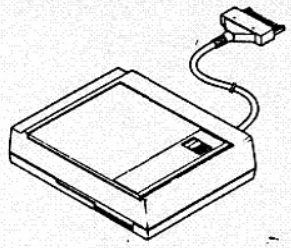
SHARP SERVICE MANUAL

CODE : 00ZCE140F/SME



MODEL CE-140F

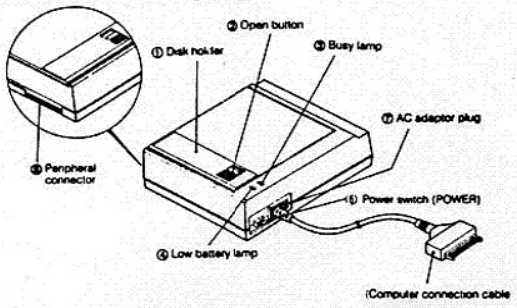
POCKET DISK DRIVE

1. SPECIFICATIONS

Model name:	CE-140F
Product name:	Pocket disk drive
Number of drives:	Single drive (single sided)/unit
Recording medium:	2.5-inch double-sided disk
Recording method:	GCR (4/5)
Number of tracks:	16 tracks/side (8 sectors/track, 512 bytes/sector)
Capacity:	64K bytes (single side) 128K bytes (double sides) The user area size (at formating) is 62464 Bytes (Single side).
Power source:	7.5V ... (DC) Dry cell, size AA (or R6) x 5 AC: AC adaptor (EA-160)
Power consumption:	2.5W
Cell life:	Approx. 60 minutes for manganic cell SUM-3(C). R6P Approx. 200 minutes for alkaline cell AM-3.LR6 (These values are obtained when a 4K-byte program is written and read continuously at a temperature of 20°C.) The life of the dry cell may be shorter than the above values because of natural discharge. In addition, it may vary slightly depending on environment and use.
Temperature:	10°C to 35°C (environmental conditions for drive operation)
Humidity:	20% to 80% (without condensation)
Dimension:	118(width) × 145 (depth) × 39 (height) mm
Weight:	Approx. 650g (including cells)
Accessory:	Pocket disk (1), dry cell (5), operation manual (1)
Option:	CE-1650F (ten disks) EA-160 (adaptor)

Note: A 2.5-inch (approx. 63.5mm) disk indicates that the diameter of the disk is 2.5 inches.

2. NOMENCLATURE



3. NOTE ON USE

Because the pocket disk drive is a precision instrument, use and store it observing the following points. Ignoring these precautions will result in the pocket disk drive being damaged.

① Do not turn the power on or off when a disk is in the pocket disk drive.
② Do not push the open button while the busy lamp is lit. Pushing this button may cause data to be deleted from the disk.
③ If the low battery lamp (red) lights during disk operation, turn off the power after completion of the operation, replace the dry cells, or connect the AC adaptor.
④ Connect the pocket disk drive as specified and use it in a safe, vibration-free place.
⑤ Connect or disconnect all devices, including the pocket disk drive, only after setting their power switches to OFF.
⑥ Do not jolt or put weight on the pocket disk drive. Especially, avoid putting heavy objects on the top cover of the disk drive.
⑦ Remove the disk and dry cells when the pocket disk drive is not to be used for a long time.

4. NOTES

• Data compatibility

Data may not be read because of data incompatibility between the PC-1360 and PC-1460, PC-1403 or PC-1425, as shown below.

1. ASCII files (programs saved by SAVE "file name", A) can be used by all machines.
2. Data files can be used by all machines.
3. Intermediate files (binary files saved by SAVE "file name") can be used by both the PC-1460, PC-1403 and PC-1425, but not by the PC-1360 (ERROR 9).

• When two disks are being used for COPY command execution, if the [BRK] key is pressed to interrupt the execution, turn off the power of the pocket disk drive, and turn it on again after five seconds.
• Check whether the disk has been write-inhibited before using it.

5. INSTRUCTIONS FOR CE-140F

CHAIN	INIT	MERGE
CLOSE	KILL	NAME
COPY	LFILES	OPEN
DSKF	LOAD	PRINT#
EOF	SAVE	SET
FILES	LOC	
INPUT#	LOF	

6. CIRCUIT DESCRIPTION

6-1. General description

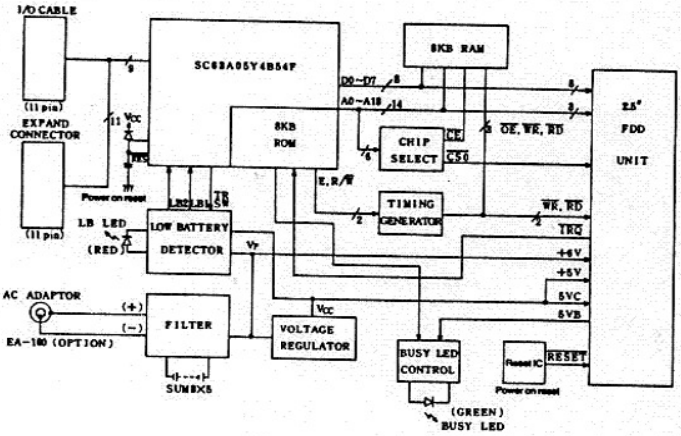
The CE140F is an external disk drive unit designed for use with general purpose pocket computer. It uses a 2.5" pocket disk drive which has memory size of 64KB per one side of disk when formatted. It enhances accessing of data and program stored in any location of the disk memory because its access speed is faster than cassette recorder (about 1700 bits/sec, with the ESR-H CPU in use) and files on the disk are software managed.

The 11-pin general purpose I/O is used for interfacing with pocket computer and data transfer is handshaked and carried out in the 4 bits × 2 parallel mode.

The CE140F incorporates an 11-pin I/O connector to be connected with the CE126P printer and CE124 cassette deck interface.

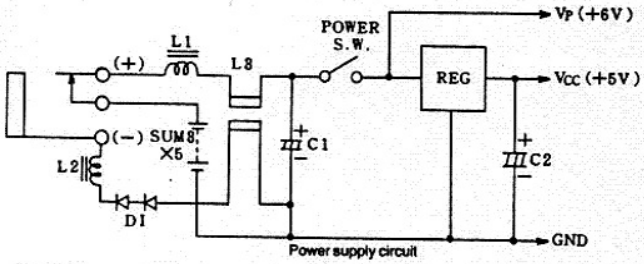
Two modes of power supplies are enabled; from 5 × SUM3 dry battery cells or via the EA160 AC adapter option. With dry battery in use, the CE140F will continue to operate for a period of about one hour.

6-2. Block diagram



6-3. Circuit description

1) Power supply



Power supply circuit

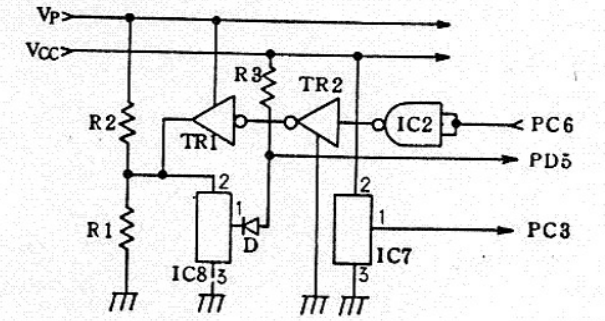
① AC supply from the AC adapter first goes through coils L1 and L2, then the filter coil L3 and the 200μF capacitor C1, to be added to the power switch line VP. A diode inserted to the negative side of the adapter is employed to drop the voltage (8.5V) from the adapter by 1.5V. However, this voltage drop may be affected the load current.

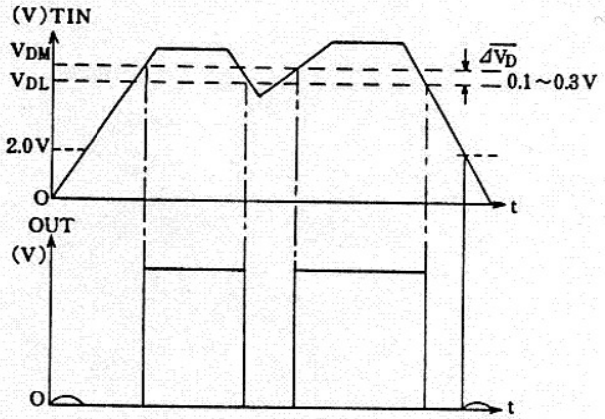
② Power supply from the battery is first connected to the AC adapter switch to be used as VP. No diode is used in this circuitry to make full utilization of battery supply. When fresh battery cells are used, it may be about 8V without load and about 7V during operation.

③ The voltage VP is added to the FDD motor drive line (+6V) through the power switch. The internal logic operating VCC (5V)is more stable than VP as it is regulated in the voltage regulator (SI3052V). For the voltage regulator is of a low saturation type having a voltage difference of less than 0.3V between in and out, better utilization of the battery power supply. But, if VP≒ 5V, more voltage regulator power consumption is evoked so that VCC ≒ VP is established (3~4mA normal → 50mA or more).

The 220μF capacitor at the output is provided for prevention of oscillation, as well as absorbing ripple.

2) Low battery detect circuit





Voltage detect IC functional description

IC7 is used to monitor the VCC line and IC8 the VP line. For the VP line, two-level detection (caution and fatal levels) is implemented by resistor division and a single level detection (fatal level) for the VCC line. The caution level is to alarm the operator with the low battery LED indication that battery supply level is low now, but the operator can continue to operate the machine. In the case of the fatal level, the operator is alerted with the low battery LED indication that it is no more possible to operate the machine because of a low battery situation.

I) IC8 function

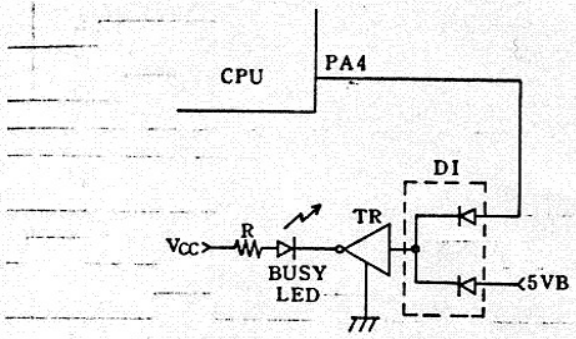
As shown in the above figure, the output from the voltage detect IC turns from low to high when the input voltage VIN changes above the detect voltage level VD. On the other hand, when VIN goes below VD, the output turn from high to low state. So, the supply voltage is monitored in this manner. IC7 is employed to monitor the VP level. Because two levels of caution and fatal are detected by a single IC, the voltage added to input (pin 2) is divided by R1 and R2 and that R2 is turned on or off using TR1. TR2 in this circuit is used to prevent invading IC when VP is higher than VCC and to drive TR1. The detect voltage level is about 5.1V when TR1 is off and about 4.6V when TR2 is on, provided that the detect IC has a tolerance of ±0.15V.

This IC is used to check voltage level during read and write.

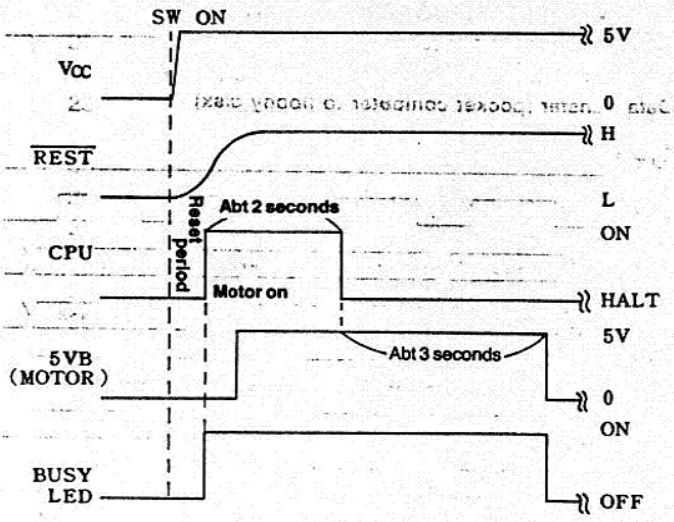
II) IC7 function

IC7 is used to monitor the VCC level which is engaged to check for only the fatal level (V_D = about 4.2V). It monitors the VCC level when the motor is operating (about 500ms) or when seek is conducted. For IC7 and IC8 operate independently to detect a low battery condition according to the operating mode.

3) Busy lamp control



Busy lamp control circuit

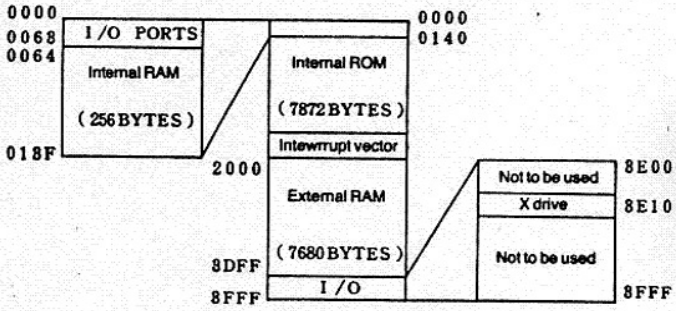


Timings after power on

The busy indicator comes active when the CPU or the FDD is in action. The PA4 signal from the CPU is used to prevent intrusion of an unwanted signal through the expansion 11-pin DIN line when the CE140F is in operation. The signal is at a high level when the CPU is in action. The 5VB line is an output voltage which is in synchronization with the FDD on signal which is kept at a high level when the motor is in action. These two signals are ORed with diodes to prevent signal intrusion and used to drive the base of TR. In order to discuss this operation, initialization timings upon power on are shown in the figure above. Upon rising of VCC after power on, REST comes to rise with a delay and the power-on-reset is applied to the CPU. After the reset has been completed, the CPU starts to operate and the motor on signal is sent to the FDD. The CPU finishes its initialization within two seconds and the motor off command is sent. Then, the CPU goes into the halt state. The FDD that received the motor off command keeps the motor running for three seconds by the internal timer, in order to avoid an unwanted motor on and off wait time (0.5 sec) against a short accessing.

4) Chip select circuit

The CPU internal ROM, external RAM, and memory mapped I/O are assigned to address, 0000H~3FFFH, and the chip select signal is decoded and derived from the address signal to select the external RAM (8KB) and I/O port.



Memory map

Address	Read	Write
3E10	Status register-1	Command register
11	Sector register	←
12	Status register-2	Interrupt register
13	Data register	←
15	Track register	←
3E16~3E1F	–	–

I/O map

5) Timing generation circuit

External RAM $\overline{OE}$, R/W, and FDD $\overline{RD}$ and $\overline{WR}$ signals are created from the CPU clock E and R/$\overline{W}$ signal.

6) 11-pin connector signal interfacing circuit

For the CE140F, the 11-pin general purpose pocket computer I/O is used to conduct 4-bit parallel data transfer in the handhshake mode. The CPU has PD1 to PD4 for input only and PB0 to PB3 for output only. An 8-bit data is divided into four bits each and transferred in two periods of LSB and MSB. The diode inserted to the data line is for prevention of signal intrusion. To transfer signal transfer from the CPU to the data line, a high level of signal is issued by pulling the base of the resistor incorporated transistor to GND level.

6-4. Protocol

In order to put the CE140F into action from the pocket computer, connection must be confirmed first using the device code and data transfer is carried out by receiving the protocol which represents the command code, checksum, and data.

1) Device code transfer

A specific device code is issued to all devices but to choose only one device required (printer or floppy disk).

o Device code sending protocol

First, the pocket computer issues a high state of signal on XOUT and DOUT lines for more than 40ms. (The reason why DOUT is turned high is to discriminate a high state of XOUT and low state of DOUT when beep or cassette I/O is done.)

As soon as device recognizes, a high state of ACK is issued. For ACK lines are wired OR one another, a high on the ACK line from any device causes the pocket computer ACK line to turn high level.

Upon the pocket computer recognizes a high state of signal on ACK, the pocket computer sends out on the DOUT line the device code bit by bit from LSB through MSB. Each time a bit was sent, the pocket computer sets BUSY high. Device receives DOUT after recognizing a high state of BUSY and ACK is set. BUSY is set low by the pocket computer after recognizing a low state of ACK to complete a single bit data output. After device finishes data reception, ACK is set high again to inform the pocket computer that it is ready to receive a next data. So, the pocket computer sends out a next one bit on DOUT in response to a high state of ACK and BUSY is set high again. In this manner, an 8-bit device code is sent to devices. If ACK were not set high within 5ms after BUSY turned high, the pocket computer assumes it to be an error.

If the desired device exists, the ACK line is forced high in 5ms after a high to low transition of BUSY upon confirming a low on XOUT and BUSY. So, the pocket computer recognizes connection with the device.

2) Data transfer

BUSY and ACK are used for strobe and input signal for handshaking. One byte of data is transferred in two units of four bits each in the parallel transmit mode.

XOUT is at a low in the data transfer mode.

Pin name	First handshake	Second handshake
Din	bit3	bit7
Dout	bit2	bit6
IO2	bit1	bit5
IO1	bit0	bit4

Transfer data

o Data transmit protocol (pocket computer to FDD)

The pocket computer sets low order four bits of one byte data on DIN, DOUT, IO2 and IO1. Then, BUSY is forced high.

On the FDD side, ACK is forced low after confirming a low state of BUSY to finish the first handshaking. As the second handshaking is done in the same manner, transfer of one byte data is completed.

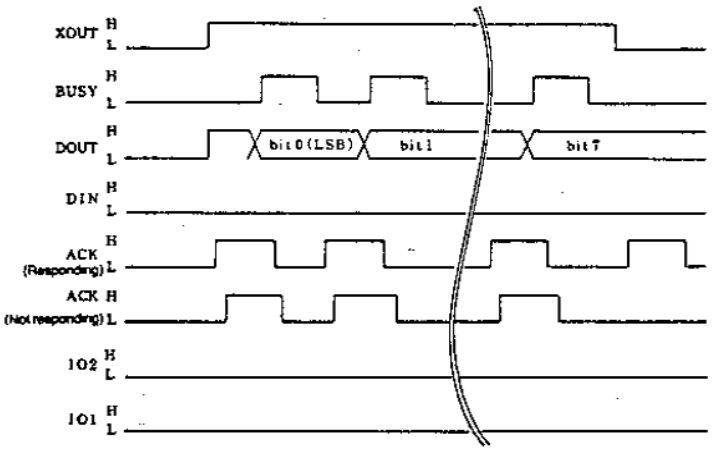
o Data receive protocol (FDD to pocket computer)

If ACK is high for the FDD is in process,ACK is set low for more than 10ms before data are transferred from the FDD after completion of its processing.

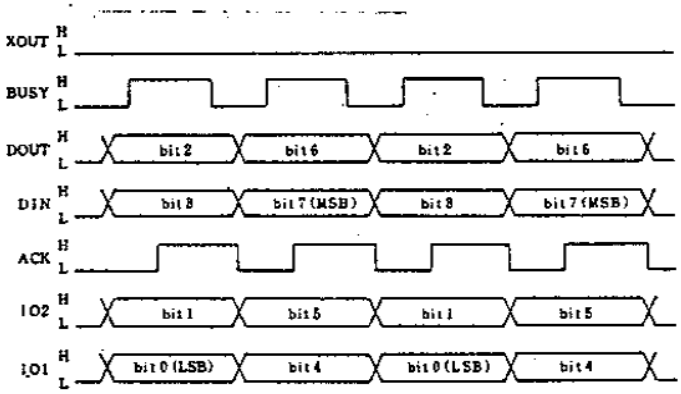
The FDD set ACK high after setting data on DIN, DOUT, IO2, and IO1. However, the data must be sent out in 50ms after ACK turned low.

After recognizing a high state of ACK, the pocket computer receives a 4-bit data, then BUSY is set low. After the FDD confirms a high state of BUSY, ACK is set low. After the pocket computer confirms a low state of ACK, BUSY is forced low to terminate the first handshaking. A single byte data is received by repeating this procedure.

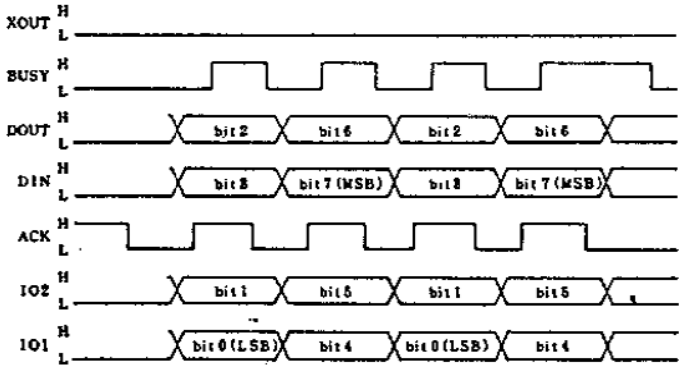
Device code transfer



Data transfer (pocket computer to floppy disk)



Data transfer (floppy disk to pocket computer)



7. CPU pin description

The SC63AO5Y 8-bit single chip microcomputer (fast version of SC6305Y1) is used.

Pin No.	Pin name	In/Out	Signal description
1	TIMER	In	Fixed to GND = 0V.
2	PA7	In	XOUT input, pulled down to GND level with a 220KΩ.
3	PA6	In	BUSY input, pulled down to GND level with a 220kΩ. } Handshaking Signal
4	PA5	Out	ACK output
5	PA4	Out	DIN CUT, high during CPU operation.
6	PA3~PA0	In	Fixed to GND = 0V
13	PB7~PB4		
14	PB3	Out	DIN output
15	PB2	Out	DOUT output } 4-bit data output
16	PB1	Out	IO2 output
17	PB0	Out	IO1 output
18	PC7	In	Pulled up to Vcc with a 220kΩ
19	PC6	Out	Variable low battery level output.
20	PC5	Out	Low battery indicator control output
21	PC4	Out	Not used.
22	PC3	In	Low battery detect input (Vcc line)
23	PC2	Out	Not used.
25	PC0		
26	Vcc	Supply power	4~5.5V
27	PD1	In	IO1 input
28	PD2	In	IO2 input } 4-bit data input
29	PD3	In	DOUT input
30	PD4	In	DIN input
31	PD5	In	Low battery input (VP line)
32	$\overline{INT2}$	In	External interrupt, active low
33	PD7	In	FDD command termination signal
34	A0	Out	Address signal
47	A13		
48	R/$\overline{W}$	Out	Read/write, high: read, low: write.
49	E	Out	Write enable (WE)
50	D7	In/Out	Data bus
57	D0		
58	Vs	Supply power	0V = GND
59	$\overline{RES}$	In	Pwer on reset input
60	$\overline{INT}$	In	Fixed to Vcc (high)
61	$\overline{STBY}$	In	Fixed to Vcc (high)
62	XTAL	In	6MHz oscillator input
63	EXTAL	In	6MHz oscillator input
64	NUM	In	Fixed to Vcc (high)

8. TROUBLESHOOTING

Trouble phenomenon	Cause	Action
1. Open/close button does not move smoothly (does not return to front).	Improper top cover installation	Loosen the top cover holding screw and tighten it again.
2. The busy indicator does not come active after the power switch is turned on.	1. Failure in the power supply circuitry 2. Failure in the reset circuitry 3. Failure in the CPU	1. Check the Vcc level if 5V ± 0.1V. If the voltage (Vcc) across pins 1 and 2 of the SI3052V was not proper, check it across pins 1 and 3 of the SI3052V. If the AC adapter is in connection, check that it is about 7V before standby. If the level is below the predetermined level or no level is found, check the adaplter jack, coil, diode, switch continuity, short or open circuit in printed pattern. If VP is tested correct, check the Vcc line (current). 2. If the CPU pin 59 ($\overline{RES}$) is at a low level, check the 3.3μF capacitor or short in the circuit. 3. Replace the CPU.
3. The busy indicator comes active after the power switch is turned on, but goes out soon (about 2 seconds).	Failure in the external bus, chip select, $\overline{RD}$, or $\overline{WR}$ signal line. (Clock supply stops in the same timing as the indicator.)	Check level of each signal.
4. The busy indicator remains active after the power switch is turned on.	Short or open signal line around the CPU. (Clock remains oscillating.)	Check for signal interference and level.
5. The busy indicator does not come active after operating the pocket computer and ERROR8 is evoked.	Failure in the 11-pin interface connector. (Short or open circuit around the 11-pin connector.	1. If ERROR8 were to occur immediately, check the device code transmission and reception lines if properly transmitted and received. 2. If ERROR8 were to occur with a delay of 5 to 6 seconds, check the ACK and BUSY lines.
6. The busy indicator comes active, but ERROR8 is evoked.	Failure between the CPU and the FDD.	1. Check for short and open circuit around the 25-pin connector. 2. Replace the 2.5" FDD with the new one and check it, as it might be a failure in the FDD. 3. Replace the floppy disk with a new one and check it, as it might be failure in the floppy disk. 4. Replace the RAM chip with the new one and check it, as it might be a failure in the RAM chip. 5. Replace the CPU with the new one and check it, as it might be a failure in the CPU.
7. Correct display indication does not appear when FILES is executed (No error occurs.)	1. Failure in the RAM chip. 2. Improper display indication for the floppy disk	1. Check for a solder interference across leads, esparation, and overheat. If a failure was found, it must be replaced with the new one. 2. Initialize the floppy disk again.
8. The low battery indicator remains active. (At normal voltage)	1. If operation takes place, there may be a failure in the circuit around the low battery detect IC or LED lead. 2. If operation does not take place, there may be a failure in the low battery detect IC or low battery signal line.	1. Check the IC6 voltage dividing resistance and the resistor incorporated transistor. Check for IC overhead. Check for a short circuit around lead. 2. Replace the IC or check the signal line.
9. Display does not start in the given period (or does not appear) after the pocket computer switch was turned on (or off).	Failure in the 11-pin connector ACK line, However, the display may not go out within 5 to 6 seconds when the pocket computer power switch is turned off, if the CE140F is still in action with the busy indicator on.	Check signal level. Check for a short line or signal intrusion around the 11-pin connector signal lines of the interface board.

9. HINTS AND TIPS

①The bushing for the 11-pin cable must be fixed with a white mark faced up.

②The soldered portion of the battery positive terminal must be bend 15 degrees, at most.

10. OPERATIONAL TESTS

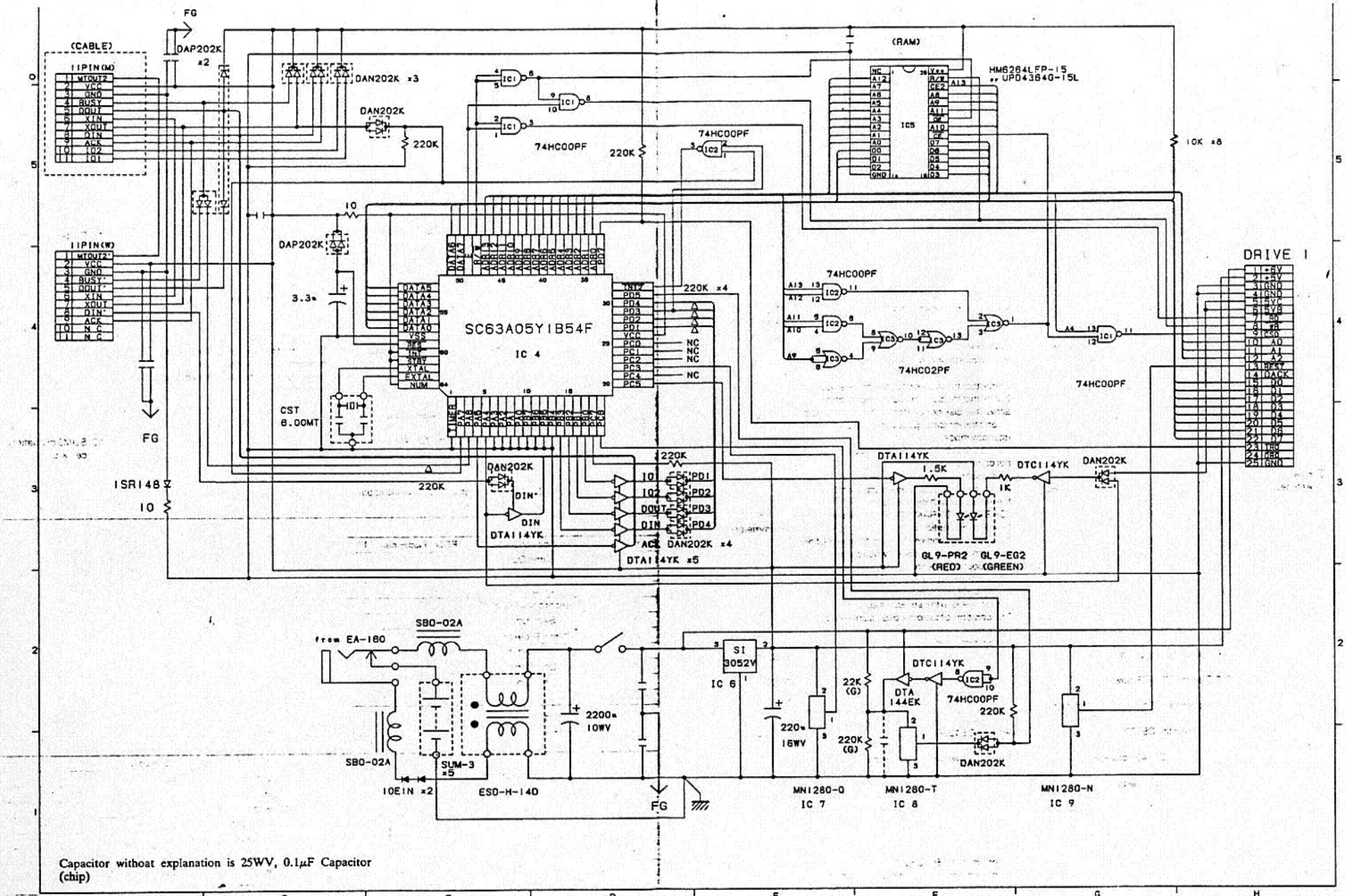
◎ Tools required
- CE140F to be tested
- PC1360 + CE212M (OR CE2H16M, 2H32M)
- EA160
- Formatted blank floppy disk
- Test program containing floppy disk (UKOGC3025CSZZ, PRICE RANK: BD)
- DC power supply
- SUM3 dry battery cell × 5

Command only valued with 1360K = Kanji version in Japan

◎ Before start of test
Connect the program loading CE140F and the PC1360. Turn power on for the both units. Check that they are in the RUN mode. Then, type "WIDTH24.4 [ENTER]" and "LOAD"X:CE-140F.BAS" [ENTER]". After confirming that program loading has been complete, turn power off for the both units and unfasten the 11-pin connector. Now, check the CE140F to be tested in the following manner:

Test flow	Action	Check item	Tool use
▽	1. Insert the blank floppy disk	○ the open/close button must be operated floppy disk is inserted. ○ Close the cover and see that the button is at the LOCK position or returned all the way to front.	1. Blank floppy formatted. EA160 AC adapter
	2. Insert the AC adapter	○ Make sure after insertion that it has inserted deep without any play.	3. PC1360 with RAM card of than 8KB ar
	3. Fasten the 11-pin cable connector with the PC1360.	○ Check that the 11-pin cable connector frame ground can be inserted smoothly in the PC1360.	
○ Initialization	4. Turn power on.	○ Check that the slide switch can move smoothly. ○ Check that the busy indicator (green) comes active, the disk head restores (returning to track 0), and the indicator goes out in five seconds (standby mode). ○ Make sure that the low battery indicator does not come active.	
○ Read/ write test	5. Turn power on the PC1360 and type "[DEF] [A]".	• No message is displayed on the PC1360, but the busy indicator comes active and the test starts with the message "CHECK PROGRAM START" on display. ○ Power consumption test 1) During read and write, 200 to 230mA will flow, except during head seek when current of about 350mA flows. 2) During standby, 3.5 to 4mA will flow. The busy indicator is not active when the machine is in the standby mode. ○ The contents of the error code displayed at the test termination must be "00" in one byte of hexadecimal representation.	(5. ammeter)
	6. Remove the floppy disk.		6. CE-126p
	7. Turn the CE140F power off.		7. CE-152
	8. Fasten the CE140F 11-pin expansion		
	9. Connect the CE152	with the CE126P	
	10. Turn the CE140F power on.	The action similar to 4. above must take place.	
	11. Turn the CE126P power on.		
	12. Turn on the CE126P remove switch and set the cassette tape recorded in the recording mode.		
○ 11-pin connector signal tests	13. Type "[DEF] [B]".	○ Check that "11-Pin CHECK START!" is displayed with the busy indicator in activation. ○ Check that "555..." is printed on the printer. ○ Check that the cassette tape recorder goes into action.	

11. CIRCULT DIAGRAM



Capacitor without explanation is 25WV, 0.1μF Capacitor (chip)

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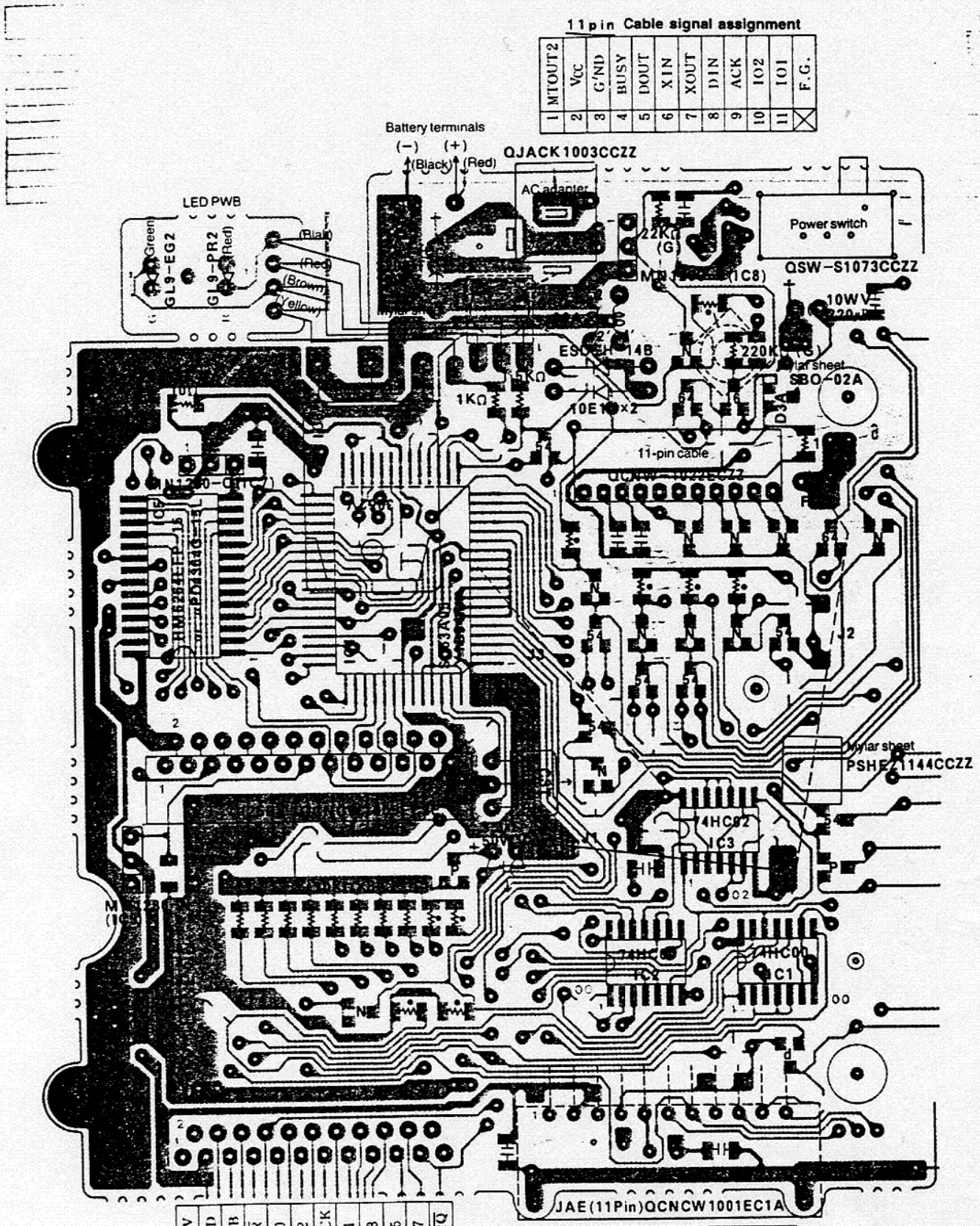
12. PARTS SIGNAL LAYOUT



11pin Cable signal assignment

1	MTOUT2	2	Vcc	3	GND	4	BUSY	5	DOUT	6	XIN
7	XOUT	8	DIN	9	ACK	10	IO2	11	IO1		F.G.

1	+6V	3	GND	5	5VC	7	$\overline{RD}$	9	$\overline{CS0}$	11	A1	13	$\overline{REST}$
15	D0	17	D2	19	D4	21	D6	23	$\overline{IRQ}$	25	GND		

25pin Female connector signal assignment

2	+5V	4	GND	6	5VB	8	$\overline{WR}$	10	A0	12	A2	14	DACK
16	D1	18	D3	20	D5	22	D7	24	$\overline{DRQ}$				

1	MTOUT2	2	Vcc	3	GND	4	BUSY	5	DOUT	6	XIN
7	XOUT	8	DIN	9	ACK	10	N.C.	11	N.C.		

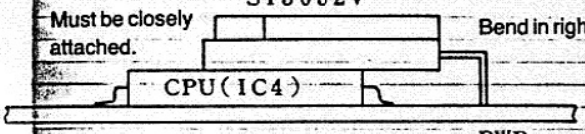
11pin Female connector signal assignment

Notes:

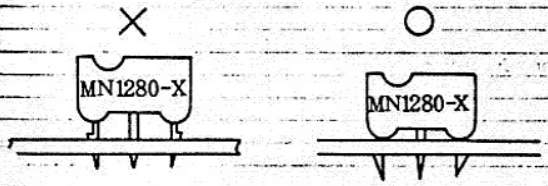
1. Symbols used in the MM package have the following significance.

Symbol	Parts name	Type
T6	DTA14EK	Resistor incorporated transistor (PNP)
54	DTA114YK	Resistor incorporated transistor (PNP)
54	DTC114YK	Resistor incorporated transistor (NPN)
D3A	1SR148	SCHOTTKY diode
P	DAP202K	Diode (anode common)
N	DAN202K	Diode (cathode common)

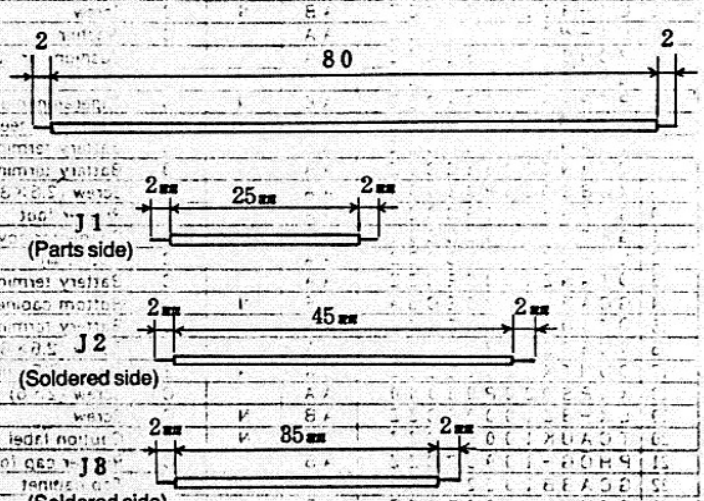
2. Unless otherwise specified, capacitor C (chip C) is 0.1μF, 25WV (104z).
3. ess otherwise specified, chip R (⌁) is 220KΩ ±5% (224J).
4. SI3052V (IC6, voltage regulator IC) must be closely attached on the surface of the CPU (IC4) and soldered.



5. MN1280-X (IC7~9, voltage detect IC) must be inserted so that their molded body should be closely attached to the PWB and soldered.



6. Parts noted with → mark must be tilted in the arrow direction and closely attached to the PWB.
7. Electrolytic capacitors 2200μF and 220μF must be osely attached to the board and soldered.
8. Excessive portion of pins of diodes, IC1~9, connectors, electrolytic capacitors, capacitor incorporated crystal (CST), and coils must be cut shorter than 2mm.
9. The length of leads (black, red, yellow, and brown) connecting the LED PWB with the main PWB must be as follows:



10. Coils L1, L2: PCILZ1032CCZZ
    Mylar sheet: PSHEZ1144CCZZ

3 Packing material & Accessories

NO.	PARTS CODE	PRICE RANK	NEW MARK	PART RANK	DESCRIPTION
1	TCAUZ1004ECZZ	AB		C	Caution card
2	TiNSL1114ECZZ	AN	N	D	Instruction book (E,F,G)
3	SPAKA0124ECZZ	AC		D	Packing cushion for media
4	SPAKA0251ECZZ	AL	N	D	Packing cushion
5	SPAKA0252ECZZ	AK	N	D	Packing cushion
6	SPAKC0258ECZZ	AP	N	D	Packing case