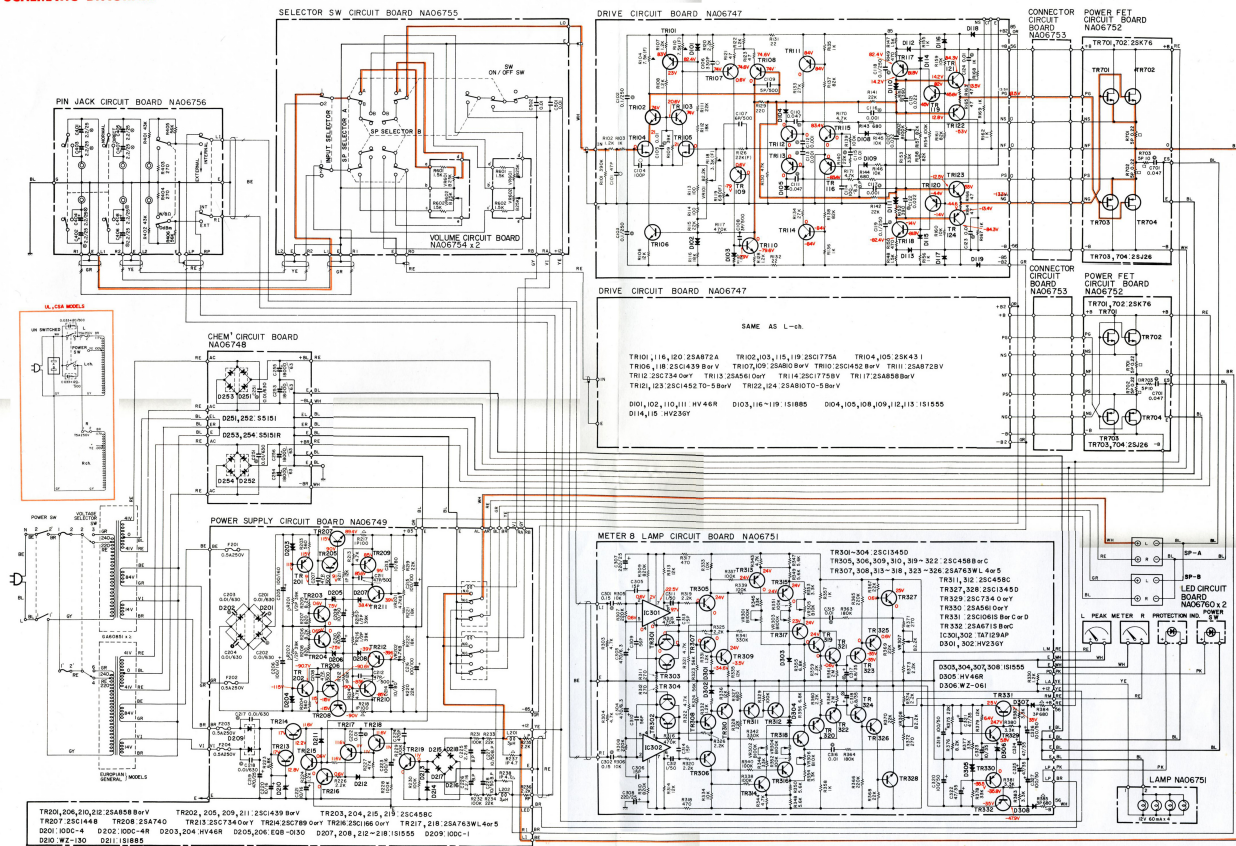


■ B-2 SCHEMATIC DIAGRAM



WIRE COLOR ABBREVIATIONS

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

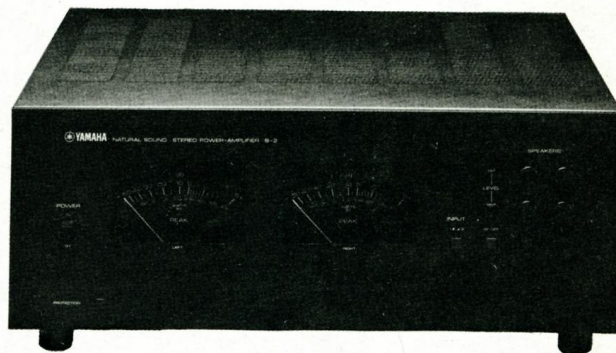
SYMBOL	PARTS NAME
—	FUSE RESISTOR
△	METAL OXIDE RESISTOR
□	CEMENT RESISTOR
NO MARK	CARBON RESISTOR
NO MARK	CEMENT MOLDED RESISTOR
□	METAL OXIDE FILM RESISTOR
⬢	METAL PLATE RESISTOR

SYMBOL	PARTS NAME	REMARKS
○	MYLAR CAPACITOR	
NO MARK	CERAMIC CAPACITOR	→
NO MARK	POLYSTYRENE CAPACITOR	
NO MARK	(BIPOLAR) ELECTROLYTIC CAPACITOR	
○	OHMONE ELECTROLYTIC CAPACITOR	→
●	TANTALUM CAPACITOR	

SERVICE MANUAL

B-2

STEREO POWER-AMPLIFIER



SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

ASM-40

①

19

©



Printed in Japan. 6 - 76

CONTENTS

SPECIFICATIONS	1
COMPONENTS LOCATION	
1. FRONT PANEL	2
2. REAR PANEL	2
3. TOP VIEW	3
4. BOTTOM VIEW	3
CIRCUIT DESCRIPTIONS	
1. CASCADE BOOTSTRAP CIRCUIT	4
2. DIFFERENTIAL CIRCUIT	4
3. PROTECTIVE CIRCUIT	5
4. AUTOMATIC BIAS CIRCUIT	5
5. PURE COMPLEMENTARY SYMMETRICAL PUSH-PULL DRIVER CIRCUIT	6
6. SPEAKER PROTECTION CIRCUIT	7
7. INPUT CIRCUIT (PIN JACK SHEET)	7
PARTIAL DISASSEMBLY	8
MEASUREMENT AND ADJUSTMENT	11
PRINTED CIRCUIT BOARD	
1. PIN JACK CIRCUIT BOARD	13
2. DRIVE CIRCUIT BOARD	14
3. SELECTOR CIRCUIT BOARD	16
4. VOLUME CIRCUIT BOARD	17
5. CONNECTOR CIRCUIT BOARD	17
6. POWER FET CIRCUIT BOARD	17
7. METER AMP CIRCUIT BOARD	18
8. POWER SUPPLY CIRCUIT BOARD	20
9. LAMP CIRCUIT BOARD	22
10. ELECTROLYTIC CAPACITOR CIRCUIT BOARD	22
FET AND NEW PARTS SYMBOLS	23
PRINTED SPECIAL CHARACTERISTIC	23
BLOCK DIAGRAM	24
PACKAGE	25
PARTS LIST	26
SCHEMATIC DIAGRAM	

SPECIFICATIONS

● POWER AMP SECTION

Dinamic power (IHF)	8Ω/1KHz/0.1%	.140W + 140W
Continuous RMS power	8Ω/20 ~ 20,000Hz/0.08%	.100W + 100W
	4Ω/20 ~ 20,000Hz/0.08%	.140W + 140W
Phase Characteristics	DC ~ 100KHz/10W	.less than +0, -15
Power Bandwidth	-3dB/0.1%/8Ω	.5Hz~100KHz
Damping Factor	20Hz/8Ω	.70
	1KHz/8Ω	.70
	20KHz/8Ω	.50
Total Harmonic Distortion	8Ω/50W20~20,000Hz	.0.01%Typ. 0.02% Max.
	8Ω/10W20~20,000Hz	.0.008% Typ. 0.02% Max.
Intermodulation Distortion	8Ω/50W/70Hz : 7KHz = 4 : 1	.less than 0.03%
	4Ω/50W/70Hz : 7KHz = 4 : 1	.less than 0.03%
	16Ω/50W/70Hz : 7LHz = 4 : 1	.less than 0.03%
Frequency Respons	8Ω /1W/DC ~ 100KHz	.+0, -1dB(at DC)
	8Ω /1W/10Hz~100KHz	.+0, -1dB (NORMAL)
Input Impeadance		.25KΩ
Input Sensitivity		.775mV
Signal-to-Noise Ratic	Input 4.7KΩ short	.0.25mV/100dB(FLAT)
		.250μV/115dB(IHF-A NET WORK)
Input Terminal.		.1.2 NORMAL, DC
Output Terminal		.A, B

● PEAK METER SECTION

Indicating Range		.-50~+50dB
		.0dB = 8Ω /100W 0dB = 0dBm
Indication Errors	-20 ~ +5dB	.±1.0dB
	-20 ~ +40dB	.±2.0dB
	-40 ~ +50dB	.±3.0dB
Frequency Respons	20~20,000Hz	.±1.0dB
Response Time		.100μS
Restoration Time		.1 sec.
Input Terminal		.EXTERNAL (RCA PIN JACK)
Indicator Changeover	REAR PANEL	.INTERNAL/EXTERNAL
Response Changeover	INTERNAL	.0dB = 8Ω/100W
	EXTERNAL.	.0dB = 8Ω/100W/100KΩ
		.0dB = 0 dBm/43KΩ

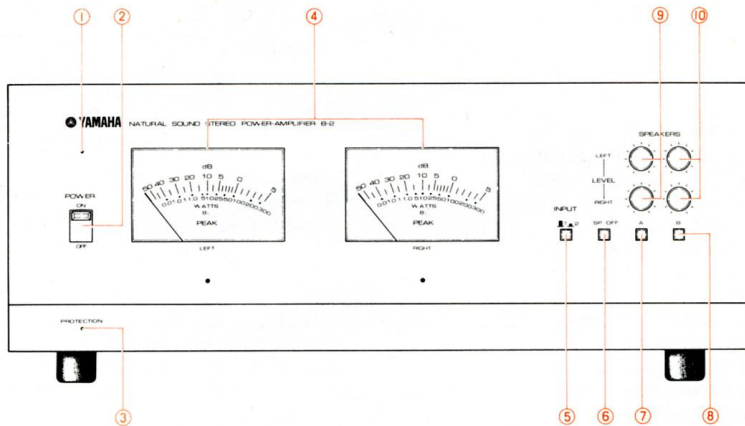
● OTHERS

DIMENSIONS	m/m	.436(W) x 370(D) x 151(H)
WEIGHT		.26Kg
POWER CONSUMPTION	AC 100V 50/60Hz	.290W (950W Max.)
Ambient Temperature		.-10 ~ +30C
SEMICONDUCTORS USED	VERTICAL FET 8 FET 4	} 175
	TRANSISTOR 95 IC 2	
	DIODE/LED. 66	

Alterations in standards and external shape may be
made for improvements without prior notice.

COMPONENTS LOCATION

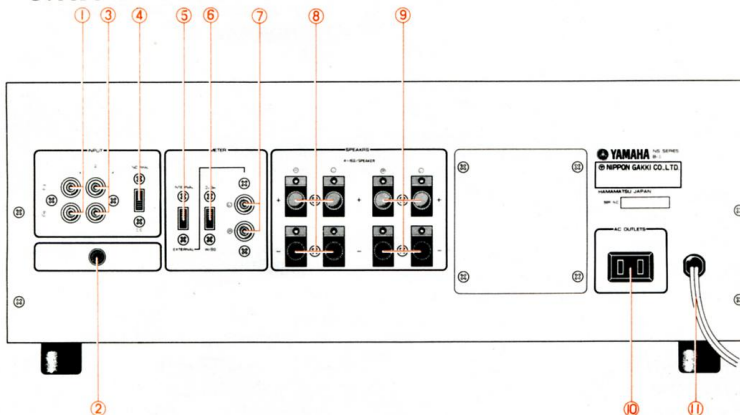
1.FRONT PANEL



- ① POWER INDICATOR (LED)
- ② POWER SWITCH
- ③ PROTECTION INDICATOR (LED)
- ④ PEAK METERS
- ⑤ INPUT SELECTOR SWITCH
- ⑥ SPEAKER SWITCH
- ⑦ SPEAKER SELECTOR SWITCH A
- ⑧ SPEAKER SELECTOR SWITCH B
- ⑨ SPEAKER LEVEL CONTROL A
- ⑩ SPEAKER LEVEL CONTROL B

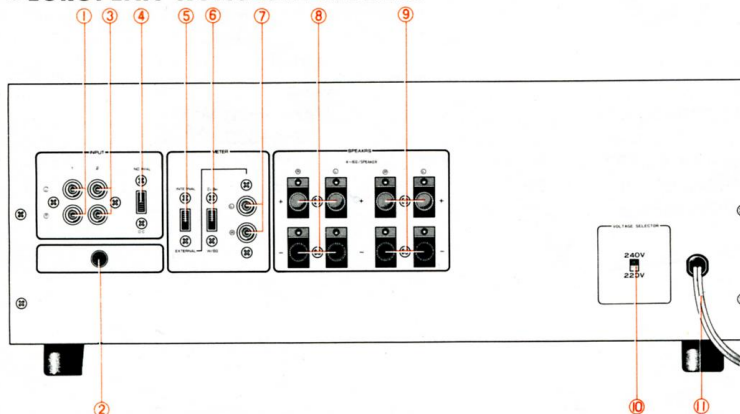
2.REAR PANEL

● U.S.&CANADIAN MODELS



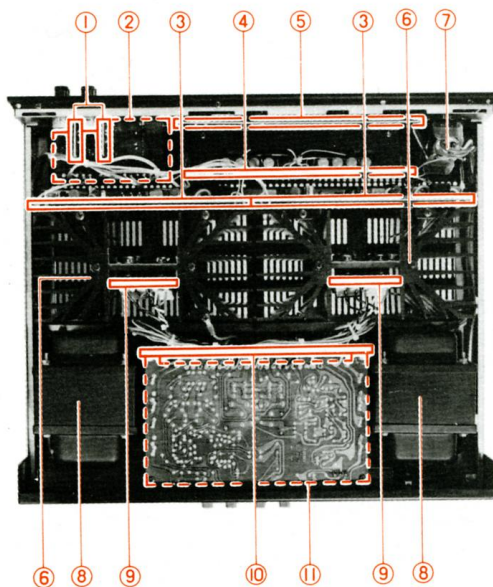
- ① INPUT JACKS-1
- ② GROUND TERMINAL
- ③ INPUT JACKS-2
- ④ SELECTOR SWITCH
- ⑤ METER SWITCH
- ⑥ METER INPUT SWITCH
- ⑦ METER INPUT JACKS
- ⑧ SPEAKER TERMINALS-B
- ⑨ SPEAKER TERMINALS-A
- ⑩ AC OUTLET
- ⑪ AC CORD

● EUROPEAN &GENERAL MODELS



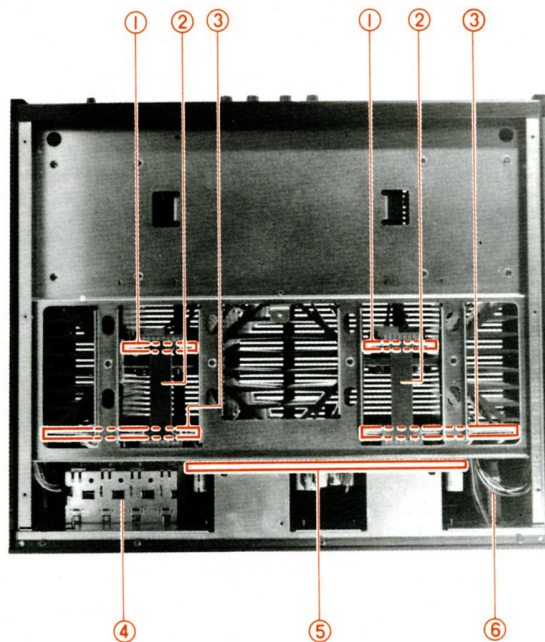
- ① INPUT JACKS-1
- ② GROUND TERMINAL
- ③ INPUT JACKS-2
- ④ SELECTOR SWITCH
- ⑤ METER SWITCH
- ⑥ METER INPUT SWITCH
- ⑦ METER INPUT JACKS
- ⑧ SPEAKER TERMINALS-B
- ⑨ SPEAKER TERMINALS-A
- ⑩ VOLTAGE SELECTOR
- ⑪ AC CORD

3.TOP VIEW



- ① VOLUME CONTROL CIRCUIT BOARD
- ② SELECTOR SWITCH CIRCUIT BOARD
- ③ DRIVE CIRCUIT BOARD
- ④ METER AMP CIRCUIT BOARD
- ⑤ LAMP CIRCUIT BOARD
- ⑥ HEAT SINK
- ⑦ POWER SWITCH
- ⑧ POWER TRANS FORMER
- ⑨ POWER FET CIRCUIT BOARD
- ⑩ ELECTROLYTIC CAPACITOR CIRCUIT BOARD
(NA06748: US & GENERAL MODELS)
(NA06750 : EUROPEAN MODEL)
- ⑪ POWER SUPPLY CIRCUIT BOARD

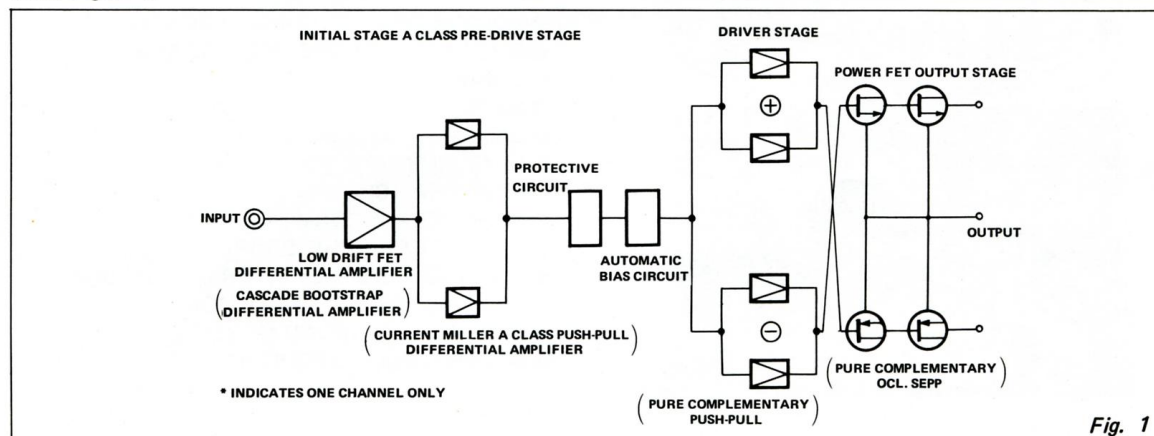
4.BOTTOM VIEW



- ① POWER FET CIRCUIT BOARD (NA06752)
- ② CONNECTOR CIRCUIT BOARD
- ③ DRIVE CIRCUIT BOARD
- ④ SELECTOR SWITCH CIRCUIT BOARD
- ⑤ METER LAMP CIRCUIT BOARD
- ⑥ POWER SWITCH

CIRCUIT DESCRIPTIONS

B-2 is composed of the "FET Differential Cascode Bootstrap Circuit" for its first stage, the "Current Miller Differential Push-Pull Amplifier Pre-Drive Stage", and a "Pure Complementary Symmetrical Push-Pull OCL ALL Stages Direct Coupled DC Amplifier" for its driver stage. (refer Figure 1)



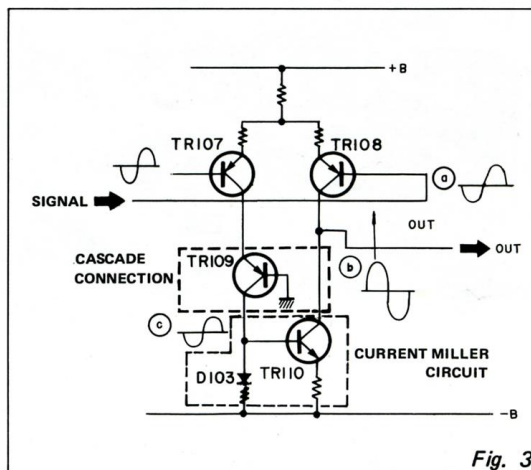
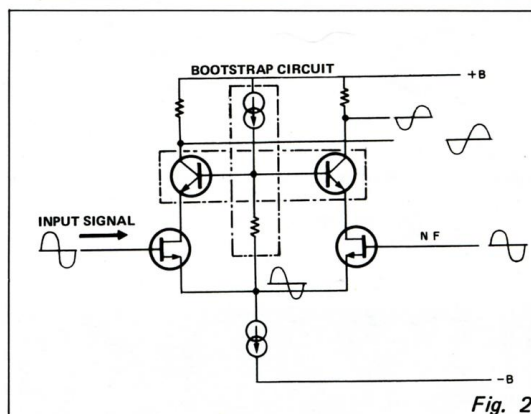
1. CASCADE BOOTSTRAP CIRCUIT

As shown in Figure 2, the initial stage is composed of a horizontal type FET with a high g_m which is thermally coupled to form a differential amplifier. A constant current bias is provided in the common source and a transistor connected to the drain side to form a cascade bootstrap circuit. (Initial stage approximately 29dB bare gain/1KHz) In actual practice, although variations may be expected in the impedance of the input volume of the amplifier to cause distortion, the differential FET in this circuit absorbs the fluctuations from the drain source by means of the input signal. For this reason, the voltage between the drain gates will vary and, as distortion will be prevented by variations in leakage current (C_{dg}) and feedback capacity (C_{rss}), in this unit

- the impedance is lowered by connecting (cascade connection) the transistor emitter to the drain side,
- fluctuations in V_d are decreased by means of its bootstrap circuit to decrease fluctuations in feedback capacity.

2. DIFFERENTIAL CIRCUIT

The second stage differential circuit is a differential amplifier formed of transistors. Also, signal-wise, it will be as shown in Figure 3. Local feedback is used to raise the input impedance of this stage, decrease the load in the initial stage, and to decrease the overall NF. On one hand, a base-grounded transistor is inserted in series on one side to eliminate distortion during large amplitude swings on the collector side. Further, to decrease secondary distortion in the pre-driver stage, a Current Miller class A push-pull circuit is incorporated.



3. PROTECTIVE CIRCUIT

* DC LIMITER

As this unit is composed of DC amplifiers, in the event that excessive DC voltage is applied to the input by error, the P channel, or N channel, in the FET side of the final stage will be set to ON condition and there will be fear of damage to the FET as PDmax (drain loss) will be exceeded.

To protect the FET when DC is applied, it will be necessary for TR112 to be in ON condition to short out the DC portion and prevent it from reaching the FET.

When DC is added to the signal, positive voltage develops at point "A" in the NF loop and the potential at point "B" rises to turn TR115 on. When TR115 is turned on, the potential at point "C" drops and TR111 is turned on. When TR111 is turned on, the potential at point "D" rises, TR112 is turned on, and the signal is shorted out. (When a negative voltage is applied, the same operation is carried out in the negative circuit.)

* PD LIMITER

When the load impedance is over 2 ohm, 50W, or when the output is in shorted condition, the potential between points "E" and "A", and at point "D" in Figure 4 increases. TR112 will therefore be set to ON condition to cut the input signal and thus protect the FET in the output stage by means of a limiter effect.

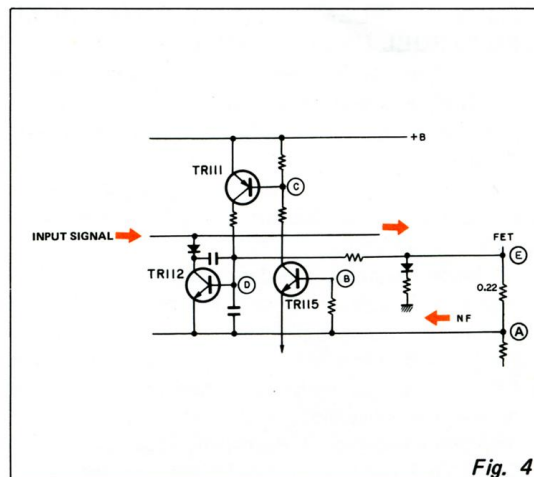


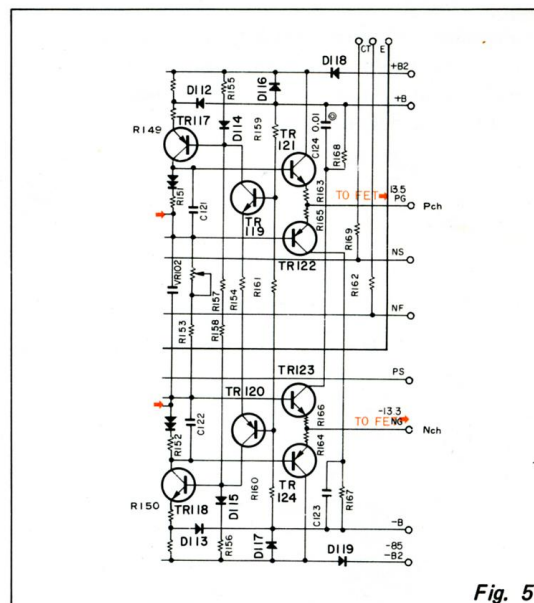
Fig. 4

4. AUTOMATIC BIAS CIRCUIT

Different from a transistor, the FET will be damaged if operated without a bias.

As the voltage in the $\pm B$ power supply rises in advance of that of the constant voltage circuit $\pm B2$ when the power switch is turned on, momentarily the $\pm B$ voltage may be considered $\pm 55V$ and $\pm B2$ as $0V$. Damage is prevented as the $\pm B$ potential is applied to [D116, R155, D114] [D117, R156, D115] and turns transistors TR117 and TR118 on; and the potential applied to (D112, R149) (D113, R150) is applied as a gate bias to each FET through transistors TR121 and TR124. (Figure 5)

Also, fluctuations (power supply voltage fluctuations) in the $+B$ voltage causes the voltage applied to the FET in the final stage to fluctuate thus varying the operating point of the FET and becoming a possible cause of distortion. For this reason, the bias applied to the FET gate is varied simultaneously to eliminate the distortion. For example, if the $+B$ potential ($+55V$) rises, since TR119 operates in the ON direction, the base potential of TR117 drops and operates in the ON direction; and the medium point potential of TR121 and TR122 rises causing the FET gate bias to rise. In other words, it operates in the OFF direction stabilizing the operating point and thus eliminating distortion.



5. PURE COMPLEMENTARY SYMMETRICAL PUSH-PULL DRIVER CIRCUIT

This circuit is to drive the FET in the final stage and is a Class A driver circuit that operates the Pch and Nch sides of the FET evenly by push-pull operation. (Figure 6)

(1) Compared to the emitter follower driver system, it is possible to equalize the driving impedance when FET is ON or OFF.

(2) Since the input impedance of the power FET is high in the frequencies near the audible range, less current will be required in the driver stage. When the frequency becomes high, class B operation will result from the input strength but the feature in (1) will not be lost. (In the case of the emitter follower system, if it is desired to reduce the driving impedance during ON or OFF conditions, it will be necessary to reduce the emitter resistance and cause increased current to flow)

(3) Since less current is required in the drive stage, transistors with low P_c may be employed. In the "B-2", the transistors are the same as those used in the predriver stage and, as transistors with P_{cmax} of approximately 1 watt may be employed, it will be possible to select those with high h_{fe} and f_t .

For instance, when a positive signal is received in example (1), the base input voltage of TR121 rises, the impedance between the collector and emitter drops and increased current tends to flow. Also, since there is a potential difference in relation to TR122, the impedance in TR122 rises to enable high gain output values to be obtained.

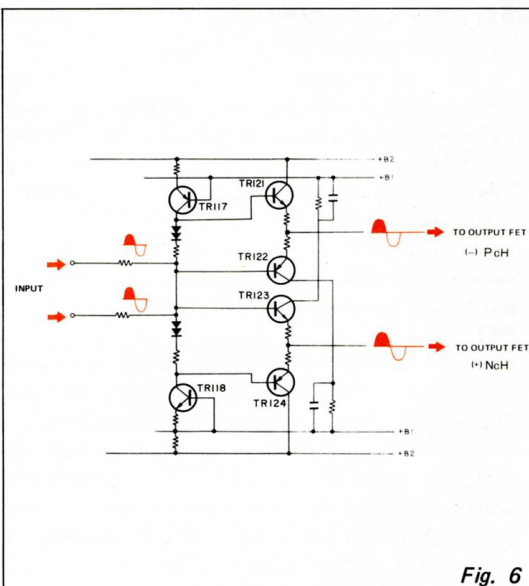


Fig. 6

6. SPEAKER PROTECTION CIRCUIT

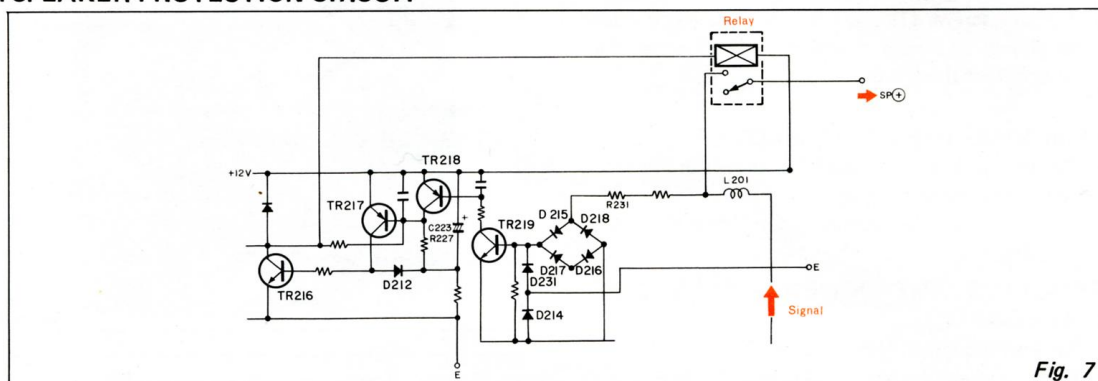


Fig. 7

- In the B-2, the relays operate approximately 3 seconds from the instant the power supply switch is turned on and the circuit will be in ON condition. As current (approximately 100ma) will not flow through the relays while the potential (0.6V) between the emitter and base of TR217 is varying, that is, while C223 is being charged, the relays will not be in ON condition and no sound will be emitted. Since TR217 will not turn ON at the instant that the power supply switch is entered (potential between base and emitter insufficient), the relays will not be in ON condition. However, when C223 is sufficiently charged to operate TR217, TR216 will operate in ON direction, current will commence to flow in the relays and the circuit will be in ON condition. (Figure 7)

7. INPUT CIRCUIT (PIN JACK SHEET)

- Input connections are possible through 2 paths and it is also possible to change over from NORMAL to DIRECT by means of a changeover switch. (Figure 8)
- FOR NORMAL operation, an input coupling condenser is connected and the unit is operated as a normal main amplifier by cutting off the current in the input.
- In DIRECT operation, as the input signal by passes the coupling condenser, the unit may be operated as a DC amplifier as the DC portion of the input signal is also amplified.
- PEAK METER, EXT. INPUT
The meter circuit in the B-2 may be used as a "0dBm Indicator" for preamplifiers etc. where direct reading of the output is possible and as a "W/8ohm Indicator" in which the output level may be read with an 8 ohm load in the main amplifier connected to the "0dBm Indicator". (Figure 9) This terminal enables the meter to be used independently and outputs from other pre-amplifiers and power amplifiers may be observed by connecting their output to the EXTERNAL terminal. Change over of the input is carried out by the SELECTOR sheet.

*** THE RELAYS WILL BE IN OFF CONDITION IF DC PORTIONS ARE INCLUDED IN THE INPUT SIGNAL.**

If (+) or (-) DC current appears in the signal system, the potential between the base and emitter of TR219 will rise causing TR219 to turn on. Next, the base potential of TR218 is lowered causing it to turn on. This, in turn, causes TR217 to turn off as the potential applied to its base rises. TR216 is also turned off and the speaker protected by cutting off the flow of current through the relay thus putting them in OFF condition and blocking the signal system.

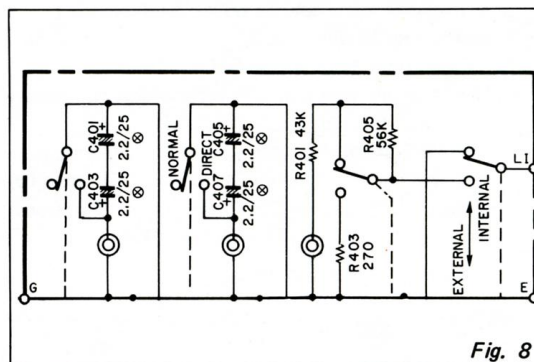


Fig. 8

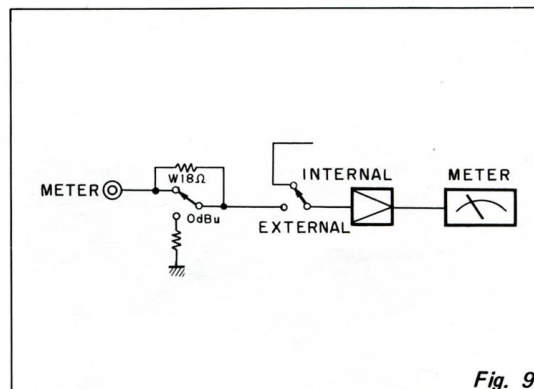


Fig. 9

PARTIAL DISASSEMBLY

1. REMOVING THE TOP COVER

- Remove screws (1) and (2) located on both sides as shown in Photo 1 and lift off cover in the direction of the arrow.

2. REMOVING THE BOTTOM COVER

- Remove screws (1) through (8) shown in Photo 2 and remove bottom cover.
- (1) Discharge power supply circuit. (refer Page 11)

3. REMOVING THE POWER SUPPLY CIRCUIT BOARD

- Remove top cover. (refer Step 1.)
- Remove screws (1) and (2) shown in Photo 3.
- Lift up power supply circuit board as shown in Photo 4. (It will be possible to inspect the relays, replace the fuses, etc. in this position)
- Unsolder all terminal connections from the power supply circuit board and, holding stoppers (3) and (4) with radio pliers or some other similar device, lift up and remove circuit board from the stoppers.

4. REMOVING THE POWER FET UNIT

- Remove top and bottom covers. (refer Steps 1 and 2)
- As shown in Photo 5, as a connector circuit board is provided between the power FET circuit board and drive circuit board, remove the connector circuit board from the rear of the chassis.
- Unsolder all terminal connections on the power FET circuit board.
- The "L" channel of the power FET unit may be removed by removing screws (5), (6), (9), and (10) shown in Photo 3 and the "R" channel by removing screws (7), (8), (11), (12), and (13).

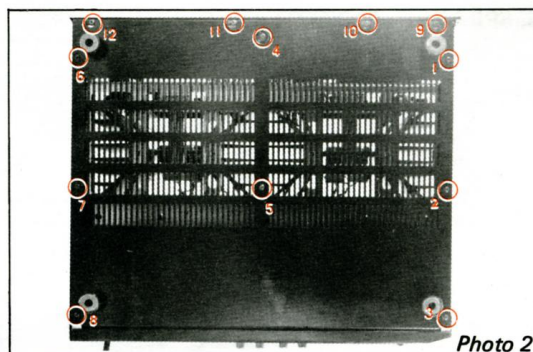


Photo 2

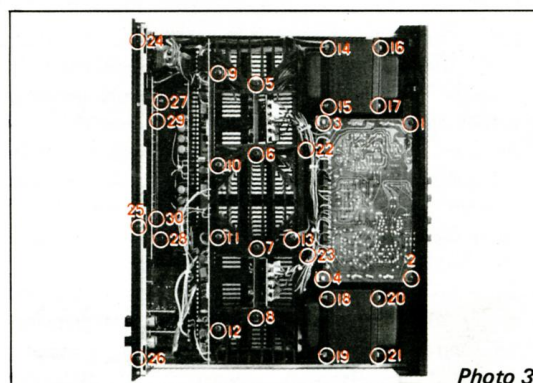


Photo 3

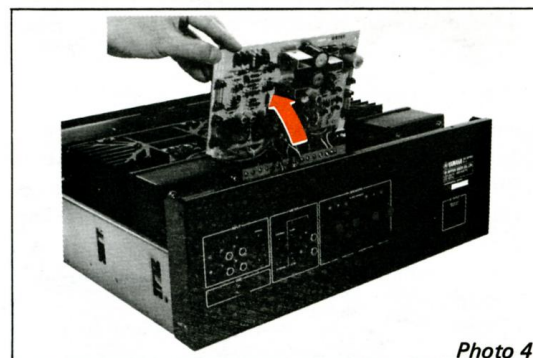


Photo 4



Photo 1

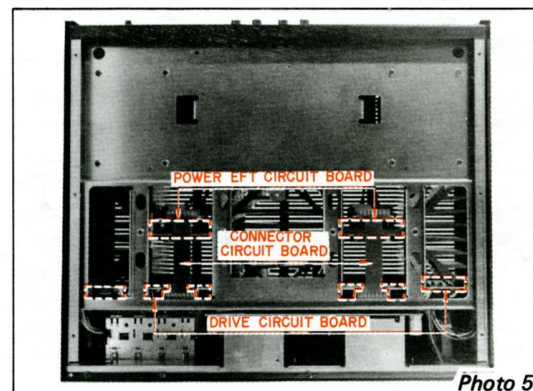


Photo 5

5. REMOVING THE DRIVE CIRCUIT BOARD

- Remove the connector circuit board. (refer Step 4-a,b)
- Unsolder terminal connections of the circuit board being removed.
- The "L" channel of the drive circuit board may be removed by removing screws (9) and (10) shown in Photo 3 and the "R" channel by removing screws (11) and (12).

6. REMOVING THE POWER SUPPLY TRANSFORMER

- Remove the top cover. (refer Step 1.)
- Remove rear panel screws (1) through (5) shown in Photo 6.
- Loosen screws (6) and (7) shown in Photo 6 and tilt back rear panel.

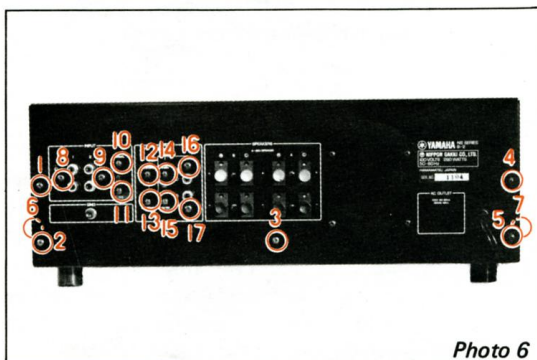


Photo 6

- Unsolder primary lead wires of the power transformer (gray and yellow). (No. (3) and (5) in Photo 7. Also unsolder secondary lead wires at this time.)

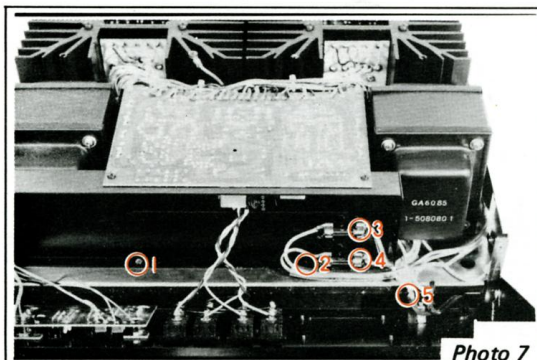


Photo 7

- The "L" channel power supply transformer may be removed by removing chassis screws (14) through (17) shown in Photo 3 and the "R" channel power supply transformer by removing

screws (18) through (21).

Caution: As the power supply transformer is fairly heavy, care must be taken to avoid damaging the other parts.

7. REMOVING THE ELECTROLYTIC CAPACITOR CIRCUIT BOARD

- Tilt back rear panel. [refer Step 6 (a) through (c)]
- Remove power supply circuit board. (refer Step 3. However, it will not be necessary to unsolder the lead wires)
- Remove screws (1) and (2) shown in Photo 7.
- Unsolder all terminals of the Electrolytic Capacitor circuit board.
- Remove Electrolytic Capacitor circuit board by removing screws (22) and (23) shown in Photo 3.

8. REMOVING THE PIN JACK CIRCUIT BOARD

- Tilt back rear panel. [refer Step 6 (a) through (c)]
- Remove screws (8) through (17) shown in Photo 6.
Note: Screws (8), (9), (16), and (17) are secured by nuts from the rear side of the panel.
- Unsolder all terminal connections from the circuit board and remove the pin jack circuit board.

9. REMOVING THE METER AMPLIFIER AND LAMP CIRCUIT BOARD

- Remove the top cover. (refer Step 1)
- Remove screws (27) and (28) in Photo 3.
- Remove the lamp circuit board from the meter amplifier circuit board by removing screws (29) and (30) shown in Photo 3.
Note: When removing the lamp circuit board and meter amplifier circuit board, unclamp lead wires, lift out circuit board, and unsolder the leads.

10. REMOVING THE FRONT PANEL

- Remove the top cover. (refer Step 1)
- Remove the 4 knobs marked SPEAKER located on the front panel.
- Remove screws (24) through (26) shown in Photo 3.
- Remove front panel by removing screws (9) through (12) shown in Photo 2.

11. REMOVING THE LED CIRCUIT BOARD

- a. Remove front panel. (refer Step 10)
- b. As the LED circuit board (1) and (2) are bonded to the chassis with foam rubber as shown in Photo 8, lift off from the chassis after unsoldering the leads.

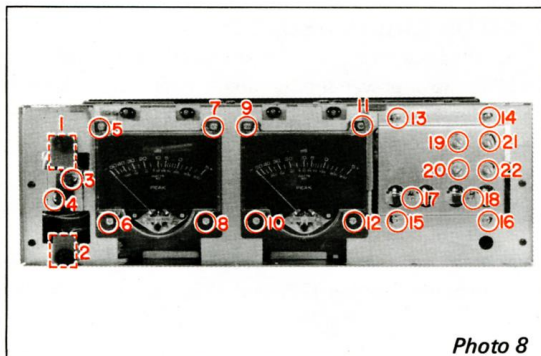


Photo 8

12. REMOVING THE POWER SWITCH

- a. Remove the front panel. (refer Step 10)
- b. Pull off lever. (refer Figure 1)

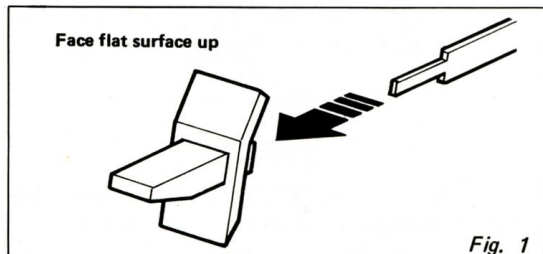


Fig. 1

- c. Remove power switch by removing screws (3) and (4) shown in Photo 8.

13. REMOVING THE PEAK LEVEL METER

- a. Remove meter by removing screws (5) through (8) and (9) through (12) shown in Photo 8.

Note: When removing the meter, unsolder the connections between the meter and meter amplifier circuit board.

Caution: When tightening the screws, care must be taken not to damage the meter by over-tightening.

14. REMOVING THE SELECTOR SWITCH CIRCUIT BOARD

- a. Remove screws (13) through (16) shown in Photo 8 and remove both the selector switch circuit board and mounting brackets.

Note: When installing the selector switch circuit board mounting brackets, position it to permit the front portion of the selector switch to slide smoothly through the switch hole in the front panel.

15. REMOVING THE VOLUME CIRCUIT BOARD

- a. Remove the selector switch circuit board. (refer Step 14)
- b. Remove volume control nuts (19) through (22) and screws (17) and (18) from the mounting bracket as shown in Photo 8 and remove volume circuit board from the selector switch circuit board connector.

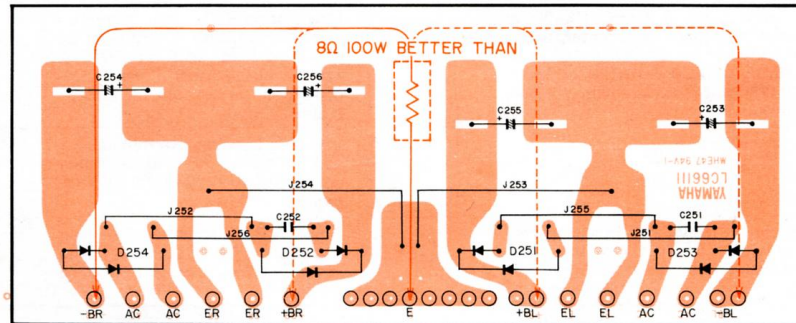
MEASUREMENT AND ADJUSTMENT

PRE-ADJUSTMENT PROCEDURES

- Prior to commencing repairs, adjustments, or replacements of circuit board, always turn power switch to OFF and discharge power supply circuit as shown in the diagram below.

- Care is required as shocks will be experienced or FET and other parts damaged if discharging is not conducted.

* Carry out the following checks with the unit completely assembled.



1. OVERALL ADJUSTMENTS

- Connect as shown in Figure 1 and, prior to turning on the power switch, turn drive circuit board BIAS VR (VR102) fully counter-clock-wise.
- With no signal input, connect a VTVM between terminals NS and CT of the left and right channel drive circuit boards.
- Turn amplifier power supply ON with the slidac in 0V position and adjust slidac to rated voltage (100V) while observing the VTVM connected to the left and right channels does not exceed 1.4V.

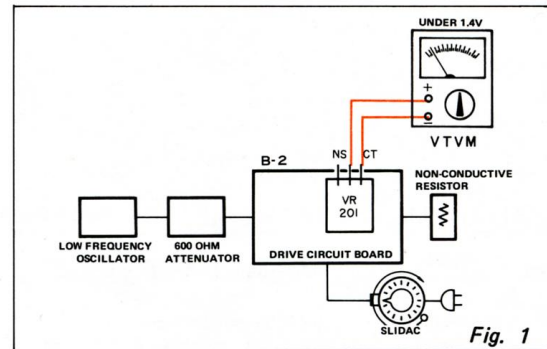


Fig. 1

2. ADJUSTING THE POWER SUPPLY VOLTAGE

Step	Items to be Adjusted	Method of Adjustment	Place Adjusted	Adjusting Procedure	Voltage Values	Remarks
2-1	+85V	Connect DC voltmeter between the +85 and E terminals of the power supply circuit board.	VR201	Adjust VR201 so the voltage between terminals +85 and E is $+85V \pm 0.5V$.	$+85V \pm 0.5V$	Refer Figure 2
2-2	-85V	Connect a DC voltmeter between the -85 and E terminals of the power supply circuit board.	VR202	Adjust VR202 so the voltage between terminals -85 and E is $-85V \pm 0.5V$.	$-85V \pm 0.5V$	Refer Figure 2

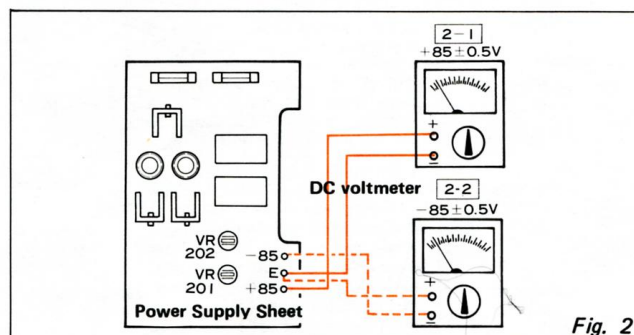


Fig. 2

3. ADJUSTMENTS OF THE MAIN AMPLIFIER

Step	Items Adjusted	Method of Adjustment	Places Adjusted	Adjusting Procedures	Voltage Values	Remarks
3-1	Adjustment of the Idling Current	Connect a VTVM to test terminals NS and CT of the Drive circuit board	VR102	Adjust VR102 so the voltage between terminals NS and CT is 40mV under no-load, no-signal input conditions.	40mV	Refer Figure 3
3-2		Connect an 8 Ohm, 100-200W load resistor, a level meter, and a distortion meter capable of measuring residual distortion of under 0.005 % at 20KHz to the speaker terminals.	VR102	Readjust VR102 for minimum distortion at 30W output with an 8 Ohm load and at 20KHz. (15.5V output and under 0.02 % distortion at terminals 30W : 8 ohm)	Distortion under 0.02 %	Refer Figure 4
3-3				Voltage between terminals NS and CT under no-load, no-signal conditions to be under 0.1V subsequent to this.	Under 0.1V	
3-4	Adjustment of DC Balance	Connect a VTVM between test terminals E and CT of the drive circuit board.	VR101	Adjust VR101 so voltage between E and CT is $0V \pm 10mV$ with the input volume control turned to minimum.	$0 \pm 10mV$	Refer Figure 3

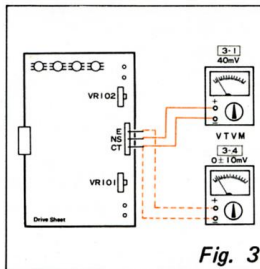


Fig. 3

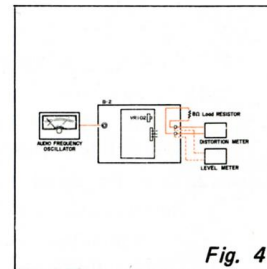


Fig. 4

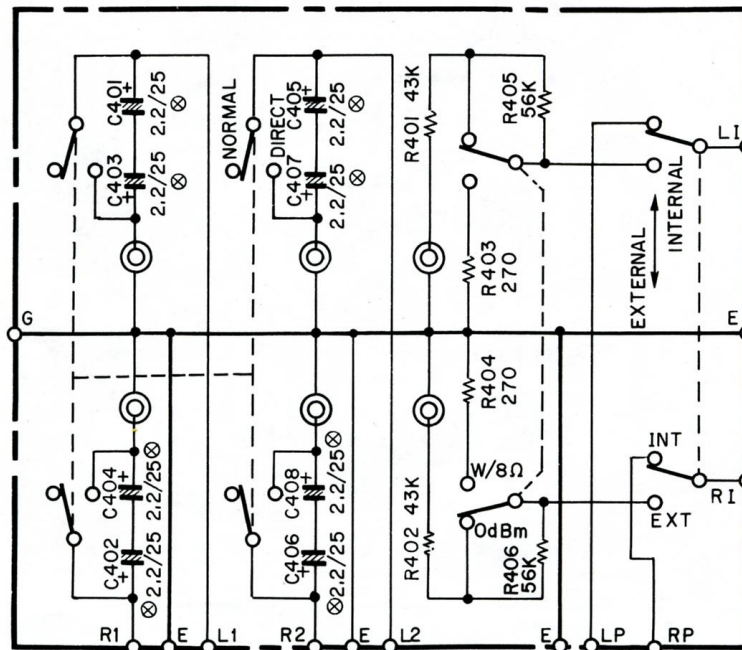
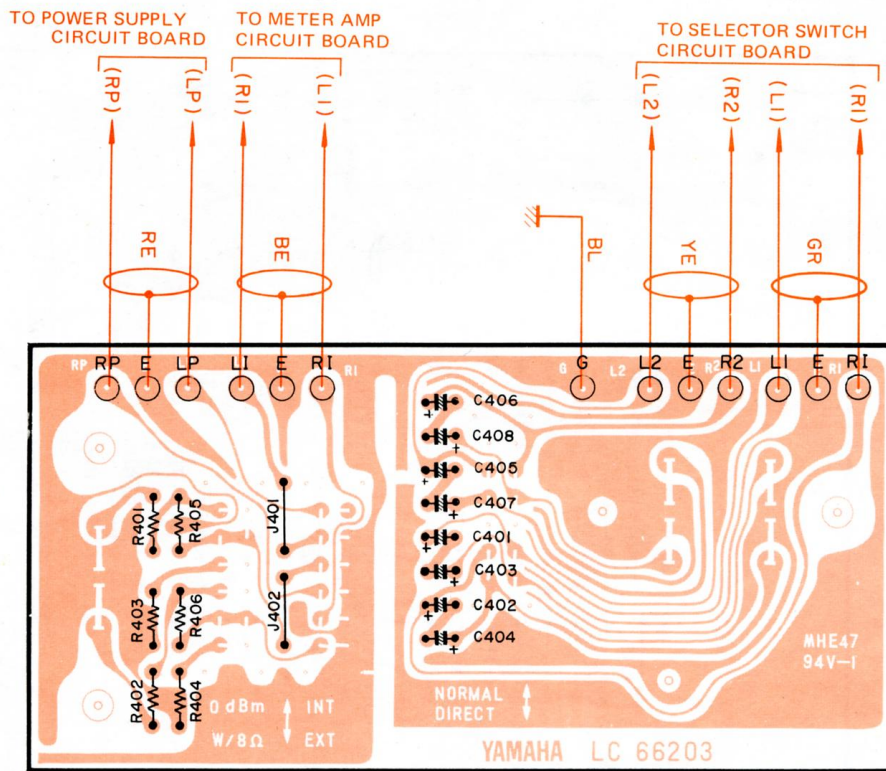
4. ADJUSTMENTS OF THE METER AMPLIFIER

Step	Items Adjusted	Method of Adjustment	Places Adjusted	Adjusting Procedure	Meter Indication Values.	Remarks
4-1	Meter Amplifier Adjustment	1. Input Terminal: Connect low frequency oscillator (1KHz, 600 Ohm output) 2. Speaker Terminal: Connect 8 Ohm load resistor 3. Observe output level at both ends of the 8 Ohm load 4. Meter Changeover Switch: Set to INTERNAL 5. Set input volume to maximum.	VR307 (LCH) VR308 (RCH) -30 dB	Apply a 1KHz signal and adjust input for an output reading of 1.2dBm with an 8 Ohm load. Adjust VR307 and VR308 (-30 dB) so the meter indicates -30dB	-30 dB	Refer Figure 5
4-2			VR301 (LCH) VR302 (RCH) -20 dB	Adjust input signal so the output reads 11.2dBm. Adjust VR301 and VR302 (-20dB) so the meter indicates -20dB.	-20 dB	
4-3			VR303 (LCH) VR304 (RCH) -10 dB	Adjust input signal so the output reads 21.2dBm. Adjust VR303 and VR304 (-10dB) so the meter indicates -10dB.	-10 dB	
4-4			VR305 (LCH) VR306 (RCH) 0 dB	Adjust input signal so the output reads 31.2dBm. Adjust VR305 and VR306 (0dB) so the meter indicates 0dB.	0 dB	
4-5	Confirm			Vary output of the low frequency oscillator from 31.2dBm to -18.8dBm in steps of 10 dB and confirm that the reading is within the meter indication lines from the dial calibrations of 0 to -30dB and within $\pm 2mm$ of the indicator lines between the dial calibrations of -40dB to -50dB.		

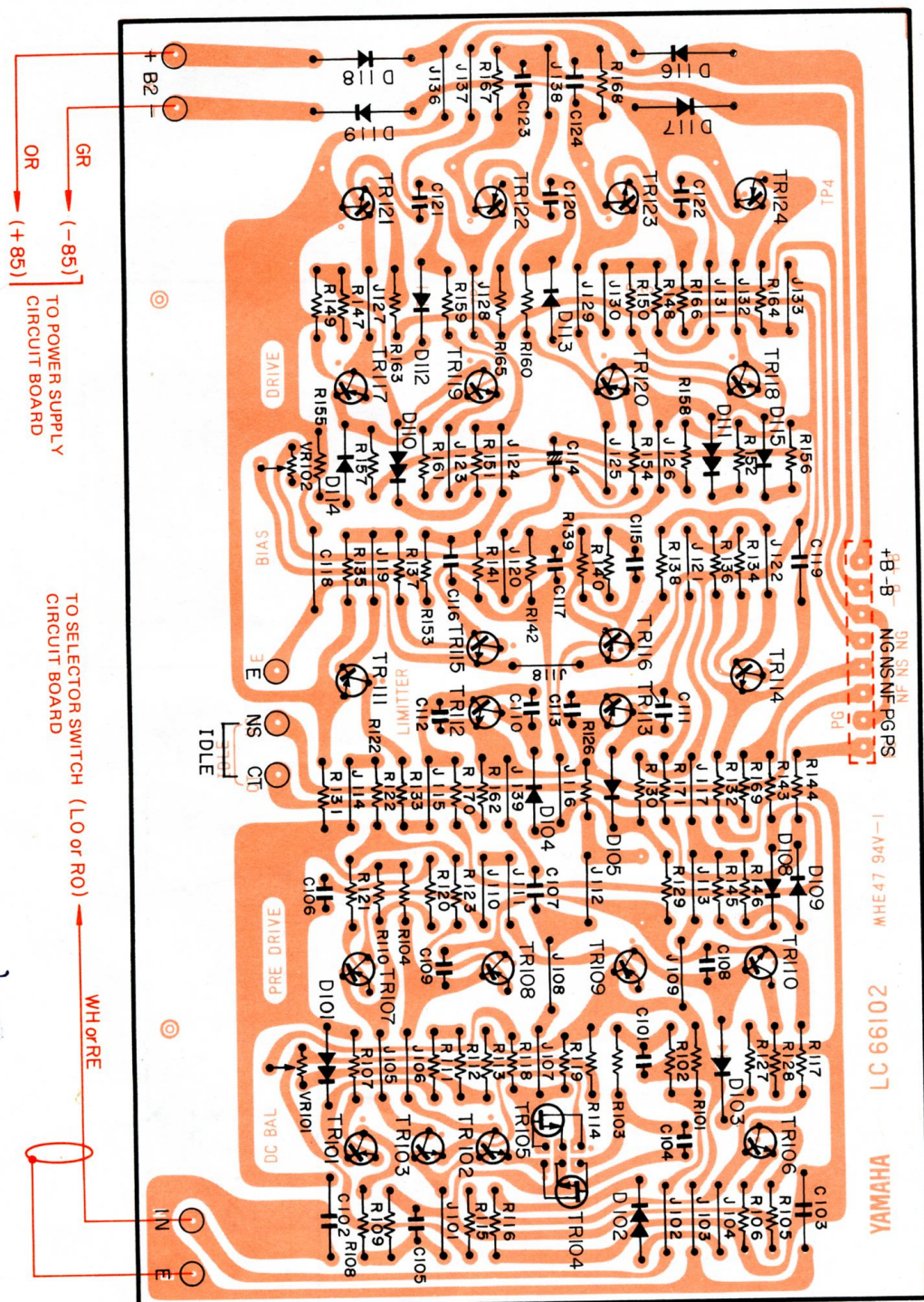
Fig. 5

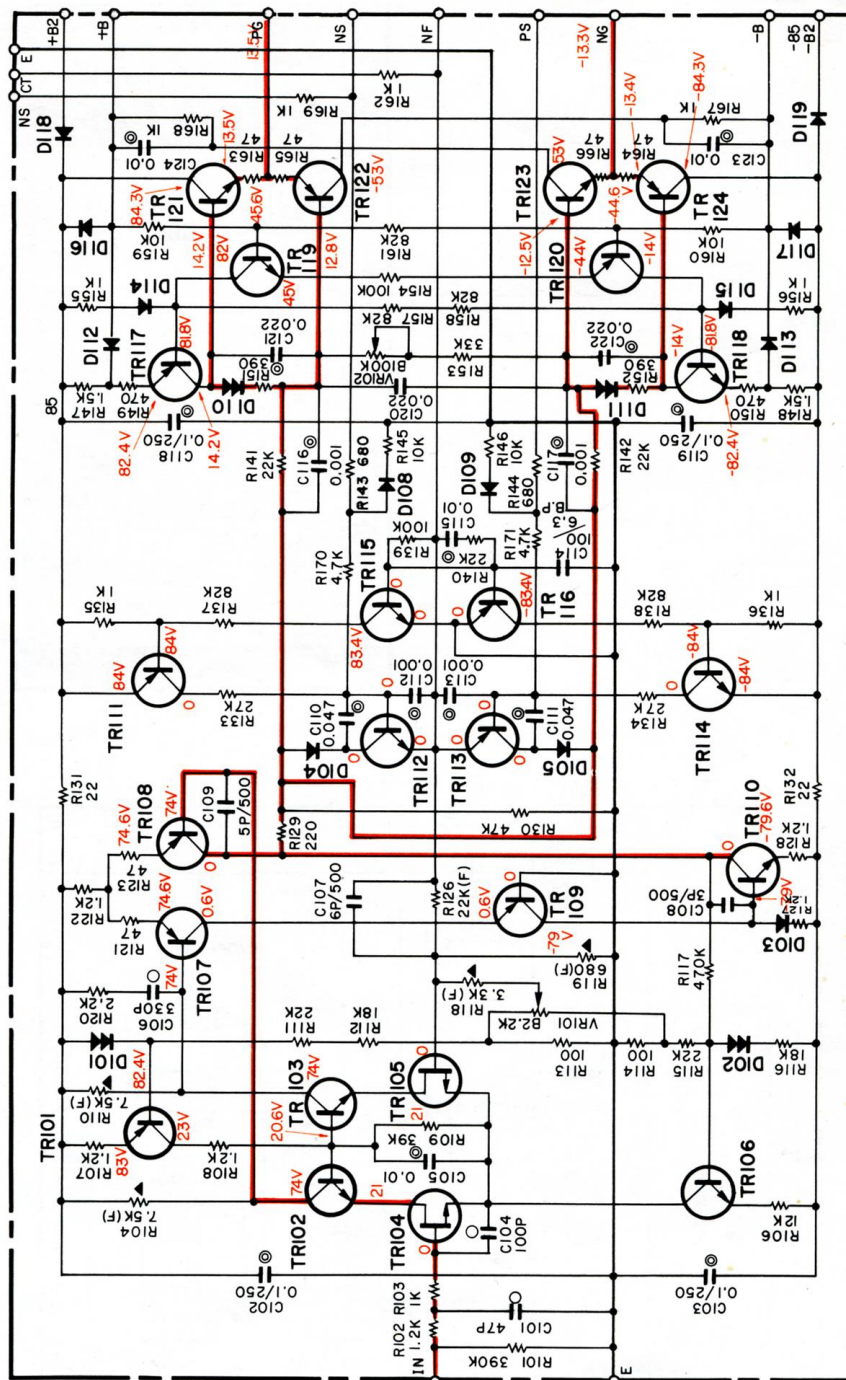
PRINTED CIRCUIT BOARD

1. PINJACK CIRCUITBOARD NAO6756

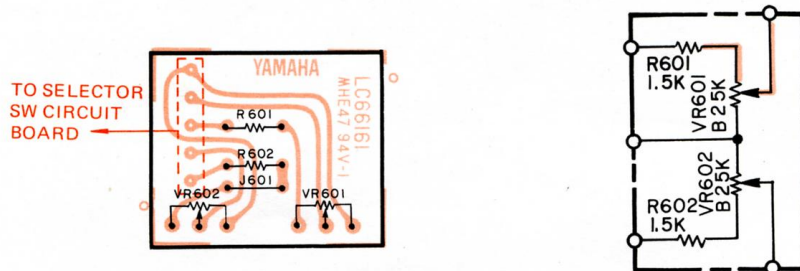


4-

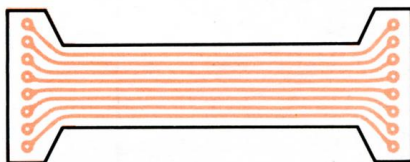




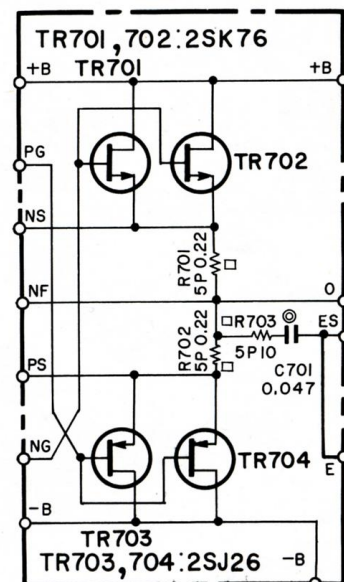
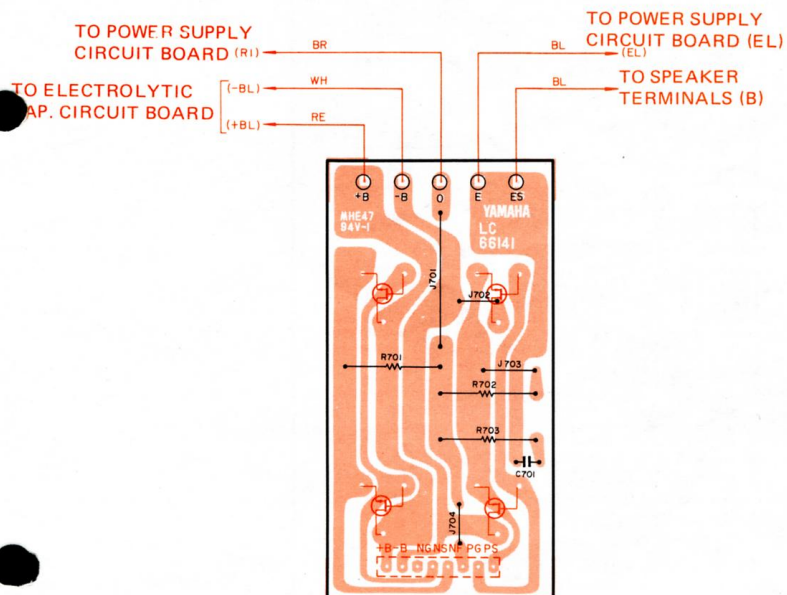
4.VOLUME CIRCUIT BOARD NAO6754



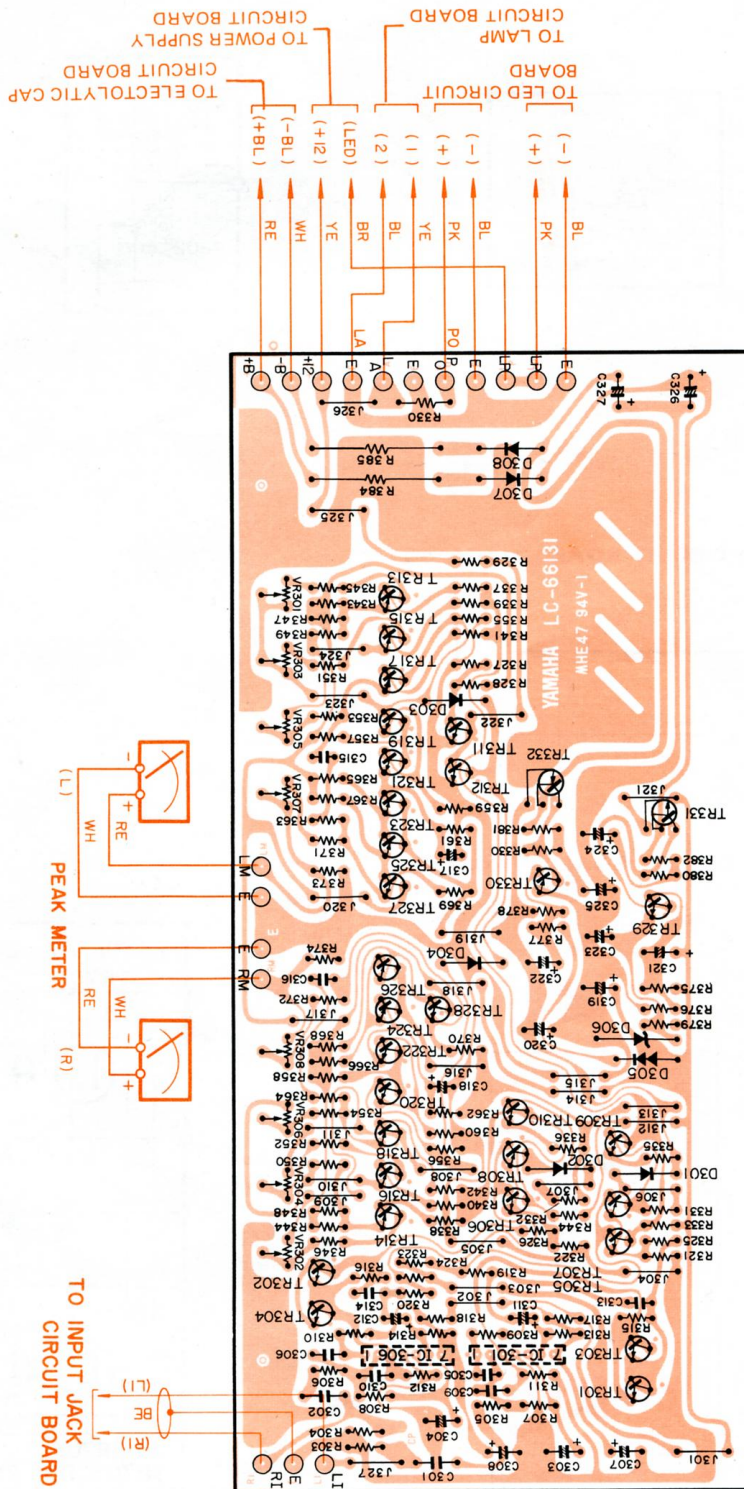
5.CONNECTOR CIRCUIT BOARD NAO6753



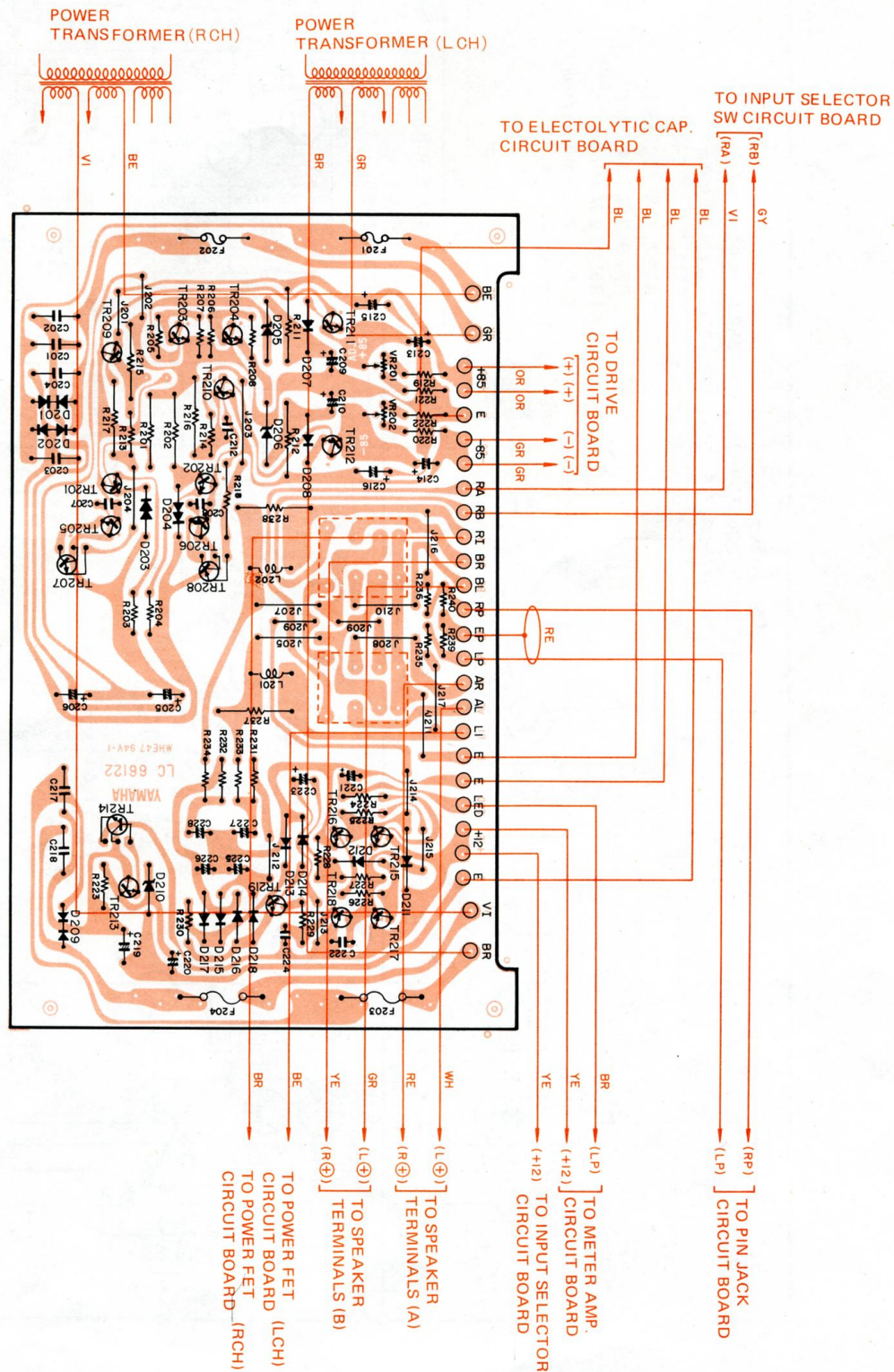
6.POWER FET CIRCUIT BOARD NAO6752



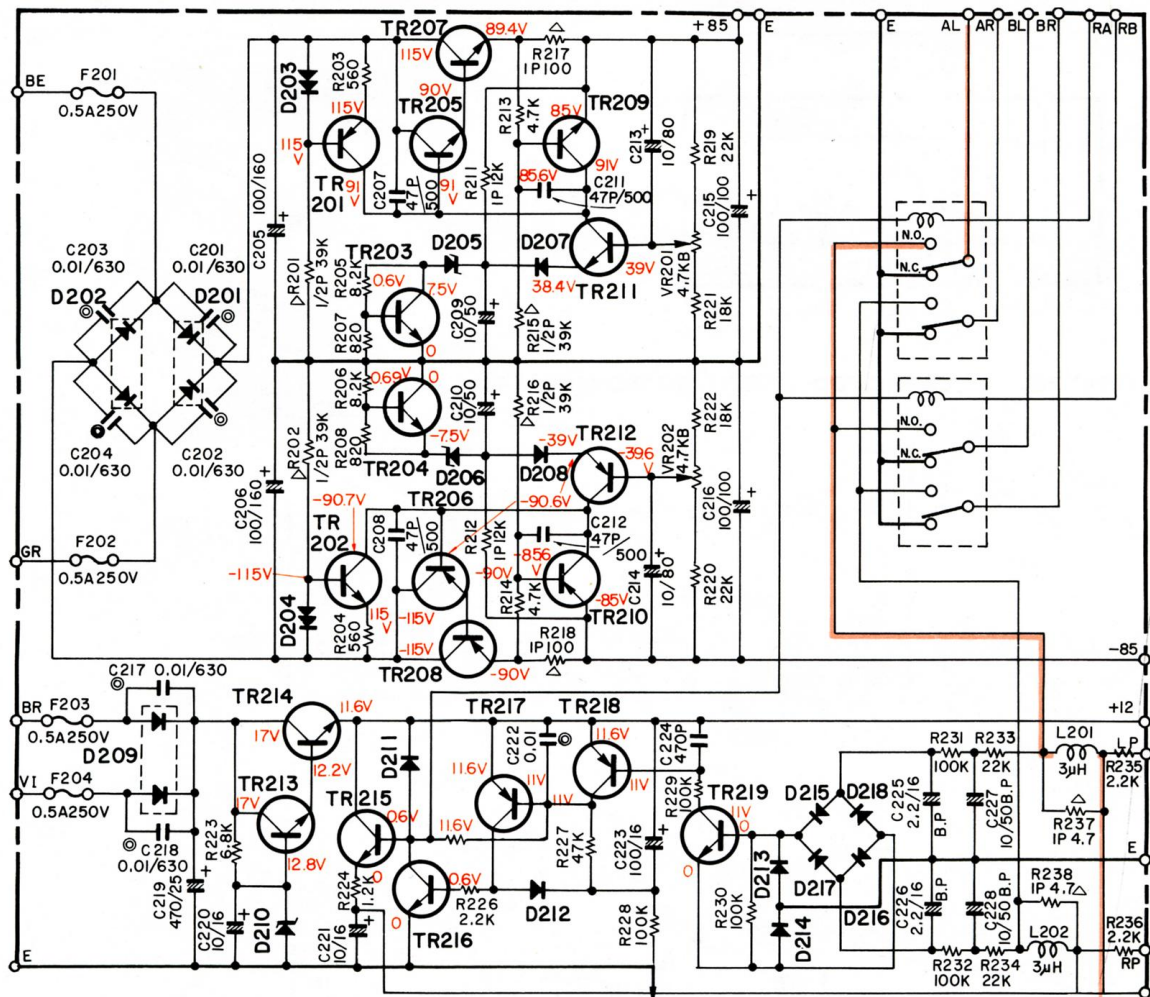
7.METER AMP CIRCUIT BOARD NAO6751



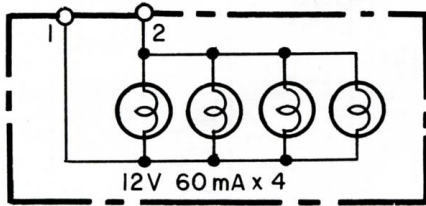
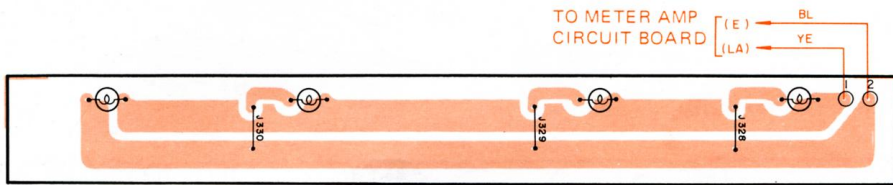
**8. POWER SUPPLY CIRCUIT BOARD NAO6749 :U.S & CANADIAN MODELS NAO6750
:EUROPEAN MODEL**



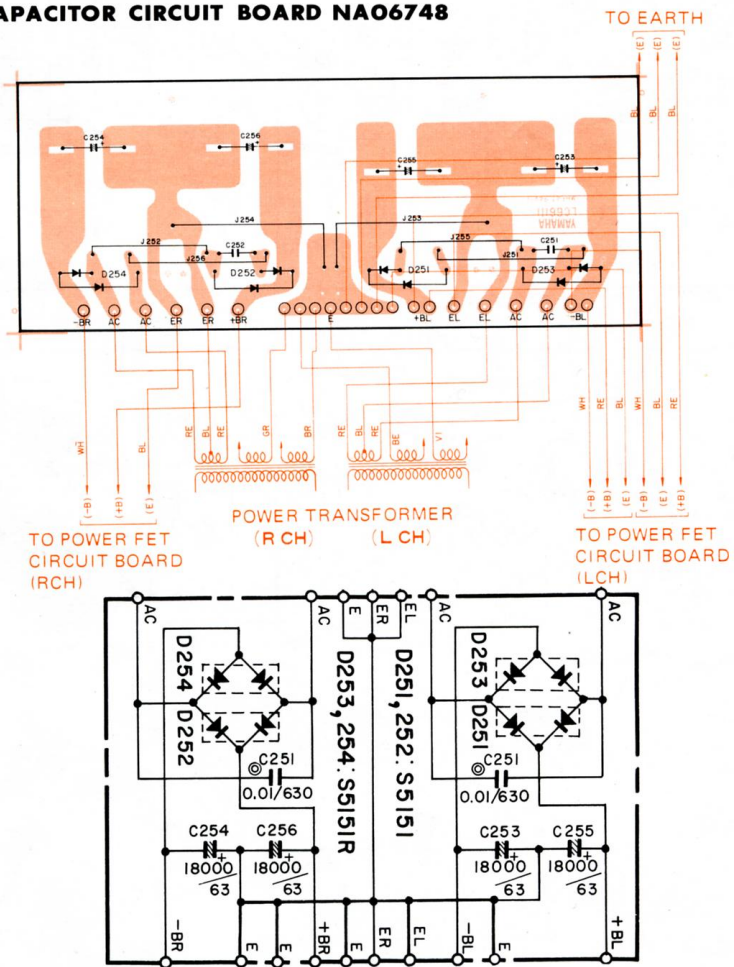
105



9.LAMP CIRCUIT BOARD NAO6751



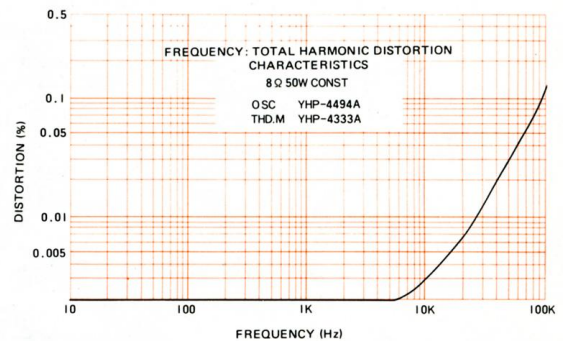
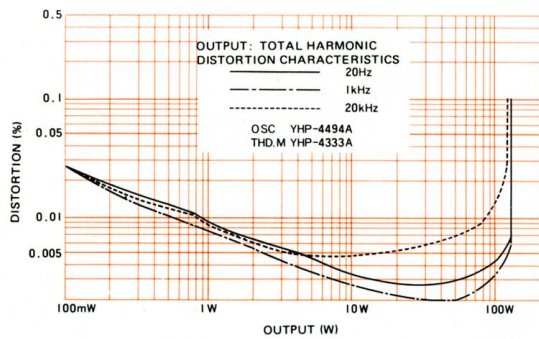
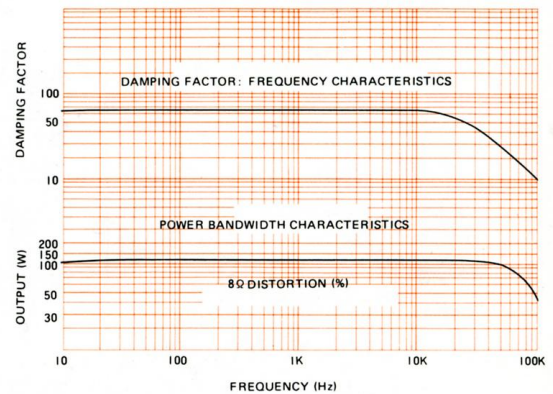
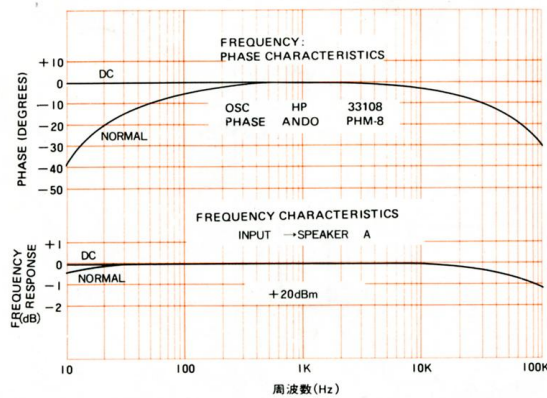
10.ELECTORLYTIC CAPACITOR CIRCUIT BOARD NAO6748



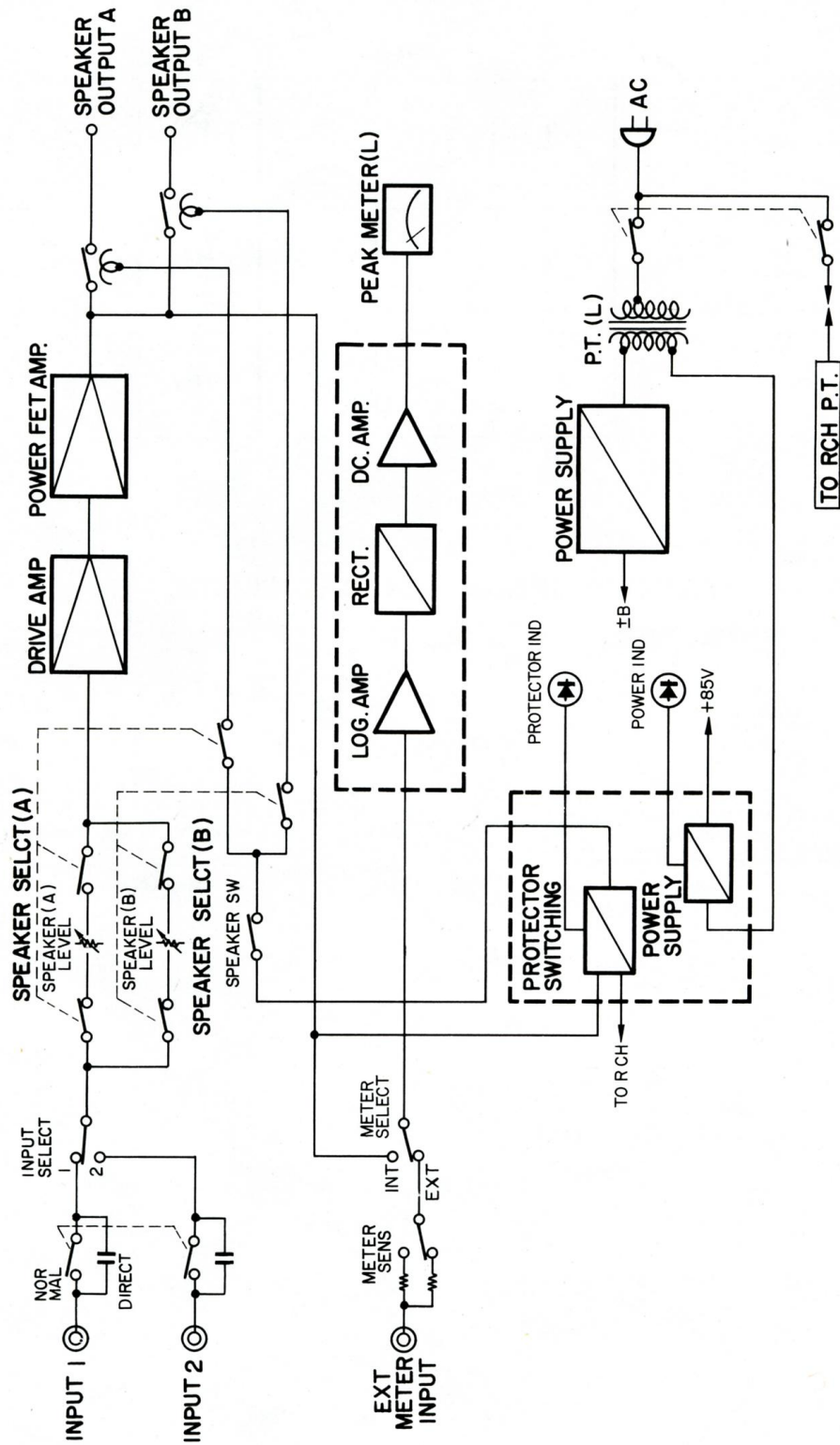
FET AND NEW PARTS SYMBOLS

	2SC177BV 2SC1439Bor V		2SC1452		2SK76		2SA872A 2SA858Bor V		2SA810		HV-46R		HV-23GY
	2SK43		2SJ26		HV-46R		HV-23GY		HV-46R		HV-23GY		HV-46R

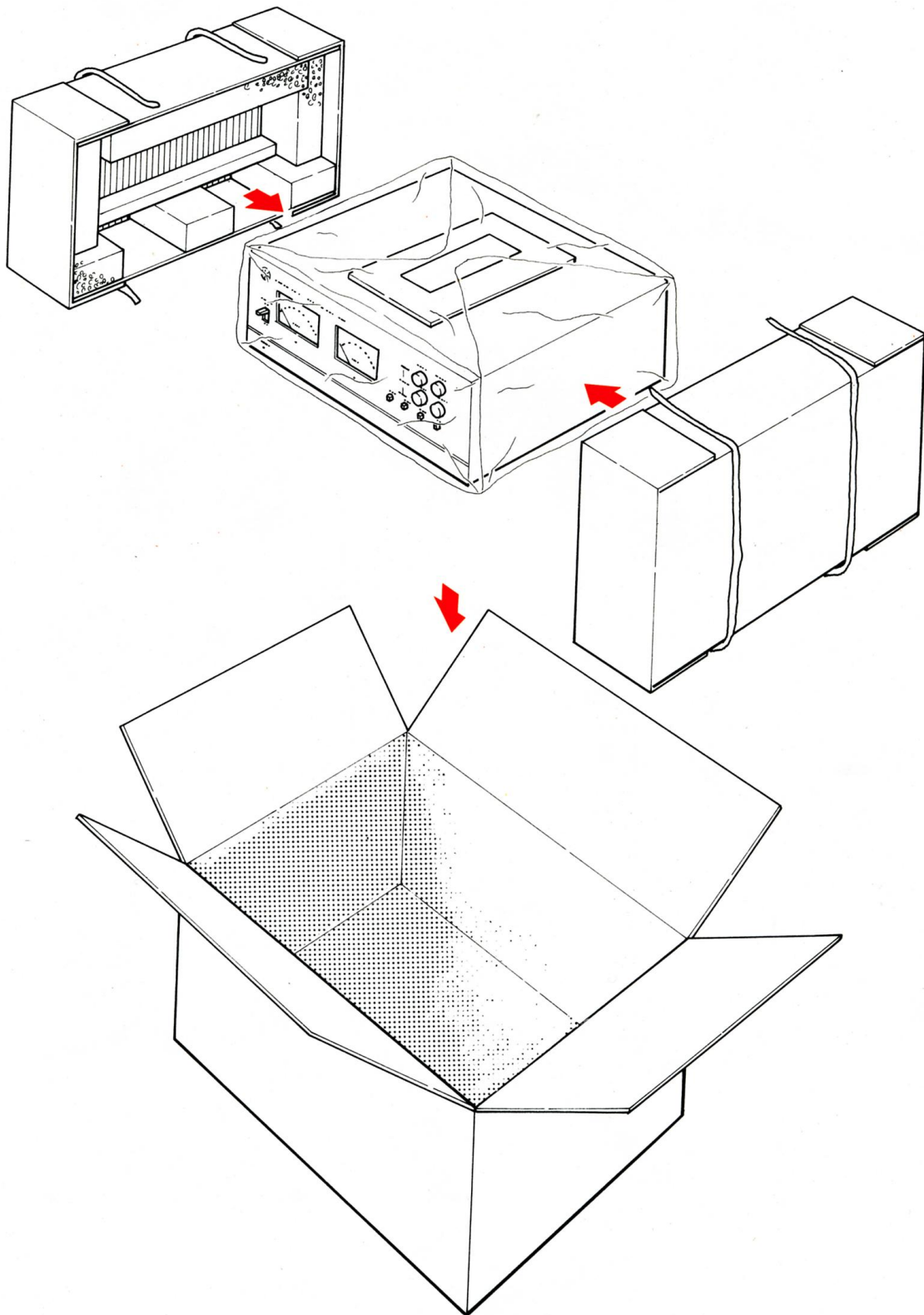
PRINTED SPECIAL CHARACTERISTIC



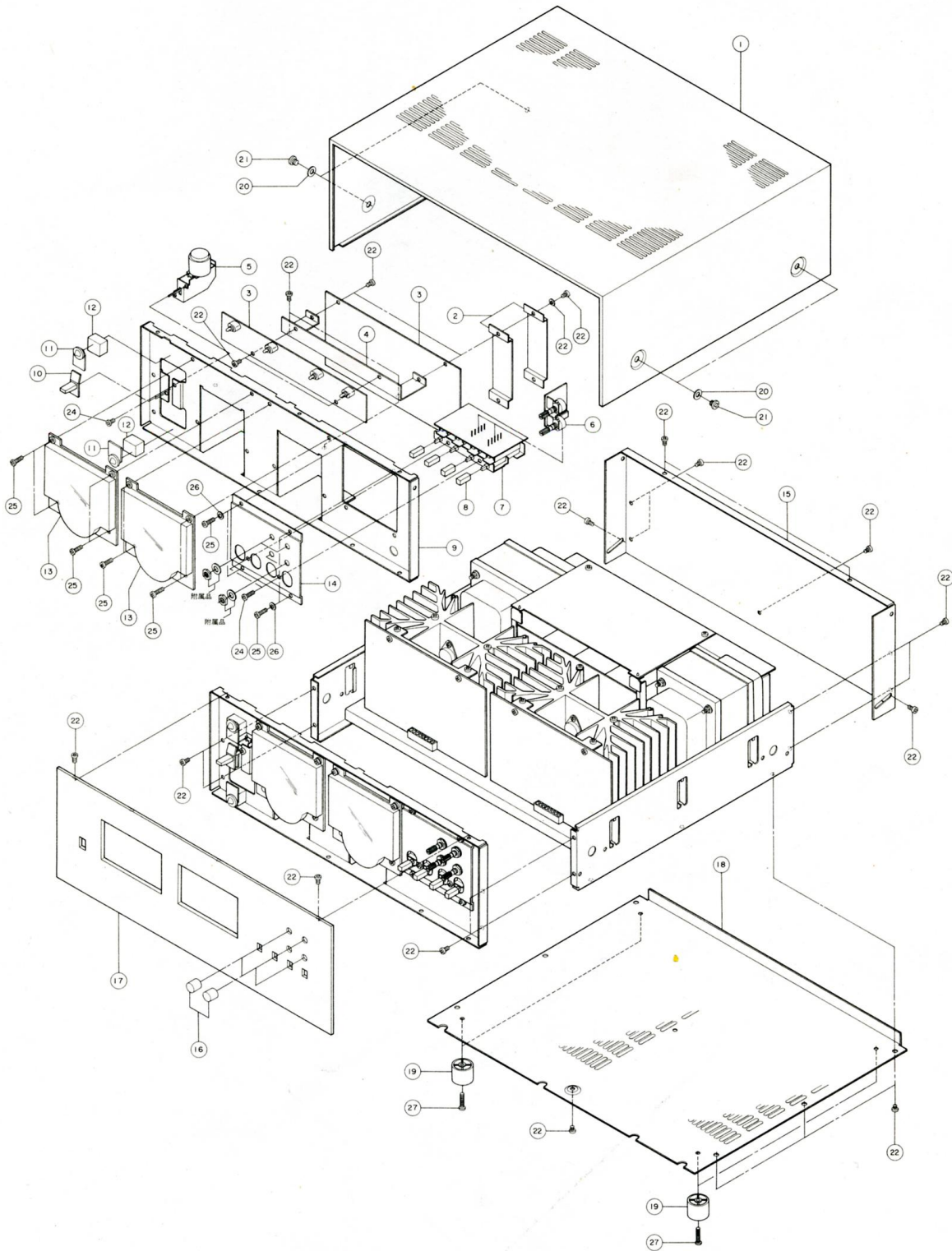
BLOCK DIAGRAM

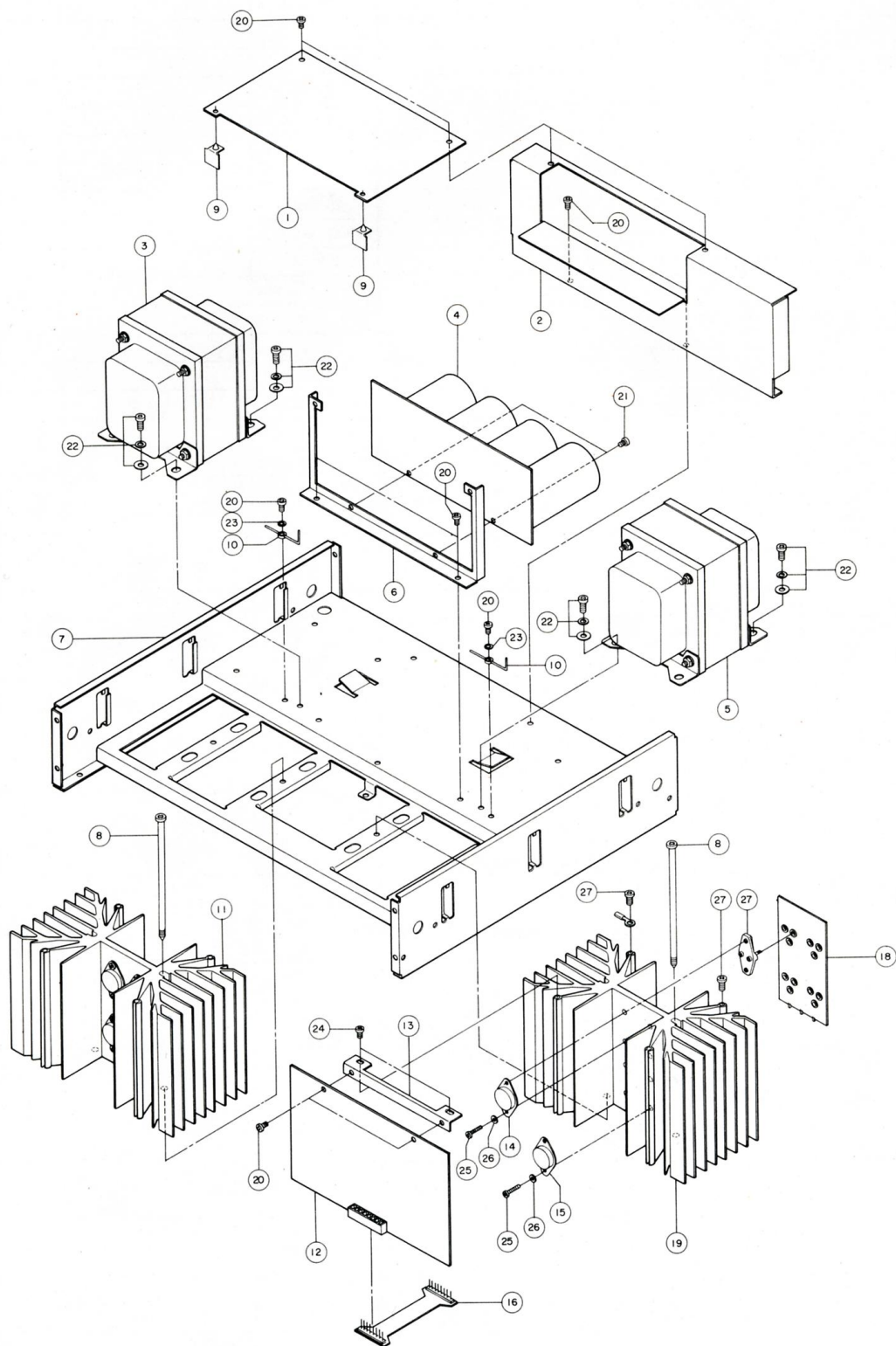


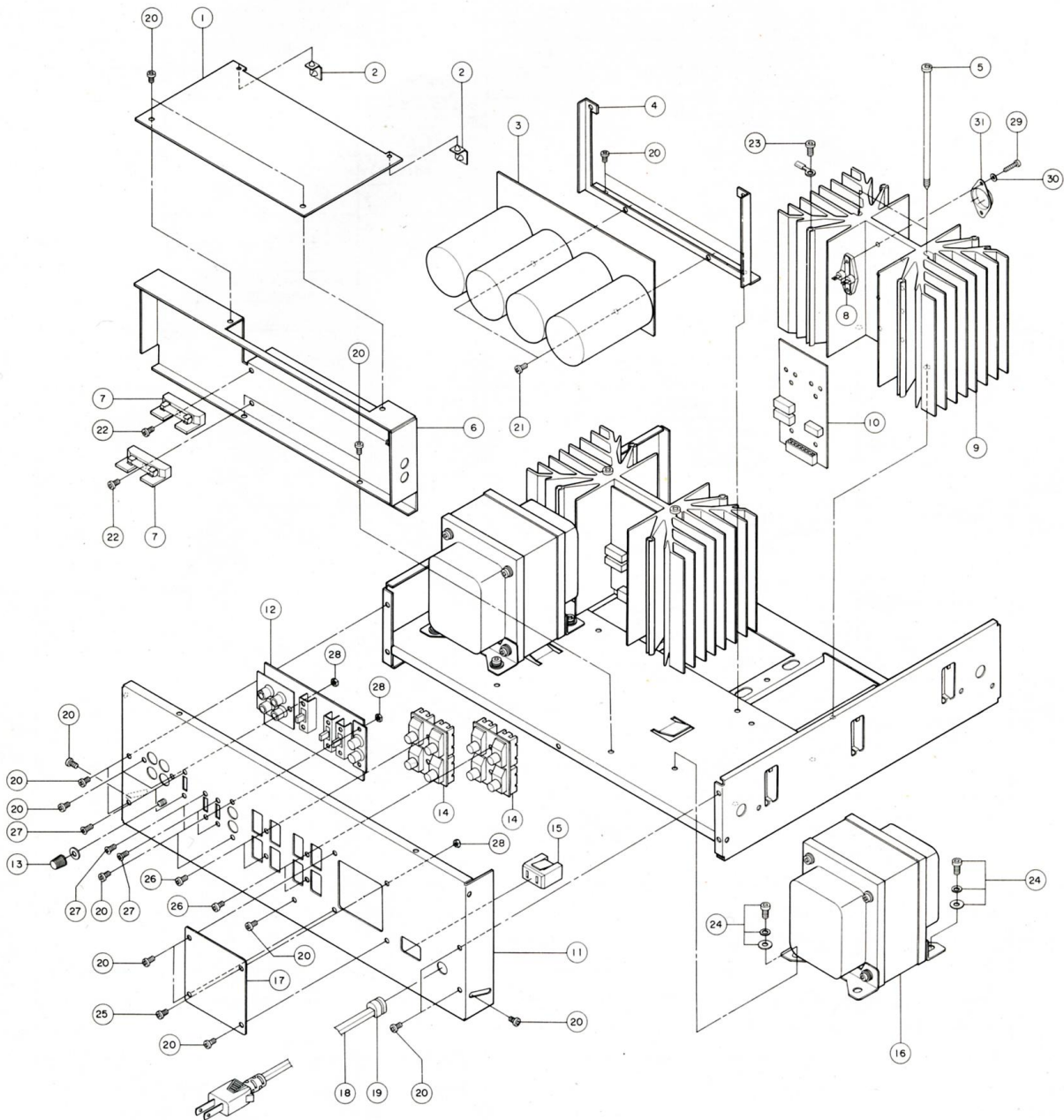
PACKAGE



PARTS LIST







Ref. No.	Part No.	Description	Remarks	Common models	
	32:00:00:NA:06:74:70	Drive Circuit Board	ドライブシート		
	42:00:00:FZ:00:06:80	Metalized Mylar Cap. 250V 0.1 μ F	メタライズドフィルム 0.1 μ		
	42:00:00:FH:61:03:00	Ceramic Capacitor 500V 3PF	セラコン 3 P		
	42:00:00:FH:61:06:00	-do.- 500V CH6PF	" 6 P		
	42:00:00:FH:61:05:00	-do.- 500V CH5PF	" 5 P		
	42:00:00:FM:10:81:00	Bipolar Electrolytic Cap.6.3V 100 μ F VERT	バイポーラコン100 μ		
	42:00:00:HW:10:44:70	Fuse Resistor 100MA 47 Ω	ヒューズ抵抗 47 Ω		
	42:00:00:HW:19:53:90	-do.- 25MA	" 390 Ω		
	42:00:00:HW:10:42:20	-do.- 150MA 22 Ω	ヒューズ抵抗 22 Ω		
	42:00:00:HL:42:61:00	Metal Oxide Film Resistor 2W 1K Ω	酸化金抵抗 1 K Ω		
	42:00:00:HL:62:61:20	-do.-	" 1.2K Ω		
	42:00:00:HU:87:56:80	Metal Film Resistor RP42A F680 Ω	金属被膜抵抗 680 Ω		
	42:00:00:HU:87:63:30	-do.- RP42A F3.3K Ω	" 3.3K Ω		
	42:00:00:HU:87:67:50	-do.- RP42A F7.5K Ω	" 7.5K Ω		
	42:00:00:HU:87:72:20	-do.- RP42A F22K Ω	" 22K Ω		
	42:00:00:HY:00:03:80	Variable Resistor B2.2K CR29R	メタルグレース V R B 2.2K		
	42:00:00:HY:00:03:50	-do.- CR29R B100K	" B100K		
	42:00:00:IA:05:61:20	Transistor 2SA561	トランジスター		
	42:00:00:IA:08:58:00	-do.- 2SA858	"		
	42:00:00:IA:08:72:10	-do.- 2SA872A	"		
	42:00:00:IA:08:72:20	-do.- 2SA872BV	"		
	42:00:00:IA:08:10:00	-do.- 2SA810	"		
	42:00:00:IC:07:34:20	-do.- 2SC734	"		
	42:00:00:IC:14:39:00	-do.- 2SC1439	"		
	42:00:00:IC:14:52:00	-do.- 2SC1452BV	"		
	42:00:00:IC:17:75:10	-do.- 2SC1775A	"		
	42:00:00:IC:17:75:20	-do.- 2SC1775B	"		
	42:00:00:IF:00:00:40	Diode 1S-1555	ダイオード 1S-1555		
	42:00:00:IH:00:02:40	Diode 1S1885 Servicing 420000IH000060	" 1S-1885		
	42:00:00:IF:00:05:40	Varistor HV23GY	バリスタ HV 23		
	42:00:00:IF:00:05:30	-do.- HV46R	" HV 46		
	42:00:00:IZ:00:01:00	FET 2SK43	2SK43 ベア		
	42:00:00:LB:60:04:20	Connector Housing 2145-8A	コネクタ コンハウジング		
	42:00:00:LB:30:03:00	Connector 5036-A6	コネクタ コンハウジング		
	32:00:00:BA:06:85:60	Heat Sink	放熱器		
	32:00:00:BB:06:45:50	Thermo-Coupler	サーモカプラー		
	32:00:00:NA:06:74:80	Electrolytic Capacitor C.B.	ケミコンシート	Canadian & B.S. models	
	42:00:00:IH:00:02:10	Diode S5151	ダイオード		
	42:00:00:IH:00:02:20	-do.- S5151R	"		
	42:00:00:FZ:00:01:90	Electrolytic Cap. 63V 18000 μ F LUG	ケミコン 18000 μ		
	42:00:00:FZ:00:06:50	Mylar Capacitor 630V MMH(M) 0.01 μ F	マイラーコン 0.01 μ		

Ref. No.	Part No.	Description	Remarks	Common models
	32 00 00 NA 06 74 90	Power Supply C.B.	電源シート	General & U.S. models
	42 00 00 FZ 00 06 50	Mylar Capacitor 630V MMH(M) 0.01 μ F	マイラーコン0.01 μ	
	42 00 00 FH 61 14 70	Ceramic Capacitor 500V CH47PF	セラコン 47P	
	42 00 00 FM 09 62 20	Bipolar Electrolytic Cap. 16V 2.2 μ F VERT	バイポーラコン2.2 μ	
	42 00 00 FM 11 71 00	-do.- 50V 10 μ F VERT	" 10 μ	
	42 00 00 GD 90 00 50	Air Core Coil 3 μ H	空芯コイル3 μ H	
	42 00 00 HL 40 73 90	Metal Oxide Resistor 1/2W 39K Ω	酸化金抵抗 39K Ω	
	42 00 00 HL 41 51 00	-do.- 1W 100 Ω	" 100 Ω	
	42 00 00 HL 41 71 00	-do.- 1W 10K	" 12K Ω	
	42 00 00 HY 00 03 70	Variable Resistor CR19R B4.7K	メタルグレース VR B 4.7K Ω	
	42 00 00 HZ 00 07 10	Fire-Proof Resistor 1P 4.7 Ω	不燃性抵抗 4.7K Ω	
	42 00 00 HV 87 81 00	Metal Film Resistor RP42A F100K Ω	金属被膜抵抗 100K Ω	
	42 00 00 HV 87 52 70	-do.- RP42A F27K Ω	" 270K Ω	
	42 00 00 iA 07 40 00	Transistor 2SA740	トランジスタ	
	42 00 00 iA 07 63 00	-do.- 2SA763	"	
	42 00 00 iA 08 58 00	-do.- 2SA858	"	
	42 00 00 iC 04 58 80	-do.- 2SC458	"	
	42 00 00 iC 07 34 20	-do.- 2SC734	"	
	42 00 00 iC 07 89 10	-do.- 2SC789 (LB, O, Y)	"	
	42 00 00 iC 11 66 10	-do.- 2SC1166 (GRY, O)	"	
	42 00 00 iC 14 39 00	-do.- 2SC1439	"	
	42 00 00 iC 14 48 00	-do.- 2SC1448	"	
	42 00 00 iF 00 00 40	Diode 1S1555	ダイオード	
	42 00 00 iH 00 00 80	-do.- 10DC-1	"	
	42 00 00 iH 00 01 40	-do.- 10DC-4	"	
	42 00 00 iH 00 01 50	-do.- 10DC-4R	"	
	42 00 00 iH 00 02 40	-do.- 1S1885 Servicing 420000iH000060	"	
	42 00 00 iF 00 05 30	Varistor HV46R	バリスタ	
	42 00 00 iF 00 03 50	Zener Diode WZ-130	シェナーダイオード	
	42 00 00 iF 00 05 00	-do.- BQB01-30	"	
	42 00 00 LB 20 05 70	Fuse Holder Pin SN5053 KA6065	ヒューズホルダーピン	
	42 00 00 KC 00 02 70	Relay LY-2-0-05	リレー LY-2-0-05	YP-1000
	32 00 00 BA 06 47 40	Heat Sink	放熱板	B-2
	32 00 48 NA 06 75 10	Meter Lamp Circuit Board	メーター & ランプシート	
	42 00 00 FP 15 66 80	Tantalum Capacitor 35V 6.8 μ F	メタルコンデンサ 6.8 μ	
	42 00 00 HL 43 56 80	Metal Oxide Film Resistor 3W 680 Ω	酸化金抵抗 680 Ω	

Ref. No.	Part No.	Description			Remarks	Common models	
42:00:00	HY:00:03:80	Variable Resistor	B2.2K CR29R	メタルグレース V R B 2.2KΩ			
42:00:00	HY:00:03:60	-do.-	CR29R B10K	" B10KΩ			
42:00:00	HY:00:03:50	-do.-	CR29R B100K	" B100KΩ			
42:00:00	CA:05:61:20	Transistor	2SA561	トランジスター			
42:00:00	IA:06:71:90	2SA671 Servicing 4200001A048910			"		
42:00:00	IA:07:63:00	Transistor	2SA763	"			
42:00:00	IC:04:58:80	-do.-	2SC458	"			
42:00:00	IC:07:34:20	-do.-	2SC734	"			
42:00:00	IC:10:61:80	2SC1061 Servicing 420000IC078910			"		
42:00:00	IC:13:45:40	Transistor	2SC 1345 (D, E)	"		CA-1000	
42:00:00	IF:00:00:40	Diode	1S1555	ダイオード1S-1555		CR-1000	
42:00:00	IF:00:03:20	Zener Diode WZ-061			ツェナーダイオード W Z - 0 6 1		
42:00:00	IF:00:05:40	Varistor	HV23GY	バイスターHV23			
42:00:00	IF:00:05:30	-do.-	HV46R	" HV46			
42:00:00	IG:00:09:70	IC TA7129P			T A 7 1 2 9 A P		
32:00:00	NA:06:75:20	Power Fet Circuit Board 8-2			パワーFETシート		
42:00:00	HM:55:22:20	Cement Holder Resistor 5W 0.22Ω			セメント抵抗0.2Ω		
42:00:00	HM:55:41:00	-do.-	5W 10Ω	" 10Ω			
42:00:00	LB:60:04:20	Connector Housing	2145-8A	コネクタ コンハウジング			
32:00:00	NA:06:75:30	Connector Circuit Board			コネクタシート		
42:00:00	LB:60:04:10	Connector Wafer			コネクタコンウェハー		
32:00:00	NA:06:75:40	Volume Circuit Board			V R シート		
42:00:00	HS:11:01:40	Variable Resistor	B25K 16mm	V R 16φ B2.5KΩ			
42:00:00	LB:50:01:30	Connector Socket	SD5119-5A5MM	ミニチュア コネクタソケット			
32:00:00	NA:06:75:50	Selector Circuit Board			セレクターシート		
42:00:00	KA:70:08:30	4 Multi Push Switch	SPU046A11	4 連プッシュSW			



SERVICE NEWS

B-2

BULLETIN NO. 39

DATE: May, 1977

Disuse of Main Radiator Coating on model B-2

In order to meet overseas standard requirements, coating for Main Radiator (BA06742) on B-2 is ceased to use.

Part No. remains unchanged, but in place of coating, mica sheet (iL00023) will be used in future.

Models Affected:

No. 4249 ~



SERVICE NEWS

Y.E. 保氏

B-2

BULLETIN NO. E-23
DATE: SEPTEMBER, 1977

IMPROVEMENT ON THE CERAMIC CAPACITOR FOR NOISE PREVENTION

Change the ceramic capacitor for click noise elimination on speaker-selector change, as follows:

1. Increase the value, $0.01\mu\text{F}$ to $0.1\mu\text{F}$, in order to eliminate the click noise caused by shortage of capacity.

SELECTOR SWITCH SHEET

NA06755

C501. 502

$0.01\mu\text{F}$

FG14410



$0.1\mu\text{F}$

FG14510

2. After changed capacity, do consider it's improvable assemble-work because the shape OF UNIT touch to relative outskirt parts on its assemble-work, and do capacity-down within limit of noise-cancel.

SELECTOR SWITCH SHEET

NA06755

C501. 502

$0.1\mu\text{F}$

FG14510



$0.056\mu\text{F}$

FG14456

UNIT AFFECTED :

1ST. : 1751 ~ 9250

2ND. : 9251 ~ up.



SERVICE NEWS

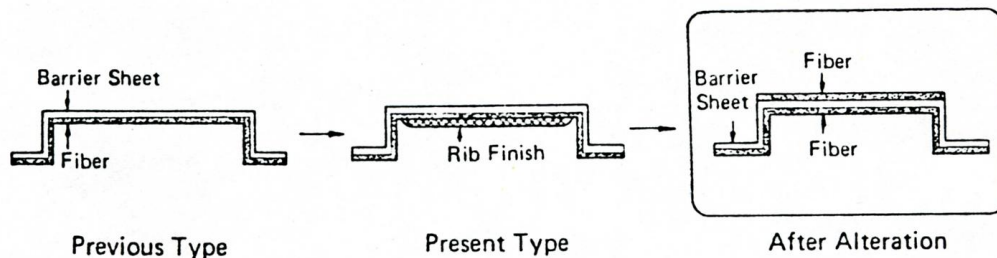
B-2

BULLETIN NO. E-29

DATE: Dec, 1977

BARRIER SHEET FORM ALTERATION

The Meter's Circuit Boards Barrier Sheet curves towards the Drive sheet due to high Internal temperatures of the set and short circuits had occurred between the Barrier and the Drive transistor. Due to such circumstances, Ribbs were reinforced into the Barrier sheet, but due to no results, re-alterations are made as follows:



Parts No. CA06462 (unchanged)

- * The Ribb finish is removed and fiber is attached to the Drive sheet side to avoid short circuits.

Effective from No. 8821 ~

- * The shippments from Head office hereafter will be all altered parts.



B - 2
B - 3

BULLETIN NO. 91

DATE: May, 1981

CHANGE IN PART NUMBERS FOR POWER FET'S

Purpose: At present, various types of FET are in use. To avoid confusion, two each of 2SK76 and 2SJ26 (4 FET in all) will be designated as a set for B-2 and one each of them as a set for B-3.
As a result, these FET's will not be supplied separately, but always as a set.

Modification:	iE300400	FET	2SK76		
	iE300430	FET	2SK76A		
	iE300440	FET	2SK76A	➤	iX600040 SIT Four as a set
	iE400200	FET	2SJ26		iX600050 SIT Two as a set
	iE400230	FET	2SJ26A		
	iE400240	EFT	2SJ26A		

Parts:

Part No.	Part Name
iX600040	Pair FET 2SK76A x 2 2SJ 26A x 2
iX600050	Pair FET 2SK76A x 1 2SJ 26A x 1



B-2

BULLETIN NO. 101

DATE: August, 1981

INTRODUCTION OF NEW TRANSISTORS FOR REPLACEMENT

Purpose: The following two types of transistors which have used in the drive circuit board have been replaced by the following new type due to discontinuance of production.

Modification:

Original	New
IC177520 2SC1775BV	IC270501 2SS2705Y
IA087220 2SA872BV	IA114501 2SA1145Y