

YAMAHA Hi-Fi STEREO SERVICE MANUAL STEREO/ PRE-MAIN AMPLIFIER MODEL CA-400



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SPECIFICATIONS

AUDIO SECTION

POWER OUTPUT

Dynamic Power	(IHF) 90 watts (4 Ω) 70 watts (8 Ω)
Continuous RMS Power	(each channel driven) 35/35 watts (4 Ω) at 1,000Hz 27/27 watts (8 Ω) at 1,000Hz
Continuous RMS Power	(both channels driven) 28+28 watts (4 Ω) at 1,000Hz 22+22 watts (8 Ω) at 1,000Hz
Continuous RMS Power	(both channels driven) 25+25 watts (4 Ω) at 20 to 20,000Hz 20+20 watts (8 Ω) at 20 to 20,000Hz

TOTAL HARMONIC DISTORTION

Preamplifier Only	(PHONO to PRT OUT) Less than 0.1% (8 Ω) at rated power (AUX to PRT OUT) Less than 0.02% (8 Ω) at rated power
Overall	(AUX to POWER OUTPUT) Less than 0.1% (8 Ω) at rated power (IHF, Closed Circuit A Network)

HUM and NOISE

Overall from PHONO 1, 2	Better than 75dB
Overall from MIC	Better than 70dB
Overall from AUX, TAPE PB	Better than 90dB

Volume at Minimum	Better than 90dB
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INPUT SENSITIVITY AND IMPEDANCE

PHONO 1	3mV (47k Ω)
PHONO 2	3mV (47k Ω)
PHONO 1, 2 Max. Input Capability	135mV
MIC	3mV (40k Ω)
MIC Max. Input Capability	400mV
AUX 1, 2	150mV (55k Ω)
TAPE PB A, B	150mV (55k Ω)

OUTPUT LEVEL AND IMPEDANCE

TAPE REC OUT A, B	(at rated power, 1,000Hz) 150mV (1k Ω)
DIN REC OUT	30mV (80k Ω)
PRE OUT	450mV (2.7k Ω)

TONE CONTROLS

BASS	+12dB, -12dB at 50Hz
TREBLE	+10dB, -10dB at 10,000Hz

FILTERS

LOW	-3dB at 50Hz (12dB/oct.)
HIGH	-3dB at 8,000Hz (6dB/oct.)

INTERMODULATION DISTORTION

Overall	(70Hz; 7,000Hz - 4:1 SMPTE method) (AUX to Power Output) Less than 0.1% (8 Ω) at rated output (IHF, distortion 0.5% const.)
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POWER BANDWIDTH

Overall	8 to 70,000Hz (at 1 watt)
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FREQUENCY RESPONSE

Overall	(AUX, TAPE PB to Power Output) 20 to 50,000Hz +0.5dB, -1dB
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Overall	(MIC to Power Output) 100 to 10,000Hz +0.5, -6dB
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Deviation from RIAA	(30 to 15,000Hz) ± 0.5 dB
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LOAD IMPEDANCE

Overall	4 to 16 Ω
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DAMPING FACTOR

Overall	Over 50 at 1,000Hz (8 Ω)
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CHANNEL SEPARATION

Overall from PHONO 1, 2	Better than 50dB
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Overall from AUX, TAPE PB	Better than 50dB
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LOUDNESS CONTROL

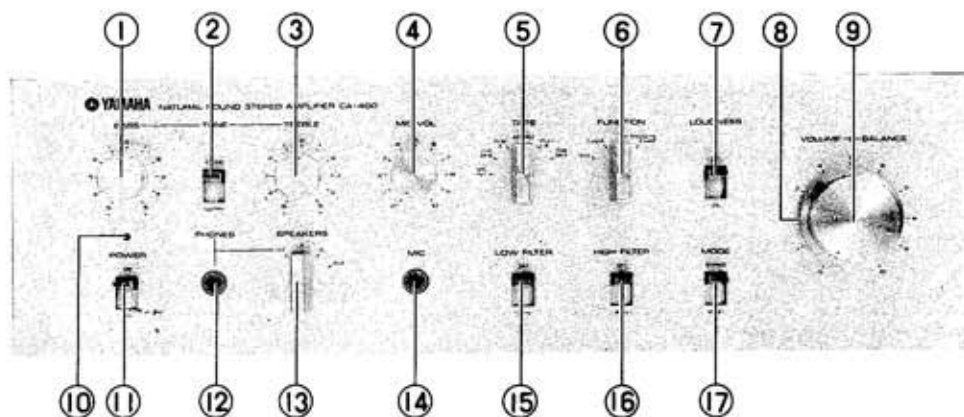
Overall	(vol. at -30dB) +8dB at 100Hz, +5dB at 10,000Hz
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GENERAL

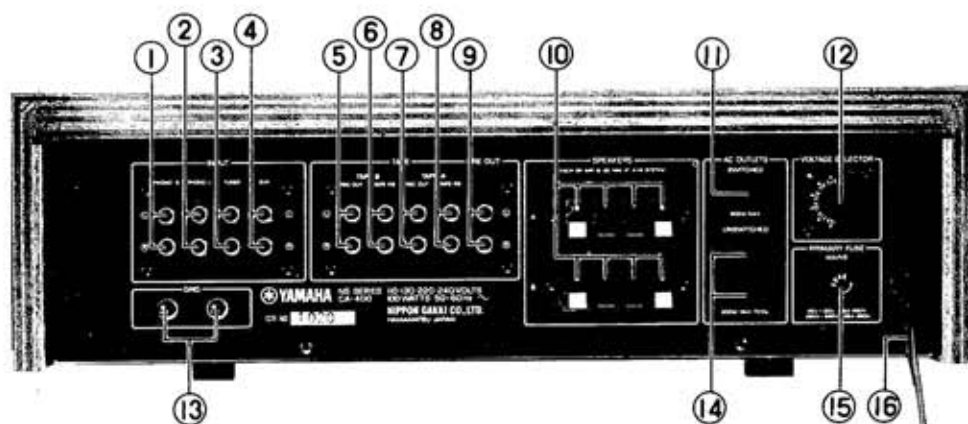
Semiconductors	31 Transistors; 9 Diodes; 1 Zener Diode; 2 ICs
Power Source	AC 110, 117, 130, 220, 240V, 50/60Hz
Power Consumption	
Max.	100 watts
Rated	13 watts
AC Outlets	
Switched	1 (200 watts)
Unswitched	2 (total 200 watts)
Dimensions	(W x H x D) 436 x 144 x 300mm (17 1/4" x 5 3/4" x 12")
Weight	8kg (17.6lbs.)

EXTERNAL VIEW

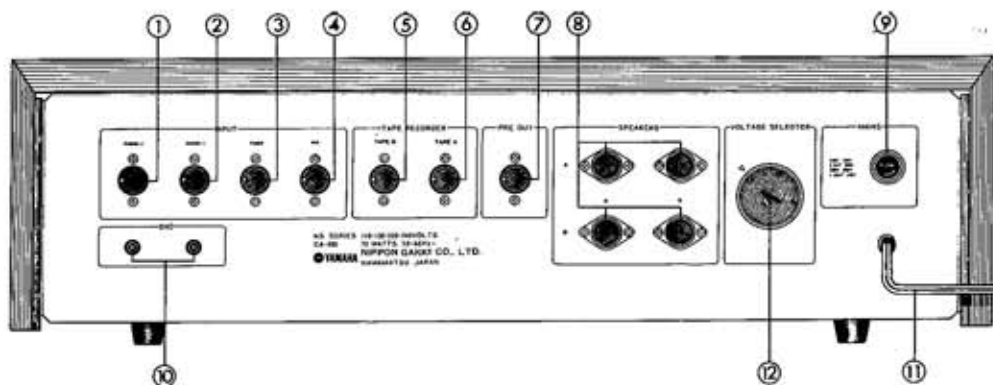
FRONT PANEL



REAR PANEL (U.S. & CANADIAN MODELS)



REAR PANEL (EUROPEAN MODEL)



FRONT PANEL

- | | |
|-----------------------|------------------------|
| ① BASS TONE CONTROL | ⑩ POWER INDICATOR LAMP |
| ② TONE DEFEAT SWITCH | ⑪ POWER SWITCH |
| ③ TREBLE TONE CONTROL | ⑫ HEADPHONE JACK |
| ④ MIC VOLUME CONTROL | ⑬ SPEAKER SELECTOR |
| ⑤ TAPE SELECTOR | ⑭ MIC JACK |
| ⑥ FUNCTION SELECTOR | ⑮ LOW FILTER |
| ⑦ LOUDNESS SWITCH | ⑯ HIGH FILTER |
| ⑧ BALANCE CONTROL | ⑰ MODE SWITCH |
| ⑨ VOLUME CONTROL | |

REAR PANEL (U.S. & CANADIAN MODELS)

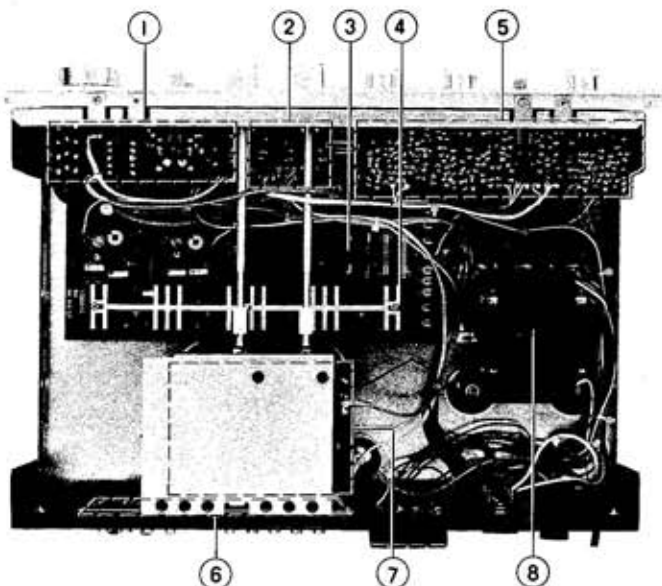
- | | |
|------------------------|---------------------------|
| ① PHONO-2 INPUT JACKS | ⑨ PRE OUT JACKS |
| ② PHONO-1 INPUT JACKS | ⑩ SPEAKER TERMINAL |
| ③ TUNER INPUT JACKS | ⑪ AC OUTLET (Switched) |
| ④ AUX INPUT JACKS | ⑫ VOLTAGE SELECTOR |
| ⑤ TAPE B REC OUT JACKS | ⑬ GROUND TERMINAL |
| ⑥ TAPE B TAPE PB JACKS | ⑭ AC OUTLETS (Unswitched) |
| ⑦ TAPE A REC OUT JACKS | ⑮ PRIMARY FUSE |
| ⑧ TAPE A TAPE PB JACKS | ⑯ AC CORD |

REAR PANEL (EUROPEAN MODEL)

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

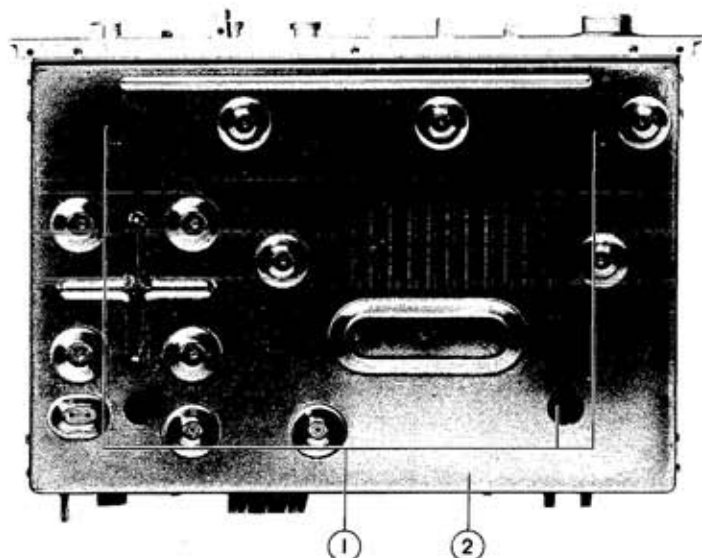
INTERNAL VIEW

TOP VIEW



- ① VOLUME CIRCUIT BOARD
NA06560: U.S. and Canadian models
NA06498: except U.S. and Canadian models
- ② FILTER CIRCUIT BOARD
NA06557: U.S. and Canadian models
NA06493: except U.S. and Canadian models
- ③ MAIN AMP CIRCUIT BOARD
NA06495: General and Australian models
NA06496: U.S. and Canadian models
NA06497: European model
- ④ HEAT SINK
- ⑤ TONE CONTROL AMP CIRCUIT BOARD
NA06558: U.S. and Canadian models
NA06493: except U.S. and Canadian models
- ⑥ PIN JACK CIRCUIT BOARD
NA06494: General and Australian models
NA06559: U.S. and Canadian models
DIN CONNECTOR CIRCUIT BOARD
NA06499: European model
- ⑦ FUNCTION CIRCUIT BOARD
NA06556: U.S. and Canadian models
NA06491: except U.S. and Canadian models
- ⑧ POWER TRANSFORMER
GA60742: European model
GA60741: except European model

BOTTOM VIEW

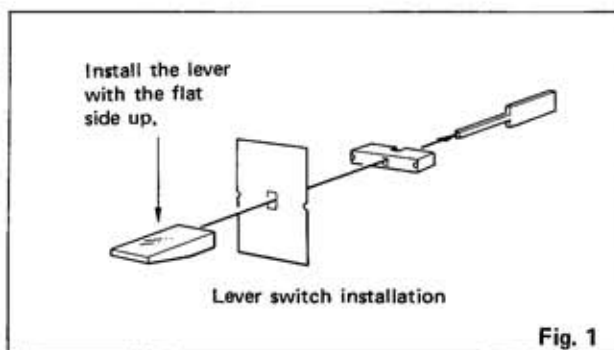


- ① LEG
- ② CHASSIS

PARTIAL DISASSEMBLY

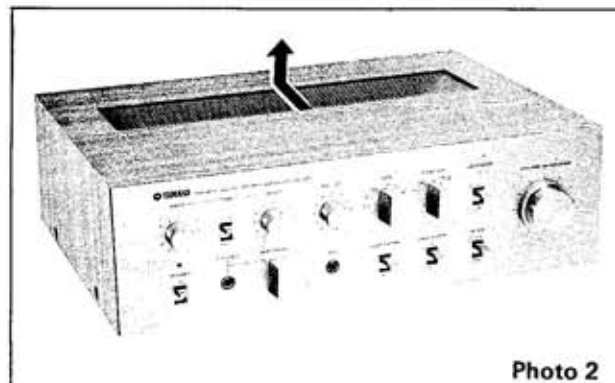
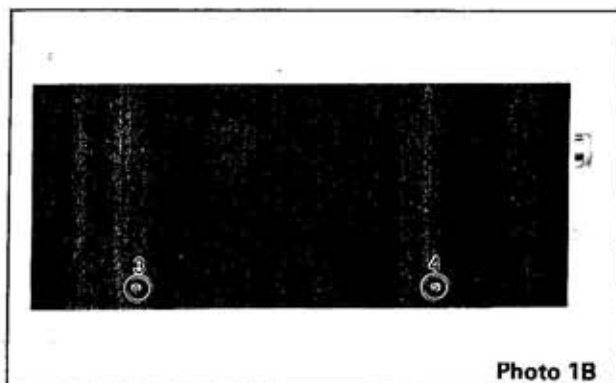
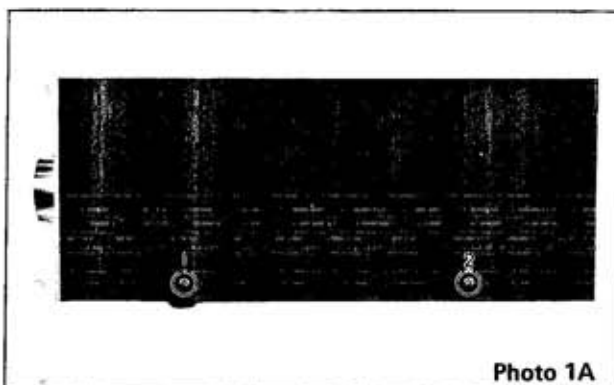
BEFORE DISASSEMBLY

- The screwdriver for each screw should match the screw size. If you use a smaller or larger size it will damage the groove.
- If you use excessive force on the printed circuit board it will crack or cut the print wiring, so be careful.
- When using a soldering iron finish all work as quickly as possible.
- Be careful not to install switches and knobs in the wrong place or upside-down. See Fig. 1.



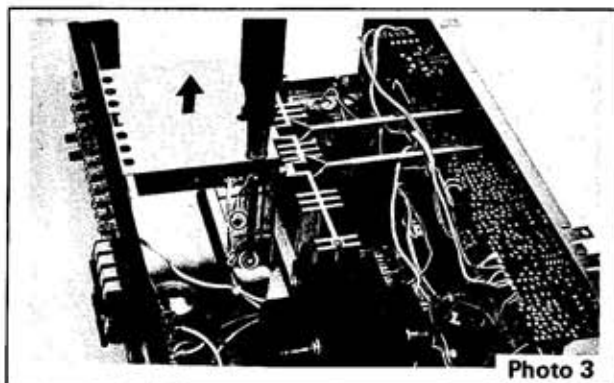
CABINET REMOVAL

- Remove screws 1~4 shown in Photo 1 (A), (B).
- Pull cabinet apart from the chassis as shown in Photo 2.



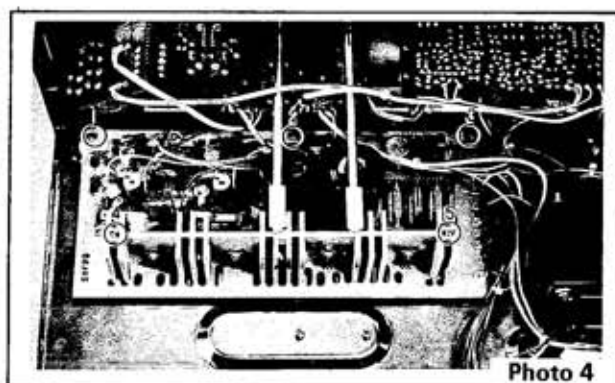
FUNCTION CIRCUIT REMOVAL

- Loosen screws 1, 2 as shown in Photo 3 on main chassis.
- Slide the joint toward the front panel as shown in Photo 3, then remove the function circuit board from the extension shaft.
- Pull the function circuit board in the direction of the *arrow in Photo 3, then lift it upward to remove.



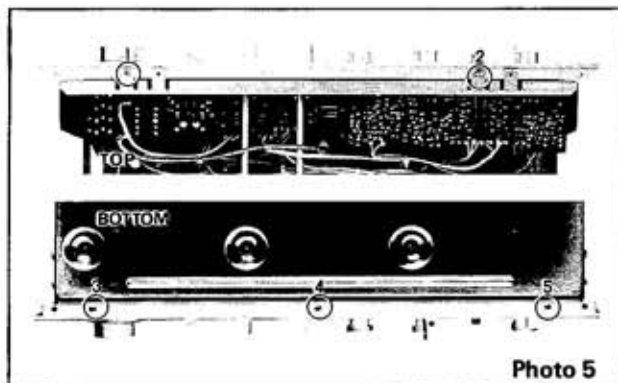
MAIN AMP CIRCUIT BOARD REMOVAL

- Slide the joint toward the front panel as shown in Photo 3, then remove the function circuit board from the extension shaft.
- Remove screws 1~5 shown in Photo 4, then lift it upward to remove.



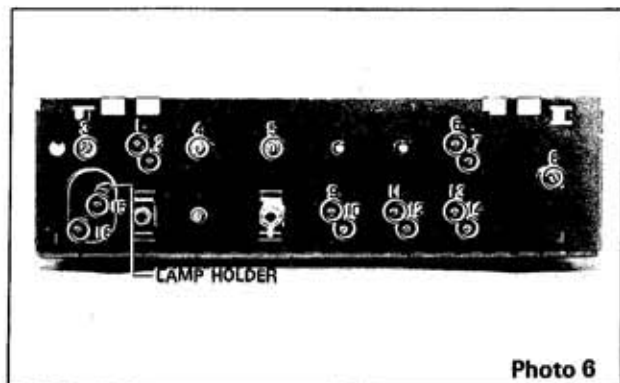
FRONT PANEL REMOVAL

- Remove all knobs. Use a hexagonal wrench to loosen the nuts on the TAPE, FUNCTION, SPEAKERS and BALANCE functions. Then remove these and other switches.
- Remove screws 1~5 as shown in Photo 5, then remove the front panel.



TONE CONTROL AMP CIRCUIT BOARD REMOVAL

- Remove the front panel.
- Remove screws 1, 2 and nuts 3~5 as shown in Photo 6. Tone control circuit board can now be removed.



VOLUME CIRCUIT BOARD REMOVAL

- Remove the front panel.
- Remove screws 6, 7 and nut 8 as shown in Photo 6. Volume circuit board can now be removed.

FILTER CIRCUIT BOARD REMOVAL

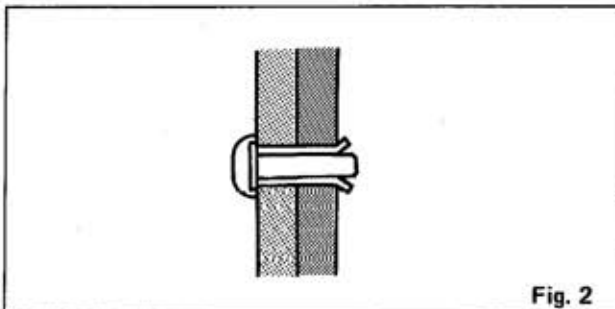
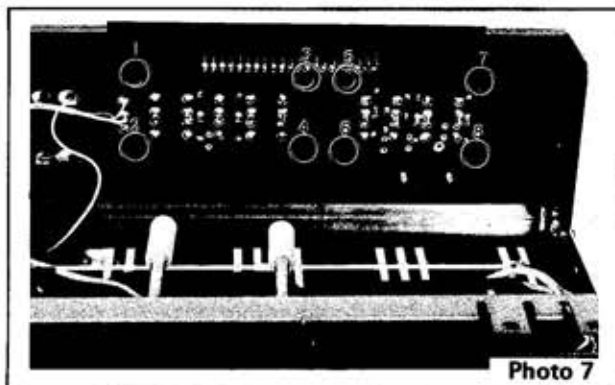
- Remove the front panel.
- Remove screws 9~14 as shown in Photo 6. Filter circuit board can now be removed.

POWER SWITCH REMOVAL

- Remove the front panel.
- Slide the lamp holder to the right as shown in Photo 6 and remove it. When reinstalling the pilot lamp, be careful that it is not placed so far forward that it touches the front panel; it should not be too far from the lamp holder.
- Remove screws 15, 16 as shown in Photo 6, then remove the Power Switch.

PIN JACK (DIN) CIRCUIT BOARD REMOVAL

- Remove the function circuit board.
- Push plastic rivets 1~8 with screwdriver as shown in Photo 7 remove it. Pin jack circuit board can now be removed.



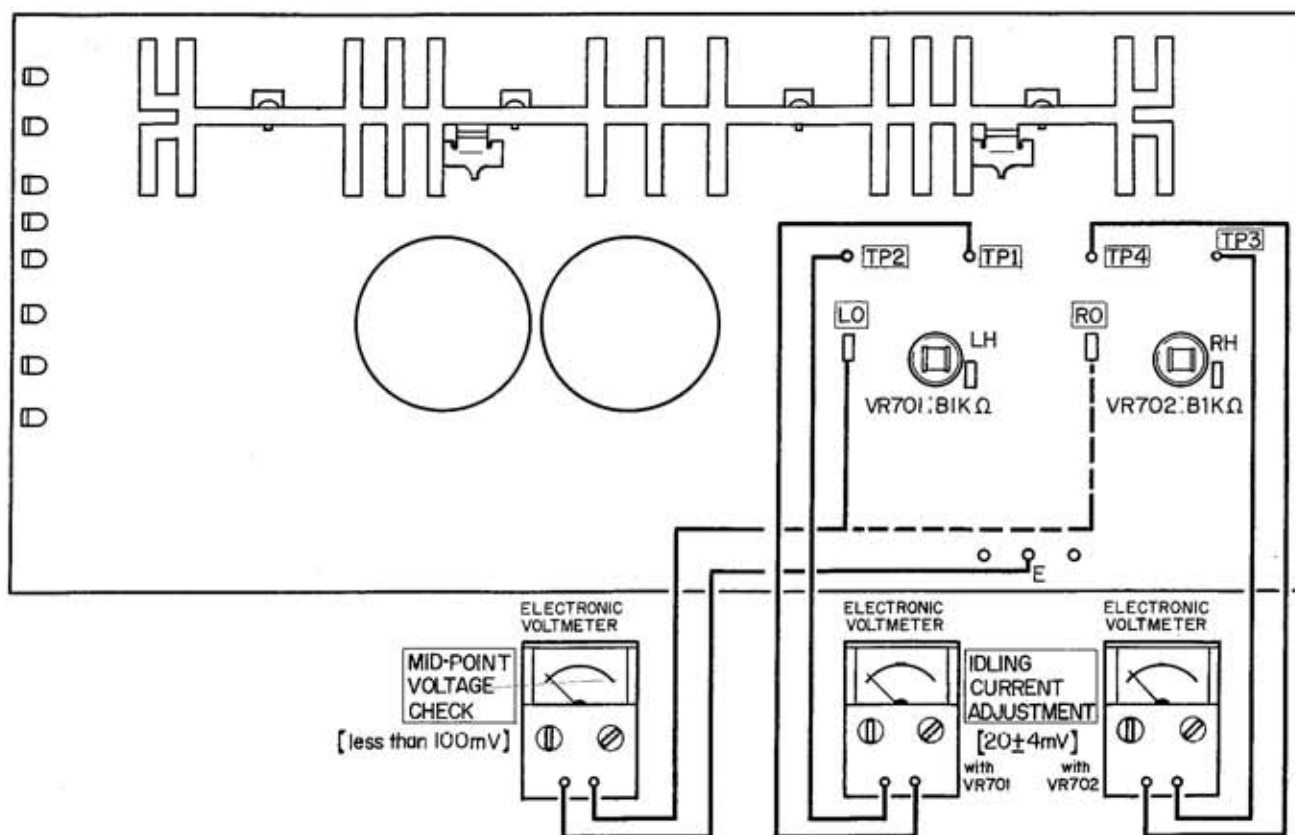
ADJUSTMENT

BEFORE ADJUSTMENT

- Carry out adjustment immediately after switching on the power, then readjust a few minutes later, so that all measurements fall within the prescribed standards.

- During adjustment be sure to short the main amp circuit board input terminals, do not connect the speakers or dummy load resistors to the output terminals; leave them open.

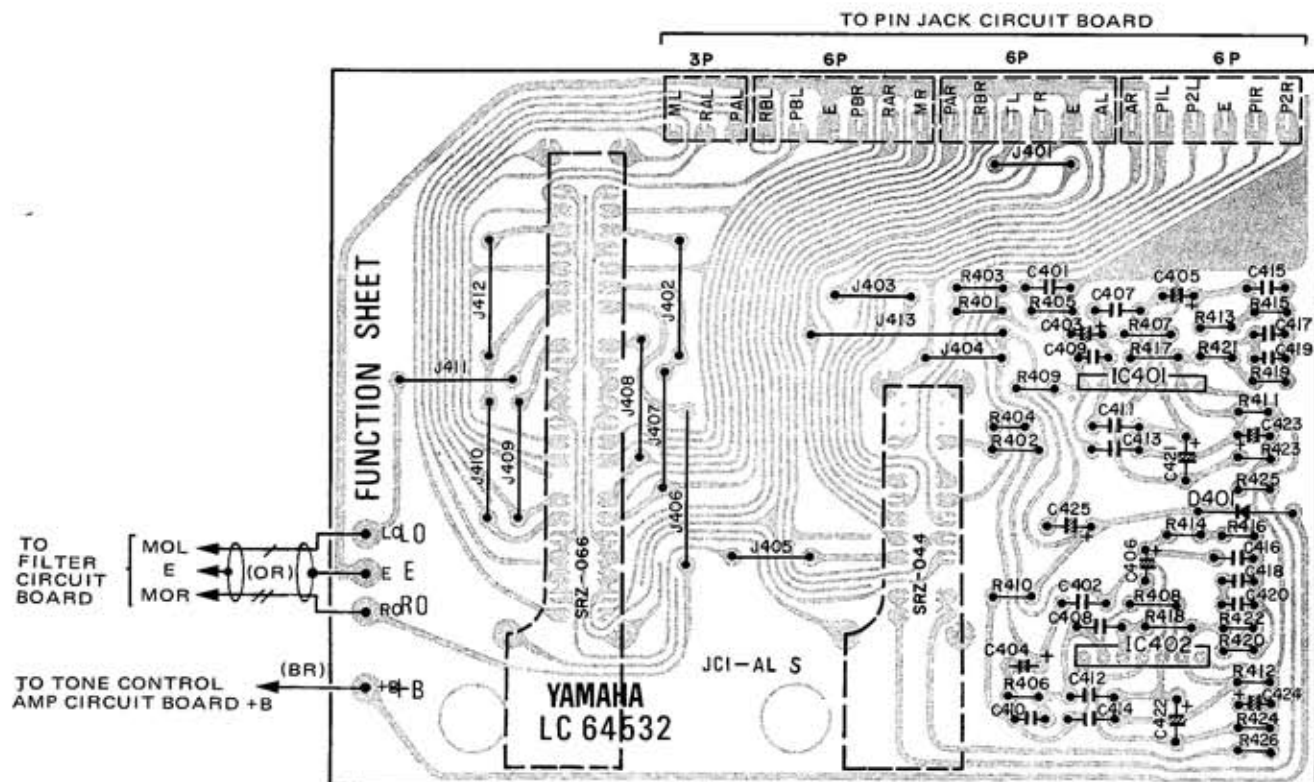
ADJUSTMENT	CONNECTION TERMINAL(s) AND INSTRUMENT(s)	ADJUSTMENT POINT	ADJUSTMENT METHOD	STANDARD MEASUREMENT
Bias current adjustment	Connect a voltmeter between TP1 and TP2 then between TP3 and TP4.	VR701, VR702	Adjust VR701 and/or VR702 so that the voltage between the TPs falls within the standard ratio.	$20 \pm 4\text{mV}$



PRINTED CIRCUIT BOARD

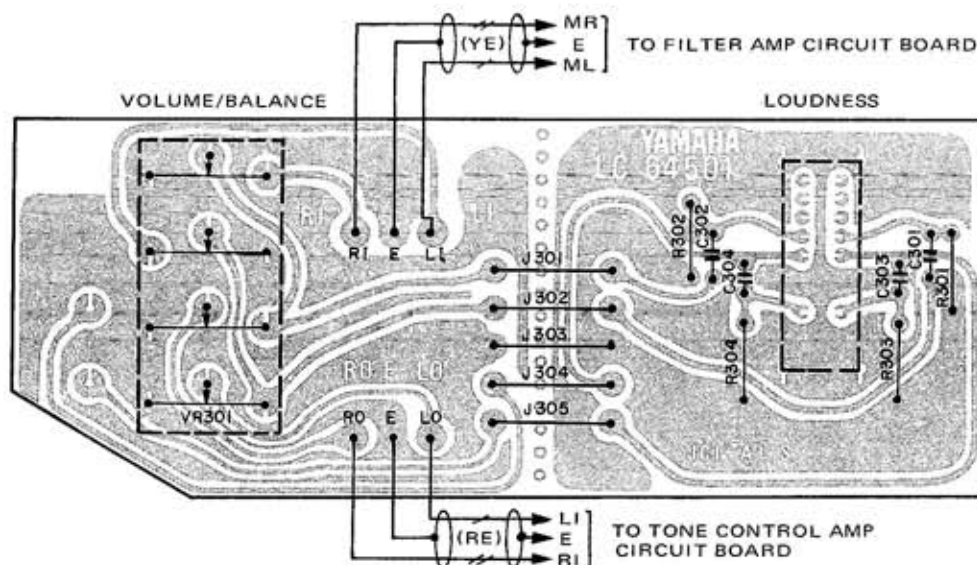
FUNCTION CIRCUIT BOARD

NA06491: GENERAL, AUSTRALIAN & EUROPEAN MODELS
NA06556: U.S. & CANADIAN MODELS



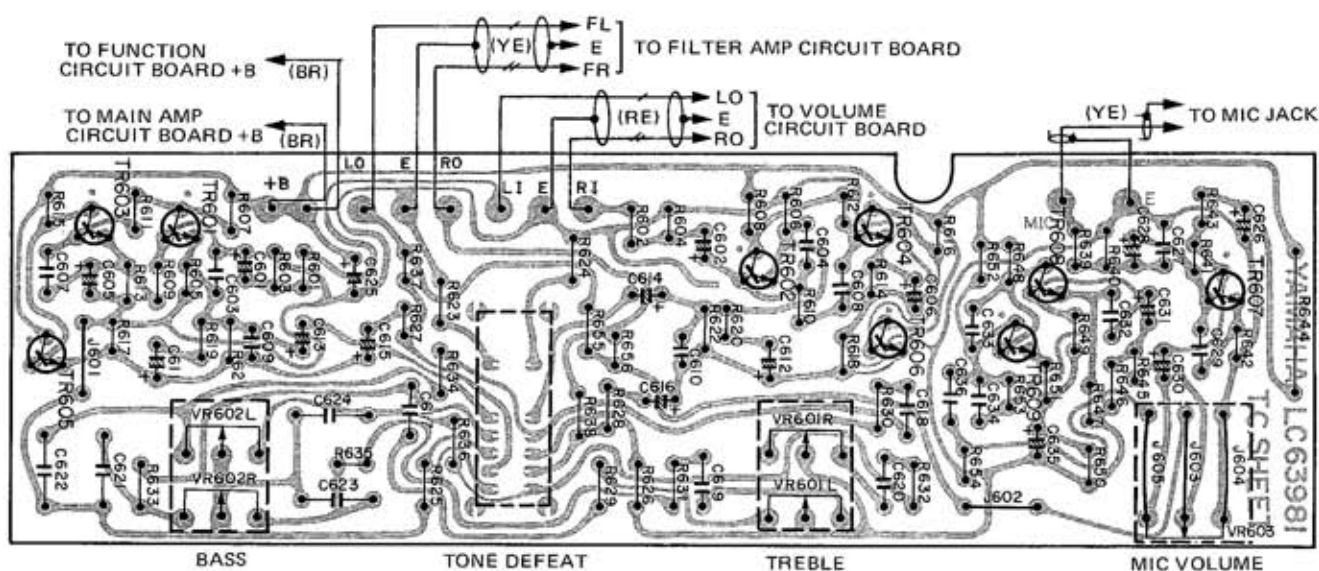
VOLUME CIRCUIT BOARD

NA: 06560



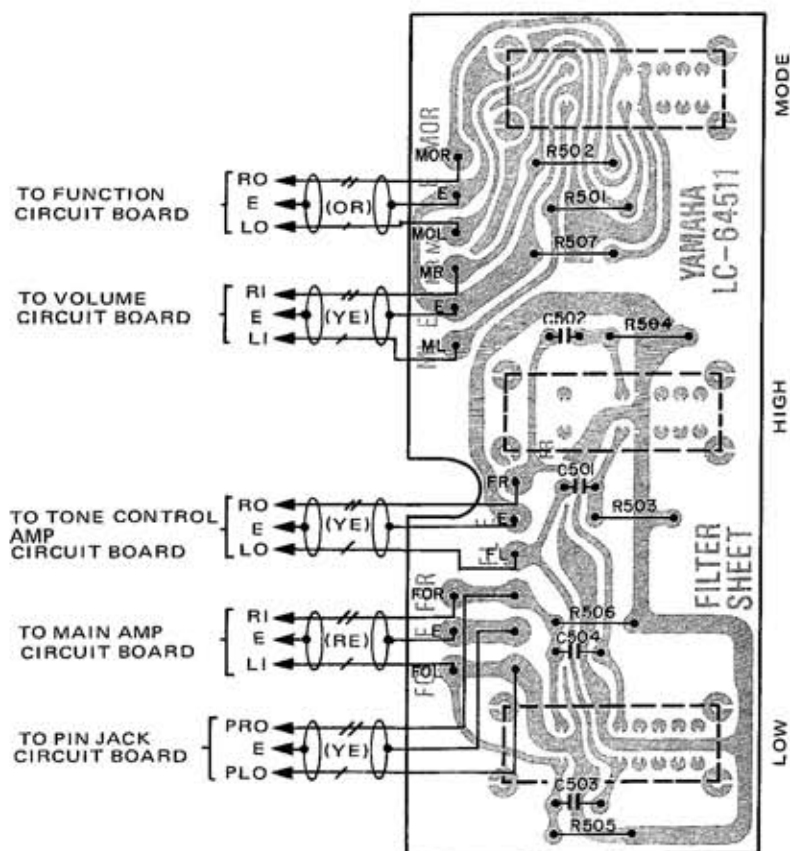
TONE CONTROL AMP CIRCUIT BOARD

NA06493: GENERAL, AUSTRALIAN & EUROPEAN MODELS
NA06558: U.S. & CANADIAN MODELS



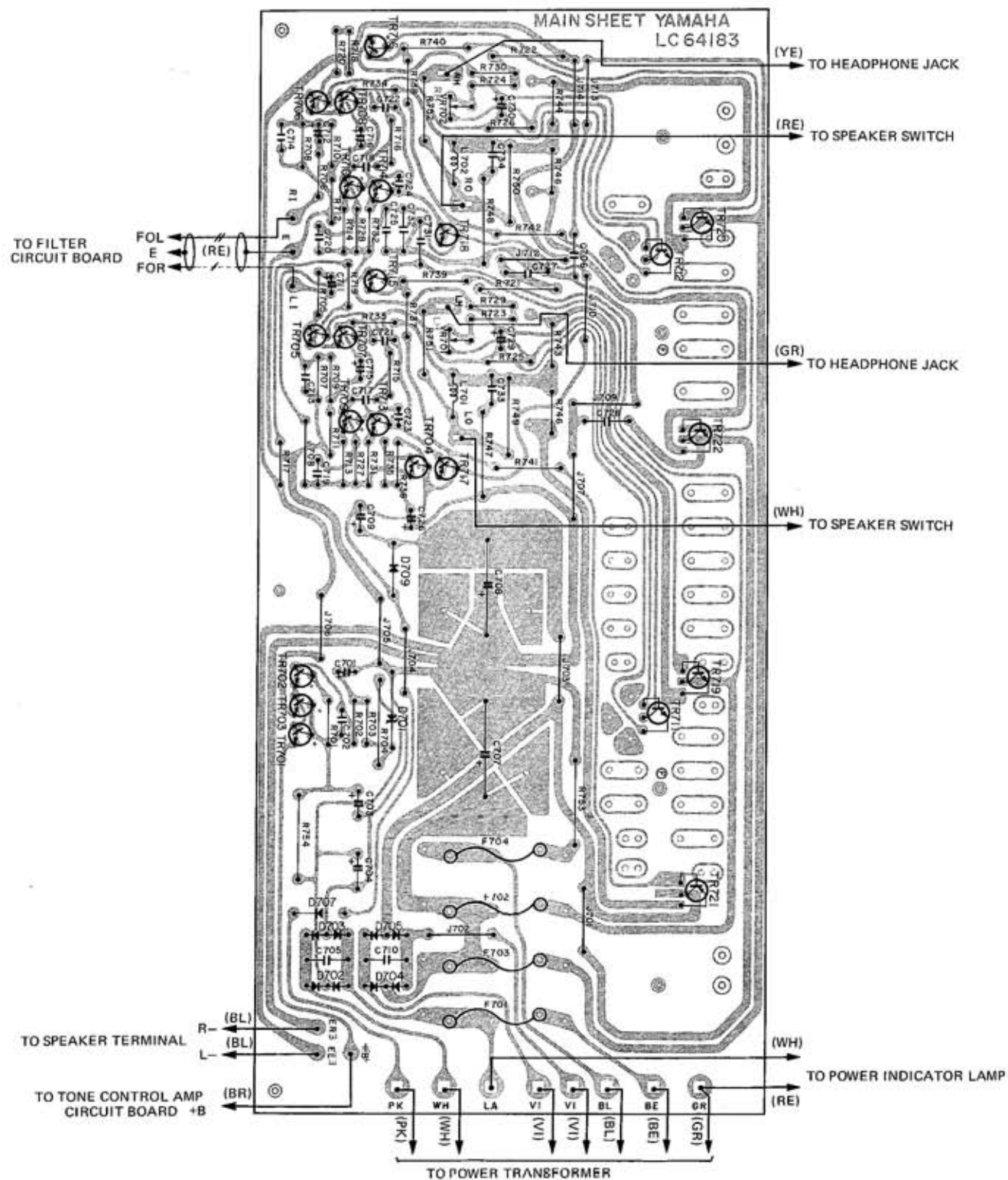
FILTER CIRCUIT BOARD

NA06492: GENERAL, AUSTRALIAN & EUROPEAN MODELS
NA06557: U.S. & CANADIAN MODELS

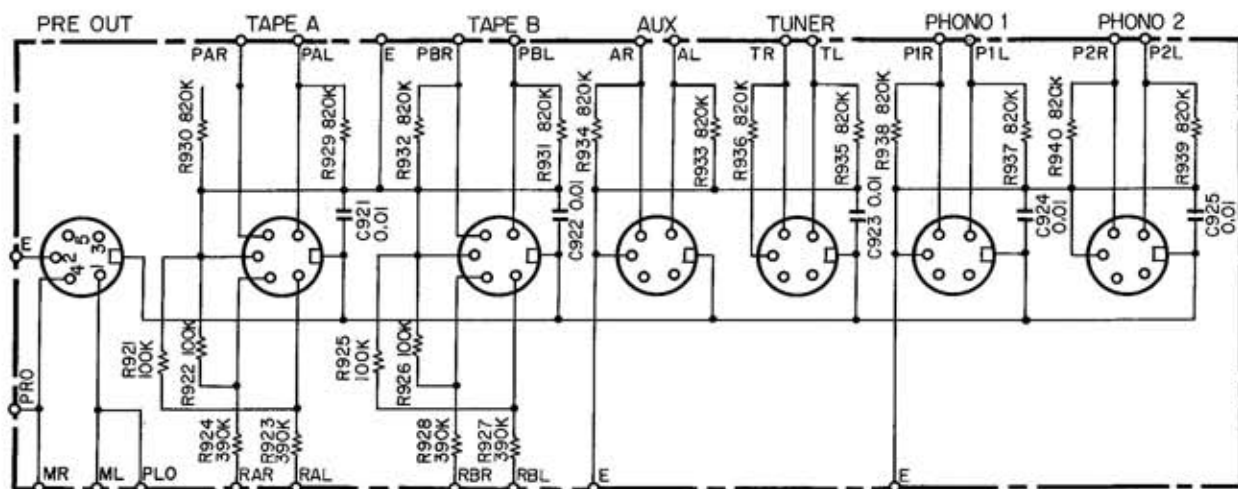


MAIN AMP CIRCUIT BOARD

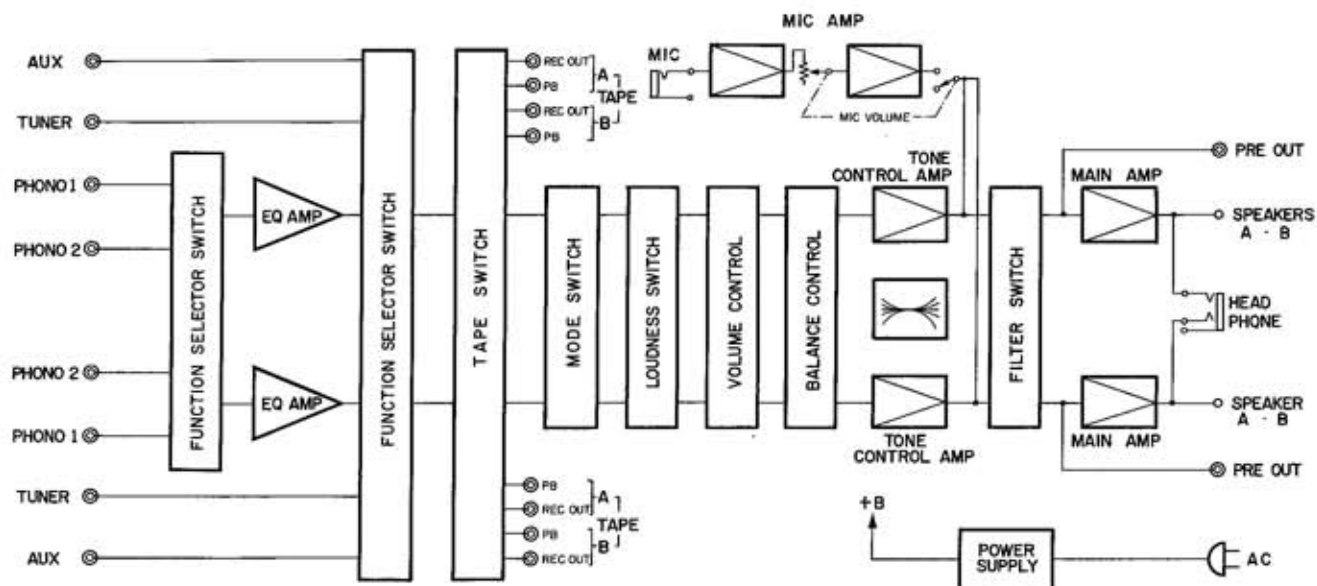
NA06495: GENERAL, AND AUSTRALIAN MODELS
 NA06496: U.S. & CANADIAN MODELS
 NA06497: EUROPEAN MODEL



NA06494: GENERAL, AND AUSTRALIAN MODELS
NA06559: U.S. & CANADIAN MODELS



BLOCK DIAGRAM

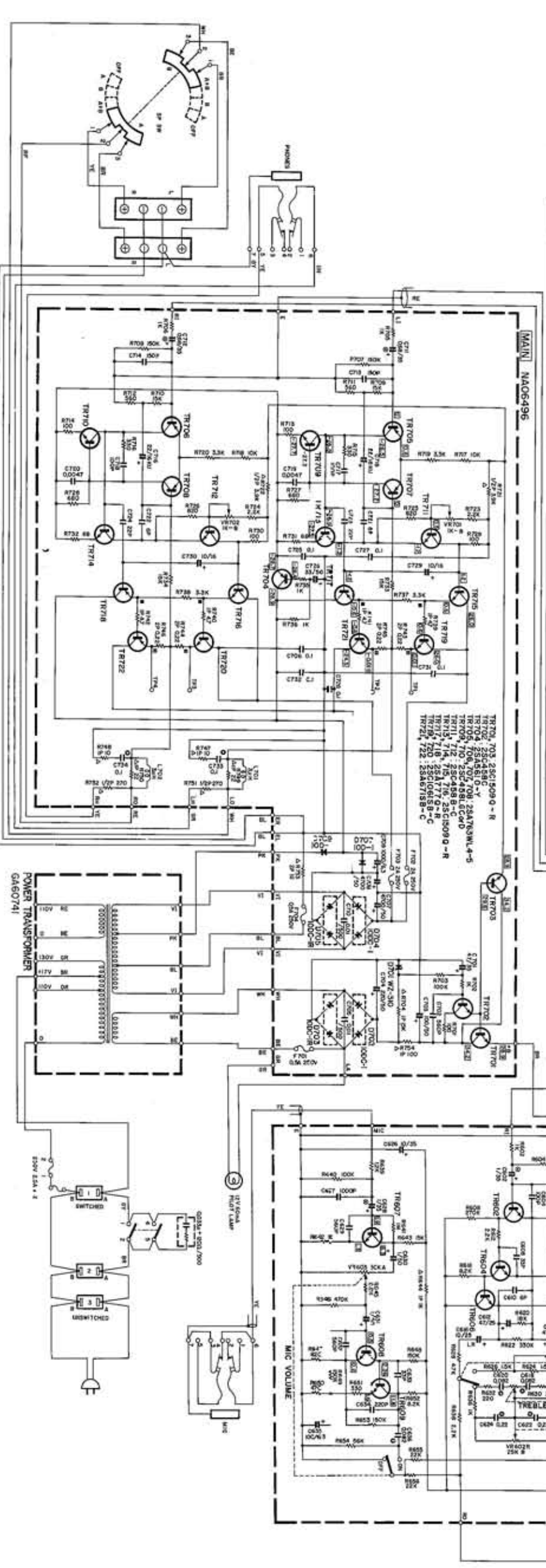


WIRE COLOR ABBREVIATIONS

BL ▶ Black	VI ▶ Violet
BR ▶ Brown	GY ▶ Gray
RE ▶ Red	WH ▶ White
OR ▶ Orange	GG ▶ Light Green
YE ▶ Yellow	SB ▶ Light Blue
GR ▶ Green	PK ▶ Pink
BE ▶ Blue	

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

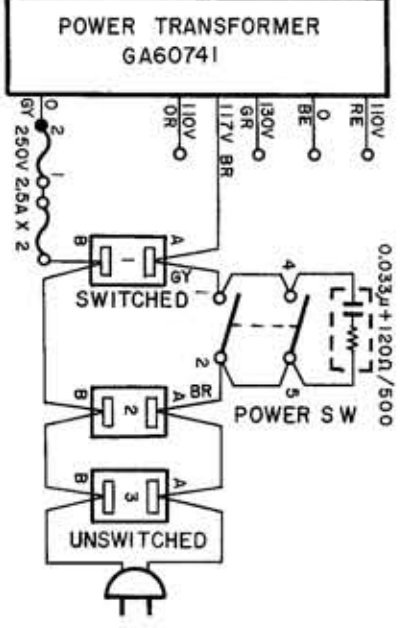
SYMBOL	PARTS NAME	REMARKS
	MYLAR CAPACITOR	
NO MARK	CERAMIC CAPACITOR	
	POLYSTYRENE CAPACITOR	
NO MARK	(BI-POLAR) ELECTROLYTIC CAPACITOR	
	LOW-NOISE ELECTROLYTIC CAPACITOR	
	TANTALUM CAPACITOR	

[illegible]

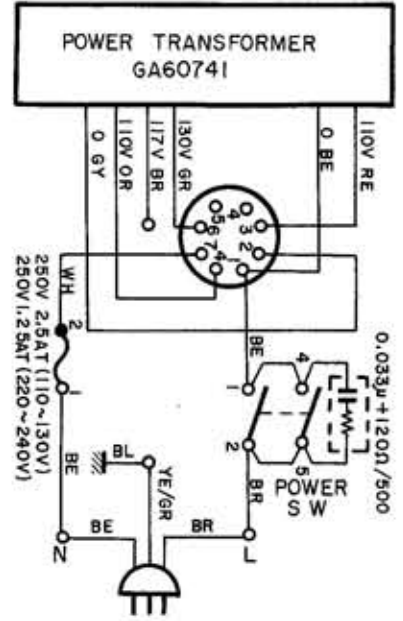
PARTIAL CHANGES MADE ACCORDING TO DESTINATION

▼POWER

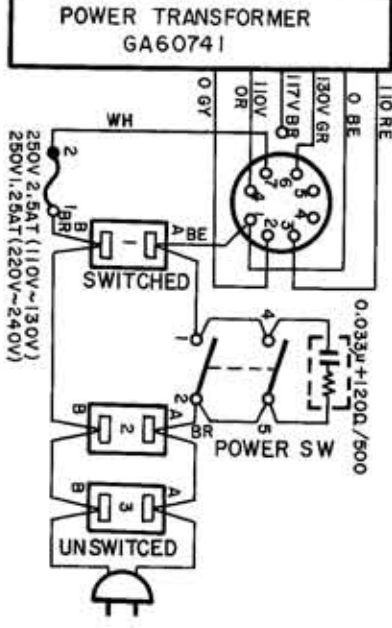
● U.S. & CANADIAN MODELS



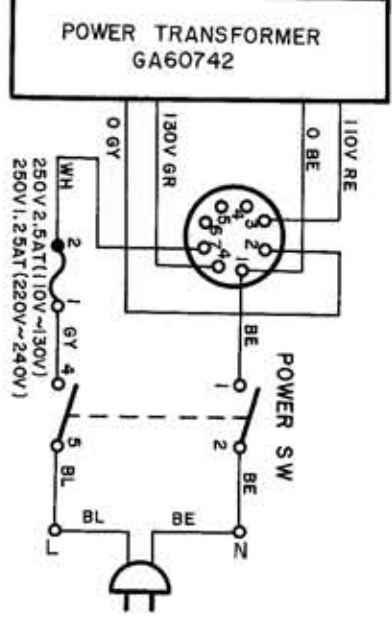
● SOUTH AFRICAN MODEL



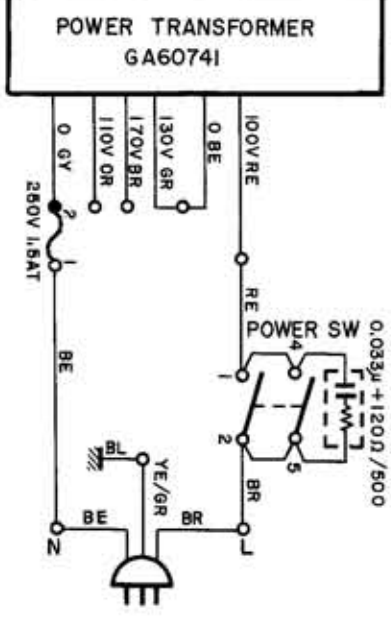
● GENERAL MODEL



● EUROPEAN MODEL

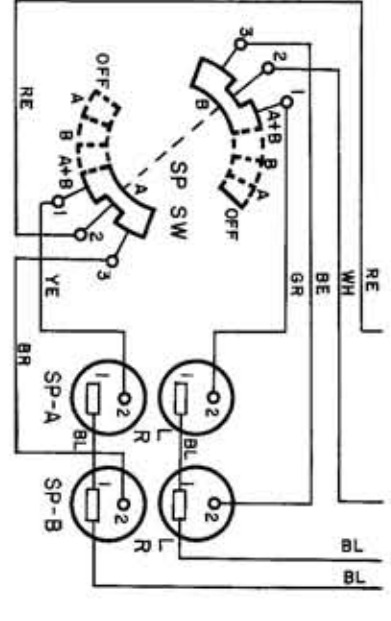


● AUSTRALIAN MODEL



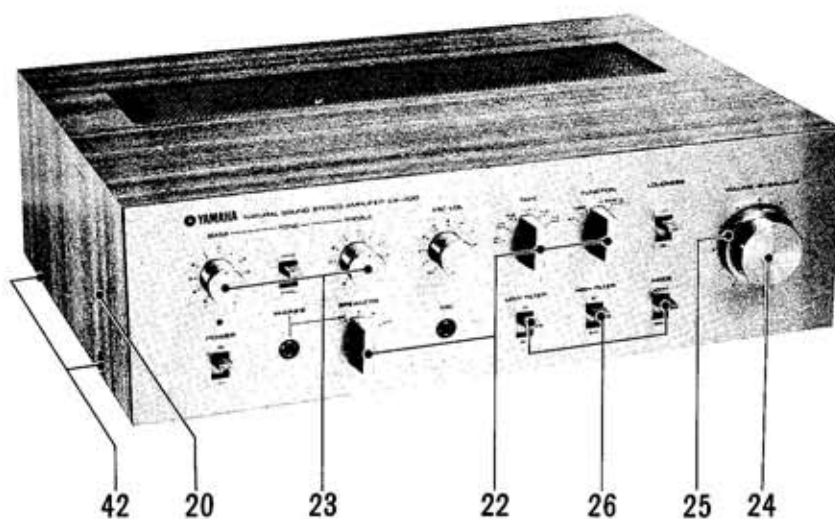
▼SPEAKER CONNECTOR

(EUROPEAN MODEL ONLY)

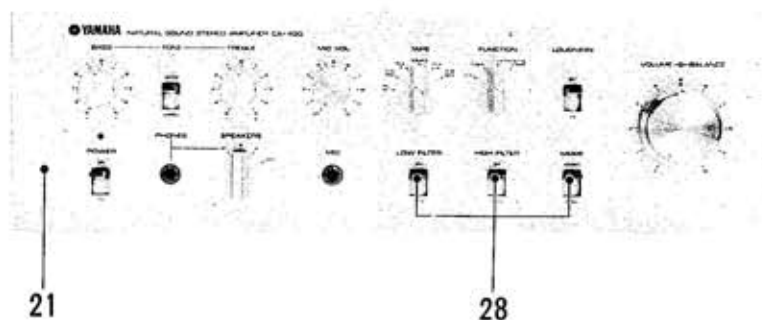


PARTS LIST

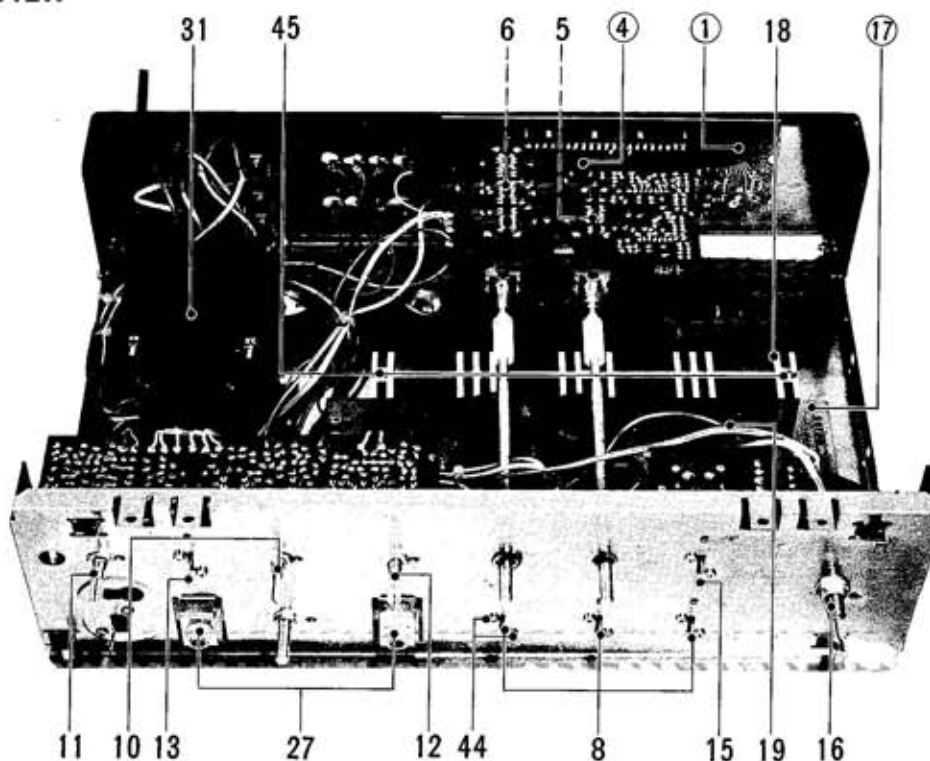
FRONT VIEW



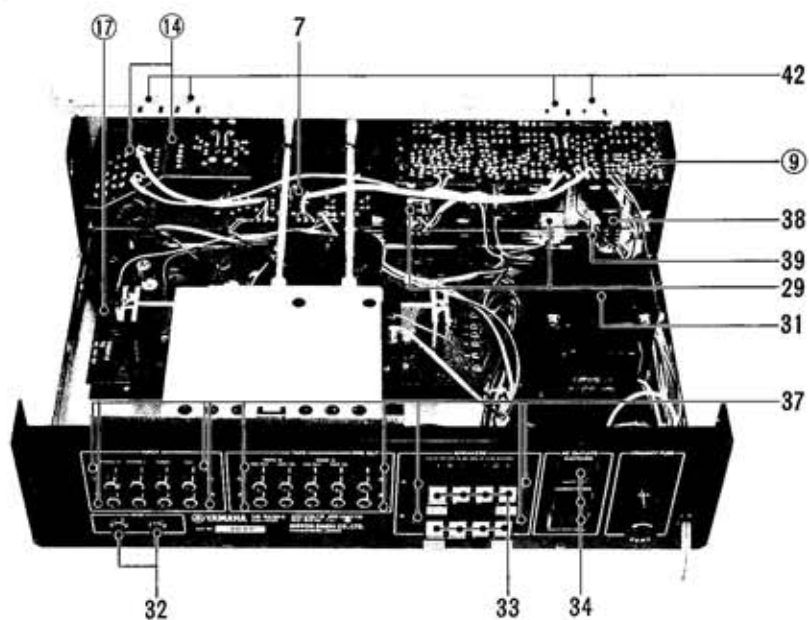
FRONT VIEW



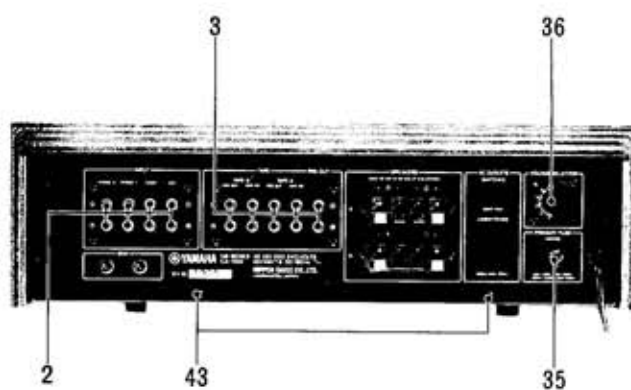
INTERNAL VIEW



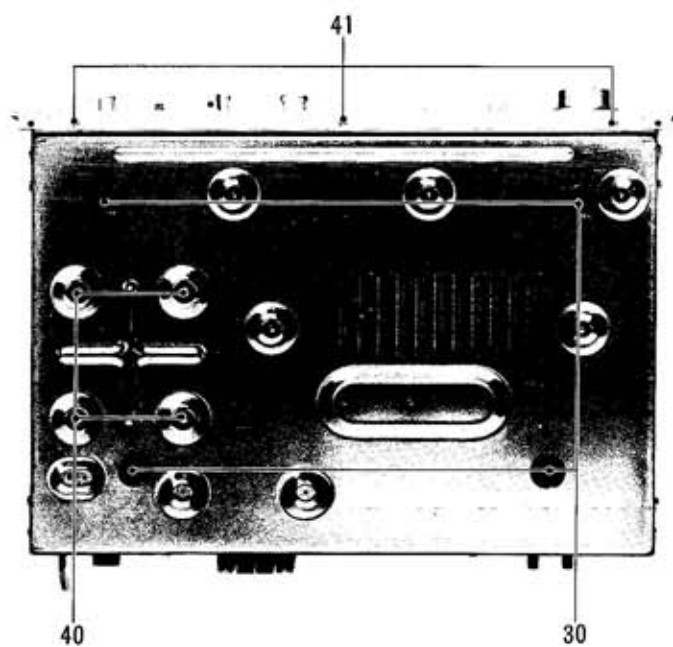
INTERNAL VIEW



BACK VIEW



BOTTOM VIEW



Ref. No.	Part No.	Description		Remarks	Common Models
①	NA06494	Pin jack circuit board	# 63990	ピンジャックシート	Except U.S., Canadian & European models
	NA06559	"	# 6452	"	U.S. & Canadian models
	LB30012	Connector pin	2183 - 3A	コネクタピン	
	LB60027	"	2402 - 6A	"	
2	LB60039	8P pin jack		8 P ピンジャック	
3	LB60049	10P "		10 P ピンジャック	
	NA06499	DIN connector circuit board	# 64190	D I N シート	European model
	LB30012	Connector pin	2183 - 3A	コネクタピン	
	LB60027	"	2402 - 6A	"	
	LB50009	DIN connector socket	5P SMK	D I N ソケット	
④	NA06491	Function circuit board	# 63910	ファンクションシート	Except U.S. & Canadian models
	NA06556	"	# 64530	"	U.S. & Canadian models
	FP13647	Tantalum Capacitor	4.7 μ F 16V	タンタルコン	
	FP15610	"	1 μ F 35V	"	
	iG00011	Integrated circuit	TA-7122P	I C	
	iG00037	"	BA-311	I C	
	iF00004	Diode	1S1555	ダイオード	
5	KA50024	Rotary switch	SRZ-V-044	ロータリースイッチ	
6	KA50040	"	SRZ-066	"	$\ell = 25$ Non-shorting
	LB30013	Connector socket	2145-3A	コネクタソケット	
	LB60028	"	2145-6A	"	
⑦	NA06492	Filter circuit board	# 63920	フィルターシート	Except U.S. & Canadian models
	NA06557	"	# 6451	"	U.S. & Canadian models
8	KA20014	Lever switch	SLA-34301	レバースイッチ	Shorting
⑨	NA06493	Tone control circuit board	# 63980	トーンコンシート	Except U.S. & Canadian models
	NA06558	"	# 64490	"	U.S. & Canadian models
	FJ53747	Electrolytic capacitor	4.7 μ F 16V	ケシコン K U 型	KU type

Ref. No.	Part No.	Description		Remarks	Common Models
	FJ66610	"	1 μ F 50V	ケシコンLR型	LR type
	FJ64710	"	10 μ F 25V	"	"
	FP15610	Tantalum capacitor	1 μ F 35V	タンタルコン	
10	HS41020	Variable resistor V16R	810K Ω x2	可変抵抗	With 11 clicks
11	HS41021	"	825K Ω x2	"	"
12	HS41015	"	A50K	"	With switch
13	KA20012	Lever switch	SL34202	レバースイッチ	Shorting
	iC04589	Transistor	2SC458 LG C or D	トランジスター	
⑭	NA06498	Volume circuit board	# 64081	ボリュームシート	Except U.S. & Canadian models
	NA06560	"	# 64501	"	U.S. & Canadian models
15	KA20012	Lever switch	SL34202	レバースイッチ	Shorting
16	HS12041	Variable resistor	250K Ω 1Zx2 250K Ω 8x2 With C.T.	可変抵抗	
⑰	NA06495	Main amp circuit board	# 64000	メインシート	General & Australian models
	NA06496	"	"	"	U.S. & Canadian models
	NA06497	"	# 64180	"	European model
	HZ00021	Cement molded resistor (fire proof)	4.7 Ω 1P	不燃性抵抗	
	HZ00058	Fuse resistor	100 Ω 1/2P	ヒューズ抵抗	
	HL40527	Metal oxide resistor	270 Ω 1/2p	酸化金属抵抗	
	HL40639	"	3.9k Ω "	"	
	HL41410	"	10 Ω 1P	"	
	HL41422	Metal oxide resistor	22 Ω 1P	"	
	HL41615	"	1.5k Ω 1P	"	
	HL42410	"	10 Ω 2P	"	
	HZ00033	Metal plate resistor	0.22 Ω 2P	金属板抵抗	
	GD90005	Coil	3 μ H	コイル	
	FJ53722	Electrolytic capacitor	22 μ F 16V	KU型ケシコン	KU type
	FP15568	Tantalum capacitor	0.68 μ F 35V	タンタルコン	

Ref. No.	Part No.	Description			Remarks	Common Models	
	iH00008	Diode	10DC-1	ダイオード	for service iH00014		
	iH00009	"	10DC-1R	"	for service iH00015		
	iH00003	"	10D-1	"	for service iH00006		
	iF00022	Zener Diode	WZ-310	ツェナーダーオード			
	iA05617	Transistor	2SA561 O or Y	トランジスター			
	iA07630		2SA763	"			
	iA06719		2SA671S B or C	"			
	iA07773		2SA777 Q or R	"			
	iC04588		2SC458 B or C	"			
	iC10618		2SC1061S B, C or D	"			
	iC15093		2SC1509 Q or R	"			
	HT41002	Variable resistor	SV10KR B1K	可変抵抗器			
	iL00005	Insulator for transistor	2SC1061	Tr用絶縁板	AC221		
	LB20057	Fuse holder pin	SN-5053	ヒューズホルダーピン			
18	BA06522	Heat sink	No. 6522	放熱器			
19	BB06308	Transistor clamper	No. 6308	Trブッシャー			
	iL000025	Bush No. 25 2.6 mm		ブッシュ	PPO		
	FJ21910	Electrolytic capacitor	1000 μ F 6.3V	ケシコン (タテ)			
	FM05947		4700 μ F 50V	ケシコン (キバン)			
	KB00031	Fuse	0.5AT 250V	耐ラッシュヒューズ	General & Australian models		
	KB00035	"	2AT 250V	"	"		
	KB00101	Fuse, UL listed	0.5AT 250V	ULヒューズ	U.S. & Canadian models		
	KB00103	"	2AT 250V	"	"		
	KB00071	Miniature fuse	0.5A 250V	Ⓢヒューズ速断	European model		
	KB00056	"	2A 250V	"			
20	3200337005000	Outside case		外装箱 A/W			
21	NB06942	Front panel unit		フロントパネルユニット			
22	BA06442	Knob	No. 6442	スイッチつまみ	Switch		
23	BA06446	"	No. 6446	トーンコンつまみ	Tone control		
24	BA06576	Double knob	No. 1576	ボリュームつまみ	Volume		
25	BA06577	"	No. 6077	バランスつまみ	Balance		
26	CB06857	Lever knob		レバーつまみ			

Ref. No.	Part No.	Description		Remarks	Common Models
27	CB06827	Phone nut	ホーンナット		
	CB06858	Bush No. 6858	スイッチブッシュ	Switch	
28	CB06872	Switch apron No. 6872	スイッチエプロン		
	CB06862	Lamp holder	ランプホルダー		
	CB06861	Lamp lens No. 6861	ランプレズ		
29	LB10007	Phone jack	ホーンジャック		
30	CB06855	Leg No. 6855	脚		
31	GA60741	Power transformer	電源トランス	Except European model	
	GA60742	"	"	European model	
	LA00104	3P terminal lug	3 P 中継端子台	Australian & European models	
32	LA00107	Ground terminal (knob type)	アース端子		
33	LA00132	4PE push terminal X-Q2366	スピーカー端子	Except European model	
	LB20005	DIN 2P socket CS-220	DIN 2 P ソケット	European model	
34	LB20071	AC connector socket (spring type)	A C コンセント	General, U.S. & Canadian models	
35	LB20048	" (UL type)	"	Except European model	
	LB20059	" FEB031-1401	"	European model	
	KB00043	Fuse 1.25AT 250V	ヒューズ	General model	
	KB00111	Fuse, UL listed 2.5A 250V SS-2	"	U.S. & Canadian models	
	KB00068	Miniature fuse 1.25AT 250V	"	European model	
	KB00088	Lead type fuse 2.5A 250V ASF-3	"	U.S. & Canadian models	
	KB00034	Fuse 1.5AT 250V	"	Australian model	
36	LB20025	Voltage selector 033-3001	電圧切換器	General & European models	
37	CB06888	Plastic rivet	プラスチックリベット		
	KA50033	Rotary switch	ロータリースイッチ	Speaker selector	
38	KA20010	Lever switch JL-04	パワースイッチ	Except European model	
	KA20011	" JL-08	"	European model	
39	FZ00011	Spark killer 0.33 μ F +120 Ω	スパークキラー	Except European model	
	TX90083	Hexagonal wrench 2.0 mm	六角棒レンチ		
	NB06678	Service pad No. 6678	サービスパッド		
	MZ06189	Connection cord Pin-Pin	接続コード	Except European model	
	MZ06160	" DIN-DIN	"	European model	
	LB10018	Shorting plug, Black	ショートプラグ	Except European model	
	JB00023	Pilot lamp (lead type) 12V 60mA	リード付ランプ		

