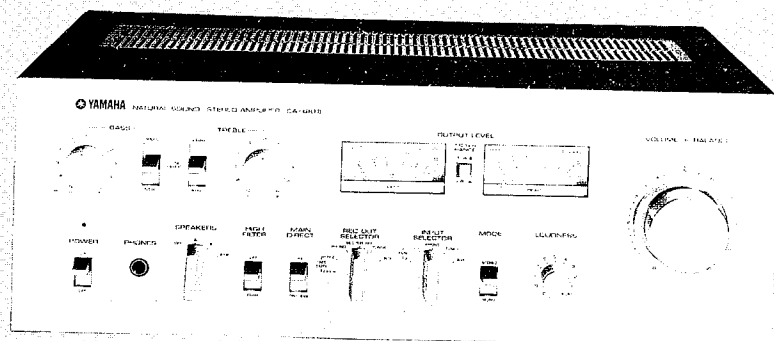


SERVICE MANUAL

CA-610 II

STEREO AMPLIFIER



SINCE 1887  **YAMAHA**
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

004337

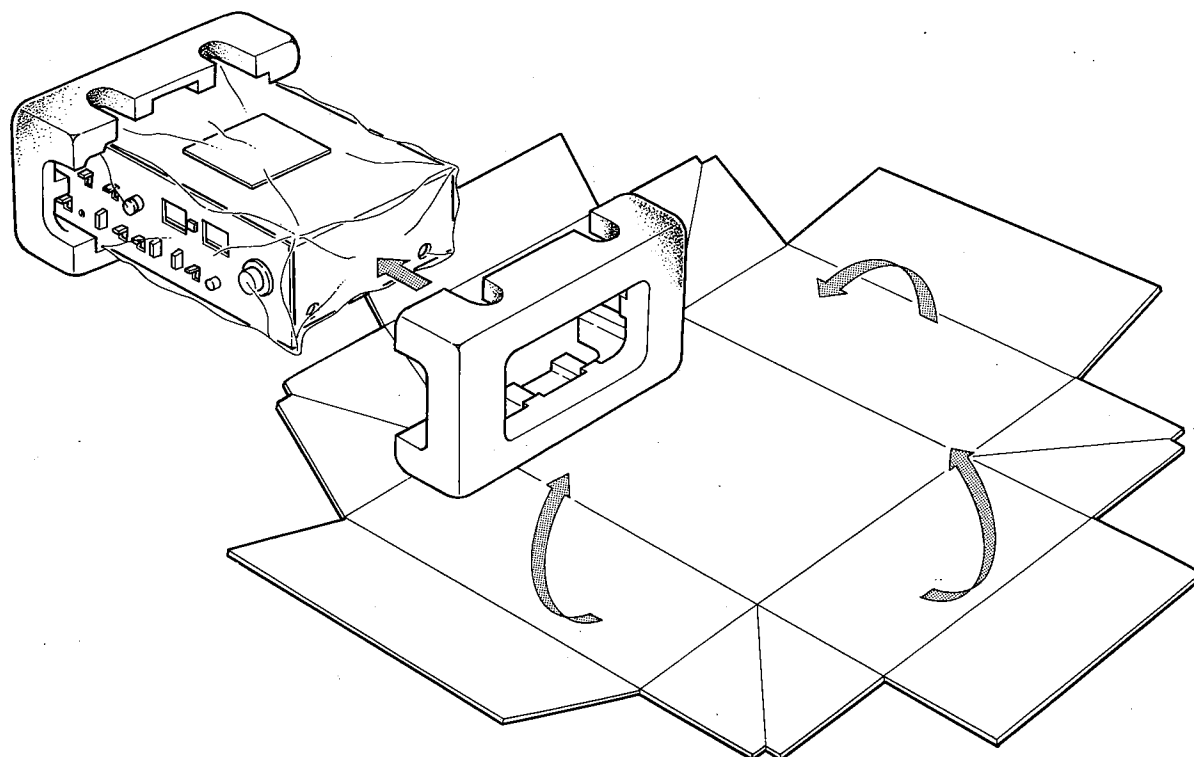
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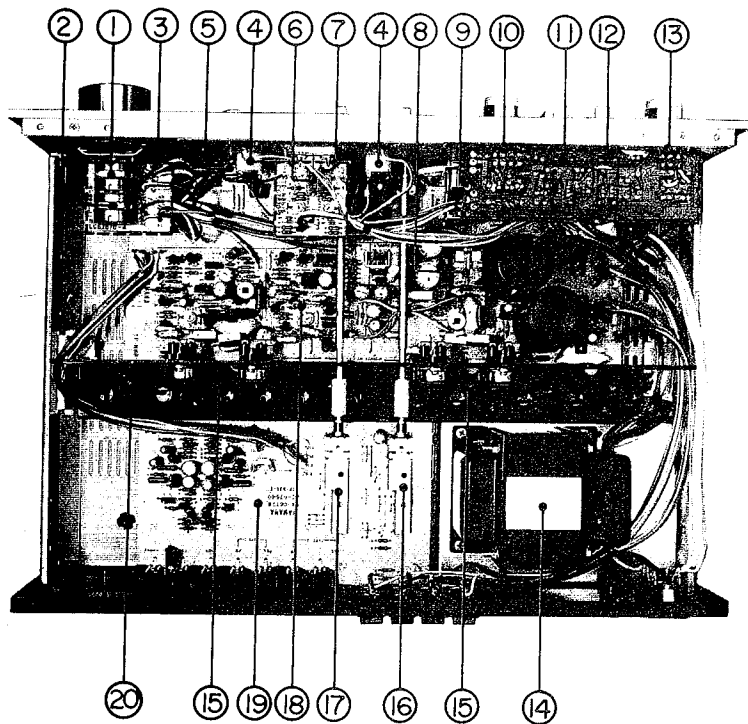


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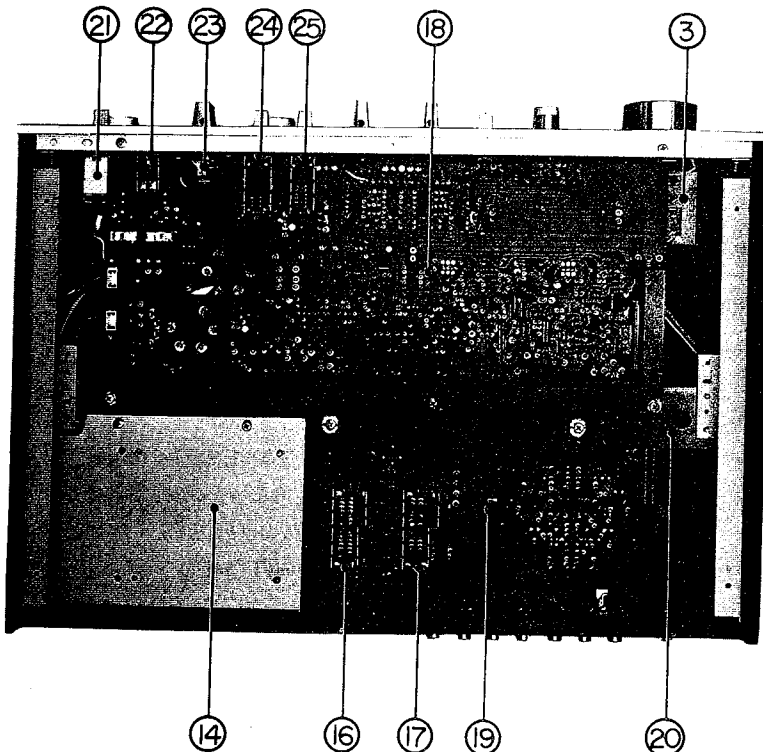
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■PACKAGE INSTRUCTION



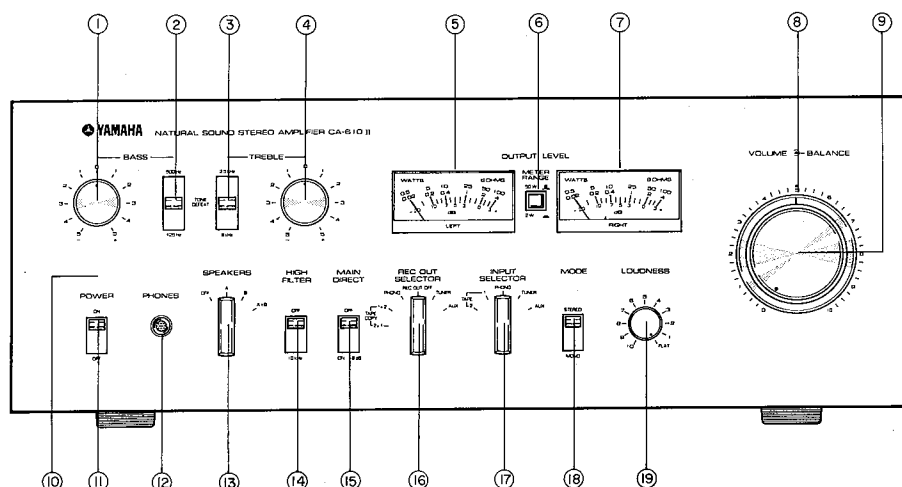
EXTERNAL VIEW**TOP VIEW**

- ① Balance VR
- ② Level Control
- ③ Main C, Board 2 (Volume)
- ④ Level Meter
- ⑤ Loudness Control VR
- ⑥ Meter Range SW
- ⑦ Main C, Board 4 (Meter Drive)
- ⑧ Protector Relay
- ⑨ Main C, Board 3 (Tone Control)
- ⑩ Treble Control
- ⑪ Turnover Selector/Tone Defeat SW (TREBLE)
- ⑫ Turnover Selector/Tone Defeat SW (BASS)
- ⑬ Bass Control
- ⑭ Power Transformer
- ⑮ Power Transistor
- ⑯ Recording Output Selector
- ⑰ Input Selector
- ⑱ Main C, Board 1 (Power Supply, Main Amplifier)
- ⑲ Function C, Board
- ⑳ Heat-sink
- ㉑ Power SW
- ㉒ Head-phone Jack
- ㉓ Speaker Selector
- ㉔ High Filter
- ㉕ Main-Direct SW

BOTTOM VIEW

PANEL OPERATION

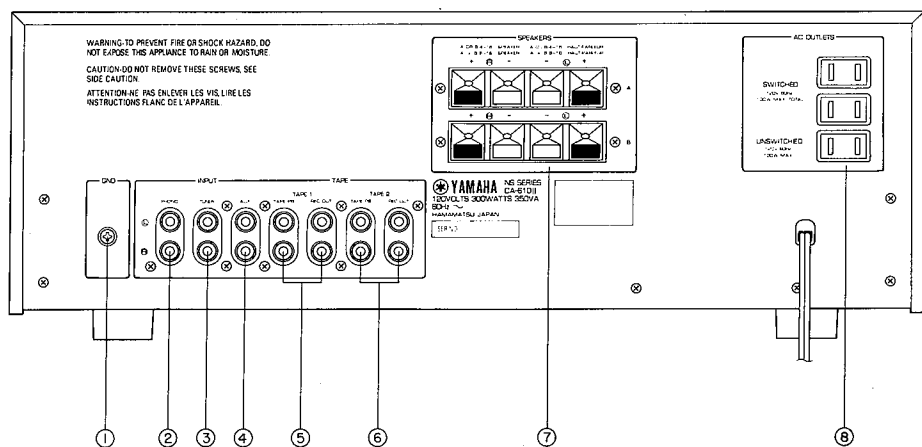
FRONT PANEL



- ① BASS Control
- ② Turnover TONE DEFEAT (BASS)
- ③ Turnover TONE DEFEAT (TREBLE)
- ④ TREBLE Control
- ⑤ OUTPUT LEVEL Meter (LEFT)
- ⑥ METER RANGE Switch
- ⑦ OUTPUT LEVEL Meter (RIGHT)
- ⑧ BALANCE Control
- ⑨ VOLUME Control
- ⑩ POWER Indicator
- ⑪ POWER Switch
- ⑫ Head Phone Jack
- ⑬ SPEAKERS Selector
- ⑭ HIGH FILTER Switch
- ⑮ MAIN DIRECT Switch
- ⑯ REC OUT SELECTOR
- ⑰ INPUT SELECTOR
- ⑱ MODE Switch
- ⑲ LOUDNESS Control

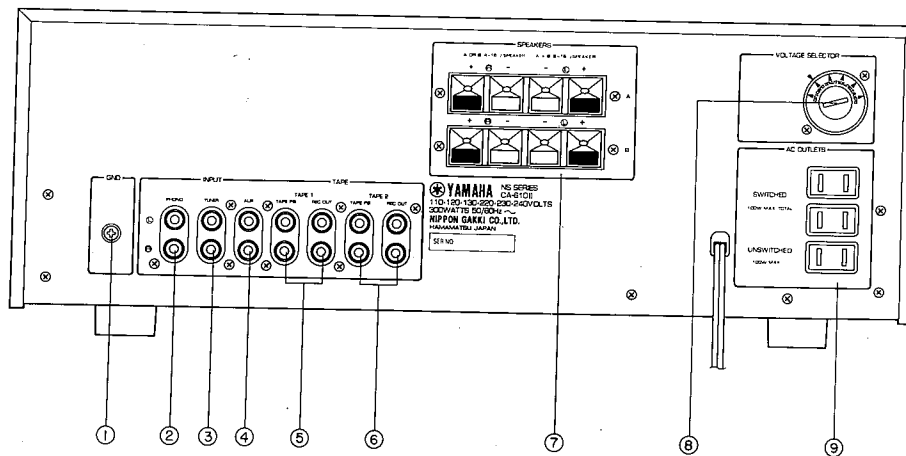
REAR PANEL

U.S.A. & Canadian Model



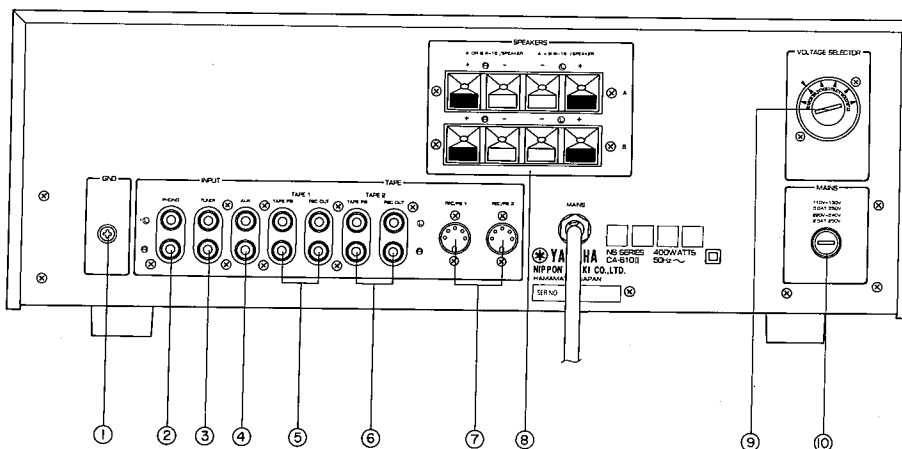
- ① GND Terminal
- ② PHONO Input
- ③ TUNER Input
- ④ AUX Input
- ⑤ TAPE 1 (REC Out, TAPE PB)
- ⑥ TAPE 2 (REC Out, TAPE PB)
- ⑦ SPEAKERS Terminal A, B
- ⑧ AC OUTLETS (SWITCHED, UNSWITCHED)

General Export Model



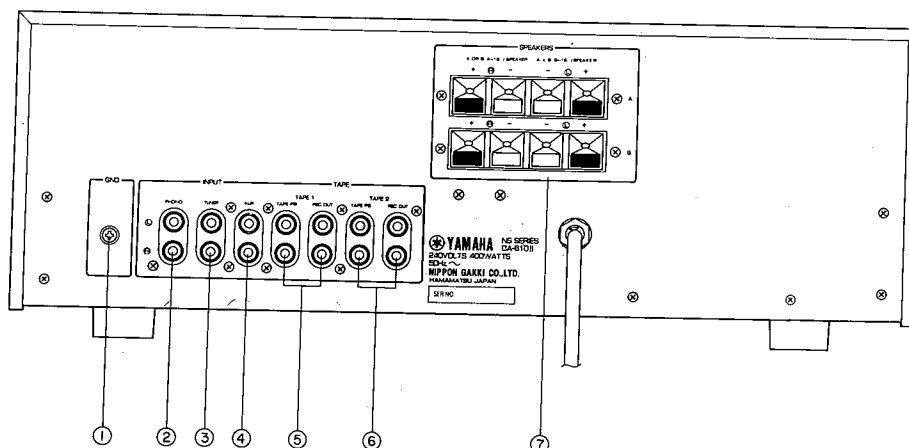
- ① GND Terminal
- ② PHONO Input
- ③ TUNER Input
- ④ AUX Input
- ⑤ TAPE 1 (REC Out, TAPE PB)
- ⑥ TAPE 2 (REC Out, TAPE PB)
- ⑦ SPEAKERS Terminal A, B
- ⑧ VOLTAGE SELECTOR
- ⑨ AC OUTLETS (SWITCHED, UNSWITCHED)

British & European Model



- ① GND Terminal
- ② PHONO Input
- ③ TUNER Input
- ④ AUX Input
- ⑤ TAPE 1 (REC Out, TAPE PB)
- ⑥ TAPE 2 (REC Out, TAPE PB)
- ⑦ REC/PB 1, 2
- ⑧ SPEAKERS Terminal A, B
- ⑨ VOLTAGE SELECTOR
- ⑩ Fuse Holder (MAINS)

Australian Model



- ① GND Terminal
- ② PHONO Input
- ③ TUNER Input
- ④ AUX Input
- ⑤ TAPE 1 (REC Out, TAPE PB)
- ⑥ TAPE 2 (REC Out, TAPE PB)
- ⑦ SPEAKER Terminal A, B

■ DISASSEMBLY PROCEDURES

1. Cabinet Removal

Remove four screws from both sides of the cabinet and remove the cabinet by pulling it backward. Do not lift the cabinet.

Note: In this condition, fuses, meter lamps, etc. can be replaced.

2. Bottom Cover Removal

Turn the unit upside down and remove five screws on the bottom cover.

Note: In this condition, at each PCB, parts not directly secured to the sub-panel can be checked and replaced.

3. Front Panel Removal

3.1 Remove the control knobs on the front panel.

- a. Pull off the level control VR knob, tone control knobs and LOUDNESS control knob.
- b. Remove the selector knobs and BALANCE VR knob after loosening set screws with a hexagonal wrench. For the BALANCE VR knob, insert the wrench between the front panel and sub-panel in arrow direction, and loosen two screws. (See Photo 1)

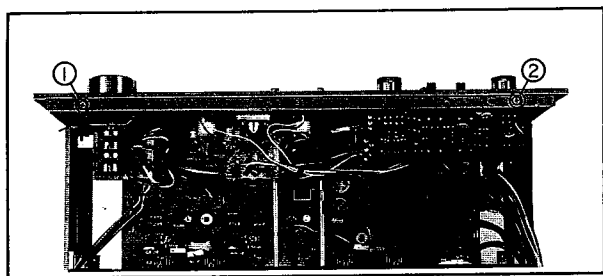


Photo. 1

3.2 Pull out the socket from the POWER IND. LED as shown in Photo 2.

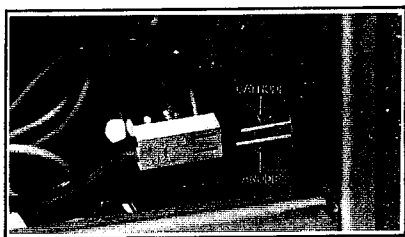


Photo. 2

3.3 Remove the screws ① and ② in Photo 1 as well as two front-panel-securing screws on the bottom side of the unit and remove the panel.

Note: Photo 3 shows the unit without the front panel and level meters.

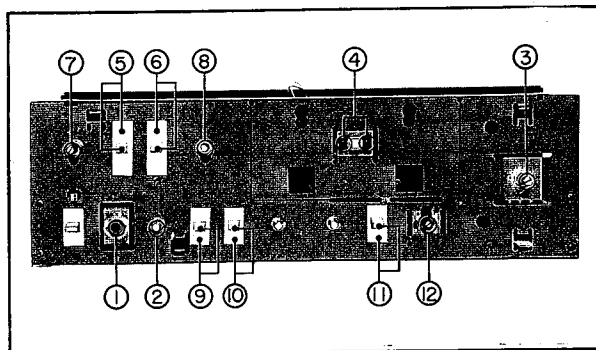


Photo. 3

In this condition, parts secured to the sub-panel can be replaced after removing the hexagon nuts ① to ④ and screws. For the switches whose bases are directly soldered to the PCB, unsolder them for removal with a soldering iron.

- a. Headphone jack Nut ①
- b. Speaker selector switch Nut ②
- c. Main circuit board 4 (level control and balance control section) Nut ③
- d. Main circuit board 2 (meter drive section) Screw ④

The selector switch is directly soldered to the PCB.

Note: The level meters can be removed merely by removing lead wires. At this time, be careful not to tear the protection tape.

4. Main Circuit Board 3 (Tone Control Section) Removal

To remove the main circuit board 3, withdraw ⑤ and ⑥ shown in Photo 3, then unscrew hexagon nuts ⑦ and ⑧ in Photo 3 as well as screws ① and ② in Photo 5.

5. Main Circuit Board 1 (Main Amp Section) Removal

- 5.1 Remove screws ① and ② in Photo 4, then withdraw the power transistors from the sockets. (Condition (B))
 - 5.2 Withdraw ⑨ to ⑪ and unscrew hexagon nut ⑫ shown in Photo 3, then remove screws ③ to ⑤ in Photo 5.
 - 5.3 Remove screws ① to ③ shown in Photo 6.
- Note: Replace the selector switches by removing the hexagon nuts according to Item 5.2, skipping the step 5.1.

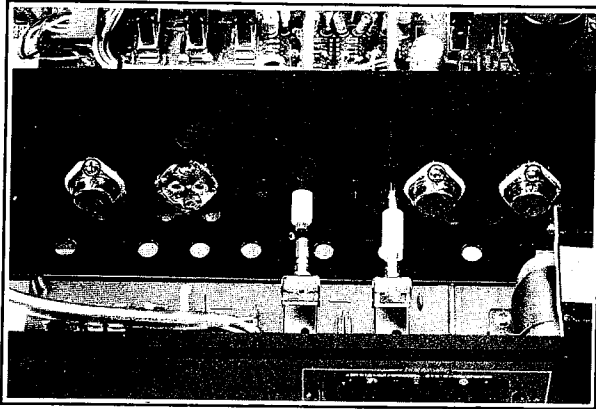


Photo. 4

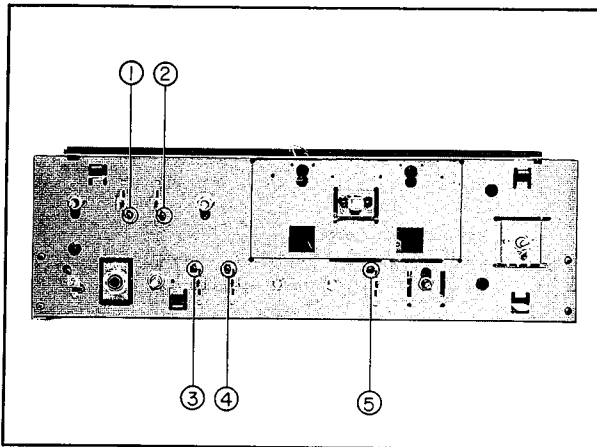


Photo. 5

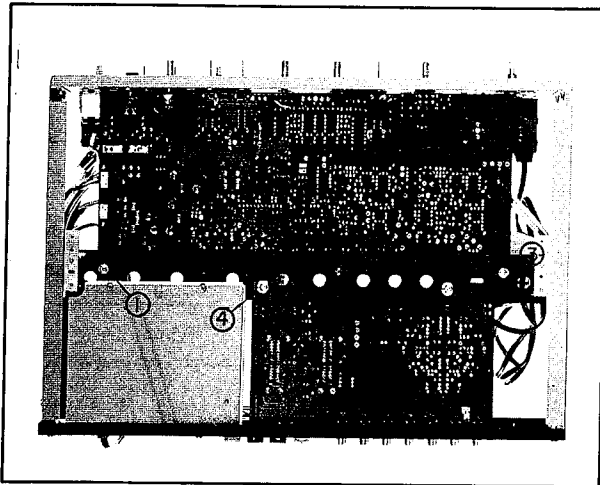


Photo. 6

Photo 7 shows TR490 (right) and TR489 (left) which are temperature-compensating transistors being heat-coupled with the heat sink. When assembling the main circuit board as well as the power transistors, be sure to closely fit the joint surfaces.

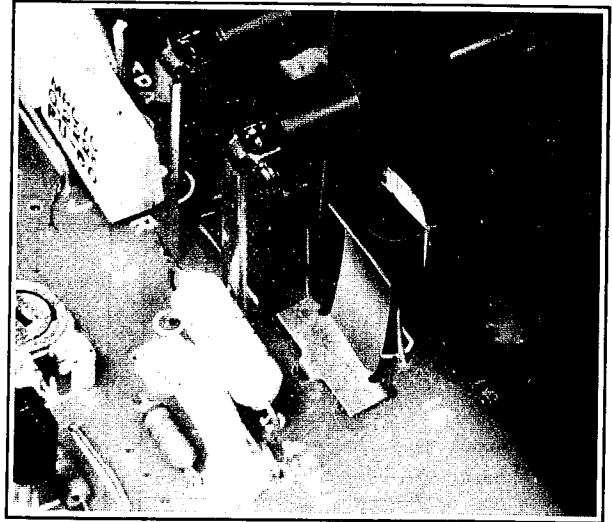


Photo. 7

6. Function Circuit Board Removal

- 6.1 To disengage the shaft, shift the joint in arrow direction like (A) shown in Photo 4.
- 6.2 Remove eight screws shown in Photo 8.
- 6.3 Remove screws (4) and (5) shown in Photo 6.

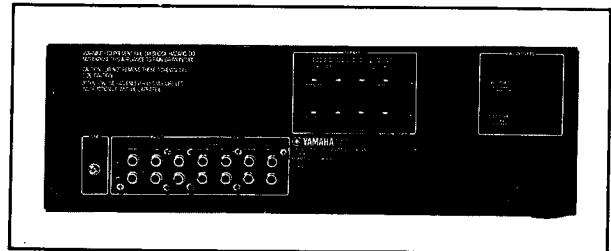
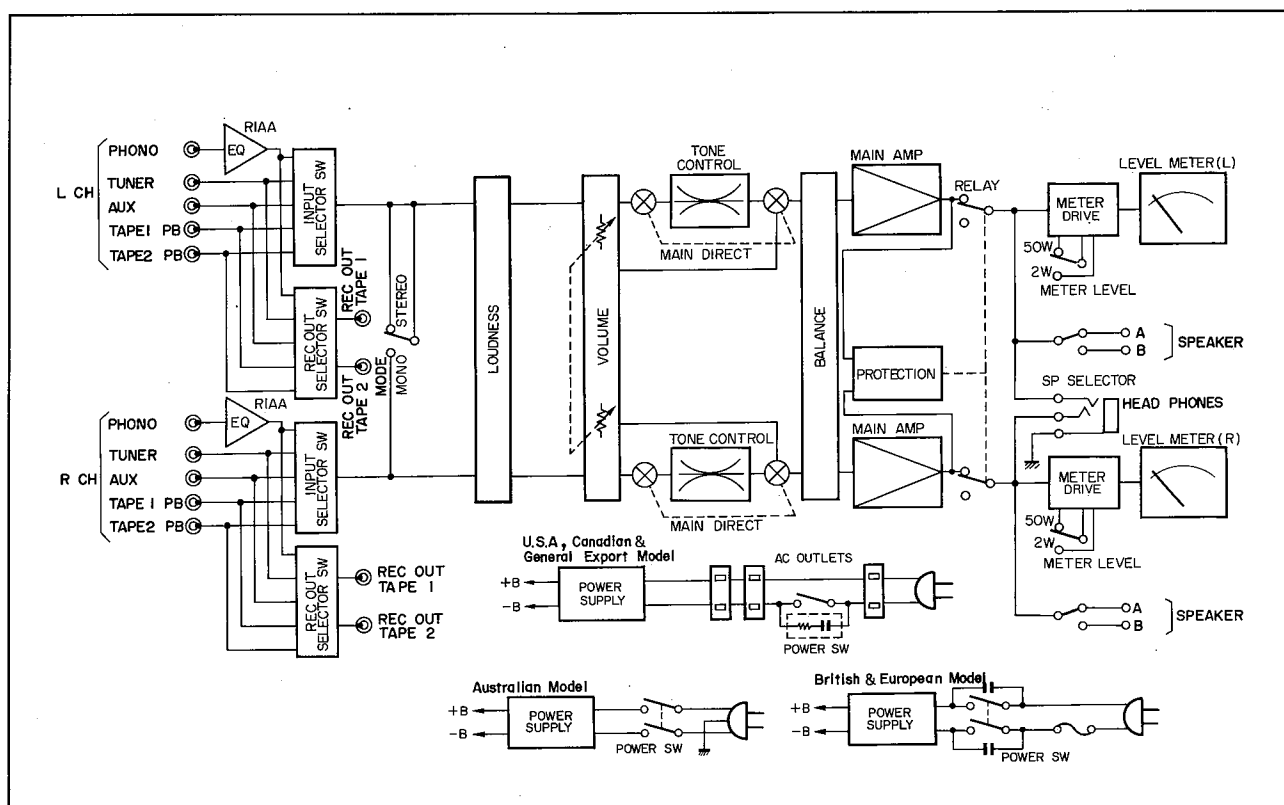


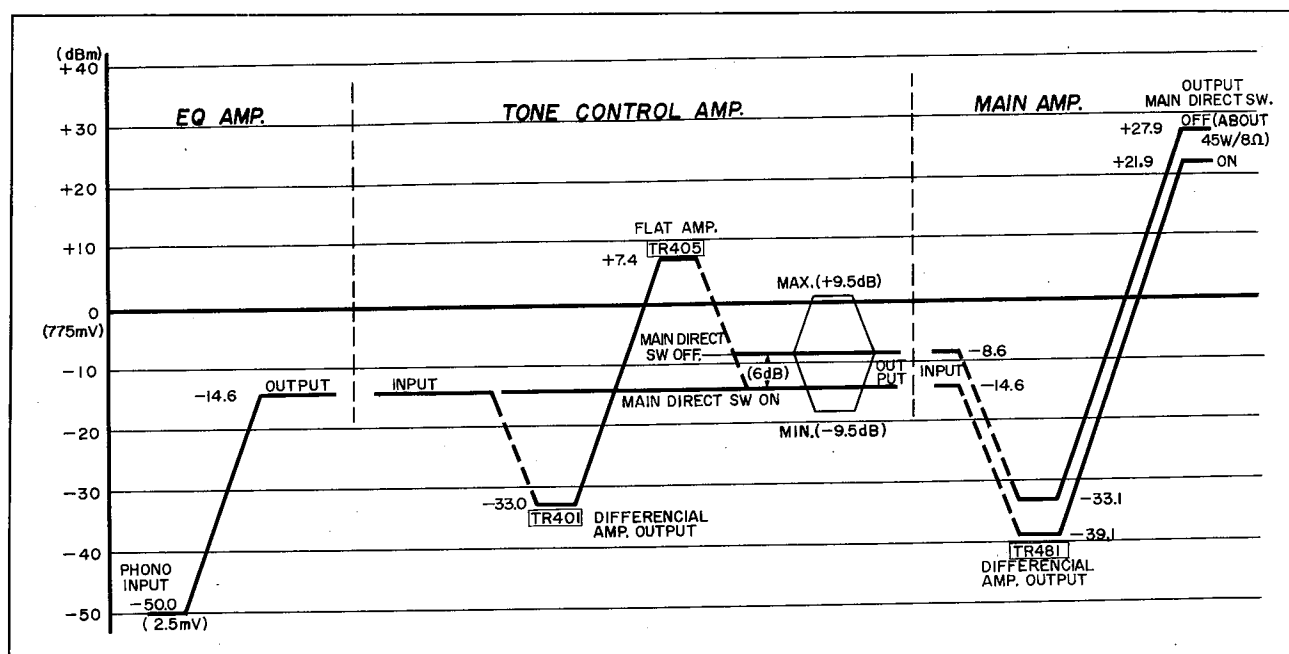
Photo. 8

Note: The photos depict the U.S.A. model.

BLOCK DIAGRAM



LEVEL DIAGRAM



ADJUSTMENT

1. Main Amplifier

Adjusting Preparations

- * For adjustment, wait three to four minutes after the POWER switch is turned on.
- * Connect a dummy load of 8Ω (50W or more) to the speaker terminal).
- * Set the level control volume to minimum.

1.1 Idling Current Adjustment

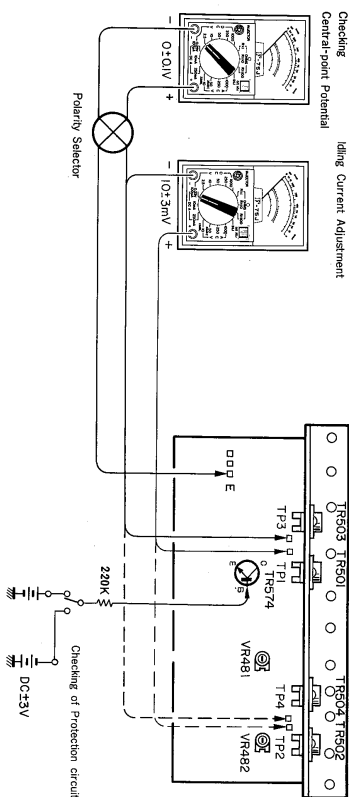
- Left channel: By turning VR481, adjust the voltage between TP1 and TP2 to $10 \pm 3mV$.
 - Right channel: By turning VR482, adjust the voltage between TP3 and TP4 to $10 \pm 3mV$.
- Notes:
- Turn the adjusting volume knob gently.
 - Pay attention to the polarity of test points. (TP1 and TP3 are ⊕, and TP2 and TP4 are ⊖.)

1.2 Checking Central-point Potential

- Confirm that potential difference between E and TP2 or TP4 is within $0 \pm 0.1V$.

1.3 Checking Speaker Protection Circuit

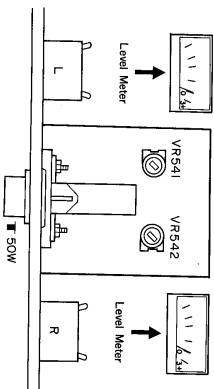
- Confirm that the relay switches to on within 4 ± 1 seconds after the power is supplied.
- Confirm that the relay is switched off within three seconds after DC $\pm 3V$ is supplied between TR574 (Base) and Earth as shown below.



2. Level Meters

Adjusting Preparations

- * Connect a dummy load of 8Ω (50W or more) and VTVM to the output terminal in parallel.
- * Connect an audio signal generator to the AUX input terminal, and supply a sine wave at 1kHz.
- * Set the sensitivity selector switch to 50W position.



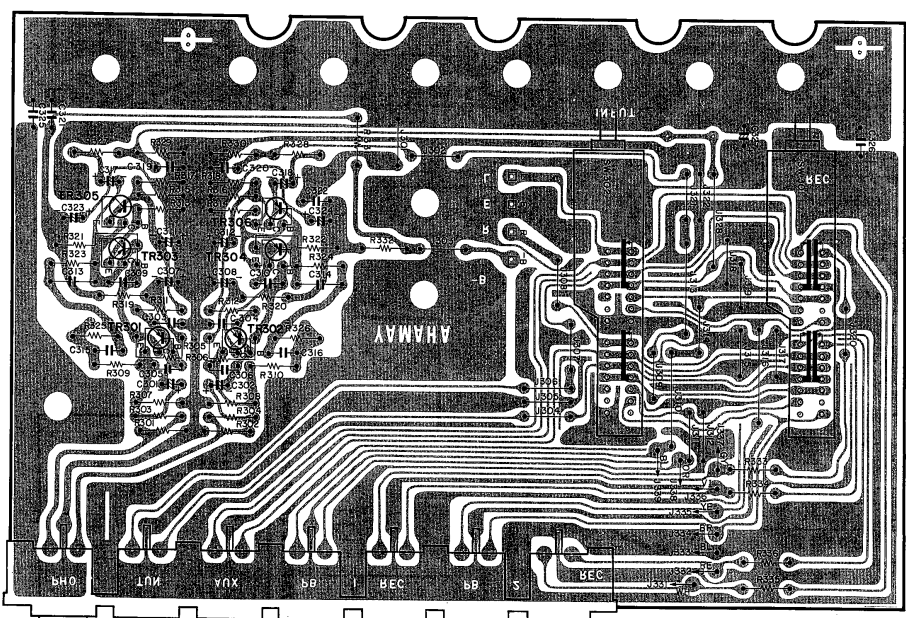
2.1 Meter Indication Adjustment

Adjust the meter indication so that the pointer of the meter reads 0dB when the output is 50W (VTVM voltage is 20Vrms) by turning the level control knob as well as VR541 (left channel) and VR542 (right channel).

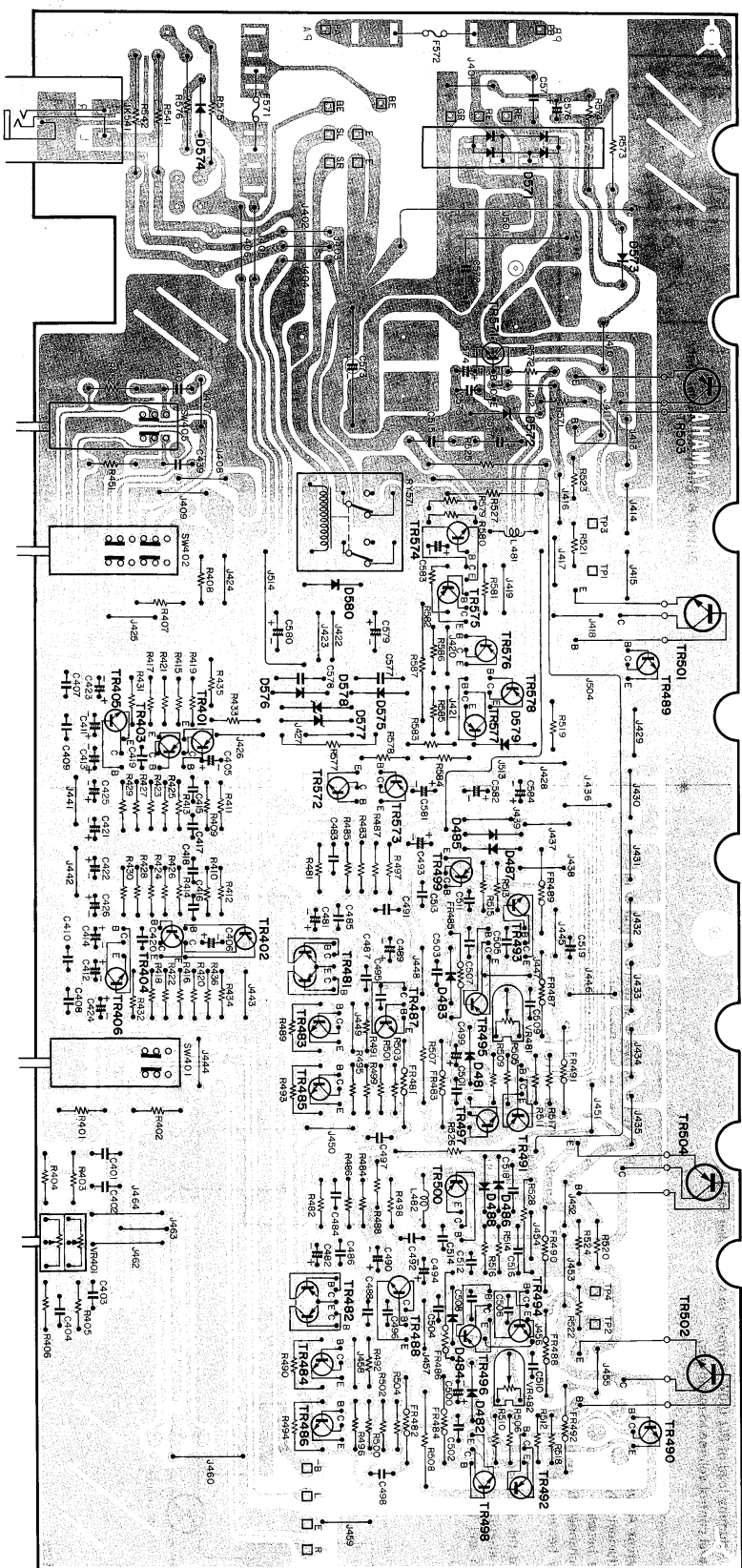
PATTERN DIAGRAM

FUNCTION C. BOARD (Function, EQ) NAO6937 (R,A,C), NAO6938 (U), NAO6939 (E,B)

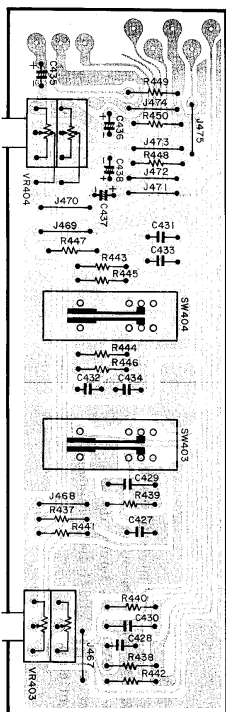
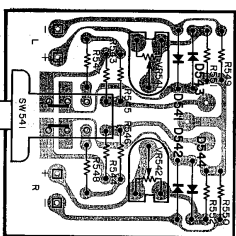
British & European Model Only.



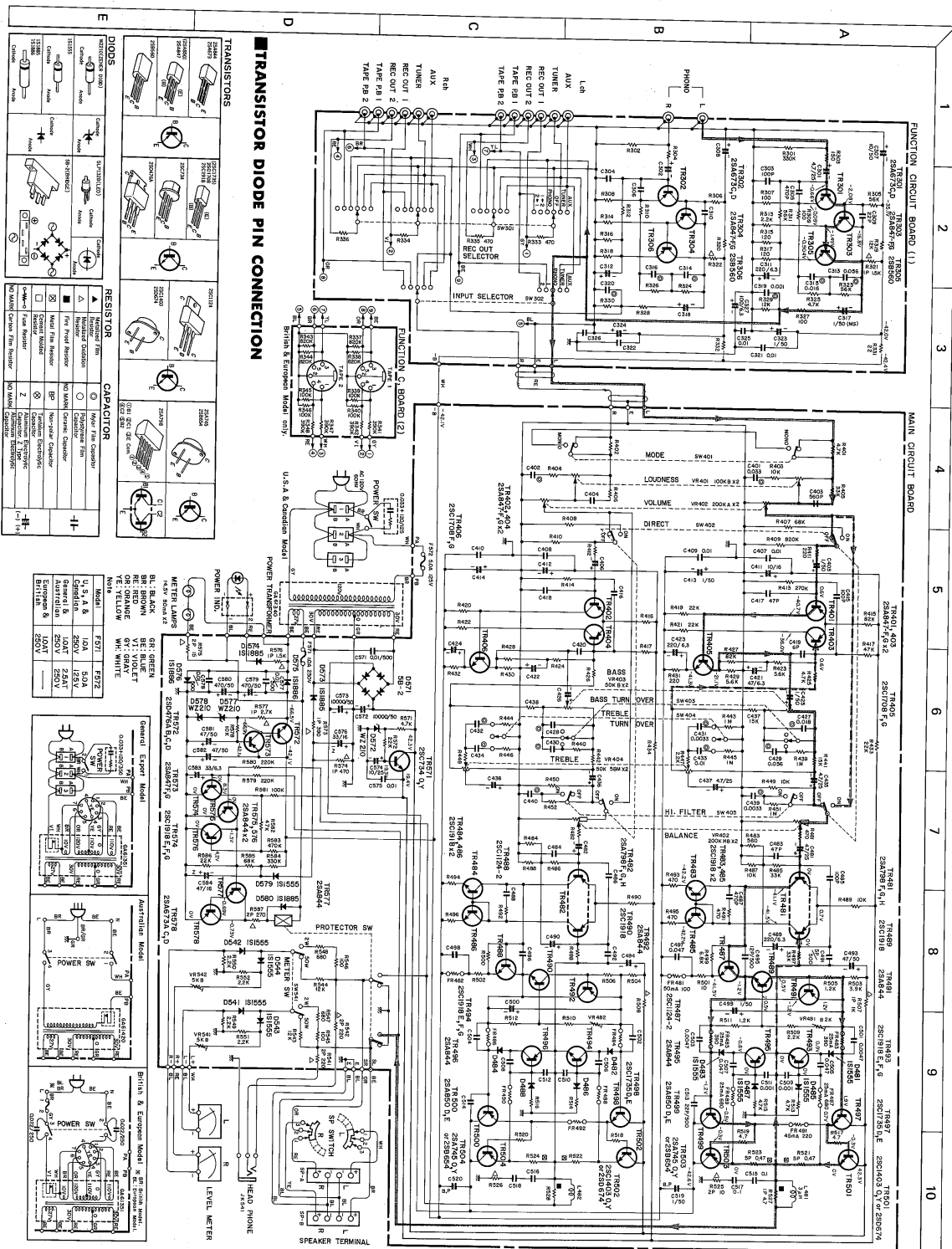
■MAIN C. BOARD 1 (Main Amplifier, Power) NAO6941 (U)
NAO6942 (C)

NA06943 (R,A)
NA06944 (E,B)

■MAIN C. BOARD 3 (Tone Control)



SCHEMATIC DIAGRAM

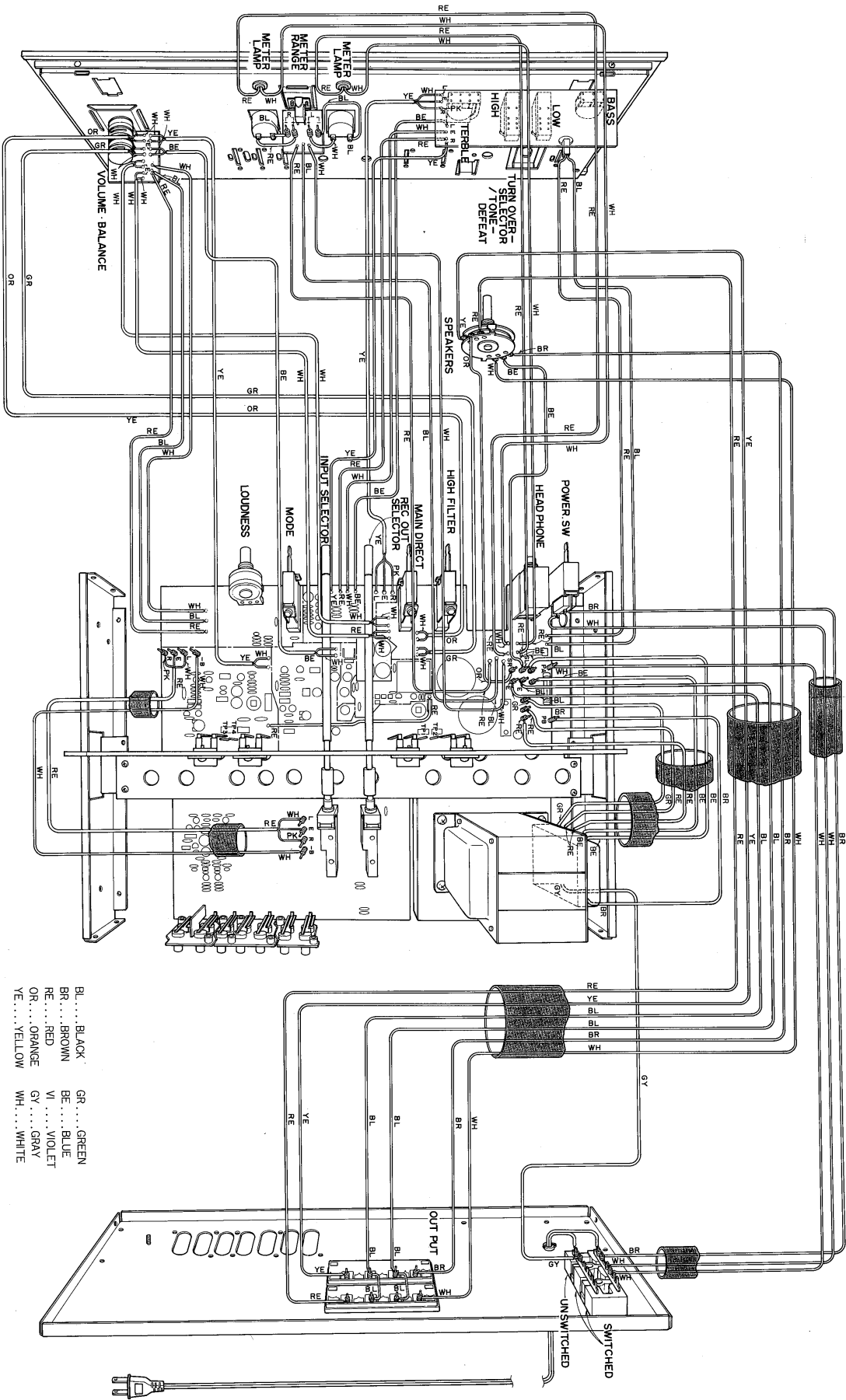


SPECIFICATIONS

Input Sensitivity/Impedance	2.5mV/47kΩ
PHONO, AUX, TAPE PB	150mV/47kΩ
TUNER, AUX, TAPE PB	150mV/47kΩ
PHONO Input Level	Better than 150mV
Output Level/Impedance	150mV/600Ω
RFC, OUT	45 ± 45W
60, 0.05% 20 to 20kHz	50 ± 50W
40, 0.1% 20 to 20kHz	65 ± 65W
Power Band Width	10 to 50kHz
Damping Factor (D)	1kHz, better than 50
PHONO, TUNER + SP OUT	Better than 65dB
Total Harmonic Distortion	Less than 0.01%
PHONO + REC OUT	Less than 0.01%
(20 to 20kHz, 1V)	Less than 0.01%
TUNER, AUX, TAPE PB + SP OUT	Less than 0.01%
(80, 22.5W)	Less than 0.01%
Main Direct OFF	Less than 0.02%
Intermodulation Distortion	Less than 0.01%
TUNER, AUX, TAPE PB + SP OUT	Less than 0.01%
(80, 22.5W)	Less than 0.01%
Main Direct OFF	Less than 0.02%
N.D.C.R VOL. (20dB)	Less than 0.01%
PHONO + SP OUT 1kHz, 0.1% THD	10mW ~ 45W
Main Direct ON	0.1W ~ 45W
F. Modulation, REC OUT, 30 to 15kHz, 2.0-3dB	10 to 100kHz
TUNER, AUX, TAPE PB + SP OUT (80)	0.1dB
S/N (Input Short, I.H.F. A Network)	55dB (25mV Input)
TUNER, AUX, TAPE PB	55dB (10mV Input)
Residual Noise Level	160μV
(I.H.F. A Network)	160μV
Tone Control Frequency	20Hz-10kHz
BASS, 500Hz, 12dB/2	20Hz-10kHz
TREBLE (Turnover)	20kHz-10kHz
Filter (High Cut) 10kHz, 8kHz	20kHz-10kHz
Lowpass (VOL. -30dB) 20kHz	13dB
Muting -20dB	-20dB
When Main Direct ON	-6dB
TAPE PB + SP OUT	70μV
(VOL. min, I.H.F. A Network)	70μV
Speaker Load Impedance	4 to 16Ω
A + B each 8 to 16Ω	4 to 16Ω
Headphone (over Output) 55mV	55mV
80, 20 to 20kHz 435x160x35mm	435x160x35mm
Dimensions (WxHxD) (17-1/8"-6-3/16"x13-1/8")	17-1/8"-6-3/16"x13-1/8"
Weight 10kg	10kg
U.S.A. & Canadian Model: 120V, 60Hz	120V, 60Hz
European & British Model: 110 to 240V, 50Hz	110 to 240V, 50Hz
General Model: 240V, 50Hz	240V, 50Hz
U.S.A. & Canadian Model: 300W, 50V/A	300W, 50V/A
Australian, European & British Model: 400W	400W
General Model: 300V	300V
AC OUTLETS (General Model)	2
Switched	1
Semiconductors	45
Diodes	25
LED	1

Design and Specifications are subject to change without notice for improvement.

■ WIRING



BL...BLACK
BR...BROWN
RE...RED
OR...ORANGE
YE...YELLOW
GR...GREEN
BE...BLUE
VI...VIOLET
GY...GRAY
WH...WHITE

PARTS LIST

CA-610 II STEREO AMPLIFIER

SINCE 1887

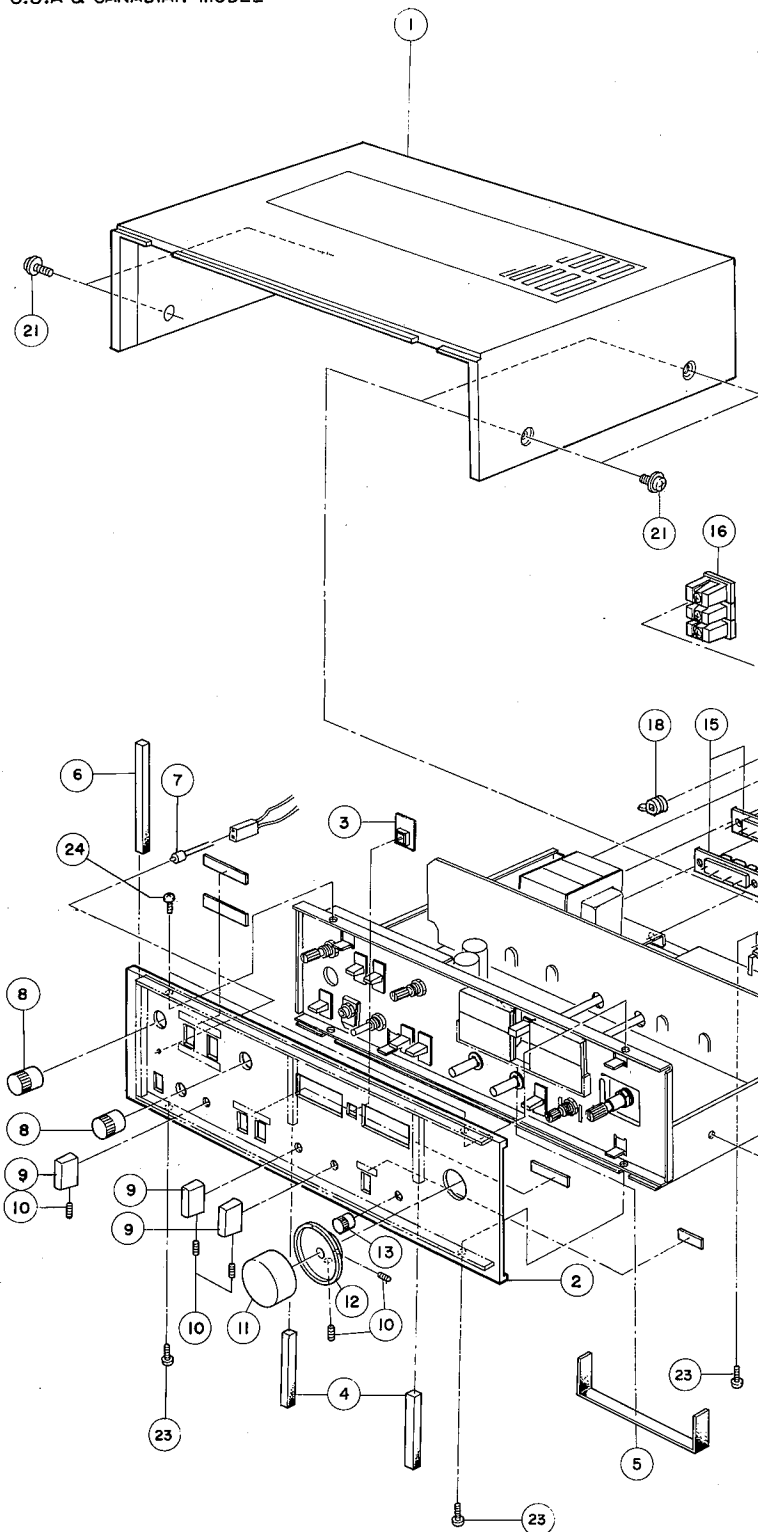


YAMAHA

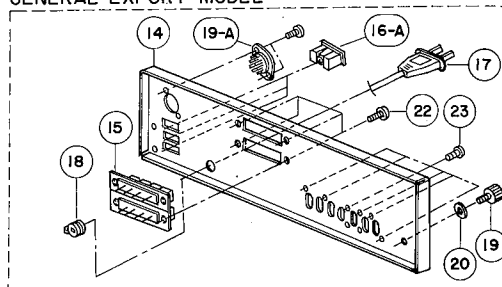
NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

EXPLODED VIEW

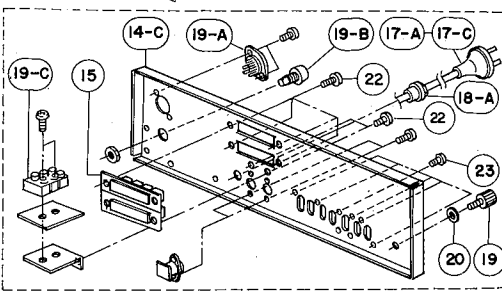
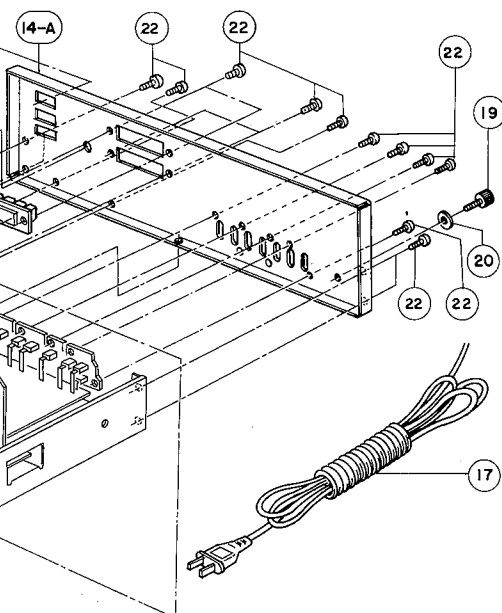
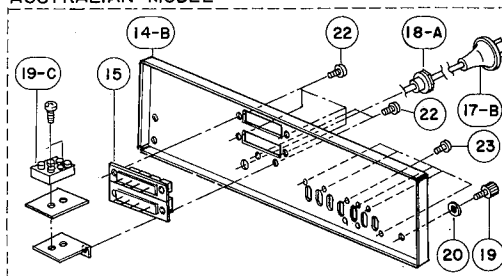
U.S.A & CANADIAN MODEL



GENERAL EXPORT MODEL



AUSTRALIAN MODEL

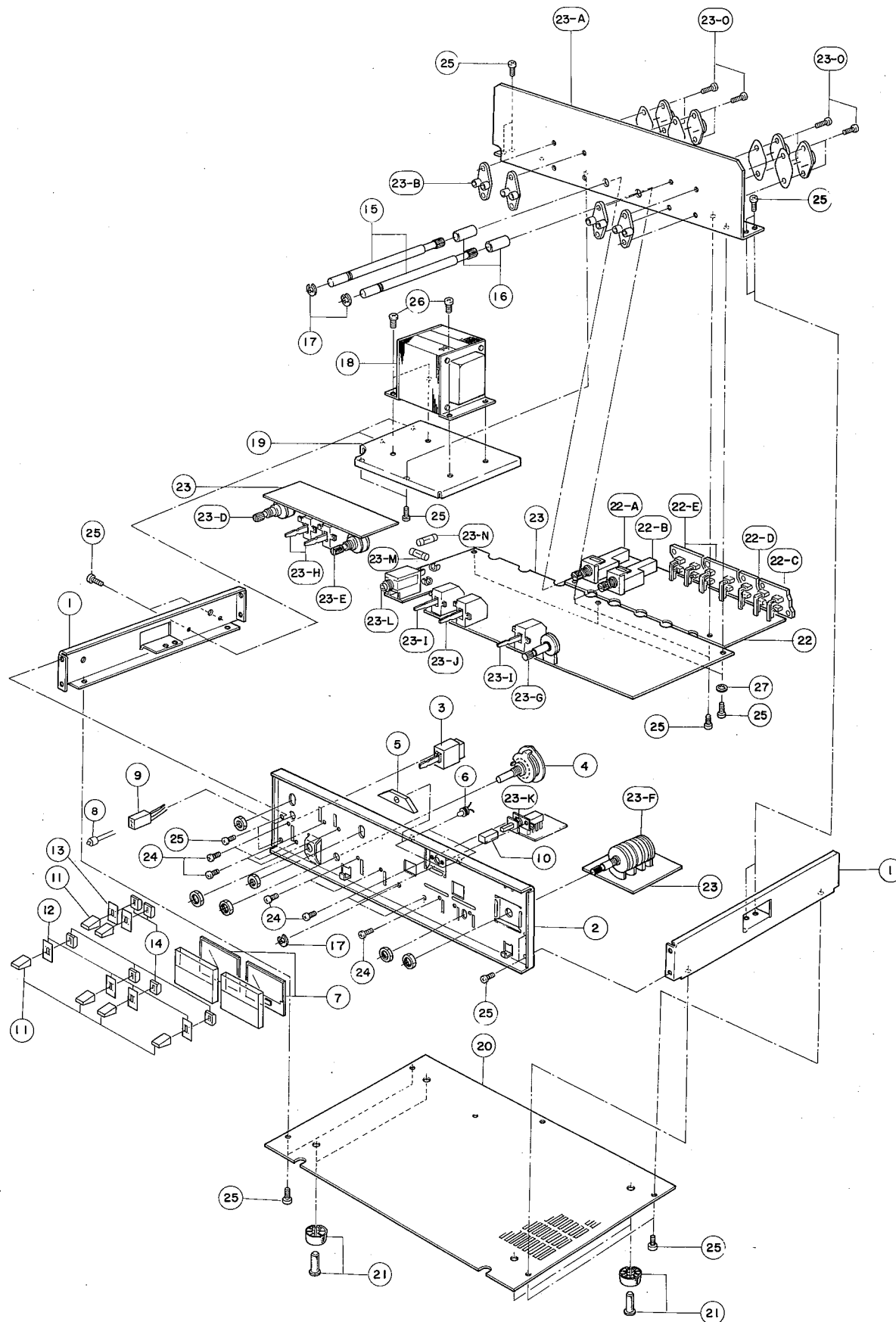


EUROPEAN & BRITISH MODEL

■ PARTS LIST

[illegible]

EXPLODED VIEW



PARTS LIST

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Models	卸価	小売価
1	32:00:00:AA:08:74:90	Side Frame	サイドフレーム				
2	32:00:00:AA:08:74:80	Sub Chassis	サブシャーシ				
	42:00:00:KA:20:07:30	Lever Switch SDE-3L TBE	レバースイッチ	A,E,B			
3	42:00:00:KA:20:05:90	—do.— SDA-1L TDU TV-5	//	R,U,C			
4	42:00:00:KA:50:06:60	Rotary Switch SR-321	ロータリースイッチ				
5	32:00:00:CB:08:13:50	Lens, Lamp	ランプレズ				
6	42:00:00:JB:00:05:50	Pilot Lamp 14.5V 80mA	パイロットランプ リード式	Lead Type			
7	42:00:00:JI:00:06:80	Level Meter	レベルメーター				
8	42:00:00:IF:00:06:80	LED SLP132B	LED				
9	42:00:00:LB:20:07:20	Miniature Connector 2P	ミニチュアコネク トコンハウジング				
10	32:00:00:CB:08:03:20	Push Button S	プッシュボタン				
11	32:00:00:CB:07:97:80	Knob, Lever	レバーツマミ		CR-2020		
12	42:00:00:CB:07:95:10	Aplon, Switch	SWエプロン		CT-810		
13	42:00:00:CB:07:95:00	—do.—	//		—do.—		
14	32:00:00:CB:07:97:70	Bush, Switch	SWブッシュ		—do.—		
15	32:00:00:BA:06:95:30	Extension Shaft	延長シャフト		—do.—		
16	32:00:00:CB:07:13:80	Joint 24L	ジョイント		CA-400		
17	42:00:00:EV:50:15:00	E Ring $\phi 5$	E リング				
	32:00:00:GA:61:35:10	Power Transformer	電源トランス	R,E,B			
18	32:00:00:GA:61:34:00	—do.—	//	U,C			
	32:00:00:GA:61:42:00	—do.—	//	A			
19	32:00:00:AA:08:90:50	Transformer Holder	トランスホルダー				
20	32:00:00:AA:08:75:00	Bottom Cover	ボトムカバー				
21	32:00:00:CB:08:13:90	Leg	脚				
	32:00:00:NA:06:93:70	Function C. Board	ファンクション シート	R,A,C			
22	32:00:00:NA:06:93:80	—do.—	//	U			
	32:00:00:NA:06:93:90	—do.—	//	E,B			
A	42:00:00:KA:50:09:20	Rotary Switch SRZ046N	ロータリースイッチ				
B	42:00:00:KA:50:09:10	—do.— SRZ045N	//				
C	42:00:00:LB:40:03:40	Pin Jack PC4P	ピンジャック				
D	42:00:00:LB:20:10:10	—do.— PC2P	//	L-Type New	CA-V1		
E	42:00:00:LB:40:03:10	—do.— PC4P	//	L-Type	—do.—		
	42:00:00:LB:50:00:90	DIN Connector Socket 5P X-i 3306	DINコネクター ソケット5P	E,B			
23	32:00:00:NA:06:94:10	Main C. Board	メインシート	U			
	32:00:00:NA:06:94:20	—do.—	//	C			
	32:00:00:NA:06:94:30	—do.—	//	R,A			
	32:00:00:NA:06:94:40	—do.—	//	E,B			
A	42:00:00:BA:06:76:70	Heat Sink	放熱板				
B	42:00:00:LB:30:04:00	Transistor Socket PC M1624	TRソケット		AU Com.		
C	42:00:00:IL:00:02:30	Mica Base	マイカベース				
D	42:00:00:HS:11:01:60	Variable Resistor $\phi 16$ 50K Ω -B(11 clicks)	ボリューム (11クリック)				
E	42:00:00:HS:11:02:10	—do.— $\phi 16$ 50K Ω -5B(—do.)	ボリューム(センター タップ,11クリック)				
F	42:00:00:HS:12:06:30	—do.— $\phi 24$ 200K Ω -A \times 2	ボリューム(2軸 4連)				
G	42:00:00:HS:41:05:80	—do.— $\phi 16$ 100K Ω -B	ボリューム (1軸2連)				
H	42:00:00:KA:20:06:10	Lever Switch 2 \times 3S	レバースイッチ				
I	42:00:00:KA:20:06:00	—do.— 2 \times 2S	//				
J	42:00:00:KA:20:07:10	—do.— 4 \times 2NS	//				
K	42:00:00:KA:80:01:90	Push Switch SUE NS 12.5mm	プッシュスイッチ				
L	42:00:00:LB:30:03:90	Phone Jack LJ213-1-2	ホーンジャック				

[illegible]

Ref. No.	Part No.	Description	部 品 名	Remarks	Common Models	卸 価	小 売 価
		Function C. Board	ファンクションシート				
	42:00:00 i A:06:73:10	Transistor 2SA673A(C,D)	トランジスター				
	42:00:00 i A:08:47:00	-do.- 2SA847(F,G)	//				
	42:00:00 i A:05:60:00	-do.- 2SB560	//				
	42:00:00 F A:45:31:00	Mylar Capacitor 0.001 μ F 50V(J)	マイラーコンデンサー				
	42:00:00 F A:15:41:60	-do.- 0.016 μ F 50V(J)	//				
	42:00:00 F A:45:45:60	-do.- 0.056 μ F 50V(J)	//				
	42:00:00 H L:41:61:50	Metal Oxide Film Resistor 1P 1.5K Ω	酸化被膜抵抗				
		Main C. Board	メインシート				
	42:00:00 i A:06:73:10	Transistor 2SA673A(C,D)	トランジスター				
	42:00:00 i B:06:54:00	-do.- 2SB654	//				
	42:00:00 i A:07:45:00	-do.- 2SA745(O~Y)	//				
	42:00:00 i A:07:98:00	-do.- 2SA798(F,G,H)	//				
	42:00:00 i A:08:44:00	-do.- 2SA844	//				
	42:00:00 i A:08:47:00	-do.- 2SA847(F,G)	//				
	42:00:00 i A:08:50:00	-do.- 2SA850(D,E)	//				
	42:00:00 i C:07:34:30	-do.- 2SC734(O~Y)	//				
	42:00:00 i C:11:24:20	-do.- 2SC1124(Z)	//				
	42:00:00 i D:06:74:00	-do.- 2SD674	//				
	42:00:00 i C:14:03:00	-do.- 2SC1403(O~Y)	//				
	42:00:00 i C:17:08:00	-do.- 2SC1708(F,G)	//				
	42:00:00 i C:17:35:00	-do.- 2SC1735(D,E)	//				
	42:00:00 i C:19:18:00	-do.- 2SC1918(E,F,G)	//				
	42:00:00 i D:04:76:20	-do.- 2SD476A(B,C,D)	トランジスター (V>70)				
	42:00:00 i F:00:00:40	Diode 1S1555	ダイオード				
	42:00:00 i H:00:01:10	-do.- 5B-2	//				
	42:00:00 i H:00:02:40	-do.- 1S1885	//	Servicing iH000060			
	42:00:00 i H:00:02:50	-do.- 1S1886	//				
	42:00:00 i F:00:02:80	Zener Diode WZ-210	ツェナーダイオード				
	42:00:00 K C:00:04:20	Relay FRL-264	リレー				
	42:00:00 H T:17:00:50	Variable Resistor V8K4-1B-5K Ω	半固定抵抗				
	42:00:00 H T:17:00:60	-do.- -do.- B-2K Ω	//				
	42:00:00 G D:90:00:50	Coil 3 μ H	コイル				
	42:00:00 H W:10:52:20	Fuse Resistor 45mA 220 Ω	ヒューズ抵抗	R,A,E,C,B			
	42:00:00 H W:20:52:20	-do.- -do.-	//	U			
	42:00:00 H W:10:56:80	-do.- 25mA 680 Ω	//	R,A,E,C,B			
	42:00:00 H W:20:56:80	-do.- -do.-	//	U			
	42:00:00 H W:19:51:00	-do.- 50mA 100 Ω	//	R,A,E,C,B			
	42:00:00 H W:29:51:00	-do.- -do.-	//	U			
	42:00:00 H W:19:53:90	-do.- 25mA 390 Ω	//	R,A,E,C,B			
	42:00:00 H W:29:53:90	-do.- -do.-	//	U			
	42:00:00 H L:41:53:90	Metal Oxide Film Resistor 1W 390 Ω	酸化被膜抵抗				
	42:00:00 H L:41:54:70	-do.- 1W 470 Ω	//				
	42:00:00 H L:41:61:00	-do.- 1W 1K Ω	//				
	42:00:00 H L:41:61:50	-do.- 1W 1.5K Ω	//				
	42:00:00 H L:41:62:70	-do.- 1W 2.7K Ω	//				
	42:00:00 H L:42:41:00	-do.- 2W 10 Ω	//				
	42:00:00 H L:42:41:50	-do.- 2W 15 Ω	//				

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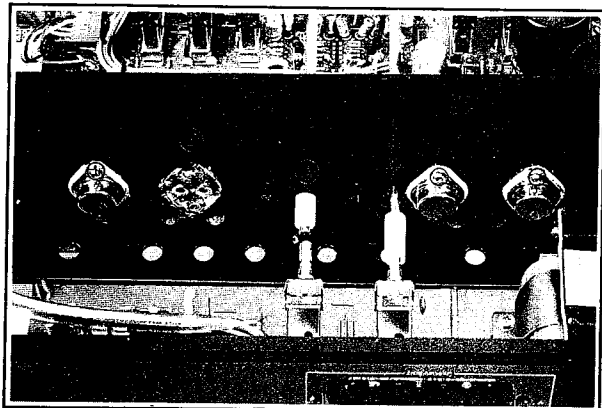


Photo. 4

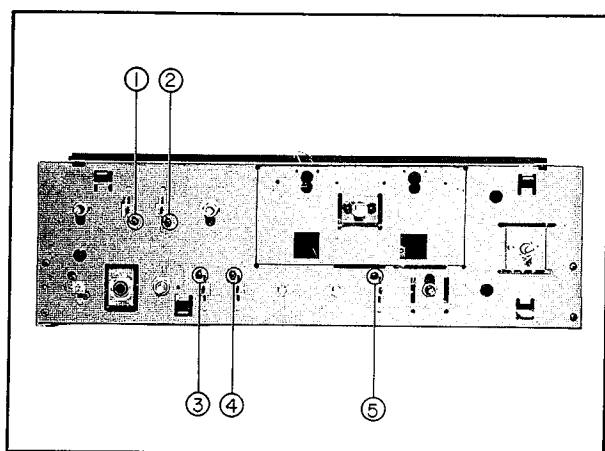


Photo. 5

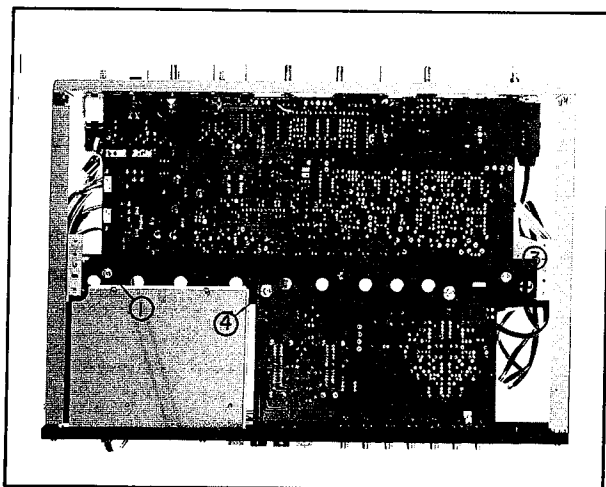


Photo. 6

Photo 7 shows TR490 (right) and TR489 (left) which are temperature-compensating transistors being heat-coupled with the heat sink. When assembling the main circuit board as well as the power transistors, be sure to closely fit the joint surfaces.

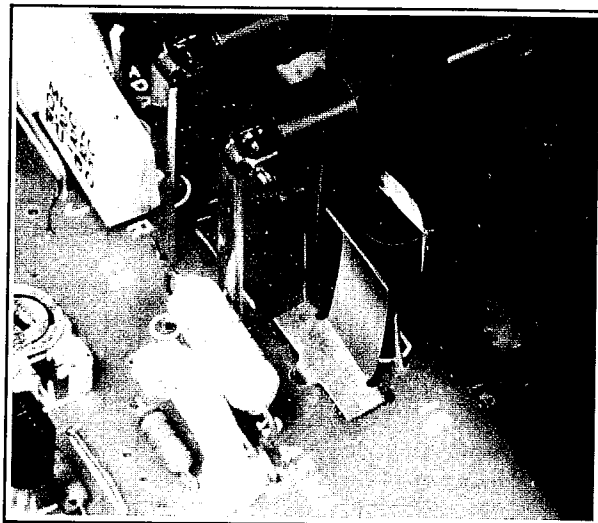


Photo. 7

6. Function Circuit Board Removal

- 6.1 To disengage the shaft, shift the joint in arrow direction like (A) shown in Photo 4.
- 6.2 Remove eight screws shown in Photo 8.
- 6.3 Remove screws (4) and (5) shown in Photo 6.

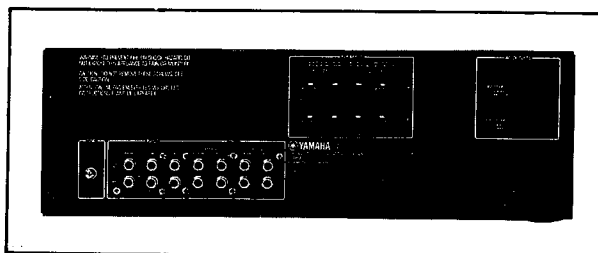
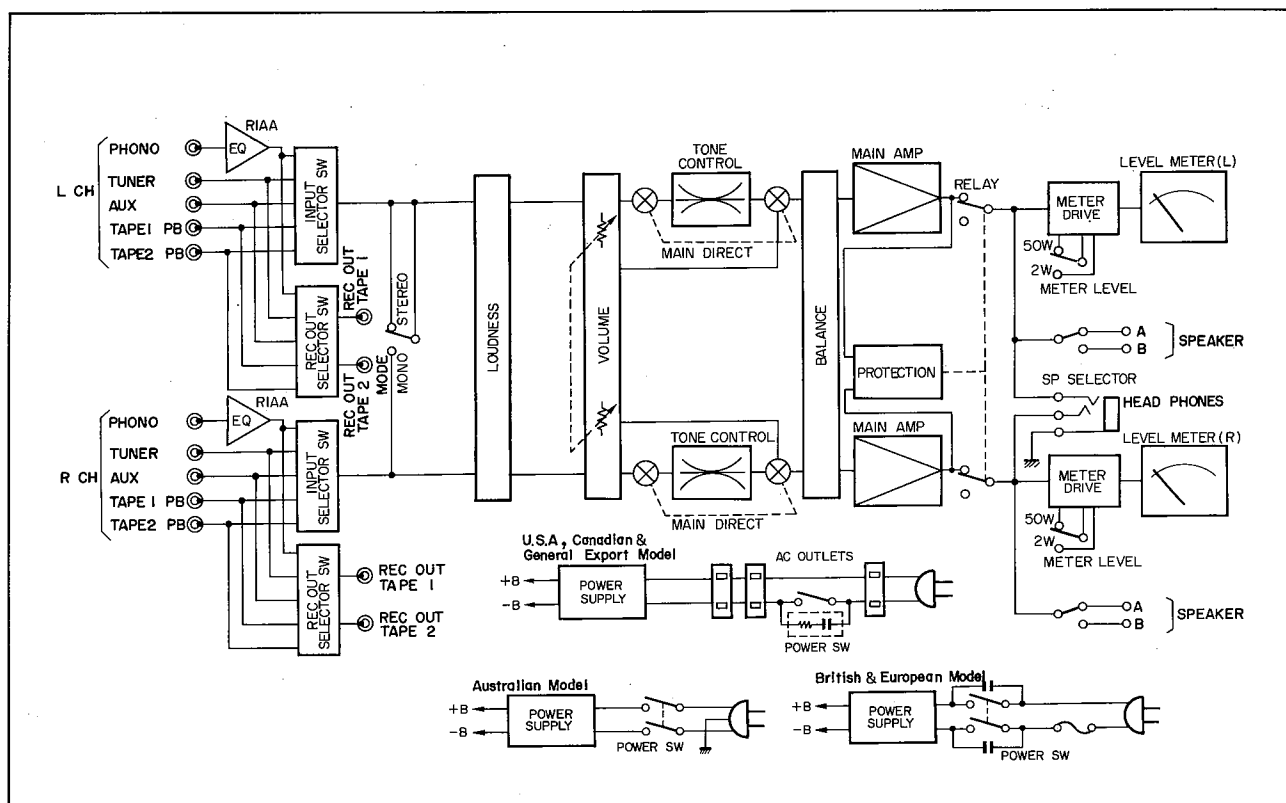


Photo. 8

Note: The photos depict the U.S.A. model.

BLOCK DIAGRAM



LEVEL DIAGRAM

