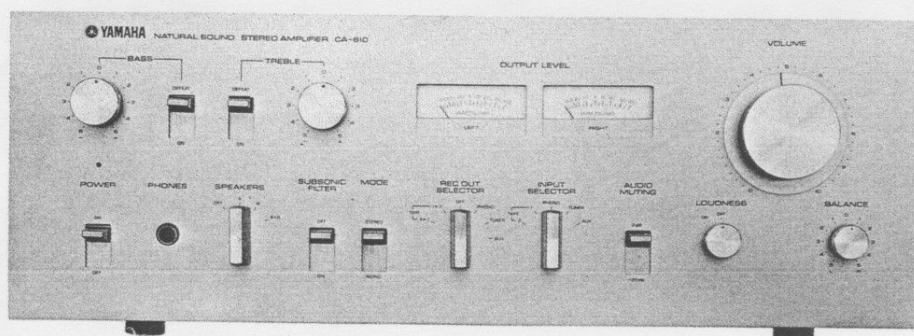


SERVICE MANUAL

CA-610

PRE-MAIN AMPLIFIER



SINCE 1887

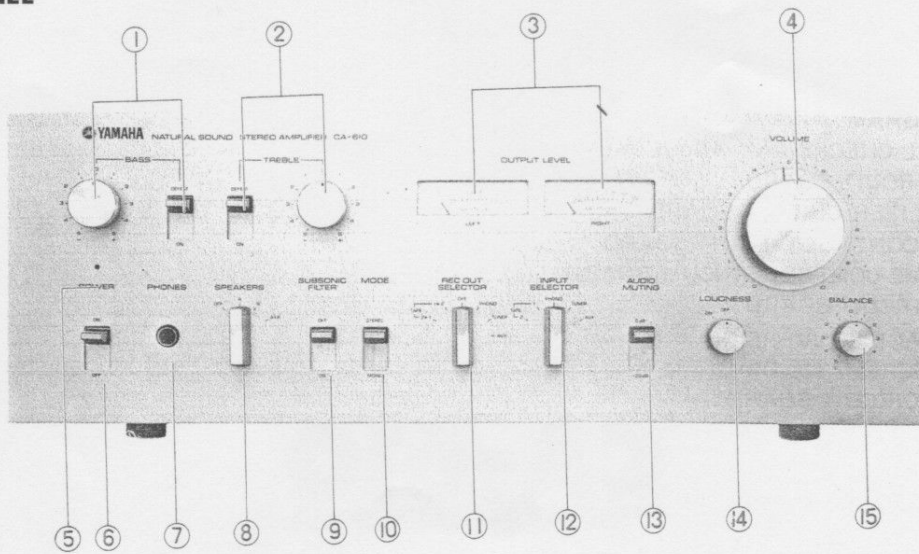


YAMAHA

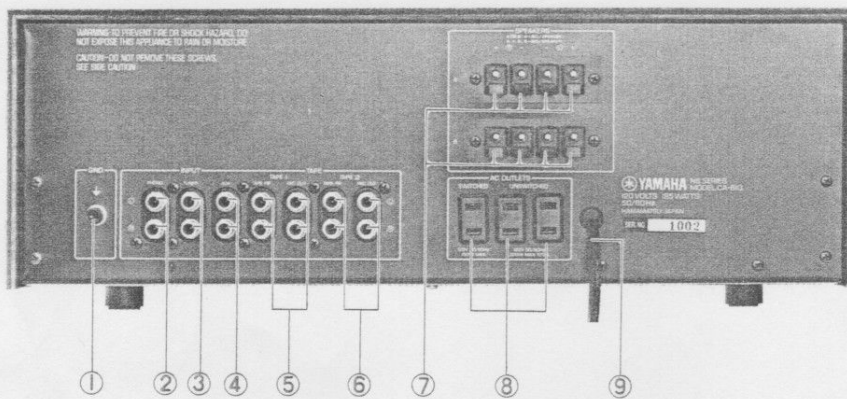
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

EXTERNAL VIEW

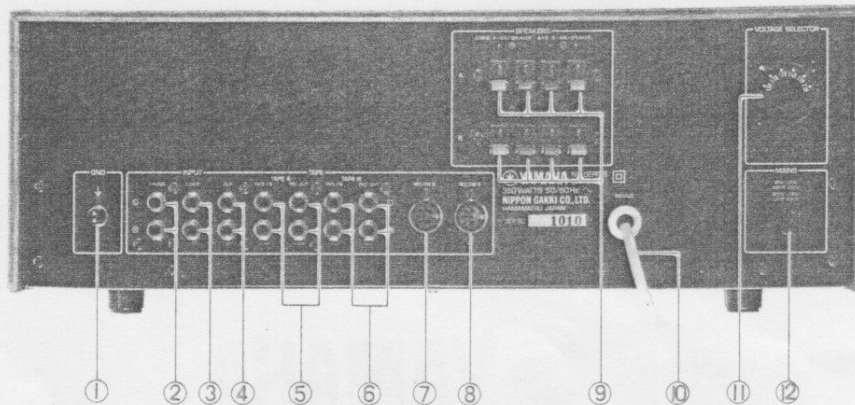
FRONT PANEL



REAR PANEL (GENERAL MODEL)



REAR PANEL (EUROPEAN MODEL)



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SPECIFICATIONS

DYNAMIC POWER (IHF, 8 Ω 1kHz)	125W
CONTINUOUS RMS POWER	
(20Hz~20kHz 8 Ω	40W+40W
both channels driven) 4 Ω	50W+50W
(1kHz both channels driven) 8 Ω	45W+45W
4 Ω	62W+62W
POWER BANDWIDTH (IHF, 0.05%)	10Hz~50kHz
TOTAL HARMONIC DISTORTION (8 Ω)	Less than 0.05%
(8 Ω , 20W, 1kHz)	Less than 0.005%
INTERMODULATION DISTORTION (8 Ω)	Less than 0.05%
DAMPING FACTOR (8 Ω , 1kHz)	50
FREQUENCY RESPONSE (AUX $\rightarrow$ SP OUT)	
.....	20Hz~20kHz ± 3 dB
INPUT (SENSITIVITY/IMPEDANCE)	
PHONO	2.5mV, 50k Ω
TUNER, AUX	150mV, 50k Ω
TAPE PB 1, 2	150mV, 50k Ω
MAXIMUM INPUT CAPACITY (PHONO)	
.....	150mV at 1kHz, 0.05% T.H.D.
OUTPUT (LEVEL/IMPEDANCE)	
TAPE REC OUT A.B.	150mV, 1k Ω (DIN 30mV)
TONE CONTROLS	
BASS	50Hz, ± 12 dB
TREBLE	10kHz, ± 10 dB
AUDIO MUTING	-20dB
FILTER	-30dB at 25Hz (12dB/oct)
LOUDNESS	-30dB, VOL down +9dB at 50Hz +5dB at 10Hz
S/N RATIO (IHF A NETWORK)	
PHONO $\rightarrow$ SP OUT	75dB
AUX $\rightarrow$ SP OUT	90dB
RESIDUAL NOISE	0.4mV
AUXILIARY CIRCUITS	
OUTPUT LEVEL METER, REC OUT SELECTOR, SPEAKER PROTECTION CIRCUIT, PC LIMITER	
OTHERS	
SEMICONDUCTORS USED	Transistor 35 IC 4 Diode 22 Zener Diode 3
GENERAL	
POWER SOURCE	AC110V~240V, 50/60Hz
POWER CONSUMPTION	350W: European British } models Australian } 195W: US & Canadian models
DIMENSIONS	435(W) x 150(H) x 298(D) mm (110.7" x 38.2" x 75.9")
WEIGHT	8.9kg (4.058 lbs)
- Specifications subject to change without notice. -	

FRONT PANEL

- ① BASS TONE CONTROL & DEFEAT SWITCH
- ② TREBLE TONE CONTROL & DEFEAT SWITCH
- ③ OUTPUT LEVEL METER
- ④ VOLUME CONTROL
- ⑤ POWER INDICATOR LAMP
- ⑥ POWER SWITCH
- ⑦ HEADPHONE JACK
- ⑧ SPEAKERS SELECTOR
- ⑨ SUBSONIC FILTER SWITCH
- ⑩ MODE SWITCH
- ⑪ REC OUT SELECTOR
- ⑫ INPUT SELECTOR
- ⑬ AUDIO MUTING SWITCH
- ⑭ LOUDNESS SWITCH
- ⑮ BALANCE CONTROL

REAR PANEL(GENERAL MODEL)

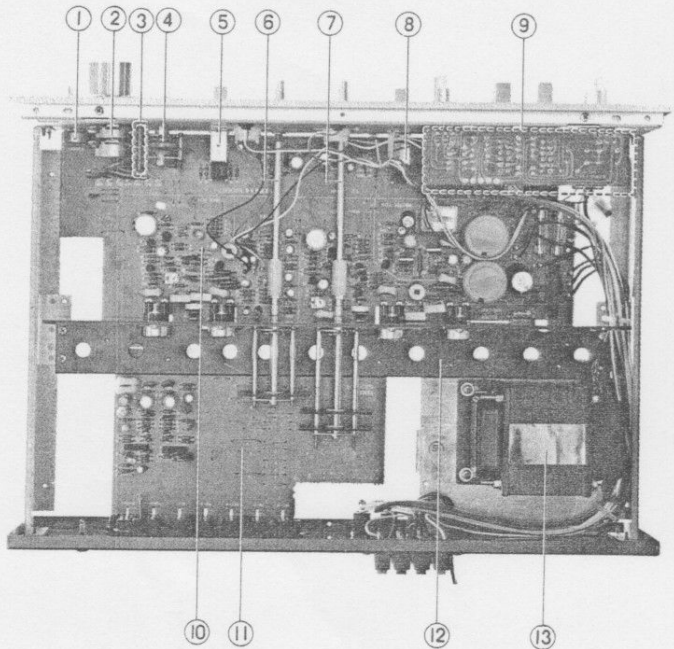
- ① GROUND TERMINAL
- ② PHONO INPUT JACKS
- ③ TUNER INPUT JACKS
- ④ AUX INPUT JACKS
- ⑤ TAPE 1 PB/REC OUT JACKS
- ⑥ TAPE 2 PB/REC OUT JACKS
- ⑦ SPEAKER TERMINALS
- ⑧ AC OUTLETS
- ⑨ AC CORD

REAR PANEL (EUROPEAN MODEL)

- ① GROUND TERMINAL
- ② PHONO INPUT JACKS
- ③ TUNER INPUT JACKS
- ④ AUX INPUT JACKS
- ⑤ TAPE A PB/REC OUT JACKS
- ⑥ TAPE B PB/REC OUT JACKS
- ⑦ TAPE A REC/PB DIN CONNECTOR
- ⑧ TAPE B REC/PB DIN CONNECTOR
- ⑨ SPEAKER TERMINALS
- ⑩ AC CORD
- ⑪ VOLTAGE SELECTOR
- ⑫ PRIMARY FUSE

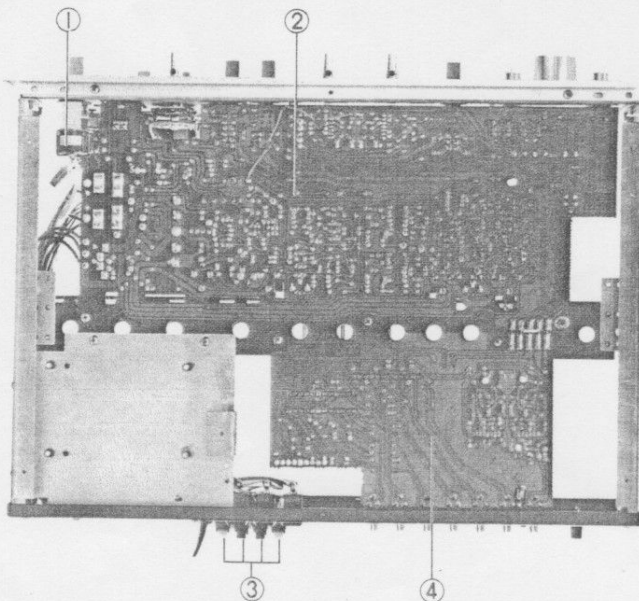
INTERNAL VIEW

TOP VIEW



- ① BALANCE CONTROL
- ② VOLUME CONTROL
- ③ VOLUME CONTROL CIRCUIT BOARD (NA06809)
- ④ LOUDNESS SWITCH
- ⑤ AUDIO MUTING SWITCH
- ⑥ INPUT SELECTOR
- ⑦ REC OUT SELECTOR
- ⑧ MODE SWITCH
- ⑨ TONE CONTROL CIRCUIT BOARD (NA06809)
- ⑩ MAIN CIRCUIT BOARD (NA06809)
- ⑪ EQUALIZER AMP CIRCUIT BOARD (NA06759, NA06804)
- ⑫ HEAT SINK
- ⑬ POWER TRANSFORMER

BOTTOM VIEW



- ① POWER SWITCH
- ② MAIN CIRCUIT BOARD (NA06809)
- ③ SPEAKER TERMINALS
- ④ EQUALIZER AMP CIRCUIT BOARD (NA06759, NA06804)

PARTIAL DISASSEMBLY

1. TOP COVER REMOVAL

- a) Unscrew o marked 4 retaining screws holding both sides of the unit as in Photo 1.
- b) Pull out then the cover backward of the unit under servicing.

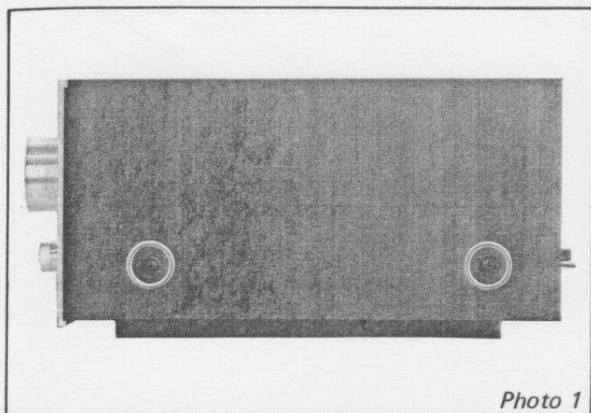


Photo 1

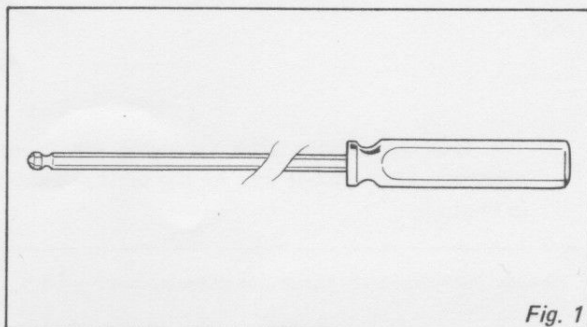


Fig. 1

- c) Remove each screw of (1), (2) of Photo-3, and (3), (4) of Photo-4 before gently drawing off the Front operating panel toward you.

Note: In doing the job pay special attention not to apply any damage or scratches to the portion of an output level meter and an L.E.D. indicator light.

For the level meters initially, take out the adhesive tape holding acrylic cover of the Front panel to separate them from the meters themselves. Unplug the power LED indicator connector then, for an easy job prior to the panel removal.

2. BOTTOM PANEL REMOVAL

- a) In Photo 2, remove the bottom panel with unscrewing 7 retaining screws of (1) to (6) as shown.

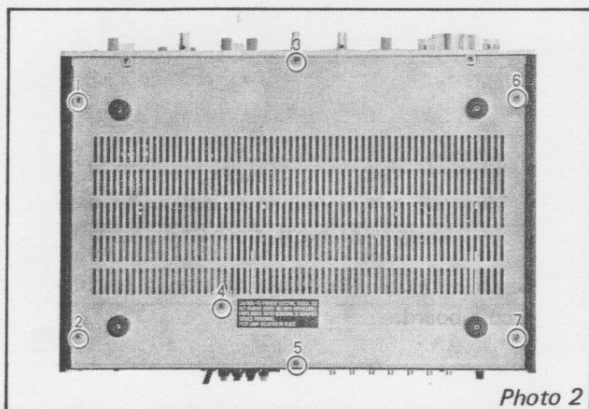


Photo 2

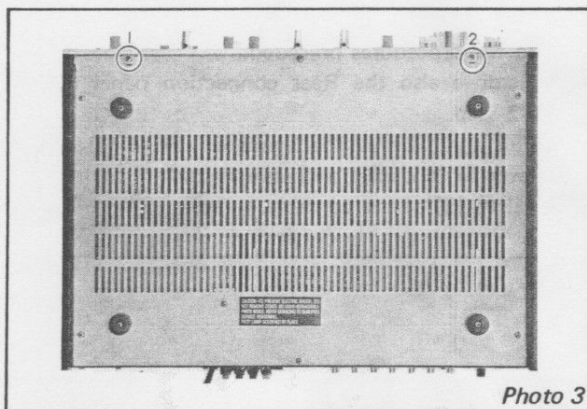


Photo 3

3. FRONT PANEL REMOVAL

- a) According to the 1-a) Instruction, remove the top cover for the first of all procedures required.
- b) Take all the knobs off such that of function switches, volume, tones, balance and loudness controls, and selectors.

Note: A master volume control knob must be then removed with unscrewing two set screws by a long arm countersunk screw driver (Fig. 1) inserted between the front panel and mother chassis.

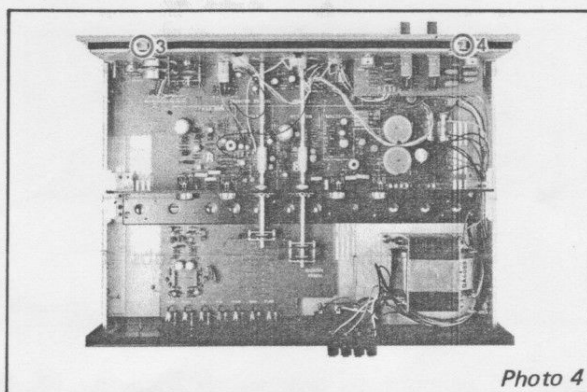


Photo 4

d) The final appearance after removing the Front operating panel should thus be the same as shown in Photo-5.

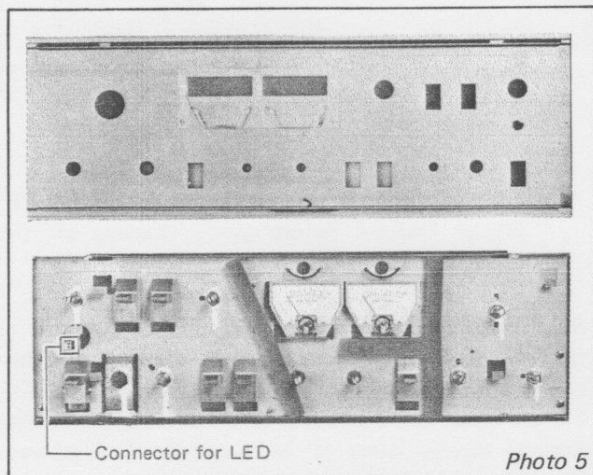


Photo 5

4. MAIN CIRCUIT BOARD & EQUALIZER CIRCUIT BOARD REMOVAL

- Remove the front operating panel first according to the procedures preceded.
- Remove also the Rear connection panel by the #2 step.
- Pull and take all the knobs of (1) to (3) of the lever switches out, and remove shaft fastening nuts (4) to (9) of the controls.

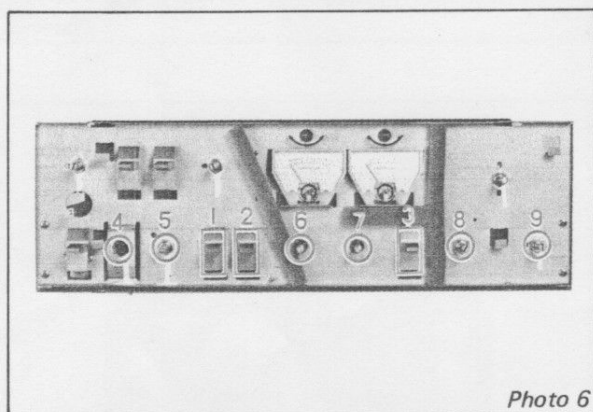


Photo 6

Note: To remount the lever switch knobs the Fig. 2 should be referred to do quick jobs.

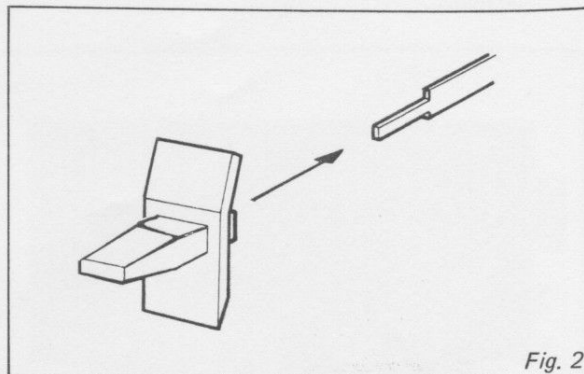


Fig. 2

- Screws of numbered (1) to (4) shown in the Photo-7 must then be removed, and try to prepare then, to move joints of extension shafts for INPUT SELECTOR & REC OUT SELECTOR out.
- Unsolder wirings of each circuit board.

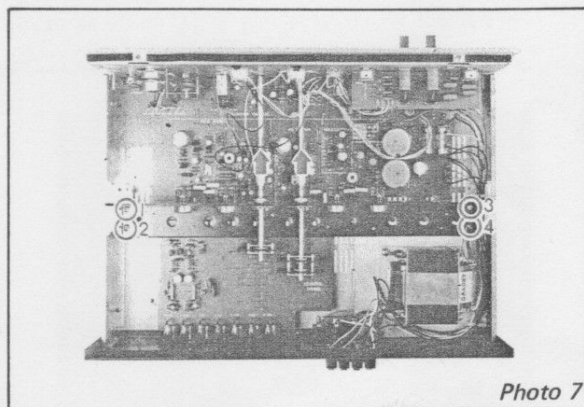


Photo 7

- Remove (1) to (4) retaining screws holding the circuit board.

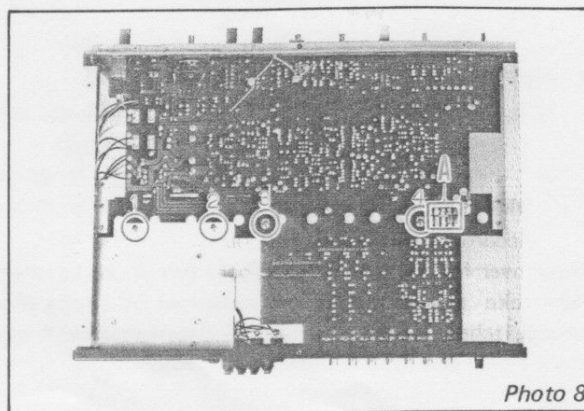


Photo 8

- g) Remove also (1) to (8) retaining screws located on the Rear connection panel.

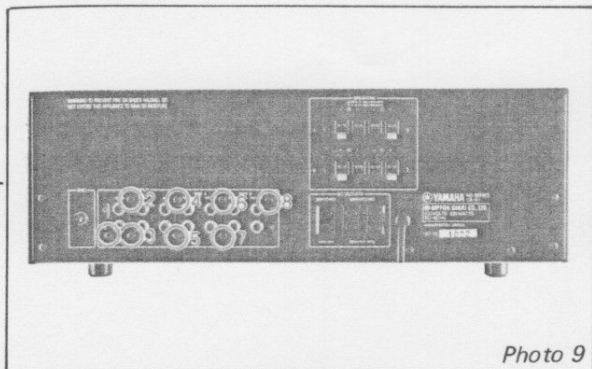


Photo 9

- h) Unsolder each lead wire from the portion "A" that connected between the Main circuit board and Equalizer circuit board.

****** At the same time remove also ground lead wires from each circuit board to the chassis ground.

- i) Gently take the equalizer circuit board first, next the main circuit board out.

5. TONE CIRCUIT BOARD REMOVAL

- a) Conduct the procedures always after the instruction of #3; Front operating panel removal procedures.
- b) With removing nuts and knobs (1) to (4) of the lever switch as shown in the Photo-10, take the circuit board off from the chassis.

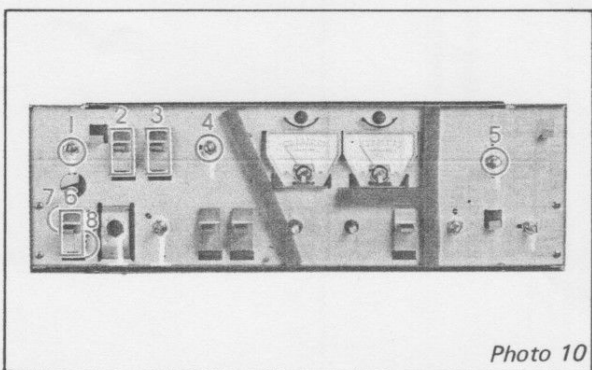


Photo 10

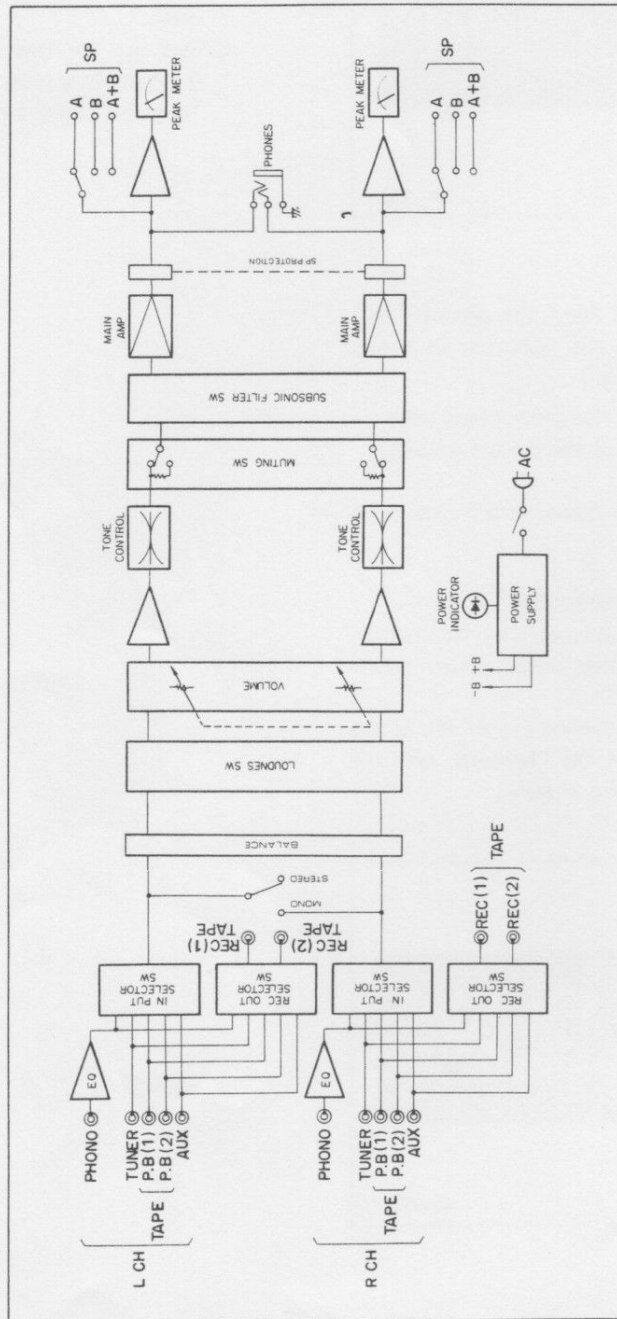
6. VOLUME CONTROL CIRCUIT BOARD

- a) The procedure should follow after the #3 Instruction.
- b) Remove the circuit board with previously taking out the nut (5) as shown in the Photo-10.

7. POWER SWITCH REMOVAL

- a) Before proceeding the power switch removal, the #3 step for the Front panel removal should be done.
- b) Pull out the lever switch knob (6), and unscrew 2 retaining screws (7) and (8) then, remove carefully the power switch out from the Main chassis.

BLOCK DIAGRAM



ELECTRICAL CHECKS AND ADJUSTMENTS

BEFORE ADJUSTMENTS

- Basically, all the adjustments required should always be performed after the unit became steady condition at least 3 to 4 minutes warm up time run.
- At the SP terminals (speaker output), do not connect any resistances as a dummy load but remain opened during adjustment.
- To prevent the unit under test from any damages possible set always the Main (master) volume controls to the minimum position.

IDLING CURRENT ADJUSTMENT

1. Adjust VR403 so that obtaining a standard reference DC 11mV ± 2 mV across to TP1 and TP2 on the Main circuit board.

In this adjustment, connect a (+) lead of the VAOM tester to TP1, a (-) lead to TP2.

2. Adjust this time then, VR404 for getting a DC 11mV ± 2 mV specified on between TP3 and TP4.

Make connections in this adjustment, that a (+) lead to TP3 and a (-) lead to TP4 with the tester set.

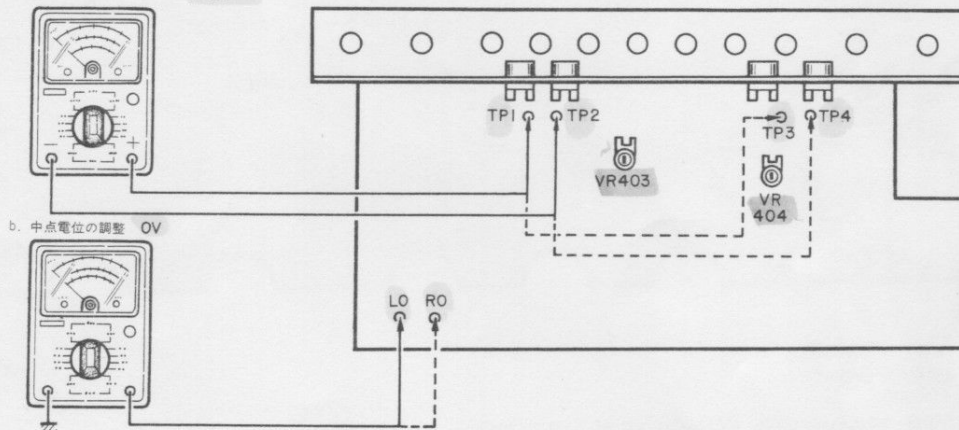
3. Repeat those adjustment steps described for until obtaining specified values desired.

- Adjustable controls (i.e., VR403 and VR404) should then be turned gently and smoothly for not to miss the correct test values desired.
- Correct polarity of test connections to the test points specified must always be paid by special attentions in doing these adjustments.

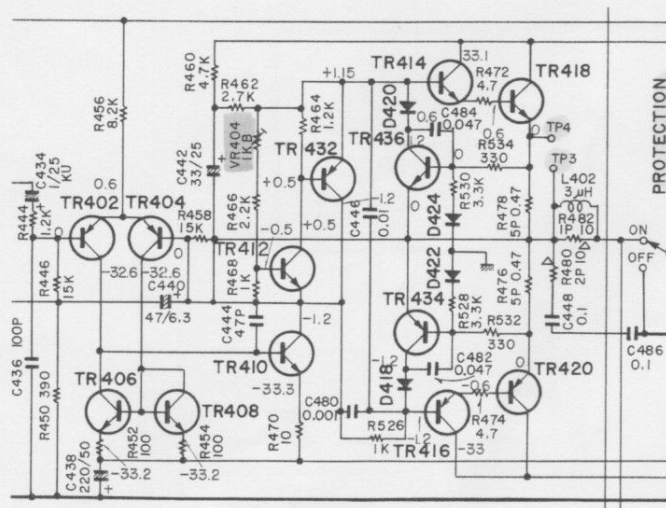
CHECKING ZERO POTENTIAL JUNCTION POINT

Check and confirm to see that voltage of 0V ± 0.1 V at the junction points specified can be obtained, between the LO and E, RO and E located on the Main circuit board.

a. アイドリング電流調整 11V ± 2 mV



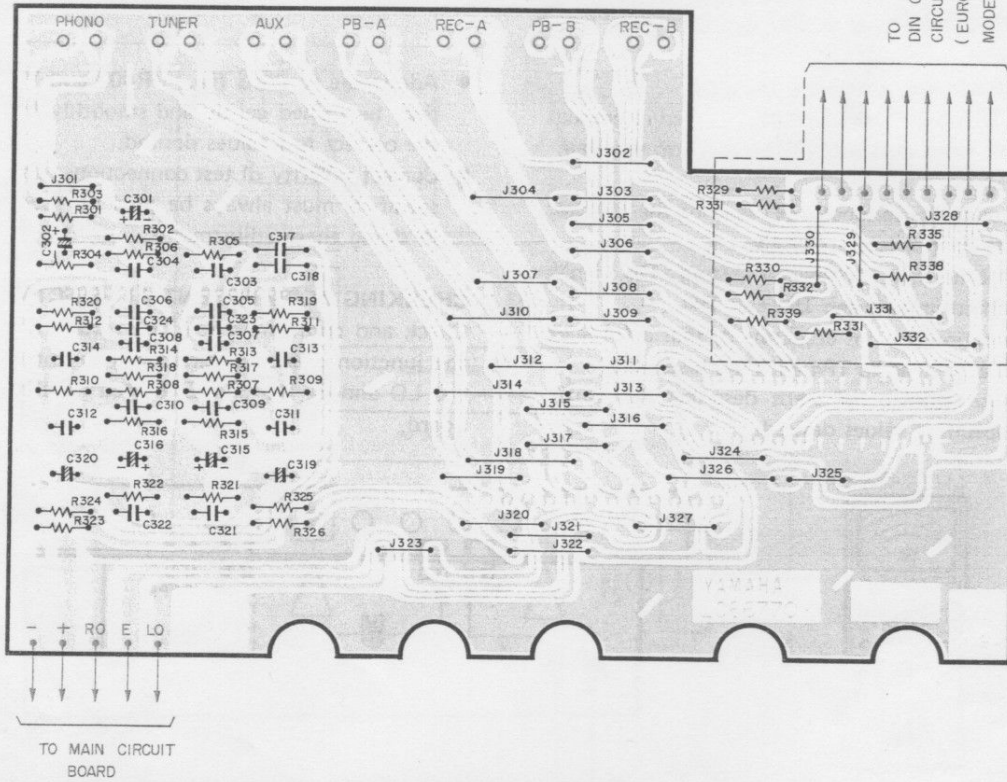
b. 中点電位の調整 0V



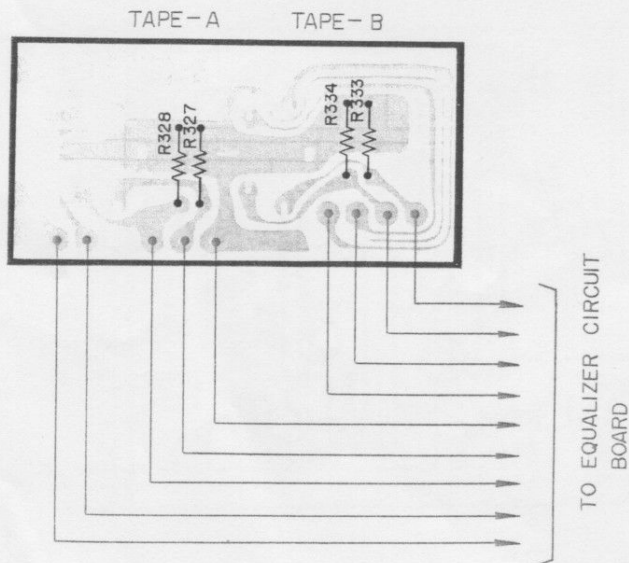
PRINTED CIRCUIT BOARD

EQUALIZER CIRCUIT BOARD

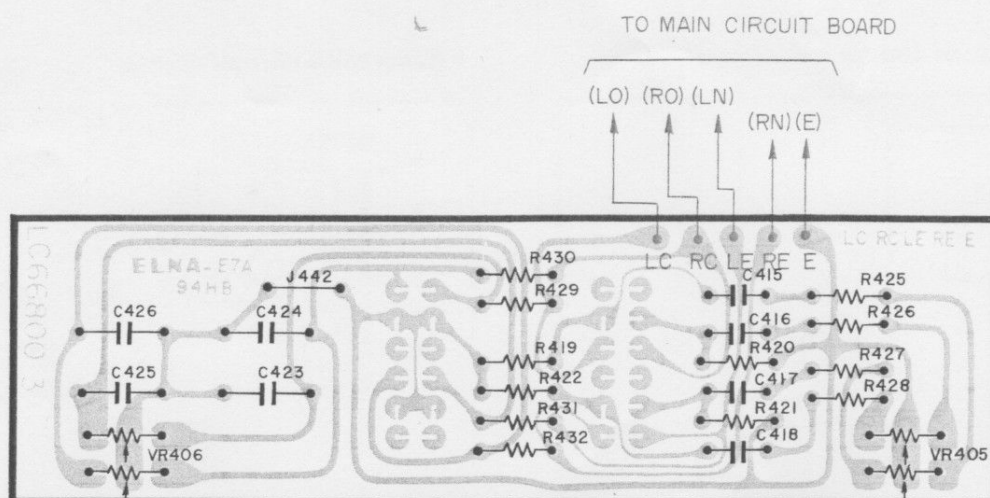
NAO6759: GENERAL; CANADIAN; AUSTRALIAN MODELS
NAO6804: US MODEL



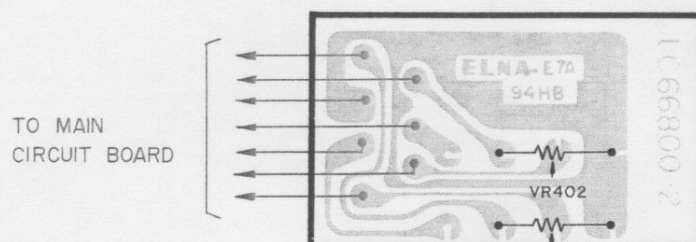
DIN CONECTER NAO6805: EUROPIAN & BRITISH MODELS



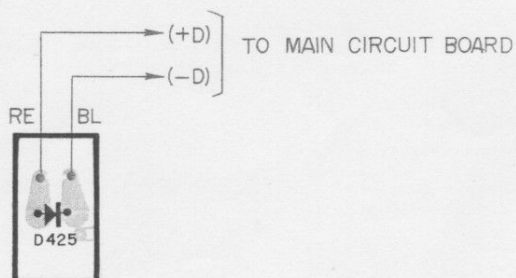
TONECONTROL CIRCUIT BORD



VOLUMECONTROL CIRCUIT BOARD

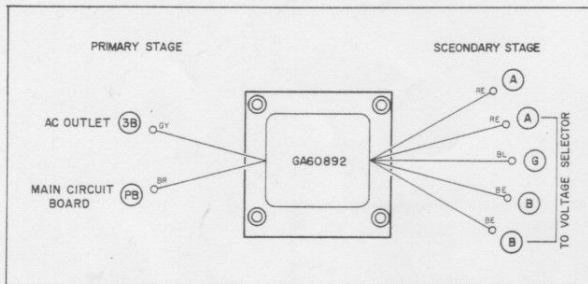
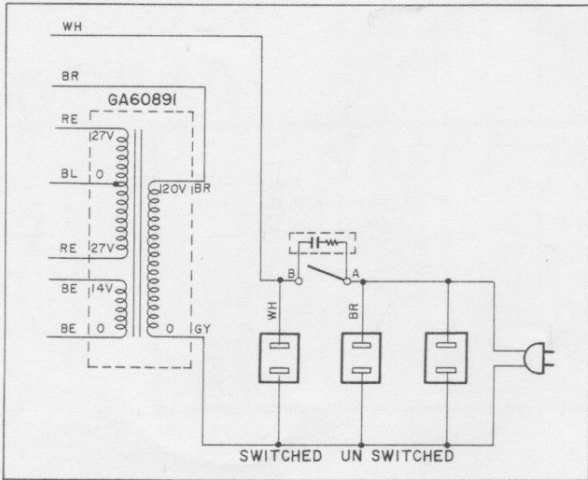


LED CIRCUIT BOARD

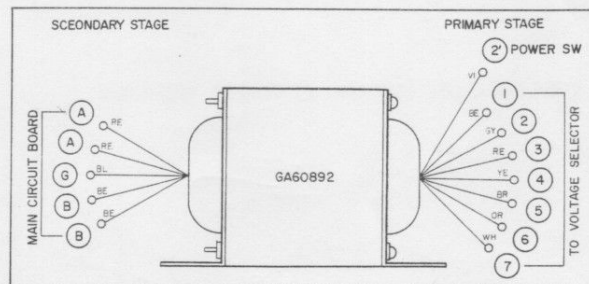
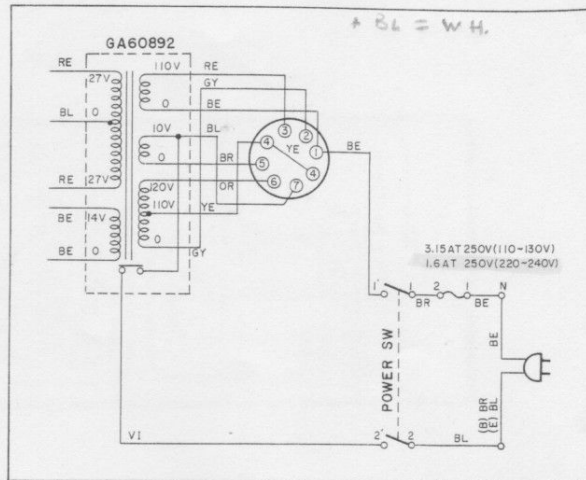


LINE VOLTAGE CONVERSION

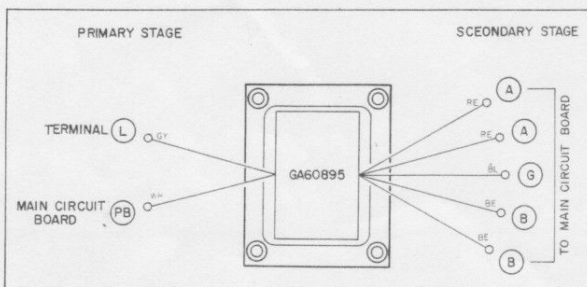
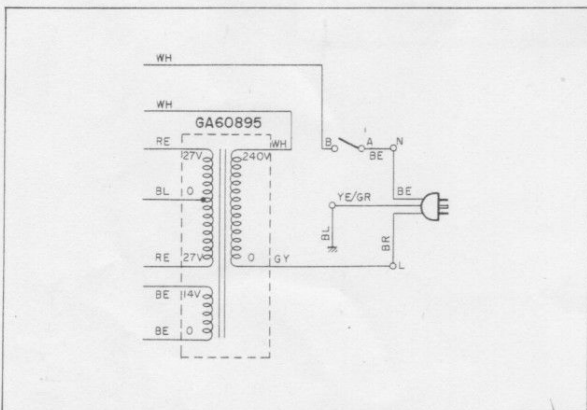
▼ U.S. & CANADIAN MODELS



▼ EUROPEAN & BRITISH MODELS



▼ AUSTRALIAN MODEL



110V → BE = GY
RE = YE = WH. } 110/110
RE = YE

120V → BE = GY
RE = YE = BR } 110/110 + 10
OR = WH - RE

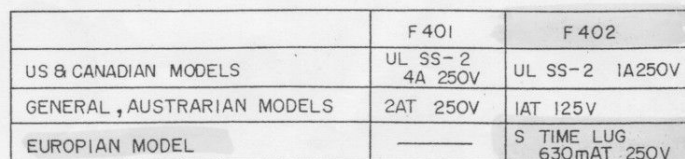
130V → BE = GY.
RE = YE = WH } 110/110
OR = BR

220V → RE = GY
230V → - WH = YE } 110 + 110.

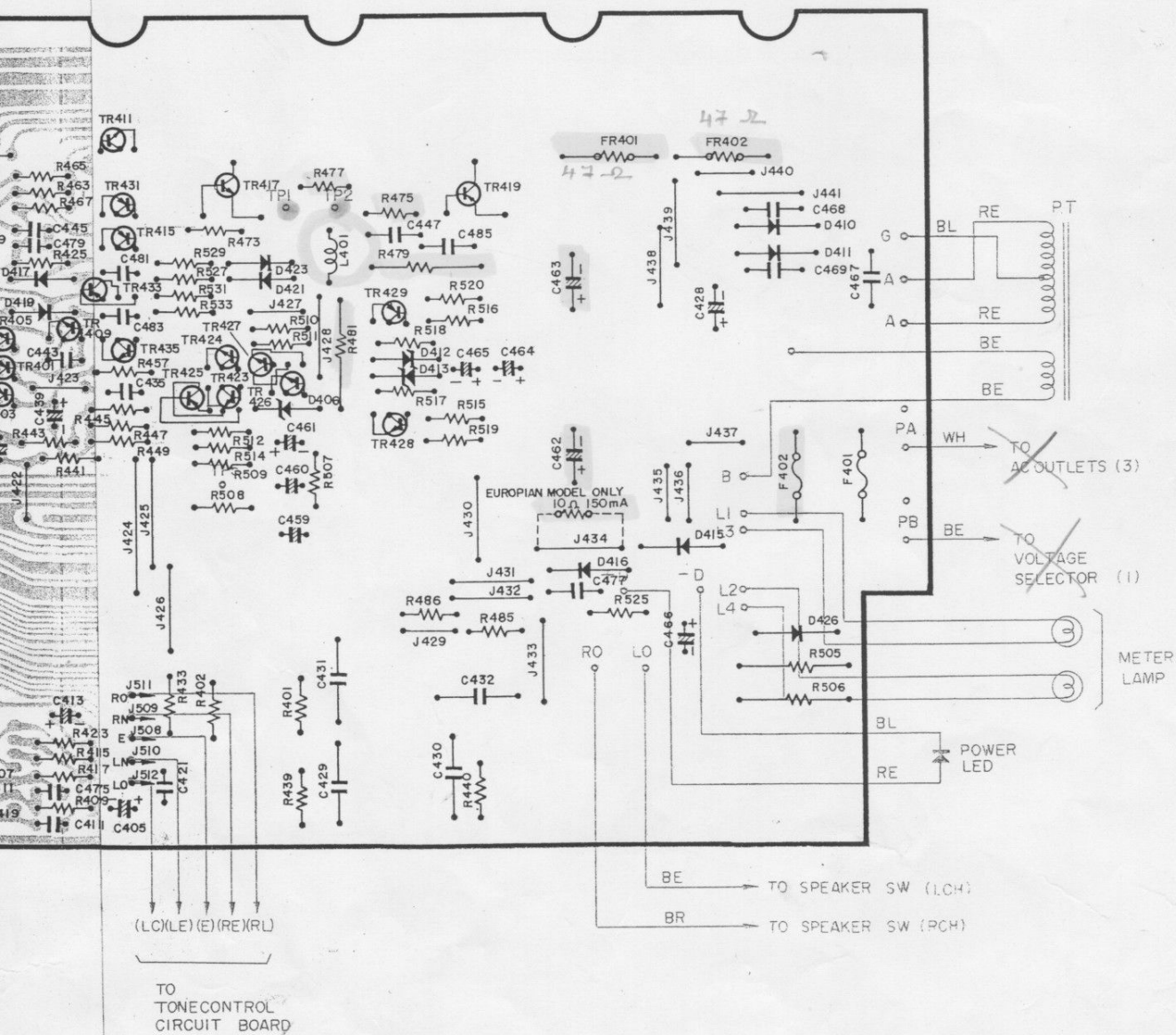
230V → RE = GY
OR = WH. } 110 + 110
BR = YE } 110 + 110

240V → RE = GY
OR = BR. } 110 + 120 + 10.

(retic CI)

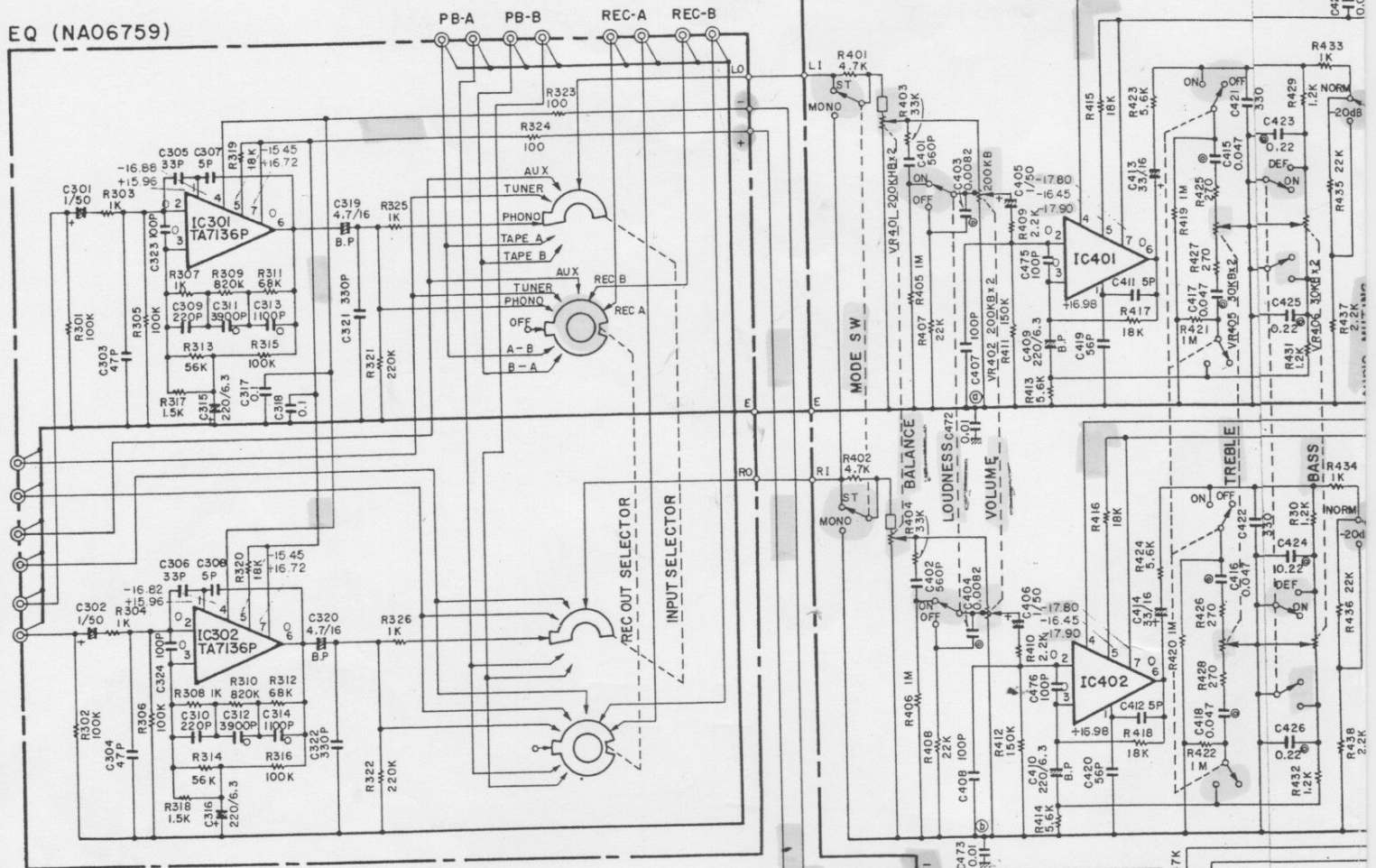


LO → radio graph
RO → radio drive

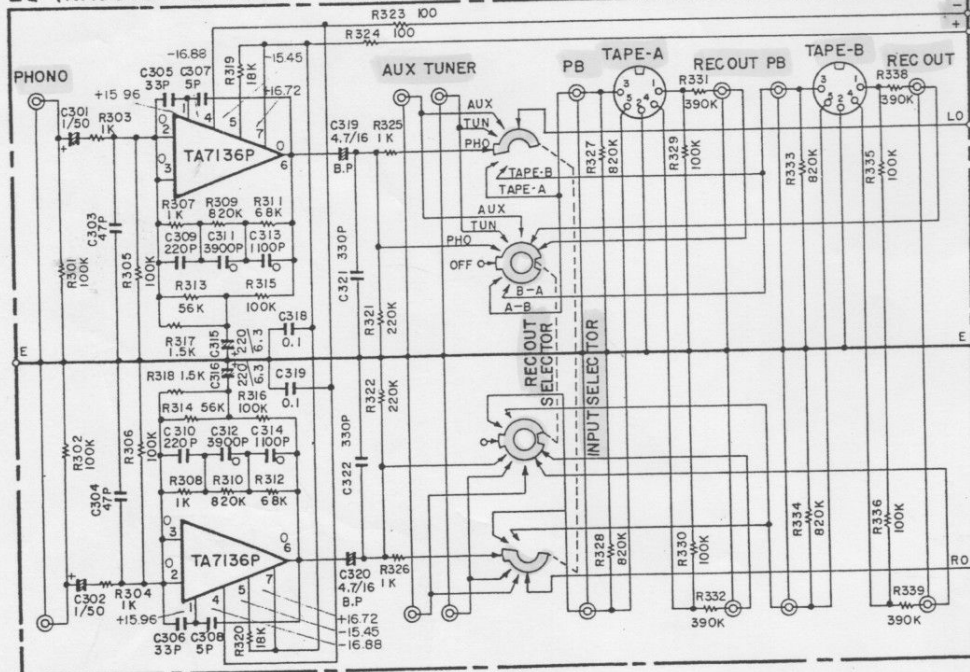


MAIN (NA06816)

EQ (NA06759)



EQ (NA06759 EUROPEAN & BRITISH MODELS)



- TR401~404: 2SA763WL4 or 5
- TR405~408, 413, 414, 421~424, 426: 2SC1918E or ForG
- TR409, 410, 435, 436: 2SC1509 Q or R
- TR411, 412: 2SC458B~C
- TR415, 416: 2SA777
- TR417, 418: 2SC1403 O or Y or 2SC793Y
- TR419, 420: 2SA745 O or Y or 2SA663Y
- TR425, 431~434: 2SA844
- TR427, 428: 2SD476
- TR429: 2SC13560 E or F
- D401~404, 417~424: 1S1555
- D405~408: 1S188
- D409: HZ-120
- D410, 411, 415, 416, 426: 1S1885
- D412, 413: HZ-18
- D414: 5B-2
- IC401, 402: TA7136P

* FR403: EUROPEAN & BRITISH MODELS ONLY

SECONDARY STAGE

PRIMARY STAGE

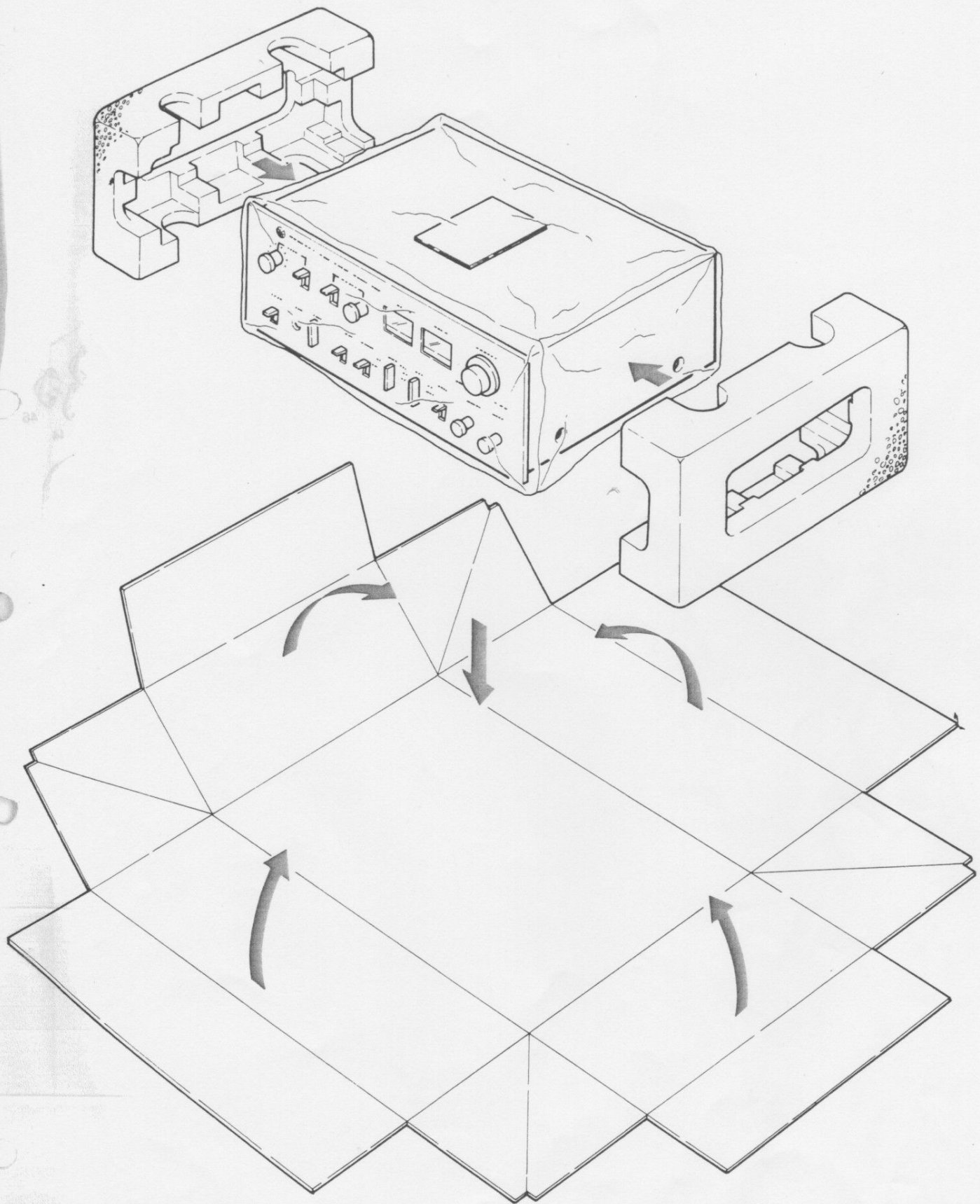




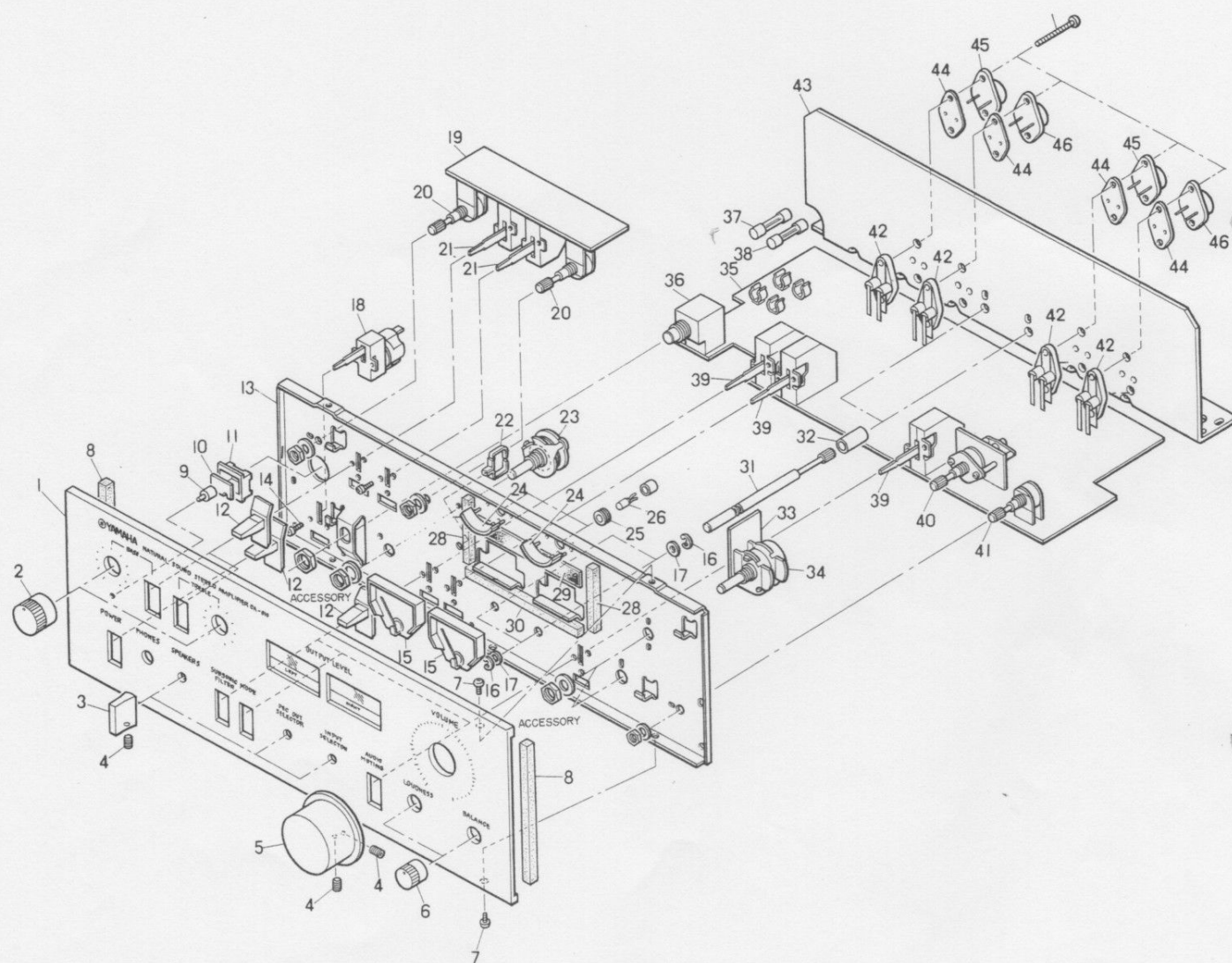
SYMBOL	PARTS NAME
	FUSE RESISTOR
	METAL OXIDE RESISTOR
	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
	CEMENT MOLDED RESISTOR
	METALIZED FILM RESISTOR

SYMBOL	PARTS NAME
⊙	MYLAR CAPACITOR
NO MARK	CERAMIC CAPACITOR
○	POLYSTYRENE CAPACITOR
NO MARK	(BI-POLAR) ELECTROLYTIC CAPACITOR
●	LOW-NOISE ELECTROLYTIC CAPACITOR

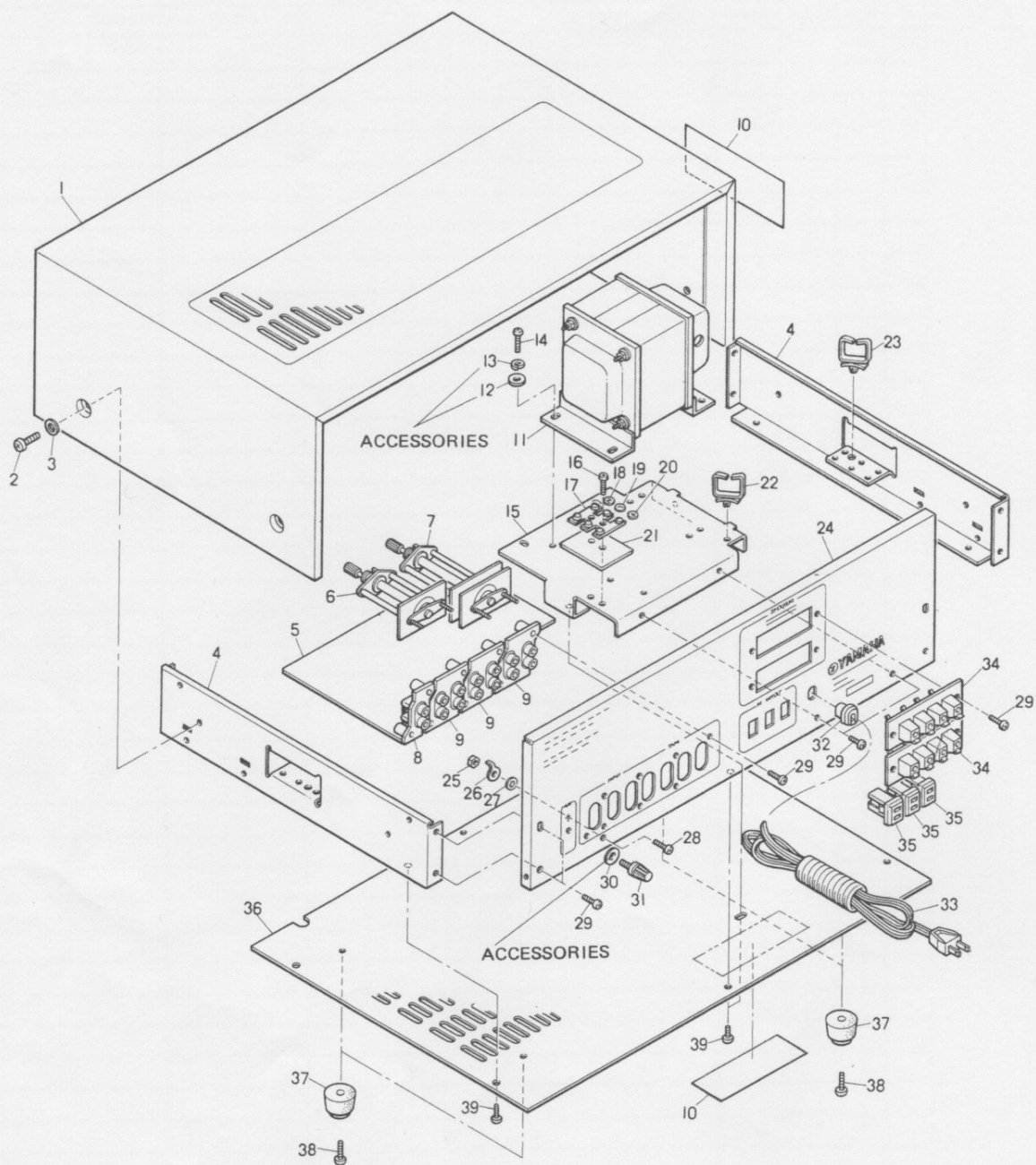
PACKAGE

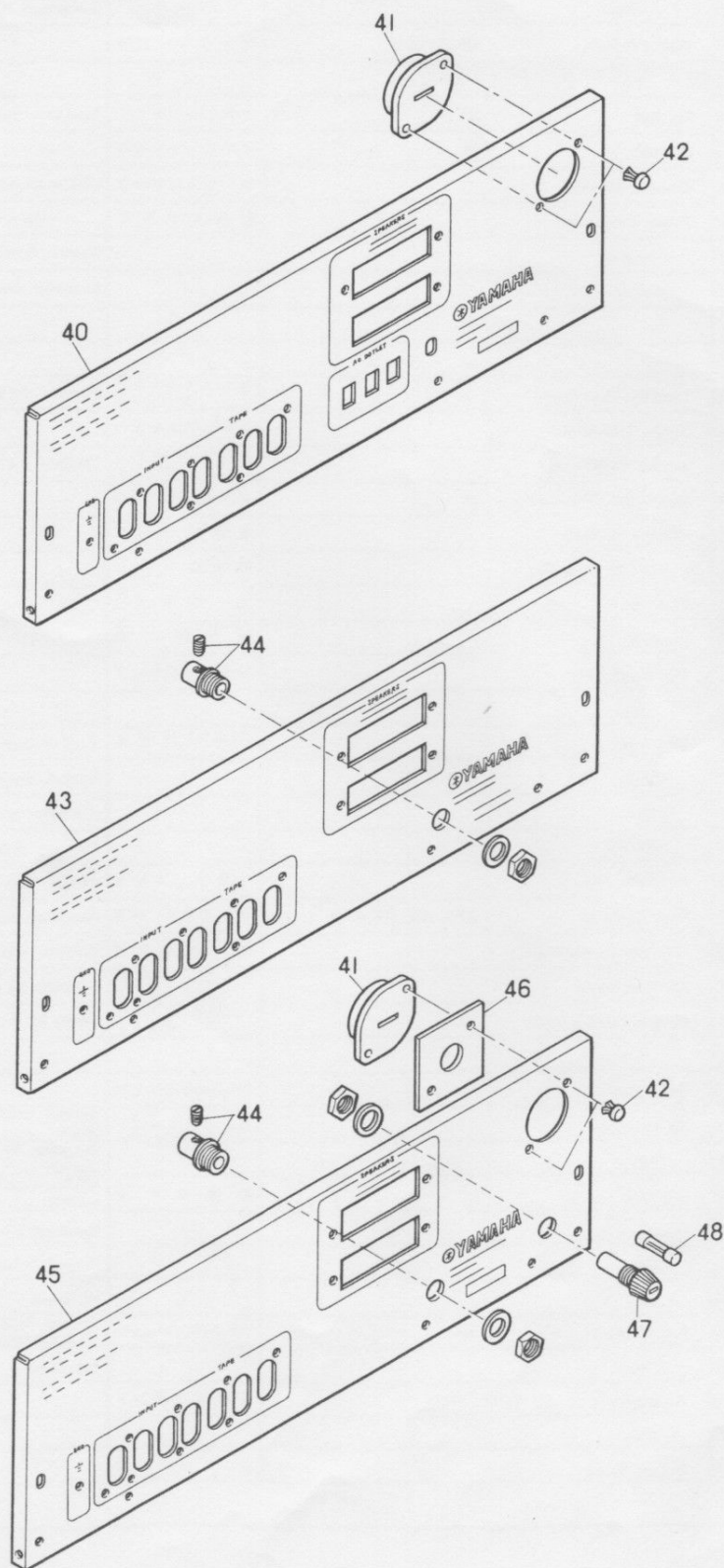


PARTS LIST



Ref. No.	Parts No.	Description	Remarks	Common Models
1	32:00:00:BA:06:87:30	Front Panel	フロントパネル	
2	32:00:00:BA:06:76:30	Knob Tone	ノブトーン	
3	32:00:00:BA:06:76:50	Knob Switch	ノブSW	
4	32:00:00:EZ:00:01:90	Screw Knob Holder	6角ソケットスクリュー	
5	32:00:00:BA:06:76:20	Knob Volume	ノブボリューム	
6	32:00:00:BA:06:76:40	Knob Balance	ノブバランス	
7	42:00:00:EI:03:00:80	Binding Tapping Screw	バインドタッピングネジ M3×8	ZMC2-Y 3×8
8	42:00:00:CB:07:80:30	Tape	シャコウテープ	
9	42:00:00:IF:00:06:80	LED SLP-132B	LED	
10	32:00:00:JB:00:04:00	Pilot Lamp 12V 60MA	パイロットランプ	
11	32:00:00:CB:07:78:00	LED Holder	LEDホルダー	
12	32:00:00:CB:07:58:00	Knob Lever	レバーツマミ	
13	42:00:00:CB:08:30:70	Sub Chassis	サブシャーツ	
14	42:00:00:ED:03:00:60	Binding Head Screw	バインド小ネジ M3 6	ZMC2-Y 3×6
15	42:00:00:JI:00:03:80	Peak Level Meter A3A	レベルメーター	
16	42:00:00:EV:50:15:00	Ring E	Eリング	5M
17	42:00:00:CB:06:09:50	Washer	ワッシャー	
18	42:00:00:KA:20:04:60	Power Switch	パワー右SW	US, General, Australian models
	42:00:00:KA:20:03:40	-do.-	"	Canadian model
	42:00:00:KA:20:04:70	-do.-	"	European & BS models
19		T.C. Circuit Board is included in the MAIN Circuit Board		
20	42:00:00:HS:31:00:80	Variable Resistor G30K 2	ソリッドボリューム	
21	42:00:00:KA:20:03:10	Lever Switch SX-15	レバースW	Australian model
22	42:00:00:CB:06:91:20	Wire Supporter	ワイヤークリップ	
23	42:00:00:KA:50:06:60	Rotary Switch SR-321	ロータリースW	
24	32:00:00:CB:07:58:60	Collor Plate	カラープレート	
25	32:00:00:CB:07:58:70	Gum Bush	ゴムブッシュ	
26	42:00:00:JB:00:04:00	Pilot Lamp 12V 60MA	パイロットランプ	
28	42:00:00:CB:07:60:40	Tape No. 217	テープ	
29	42:00:00:CB:07:55:80	Meter Holder	メーター押込	
30	42:00:00:CB:07:66:30	Tape	シャコウテープ	
31	32:00:00:BA:06:76:60	Extention Bar	延長シャフト	
32	32:00:00:CB:07:13:80	Joint 1=25	ジョイント	
33		Volume Circuit Board is included in the MAIN Circuit Board		
34	42:00:00:HS:32:03:50	Variable Resistor B200K x 2	ボリューム	vol
35	42:00:00:NA:06:81:60	MAIN Circuit Board	MAシート	General & Australian models
	42:00:00:NA:06:81:70	-do.-	"	US model
	42:00:00:NA:06:81:00	-do.-	"	European & BS models
	42:00:00:NA:06:80:90	-do.-	"	Canadian model
36	42:00:00:LB:30:03:90	Phone Jack	フォンジャック	Australian model
37	42:00:00:KB:00:03:50	Fuse 250V 2AT	ヒューズ	General & Australian models
	42:00:00:KB:00:07:50	-do.-	"	European & BS models
	42:00:00:KB:00:10:50	-do.- 250V 1AT	"	US & Canadian models
38	42:00:00:KB:00:02:10	-do.- 125V 1AT	"	General & Australian models
	42:00:00:KB:00:06:70	-do.- Miniature Type 250V 630MA	"	European & BS models
	42:00:00:KB:00:10:20	-do.- 250V 1AT	"	US, Canadian models
39	42:00:00:KA:20:03:10	Lever Switch SX-15	レバースW	Australian model
40	42:00:00:KA:50:06:90	Rotary Switch SR-263	ロータリー	





Ref. No.	Parts No.	Description	Remarks	Common Models
1	32:00:47:23:61:44:10	Cabinet	外 装	
2	32:00:47:ED:35:01:00	Binding Head Screw	バインド小ネジ M 5 x 10	FCM-BL 5 x 10
3	32:00:47:CB:07:59:60	Mylar Washer	マイラーワッシャー	AU Common
4	32:00:00:AA:08:30:70	Side Frame	サイドフレーム	
5	32:00:00:NA:06:75:90	EQ Circuit Board	イコライザーシート	General, Australian & Canadian models
	32:00:00:NA:06:80:40	- do.-	"	US model
	32:00:00:NA:06:80:50	- do.-	"	European & BS models
6	32:00:00:KA:00:02:10	Rotary Switch SR-26 1-2-5	ロータリー S W	
7	32:00:00:KA:00:02:60	- do.- <i>Remplace par KA500660 SR-26 2-2-6</i>	"	
8	32:00:00:LB:20:08:90	Pin Jack 2P	2 P ピンジャック	Australian model
9	32:00:00:LB:40:02:80	Pin Jack 4P	4 P ピンジャック	- do.-
10	42:00:00:CB:07:16:70	Courtion Sticker	コーションマーク	US/Canadian models
11	42:00:00:GA:60:89:10	Power Transformer	電 源 ト ラ ン ス	- do.-
	42:00:00:GA:60:89:20	- do.-	"	General, European & BS models
	42:00:00:GA:60:89:50	- do.-	"	Australian model
14	42:00:00:EH:04:00:80	Sems Pan Head Screw	セムスナベ小ネジ M 4 x 8 S	ZMC2-Y 4 x 8s
15	32:00:00:AA:08:11:60	Holder Transformer	トランスホルダー	
16	42:00:00:ED:03:01:60	Binding Head Screw	バインド小ネジ M 3 x 16	ZMC2-Y 3 x 16
17	42:00:00:LA:00:10:40	Connection Terminal Plate 3P	3P中継端子台ボイボ	
18	42:00:00:CA:06:06:70	Center Line Mark	中 立 線 マ ー ク	
19	42:00:00:CA:06:06:80	Charge Line Mark	充 電 線 マ ー ク	
20	42:00:00:CA:06:09:60	Earth Mark	ア ー ス マ ー ク	
21	32:00:00:CB:07:34:90	Isolation	絶 縁 板	
22	32:00:00:CB:06:94:80	Wire Supporter	ワイヤークリップ	
23	32:00:00:CB:06:94:70	- do.-	"	
24	32:00:00:AA:08:30:80	Rear Panel	リヤ パネル	General model
	32:00:00:AA:08:30:90	- do.-	"	US/Canadian models
	32:00:00:AA:08:31:00	- do.-	"	Australian model
	32:00:00:AA:08:31:10	- do.-	"	European & BS models
25	42:00:00:EV:10:03:00	Hexagonal Nut	6 角 ナ ッ ト M 3	ZMC2-Y 3.0
26	42:00:00:LA:00:16:00	Earth Terminal 3.5M 36L T=0.5 N1	アースラグ M 3	Australian model
27	42:00:00:EV:41:00:30	Theethed Looked Washer	歯付座金 3 S	ZMC2-Y A3S
28	42:00:00:EA:30:50:80	Pan Head Screw	ナベフネネジ M 3 P O 5 x 8	FCM-BL 5 x 8
29	42:00:00:EI:33:00:80	Binding Tapping Screw	バインドタッピングネジ M 3 x 8	ZMC2-BL 3 x 8
31	42:00:00:LA:00:10:70	Earth Terminal	アース端子ツマミ式	
32	42:00:00:CB:06:86:30	Cord Stopper	コードストッパー	General, US/Canadian models
	42:00:00:CB:07:06:90	- do.-	"	European, BS & Australian models
33	42:00:00:MG:00:03:40	AC Cord	電 源 コ ー ド	US/Canadian & General models
	42:00:00:MG:00:02:90	- do.-	"	European model
	42:00:00:MG:00:05:00	- do.-	"	Australian model
	42:00:00:MZ:06:78:40	- do.-	"	BS model
34	42:00:00:LA:00:15:60	Push Terminal 4P	4Pプッシュターミナル	General, Australian, European, BS & Canadian models
	42:00:00:LA:00:18:30	- do.-	"	US model
35	42:00:00:LB:20:09:10	AC Socket	A C コ ン セ ント	
	42:00:00:LB:20:07:10	- do.-	"	
36	32:00:00:AA:08:11:30	Bottom Board	底 板	

