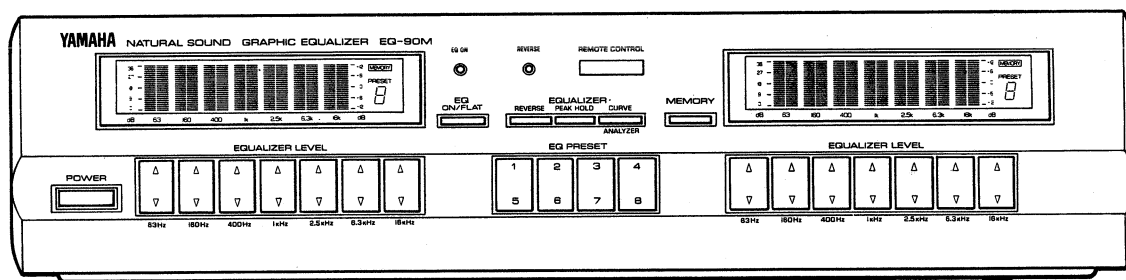


STEREO GRAPHIC EQUALIZER EQ-90M

SERVICE MANUAL

■ FRONT PANEL



IMPORTANT NOTICE

This manual has been provided for the use of authorized Yamaha Retailers and their service personnel. It has been assumed that basic service procedures inherent to the industry, and more specifically Yamaha Products, are already known and understood by the users, and have therefore not been restated.

WARNING: Failure to follow appropriate service and safety procedures when servicing this product may result in personal injury, destruction of expensive components and failure of the product to perform as specified. For these reasons, we advise all Yamaha product owners that all service required should be performed by an authorized Yamaha Retailer or the appointed service representative.

IMPORTANT: The presentation or sale of this manual to any individual or firm does not constitute authorization, certification, recognition of any applicable technical capabilities, or establish a principle-agent relationship of any form.

The data provided is believed to be accurate and applicable to the unit(s) indicated on the cover. The research, engineering, and service departments of Yamaha are continually striving to improve Yamaha products. Modifications are, therefore, inevitable and specifications are subject to change without notice or obligation to retrofit. Should any discrepancy appear to exist, please contact the distributor's Service Division.

WARNING: Static discharges can destroy expensive components. Discharge any static electricity your body may have accumulated by grounding yourself to the ground buss in the unit (heavy gauge black wires connect to this buss).

IMPORTANT: Turn the unit OFF during disassembly and parts replacement. Recheck all work before you apply power to the unit.

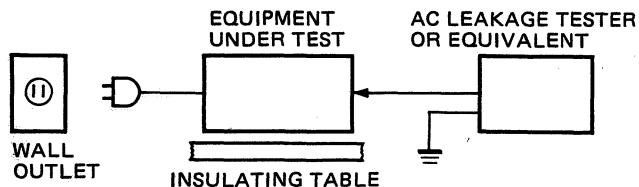
■ CONTENTS

TO SERVICE PERSONNEL.....	1
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DIMENSIONS.....	1
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■ TO SERVICE PERSONNEL

- Critical Components Information.**
Components having special characteristics are marked  and must be replaced with parts having specifications equal to those originally installed.
- Leakage Current Measurement (For 120V Model Only).**
When service has been completed, it is imperative that you verify that all exposed conductive surfaces are properly insulated from supply circuits.
 - Meter impedance should be equivalent to 1500 ohm shunted by 0.15 μ F.
 - Leakage current must not exceed 0.5mA.
 - Be sure to test for leakage with the AC plug in both polarities.



- POLARIZATION (U model only)**
This amplifier product is equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature.

■ SPECIFICATIONS

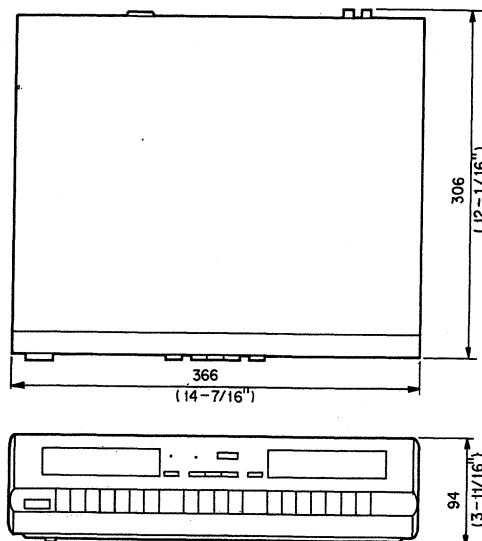
Input sensitivity	1V
Output voltage	1V
Frequency characteristic (FLAT)	5Hz - 100kHz -3dB
Equalizer level control	
Center frequency ...	63Hz, 160Hz, 400Hz, 1kHz, 2.5kHz, 6.3kHz, 16kHz
Variable range	± 12 dB
Signal to noise ratio	105dB
Total harmonic distortion (1kHz, 1V)	0.005%
Maximum continuous power output (1kHz, THD 0.03%)	8V
Power requirements	
USA and Canada models	AC120V 60Hz
Australia model	AC240V 50Hz
General model	AC110/120/220/240V 50/60Hz

Power consumption	10W
Dimensions (W $\times$ H $\times$ D)	366 $\times$ 94 $\times$ 306 mm (14 3/8" $\times$ 3 3/4" $\times$ 12")
Weight (Net)	3kg (6lbs. 10oz)
Attached (item)	Owner's manual, Pin-plug cord, Power cord

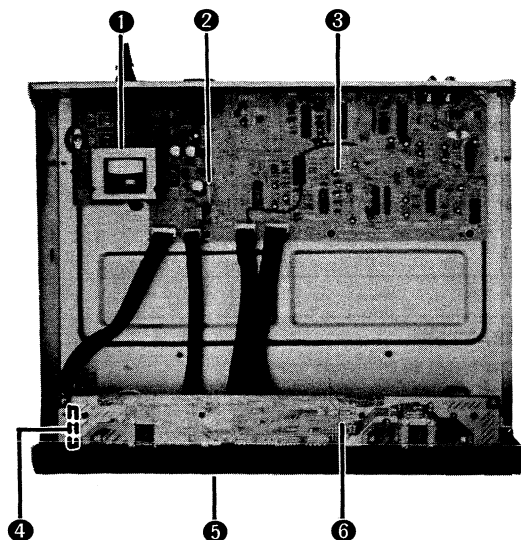
* Specifications and appearance may be changed without notice due to continuous progress in development.

(U)...U.S.A. model (A)...Australian model
(C)...Canadian model (R)...General model

■ DIMENSIONS



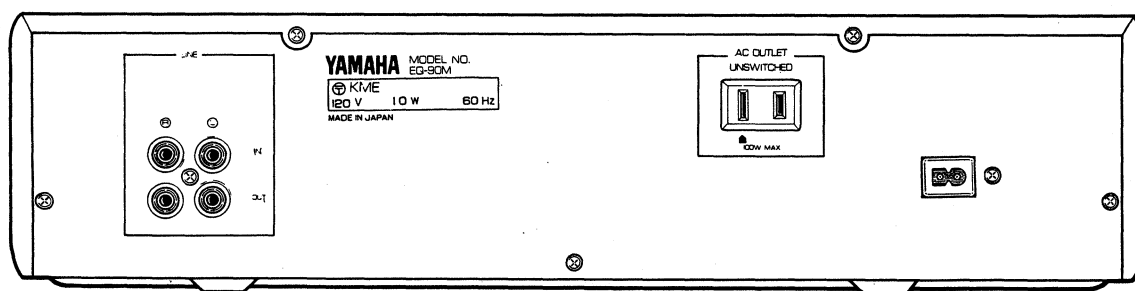
INTERNAL VIEW



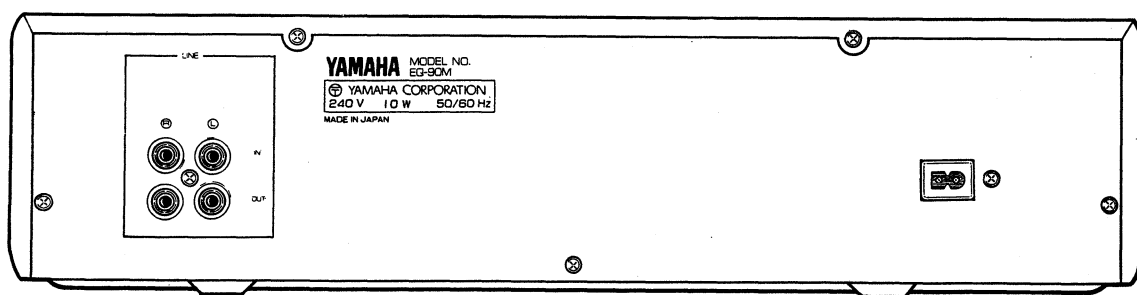
- ① POWER TRANSFORMER
- ② LITHIUM BATTERY (MEMORY)
- ③ MAIN CIRCUIT BOARD (1)
- ④ MAIN CIRCUIT BOARD (2)
- ⑤ PANEL CIRCUIT BOARD (2)
- ⑥ PANEL CIRCUIT BOARD (1)

REAR PANELS

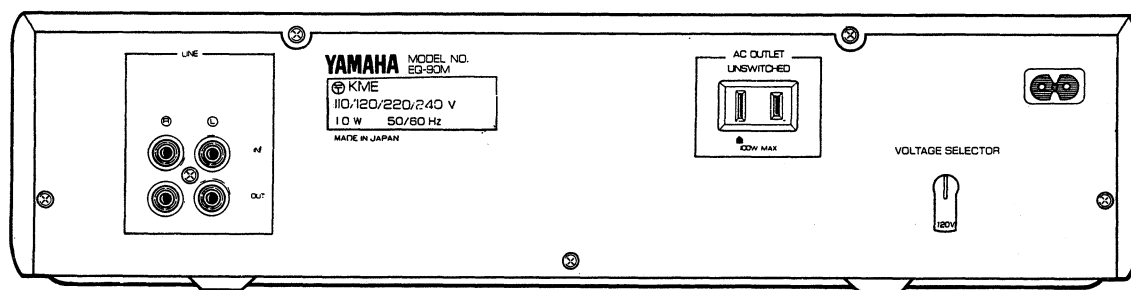
• U, C models



• A model



• R model



■ LITHIUM BATTERY

This product uses a lithium battery for memory back-up.

WARNING: Lithium batteries are dangerous because they can be exploded by improper handling. Observe the following precautions when handling or replacing lithium batteries.

- Leave lithium battery replacement to qualified service personnel.
- Always replace with batteries of the same type.
- When installing on the PC board, solder using the connection terminals provided on the battery cells. Never solder directly to the cells. Perform the soldering as quickly as possible.
- Never reverse the battery polarities when installing.
- Do not short the batteries.
- Do not attempt to recharge these batteries.
- Do not disassemble the batteries.
- Never heat batteries or throw them into fire.

English

WARNING!

Lithium batteries. Explosion danger.
Change of batteries must only be done by qualified personnel and as described in the service manual.

Danish

ADVARSEL!

Lithiumbatterier. Eksplosionsfare.
Udskiftning må kun foretages af en sagkyndig og som beskrevet i servicemanualen.

Swedish

LITIUMBATTERI.

Bör endast bytas av servicepersonal.
Explosionsfara vid felaktig hantering.

Finnish

VAROITUS!

Lithiumparisto. Räjähdyksaara.
Pariston saa vaihtaa ainoastaan alan ammattimies.

■ DISASSEMBLY PROCEDURES (Remove parts in disassembly order as numbered)

1. Removal of Top Cover

- Remove 2 screws ① and 4 screws ② in Fig.1.
- Slide the Top Cover back.

2. Removal of Front Panel

- Remove connectors located at 4 places (J101, 104~106).
- Remove 5 screws ③ and pull the Front Panel forward.

● LITHIUM BATTERY REPLACEMENT

Note) Due to the danger of explosion it is only allowed to use a battery of the same type and manufacturer when it has to be shifted.

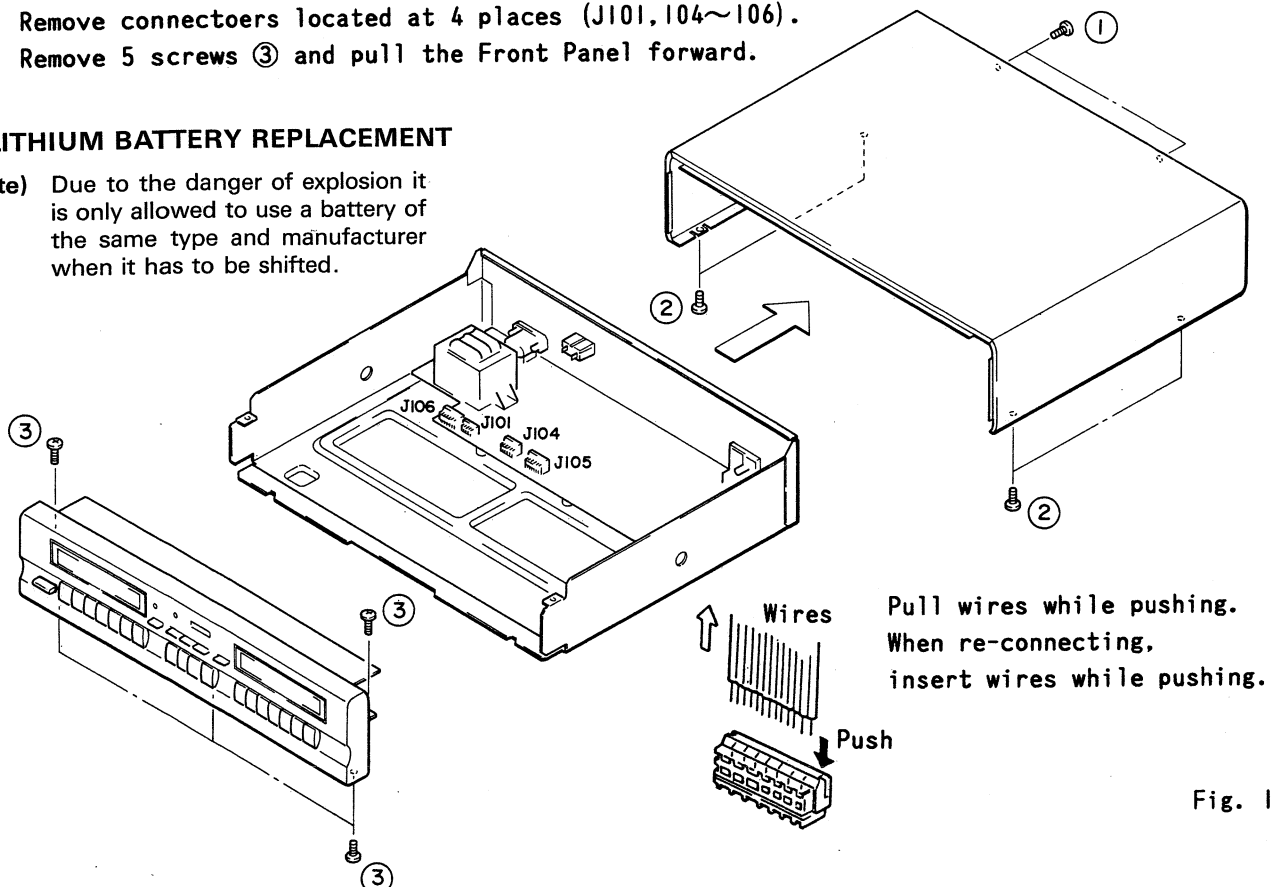
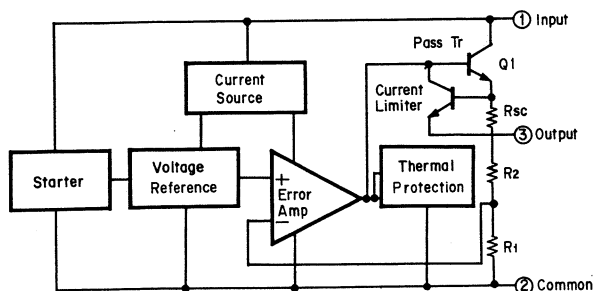


Fig. 1

■ IC BLOCK

IC 1 : AN78N05

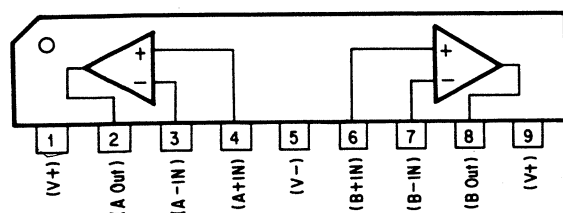
(3-Terminal Voltage Regulator)



IC101, 201, 202, 205, 206 :

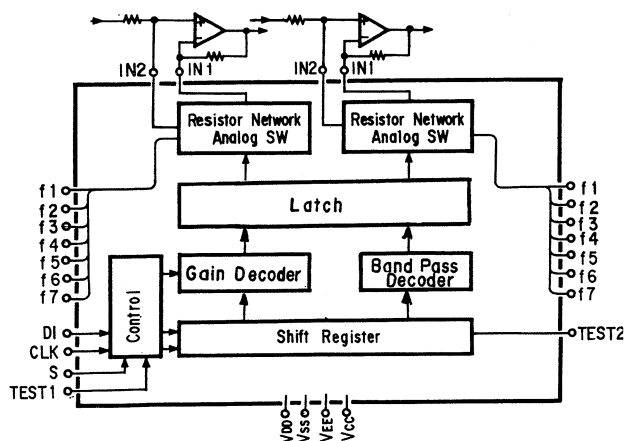
NJM4558SD

(Operational Amplifier)

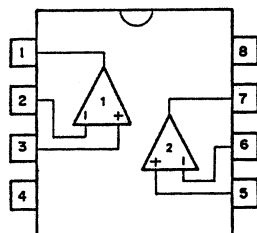


IC103 : NJU7305L

(Graphic Equalizer Electronic Variable Resistor)

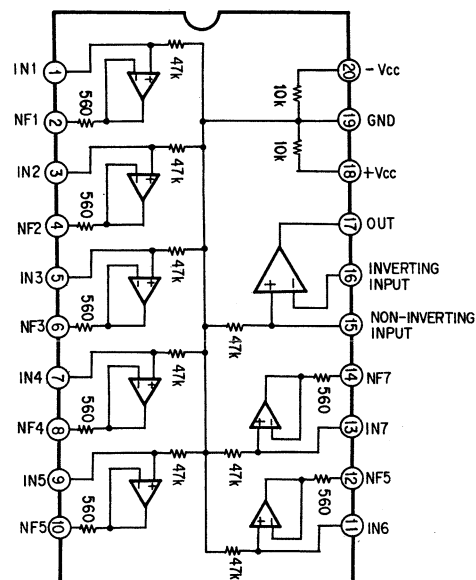


IC304 : μ PC393



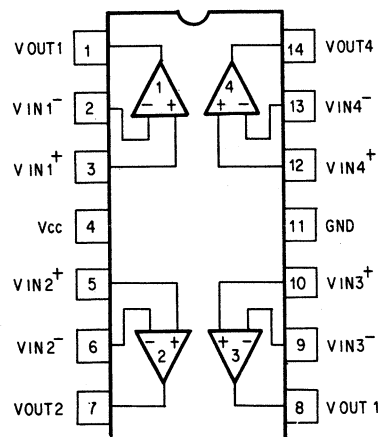
IC104, 105 : M5229P

(Hi-Fi 7-Band G.E IC)



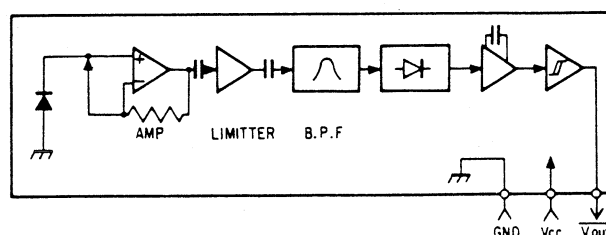
IC203, 204 : LA6324N

(Quad Ope-Amp)

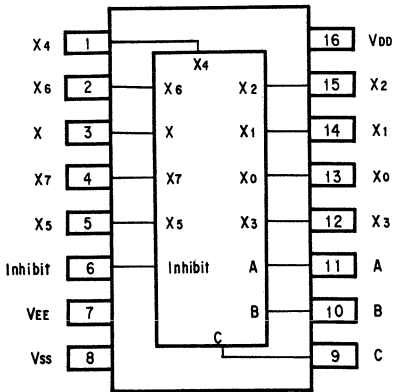


IC305 : GPIU501X

(Remote Control Receptor Unit)



IC207,208 : MN4051BD
(8-channel Analog Multiplexer Demultiplexer)



Function Table

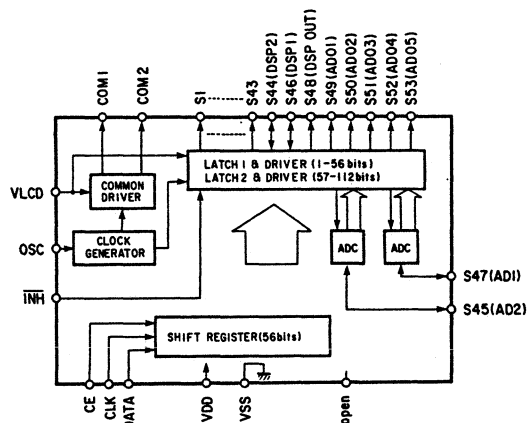
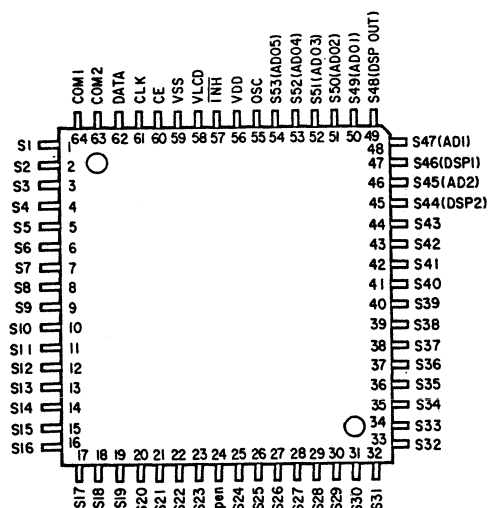
Control Input			ON Switch
C	B	A	
0	0	0	X ₀
0	0	1	X ₁
0	1	0	X ₂
0	1	1	X ₃
1	0	0	X ₄
1	0	1	X ₅
1	1	0	X ₆
1	1	1	X ₇
×	×	×	—

IC303 : HD614080S
(4-Bit ICHIP MC)

Function	I/O	Pin Name	Pin Name	I/O	Function
Muting	i o	D11	64	D10	i o REVERSE LED
Vol.DATA	i o	D12	63	D9	i o EQ/Flat LED
Vol.Clock	i o	D13	62	D8	i o
MPX C.S.R ch	i o	D14	61	D7	i o
MPX C.S.L ch	i o	D15	60	D6	i o
MPX DATA A	i o	R00	59	D5	i o
MPX DATA B	i o	R01	58	D4	i o LC7582 TNH
MPX DATA C	i o	R02	57	D3	i o LC7582 DATA
	i o	R03	56	D2	i o LC7582 Clock
	i o	R10	55	D1	i o LC7582 CE Lch
Vol.Chip Selection	i o	R11	54	D0	i o LC7582 CE Rch
	i o	R12	53	GND	i
	i o	R13	52	OSC 2	i
	i o	R20	51	OSC 1	i
	i o	R21	50	TEST	i
	i o	R22	49	RESET	i
	i o	R23	48	R93	i GND
	i o	RA0	47	R92	i KEY Input
A/D Input	i	RA1/Vdis	46	R91	i KEY Input
G	i	R30	45	R90	i KEY Input
2nd Power SW Det.	i o	R31	44	R83	o OPEN
	i o	R32/INT0	43	R82	o KEY Output 7
1st Power OFF	i o	R33/INT1	42	R81	o KEY Output 6
Remote Input	i o	R50	41	R80	o KEY Output 5
8 bit A/D L.S.B	i o	R51	40	R73	o KEY Output 4
8 bit A/D L.S.B	i o	R52	39	R72	o KEY Output 3
8 bit A/D L.S.B	i o	R53	38	R71	o KEY Output 2
8 bit A/D L.S.B	o	R60	37	R70	o KEY Output 1
8 bit A/D L.S.B	o	R61	36	R43	i o GND
8 bit A/D L.S.B	o	R62	35	R42/S0	i o KEY Input
8 bit A/D L.S.B	o	R63	34	R41/S1	i o KEY Input
8 bit A/D M.S.B	i	Vcc	33	R40/SCK	i o KEY Input

Note) i ...High Voltage Input
o ...High Voltage Output
i ...Input
o ...Output

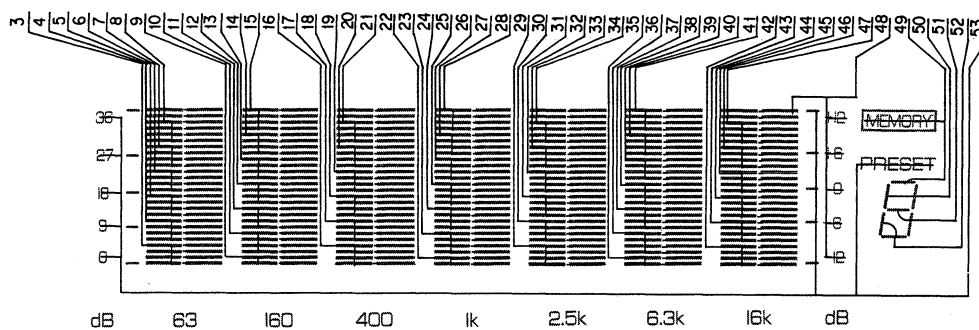
IC301,302 : LC7582 (LCD Driver)



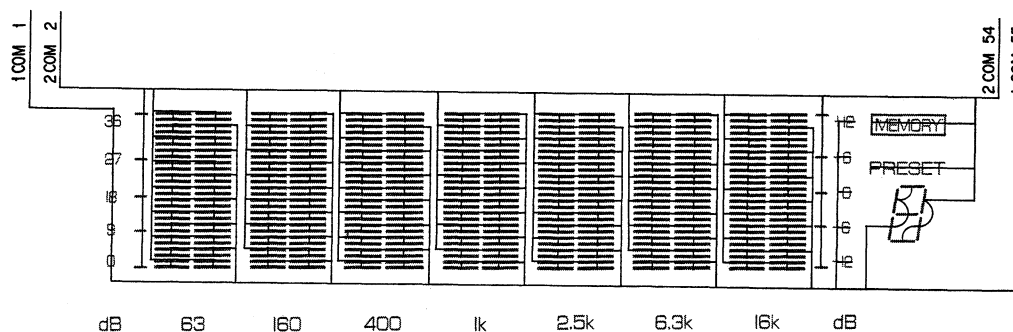
■ DISPLAY Pin Connection

LCD : PSALFD6C80

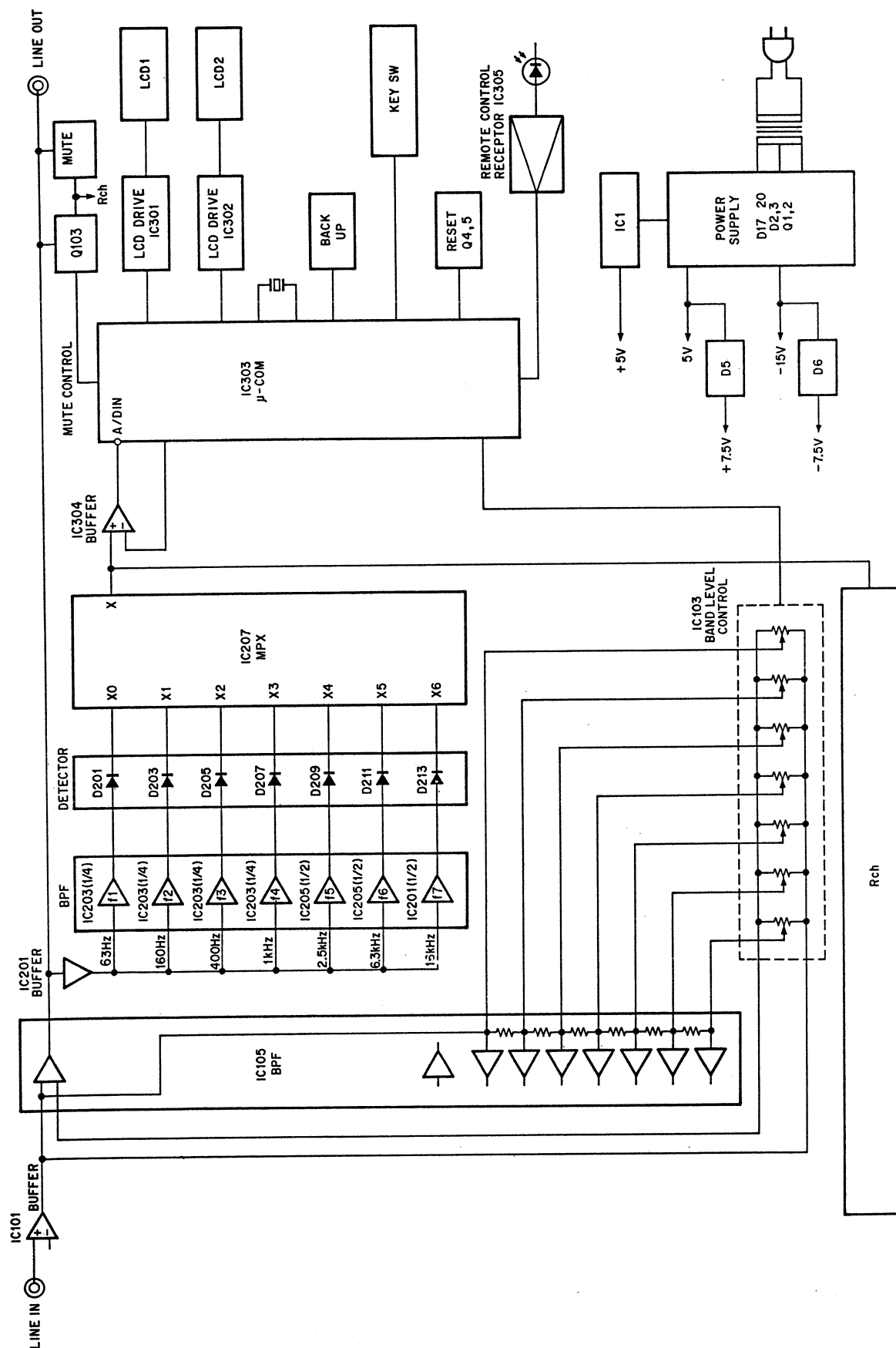
SEGMENT



COMMON



BLOCK DIAGRAM



A

B

C

D

E

F

G

H

I

EQ-90M

■ PRINTED CIRCUIT BOARD (Pattern Side) (Note) 文字面 : Component Side

1

2

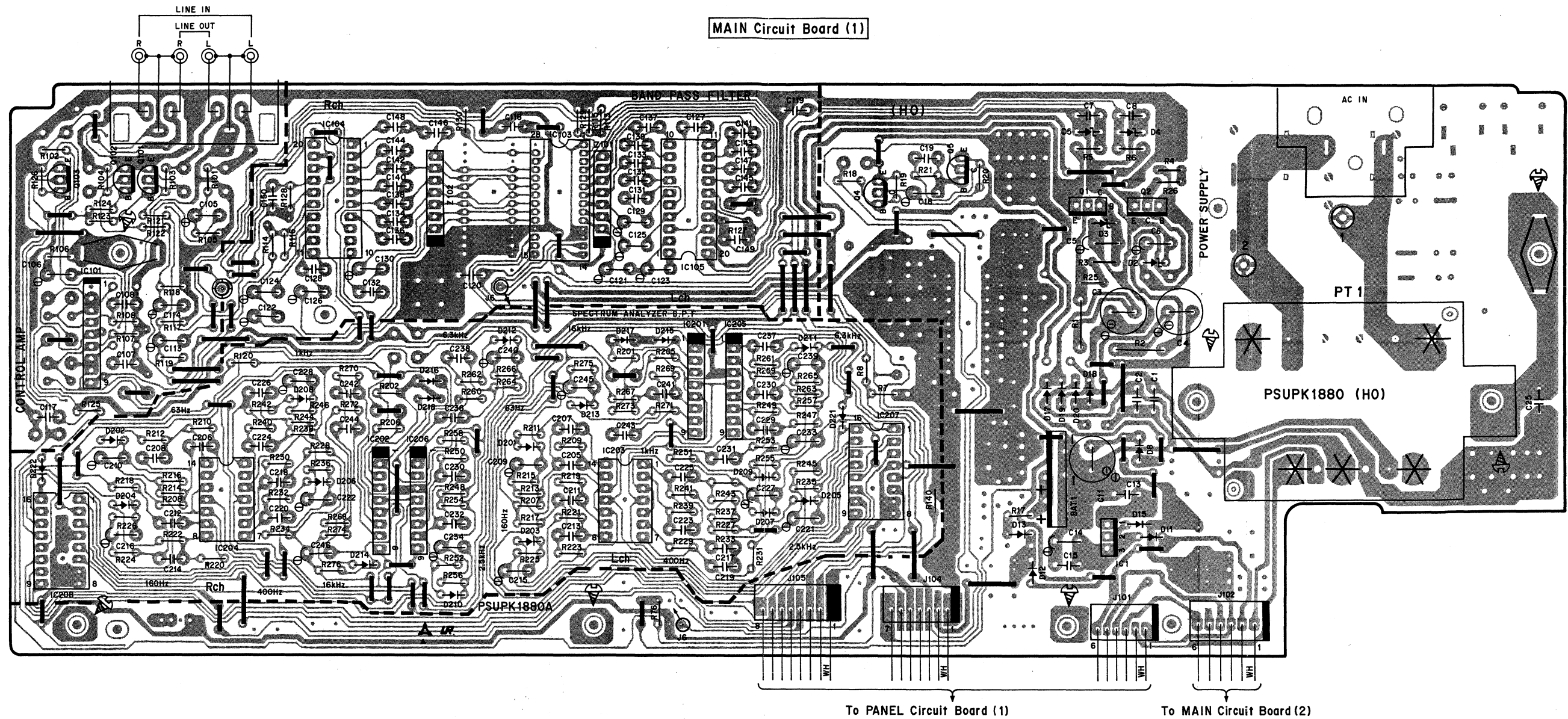
3

4

5

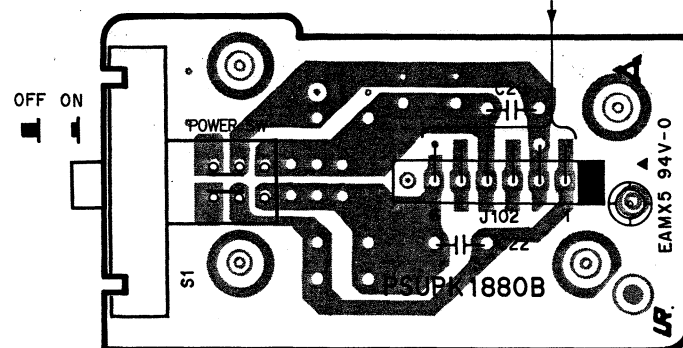
6

7



MAIN Circuit Board (2)

From MAIN Circuit Board (2)



IC1 HA17805
or AN78N05

IC101,201,202,205,206 NJM4558S0
or AN6555
or TA75559S-1
or NJM4559S

IC103 NJU7305

IC104,105 AN7337
or M5229P

IC203,204 LA6324N

IC207,208 NJU4051BP
or MN4051B
or HD14051BP
or BU4051B

Q1 2SD1762
or 2SD2012

Q2 2SB1375
or 2SB1185

Q4 2SC1740S
or 2SC3311

Q5 DTA114T
or UN4115

Q103 2SA933
or 2SA1309

Q101,102 2SC2878
or 2SD1915

D2,3 HZS15-3
or MA4150H

D4,5 HZS7C2
or MA4075

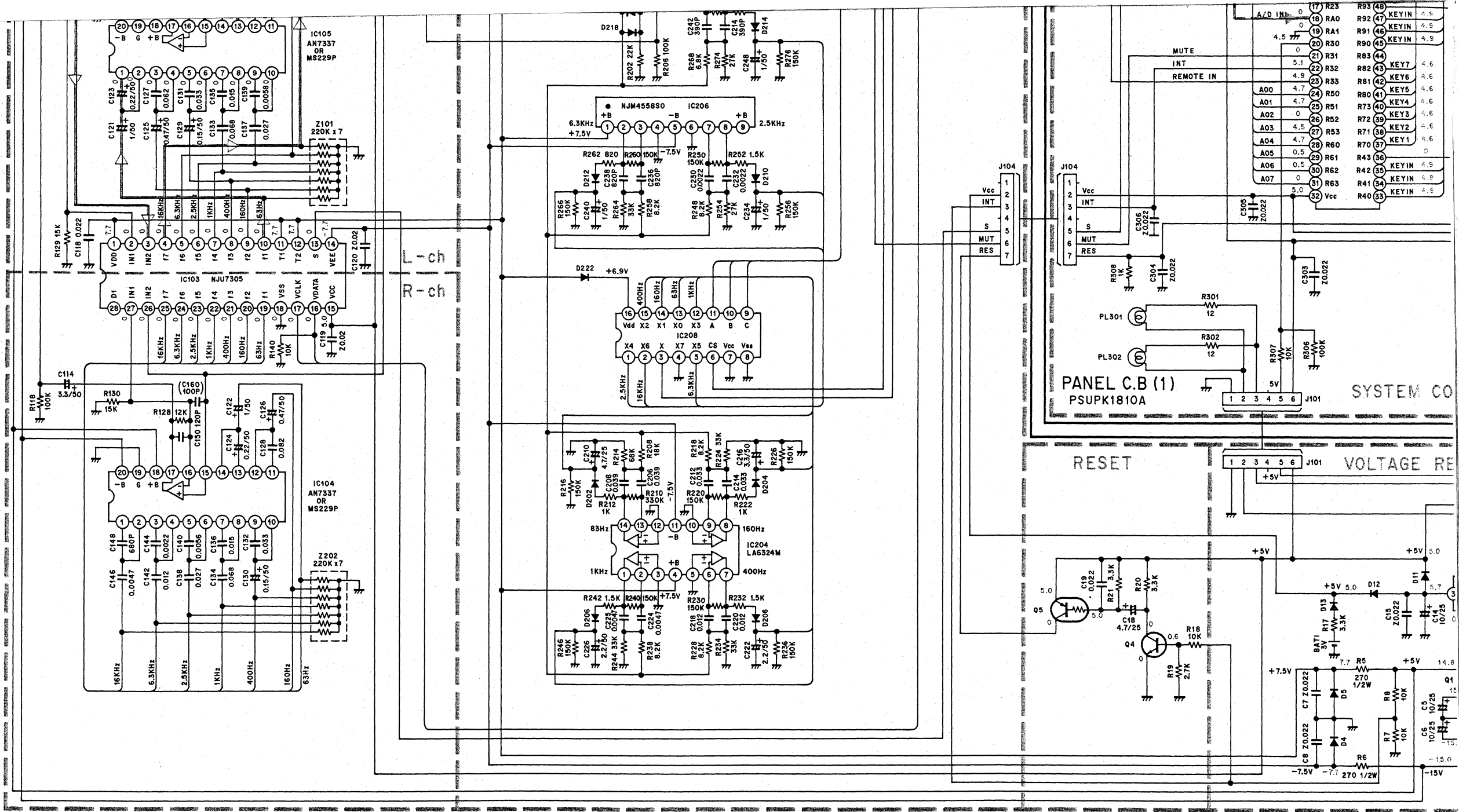
D8,17~20 RLIN4003

D11~13,15,201~218,221,222

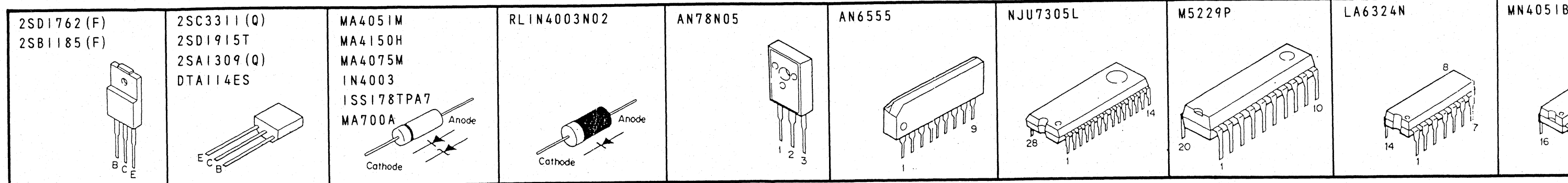
BAT1 ISS119
or ISS178

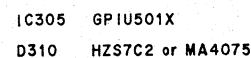
SUMM2CC200
or CR2032-1VC
or CR2032/1VC

MAIN C.B (1)

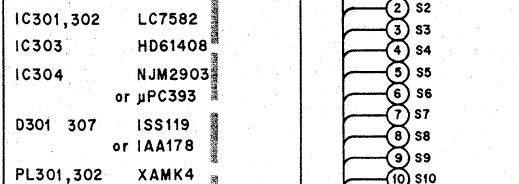


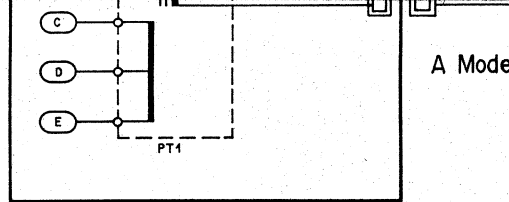
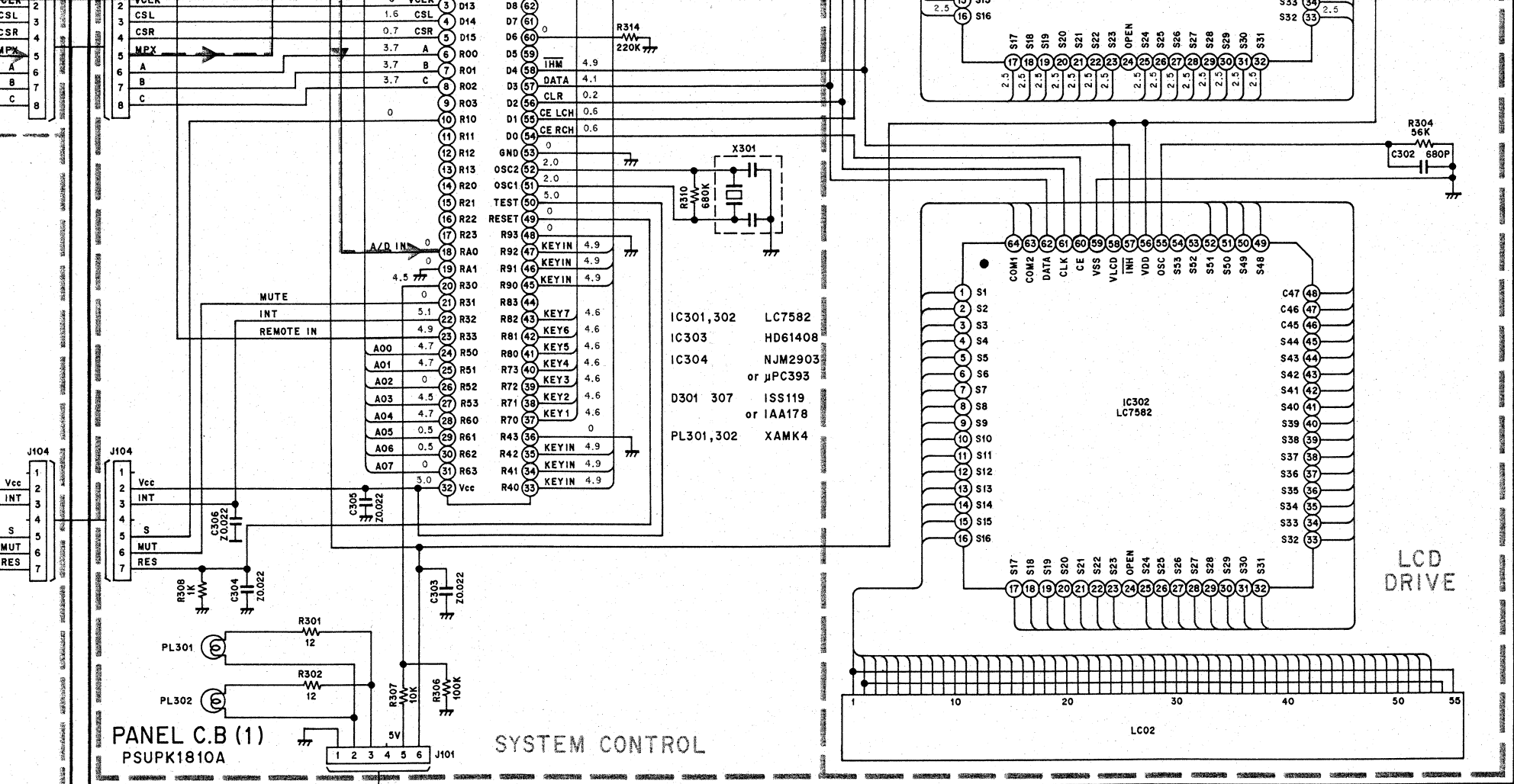
■ PIN CONNECTION DIAGRAM OF TRANSISTORS, DIODE AND ICS.





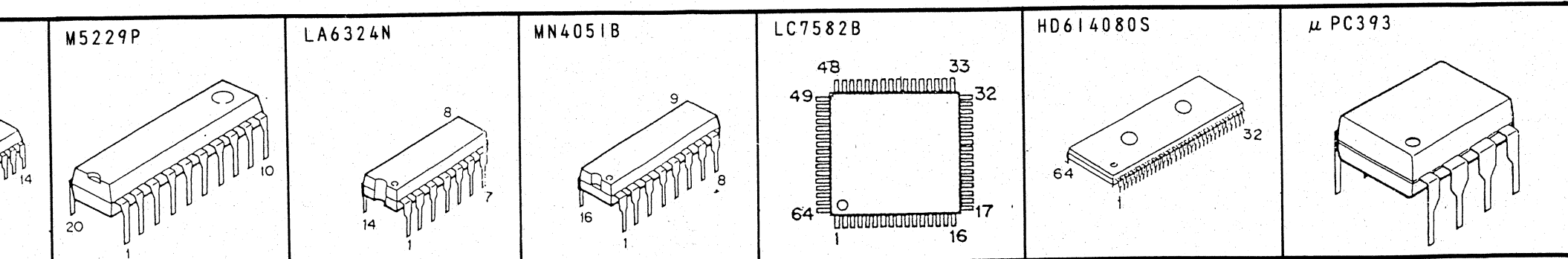
PANEL C.B (2)



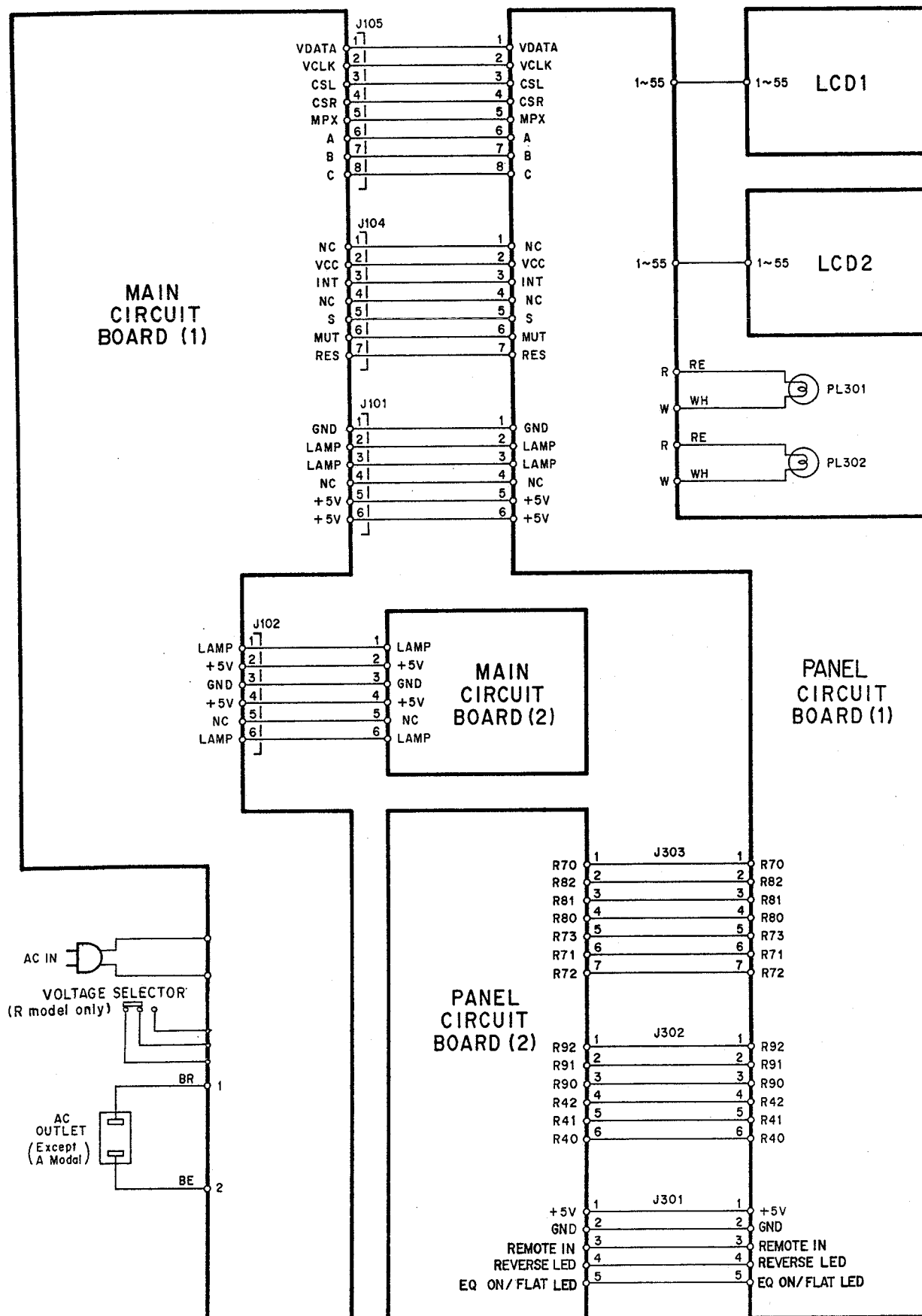


CAUTION

- Components having special characteristics are marked Δ and must be replaced with parts having specifications equal to those originally installed.
- All voltages are measured with a 10M Ω /V DC electric volt meter.
- Schematic diagram is subject to change without notice.



WIRING



PARTS LIST

■ ELECTRICAL PARTS

■ WARNING

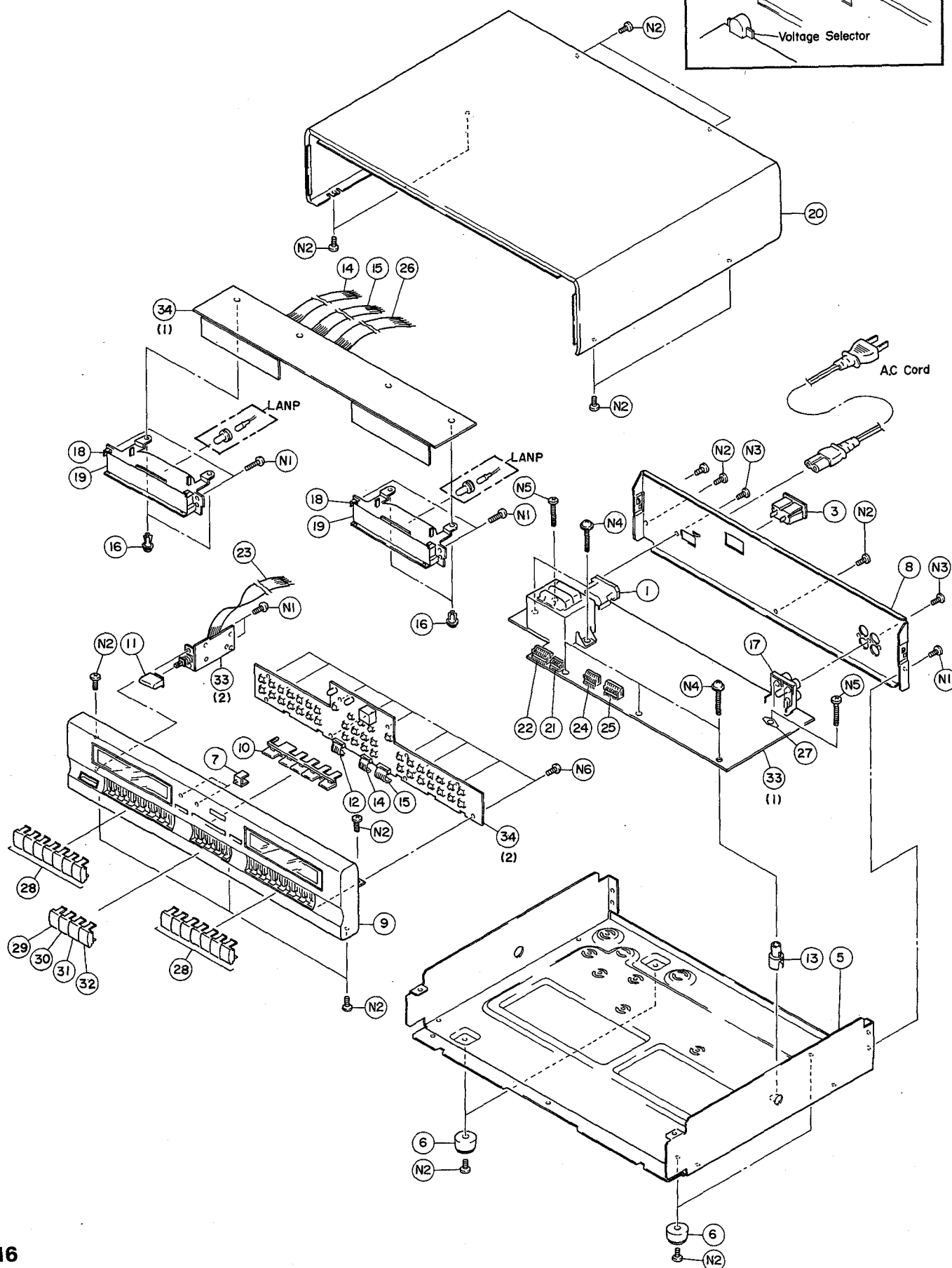
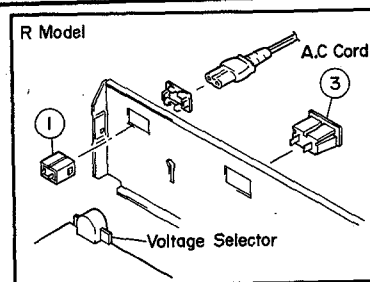
- Components having special characteristics are marked  and must be replaced with parts having specifications equal to those originally installed.
- Carbon resistors 1/6 W are not included in the ELECTRICAL PARTS list. For the parts No. of the carbon resistor, refer to the last Page.

Ref. No.	Part No.	Description	部 品 名	Remarks/Markets	Common Model	ランク
※	NX 60 39 50	Main Circuit Board	メ イ ン シ ー ト	(J)	PSPK407	
※	NX 60 39 60	//	//	(U,C)	PSPK408	
※	NX 60 39 70	//	//	(R)	PSPK409	
※	NX 60 39 80	//	//	(A)	PSPK410	
	FG 21 21 20	Ceramic Cap.	セ ラ コ ン	C107,108,149,150		
	FG 21 23 90	//	//	C241~244		
	FG 21 26 80	//	//	C147,148		
	FG 21 28 20	//	//	C235~238		
	FG 21 31 00	//	//	C117		
	FG 41 32 20	//	//	C143,144,229~232		
	FG 24 41 50	//	//	C135,136		
	FG 24 42 20	//	//	C1,2,7,8,13,15,22,25 118~120.		
	Fi 22 42 20	//	円 筒 型 セ ラ コ ン	C20		
	UJ 14 64 70	Electrolytic Cap.	ケ ミ コ ン	C18,105,106,209,210		
	UJ 14 71 00	//	//	C5,6,14		
	UJ 15 82 20	//	//	C3,4		
	UJ 45 83 30	//	//	C11		
	UW 56 51 50	//	//	C129,130		
	UJ 16 52 20	//	//	C123,124		
	UJ 16 54 70	//	//	C125,126		
	UJ 16 61 00	//	//	C121,122,233,234,239, 240,245,246		
	UJ 16 62 20	//	//	C221,222,227,228		
	UJ 46 63 30	//	//	C113,114,215,216		
	FX 60 11 00	Semi Conductive Ceramic Cap.	半 導 体 セ ラ コ ン	C145,146,223~226		
	FS 68 35 60	//	//	C139,140		
	FS 68 41 20	//	//	C141,142,217~220		
	FS 68 42 20	//	//	C19		
	FX 60 11 30	//	//	C137,138		
	FS 68 43 30	//	//	C131,132,211~214		
	FS 68 43 90	//	//	C205~208		
	FS 68 46 80	//	//	C133,134		
	FS 68 48 20	//	//	C127,128		
	HW 19 34 70	Fusing Resistor	ヒ ュ ー ズ 抵 抗	R1,2	ERD2FCJ4R7	
	HX 60 22 70	Frame Proof Carbon Resistor	不 燃 化 カ ー ボ ン 抵 抗	R5,6	ERDSIFJ271	
	HX 60 21 50	Resistor Array	集 合 抵 抗	Z101,102	EXBF8E224J	
※	GX 60 29 30	Power Transformer	電 源 ト ラ ン ス	T1 (J)	PSLTK5K22	△
※	GX 60 29 40	//	//	T1 (U,C)	// 23	△
※	GX 60 29 50	//	//	T1 (R)	// 24	△
※	GX 60 29 60	//	//	T1 (A)	PSLTK5K26	△
※	ix 61 37 70	Transistor	ト ラ ン ジ ス タ ー	Q1		
※	ix 61 37 80	//	//	Q2		
※	ix 61 37 90	//	//	Q4		
※	ix 61 05 00	//	//	Q101,102		
※	ix 61 38 00	//	//	Q103		
※	ix 60 76 10	Digital Transistor	デ ジ タ ル ト ラ ン ジ ス タ ー	Q5		

※New Parts (新規部品)

[illegible]

※New Parts (新規部品)



■ EXPLODED VIEW PARTS

Ref. No.	Part No	Description	部 品 名	Remarks/Markets	Common Model	ランク
※ 1	LX 60 19 80	AC Inlet	A C イ ン レ ッ ト	(U,C,A)	SJSD16	△
※ //	LX 60 19 90	//	//	(R)	SJS9231-1B	△
※ //	LX 60 20 00	//	//	(J)	SJS9236	△
※ 2	CX 60 71 10	Cover, AC Inlet	A C イ ン レ ッ ト カ バ ー	(R)	SJS9231A	
※ 3	LX 60 06 00	AC Outlet	A C ア ウ ト レ ッ ト	(J,U,C,R)	SJS9223	△
※ 5	AX 60 47 00	Chassis	シ ャ ー シ		PSKUED90M-J	
※ 6	CX 60 71 20	Leg	脚		PSKLIK13	
※ 7	CX 60 71 90	Reflector	導 光 板		PSGLK19	
※ 8	AX 60 47 10	Rear Panel	リ ャ バ ネ ル	(A)	PSGPK540-1A	
※ //	AX 60 47 20	//	//	(R)	// -4A	
※ //	AX 60 47 30	//	//	(J)	PSGPK540A	
※ //	AX 60 47 40	//	//	(U,C)	PSGPK540B	
※ 9	NX 60 36 80	Front Panel	フ ロ ン ト パ ネ ル		PSGYEQ90M-J	
※ 10	CX 60 71 30	Button, Function	フ ァ ン ク シ ョ ン ボ タ ン		PSBCK86	
※ 11	CX 60 71 40	Button, Power	電 源 ボ タ ン		PSBCK87	
※ 12	LX 60 20 10	Socket	ソ ケ ッ ト	J301	SJSK90503DS	
※ 13	CX 60 14 50	Support, P, C, B	シ ー ト サ ポ ー ト		SHE187-K	
※ 14	LX 60 20 20	Socket	ソ ケ ッ ト	J101,302	SJSK90603DS	
※ 15	LX 60 20 30	//	//	J104,303	SJSK90703DS	
※ 16	CX 60 71 50	Plastic Rivet	プ ラ ス チ ッ ク リ ッ ッ ト (ナ イ ラ ッ ッ)		SHR401-I	
※ 17	LX 60 20 40	Terminal Plate	ターミナルプレート		SJF3057-8N	
※ 18	CX 60 71 60	Case, Lamp	ラ ン プ ケ ー ス		PSMPK8	
※ 19	CX 60 71 70	Sheet	拡 散 シ ー ト		PSDUK24	
※ 20	AX 60 46 90	Top Cover	キ ャ ビ ネ ッ ト		PSKCK260	
※ 21	LX 60 06 40	Connector	コ ネ ク タ ー	J101	SJSD0605	
※ 22	LX 60 20 50	//	//	J102	SJT30640LX-V	
※ 23	LX 60 20 60	Socket	ソ ケ ッ ト	J102	SJS50671DS	
※ 24	LX 60 06 70	Connector	コ ネ ク タ ー	J104	SJSD0705	
※ 25	LX 60 06 80	//	//	J105	SJSD0805	
※ 26	LX 60 20 70	Socket	ソ ケ ッ ト	J105	SJSK90803DS	
※ 27	AX 60 54 10	Ground Terminal	ア ー ス 端 子		SNE55-I	
※ 28	CX 60 81 30	Button	ボ タ ン	UP-DOWN	PSBWK32A	
※ 29	CX 60 81 40	//	//	M1,M5	PSBWK32B	
※ 30	CX 60 81 50	//	//	M2,M6	// 32C	
※ 31	CX 60 81 60	//	//	M3,M7	// 32D	
※ 32	CX 60 81 70	//	//	M4,M8	// 32E	
※ 33	NX 60 39 50	Main Circuit Board	メ イ ン シ ー ト	(J)	PSXPK407	
※ //	NX 60 39 60	//	//	(U,C)	// 408	
※ //	NX 60 39 70	//	//	(R)	// 409	
※ //	NX 60 39 80	//	//	(A)	// 410	
※ 34	NX 60 39 90	Panel Circuit Board	パ ネ ル シ ー ト		// 412	
※ N1	EJ 03 01 06	Pan Head Tapping Screw	3×10 ZMC2-Y	ナベタッピングネジ	PACK	XTV3+10G
※ N2	EX 60 03 10	Binding Head Tapping Screw	3×8 FCRM3-BI	バインドタッピングネジ(Pタイト)		XTB3+8GFZ
※ N3	Ei 33 00 86	Binding Head Tapping Screw	3×8 FCRM3-BI	バインドタッピングネジ	PACK	XTB3+8JFZ
※ N4	EK 03 00 40	BW Head Tapping Screw	3×20 ZMC2-Y	BW ヘッドタッピングネジ		XTW3+20T
※ N5	AX 60 54 20	Special Screw	3×20 ZMC2-Y	ネ ジ		XTBS3+20FI
※ N6	EJ 03 00 86	Pan Head Tapping Screw	3×8 ZMC2-Y	ナベタッピングネジ	PACK	XTV3+8G
※ N7	EX 60 03 10	Binding Head Tapping Screw	3×8 FCRM3-BI	バインドタッピングネジ(Pタイト)	(J,U,C,A)	XTB3+8GFZ
※ N8	Ei 33 00 86	//	3×8 FCRM3-BI	バインドタッピングネジ		XTBS3+8JFZ
※ N9	EK 33 60 10	BW Head Tapping Screw	3×8 FCRM3-BI	BW ヘッドタッピングネジ		XTW3+8T

※ New Parts (新規部品)

[illegible]

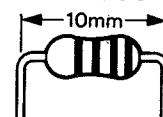
※New Parts (新規部品)

Parts List for Carbon Resistor

Value	1/4W Type Part No.	1/6W Type Part No.	Value	1/4W Type Part No.	1/6W Type Part No.
1.0 Ω	HJ353100	HF853100	12K Ω	HJ357120	HF857120
1.8 "	HJ353180	※	15 "	HJ357150	HF857150
2.2 "	HJ353220	HF853220	18 "	HJ357180	HF857180
3.3 "	HJ353330	HF853330	22 "	HJ357220	HF857220
4.7 "	HJ353470	HF853470	27 "	HJ357270	HF857270
5.6 "	HJ353560	HF853560	33 "	HJ357330	HF857330
10 "	HJ354100	HF854100	39 "	HJ357390	HF857390
15 "	HJ354150	HF854150	47 "	HJ357470	HF857470
22 "	HJ354220	HF854220	56 "	HJ357560	HF857560
27 "	HJ354270	HF854270	68 "	HJ357680	HF857680
33 "	HJ354330	HF854330	82 "	HJ357820	HF857820
39 "	HJ354390	HF854390	91 "	HJ357910	HF857910
47 "	HJ354470	HF854470	100 "	HJ358100	HF858100
56 "	HJ354560	HF854560	120 "	HJ358120	HF858120
68 "	HJ354680	HF854680	150 "	HJ358150	HF858150
82 "	HJ354820	HF854820	180 "	HJ358180	HF858180
100 "	HJ355100	HF855100	220 "	HJ358220	HF858220
110 "	HJ355110	HF855110	270 "	HJ358270	HF858270
120 "	HJ355120	HF855120	330 "	HJ358330	HF858330
150 "	HJ355150	HF855150	390 "	HJ358390	HF858390
160 "	HJ355160	※	470 "	HJ358470	HF858470
180 "	HJ355180	HF855180	560 "	HJ358560	HF858560
220 "	HJ355220	HF855220	680 "	HJ358680	HF858680
270 "	HJ355270	HF855270	820 "	HJ358820	HF858820
330 "	HJ355330	HF855330	1.0M Ω	HJ359100	HF859100
390 "	HJ355390	HF855390	1.2 "	HJ359120	※
470 "	HJ355470	HF855470	1.5 "	HJ359150	HF859150
510 "	※	HF855510	1.8 "	HJ359180	HF859180
560 "	HJ355560	HF855560	2.2 "	HJ359220	HF859220
680 "	HJ355680	HF855680	3.3 "	HJ359330	HF859330
820 "	HJ355820	HF855820	3.9 "	HJ359390	※
910 "	HJ355910	HF855910	4.7 "	HJ359470	HF859470
1.0K Ω	HJ356100	HF856100			
1.2 "	HJ356120	HF856120			
1.5 "	HJ356150	HF856150			
1.8 "	HJ356180	HF856180			
2.0 "	HJ356200	HF856200			
2.2 "	HJ356220	HF856220			
2.4 "	HJ356240	HF856240			
2.7 "	HJ356270	HF856270			
3.0 "	HJ356300	HF856300			
3.3 "	HJ356330	HF856330			
3.6 "	HJ356360	HF856360			
3.9 "	HJ356390	HF856390			
4.7 "	HJ356470	HF856470			
5.1 "	HJ356510	HF856510			
5.6 "	HJ356560	HF856560			
6.8 "	HJ356680	HF856680			
8.2 "	HJ356820	HF856820			
9.1 "	HJ356910	HF856910			
10 "	HJ357100	HF857100			

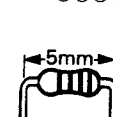
1/4W Type

HJ35○○○○



1/6W Type

HF85○○○○



EQ-90M

YAMAHA
