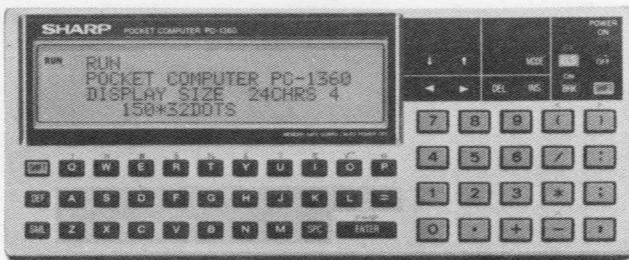


# SHARP SERVICE MANUAL

CODE : 00ZPC1360SM/E

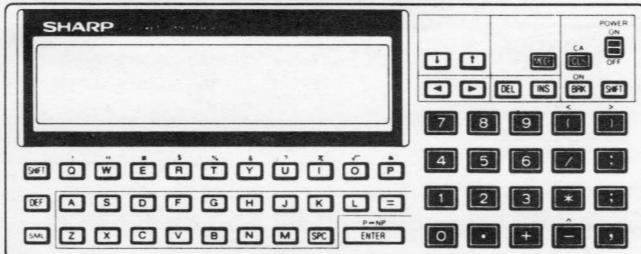


## MODEL PC-1360

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## 1. KEY LAYOUT



## 2. INTRODUCTION

- 1 PC-1360 has the two RAM card slots. (for CE-210M ~ CE-2H32M). The RAM cards for PC-1350 (CE-201M ~ 202M) cannot be used.
- 2 PC-1360 has the self check program in ROM. See 9. TEST PROGRAM.

## 3. SPECIFICATIONS

**Model:** PC-1360 Pocket Computer

**Processor:** 8 bit CMOS CPU

**Programming:** BASIC

**Language:**

**System ROM:** 136 K Bytes

**Memory Capacity:** RAM:

Held in RAM card (8KB)	System internal	960 Bytes	Can be ex- tended to 64KB using the two slots
	System area	1282 Bytes	
	User		
	Fixed Memory Area	208 Bytes	
	(A ~ Z, A\$ ~ Z\$)		
	Program/Data Area	6558 Bytes	
	Reserve Area	144 Bytes	

#### Stack:

Sub-routine: 10 stacks

FOR-NEXT: 5 stacks

Function: 16 stacks

Data: 8 stacks

#### Operators:

Addition, subtraction, multiplication, division, trigonometric and inverse trigonometric functions, logarithmic and exponential functions, angle conversion, square and square root, sign, absolute, integer, relational operators, logical operators etc...

#### Numeric Precision:

10 digits (mantissa) + 2 digits (exponent).

#### Editing Features:

Cursor left and right, line up and down, character insert, character delete.

#### Memory Protection:

CMOS Battery backup.

#### Serial Input/Output Features:

Standards: Start-stop transmission (asynchronous) system.  
Only half duplex.

Baud Rates: 300, 600, 1200 Baud

Data Bits: 7 or 8 Bits

Parity Bits: Even, odd, or no-parity

Stop Bit: 1 or 2 Bits

Connectors Used: 15-Pin connector (for external equipment)

#### Output Signal Level:

C-MOS level (4~6 Volts)

#### Interfacing Signals:

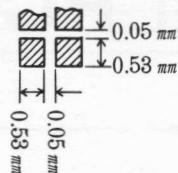
Inputs: RS, CS, CD, PAK

Outputs: SD, RS, RR, ER, PRQ

Others: SG, FG, VC

**Printer interface capability:**

11 pin (For CE-126P, CE-124)

**Graphics interface capability:**CE-140P commands (CIRCLE,  
PAINT etc.).**2 RAM card Slots:** each card 2KB, 4KB 8KB, 16KB, or  
32 KB.**Display:** 4-line 24-digit liquid crystal display  
with 5x 7 dot characters or 150x 32  
dot graphics.**Key:** 62 keys. Alphabetic, numeric, special  
symbols, and functions. Numeric  
pad. User defined keys.**Power Supply:** 6.0 V DC: Lithium cells.  
type: CR-2032x2**Power Consumption:** 6.0 V DC @ 0.03W  
Approximately 120 hours of continuous  
operation under norman conditions  
(based on 10 minutes of  
operation or program execution and  
50 minutes of display per hour at a  
temperature of 20°C). The time may  
vary slightly depending on usage and  
the type of battery used.**Operating****Temperature:** 0°C – 40°C (32°F – 104°F)**Dimensions:** 182(W) x 72(D) x 16(H) mm.

7-5/32" (W) x 2-27/32" (D) x

5/8"(H)

**Weight:** Approximately 220g (0.49 lbs.)  
(with cells and a RAM card)**Accessories:** Hard cover, one 8KB RAM card  
(CE-212M), two lithium cells (built  
in), one keyboard template and  
operation manual.**Options:** Plug in RAM cards

2 KB(CE-210M)

4 KB(CE-211M)

8 KB(CE-212M)

16 KB(CE-2H16M)

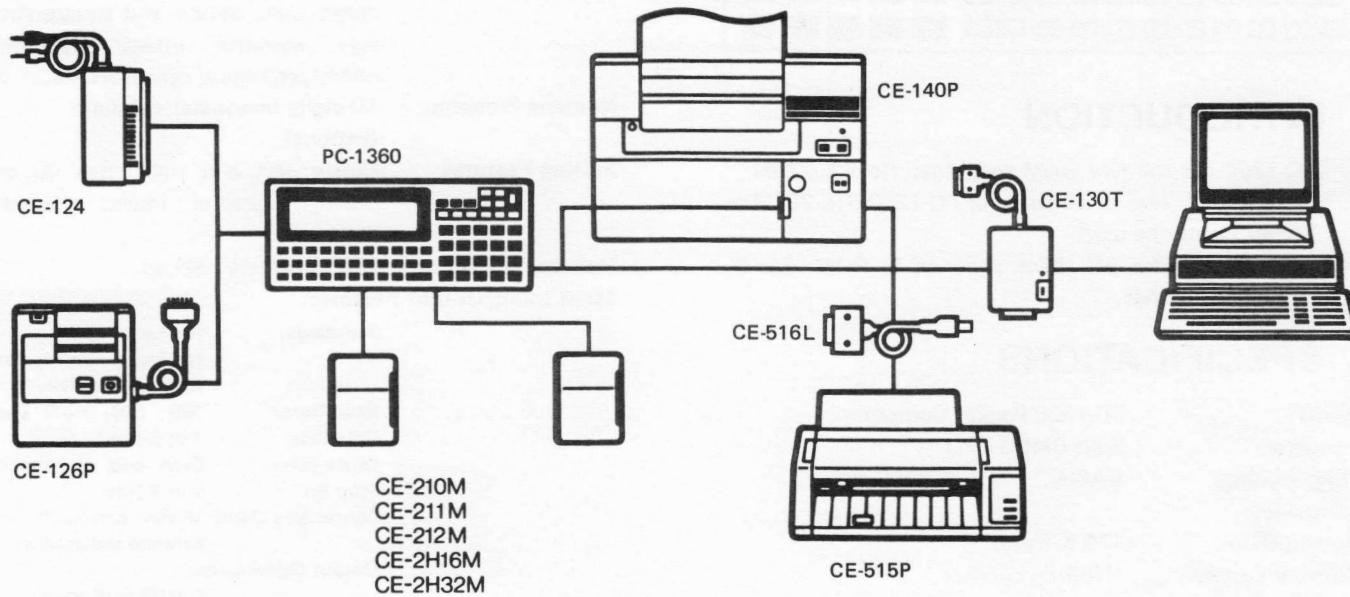
32 KB(CE-2H32M)

Cassette Tape Recorder (CE-152)

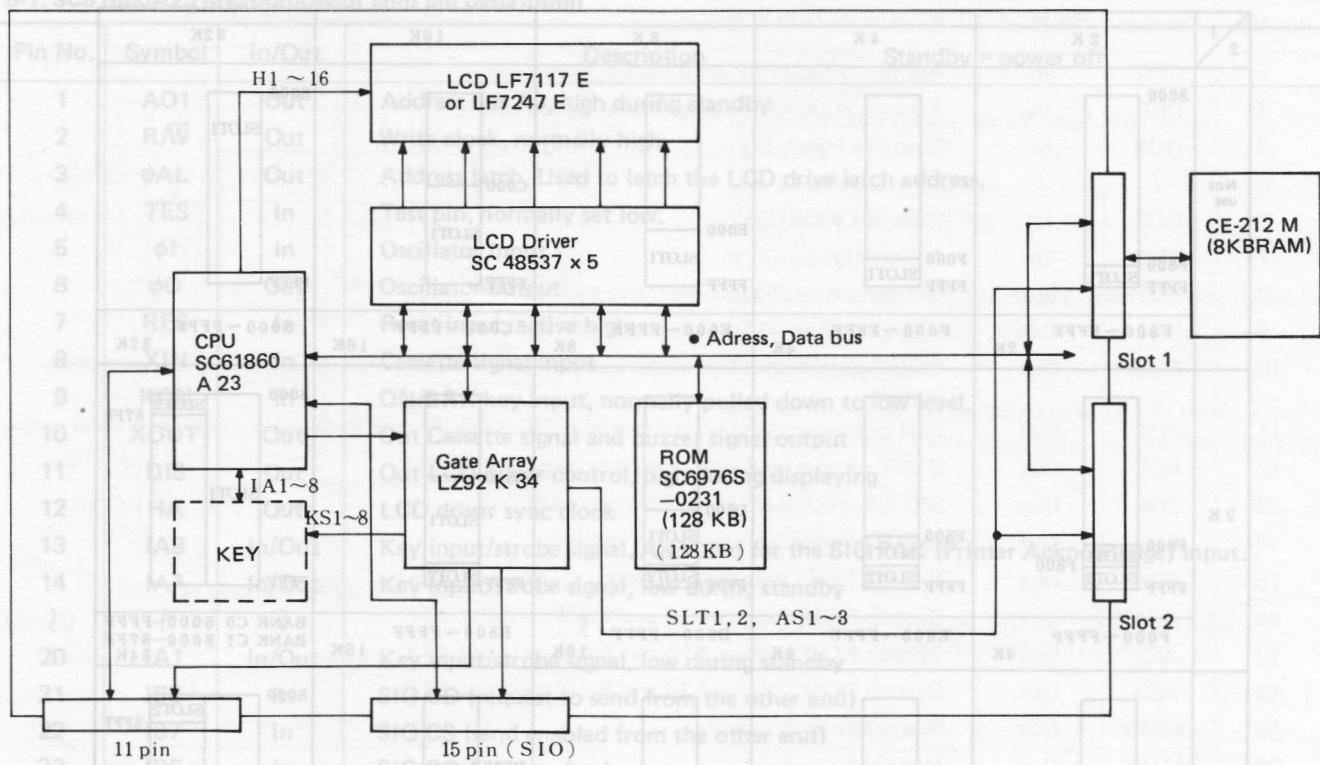
Printer/Cassette Interface (CE-126P)

Printers (CE-140P, CE-515P, CE-  
516P) etc.**Copy Capability:** RAM cards can be copied from slot  
1 to slot 2.

## 4. SYSTEM CONFIGURATION



## 5. BLOCK DIAGRAM



## 6. POWER CONSUMPTION

Power consumed for the PC-1360 under power off	25 $\mu$ A, max.
Power consumed for the PC-1360 during displaying	600 $\mu$ A, max.
Power consumed for the PC-1360 during arithmetical operation	4.3 mA, max.
Power consumed for the CE-212M	About 25 $\mu$ A, max.

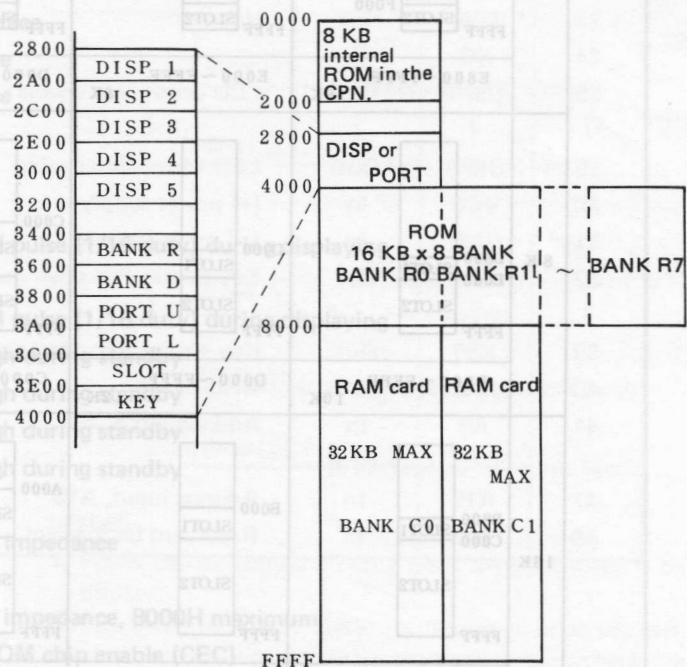
As the above values are observed under the room temperature of 20°C, it may vary depending on environment.

- How to judge the life of the battery

PC-1350: Needs replacement when the terminal voltage drops below 5.2 volts (2.6 volts per battery cell).

CE-212M: Needs replacement when the terminal voltage drops below 2.5 volts.

## 7. MEMORY MAP

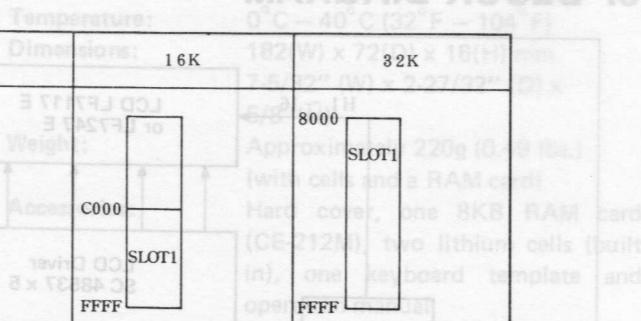


Up to two RAM cards can be used in this model, which should be interfaced through the slot-1 and slot-2. For there are five variety of RAM cards (2 KB to 32 KB), the following RAM card addresses are established according to the size of RAM cards combined.

## MEMORY MAP FOR RAM CARDS

Graphic 2	Face card 2 K	4 K	8 K	16 K	32 K					
	8000 F800 FFFF	SLOT1	F000 FFFF	SLOT1	E000 FFFF	SLOT1	C000 FFFF	SLOT1	8000 FFFF	SLOT1
Not use	F800 FFFF	SLOT1	F000 FFFF	SLOT1	E000 FFFF	SLOT1	C000 FFFF	SLOT1	8000 FFFF	SLOT1
	F800 ~ FFFF	2K	F000 ~ FFFF	4K	E000 ~ FFFF	8K	C000 ~ FFFF	16K	8000 ~ FFFF	32K
2 K	F000 FFFF	SLOT1 SLOT2	E800 FFFF	SLOT1 SLOT2	D800 FFFF	SLOT1 SLOT2	B800 FFFF	SLOT1 SLOT2	8000 FFFF	SLOT2 SLOT1
	F000 ~ FFFF	4K	E800 ~ FFFF	6K	D800 ~ FFFF	10K	B800 ~ FFFF	18K	BANK C0 8000 ~ FFFF	BANK C1 8000 ~ 87FFF 34K
4 K	E800 FFFF	SLOT1 SLOT2	F000 FFFF	SLOT1 SLOT2	D000 FFFF	SLOT1 SLOT2	B000 FFFF	SLOT1 SLOT2	8000 FFFF	SLOT2 SLOT1
	E800 ~ FFFF	6K	E000 ~ FFFF	8K	D000 ~ FFFF	12K	B000 ~ FFFF	20K	BANK C0 8000 ~ FFFF	BANK C1 8000 ~ 8FFF 36K
8 K	D800 E000 FFFF	SLOT1 SLOT2	D000 FFFF	SLOT1 SLOT2	C000 FFFF	SLOT1 SLOT2	A000 FFFF	SLOT1 SLOT2	8000 FFFF	SLOT2 SLOT1
	D800 ~ FFFF	10K	D000 ~ FFFF	12K	C000 ~ FFFF	16K	A000 ~ FFFF	24K	BANK C0 8000 ~ FFFF	BANK C1 8000 ~ 9FFF 40K
16 K	B800 C000 FFFF	SLOT1 SLOT2	B000 FFFF	SLOT1 SLOT2	A000 FFFF	SLOT1 SLOT2	8000 FFFF	SLOT1 SLOT2	8000 FFFF	SLOT2 SLOT1
	B800 ~ FFFF	18K	B000 ~ FFFF	20K	A000 ~ FFFF	24K	8000 ~ FFFF	32K	BANK C0 8000 ~ FFFF	BANK C1 8000 ~ BFFF 48K
32 K	8000 F800 FFFF	SLOT2 SLOT1	8000 F000 FFFF	SLOT2 SLOT1	E000 FFFF	SLOT2 SLOT1	C000 FFFF	SLOT2 SLOT1	8000 FFFF	SLOT2 SLOT1
	BANK C0 E800 ~ FFFF 34K	BANK C0 E000 ~ FFFF 36K	BANK C1 8000 ~ FFFF 40K	BANK C0 E000 ~ FFFF 40K	BANK C1 8000 ~ FFFF 48K	BANK C0 C000 ~ FFFF 48K	BANK C1 8000 ~ FFFF 64K	BANK C0 8000 ~ FFFF BANK C1 8000 ~ FFFF 64K	BANK C0 8000 ~ FFFF BANK C1 8000 ~ FFFF 64K	

## 2. BLOCK DIAGRAM



## 8. LSI DESCRIPTION

### 8-1. SC61860A23 Microprocessor chip pin description

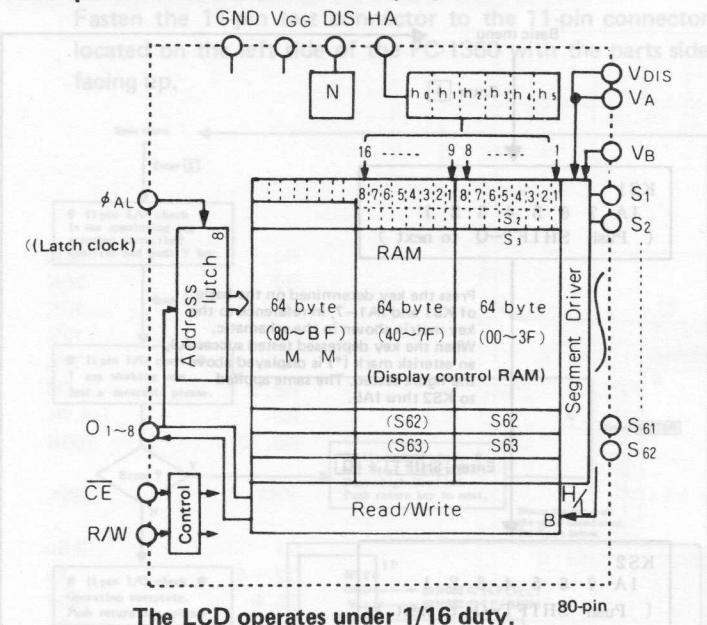
Pin No.	Symbol	In/Out	Description	Standby = power off
1	AO1	Out	Address bus A0, high during standby	
2	R/W	Out	Write clock, normally high	
3	φAL	Out	Address latch. Used to latch the LCD drive latch address.	
4	TES	In	Test pin, normally set low.	
5	φI	In	Oscillator input	
6	φO	Out	Oscillator output	
7	RES	In	Reset input, active high	
8	XIN	In	Cassette signal input	
9	KON	In	ON/BRK key input, normally pulled down to low level.	
10	XOUT	Out	Out Cassette signal and buzzer signal output	
11	DIS	Out	Out LCD driver control, high during displaying	
12	HA	Out	LCD driver sync clock	
13	IA8	In/Out	Key input/strobe signal. Also used for the SIO PAK (Printer Acknowledge) input.	
14	IA7	In/Out	Key input/strobe signal, low during standby	
20	IA1	In/Out	Key input/strobe signal, low during standby	
21	IB8	In	SIO CD (request to send from the other end)	
22	IB7	In	SIO CS (send enabled from the other end)	
23	IB6	In	SIO RD (receive data)	
24	IB5	In	ACK input on 11-pin interface	
25	IB4	In	DIN input on 11-pin interface	
26	IB3	In	DOUT input on 11-pin interface	
27	IB2	In	IO2 input on 11-pin interface	
28	IB1	In	IO1 input on 11-pin interface	
29	VM	In	LCD drive power supply	
30	VA	In	LCD drive power supply	
31	GND	In	(+) power supply	
32	H1	Out	LCD backplate signal, 4-level pulse (1/16 duty) during displaying	
47	H16	Out	LCD backplate signal, 4-level pulse (1/16 duty) during displaying	
48	VB	In	LCD drive power supply, high during standby	
49	VDIS	In	LCD drive power supply, high during standby	
50	VCC	In	LCD drive power supply, high during standby	
51	VDC	Out	LCD drive power supply, high during standby	
52	VGG	In	(-) power supply	
53	08	In/Out	Data bus, D7, normally high impedance	
60	01	In/Out	Data bus, D0, normally high impedance, 8000H maximum	
61	F05	Out	RAM, LCD driver, system ROM chip enable (CEC)	
62	F04	Out	RAM card chip enable (CER)	
63	F03	Out	RAM card bank select (BA)	
64	F02	Out	SIO SD (send data)	
65	F01	Out	Not used.	
66	B08	Out	Address bus, A15, high during standby	
78	B01	Out		
74	A08	Out		
80	A02	Out	Address bus, A1, high during standby	

## 8-2. LS82K34 gate array pin description

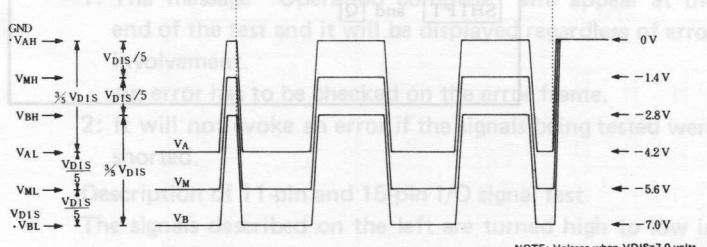
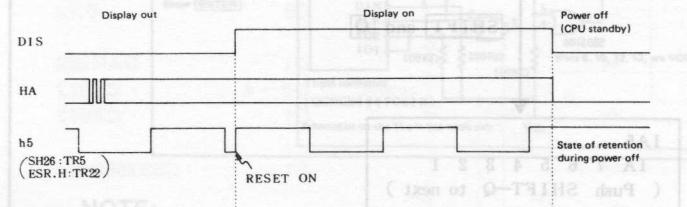
Pin No.	Symbol	In/Out	Description	Standby = power off
1	CEC	In	Address 0000-7FFF chip enable, active low	
2	CER	In	Address 8000-FFFF chip enable, active low	
3	DO0	In	Data bus input, D0	
4				
6	DO3	In	Data bus input, D3	
7	GND	In	(-) supply	
8	PO1	Out	IO1 output on 11-pin interface, pch open output	
9	PO2	Out	IO2 output on 11-pin interface, pch open output	
10	PO3	Out	DOUT output on 11-pin interface and SIO PRQ (Printer ReQuest output), pch open output	
11	PO4	Out	DIN output on 11-pin interface and SIO PRQ (Printer ReQuest output), pch open output	
12	PO5	Out	BUSY output on 11-pin interface, pch open output	
13	PO6	Out	SIO ER. High with an OPEN command	
14	PO7	Out	SIO RR (main unit ready to receive)	
15	PO8	Out	SIO RS (main unit send request)	
16	AS1	Out	System ROM address A14 and RAM card slot A11	
17	AS2	Out	System ROM address A15 and RAM card slot A12	
18	AS3	Out	System ROM address A16 and RAM card slot A13	
19	AD16	Out	Not used.	
20	AD17	Out	Not used.	
21	SLT1	Out	RAM card slot-1 chip enable	
22	SLT2	Out	RAM card slot-2 chip enable	
23	RAM	Out	Not used.	
24	NC			
25	DSP1	Out	LCD driver chip enable	
26				
29	DSP5	Out	LCD driver chip enable	
30	VCC	In	(+) power supply	
31	GND	In	(-) power supply	
32	KS1	Out	Key strobe, Pch open output	
33				
39	KS8	Out	Key strobe, Pch open output	
40	R/W	In	Write clock	
41	A9	In	Address input, A9	
42				
47	A15	In	Address input, A15	
48	BA	In	RAM card bank select	



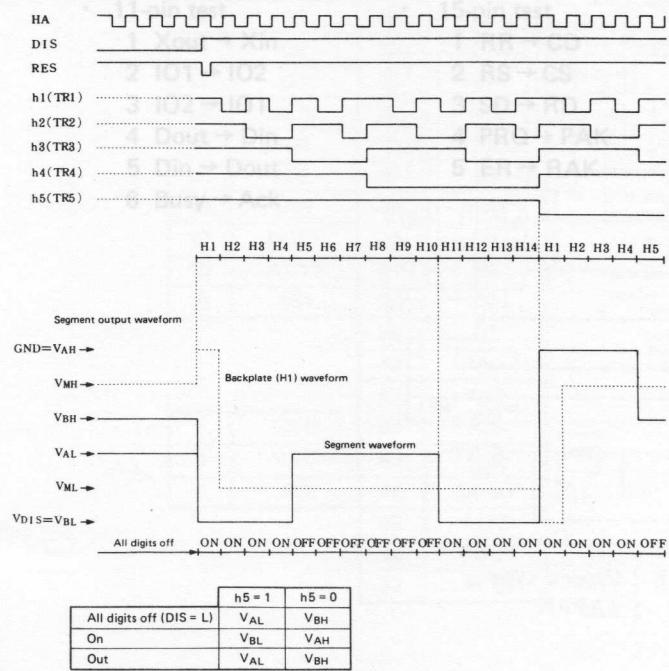
## Description of the SC43537 Display LSI



### Timing



### Counter and segment waveforms



## 9. TEST PROGRAM

The PC-1360 has the test program.

### Test items

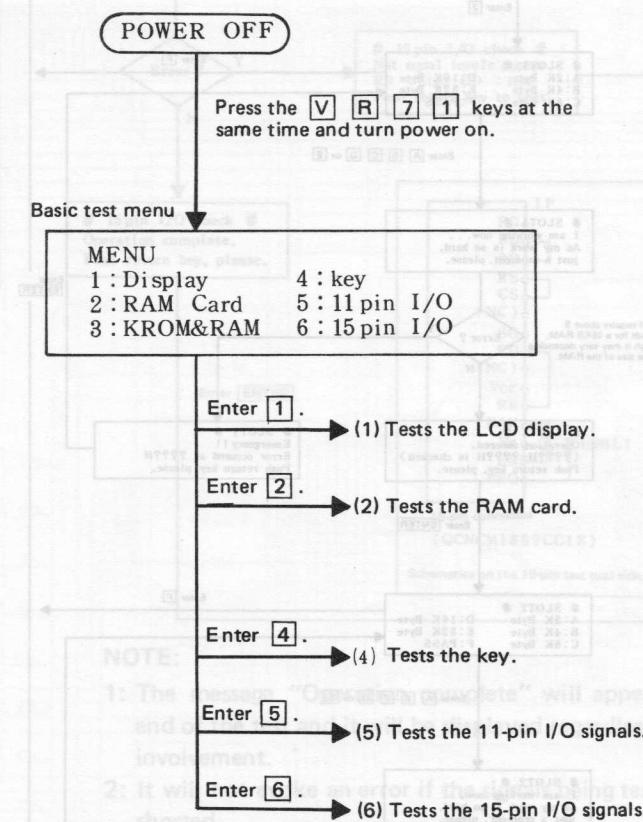
- (1) LCD display
- (2) RAM card (slot-1, slot-2) read after write
- (3) Keys
- (4) 11-pin I/O signal test
- (5) 15-pin I/O signal test

### Tools required

Special tool UKOGC3020CSZZ used for the above items (4) and (5). (price rank : BC)

### Test operation

Set the PC-1360 to be tested in the RUN mode, power off, then make key entry according to the flowchart shown below.

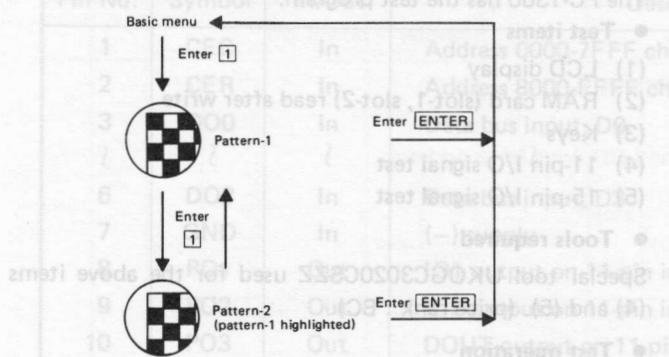


### NOTES:

- 1: Power can be turned off only while the basic menu is on display.
- 2: The contents of the RAM are destroyed after the test.
- 3: If the specified test program were not to start, check the key performance first.
- 4: In the menu, "KROM & RAM" is displayed. But this test is only for Japan.

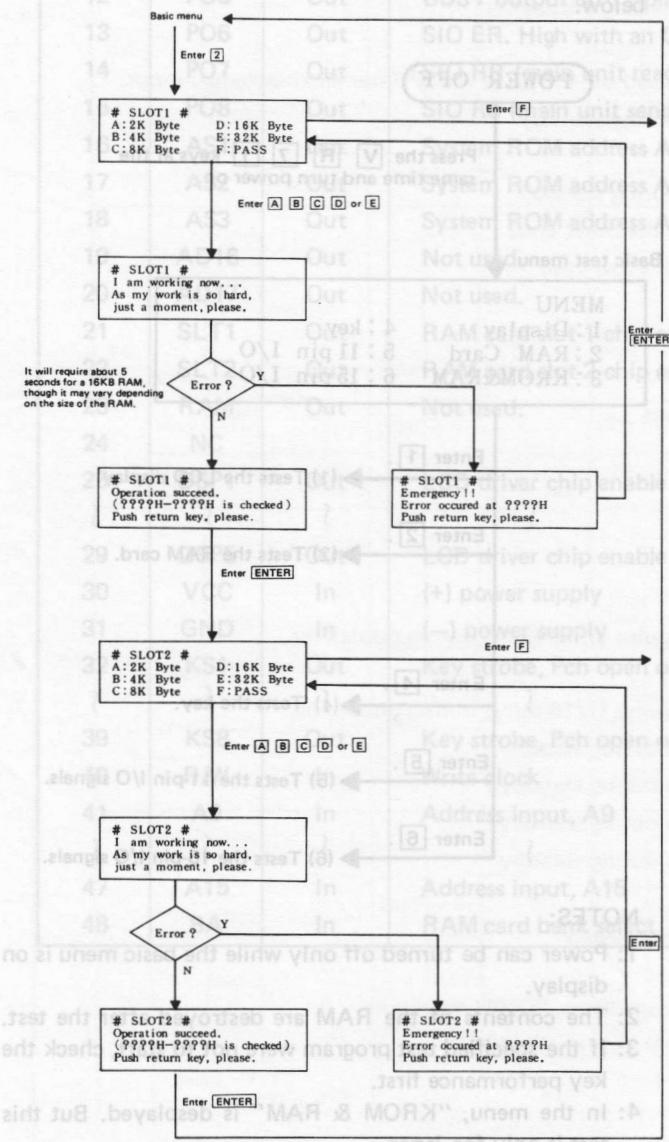
## ● Test description

### (1) LCD display test



After the above operation, visually check the LCD.

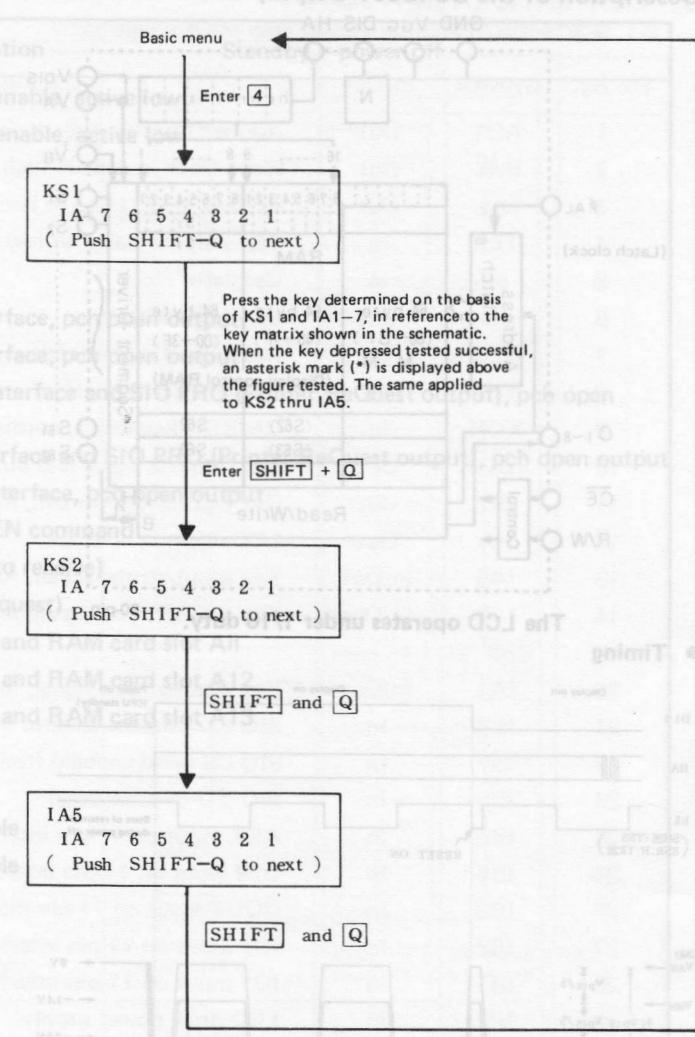
### (2) RAM card test



### NOTE:

- 1: Since the slot-1 is first tested and then the slot-2 for the RAM card test, it is not possible to test only the slot-2. On the other hand, it is possible to test only the slot-1. The slot-2 test can be passed after the slot-1.
- 2: If the 4KB test is commanded for the 8KB RAM card, only the 4KB portion of the RAM is tested. In otherwise, case, it will result in an error.

### (3) Key test

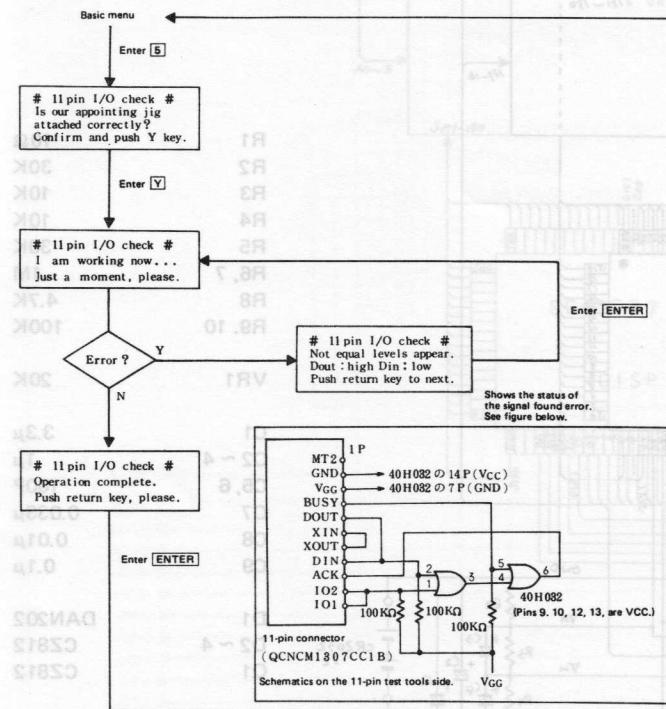


Press the key determined on the basis of KS1 and IA1-7, in reference to the key matrix shown in the schematic. When the key depressed tested successful, an asterisk mark (\*) is displayed above the figure tested. The same applied to KS2 thru IA5.

0 ~ 81	82 ~ 84	85 ~ 86
A&V	A&V	(*) A&V
A&V	A&V	NO
A&V	A&V	NO
A&V	A&V	NO

**(4) 11-pin I/O signal tests**

Fasten the 11-pin test connector to the 11-pin connector located on the left side of the PC-1360 with the parts side facing up.

**NOTE:**

- 1: The message "Operation complete" will appear at the end of the test and it will be displayed regardless of error involvement.

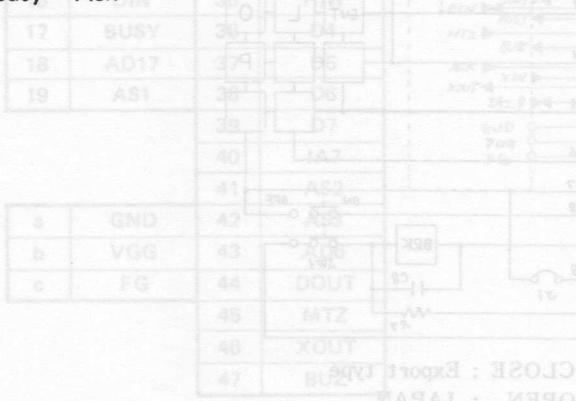
An error has to be checked on the error frame.

- 2: It will not evoke an error if the signals being tested were shorted.

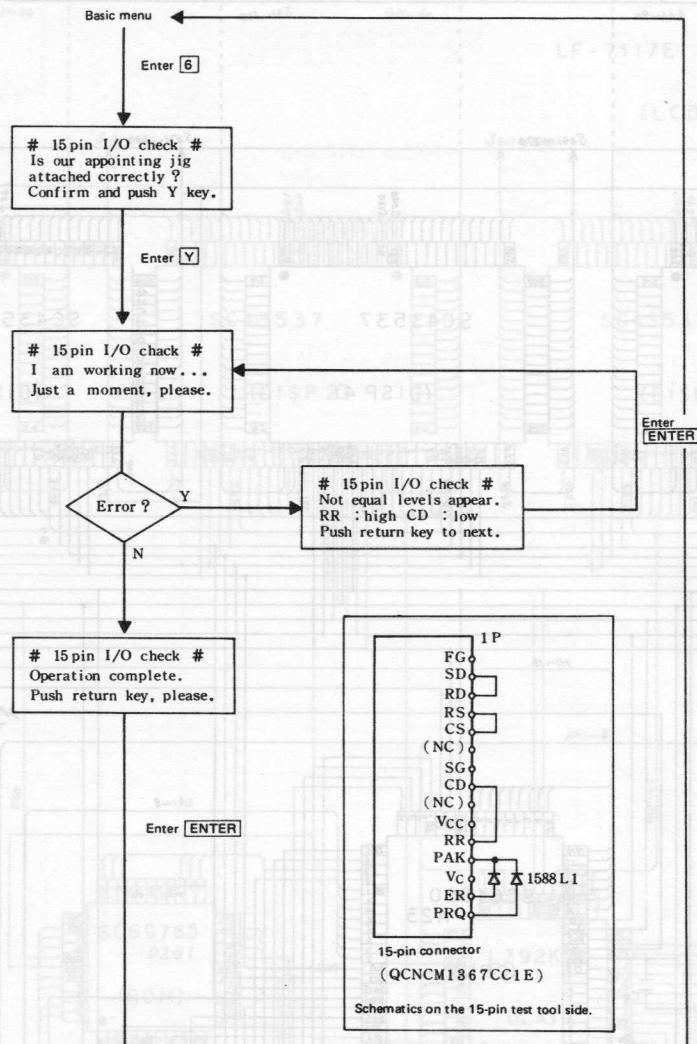
**Description of 11-pin and 15-pin I/O signal test**

The signals described on the left are turned high to low in their order of appearance, to check if it matched the signal on the right.

- |               |               |
|---------------|---------------|
| • 11-pin test | • 15-pin test |
| 1 Xout → Xin  | 1 RR → CD     |
| 2 IO1 → IO2   | 2 RS → CS     |
| 3 IO2 → IO1   | 3 SD → RD     |
| 4 Dout → Din  | 4 PRQ → PAK   |
| 5 Din → Dout  | 5 ER → RAK    |
| 6 Busy → Ack  |               |

**(5) 15-pin I/O signal tests**

Fasten the 15-pin test connector to the 15-pin connector located on the right side of the PC-1360 with the parts side facing up.

**NOTE:**

- 1: The message "Operation complete" will appear at the end of the test and it will be displayed regardless of error involvement.

- 2: It will not evoke an error if the signals being tested were shorted.

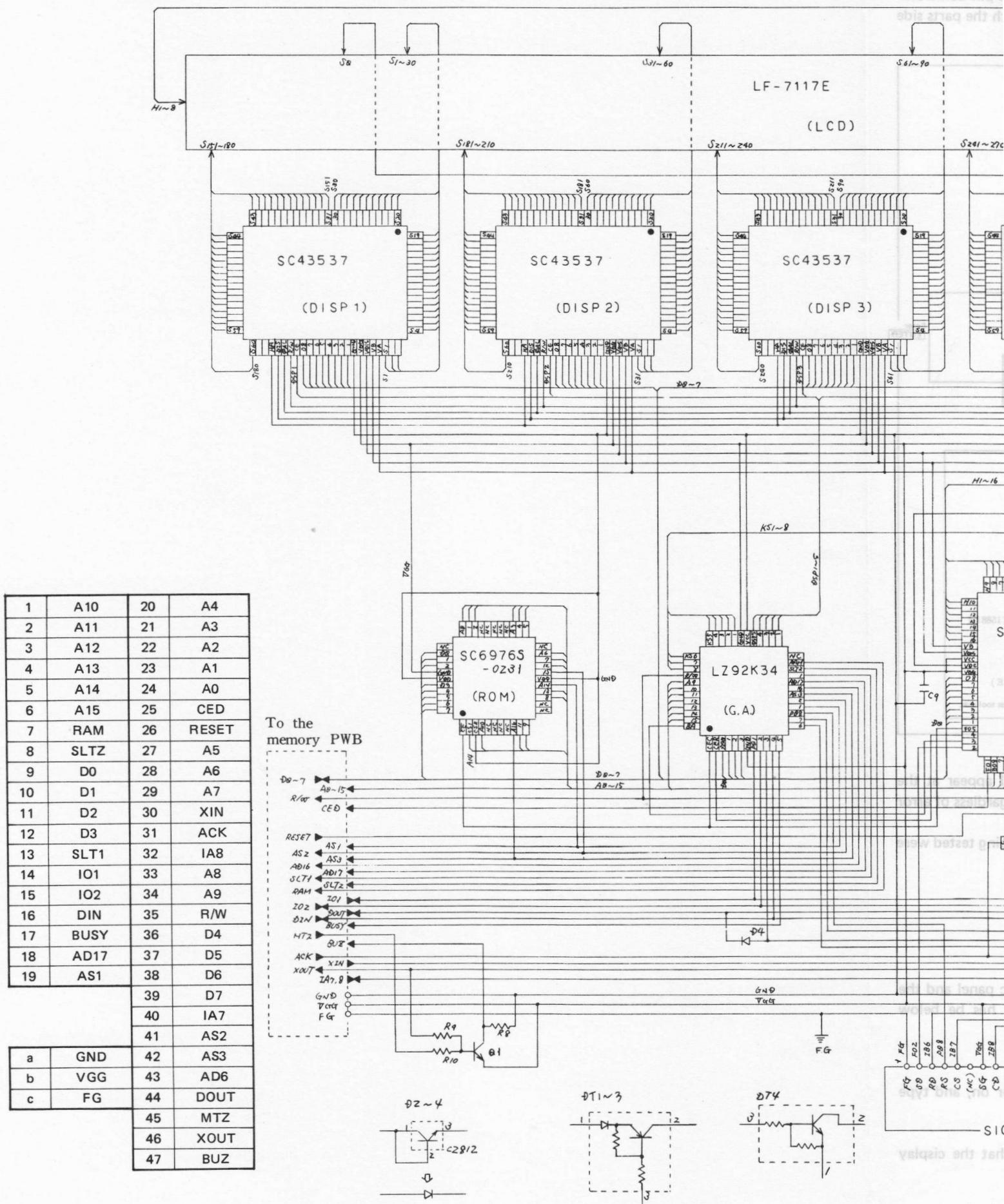
**10. OTHER TEST ITEMS****(1) Continuity test**

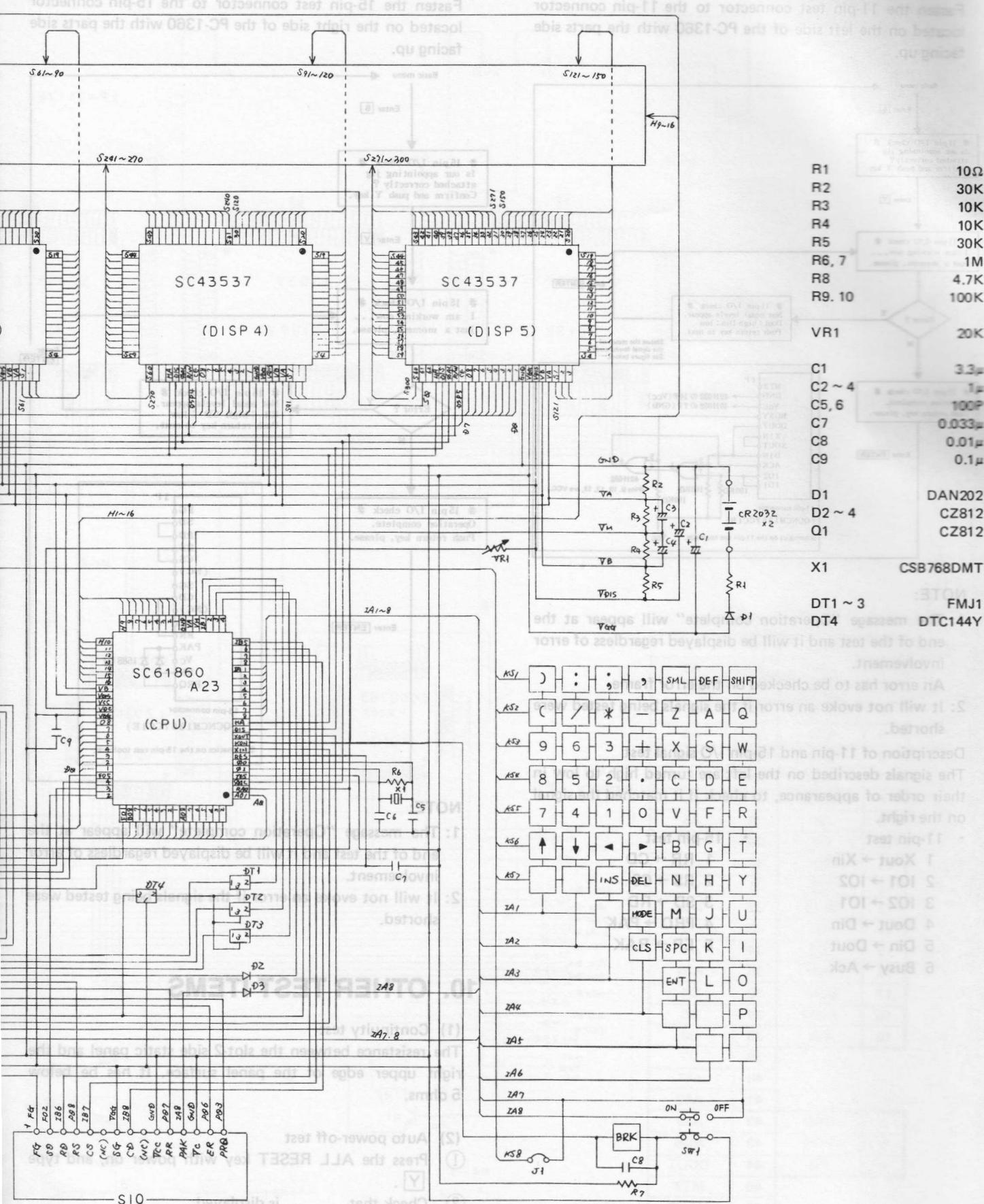
The resistance between the slot-2 side static panel and the right upper edge of the panel surface. It has to be below 5 ohms.

**(2) Auto power-off test**

- ① Press the ALL RESET key with power on, and type **Y**.
- ② Check that ..... is displayed.
- ③ Leave it for 15 minutes, then check that the display went off.

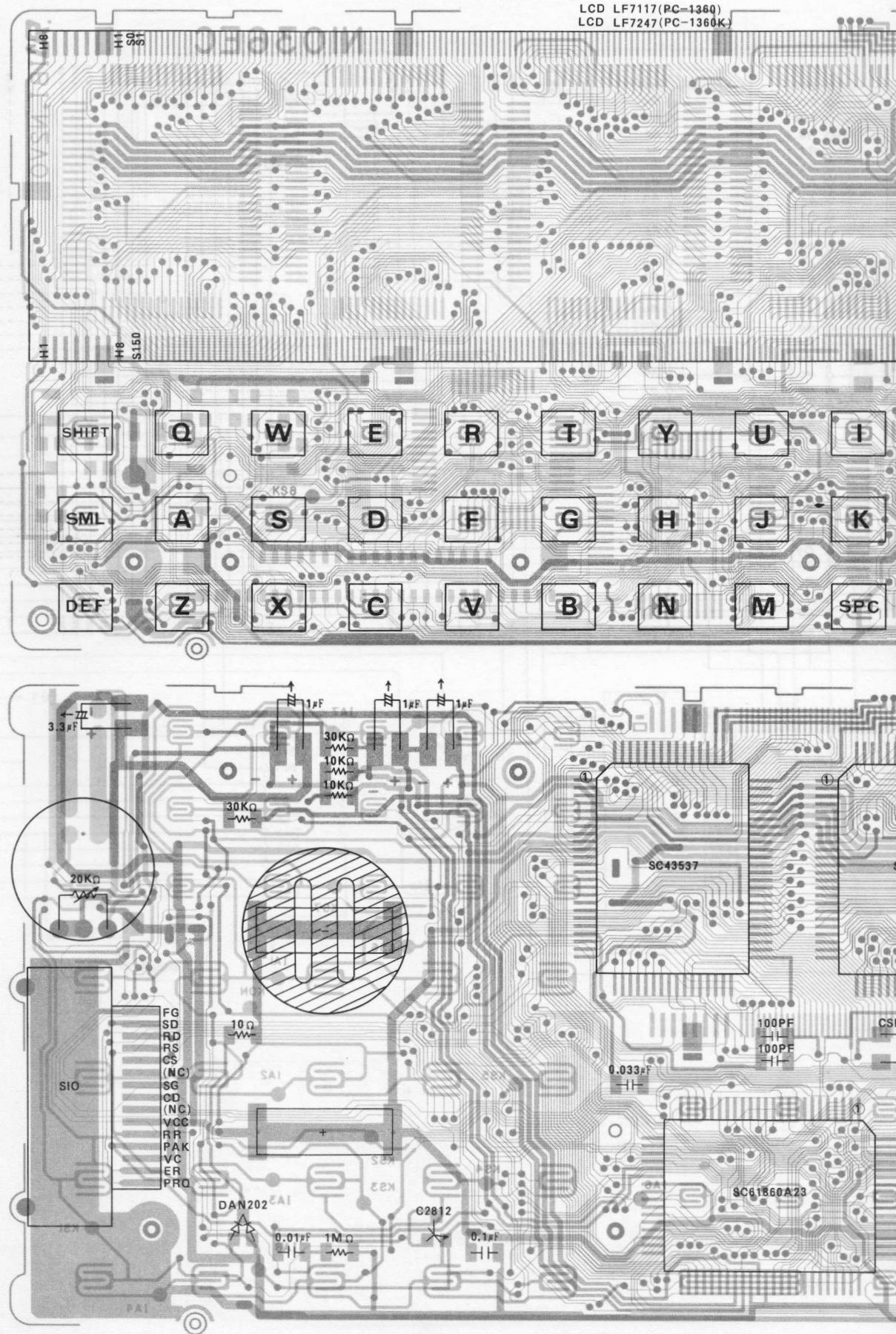
## 11. CIRCUIT DIAGRAM



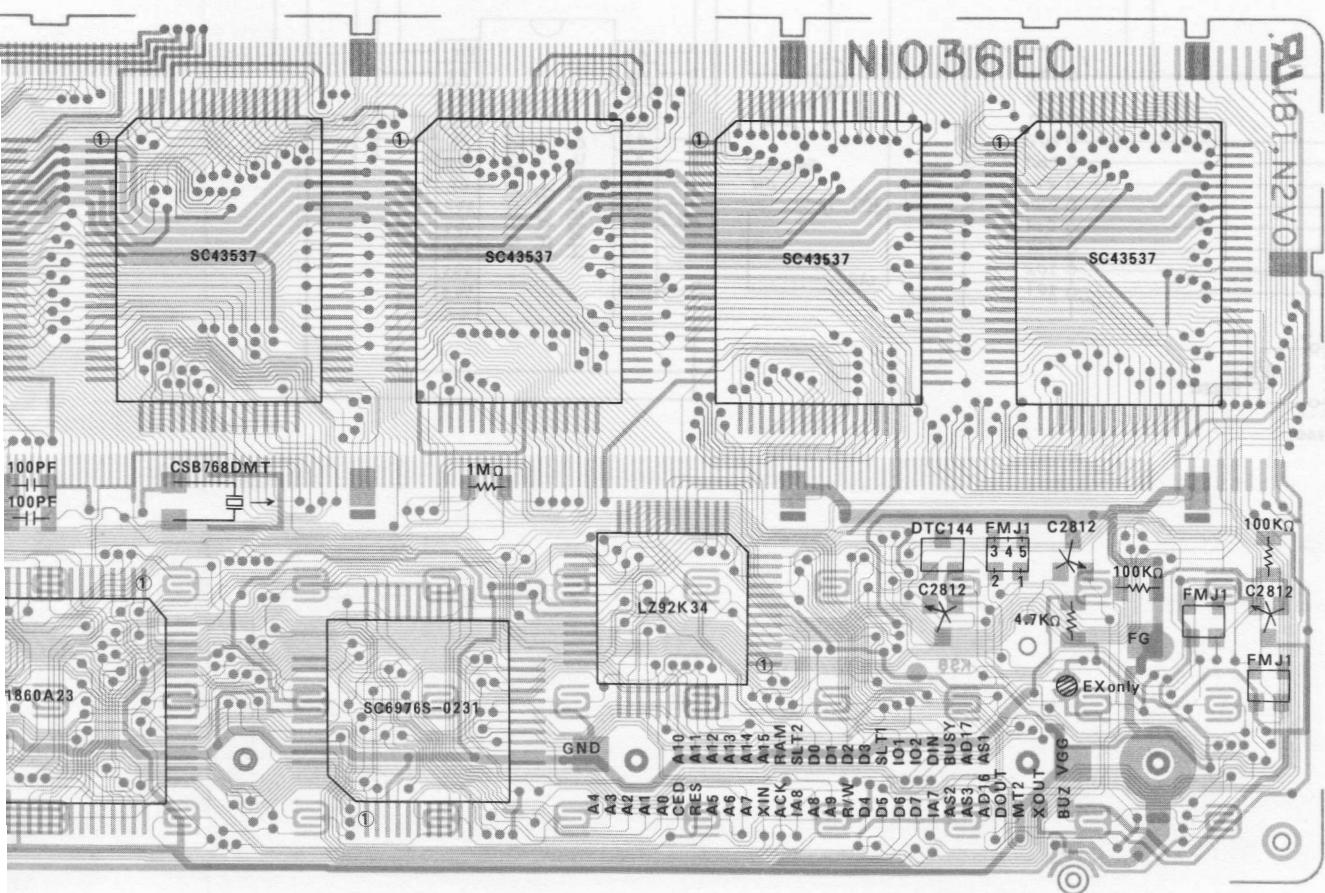
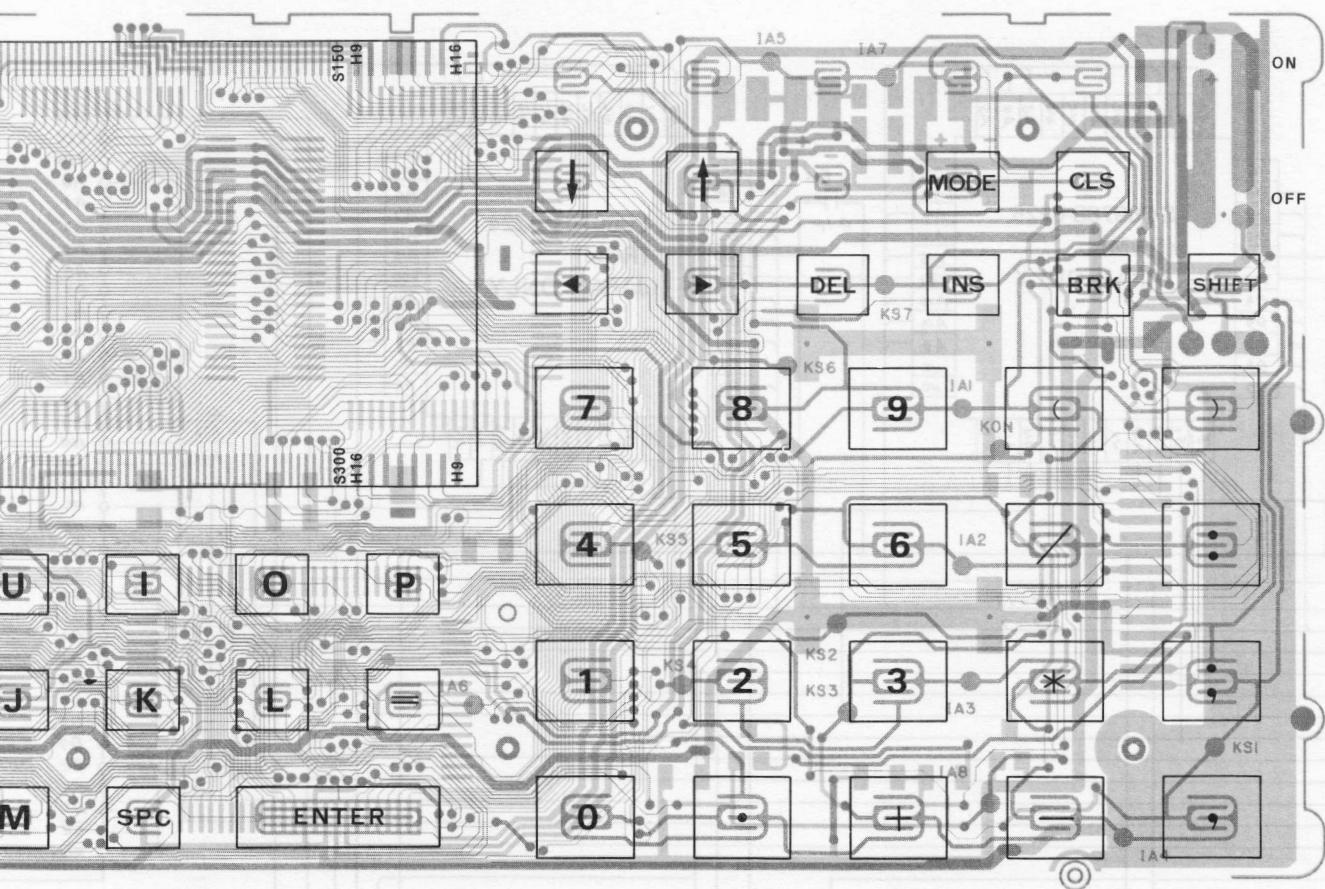


J1 CLOSE : Export type  
OPEN : JAPAN

## 12. PARTS AND SIGNALS POSITION

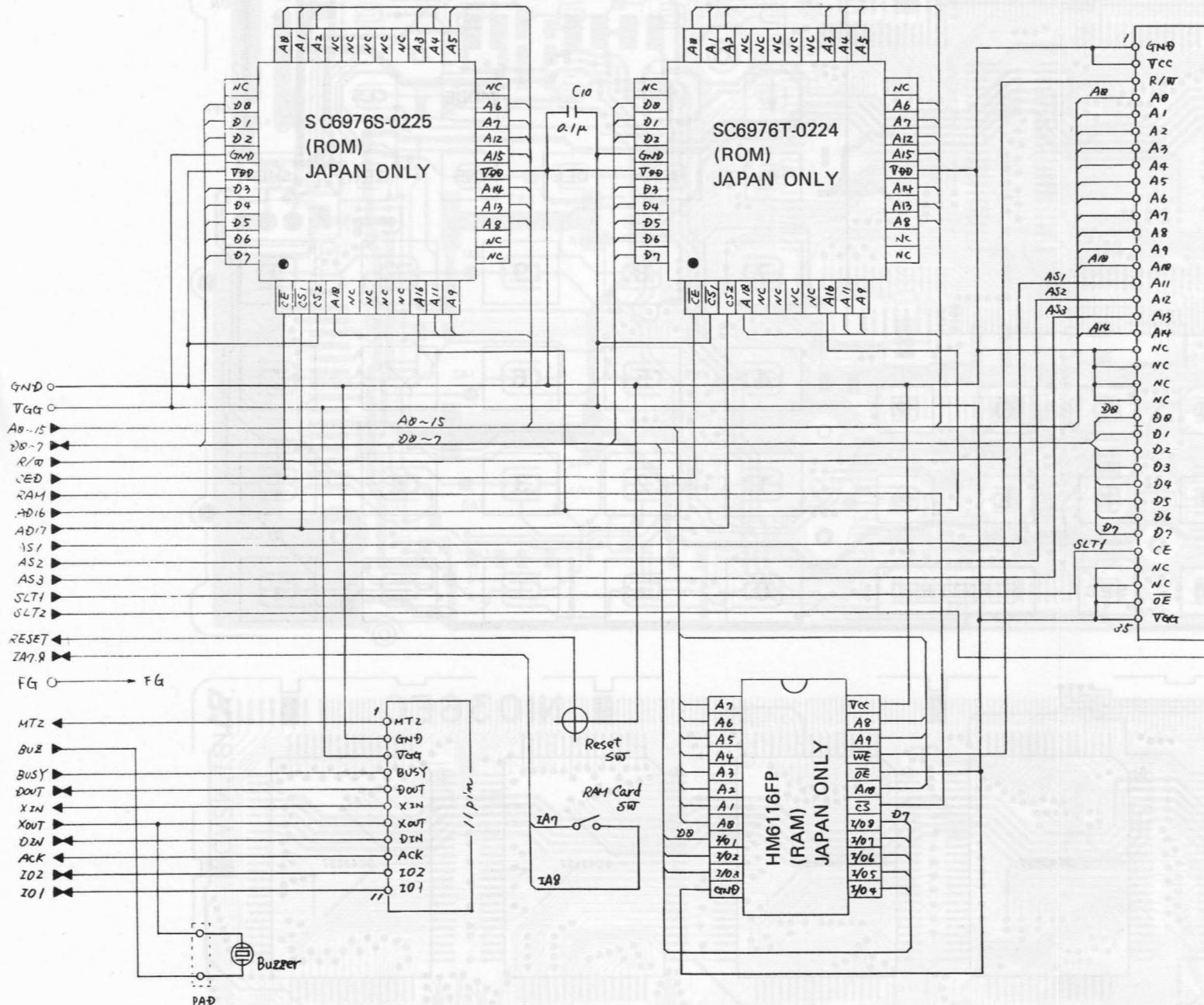


1. The parts must
2. CSB768DMT
3. 1μF and 3.3μF

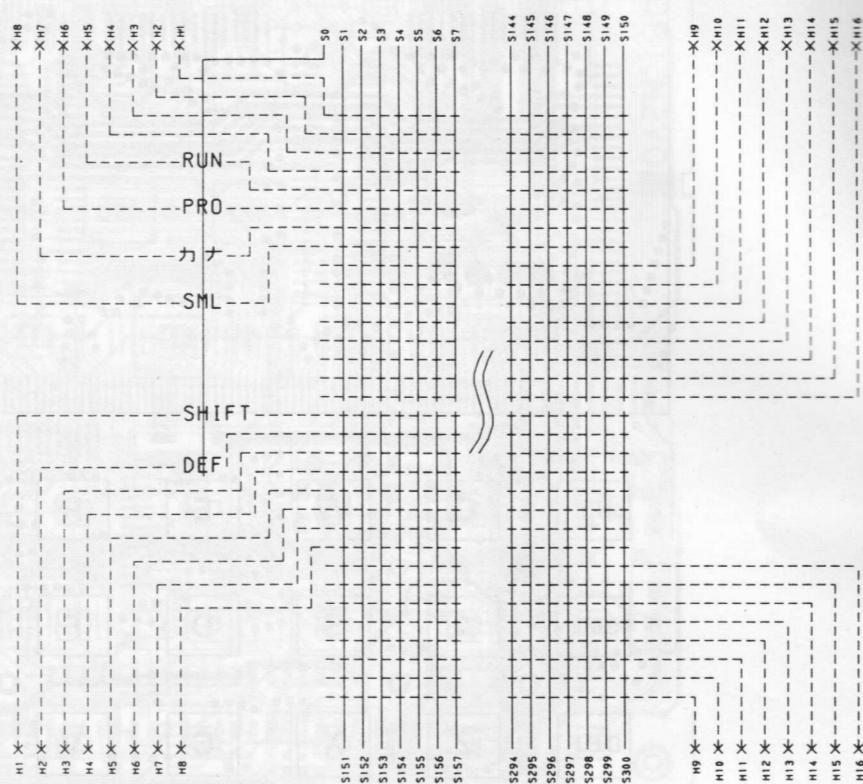
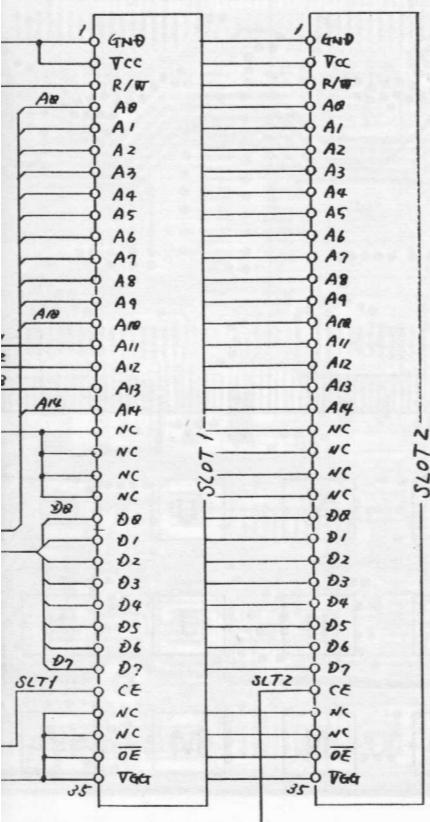


1. The parts must be installen as "↑" direction.
  2. CSB768DMT must be installen within .
  3.  $1\mu F$  and  $3.3\mu F$  capacitors must be installen within PWB.

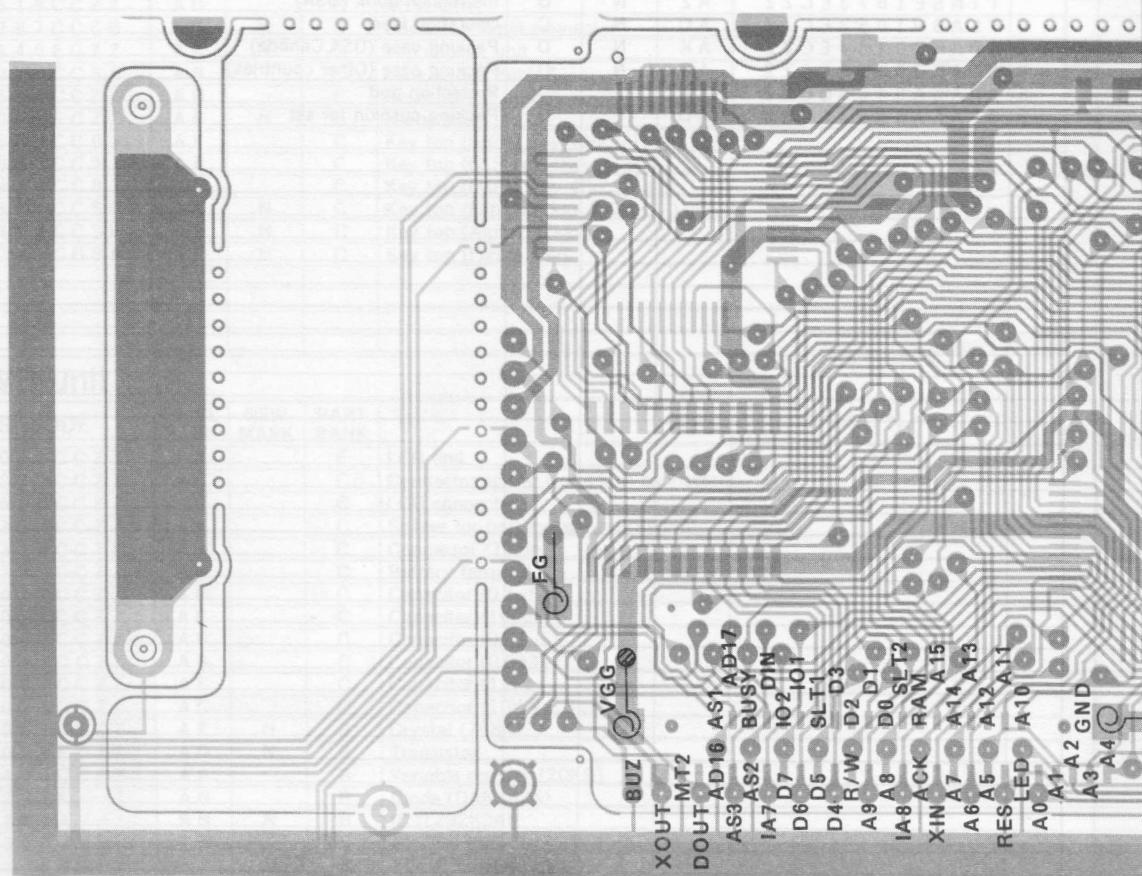
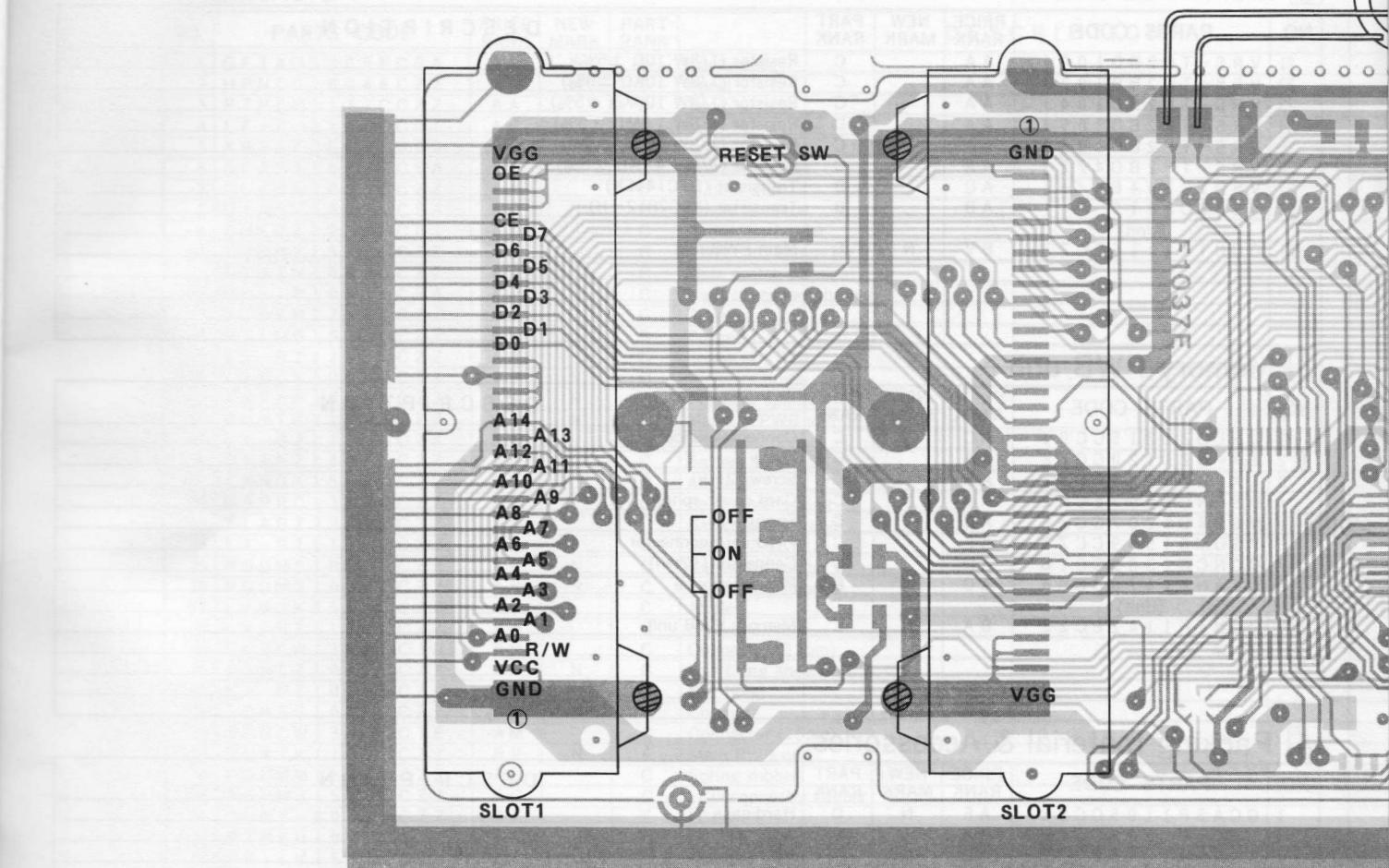
## Circuit Diagram (Memory PWB)

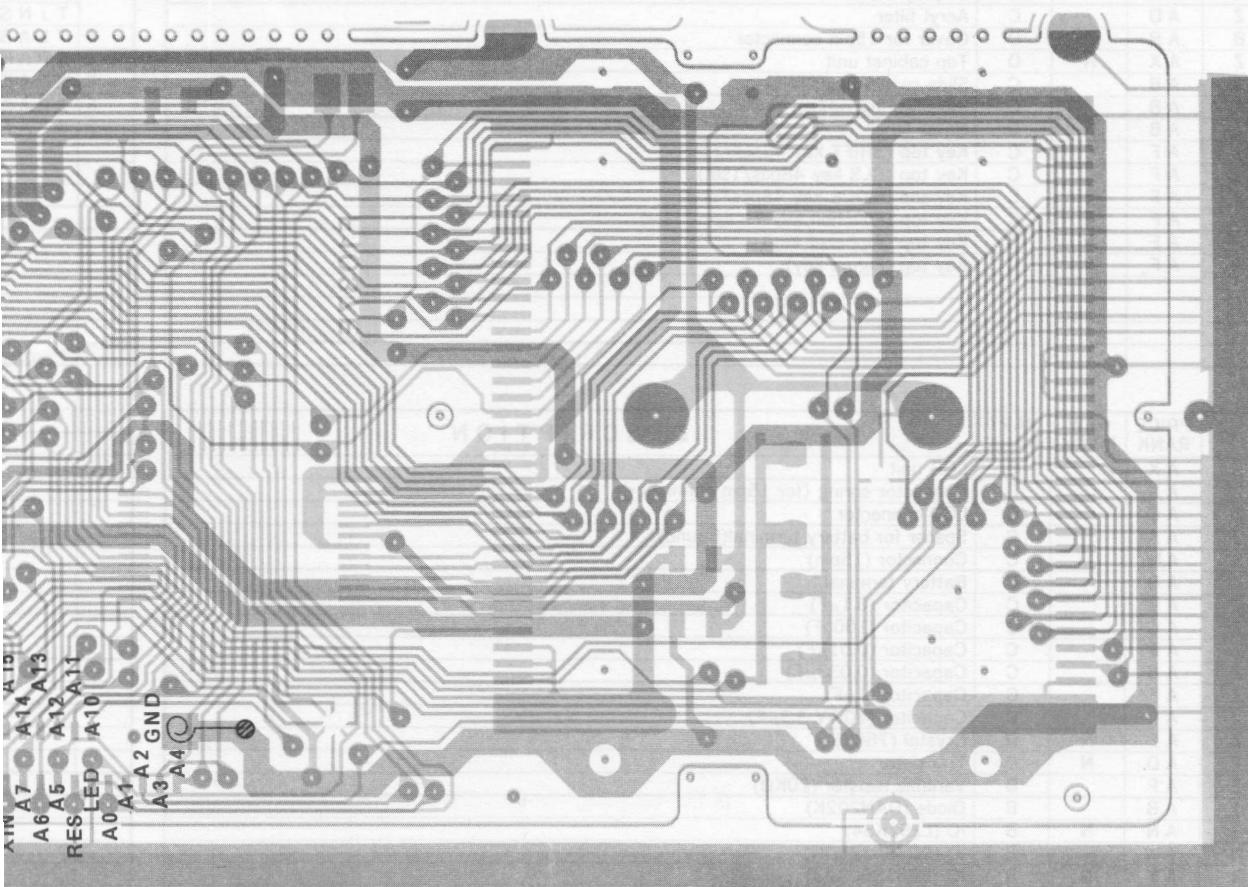
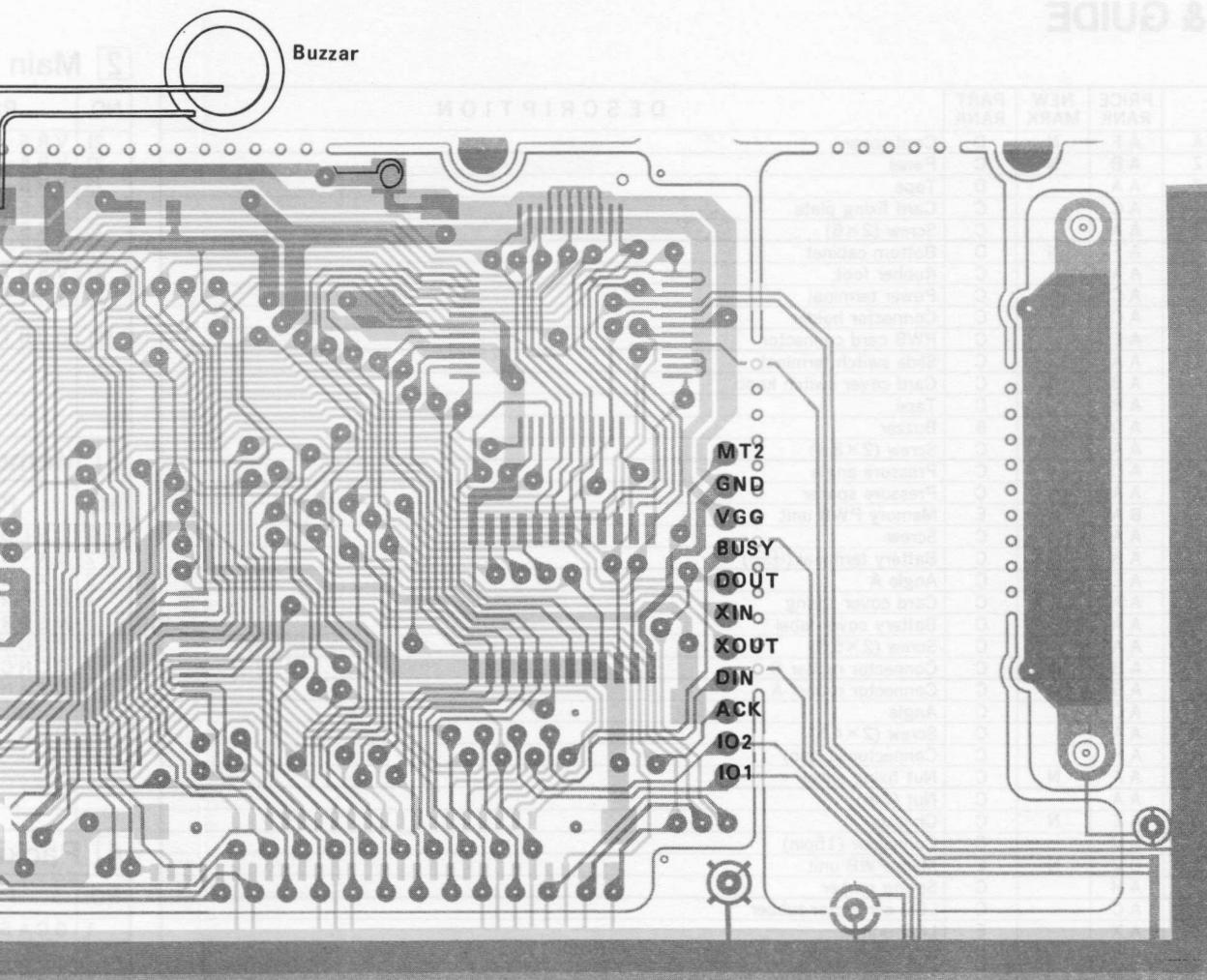


# LCD Matrix



## Memory PWB





# 13. PARTS LIST & GUIDE

## 1 Exteriors

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	GFTAU1006ECSA	A F	N	D	Card cover
2	HPNLC1004ECZZ	A B	N	C	Panel
3	PTPEH1137CCZZ	A A		D	Tape
4	LFI X-1190CC01	A C		C	Card fixing plate
5	XBB SF20P06000	A A		C	Screw (2×6)
6	GCABA1015ECSA	A F	N	D	Bottom cabinet
7	GLEGG1031CCZZ	A A		C	Rubber foot
8	QTANZ1478CCSA	A C	N	C	Power terminal
9	LHLDZ1215CC01	A C		C	Connector holder
10	PGUMS1549CCZZ	A E		C	PWB card connector
11	QCNTM1042CCZZ	A A		C	Slide switch terminal
12	MSLIP1001ECSA	A B	N	C	Card cover switch knob
13	PTPEH1213CCZZ	A B		C	Tape
14	RALMB1030CCZZ	A D		B	Buzzer
15	LX-BZ1163CCZZ	A A		C	Screw (2×8.8)
16	LANGK1008ECZZ	A C	N	C	Pressure angle
17	PSPAP1005ECZZ	A A	N	C	Pressure spacer
18	DUNT K1142ECZZ	B A	N	E	Memory PWB unit
19	LX-BZ1120CCZZ	A A		C	Screw
20	QTANZ1406CCZZ	A B		C	Battery terminal (+ -)
21	LANGK1558CCZZ	A E		C	Angle A
22	MSPRC13000CCZZ	A A		C	Card cover spring
23	T LABZ2240CCZZ	A A		C	Battery cover label
24	LX-BZ1184CCZZ	A A		C	Screw (2×5.5)
25	PGUMS1008ECZZ	A B	N	C	Connector rubber B
26	PGUMS1007ECZZ	A B	N	C	Connector rubber A
27	LANGK1566CCZZ	A C		C	Angle
28	LX-BZ1147CCZZ	A A		C	Screw (2×4.5)
29	QCNCW1385CC1B	A H		C	Connector (12pin)
30	PSHEZ1012ECZZ	A A	N	C	Nut fixing sheet
31	LX-NZ1010CCZZ	A A		C	Nut (2mm)
32	LCHSS1001ECZZ	A E	N	C	Chassis
33	QCNCW1368CC1E	A M		C	Connector (15pin)
34	DUNT K1116ECZZ	B V	N	E	Main PWB unit
35	PGUMM1548CCZZ	A H		C	Spring rubber
36	PGUMS1550CCZZ	A C		C	LCD connector rubber
37	DUNT-8038CCZZ	A X		E	LCD unit
38	PTPEH1039CCZZ	A A		C	LCD fixing tape
39	PFLV1545CCZZ	A E		C	Polarized filter
40	PSLDP1473CCZZ	A C		C	Display mask
41	PFLW1519CCZZ	A D		C	Acryl filter
42	GFTAA1287CCSB	A B	N	D	Cover for 15pin connector
43	DUNTG1140ECZZ	A X	N	D	Top cabinet unit
44	MSLIP1020CCSA	A B		C	Slide switch knob A
45	PGUMM1594CCZZ	A B		C	Reset spring rubber
46	T LABM1055ECZZ	A B	N	C	Name label
50	JKNBZ1909CC01	A F		C	Key top (SHIFT key 48pcs/1set)
51	JKNBZ1916CC01	A F		C	Key top (CLS key 48pcs/1set)
52	JKNBZ1874CC03	A F		C	Key top (MODE key 48pcs/1set)
53	JKNBZ1874CCSC	A F	N	C	Key top (Function key 7×4pcs/1set)
54	JKNBZ1873CCSH	A F	N	C	Key top (Alphabet key)
55	JKNBZ1715CCSA	A F	N	C	Key top (Figure key)

## 2 Main PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	DUNT-8038CCZZ	A X		E	LCD unit
2	MSPRC1277CCZZ	A A		C	Connector spring (for 15pin connector)
3	PGUMS1550CCZZ	A C		C	LCD connector
4	PZETL1313CCZZ	A A		C	Spacer for battery terminal(Round)
5	QCNCW1368CC1E	A M		C	Connector (15pin)
6	QTANZ1289CCZZ	A B		C	Battery terminal
7	RC-CZ1021CCZZ	A B		C	Capacitor (0.1μF)
8	RC-CZ1035CCZZ	A C		C	Capacitor (100pF)
9	RC-CZ1037CCZZ	A B		C	Capacitor (0.01μF)
10	RC-CZ1047CCZZ	A B		C	Capacitor (0.033μF)
11	RC-SZ1007CCZZ	A F		C	Capacitor (1μF)
12	RC-SZ1021CCZZ	A C		C	Capacitor (10WV 3.3μF)
13	RCRSZ1003ECZZ	A E	N	B	Crystal (768K)
14	RHT-Z1002ECZZ	A D	N	B	Transistor
15	RVR-Z2400QCCZZ	A F		B	Variable resistor (20KΩ)
16	VHDAN202K/-1	A B		B	Diode (DAN202K)
17	VHILZ92K34/-1	A N	N	B	IC (LZ92K34)
18	VHISC43537LDN	A W		B	IC (SC43537LDN)
19	VHISC61860A23	A Y	N	B	IC (SC61860A23)
20	VHISC69760231	A X	N	B	IC (SC69760231)

## 2 Main

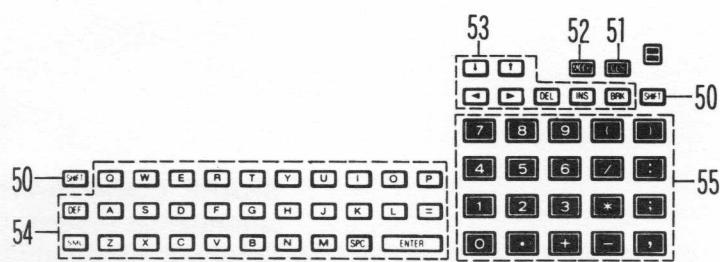
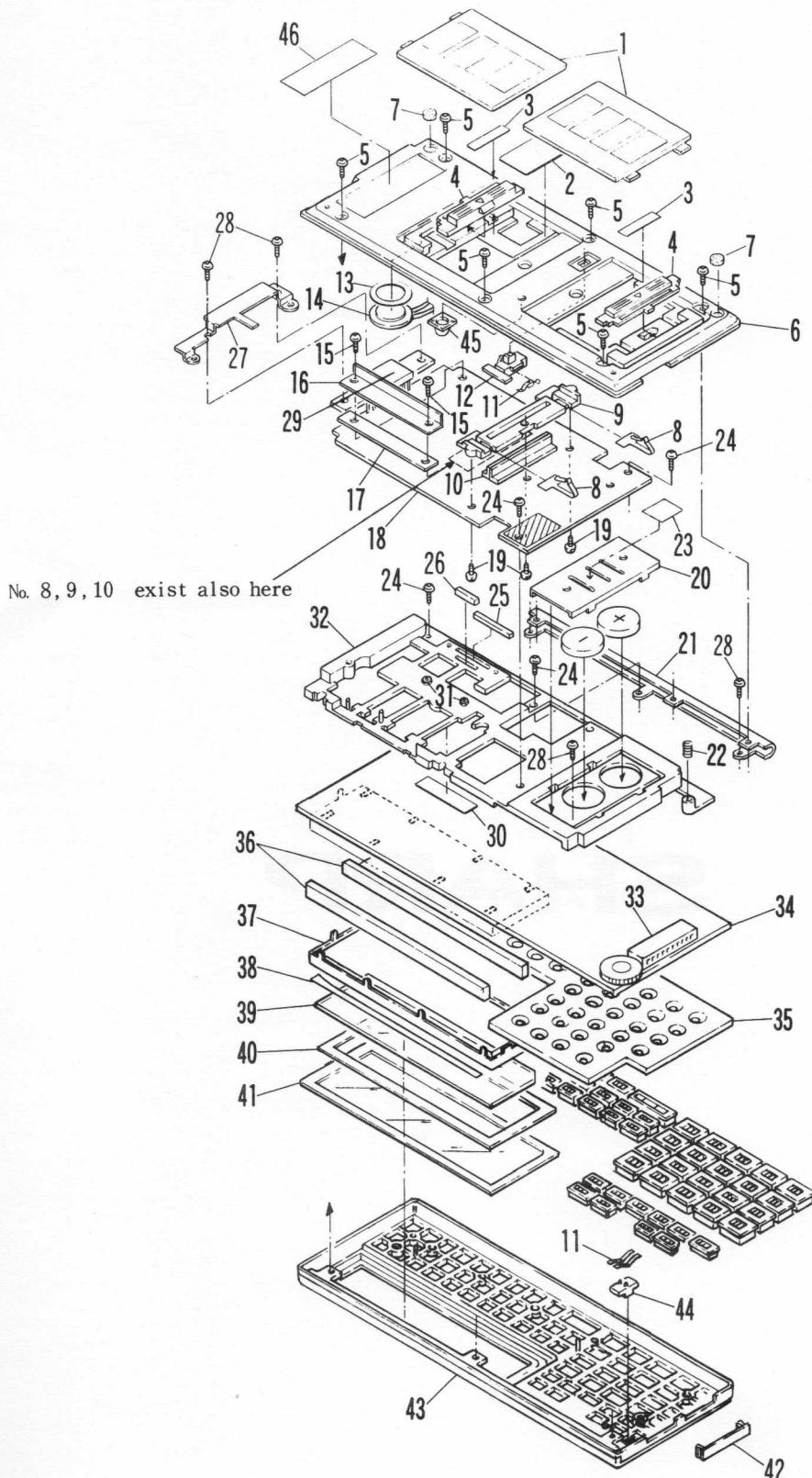
NO.	P
21	VRS-
22	VRS-
23	VRS-
24	VRS-
25	VRS-
26	VRS-
27	VS DT
28	VS 2 S
901	DUNT
1	LHLD
2	LX-B
3	LX-B
4	MSPR
5	MSPR
6	PGUM
7	QCNC
8	QTAN
901	DUNT
1	GCAS
2	LPLT
3	TINS
4	TLAB
5	SPA K
6	SPA K
7	SPA K

## 2 Main PWB unit

### 3 Memory PWB unit

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	L H L D Z 1 2 1 5 C C 0 1	A C		C	Connector holder
2	L X - B Z 1 1 2 0 C C Z Z	A A		C	Screw
3	L X - B Z 1 2 0 7 C C Z Z	A A		C	Screw (2×8)
4	M S P R C 1 0 0 7 E C Z Z	A B	N	C	Card cover spring
5	M S P R C 1 2 0 7 C C Z Z	A B		C	Spring
6	P G U M S 1 5 4 9 C C Z Z	A E		C	PWB card connector
7	Q C N C W 1 3 8 5 C C 1 B	A H		C	Connector (12pin)
8	Q T A N Z 1 4 7 8 C C S A (Unit)	A C	N	C	Power terminal
901	D U N T K 1 1 4 2 E C Z Z	B A	N	E	Memory PWB unit

## 4 Packing material & Accessories



# SHARP

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1986 August Printed in Japan ®