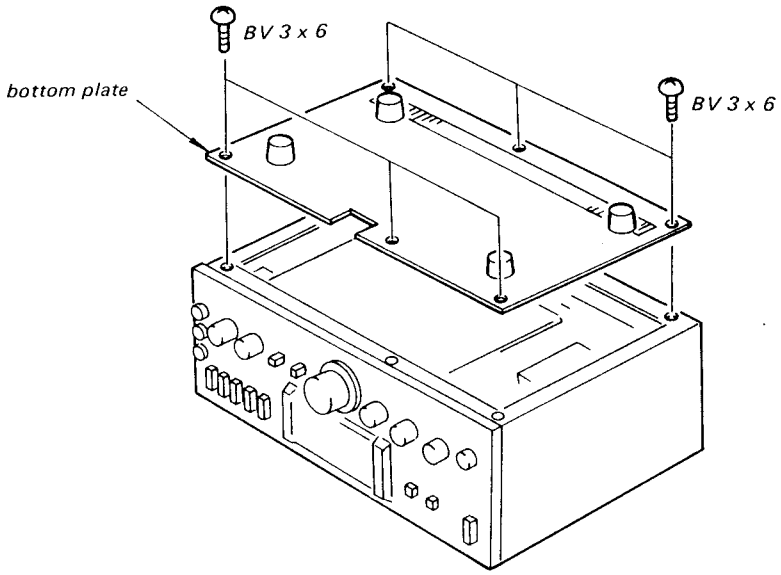
SECTION 2
DISASSEMBLY

2-1. FRONT PANEL REMOVAL

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



2-2. BOTTOM PLATE REMOVAL



SECTION 3

ADJUSTMENTS

3-1. IDLING CURRENT ADJUSTMENT

Setting:

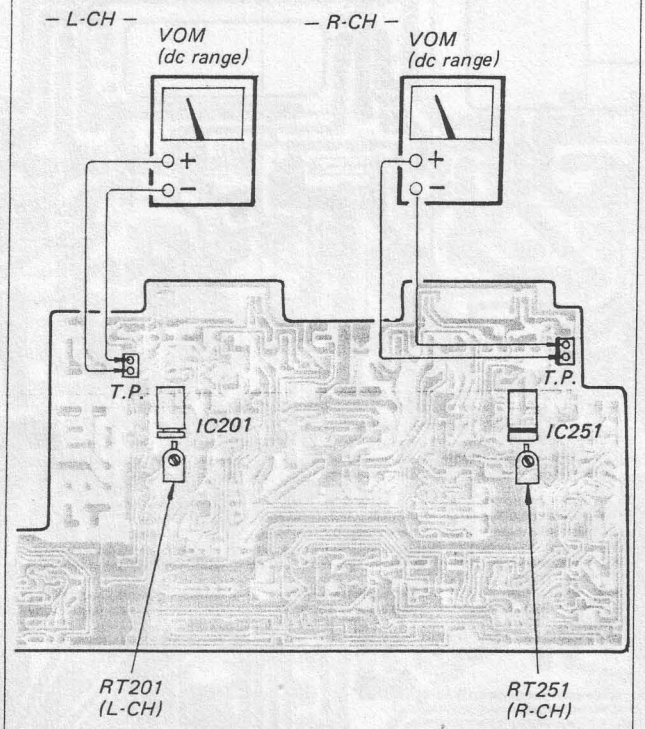
VOLUME control: minimum

Procedure:

Adjust RT201 (L-CH) and RT251 (R-CH) for 11 mV reading on the VOM.

Adjustment Location:

– power amp board –

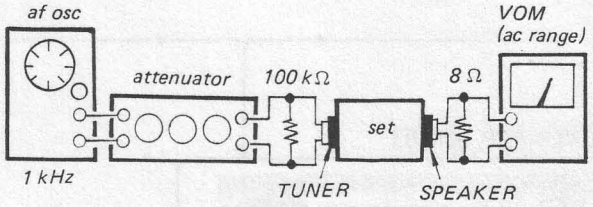


3-2. METER LEVEL ADJUSTMENT

Setting:

FUNCTION switch: TUNER

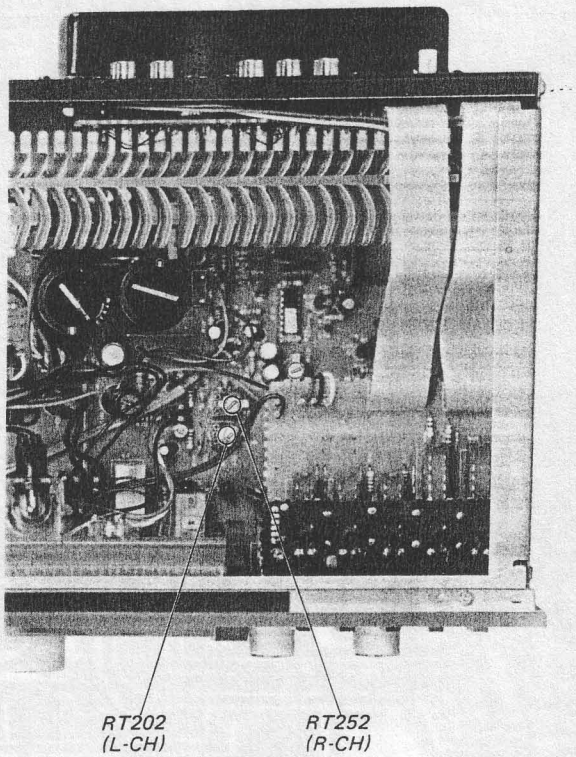
Procedure:



1. Turn the VOLUME control for a 2.83 V (1 W) reading on VOM.
2. Adjust RT202 (L-CH) and RT252 (R-CH) so that the power meter indicates 1 W.

Adjustment Location:

– power amp board –



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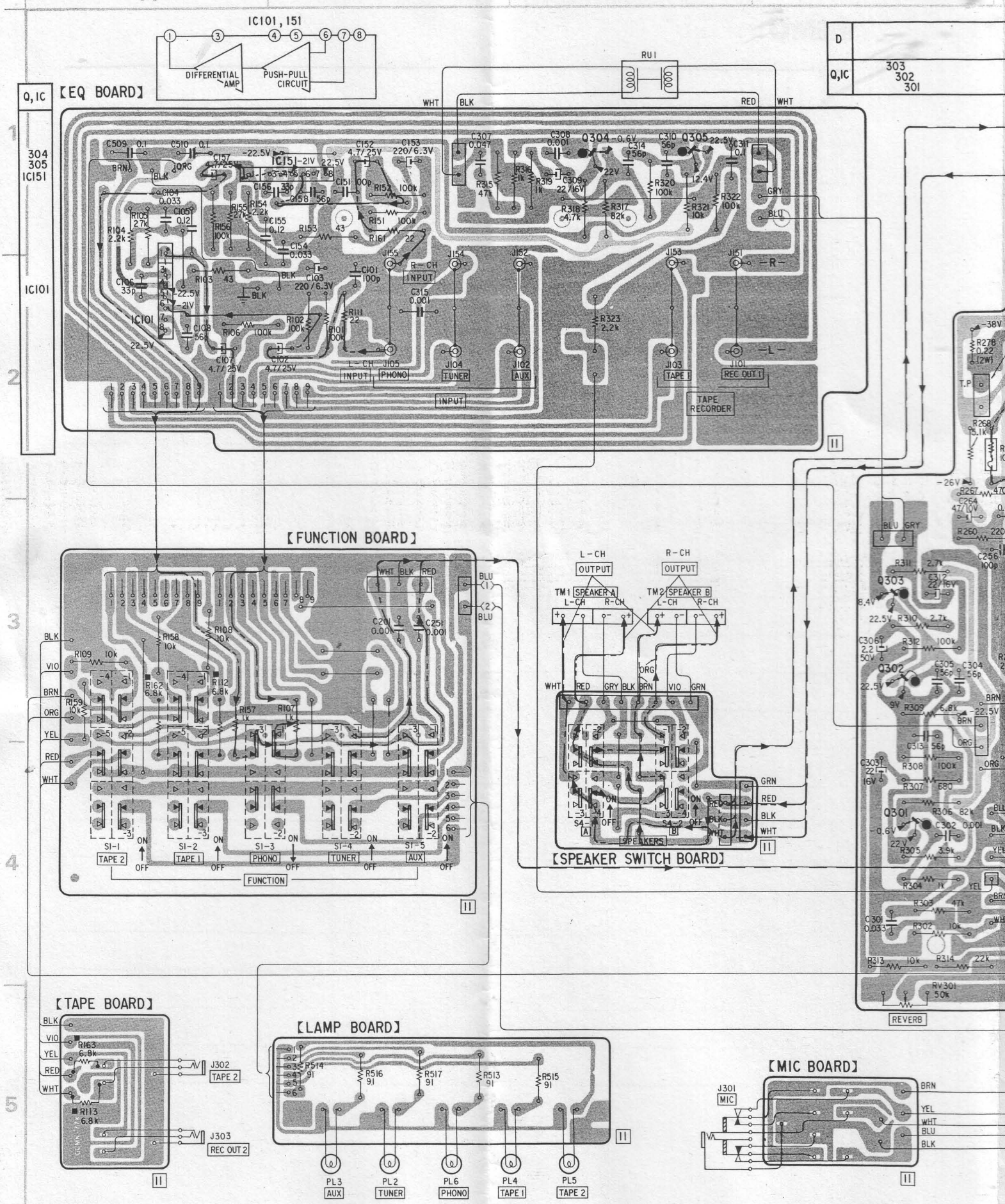
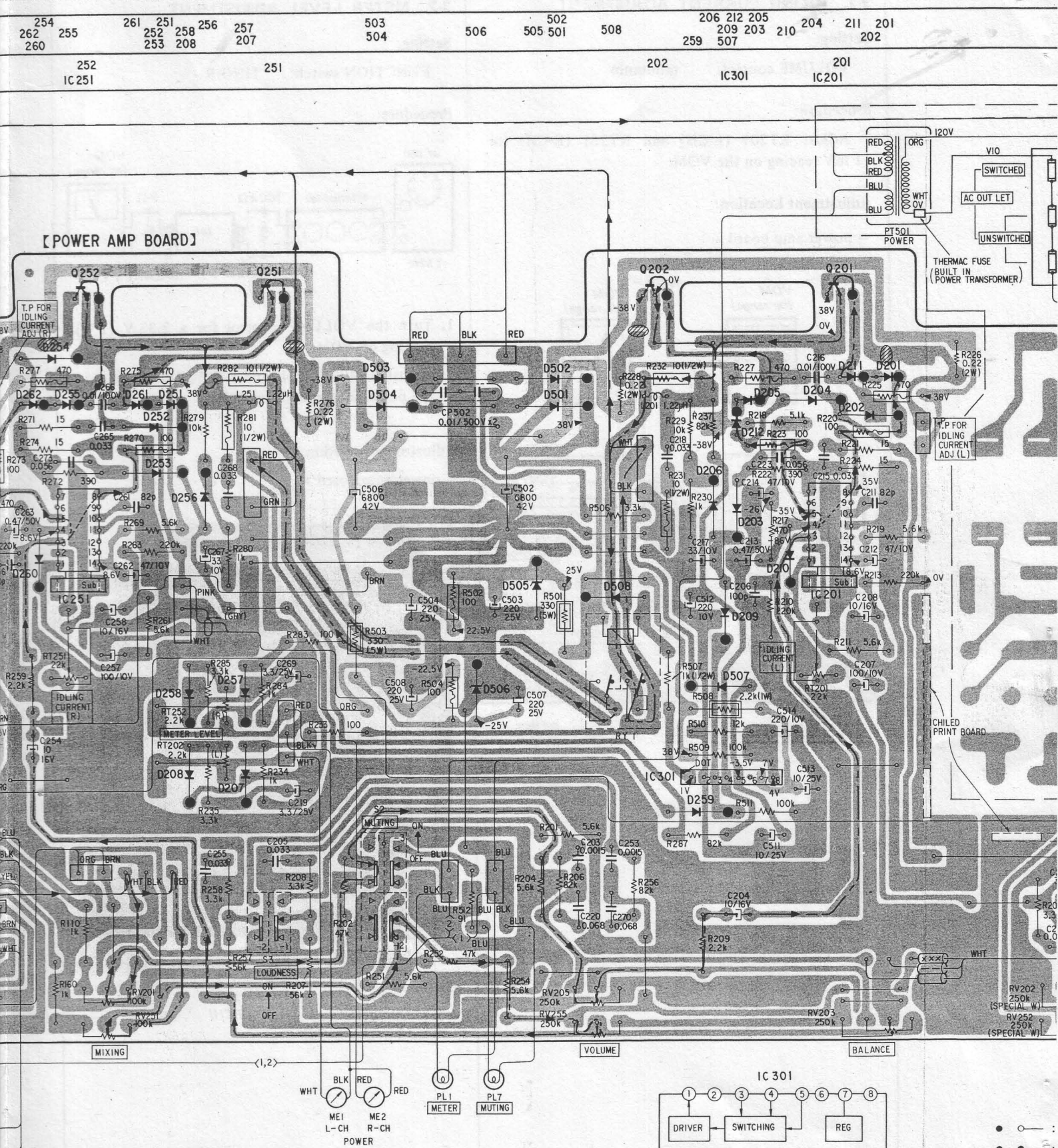
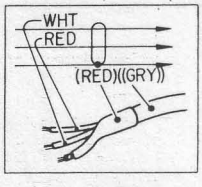
SECTION 4
DIAGRAMS

4-1. MOUNTING DIAGRAM





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



Refer the precautions on page 3 surely when handling IC201, 251 (CX171) for safety.

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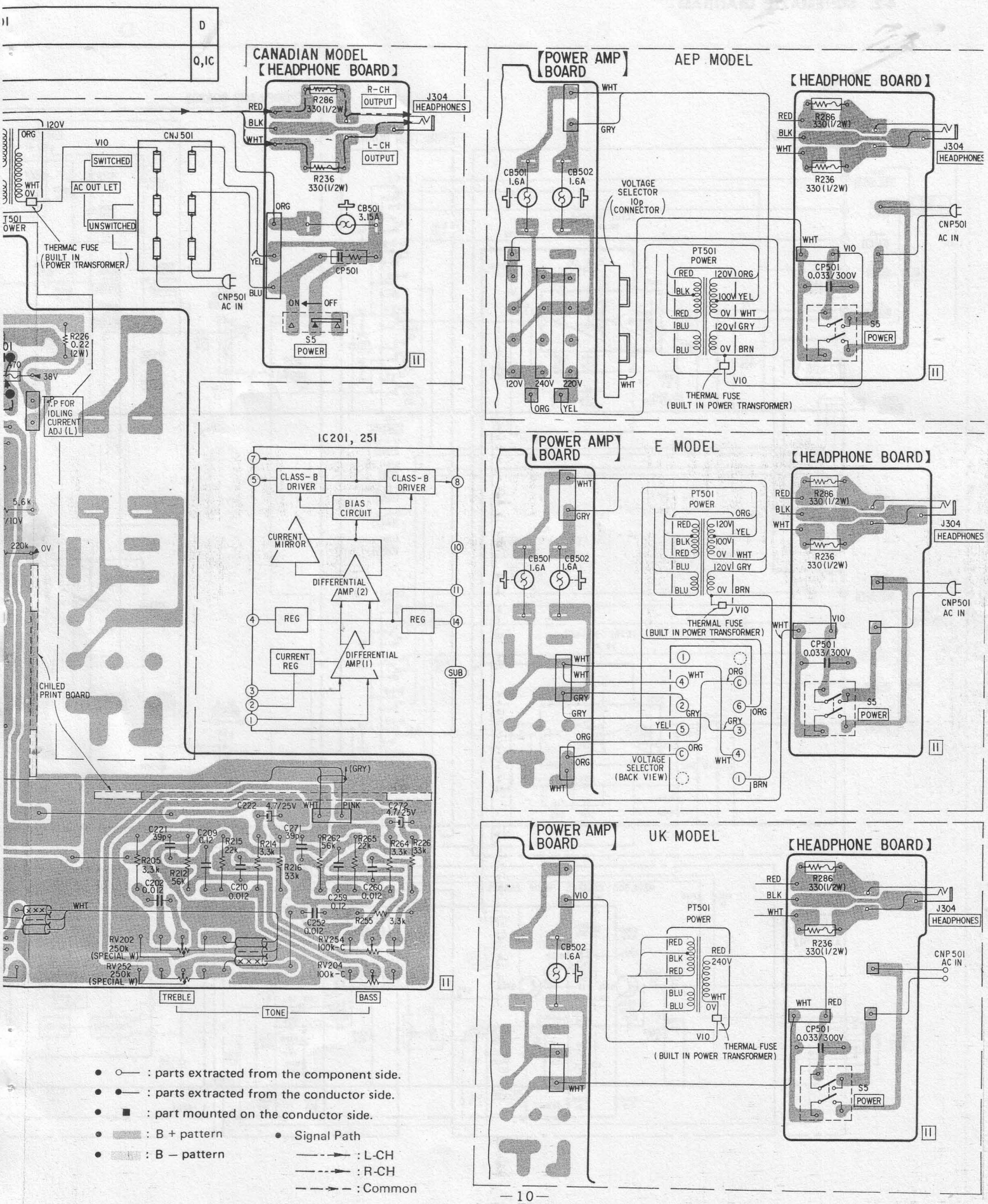
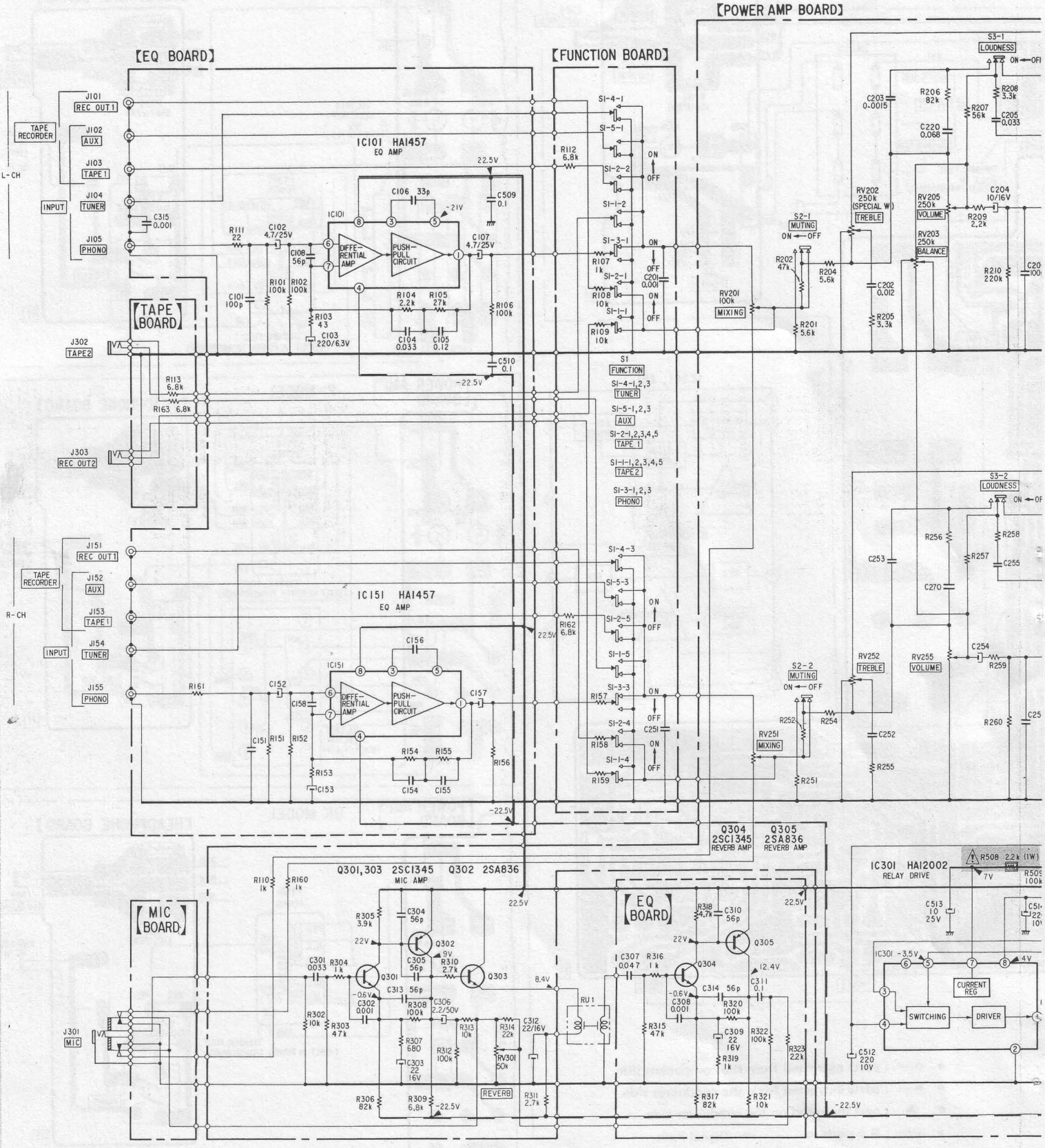


- ○— : parts extracted from the component side.
- ●— : parts extracted from the conductor side.
- ■ : part mounted on the conductor side.
- : B + pattern
- : B − pattern

- Signal Path
  - : L-CH
  - : R-CH
  - : Common

4-2. SCHEMATIC DIAGRAM



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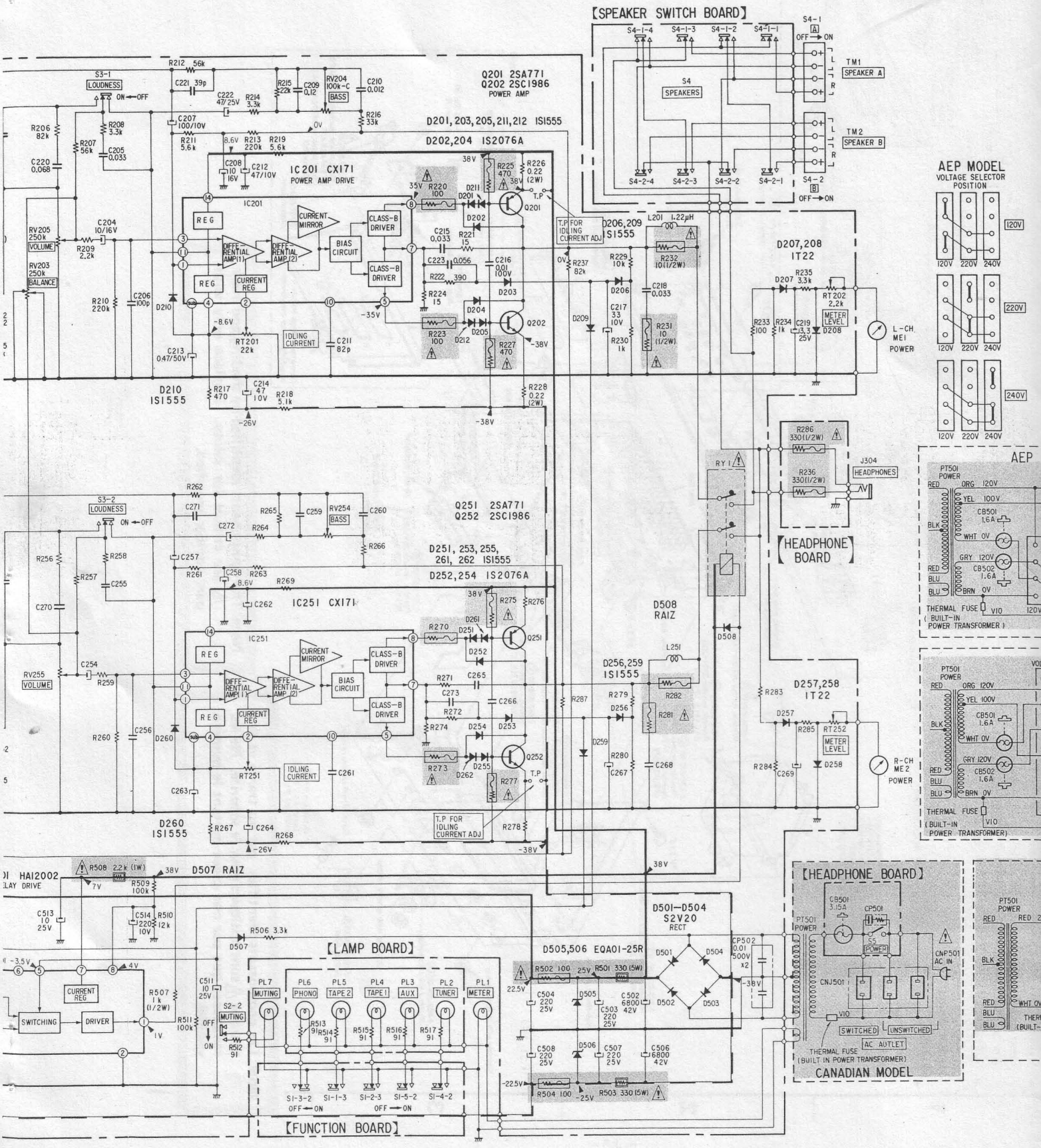
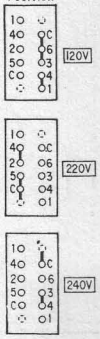


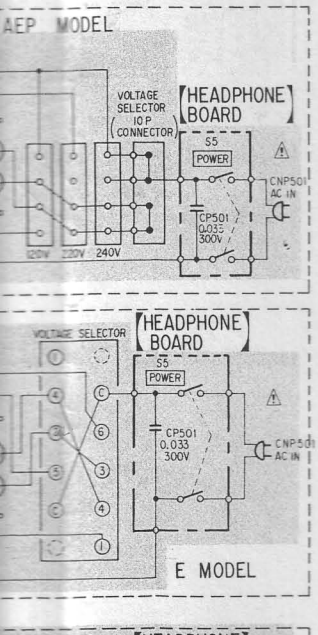
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

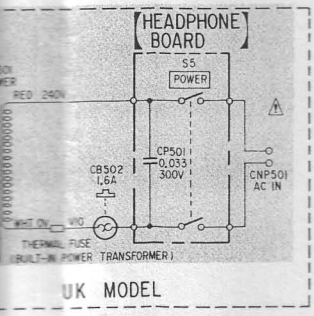
Refer the precautions on page 3 surely when handling IC201, 251 (CX171) for safety.

- 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
- ⊣⊢: fusible resistor.
- ▭: panel designation.
- ▭: adjustment for repair.
- All variable and adjustable resistors have characteristic curve B, unless otherwise noted.
- ⊣⊢: nonflammable resistor.
- Voltages are dc with respect to ground unless otherwise noted.
- Voltage variations may be noted due to normal production tolerances.

E MODEL
VOLTAGE SELECTOR POSITION







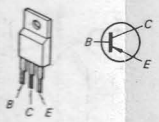
Note: Les composants identifiés par un tramé et une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

- Readings are taken under no-signal conditions with a VOM (20 kΩ/V).
- ——— : B+ bus.
- – – – : B– bus.
- Switch

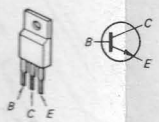
Ref. No.	Switch	Position
S1-1	TAPE 2	OFF
S1-2	TAPE 1	OFF
S1-3	PHONO	ON
S1-4	TUNER	OFF
S1-5	AUX	OFF
S2	MUTING	OFF
S3	LOUDNESS	OFF
S4-1	SPEAKER A	OFF
S4-2	SPEAKER B	OFF
S5	POWER	OFF

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

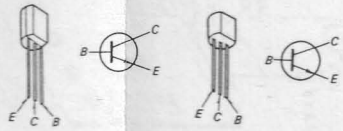
Q201, 251: 2SA771



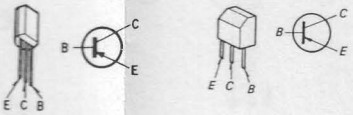
Q202, 252: 2SC1986C (2SC1986)



Q301, 303 Q304: 2SC1362 (2SC1345)

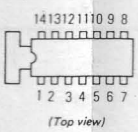


Q302, 305: 2SA872D (2SA836)

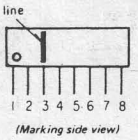


IC101, 151: HA1457

IC201, 251: CX171



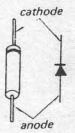
IC301: HA12002



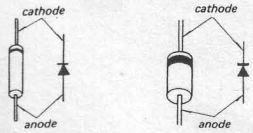
D201, 251
D203, 253
D205, 255
D206, 256
D209, 259
D210, 260
D211, 261
D212, 262 : 1S1555

D202, 252
D204, 254 : 1S2076A

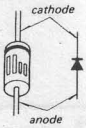
D207, 257
D208, 258 : 1T22AM (1T22)



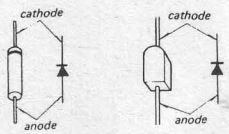
D501–504: 10E2 (S2V20)



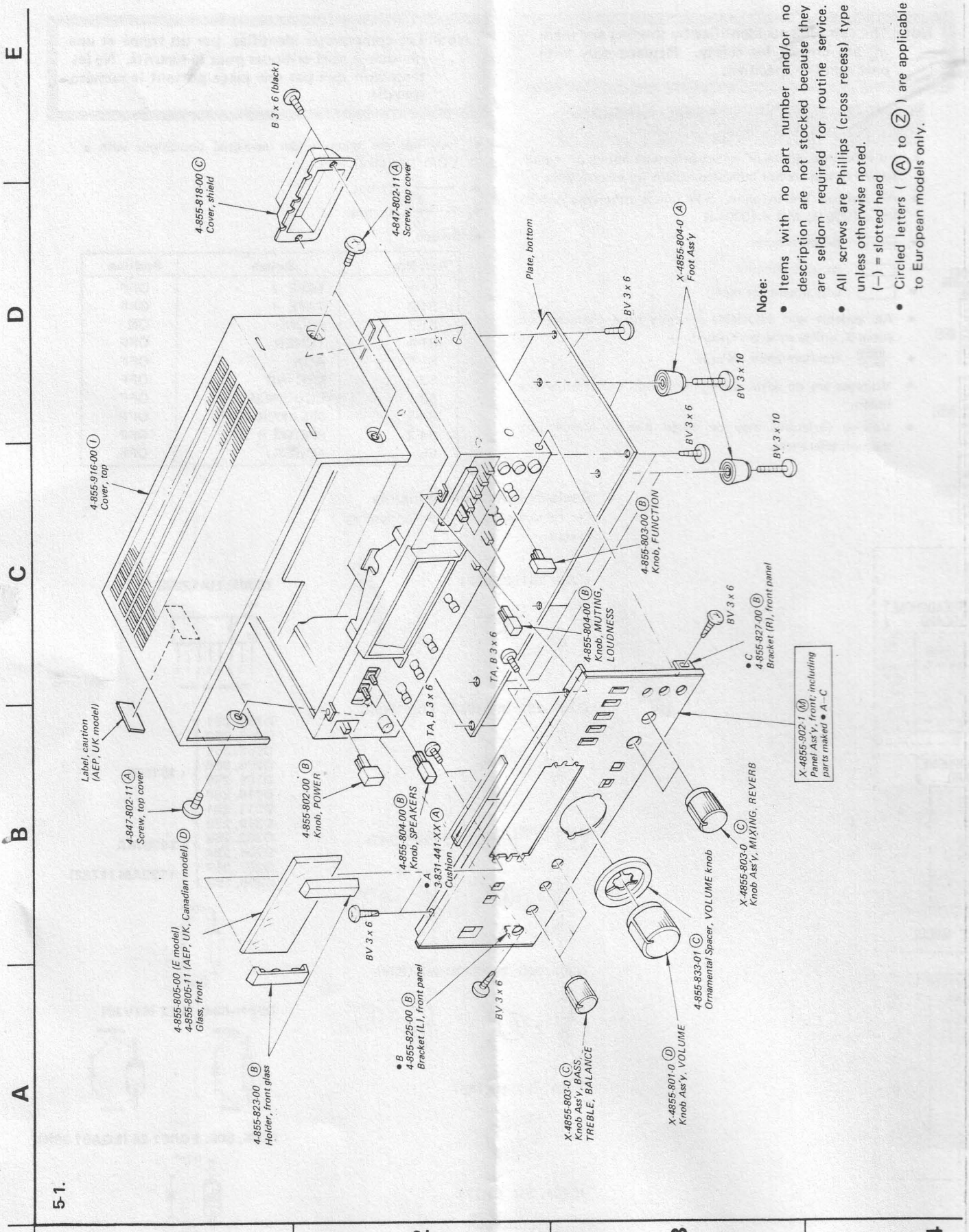
D505, 506: EQB01-25 (EQA01-25R)



D507, 508: 10E2 (RA1Z)



SECTION 5
EXPLODED VIEWS



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:

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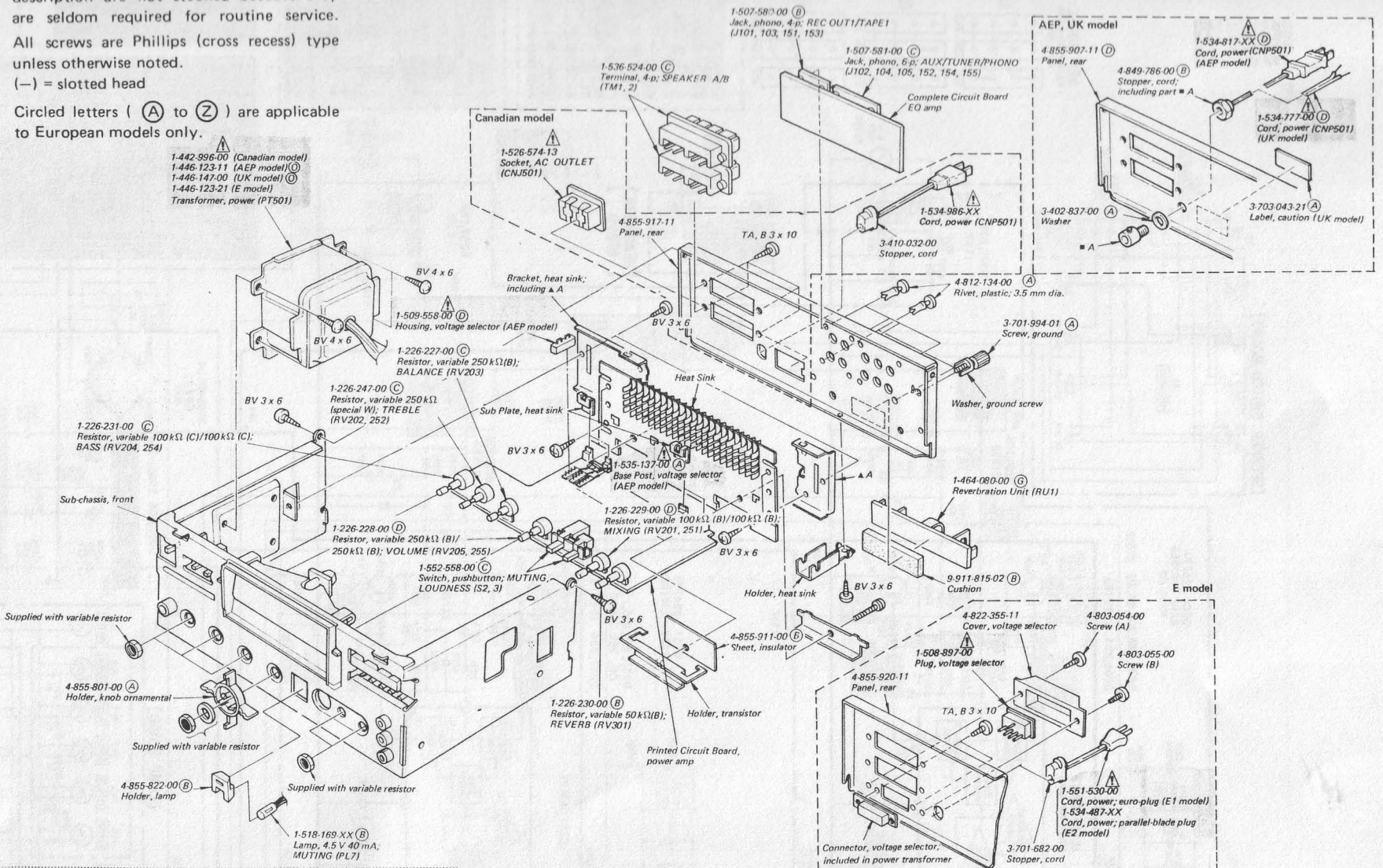

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Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

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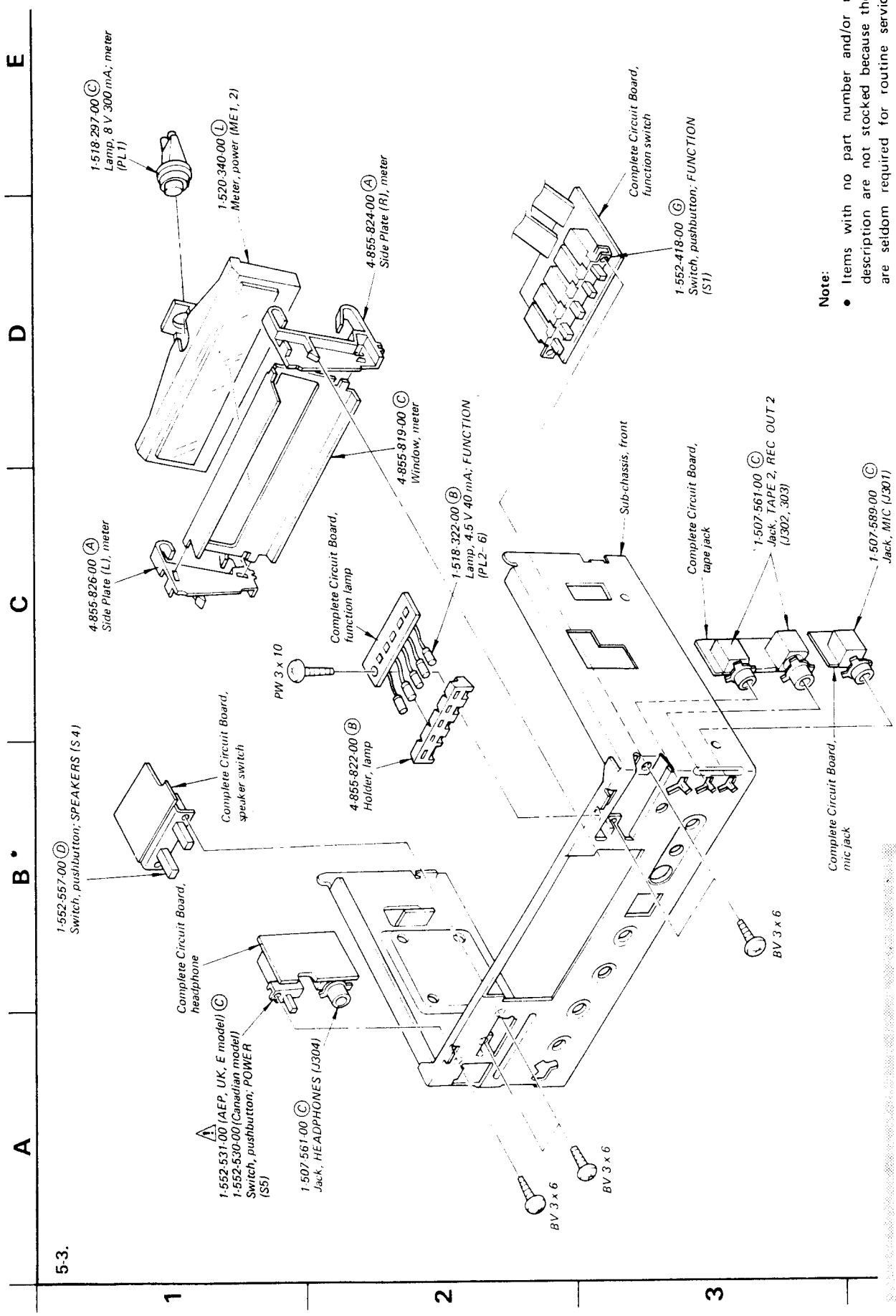

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- Circled letters (Ⓐ to Ⓩ) are applicable to European models only.

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.

SECTION 6

ELECTRICAL PARTS LIST

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

Ref. No.	Part No.	Description
		SEMICONDUCTORS
		Transistors
Q201, 251	8-729-377-12	Ⓔ 2SA771
⇒ Q202, 252	8-729-308-62	Ⓔ 2SC1986C
⇒ Q301	8-729-655-47	Ⓑ 2SC1362
⇒ Q302	8-729-387-27	Ⓑ 2SA872D
⇒ Q303, 304	8-729-665-47	Ⓑ 2SC1362
⇒ Q305	8-729-387-27	Ⓑ 2SA872D
		ICs
IC101, 151	8-759-314-57	Ⓒ HA1457
IC201, 251	8-751-710-00	Ⓖ CX171
IC301	8-759-320-02	Ⓞ HA12002
		Diodes
D201, 251	8-719-815-55	Ⓑ 1S1555
D202, 252	8-719-923-76	Ⓑ 1S2076A
D203, 253	8-719-815-55	Ⓑ 1S1555
D204, 254	8-719-923-76	Ⓑ 1S2076A
D205, 255, D206, 256	8-719-815-55	Ⓑ 1S1555
⇒ D207, 257, ⇒ D208, 258	8-719-422-21	Ⓑ 1T22AM
D209–212, D259–262	8-719-815-55	Ⓑ 1S1555
⇒ D501–504	8-719-200-02	Ⓑ 10E2
⇒ D505, 506	8-719-931-25	Ⓑ EQB01-25
⇒ D507, 508	8-719-200-02	Ⓑ 10E2
		CAPACITORS

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

C101, 151	1-102-973-11	Ⓐ 100p		
C102, 152	1-121-915-11	Ⓑ 4.7	25 V	elect
C103, 153	1-121-419-11	Ⓑ 220	6.3 V	elect
C104, 154	1-108-244-12	Ⓐ 0.033		mylar
C105, 515	1-108-363-12	Ⓐ 0.12		mylar
C106, 156	1-102-963-11	Ⓐ 33 p		
C107, 157	1-121-915-11	Ⓑ 4.7	25 V	elect
C108, 158	1-101-884-11	Ⓐ 56 p		
C201, 251	1-101-001-11	Ⓐ 0.001		
C202, 252	1-108-357-12	Ⓐ 0.012		mylar
C203, 253	1-108-228-12	Ⓐ 0.0015		mylar
C204, 254	1-123-288-11	Ⓑ 10	16 V	elect
C205, 255	1-108-244-12	Ⓐ 0.033		mylar
C206, 256	1-102-973-11	Ⓐ 100 p		
C207, 257	1-121-414-11	Ⓐ 100	10 V	elect
C208, 258	1-123-288-11	Ⓑ 10	16 V	elect
C209, 259	1-108-363-12	Ⓐ 0.12		mylar
C210, 260	1-108-357-12	Ⓐ 0.012		mylar
C211, 261	1-102-971-11	Ⓐ 82 p		
C212, 262	1-121-352-11	Ⓐ 47	10	elect
C213, 263	1-121-726-11	Ⓐ 0.47	50	elect
C214, 264	1-121-352-11	Ⓐ 47	10	elect
C215, 265	1-108-244-12	Ⓐ 0.033		mylar
C216, 266	1-108-377-12	Ⓐ 0.01	100 V	mylar
C217, 267	1-121-403-11	Ⓐ 33	10 V	elect
C218, 268	1-108-244-12	Ⓐ 0.033		mylar
C219, 269	1-121-392-11	Ⓐ 3.3	25 V	elect
C220, 270	1-108-249-12	Ⓐ 0.068		mylar
C221, 271	1-102-965-11	Ⓐ 39 p		
C222, 272	1-121-395-11	Ⓐ 4.7	25 V	elect
C223, 273	1-108-361-12	Ⓐ 0.056		mylar
C301	1-108-244-12	Ⓐ 0.033		mylar
C302	1-101-001-11	Ⓐ 0.001		
C303	1-123-191-11	Ⓐ 22	16 V	elect
C304, 305	1-101-884-11	Ⓐ 56 p		
C306	1-121-450-11	Ⓐ 2.2	50 V	elect
C307	1-108-246-12	Ⓐ 0.047		mylar
C308	1-101-001-11	Ⓐ 0.001		
C309	1-123-191-11	Ⓐ 22	16 V	elect
C310	1-101-884-11	Ⓐ 56 p		
C311	1-108-251-11	Ⓑ 0.1		mylar

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

Ref. No.	Part No.	Description		
C312	1-123-191-11 (A)	22	16 V	elect
C313, 314	1-101-884-11 (A)	56 p		
C315	1-101-001-11 (A)	0.001		
C502	1-125-157-11 (A)	6800	42 V	elect
C503, 504	1-121-422-11 (B)	220	25 V	elect
C506	1-125-157-11 (A)	6800	42 V	elect
C507, 508	1-121-422-11 (B)	220	25 V	elect
C509, 510	1-108-251-12 (A)	0.1		mylar
C511	1-121-398-11 (A)	10	25 V	elect
C512	1-121-420-11 (A)	220	10 V	elect
C513	1-121-398-11 (A)	10	25 V	elect
C514	1-121-420-11 (A)	220	10 V	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. kΩ : 1000 Ω.

R220, 270 R223, 273	⚠1-121-881-11 (A)	100	¼ W	fusible
R225, 275	⚠1-212-897-11 (A)	470	¼ W	fusible
R226, 276	1-217-151-11 (A)	0.22	2 W	wirewound
R227, 277	⚠1-212-897-11 (A)	470	¼ W	fusible
R228, 278	1-217-151-11 (A)	0.22	2 W	wirewound
R231, 232 R281, 282	⚠1-212-958-11 (A)	10	½ W	fusible
R236, 286	⚠1-212-994-11 (A)	330	½ W	fusible
R501	⚠1-207-689-11 (B)	330	5 W	wirewound (nonflammable)
R502	⚠1-212-881-11 (A)	100	¼ W	fusible
R503	⚠1-207-689-11 (B)	330	5 W	wirewound (nonflammable)
R504	⚠1-212-881-11 (A)	100	¼ W	fusible
R507	1-244-873-11 (A)	1 k	½ W	carbon
R508	⚠1-213-147-11 (B)	2.2 k	1 W	metal oxide (nonflammable)

All variable and adjustable resistors have characteristic curve B, unless otherwise noted. kΩ : 1000 Ω, MΩ : 1000 kΩ

RT201, 251	1-224-646-XX (B)	22 k, adjustable; idling current
RT202, 252	1-224-643-XX (B)	2.2 k, adjustable; meter level

Ref. No.	Part No.	Description
RV201, 251	1-226-229-00 (D)	100 k/100 k, variable; MIXING
RV202, 252	1-226-247-00 (C)	250 k (special W), variable; TREBLE
RV203	1-226-227-00 (C)	250 k, variable; BALANCE
RV204, 254	1-226-231-00 (C)	100 k (C)/100 k(C), variable; BASS
RV205, 255	1-226-228-00 (D)	250 k/250 k, variable; VOLUME
RV301	1-226-230-00 (B)	50 k, varibale; REVERB

SWITCHES

S1	1-552-418-00 (G)	Pushbutton, FUNCTION
S2, 3	1-552-558-00 (C)	Pushbutton, MUTING, LOUDNESS
S4	1-552-557-00 (D)	Pushbutton, SPEAKERS
S5	⚠1-552-530-00	Pushbutton, POWER (Canadian model)
S5	⚠1-552-531-00 (C)	Pushbutton, POWER (AEP, UK, E model)

JACKS

J101, 151 J103, 153	1-507-580-00 (B)	Phono, 4-p; REC OUT1/TAPE1
J102, 152 J104, 154 J105, 155	1-507-581-00 (C)	Phono, 6-p; AUX/TUNER/PHONO
J301	1-507-589-00 (C)	MIC
J302, 303	1-507-561-00 (C)	TAPE 2, REC OUT 2
J304	1-507-561-00 (C)	HEADPHONES

MISCELLANEOUS

CB501	⚠1-532-488-00	Circuit breaker (Canadian model)
CB501	⚠1-532-534-00 (C)	Circuit breaker (AEP, E model)
CB502	⚠1-532-534-00 (C)	Circuit breaker (AEP, UK, E model)
CNJ501	⚠1-526-574-13	Socket, AC OUTLET (Canadian model)
CNP501	⚠1-534-487-XX	Cord, power; parallel-blade plug (E2 model)
CNP501	⚠1-551-530-00	Cord, power; euro-plug (E1 model)
CNP501	⚠1-534-777-00 (D)	Cord, power (UK model)
CNP501	⚠1-534-817-XX (D)	Cord, power (AEP model)
CNP501	⚠1-534-986-XX	Cord, power (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*
CP501	⚠1-108-750-12 Ⓑ	Capacitor, mylar; 0.033 μF/300 V (AEP, UK, E model)
CP501	⚠1-231-341-21	Encapsulated Component (Canadian model)
CP502	1-102-335-00 Ⓑ	Capacitor, ceramic; 0.01 μF/500 V x 2
ME1, 2	1-520-340-00 Ⓛ	Meter, power
PL1	1-518-297-00 Ⓒ	Lamp, 8 V 300 mA; meter
PL2–6	1-518-322-00 Ⓑ	Lamp, 4.5 V 40 mA; FUNCTION
PL7	1-518-169-XX Ⓑ	Lamp, 4.5 V 40 mA; MUTING
PT501	⚠1-442-996-00	Transformer, power (Canadian model)
PT501	⚠1-446-123-11 Ⓞ	Transformer, power (AEP model)
PT501	⚠1-446-123-21	Transformer, power (E model)
PT501	⚠1-446-147-00 Ⓞ	Transformer, power (UK model)
RY1	⚠1-515-303-00 Ⓕ	Relay
RU1	1-464-080-00 Ⓖ	Reverbration Unit
TM1, 2	1-536-524-00 Ⓒ	Terminal, 4-p; SPEAKER A/B
	⚠1-508-897-00	Plug, voltage selector (E model)
	⚠1-509-558-00 Ⓓ	Housing, voltage selector (AEP model)
	⚠1-535-137-00 Ⓐ	Base Post, voltage selector (AEP model)

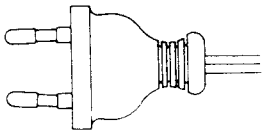
Note: The components identified by shading and mark ⚠ are critical for safety. Replace only with part number specified.

ACCESSORIES & PACKING MATERIALS

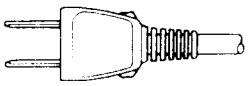
Part No.	*Description*
3-701-630-00 Ⓐ	Bag, protection
3-770-553-11 Ⓓ	Manual, instruction
4-855-829-00 Ⓑ	Cushion
4-855-908-00 Ⓓ	Carton

– Power Cord –

E1 model: euro-plug (1-551-530-00)



E2 model: parallel-blade plug (1-534-487-XX)



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-515

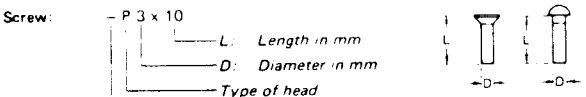
1/4 WATT CARBON RESISTORS A

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

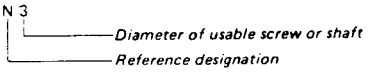
Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.	Ω	Part No.
1.0	1-244-601-11	10	1-244-625-11	100	1-244-649-11	1.0k	1-244-673-11	10k	1-244-697-11	100k	1-244-721-11	1.0M	1-244-745-11
1.1	1-244-602-11	11	1-244-626-11	110	1-244-650-11	1.1k	1-244-674-11	11k	1-244-698-11	110k	1-244-722-11	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		brazier-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	

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