CONTENTS

SPECIFICATIONS

■ POWER AMP SECTION

CIRCUIT SYSTEM — Switched A/B type all stage direct coupled pure complementary SEPP OCL circuit

DYNAMIC POWER (IHF, 8Ω) 200W

OUTPUT 20Hz ~ 20kHz

20Hz ~ 20kHz Both Channels Driven	B Class, 8Ω	70W x 2
	B Class, 4Ω	85W x 2
	A Class, 8Ω	15W x 2
1kHz (Both Channels Driven)		
	B Class, 8Ω	75W x 2
	B Class, 4Ω	100W x 2
	A Class, 8Ω	15W x 2
1kHz (One Channel Driven)		
	B Class, 8Ω	80W
	B Class, 4Ω	100W
	A Class, 8Ω	15W

TOTAL HARMONIC DISTORTION

B Class at Rated Output	0.1%
B Class at 1W Output	0.04%
A Class at Rated Output	0.1%
A Class at 1W	0.02%

INTERMODULATION DISTORTION (70Hz : 7kHz = 4 : 1)

B Class at Rated Power		0.1%
B Class at 1W	less than	0.05%
A Class at Rated Power		0.1%
A Class at 1W	less than	0.05%

POWER BANDWIDTH (IHF, Both Channels Driven 0.05%)

B Class	5Hz ~ 50kHz
A Class	5Hz ~ 100kHz

FREQUENCY RESPONSE

B Class	10Hz ~ 100kHz $^{0}_{-3}$dB
A Class	10Hz ~ 100kHz $^{0}_{-3}$dB

INPUT SENSITIVITY

B Class	775mV
A Class	330mV

INPUT IMPEDANCE 40kΩ

OUTPUT TERMINALS

Speaker Terminals	A, B, C, A+B, A+C
Headphone Jack	4Ω ~ 16Ω

DAMPING FACTOR (1kHz, 8Ω) 70

S/N RATIO (IHF, A Network) 100dB

Residual Noise (8Ω, Pre-Amp + Power Amp) 0.8mV

■ PRE-AMP SECTION

CIRCUIT SYSTEM

Equalizer Amp	FET, SRPP Input Tr. SEPP Output
Microphone Amp	Two-transistor direct coupled amp.
Control Amp	Intermediate emitter-follower type

INPUT SENSITIVITY AND IMPEDANCE

Phono 1	MIC 200μV/100Ω 3mV/50kΩ, 100kΩ
Phono 2	3mV/50kΩ
Phono Maximum Input Capacity (at 1kHz)	310mVrms (870mVp-p)
Mic.	2.5mV/50kΩ
Tuner	120mV/40kΩ
Aux. 1, 2	120mV/40kΩ
Tape PB A, B	120mV/40kΩ

OUTPUT LEVER AND IMPEDANCE

Tape Rec Out A, B	120mV/2kΩ
Pre Out	775mV/2kΩ

FREQUENCY RESPONSE

Phono (RIAA equalization)	30Hz ~ 15kHz ±0.2dB
Mic.	20Hz ~ 20kHz +0.5dB, −2dB
Tuner, Aux, Tape PB	10Hz ~ 50kHz +0.5dB, −1dB

TONE CONTROLS

Bass	50Hz ±15dB 250Hz, 500Hz ±3dB
Treble	10kHz ±10dB 2.5kHz, 5kHz ±3dB

AUDIO MUTING −20dB

FILTERS

Low	20Hz, 70Hz (12dB/oct.)
High	6kHz, 12kHz (6dB/oct.)

LOUDNESS CONTROL Continuous loudness control to be treated as loudness curve

S/N RATIO (IHF, A Network)

Phono 1	MC 70dB 50kΩ, 100kΩ 80dB
Phono 2	80dB
Mic.	70dB
Tuner, Aux, Tape	90dB

■ AUXILIARY CIRCUITS

Transistorized Protector Circuit (ASO detection limiter system)
Speaker Protection Circuit (Voltage direction relay drive system)
Operation Switch — A Class/B Class switchover
Tape Dubbing Switch
Continuous Loudness

■ GENERAL

Power Source — AC 110, 117, 130, 220, 240 V 50 ~ 60Hz

Power Consumption

Rated		
CANADIAN MODEL	320W	400VA
U.S. MODEL	250W	
EXCEPT U.S. & CANADIAN MODELS	250W	
Max.	420W	
AC Outlets	Switched (2)	Max. 200W
	Unswitched (2)	Max. 200W

■ DIMENSIONS 436(W) x 144(H) x 323m/m (D)

■ WEIGHT 15.5kg

Specifications subject to change without notice.

CIRCUIT DESCRIPTIONS

1. SRPP (SHUNT-REGULATED PUSH-PULL) CIRCUIT

Features: Thanks to efficient use of power this circuit features a large dynamic range. Superior frequency response, lower noise and distortion ratio in following stages due to higher output impedance.

The SRPP circuit provided the above features to pre-amps during the tube era. It is composed of DC elements in series, but if we look at it as an AC circuit from the load side, the top and bottom elements appear to be AC, connected in parallel, so that the input impedance is high and output impedance low.

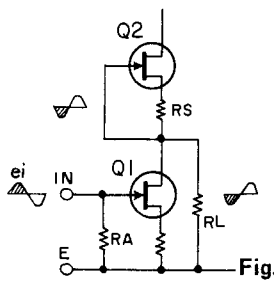


Fig. 1

When (+) input is fed to Q1, reverse phase voltage occurs at RS. Voltage, opposite in phase to the "ei" input, causes Q2 to operate in a push–pull modes Output is available from terminal RL.

In this circuit Q2 serves as load resistance for Q1 by using the gain from the FET's high output impedance. Furthermore, it is designed for a high RL factor. This is to handle the high gain with less distortion. In addition to a low distortion ratio, high S/N ratio, large input capacity and precise RIAA characteristics, the CA-1000 equalizer amp is not influenced by broadcast signals even in high field strength areas, and will accept various types of cartridges. These features are all assured by the primary FET stage. Because these elements provides characteristics close to those assured by squared factors, that random harmonic distortion is reduced and noise characteristics, especially pulse noise is extremely low. Noise factor in the transistor-collector current is minimal (near 10μA), so that ideally the equalizer amp primary stage current should be near this figure, except that this would make it difficult to provide sufficient input power. Drain current does not affect this figure, either, so it can be decreased by the supply of more current.

The CA-1000 is designed for 1mA drain current, so that primary amp stage input is dozens of times greater than the transistor's 10μA.

These excellent FETs were not used in high-fidelity amplifiers until now because of their smaller gain per unit, and because the IDSS (gate shutoff current) scatter was too large. It has also been difficult to gather data on the best characteristics for tube and transistor systems, yet this unit uses a combination of two selected FETs in the SRPP circuit for outstanding performance characteristics.

2. SPECIAL YAMAHA TONE CONTROL SYSTEM

This circuit is composed of a CR damping circuit, used generally in audio equipment, of the negative feed back type.

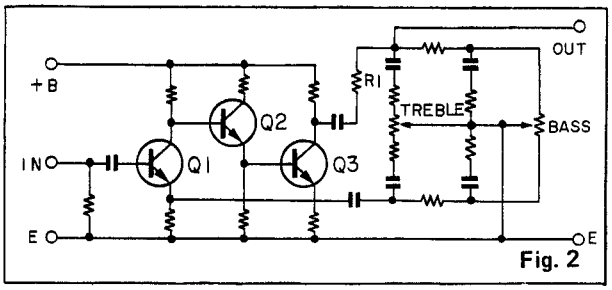


Fig. 2

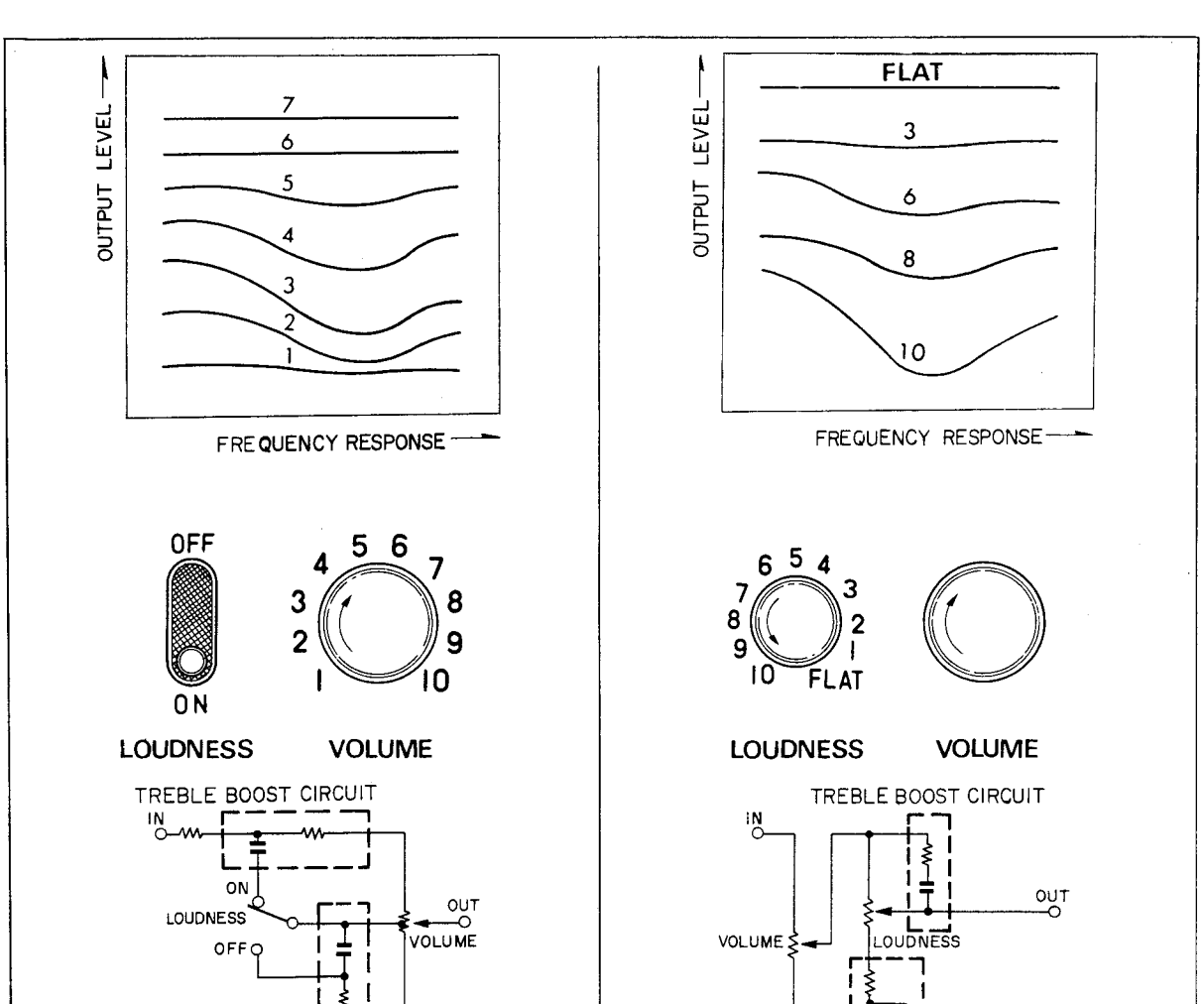
When the treble from the circuit shown in the figure is boosted, the parallel-coupled impedance in the first stage Q1 emitter rises in range and is reduced in amount. In other words, the NF decreases, boosting the treble tones. On the other hand, to cut the treble a special treble damping effect is produced by lowering the impedance of the contact point between the R1 (connected to the last stage collector) and the output terminal. Bass tone control is carried out in the same way.

Because the CA-1000 is the same as the first-quality three-stage direct-coupled equalizer amplifiers used in the most expensive audio equipment, the S/N ratio is superb and distortion is almost unmeasurably low. In addition, when the tone controls are set for flat response, gain at 25dB is 50dB negative feedback for outstanding stability.

3. CONTINUOUS LOUDNESS CIRCUIT

The continuous loudness circuit used in the CA-1000 corrects the weak point found in conventional loudness controls; its effect is graduated according to the volume control setting for ideal loudness characteristics at any volume level.

A conventional loudness circuit, as shown in the figure, is a time constant circuit connected to the middle volume tap. Its characteristics are changed according to the volume control setting as shown in Fig. 3, but it is impossible to adjust it to match speaker performance or room acoustics. The continuous loudness circuit in the CA-1000, however, is a circuit connected behind the volume circuit (actually, behind the tone control circuit). This solves the above problem, allowing the listener to use the circuit to achieve ideal listening characteristics. (Fig. 4)



4. A CLASS AND B CLASS OPERATION

The trend today is toward amplifiers with larger and larger output power, and this is one of the most important themes in new product development. Almost 100% (except for a few exceptions) of the solid state hi-fi amps now on sale employ B Class (strictly speaking, AB Class) operation. Yet engineers trying to combat audio distortion are constantly troubled by the crossover distortion and notch distortion present in B Class amps.

In the CA-1000 a great deal of effort has been spent to decrease high-range distortion while maintaining sufficient negative feedback stability. As a result, distortion between 20Hz and 100kHz has been reduced to less than 0.015% (Fig. 5). Only in A Class amps can one find higher stability, better performance and lower crossover or notch distortion. (Fig.6)

An A Class amp. is only common sense when one wants a small signal circuit, while the B Class is for high power. The B Class amp. boasts higher efficiency, provides relatively more output than the capacity loss in its power transistors, has lower ripple due to reduced current at no signal, has a better S/N ratio and is less sensitive to heat than the A Class amp. Nevertheless, the A Class amp. has its own merits, even through it suffers by comparison to a B Class amp. in the above ways when used as a main amp: in effect, the A Class amp. is more

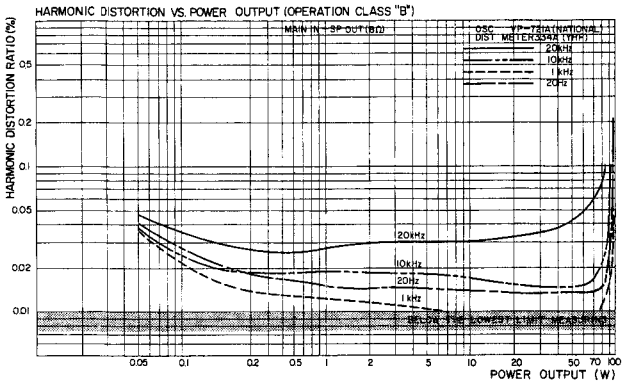


Fig. 5

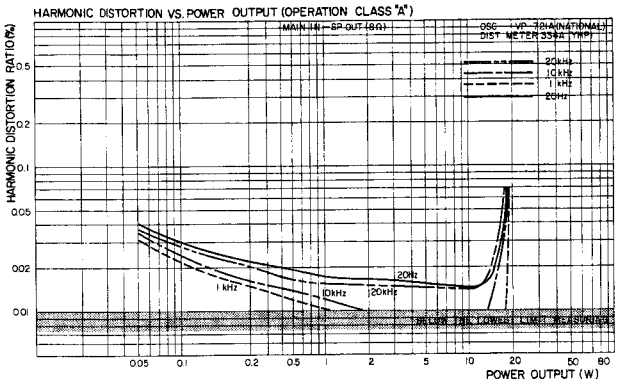
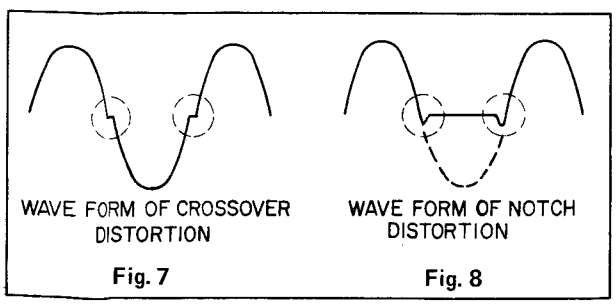


Fig. 6

faithful to the original signal. In other words, this system is much less susceptible to unstable performance and hence inferior tone quality. There is theoretically no crossover or notch distortion, and sharply reduced high range distortion. Let us examine crossover and notch distortion more carefully. Crossover distortion occurs if there is no signal current flow at the instant of changeover between positive and negative in a given cycle, during the B Class push-pull operation. In other words, when one transistor is changing from On to Off, the other transistor will be a bit late in switching from Off to On, as shown in Fig. 7. This is caused by nonlinearity in the signal transfer characteristics when the transistor collector current is small. To minimize this problem an idling current has been designed.



WAVE FORM OF CROSSOVER DISTORTION

Fig. 7

WAVE FORM OF NOTCH DISTORTION

Fig. 8

Notch distortion refers to the pulse distortion illustrated in Fig. 8. It occurs because of incomplete transistor switching, and is one of the most difficult problems inherent to solid state amplifiers. The high frequency elements of this distortion are also 5~10 times the 2nd harmonic or even higher than the audible range.

Finally, let us examine the differences between A Class and B Class amps in theory. The difference for classification purposes is in the bias setting. In an A Class amp. the mid-point P is set as the operation point where the direct load, drawn from the transistor static characteristics, is divided into two. Transistor base bias current is I_{B1} when there is no input

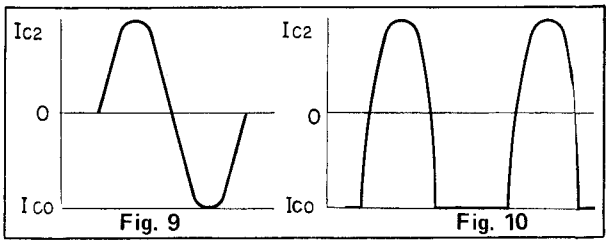


Fig. 9

Fig. 10

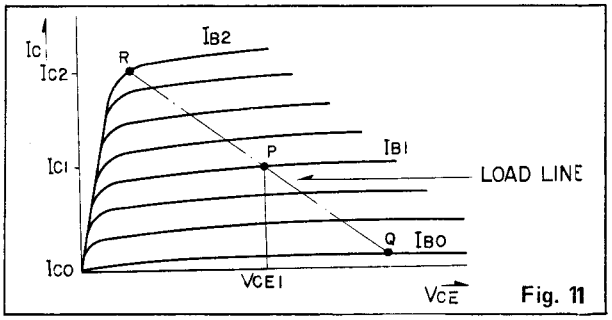


Fig. 11

signal, as shown in Fig. 11, and I_{C1} is continually flowing in the collector. Between the collector and emitter voltage V_{CE1} is added. Add a sine wave input signal to this transistor and then, when the base current is deflected from I_{BO} to I_{B2} collector current changes from I_{CO} to I_{C2} and a sine wave current with maximum amplitude $I_{C2}-I_{CO}$ is provided as shown in Fig. 9. In this way, when the amplifier output waveform operates for full negative and positive waves of the input signal, the operation is called A Class. In contrast with this, when the transistor bias is the base current I_{BO} and set to point Q to cut off practically all the collector current, then when a sine wave input signal, causing maximum deflection in I_{B2}, is added, base current is deflected from I_{BO} to I_{B2} for half the wave, but for the other half it does not flow due to opposite bias. For this reason the collector current changes to the performance shown in Fig. 10, Only following during one half of each input sinewave. This operation, using only half the input waveform, is

called B Class amplification.

A Class amplification is basically single operation, but output is only 2~3W; therefore a push-pull circuit is used for larger output. B Class operation, as shown above, is amplification using only half the waveform. Therefore, to get a full waveform the push-pull circuit is also used here. See Figs. 12~14.

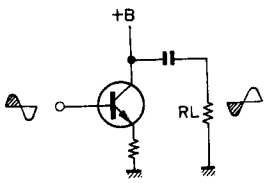


Fig. 12. A Class Single Circuit

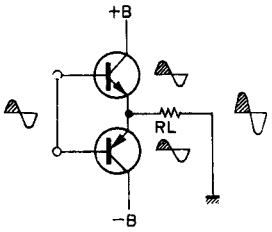


Fig. 13 A Class Push-Pull Circuit

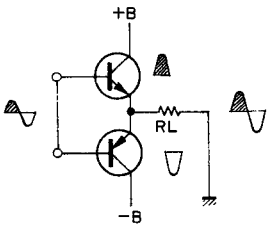


Fig. 14. B Class Push-Pull Circuit

5. PROTECTION CIRCUITS

■ Transistor Protection Circuit

The transistor protection circuit guards against transistor damage due to excessive current from a load short. In the CA-1000 a Darlington connection is used to regulate the input power flowing to the power transistor. This system has the advantage of working very quickly and protecting the transistor against overload by acting within an average of μsecond. This circuit checks both power transistor emitter resistance voltage and collector voltage drop, regulating the power transistor drive signal via the control transistor. When the load resistance drops below 4Ω the power transistor current is cut, which also radically lowers the output power for transistor protection. If there is a complete short in the output terminal, the current flowing in the power transistor averages 1.3A. To aid in discovering the cause of the short, the power does not go completely off; output merely drops considerably.

■ Speaker Protection Circuit

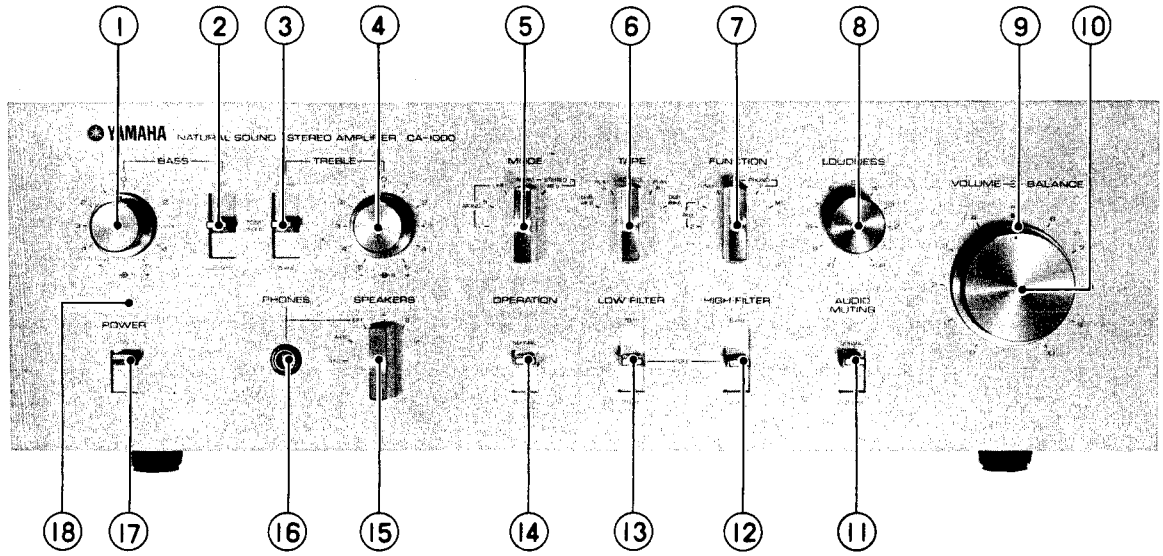
Note: Refer to the general circuit diagram power circuit.

This protection system is also unique to Yamaha. When (+) DC electric potential appears at either the left or right output terminal, the TR707 base is affected by the bias so that this transistor will be on, while TR708 and 709 will be off. Therefore the relay circuit goes off to protect the speakers.

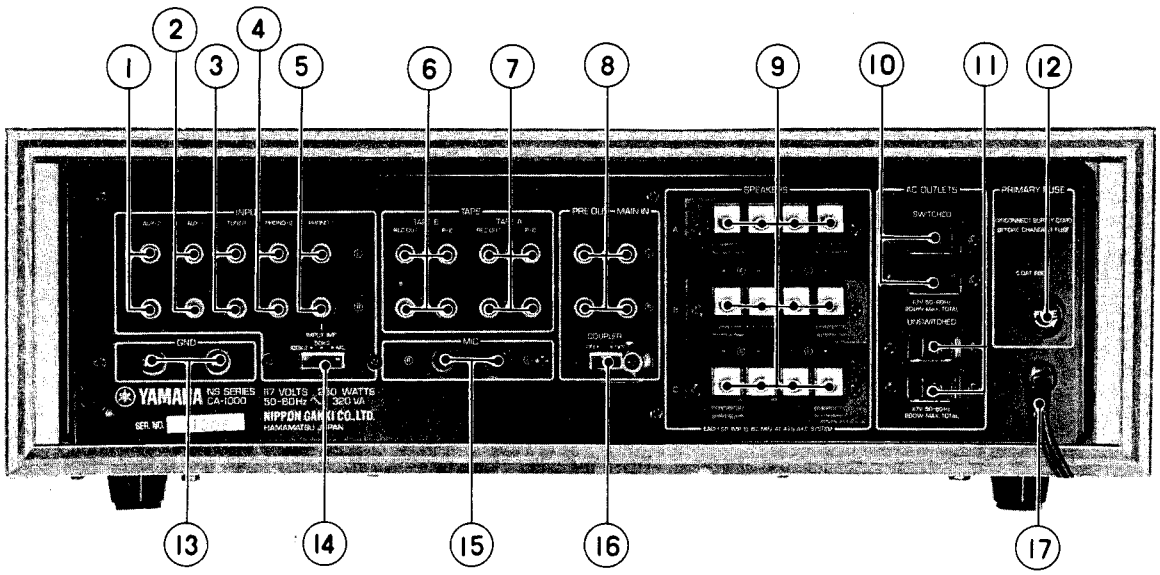
If there is a (−) DC electric potential, TR705 and 706 go on and operate in the same way. To avoid unpleasant shock noise when the switch is turned on a muting circuit is provided. This circuit switches on due to electric potential gain from the mid-point of the power sheet +B D704 and D706, with the time constant controlled by C715 and R721. After 4~5 seconds the TR709 base potential turns the transistor on, at the same time turning TR708 on and powering the relay.

EXTERNAL VIEW

FRONT PANEL



REAR PANEL



FRONT PANEL

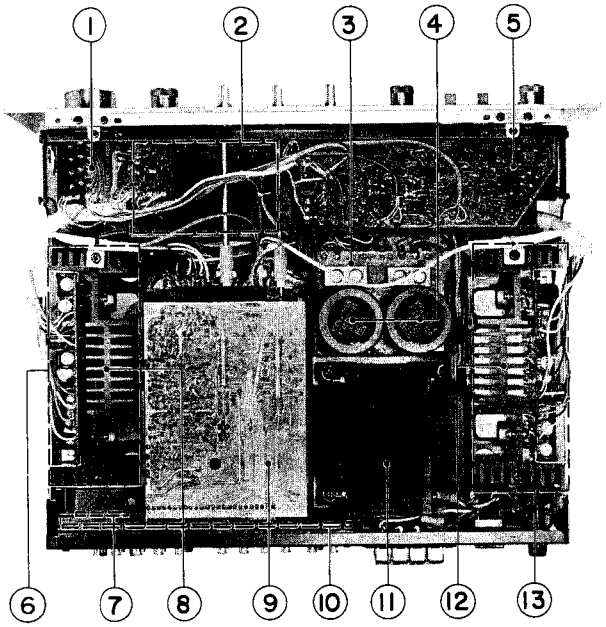
❶ BASS TONE CONTROL
❷ BASS TURNOVER SWITCH
❸ TREBLE TURNOVER SWITCH
❹ TREBLE TONE CONTROL
❺ MODE SELECTOR
❻ TAPE SELECTOR
❼ FUNCTION SELECTOR
❽ LOUDNESS CONTROL
❾ BALANCE CONTROL
❿ VOLUME CONTROL
⓫ AUDIO MUTING SWITCH
⓬ HIGH FILTER SWITCH
⓭ LOW FILTER SWITCH
⓮ A CLASS/B CLASS OPERATION SWITCH
⓯ SPEAKER SELECTOR
⓰ HEADPHONE JACK
⓱ POWER SWITCH
⓲ PILOT LAMP

REAR PANEL

❶ AUX-2 INPUT JACKS
❷ AUX-1 INPUT JACKS
❸ TUNER INPUT JACKS
❹ PHONO-2 (Turntable) INPUT JACKS
❺ PHONO-1 (Turntable) INPUT JACKS
❻ TAPE-B JACKS
❼ TAPE-A JACKS
❽ PRE OUT/MAIN IN JACKS
❾ SPEAKER TERMINALS
❿ AC OUTLETS (SWITCHED)
⓫ AC OUTLETS (UNSWITCHED)
⓬ PRIMARY FUSE
⓭ GROUND TERMINAL
⓮ INPUT IMPEDANCE SWITCH
⓯ MICROPHONE JACKS
⓰ COUPLER SWITCH
⓱ AC CORD

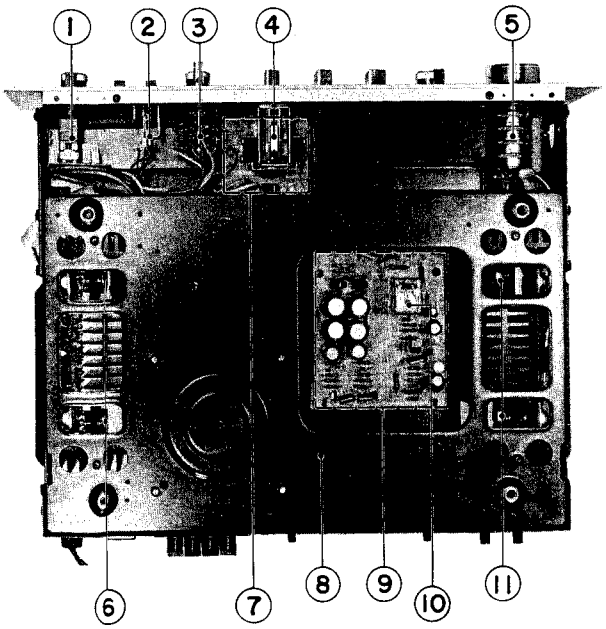
INTERNAL VIEW

TOP VIEW



❶ ELECTROLYTIC CAPACITOR (NA06336)
❷ FILTER CIRCUIT BOARD (NA06338)
❸ ELECTROLYTIC CAPACITOR CIRCUIT BOARD (NA06352)
❹ ELECTROLYTIC CAPACITOR (18,000μF/63WV)
❺ TONE CONTROL CIRCUIT BOARD (NA06337)
❻ MAIN AMP CIRCUIT BOARD
NA06331: EXCEPT EUROPEAN MODEL
NA06388: EUROPEAN MODEL
❼ MC AMP CIRCUIT BOARD (NA06339)
❽ HEAT SINK
❾ FUNCTION CIRCUIT BOARD (NA06335)
❿ REAR PANEL CIRCUIT BOARD (NA06333)
⓫ POWER TRANSFORMER (GA60530)
⓬ HEAT SINK
⓭ MAIN AMP CIRCUIT BOARD

BOTTOM VIEW



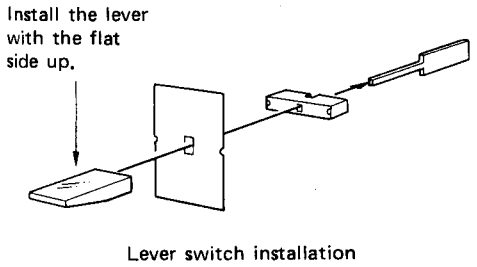
❶ POWER SWITCH CIRCUIT BOARD
NA06375: EXCEPT EUROPEAN MODEL
NA06376: EUROPEAN MODEL ONLY
❷ HEADPHONE JACK
❸ SPEAKER SELECTOR
❹ OPERATION SWITCH
❺ VARIABLE RESISTOR (Volume/Balance Control: HB250kΩ x 2 WITH CENTER CLICK A100kΩ x 2)
❻ POWER TRANSISTOR
❼ OPERATION SWITCH CIRCUIT BOARD (NA06354)
❽ CHASSIS
❾ POWER CIRCUIT BOARD (NA06332)
❿ SPEAKER PROTECTION CIRCUIT RELAY (HC-2P)
⓫ POWER TRANSISTOR

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.



Lever switch installation

Fig. 1

CABINET REMOVAL

a. Remove screws 1~5 as shown in Photo 1.
b. Remove the cabinet as shown in Photo 2.

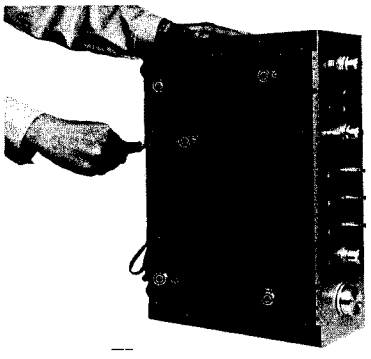


Photo 1

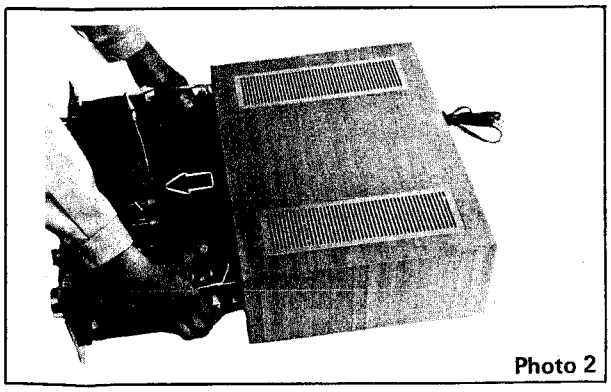


Photo 2

MC AMP CIRCUIT BOARD REMOVAL

a. Remove the two MC amp circuit board holder screws.
b. Pull up the MC amp circuit board in the direction of the arrow as shown in Photo 3.

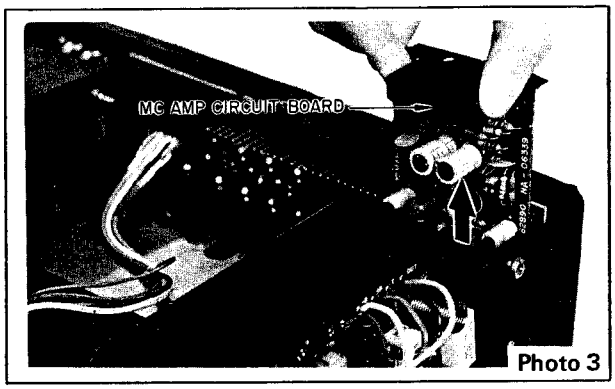


Photo 3

MAIN AMP UNIT REMOVAL

a. Remove screws 1, 2 as shown in Photo 4.
b. Pull up the main amp unit in direction of the arrow to remove it as shown in Photo 4.

   Note: Be careful not to cut the lead cord connected to the main amp circuit board.

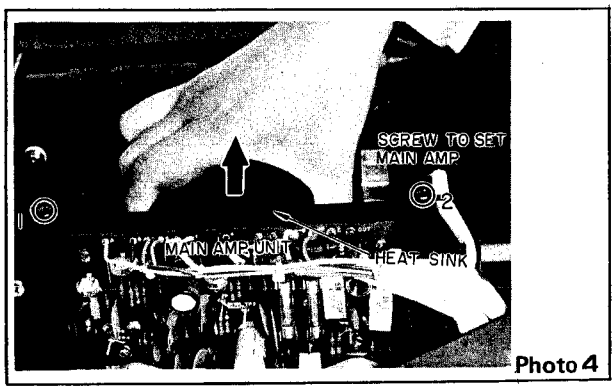


Photo 4

FUNCTION CIRCUIT BOARD

a. Loosen screws 1~3 and slide the function circuit board cover in the direction of arrow to remove it as shown in Photo 5.

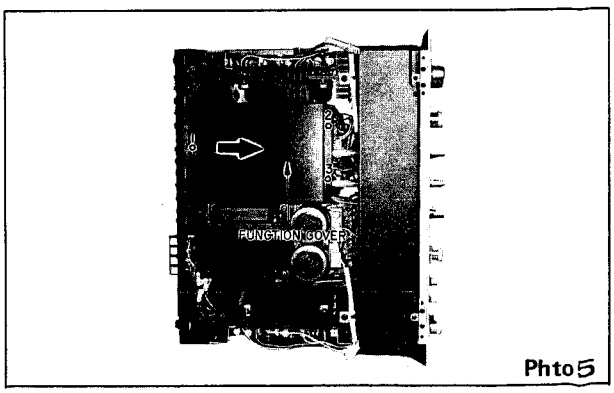


Photo 5

b. Slide the joints toward the front panel, then remove the function circuit board from the extention shaft as shown in Photo 6.

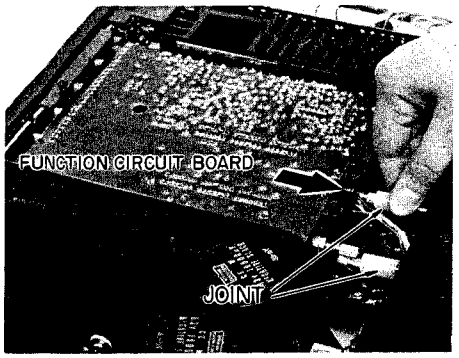


Photo 6

c. Loosen screws 1, 2 shown in Photo 7.

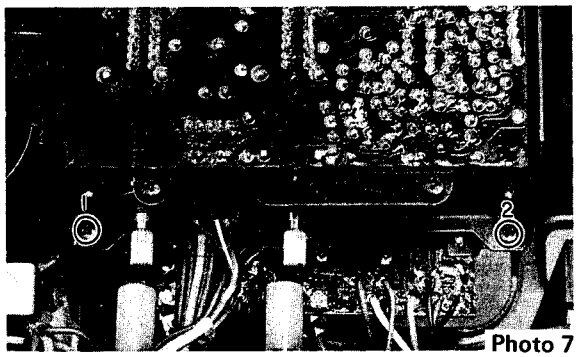


Photo 7

d. Insert a screwdriver into the hole in the function circuit board as shown in Photo 8 and pull in the direction of the arrow. Remove the function circuit board/rear panel connector.

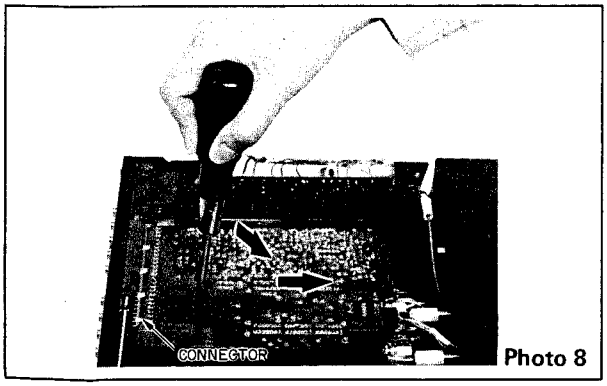


Photo 8

e. Remove the two CIS connectors from the rear panel and the one connected to the front panel, then remove the function circuit board as shown in Photo 9.

Note: When reinstalling the function circuit board, set the FUNCTION and TAPE switches to the same positions, then add the joint.

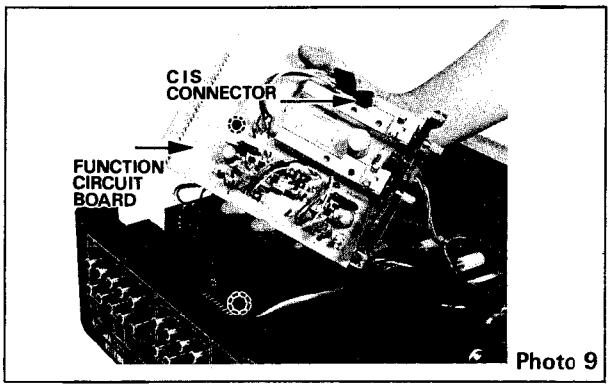


Photo 9

POWER CIRCUIT BOARD REMOVAL

a. Turn the chassis upside down.

b. Remove screws 1, 2 shown in Photo 10, then slide the power circuit board in the direction of the arrow to remove it as shown in Photo 11.

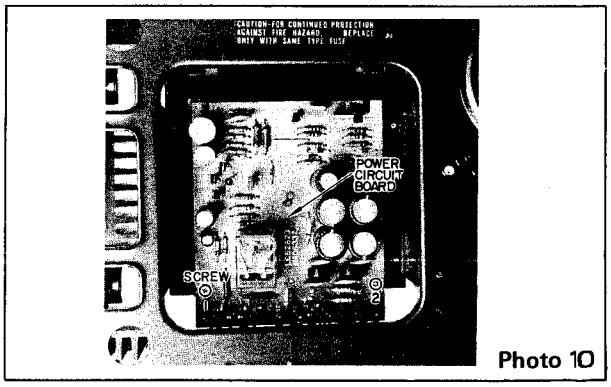


Photo 10

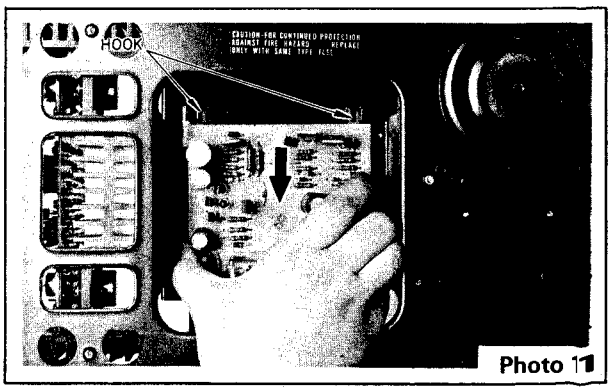


Photo 11

SUB CHASSIS UNIT TILTING

a. Remove screw 1 and loosen screws 2, 3 shown in Photo 12, then slide down the sub chassis unit as shown in Photo 13.

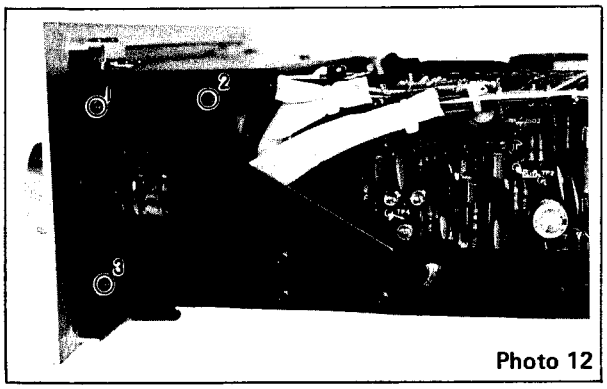


Photo 12

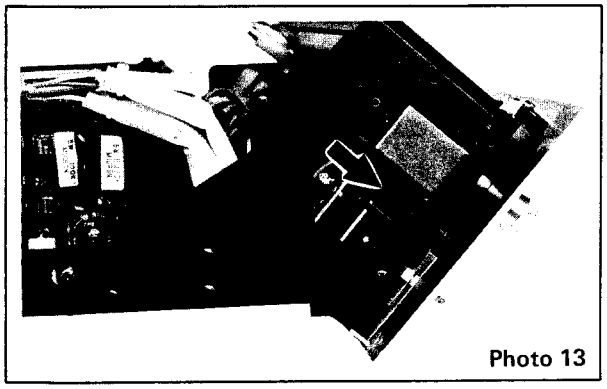


Photo 13

REAR PANEL TILTING

a. Remove the function circuit board (refer to Photo 5~9).

b. Remove screws 1~3 shown in Photo 14.

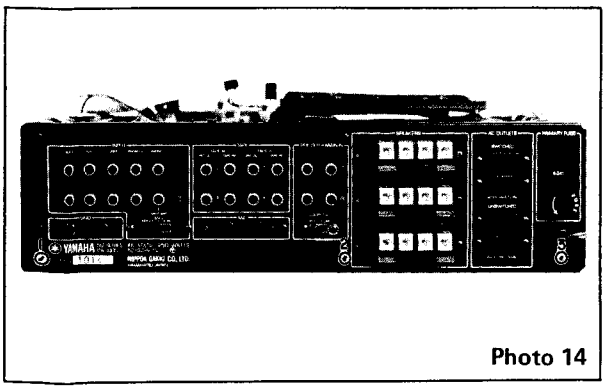


Photo 14

c. Remove screw 1 and loosen screw 2 shown in Photo 15, 15, then tilt down the rear panel as shown in Photo 16.

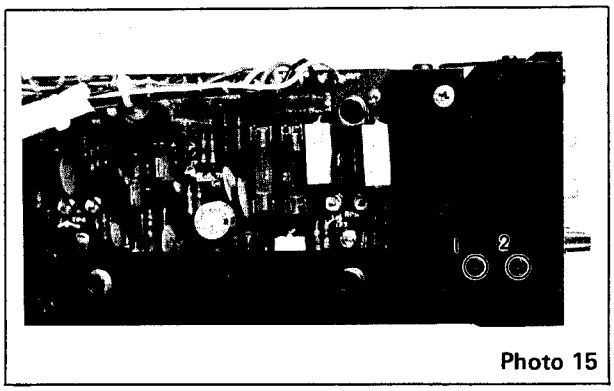


Photo 15

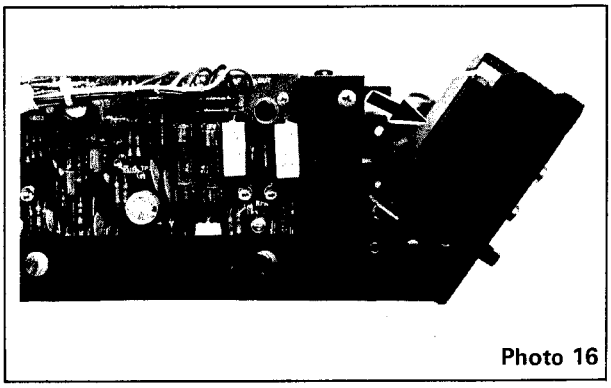


Photo 16

ELECTROLYTIC CAPACITOR CIRCUIT BOARD REMOVAL

a. Tilt the sub chassis unit down (refer to Photo 12, 13).

b. Remove screw shown in Photo 17, then pull the electrolytic capacitor holder up and remove it.

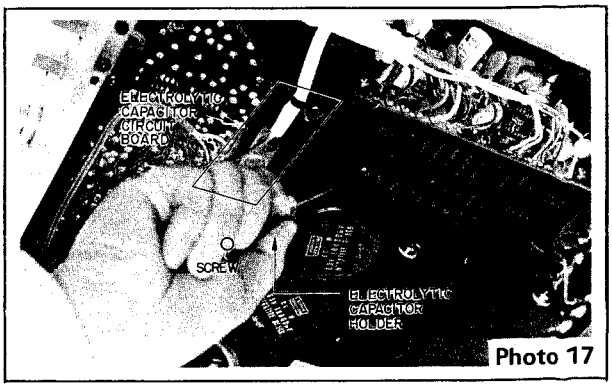


Photo 17

c. Slide the electrolytic capacitor circuit board toward the front panel, pull it up and remove it.

FRONT PANEL REMOVAL

a. Remove screw 1 and loosen 2~5 as shown in Photo 18. Then remove the shield board.
b. Remove all knobs by pulling. Use a hexeagonal wrench to loosen the nots on the MODE, FUNCTION, TAPE and SPEAKER knobs.
c. Remove screws 1~4 shown in Photo 19.
   Note: The switch aprons are of varying sizes, so be careful not to confuse them during reinstallation. Install as shown in Photo 20.

TONE CONTROL CIRCUIT BOARD REMOVAL

a. Remove the front panel and tilt down the sub chassis.
b. Remove screws 1~4 shown in Photo 21 and pull the circuit board with the shield case back to remove it.
c. Loosen screws 1, 2 shown in Photo 22 and slide the shield case in the direction of the arrow to remove it.
d. Pull out the CIS connector leading to the function circuit board.
e. To separate the tone control circuit board from its holder, remove nuts 1~3 and screws 1~4 as shown in Photo 23.

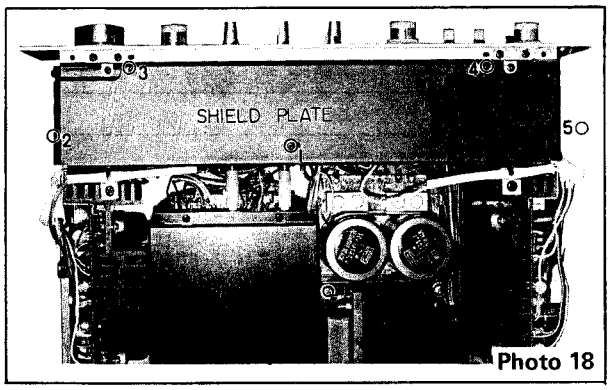


Photo 18

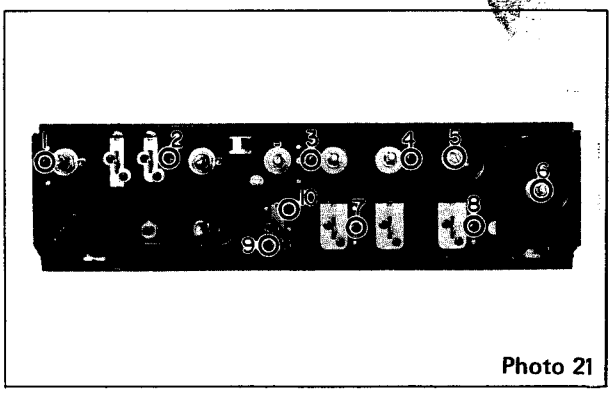


Photo 21

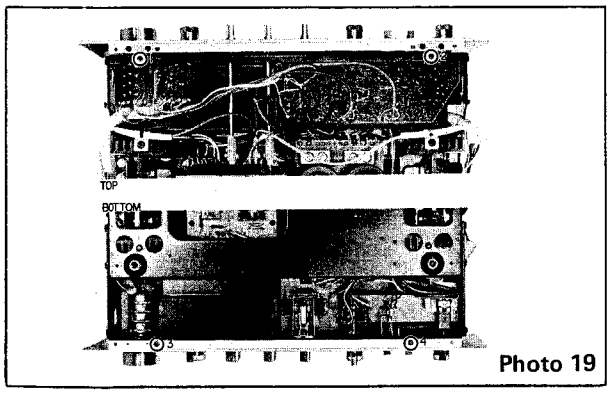


Photo 19

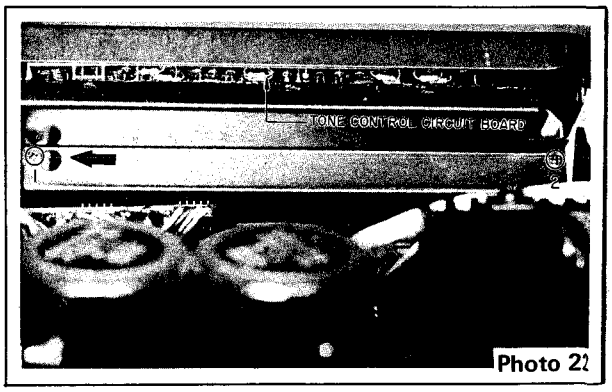


Photo 22

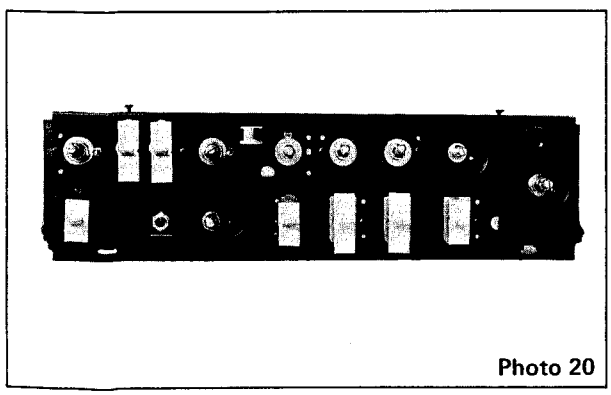


Photo 20

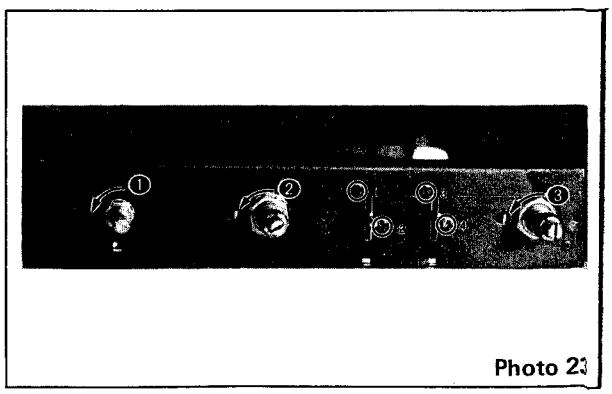


Photo 23

VOLUME CIRCUIT BOARD REMOVAL

a. Remove the nuts 5, 6 shown in Photo 21, then pull the volume circuit board back to remove it.

FILTER CIRCUIT BOARD REMOVAL

a. Remove the front panel and tilt down the sub chassis.
b. Remove the tone control circuit board and shield board.
c. Remove screws 7, 8 shown in Photo 21, then remove the filter circuit board and shield board.
d. Remove two screws from the rear bottom of the filter circuit board shield board, then remove the filter circuit board.

OPERATION SWITCH CIRCUIT BOARD REMOVAL

a. Remove the front panel and tilt the sub chassis forward.
b. Pull off the two CIS connectors.
c. Remove screws 9, 10 shown in Photo 21, then pull back the operation switch circuit board to remove it

POWER SWITCH CIRCUIT BOARD REMOVAL

a. Remove the front panel and tilt the sub chassis forward.
b. Remove the tone control circuit board and shield case.
c. Remove screws 1, 2 shown in Photo 24 and then remove the power switch circuit board.
d. At this time, slide the lamp holder to the right as shown in Photo 25, and remove it. When reinstalling the pilot lamp, be careful that it is not placed too far forward so that it touches the front panel; it should not be too far from the lamp holder.

REAR PANEL CIRCUIT BOARD REMOVAL

a. Remove the function circuit board.
b. Tilt the rear panel down.
c. Pull out the CIS connector, and disconnect the chassis earth lead connected to chassis.
d. Remove screws 1~8 as shown in Photo 25, then remove the rear panel circuit board.
e. Remove screws 1~5 as shown in Photo 26.
f. If the rear panel circuit board is further disassembled, follow the procedure shown in Photo 27.

CABINET ASSEMBLY

a. First put the power cord into the vabinet, then assembly it and the chassis, paying attention to the lead harness.
b. When all parts are safely in the cabinet, reinstall the screws in reverse order. Lift the unit a bit to be sure of correct installation.

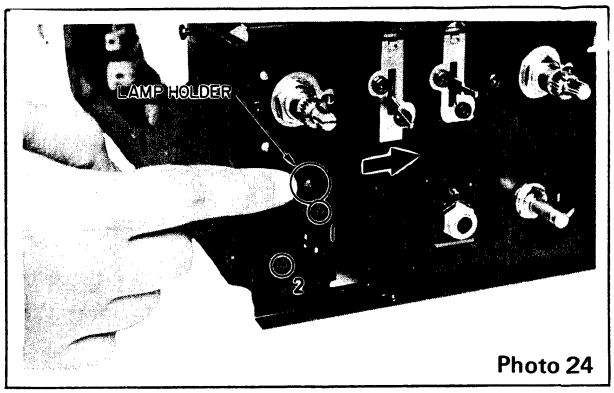


Photo 24

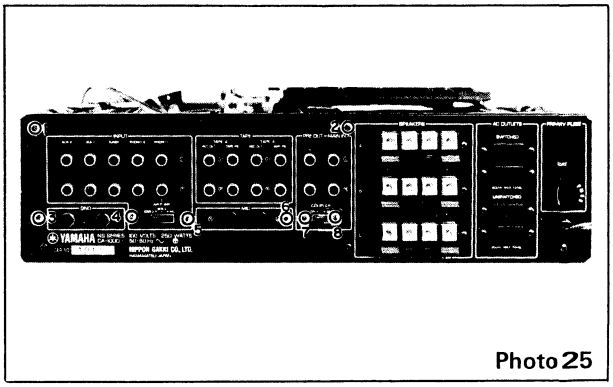


Photo 25

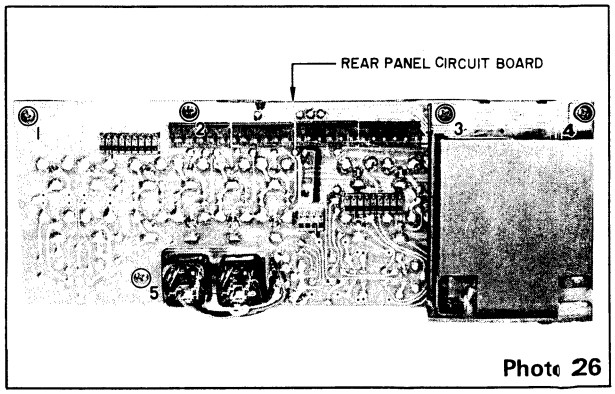


Photo 26

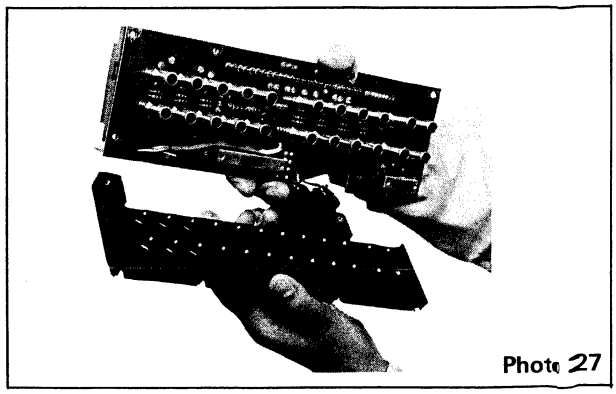


Photo 27

ADJUSTMENT OF EACH CIRCUIT BOARD

BEFORE MEASUREMENT

- Turn the Pre/Main amp. coupler switch Off.
- After the power switch is turned on, wait3~4 minutes before measuring, to be sure of the most stable operation.
- Do not connect speakers or dummy load resistance to the speaker terminals.

1. MAIN CIRCUIT BOARD

a. Primary Stage Differential Amplification Cir-

Set the voltage between TP1 and TP2 to 15V ± 1V with VR602.
TP1 : (-)
TP2 : (+)

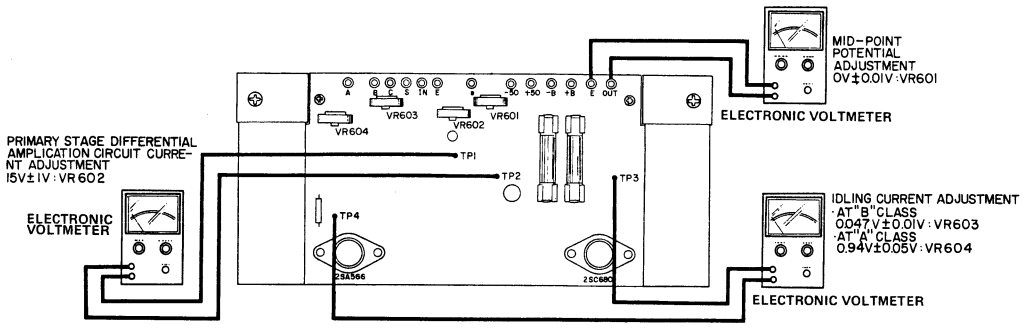
b. Mid-Point Potential Adjustment
Set the voltage between SP Out terminal and E to 0V ± 0.01V with VR601.

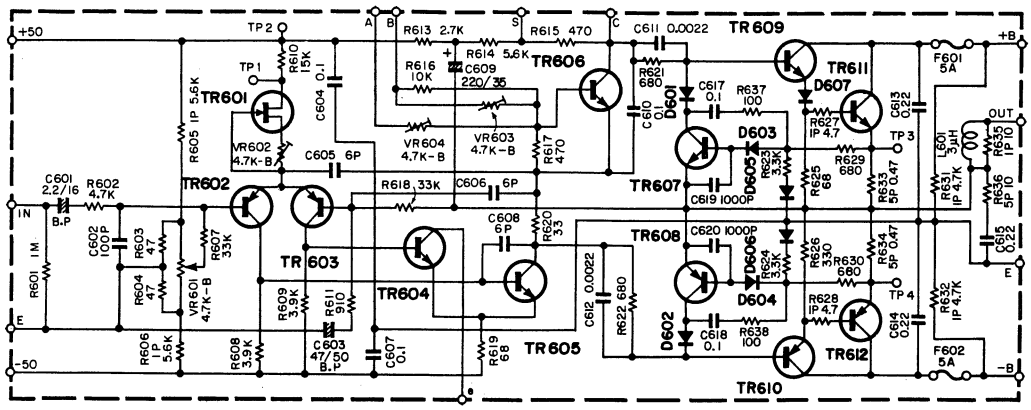
c. B Class Idling Current Adjustment
Set the Operation switch to Normal.
Set the voltage between TP3 and TP4 to 0.047V ± 0.01V with VR603.
TP3 : (+)
TP4 : (-)

d. A Class Idling Current Adjustment
Set the Operation switch to Class A.
Set the voltage between TP3 and TP4 to 0.94V ±0.05V with VR604.
TP3 : (+)
TP4 : (-)

e. Repeat procedures a-d above several times until each is within the allowable limits.

Note
- Turn the volume gently during adjustment.
- Pay close attention to the polarity of each test point.





2. FUNCTION CIRCUIT BOARD

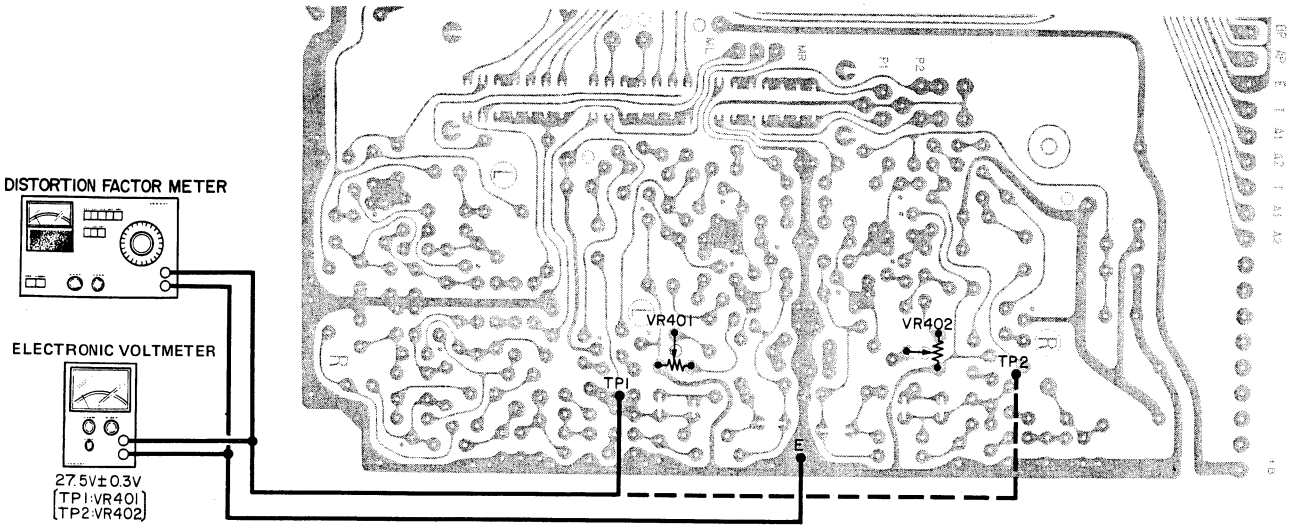
a. Equalizer SEPP Output Mid-Point Potential Adjustment.

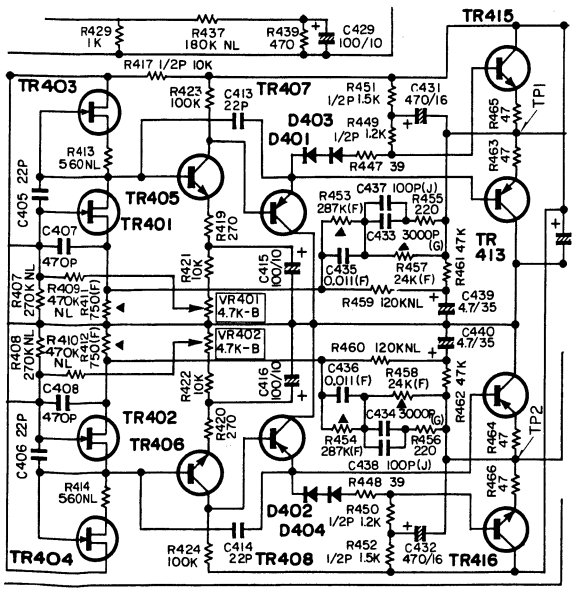
The voltage between ,TP1 and TP2 on the circuit board and E should be 27.5V±0.3V (minimum potential distortion ratio).

Adjust TP1 with VR401, TP2 with VR402.

Note: • Turn the volume gently during adjustment.

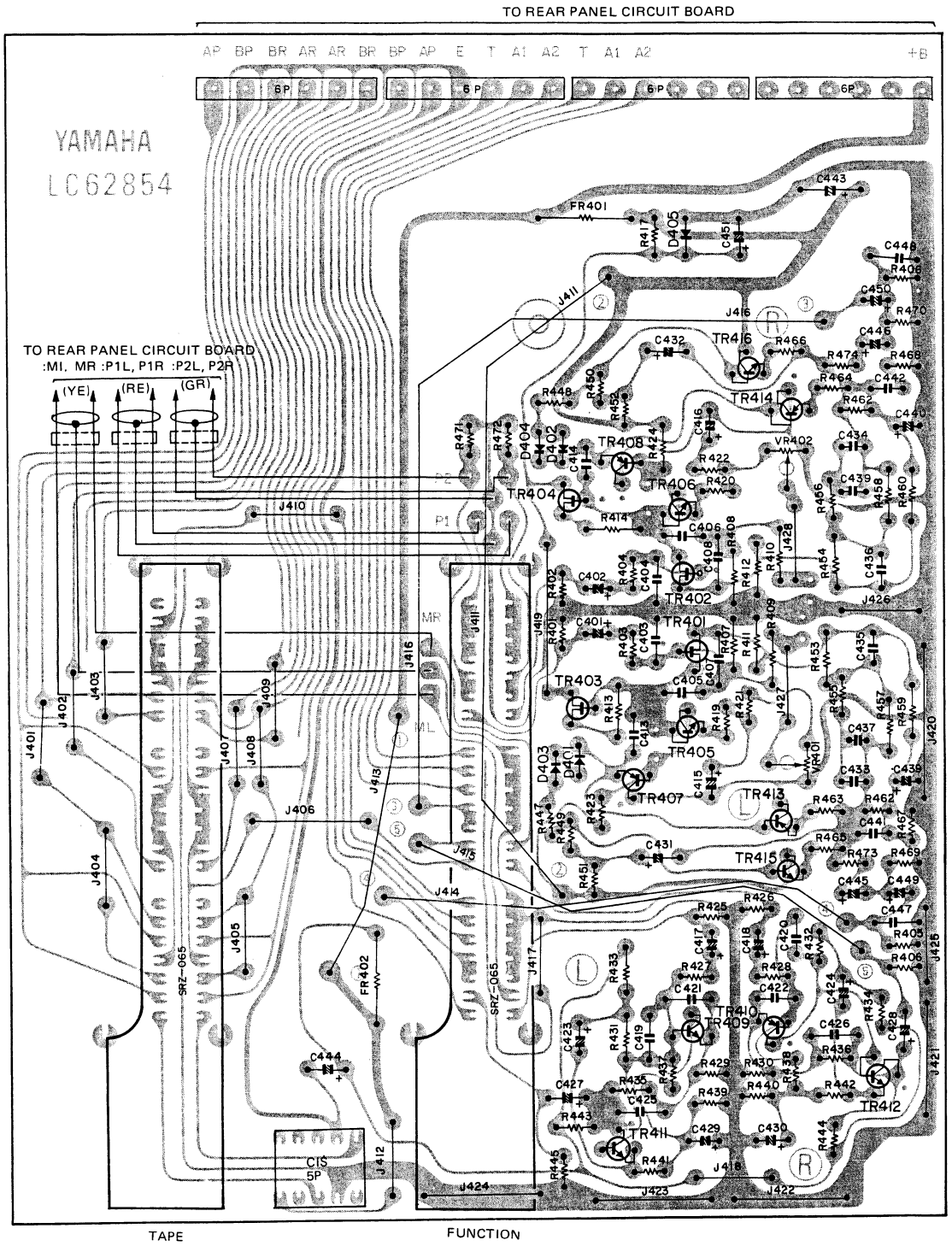
• The Pre-Main coupler switch should be Off.



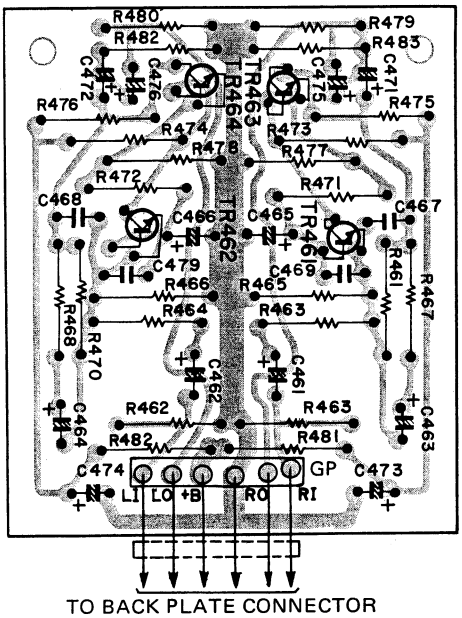


PRINTED CIRCUIT BOARDS

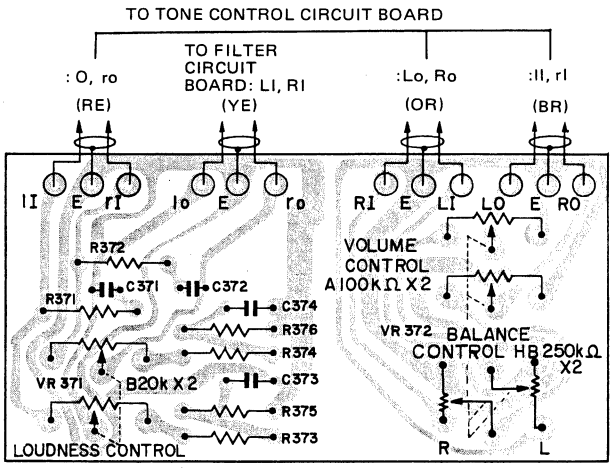
FUNCTION CIRCUIT BOARD NA06335



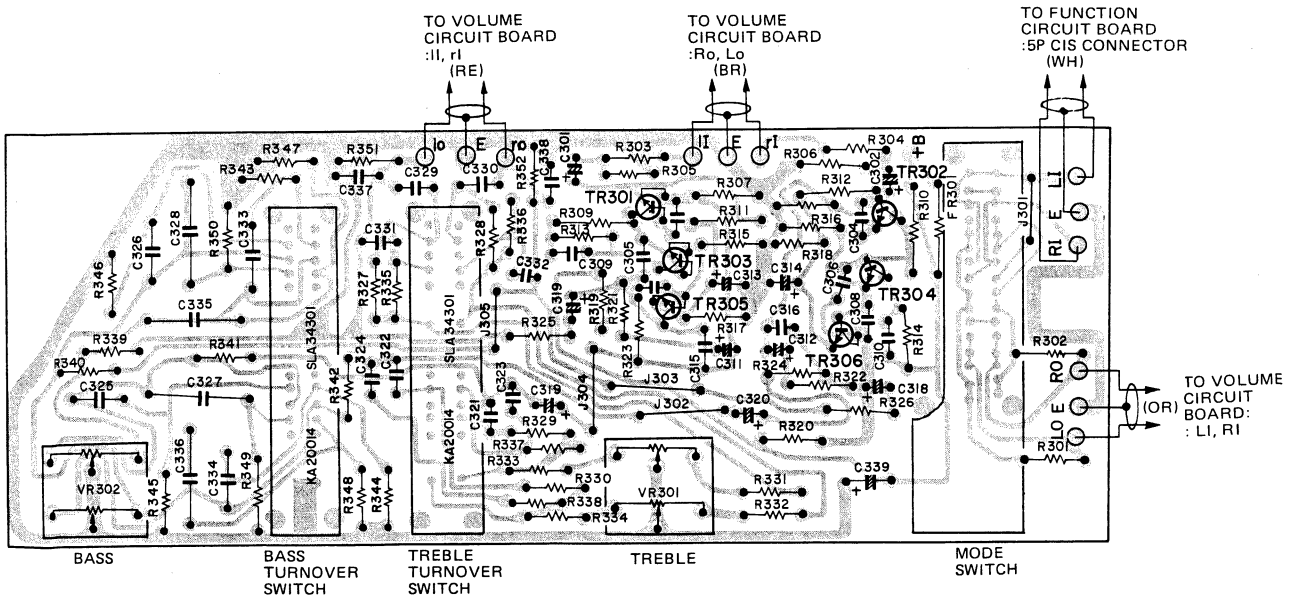
MC AMP. CIRCUIT BOARD NA06339



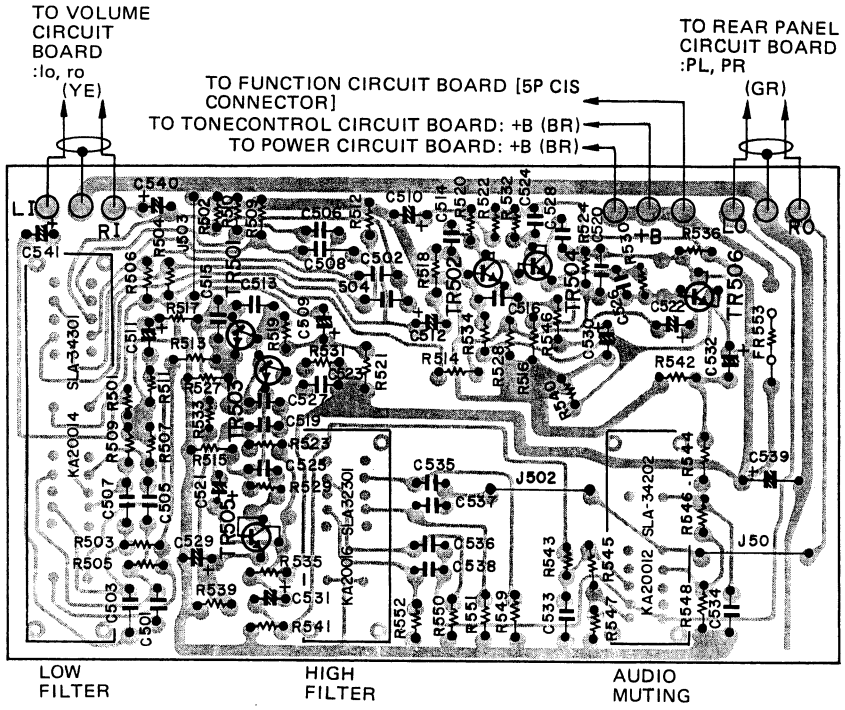
VOLUME CIRCUIT BOARD NA06336



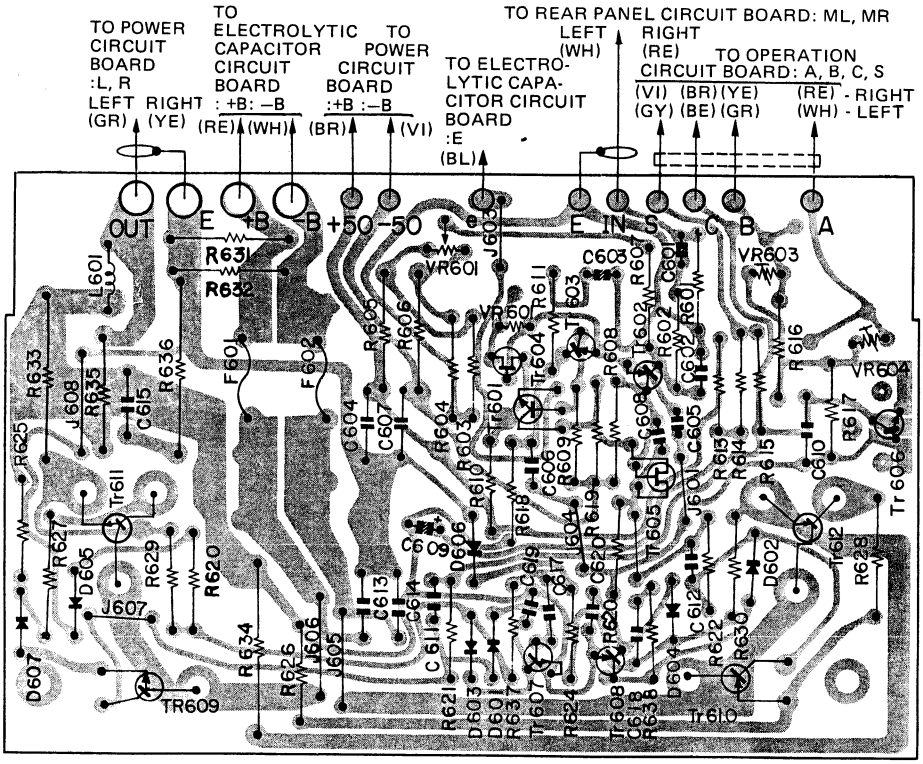
TONE CONTROL CIRCUIT BOARD NA06337



FILTER CIRCUIT BOARD NA06338

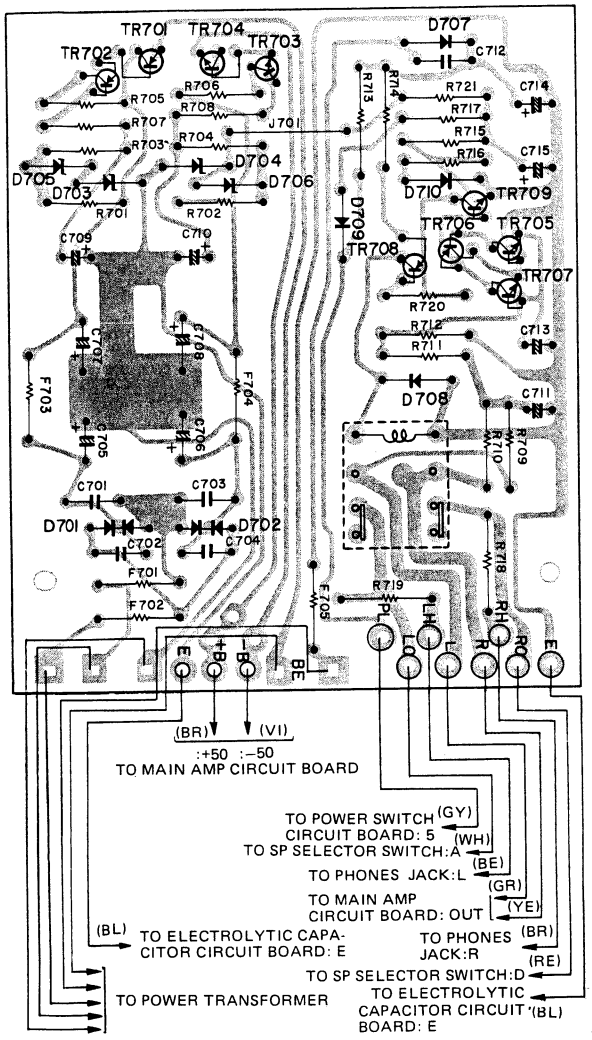


MAIN AMP. CIRCUIT BOARD NA06331

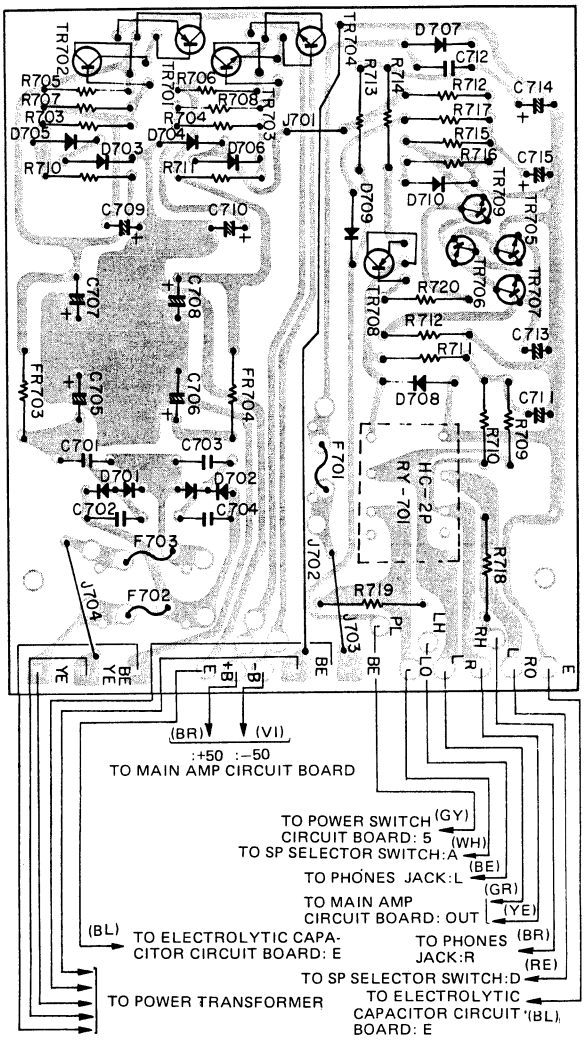


POWER CIRCUIT BOARD

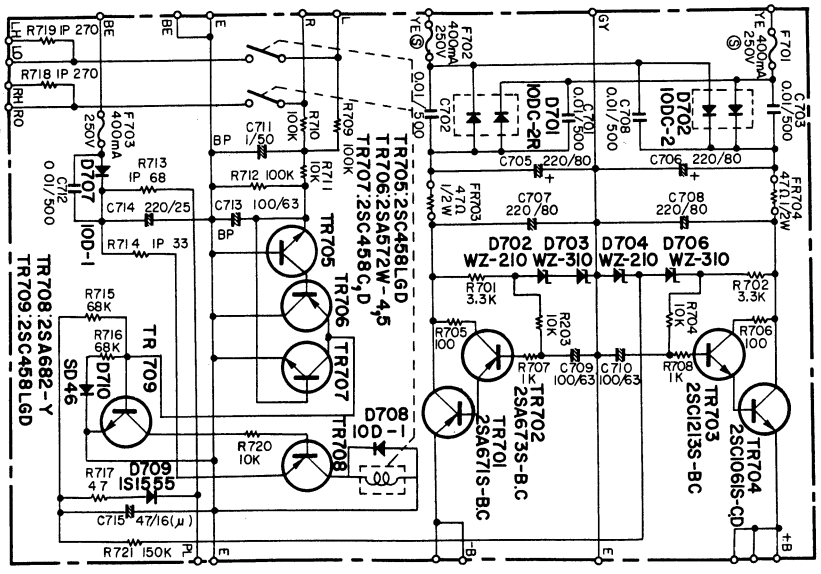
- EXCEPT CANADIAN MODEL NA06332



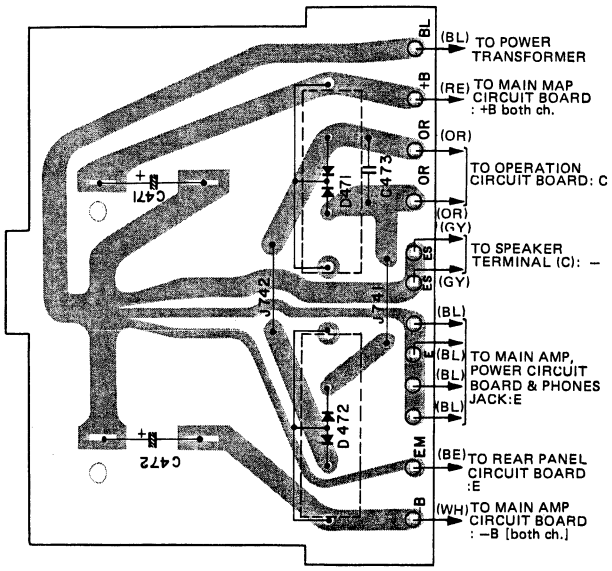
- CANADIAN MODEL



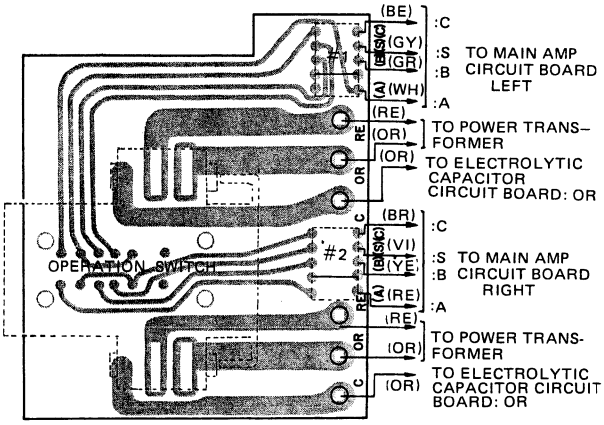
- CANADIAN MODEL NA06529



ELECTROLYTIC CAPACITOR CIRCUIT BOARD NA06352

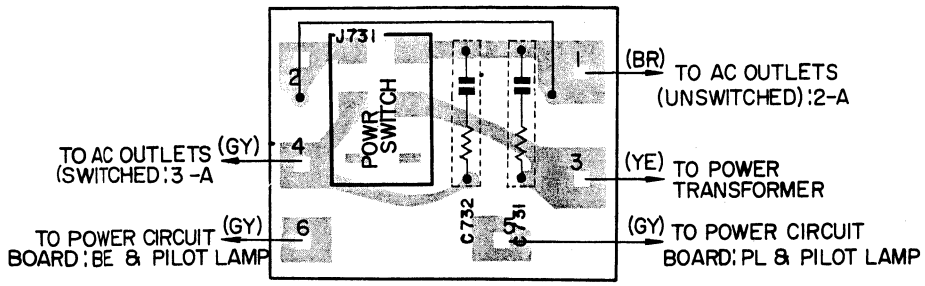


OPERATION CIRCUIT BOARD NA06354

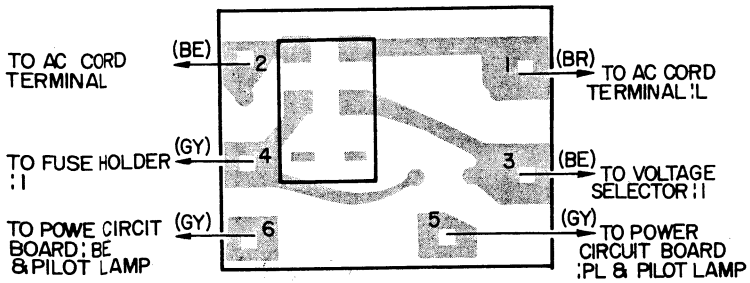


POWER SWITCH CIRCUIT BOARD.

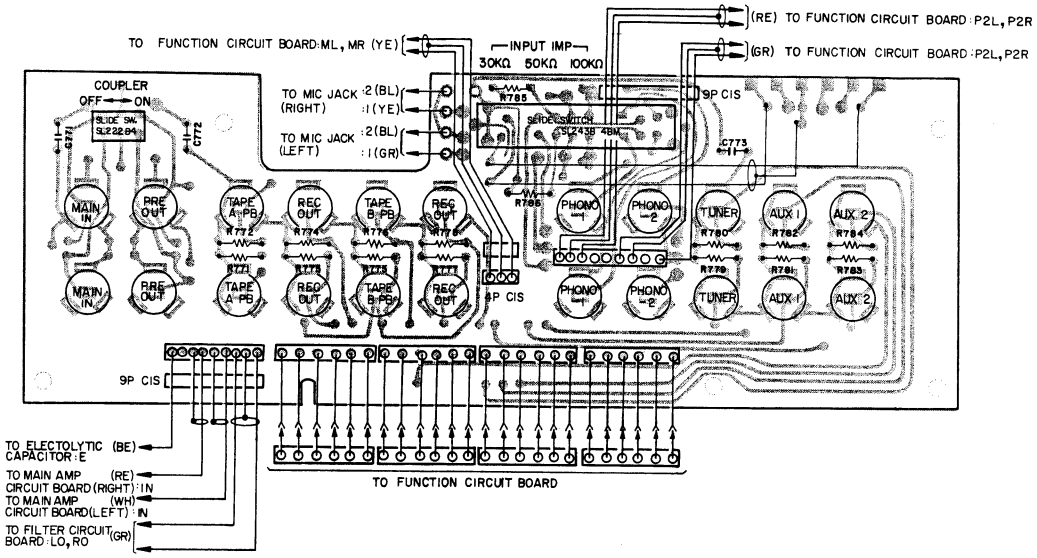
- EXCEPT EUROPEAN MODEL NA06375

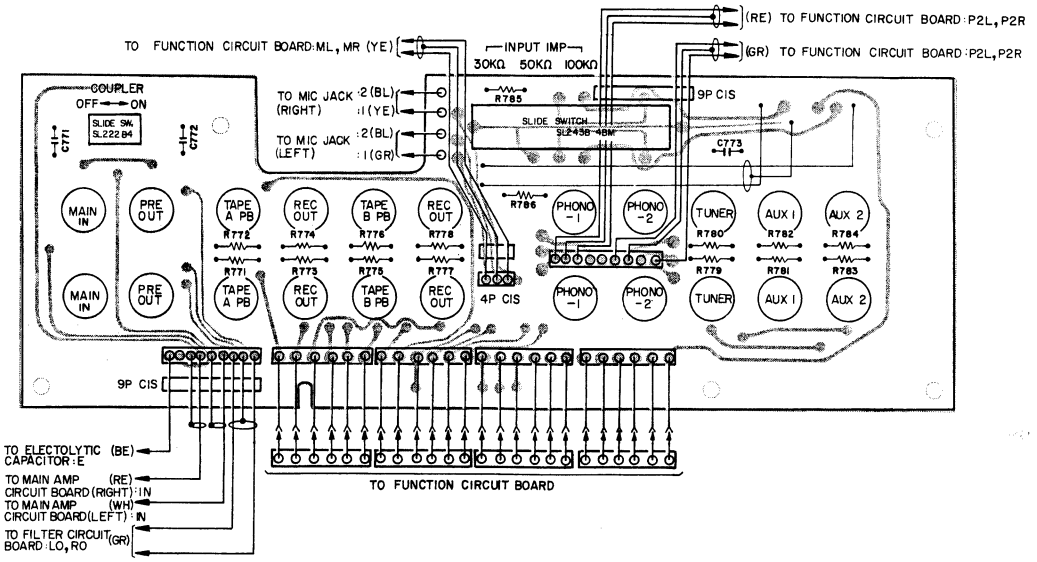


- EUROPEAN MODEL NA06376

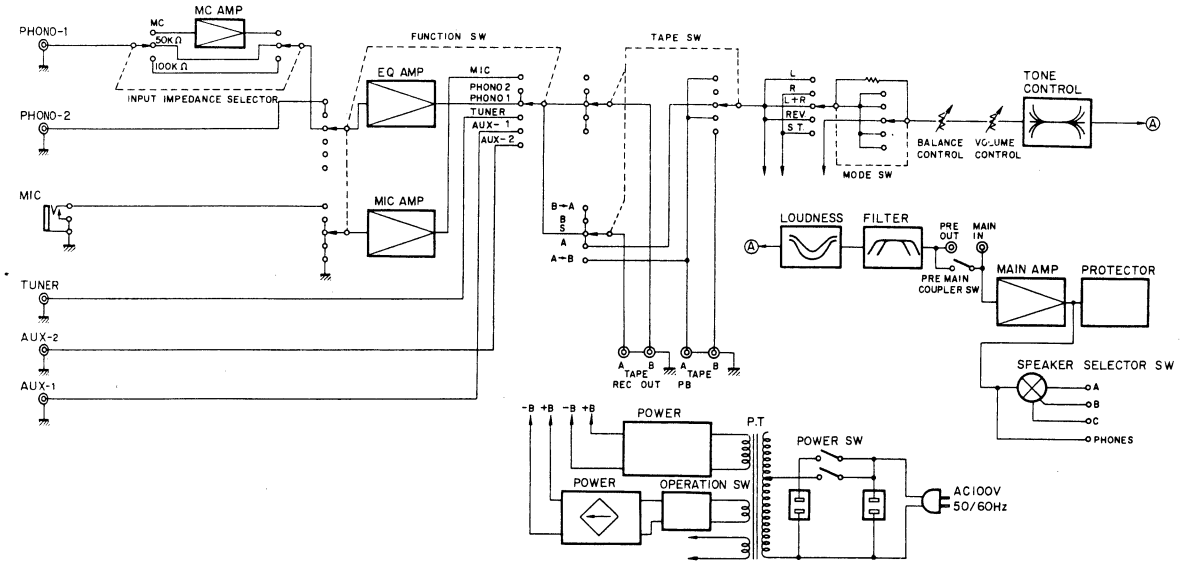


REAR PANEL CIRCUIT BOARD NA06333





BLOCK DIAGRAM



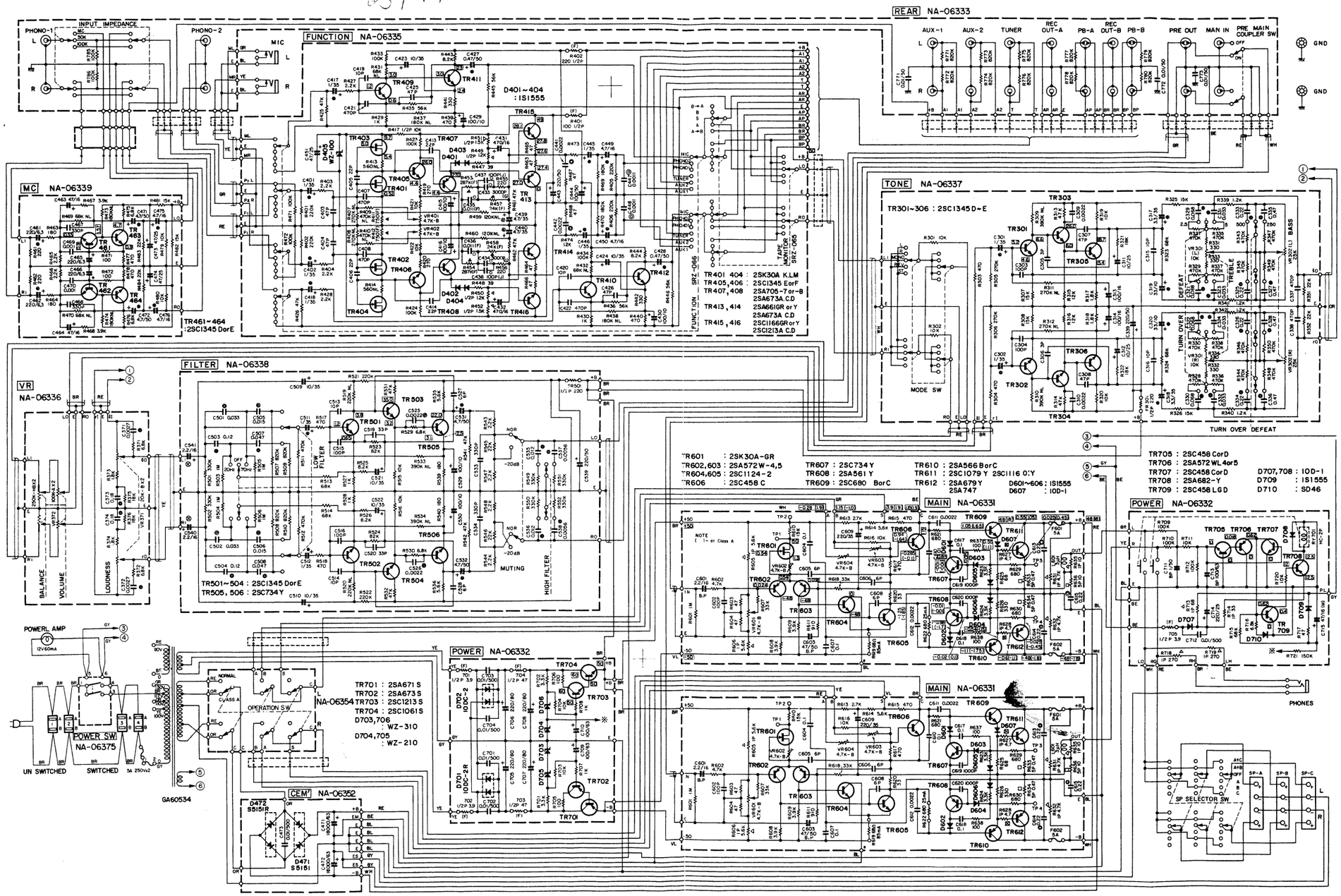
WIRE COLOR ABBREVIATIONS

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
⊶W⊷	FUSE RESISTOR
△	METAL OXIDE RESISTOR
□	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
⊠	CEMENT MOLDED RESISTOR
▲	METALIZED FILM RESISTOR

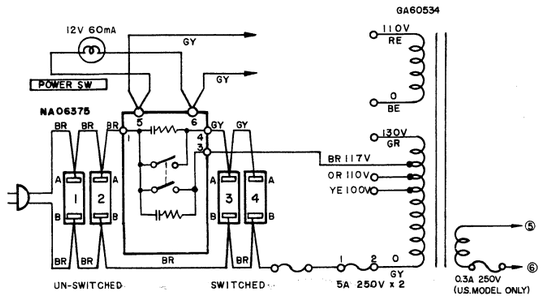
SYMBOL	PARTS NAME	REMARKS
◎	MYLAR CAPACITOR	⊣⊢
NO MARK	CERAMIC CAPACITOR	
○	POLYSTYRENE CAPACITOR	
NO MARK	(BI-POLAR) ELECTROLYTIC CAPACITOR	⊣⊢
●	LOW-NOISE ELECTROLYTIC CAPACITOR	
⊗	TANTALUM CAPACITOR	

OVERALL SCHEMATIC DIAGRAM

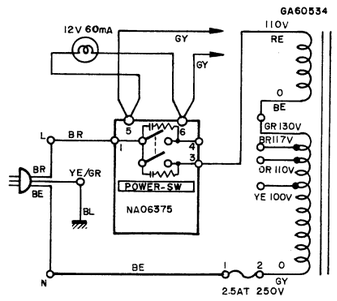


PARTIAL CHANGES MADE ACCORDING TO DISTINATION

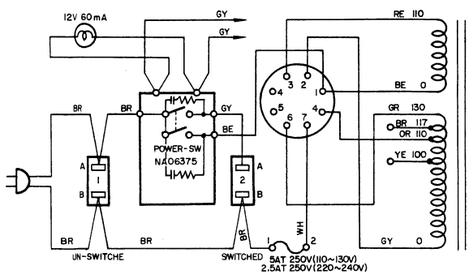
- U.S. & CANADIAN MODELS



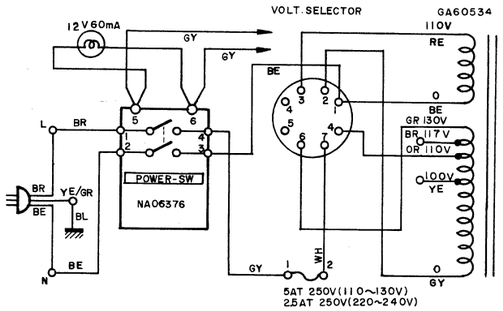
- AUSTRALIAN MODEL



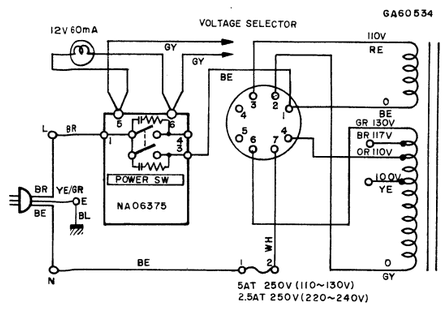
- GENERAL MODEL

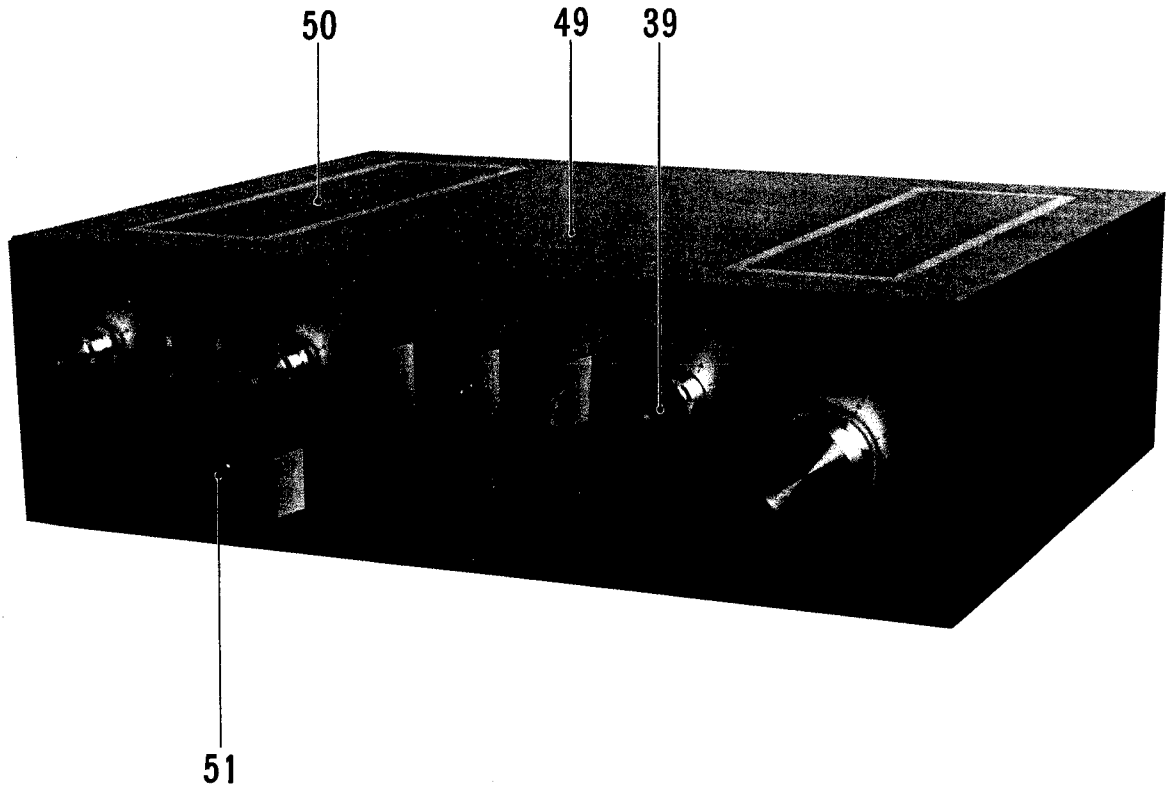


- EUROPEAN MODEL



- SOUTH AFRICAN MODEL




50
49
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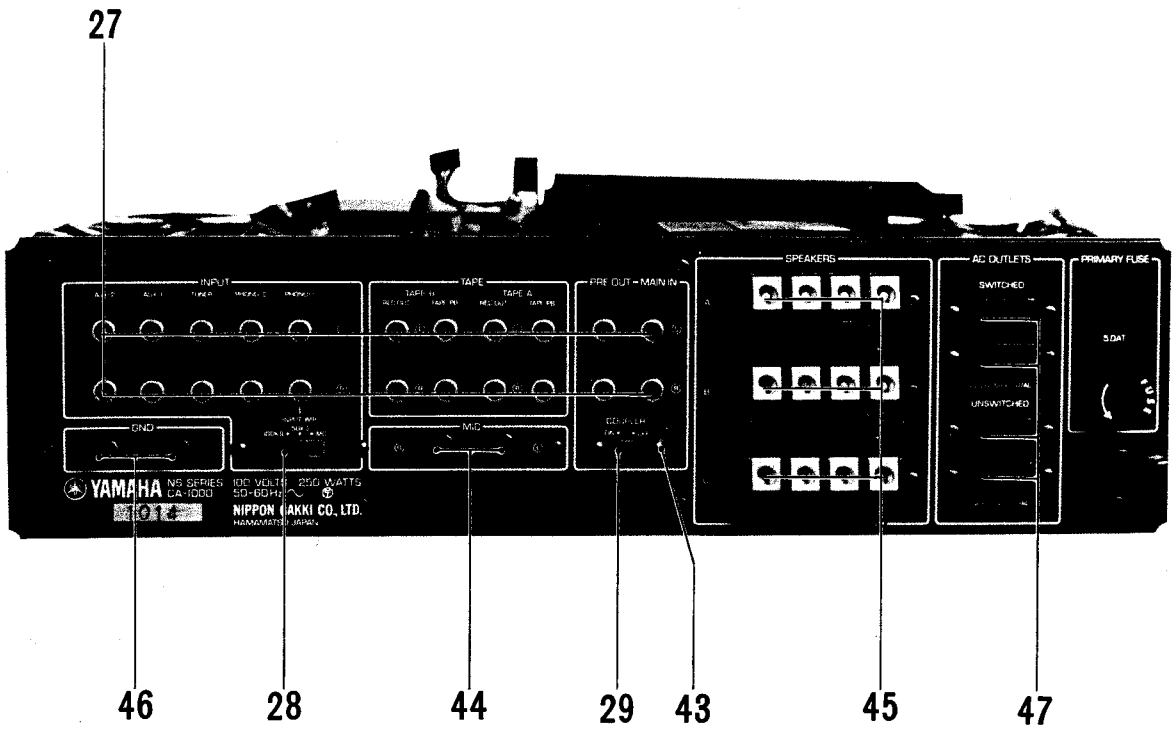
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INPUT
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PRE OUT - MAIN IN
SPEAKERS
AC OUTLETS
SWITCHED
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PRIMARY FUSE
5.0AT
GND
MIC
YAMAHA
NS SERIES
CA-1000
100 VOLTS
50-60Hz
250 WATTS
NIPPON GAKKI CO., LTD.
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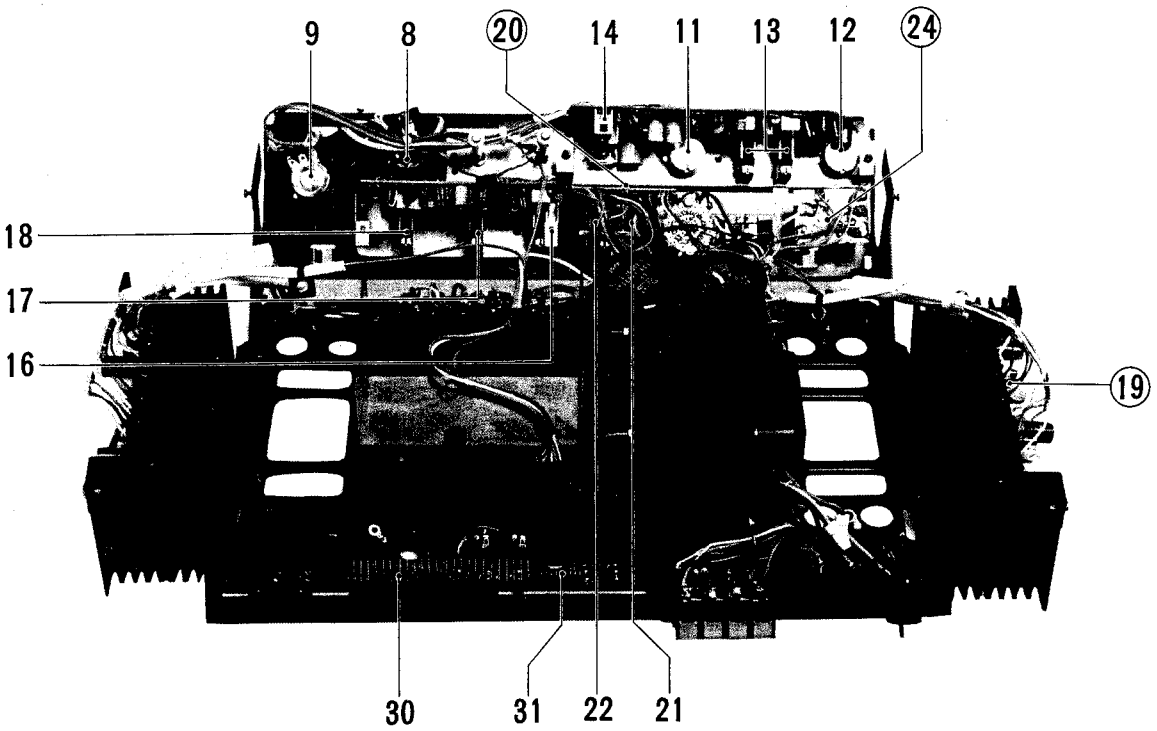
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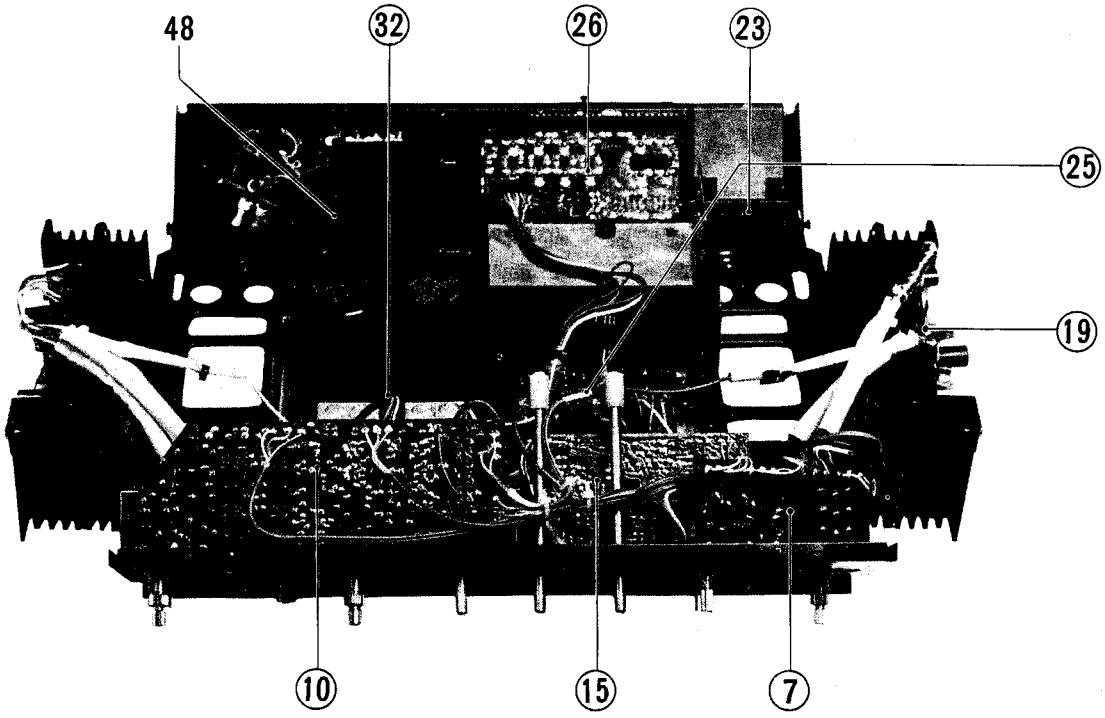
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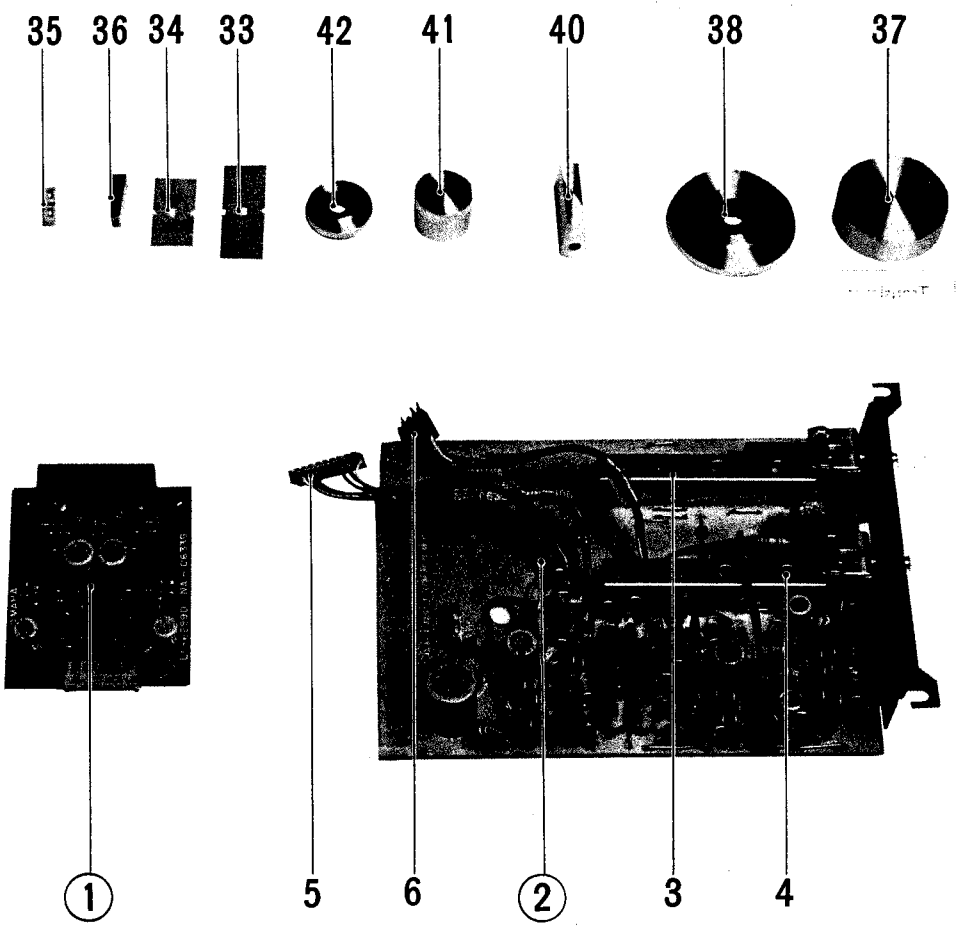
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Ref. No.	Part No.	Description				Remarks	Common Models	
①	NA06339	MC AMP. Circuit board	#62891		MCアンプシート			
	HE15768	Low Noise resistor	68KΩ	¼W	ローノイズ抵抗			
	HE15818	〃	180KΩ	〃	〃			
	FP51822	Tantalum capacitor	220μF	6.3 WV	タンタル固体コンデンサ			
	FP33647	〃	4.7μF	16 WV	〃			
	EP16647	〃	4.7μF	50 WV	〃			
	iC13454	Transistor	2SC1345	(D or E)	トランジスタ			
②	NA06335	FUNCTION Circuit board	#62853		ファンクションシート			
	NA06459	〃	63790					
					金属被膜抵抗			
	HZ00028	Metalized Film resistor	750Ω		〃			
	HZ00019	〃	24KΩ		〃			
	HZ00020		287KΩ					
	HL40612	Metal Oxide resistor	1.2KΩ		酸化金属抵抗			
	HL40615	〃	1.5KΩ		〃			
	HE15768	Low Noise resistor	68KΩ		ローノイズ抵抗			
	HE15818	〃	180KΩ		〃			
	HE15727	〃	270KΩ		〃			
	HE15847	〃	470KΩ		〃			
	HE15810	〃	100KΩ					
	HZ00017	Fuse resistor	100Ω	½P	ヒューズ抵抗			
	HZ00014	〃	220Ω	½P	〃			
	iF00004	Diode 1S1555			ダイオード			
	iF00028	Zener Diode WZ-210			ツェナーダイオード			
	FP54610	Tantalum capacitor	1μF	25 V	タンタルコンデンサ			
	FP13647	〃	4.7μF	16 WV	〃			
	FP15610	〃	1μF	35 WV	〃			
	FP16647	〃	4.7μF	50 WV	〃			
	FP16547	〃	0.47μF	50 WV	〃			
	FP15556	〃	0.56μF	35 WV	〃			
	iA06613	Transistor	2SA661GR	(Y)	トランジスタ			
	iA06611	〃	2SA661	(Y)	〃	= 2SA673A		
	iC11662	〃	2SC1166GR	(Y)	〃	= 2SC1213A		
	iC13455	〃	2SC1345	(F or E)	〃			
	iC13454	〃	2SC1345	(D or E)	〃			
	iE00004	Field Effect Transistor	2SK30A	(K, L or M)	電解効果トランジスタ			

Ref. No.		Description			Remarks	Common Models	
	HT41004	Variable resistor	B4.7KΩ (SVK10R)	ソリッドボリウム			
3	KA50028	Tape selector switch	SRZ-065	テープ切換スイッチ			
4	KA50027	Function Switch	SRZ-066	ファンクション切換スイッチ			
5	LB60028	6P connector	02145-6A	6Pコネクター			
6	LB50005	5P 〃	CIS socket	5Pコネクター			
	LB10016	CIS Keying Pin		禁止ピン			
⑦	NA06336	VOLUME Circuit board	#62861	ボリウムシート		CA-800 CA-600	
8	HS12034	Variable resistor	B20KΩx 2	ラウドネスボリウム			
9	HS12031	〃	HB250KΩx 2, A100KΩx 2	レベル及びバランスボリウム			
⑩	NA06337	TONE CONTROL Circuit board	#62874	トーンコントロールシート			
	HE15827	Low Noise resistor	270KΩ ¼ W	ローノイズ抵抗			
	HE15839	〃	390KΩ 〃	〃			
	HZ00014	Fuse resistor	220Ω ½W	ヒューズ抵抗			
	FP52733	Tantalum capacitor	33μF 10 WV	タンタル固体コンデンサ			
	FP15610	〃	1μF 35 WV	〃			
	FP15633	〃	3.3μF 〃	〃			
11	HS12033	Variable resistor	8Z-10K x 2	11点クリップ付トレブル用			
12	HS12032	〃	9Z-25 x 2	11点クリップ付バス用			
	iC13454	Transistor	2SC1345 (D or E)	トランジスタ			
13	KA20014	Lever Switch	SLA-34301	ターンオーバースイッチ			
14	KA50029	〃	SRZ-045	モード切換用			
⑮	NA06338	FILTER circuit board	#62883	フィルターシート		CA800	
	HE15822	Low Noise resistor	220KΩ ¼ W	ローノイズ抵抗			
	HE15839	〃	390KΩ 〃	〃			
	HZ00014	Fuse resistor	220Ω ½ W	ヒューズ抵抗			
	FP13622	Tantalum capacitor (BP type)	2.2μF 16 WV	タンタル固体コンデンサ			
	FP15610	〃 (〃)	1μF 35 WV	〃			

Ref. No.	Part No.	Description			Remarks	Common Models	
	FP16647	Tantalum capacitor (BP type)	4.7μF	50 WV	タンタル固体コンデンサ		
	iC07342	Transistor	2SC734 (Y)				
	iC13454	〃	2SC1345 (D or E)				
16	KA20014	Lever switch	SLA34301		ローフィルタースイッチ		
17	KA20012	〃	SLA34302		ミューティングスイッチ		
18	KA20016	〃	SLA32301		ハイフィルタースイッチ		
⑲	NA06331	MAIN AMP Circuit board #62816			メインシート		
	HT41015	Variable Resistor (Vert. type)	B4.7KΩ	(SR-29K)	半固定ボリウム		
	HZ00021	Fire proofing resistor	4.7Ω	1 W	不燃性抵抗		
	HL31410	Metal Oxide resistor	10Ω	1 W	酸金抵抗		
	HL31647	〃	4.7KΩ	〃	〃		
	HL31656	〃	5.6KΩ	〃	〃		
	HM55247	Cement resistor	0.47Ω	5 W	セメント抵抗		
	HM55410	〃	10Ω	〃	〃		
	FM11747	BP capacitor (Vert. type)	2.2μF	16 WV	バイポーラケミコン		
	FM09622	〃	47μF	50 WV	〃		
	GD900005	Air core coil	3μH		空芯コイル		
	HZ00057	Fuse resistor	68Ω	85 mA			
	HZ00060	〃	680Ω	25 mA			
	iA05612	Transistor	2SA561	(Y)	トランジスタ		
	iA05662	〃	2SA566	(B or C)	〃		
	iA05720	〃	2SA572	(W-4.5)	〃		
	iC04583	〃	2SC458		〃		
	iC06802	〃	2SC680	(B or C)	〃		
	iC07342	〃	2SC734	(Y)	〃		
	iC11242	〃	2SC1124-2		〃		
	iA07471	Power Transistor	2SA679Y or 2SA747Y		パワートランジスタ		
	iC11161	〃	2SC1079Y or 2SC1116Y		〃		
	iF00004	Diode	1S1555		ダイオード		
	iE00002	Field Effect Transistor	2SK30A GR		電界効果トランジスタ		

Ref. No.	Part No.	Description			Remarks	Common Models	
	LB30011	Transistor socket	S2-110B-00	トランジスタソケット			
	BA06450	Heat Singk		放熱板			
	BB06308	Fixing metal		トランジスタプッシャー			
	LB20057	Fuse Holder-pin		ヒューズホルダーピン			
⑳	NA06354	OPERATION Circuit board ♯63091		オペレーションスイッチシート		CA800	
21	KA20012	Lever switch	SLA34202	レバースイッチ			
22	KA60009	Micro switch	V-10-1A	マイクロスイッチ			
	LB50005	CIS 5P socket		CIS 5Pソケット			
	LB10016	CIS Keying pin		CIS キーイングピン			
	NB06636	Operation mechanism Ass'y		オペレーション金具 Assy			
㉓	NA06374	CONNECTOR Circuit board ♯63241		コネクターシート			
	LB60027	Morex connector-pin No.2183-6A		モレックスコネクターピン			
㉔	NA06375	POWER SWITCH circuit board ♯63251		パワースイッチシート		CA-800, CA-600	
	KA20010	Power switch	JL-04	パワースイッチ			
	FZ00011	Spark Killer	0.003μF x 120Ω	スパークキラー			
㉕	NA06332	POWER Circuit board	♯62823	電源シート		CA-800	
	HZ00016	Fuse resistor	3.9Ω ½W	ヒューズ抵抗			
	HZ00015	〃	47Ω 〃	〃			
	HL41433	Metal Oxide resistor	33Ω 1W	酸化金属抵抗			
	HL41468	〃	68Ω 〃	〃			
	HL41527	〃	270Ω 〃	〃			
		Electrolytic capacitor (Vert type)	47μF 16 WV		ku type		
	FM10810	BP capacitor	100μF 6.3 WV	バイポーラケミコン			
	FM11610	〃	1μF 50 WV	〃			
	KC00008	Relay	HC-2P DC-12V	リレー			

Ref. No.	Part No.	Description			Remarks	Common Models	
	iA05720	Transistor	2SA572 (W-4.5)	トランジスタ			
	iA06719	〃	2SA671S (B or C)	〃			
	iA06739	〃	2SA673S (B or C)	〃			
	iA06820	〃	2SA682 (Y)	〃			
	iC04583	〃	2SC458 (C or D)	〃			
	iC10618	〃	2SC1061S (C or D)	〃			
	iC12139	〃	2SC1213S (B or C)	〃			
	IC0456	〃	2SC458 Lg.D				
	iH00003	Diode	10D-1	ダイオード			
	iH00005	〃	10DC-2	〃			
	iH00013	〃	10DC-2R	〃			
	iF00004	〃	1S1555	〃			
	iF00002	〃	SD-46	〃			
	iF00028	Zener Diode	WZ-210	ツェナーダイオード			
	iF00022	〃	WZ-310	〃			
㉖	NA06333	REAR PANEL Circuit board #62835		リヤパネルシート			
27	LB10014	Pin Jack (for Circuit board)		プリント基板用ピンジャック			
	LB60027	Connector Pin		コネクターピン			
28	KA40020	Slide switch (Phono)	SL243B4BM	フォノインピーダンス切換用スイッチ			
29	KA40021	〃 (Coupler)	SL222B4	カプラースイッチ			
30	LB40008	CIS 4P Connector Socket		CIS 4P コネクターソケット			
31	LB60025	CIS 9P Connector Socket		CIS 5P コネクターソケット			
	LB10016	CIS Keying Pin		禁止ピン			
㉜	NA06352	ELECTROLYTIC CAPACITOR Circuit board #63181		ケミコンシート			
	FZ00012	Electrolytic capacitor (Lug type) 1800μF 63 WV		電解コンデンサ			
	iH00021	Silicon Diode	S-5151 (RED)	シリコン整流器			
	iH00022	〃	S5151R (BLACK)	〃			
	CB06964	Rubber Spacer		ゴムスペーサ			

Ref. No.	Part No.	Description		Remarks	Common Models	
	NB06610	Front Panel Unit	フロントパネルユニット			
	NB06614	Rear Panel Unit (with Circuit board)	リヤパネルユニット			
33	CB06873	Switch apron 15 x 42	スイッチエプロン		CA800	
34	CB06872	〃 15 x 29	〃		CA800	
35	CB06858	Switch Bush	スイッチ用ブッシュ			
36	CB06857	Knob (for Lever Switch)	レバースイッチ用ツマミ		CA800 CR-400	
37	BA06443	Double Knob (Level)	ダブルツマミ		CA800	
38	BA06448	〃 (Balance)	〃		CA800	
39	BA06446	Knob (Loudness)	ツマミ		CA800	
40	BA06442	Switch Knob (Mode, Tape, Function)	スイッチツマミ		CA800	
41	BA06444	Double Knob (Tone Left ch.)	ダブルツマミ		CA800	
42	BA06447	〃 (Tone Right ch.)	〃		CA800	
	CB06861	Lamp lens	ランプレンズ		CA800	
	CB06827	Phone nut	ホーンナット			
	CB06862	Lamp holder	ランプホルダー			
43	CB06868	Coupler stopper	カプラーストッパー			
	CB06851	Rear Panel Circuit Board Protector	リヤパネルシートプロテクター			
	CB06863	Cord stopper HEYCO SR-3P-4	コードストッパ	General, U.S. & Canadian Models	CA800	
	CB00441	〃 0661006	〃	South African, Australian & European Models	CA800	
	JB00023	Lead Type Lamp 12V 60mA	リード式ランプ			
44	LB30008	Phone Jack (Mic) SG7822	ホーンジャック			
45	LA00111	4PD Type Push-terminal	4PD型プッシュターミナル			
46	LA00107	Ground terminal	アース端子			
47	LB20030	AC Socket	ACコンセント			
48	GA60530	Power Transformer	電源トランス			
49	DC6048Z	Outside case	外装本体		CA800	
	AA07308	Punching Metal	パンチングメタル			
50	AA07354	Radiator grill	放熱グリル			
	CB06855	Leg	脚			
	NB06675	Pad	サービスパッド			
51	LB30007	Phone Jack (Head-phone) JH-5020K	ヘッドフォン用ジャック			
	LB20025	Voltage Selector	電圧切換器			
	LB20044	Fuse Holder	ヒューズホルダー	Except European Model		
	LB20059	〃	〃	European Model		