1.1 GENERAL

The Toshiba T1000SE is one of the lightest portable computers available offering high technology, high speed, excellent legibility, IBM PC XT compatibility and battery machine.
The T1000SE is so small it defines a new class of portables called notebook computers.
The T1000SE's operating system is used the MS-DOS version 3.30 and a powerful 80C86-2 microprocessor which has 16-bit data width on the data bus line. The memory capacity is one Mbyte as standard. The system can be added 1- or 2-Mbyte memory card, thus the system can be had up to 3 Mbytes of RAM. The T1000SE stores version 3.30 of the MS-DOS operating system and related programs in read only memory (ROM). The internal 3.5-inch floppy disk drive (FDD) supports 1.44-Mbyte double-sided, high-density, double-track (2HD) and 720-Kbyte double-sided, double-density, double-track (2DD) disks. The keyboard is compatible with IBM enhanced keyboard which has 82 or 84 keys. A backlit liquid crystal display (LCD) comes with your T1000SE. The screen supports 640 by 400 pixels with color/graphics adapter (CGA) compatible graphics and two color attribute combinations.
The power supply system is composed of AC adapter and batteries.
The T1000SE provides connecting ports with the optional devices at the rear panel of the system. There are one parallel port, one serial port, and the expansion bus connector.

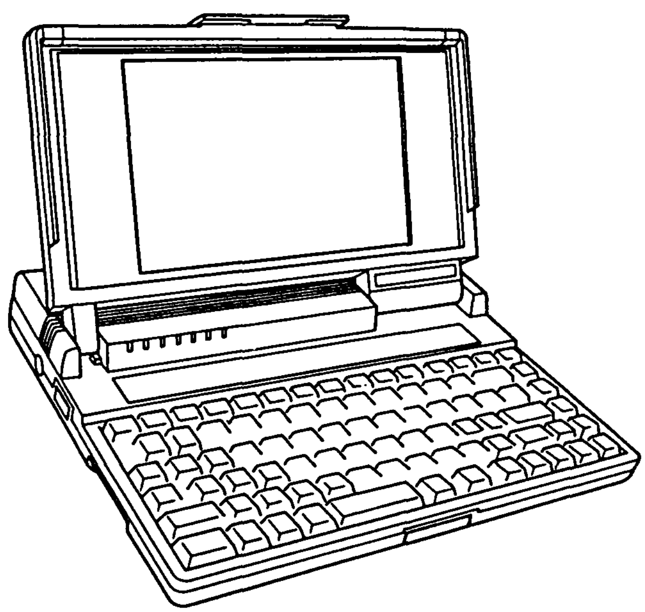


Figure 1-1 T1000SE system unit

1.2 SYSTEM UNIT

Figure 1-2 shows the T1000SE's system block diagram.

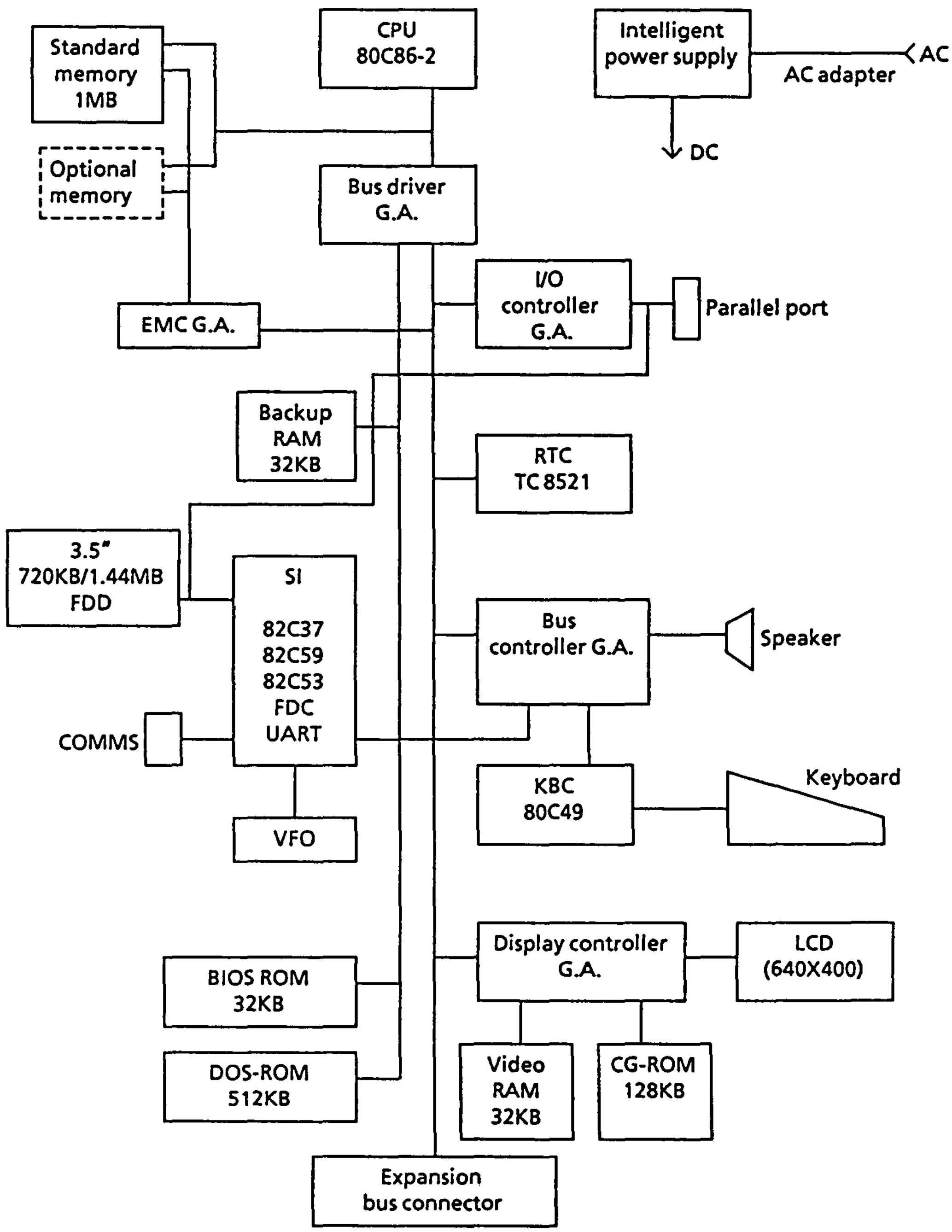


Figure 1-2 Block diagram

The T1000SE has a system board in the system. The system board is composed of the following components :

System board

* Central processing unit : CPU (80C86-2)

  The CPU is a 16-bit microprocessor operated at 9.54MHz or 4.77MHz clock speed.

* Super Integration : SI (T9776)

  The SI is stored the following components :
  Direct Memory Access controller : DMAC (82C37)
  Programmable interrupt controller : PIC (82C59)
  Programable interval timer : PIT (82C53)
  Floppy disk controller : (TC8565)
  Universal asynchronus receiver transmitter : UART (TC8570)

* Variable frequency oscillator : VFO (TC8568)

  The VFO chip is used for FDD control logic.

* Real time clock : RTC (TC8521AM)

  The RTC has memory in this chip which keeps the date, time and system configuration by RTC battery.

* Keyboard controller : KBC (80C49)

* Memories :

  Standard RAM : 1 Mbyte
  Backup RAM : 32 Kbytes
  BIOS ROM : 32 Kbytes
  Video RAM : 32 Kbytes
  CG-ROM : 128 Kbytes
  DOS-ROM : 512 Kbytes

* Gate arrays :

  Bus controller gate array : BUSC-GA (100 pin)
  Bus driver gate array : BUSD-GA (100 pin)
  I/O controller gate array : I/O CONT-GA (100 pin)
  Plasma/LCD controller 2 gate array : PLC2-GA (100 pin)
  Expanded memory controller gate array : EMC-GA (100 pin)

1.3 3.5-INCH FLOPPY DISK DRIVE

The 3.5-inch internal floppy disk drive (FDD) is a high performance, reliable, and thin drive that supports 720-kbyte (formatted) 2DD and 1.44-Mbyte (formatted) 3.5-inch floppy disk. The FDD is shown in figure 1-3 and its specifications are described in table 1-1.

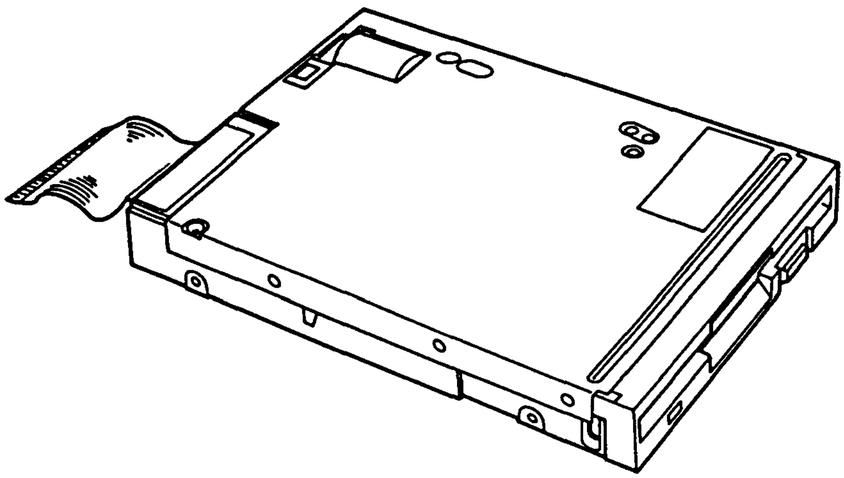


Figure 1-3 3.5-inch FDD

Table 1-1 3.5-inch FDD specifications

Item	Specifications	
	2-Mbyte mode	1-Mbyte mode
Storage capacity (Kbytes)		
Unformatted	2,000	1,000
Formatted	1,440	720
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
1 track access	3	3
Average	94	94
Head settling time	15	15
Recording density (bit per inch)	135	135
Data transfer rate (K bytes per second)	500	250
Rotational speed (revolutions per minute)	300	300
Recording method	MFM (modified frequency modulation)	

1.4 KEYBOARD

The 82 or 84-keyboard is mounted on the system unit. The 82-key is for USA version and 84-key is for European version.
The keyboard is connected to the keyboard controller on the system board through a 20-pin flat cable. The keyboard layout of the U.K. version is shown in figure 1-4.
The optional keyboards are illustrated in appendix E.

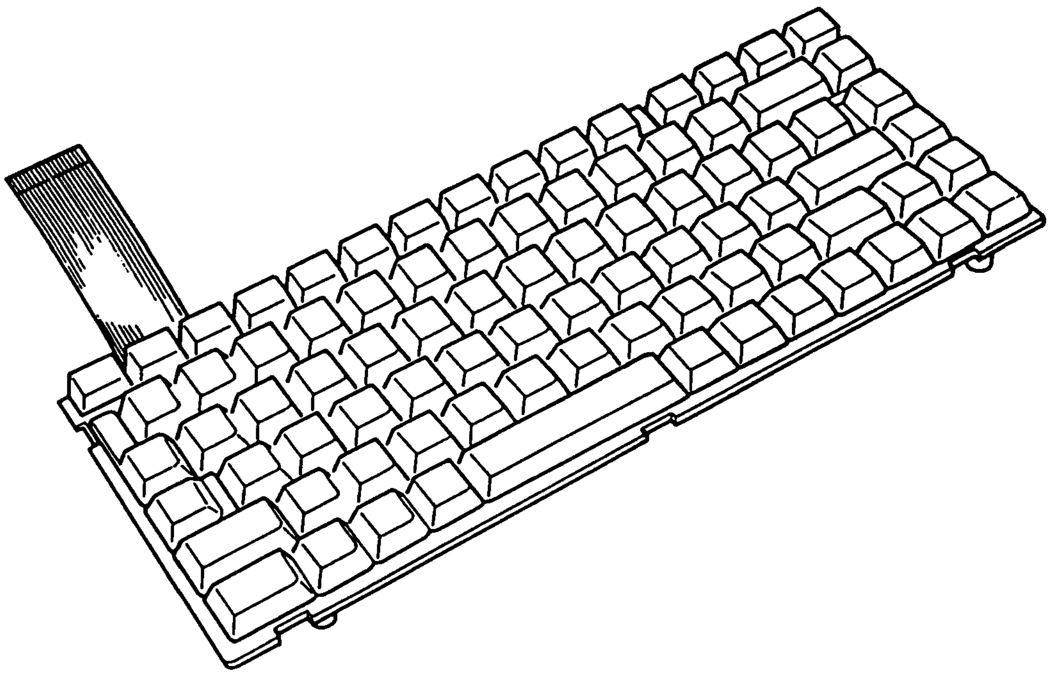


Figure 1-4 Keyboard

1.5 BACKLIT LIQUID CRYSTAL DISPLAY

The backlit liquid crystal display (LCD) is composed of a LCD module and electroluminescence (EL) panel. The backlit LCD is an LCD illuminated from the rear. Thus, you can read its clear display even in poor light condition. It receives 4-bit vertical and 4-bit horizontal synchronizing signals, and shift clock for data transmission. All signals are TTL level compatible. The specifications are described in table 1-2.

The backlit LCD has two color attribute combinations and the display quality can be adjusted by contrast and brightness controls.

The backlit LCD is shown in figure 1-5.

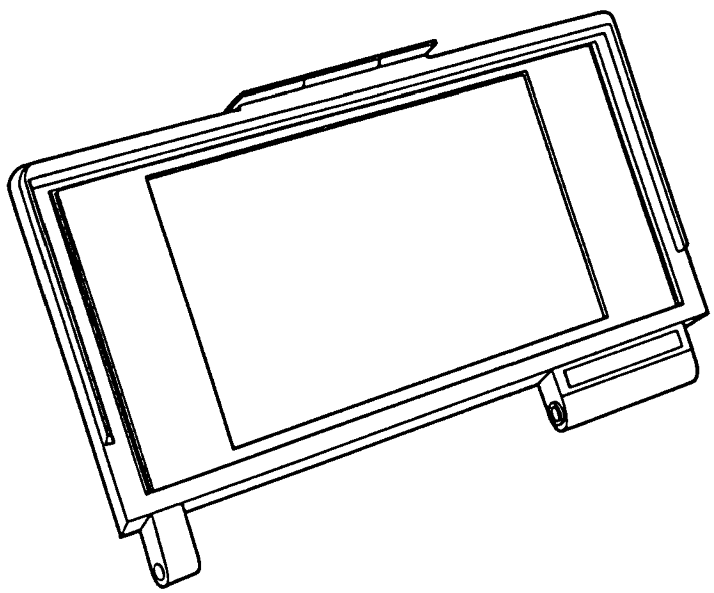


Figure 1-5 Backlit LCD

Table 1-2 Backlit LCD specifications

Item		Specifications
Number of dots	(dots)	640 X 400
Dot dimension	(mm)	0.27(W) X 0.27(H)
Dot pitch	(mm)	0.30(W) X 0.30(H)
Display area	(mm)	200.0(W) X 128.0(H)
Contrast		Approx.1 : 4

2.1 GENERAL

The problem isolation procedures described in part 2 are used to isolate defective field replaceable units (FRUs). The FRUs covered are:

1. Power supply unit
2. System board
3. FDD
4. Keyboard
5. Display

Detailed replacement procedures instructions are described in part 4 and test program operations are described in part 3.

The following items are necessary for implementing the problem isolation procedures.

1. T1000SE diagnostics disk
2. Phillips head screwdriver
3. Work disk (for FDD testing)
4. Cleaning disk kit (for FDD testing)
5. Printer port LED
6. RS-232-C, printer wraparound connectors

The problem isolation flowchart described in section 2.2 can be used to determine which isolation procedures are necessary to isolate a T1000SE problem.

2.2 PROBLEM ISOLATION FLOWCHART

The flowchart in figure 2-1 is used as a guide for determining which FRU is defective. Please confirm the followings before performing the flowchart procedures.

1. No disk is in the FDD.
2. All optional equipments are disconnected.

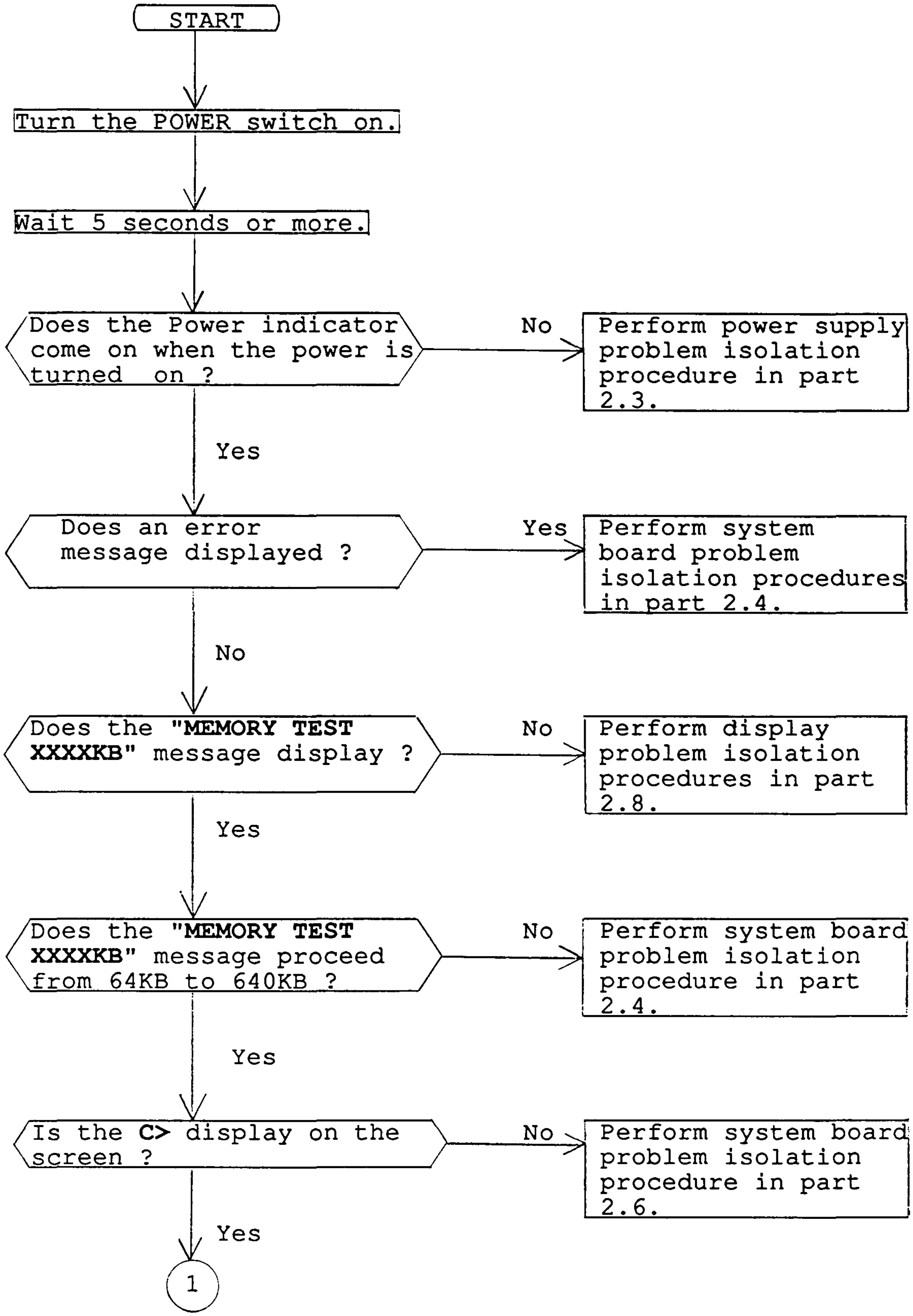
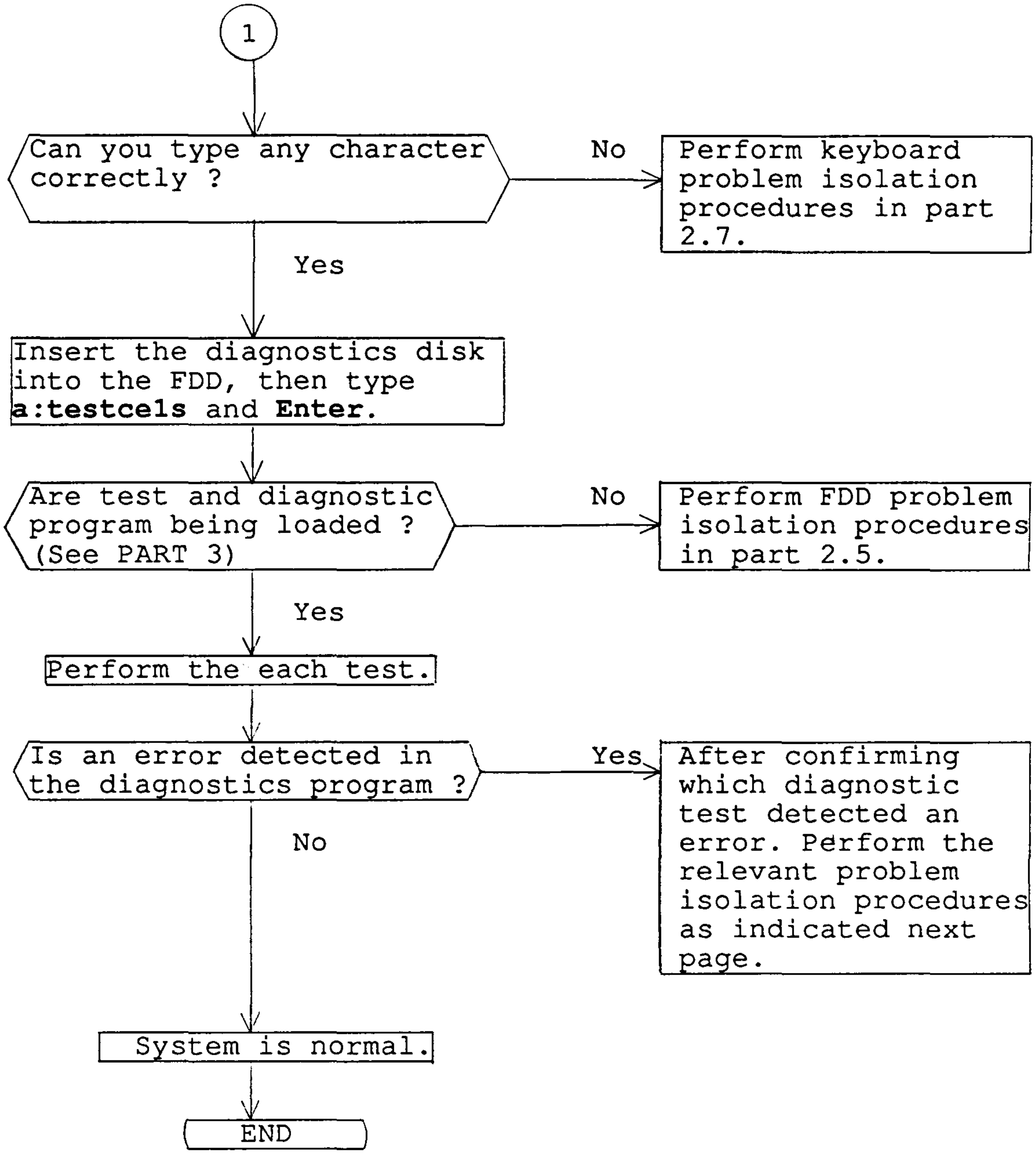


Figure 2-1 Problem isolation flowchart



If the diagnostics program cannot detect any error, it may be an intermittent error. Running test is required to check a computer for a while.

1. If an error is detected on the system test, memory test, display test, ASYNC test, printer test, or real timer test, perform the system board isolation procedures in section 2.4.

2. If an error is detected on the keyboard test, perform the keyboard problem isolation procedures in section 2.6.

3. If an error is detected on the floppy disk test, perform the FDD problem isolation procedures in section 2.5.

2.3 POWER SUPPLY PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether the power supply is defective or not. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1 DC IN indicator check
PROCEDURE 2 Connector check

PROCEDURE 1
DC IN indicator check

This indicator lights red if power is supplied from AC adapter when you connect the AC adapter to T1000SE and a wall outlet. If the AC adapter's output voltage is abnormal, the indicator labeled "DC IN" flashes red.

If the DC IN indicator flashes red or does not glow when connecting the AC adapter to the computer, check the following items.

Check 1 Unplug the AC adapter from the wall outlet and the computer. Plug the AC adapter into the computer, then the wall outlet and power on the computer. If still its phenomenon remains, perform the check 2.

Check 2 The AC adapter may be damaged. Replace a new AC adapter. If still its phenomenon remains, perform the PROCEDURE 2.

PROCEDURE 2
Connector check

The battery cable is connected to the system board. The cable may be disconnected from the PJ502 of the system board. Disassemble the T1000SE system unit for checking the cable. Disassemble procedures is described in part 4.

Check 1 Check that the following cable is connected to the system board correctly.
o Battery connector --------------> PJ502
o Sub battery connector ----------> PJ503

If these cables are disconnected, connect them. Try again the normal operation. If the phenomenon remains, the system board may be damaged. Replace the system board.

2.4 SYSTEM BOARD PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether the system board is defective or not. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Message check
PROCEDURE 2: Printer port LED check
PROCEDURE 3: Test program check

PROCEDURE 1
Message check

After power on, the system performs initial reliability test (IRT) which program is stored in BIOS ROM on the system board. If the error message appears, perform the check 1. If no displayed on the screen, perform the PROCEDURE 2

Check 1 If the following error message appears on the screen, press any key. This program confirms the current system configuration and the configuration stored to RTC memory. If it is different, the following message will appear. You can easily set the current configuration in the RTC memory by pressing any key. If another error message appears, perform check 2.

*****SYSTEM CONFIGURATION ERROR*****
A checksum error occured in the configuration RAM.
Press any key for default set....

Check 2 If the following message appears, press any key. At this time the resumed data will be erased. If another error message appears, perform check 3.

WARNING: RESUME FAILURE.
PRESS ANY KEY TO CONTINUE.

Check 3 The IRT program tests the system board. If an error occurs on the IRT program, the error message appears on the screen. If the following error message or none appears, perform PROCEDURE 3.

KEYBOARD ERROR

SYSTEM CONFIGURATION ERROR

xxxx MEMORY ERROR

FDD ERROR

PROCEDURE 2
Printer port LED check

The printer port LED informs the IRT program status and error status as a hexadecimal value after power on the system. Connect the printer port LED to the printer port. After power on, read the LED status from left to right. If the final LED status is **FEH**, perform the PROCEDURE 3. If the final LED status matches any of the error status code in the table 2-1, replace the system board.

Table 2-1 Normal status and error status of the printer port LED

Normal status	Error status	Meaning	Process
AAH		Display controller initialization test	
	01H	BIOS ROM checksum test	HALT
	06H	First 16KB RAM test	HALT

PROCEDURE 3
Test program check

The test program which is stored in T1000SE diagnostics disk has several programs for testing the system board. Perform the following test. Detail operation is described in part 3.

System test
Memory test
Display test
Printer test
ASYNC test
Real timer test

If an error is detected during the above tests, replace the system board.

2.5 FLOPPY DISK DRIVE PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether the floppy disk drive is defective or not. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Format check
PROCEDURE 2: Test program check
PROCEDURE 3: Connector check

PROCEDURE 1
Format check

Prepare the new floppy disk, the format it using MS-DOS FORMAT command.
If the floppy disk is not formatted, check the following items.

Check 1 Check that the FDD indicator lights. If it does not light, perform the PROCEDURE 3. If it lights, perform check 2.

Check 2 Check that the MS-DOS FORMAT command is used correctly.
When media type is 2DD, use the FORMAT/3 command.
When media type is 2HD, use the FORMAT command.
If FORMAT command is used correctly, perform the check 3. If FORMAT command is not used correctly, try again.
If still the phenomenon remains, perform the check 3.

Check 3 Perform the head cleaning by cleaning kit of the 3.5-inch FDD. If still remains, perform the PROCEDURE 2.

PROCEDURE 2
Test program check

The FDD test program is stored the T1000SE diagnostics disk. After run the MS-DOS, load the diagnostic program. Detail operation is described in part 3.
Prepare the formatted floppy disk, then perform the FDD test. The error code and status is described in table 2-2. If the error occurs, perform the check 1.

Table 2-2 FDD error code and status

Code	Status
01H	Bad command
02H	Address mark not found
03H	Write protected
04H	Record not found
06H	Media removed on dual attach card
08H	DMA overrun error
09H	DMA boundary error
10H	CRC error
20H	FDC error
40H	Seek error
60H	FDD not drive
80H	Time out error (Not ready)
EEH	Write buffer error

Check 1 If the "Write protected" message appears, remove the write protect by moving the write protect tab. If the another error message appear, perform the check 2.

Check 2 Check that the floppy disk is formatted correctly. If it is correctly, perform the PROCEDURE 3.

PROCEDURE 3
Connector check

The FDD is connected to the system board by one cable. Disassemble the system unit for checking the FDD cable. Detail procedures is described in part 4. If it is not connected, connect it to the system board. If it is connected to the system board correctly, performs check 1.

o FDD I/F connector ---------> PJ5

Check 1 The FDD may be damaged. Replace the FDD to a new FDD, then check the PROCEDURE 1 and 2. If still the error occurs, the system board (floppy disk controller or other controller) may be defective. Replace the system board.

2.6 KEYBOARD PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether the keyboard is defective or not. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Test program check
PROCEDURE 2: Connector check

PROCEDURE 1
Test program check

The keyboard test program is stored in T1000SE diagnostics disk. Perform the test program. Details operation is described in part 3.
If the error occurs, perform the PROCEDURE 2. If the error does not occur, the keyboard is normal.

PROCEDURE 2
Connector check

The keyboard is connected to the system board by one 22-pin flat cable. Disassemble the system unit for checking the keyboard cable. Detail procedures is described in part 4. If it is not connected, connect it. If it is connected correctly, perform the check 1.

o Keyboard I/F connector --------> PJ8

Check 1 The keyboard may be damaged. Replace the keyboard to a new one, then check the PROCEDURE 1. If still error occurs, the keyboard controller on the system board may be damaged. Replace the system board.

2.7 DISPLAY PROBLEM ISOLATION PROCEDURES

This section describes how to determine whether the DISPLAY is defective or not. Start with PROCEDURE 1 and continue with other procedures as instructed. The procedures described in this section are:

PROCEDURE 1: Brightness and contrast volume check
PROCEDURE 2: Test program check
PROCEDURE 3: Connector check
PROCEDURE 4: Replacement check

PROCEDURE 1
Brightness and contrast volume check

The system has brightness and contrast dials on the left side of the system unit. Using the two dials to fine tune the display screen to your satisfaction. If the brightness does not change, EL element may be run down. Replace the EL panel. If the character light does not change, perform the PROCEDURE 2.
If brightness and contrast of the display change, perform the PROCEDURE 2.

PROCEDURE 2
Test program check

Using T1000SE diagnostics disk, perform the display test. The display test checks the display controller on the system board.
If the error is detected, perform the PROCEDURE 3. If the error is not detected, the display is normal.

PROCEDURE 3
Connector check

The display unit has LCD module and EL panel. The LCD module are connected to the LED board and a system board by connector. Disassemble the display unit for checking these connector. Detail procedures are described in part 4.
If these connectors are not connected, connect them. If these connectors are connected, perform the PROCEDURE 4.

PROCEDURE 4
Replacement check

Replace the LED board, then perform the normal operation. If still the phenomenon remains, replace the LCD module. If still the phenomenon remains, system board may be damaged.

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3.1 GENERAL

This part explains test and diagnostics programs. That checks the functions of all hardware modules of the T1000SE.
There are 14 programs grouped into two modules: the service program module (DIAGNOSTICS MENU) and test program module (DIAGNOSTIC TEST MENU).
The service program module is composed of 5 tasks:

1. DIAGNOSTIC TEST
2. RUNNING TEST
3. LOG UTILITIES
4. HEAD CLEANING
5. SYSTEM CONFIGURATION

The test program module is composed of 9 tests:

1. SYSTEM TEST
2. MEMORY TEST
3. KEYBOARD TEST
4. DISPLAY TEST
5. FLOPPY DISK TEST
6. PRINTER TEST
7. ASYNC TEST
8. REAL TIMER TEST
9. EXPANSION TEST

The following items are necessary for carrying out the test and diagnostic programs.

1. T1000SE diagnostics disk
2. Formatted work disk (For FDD test)
3. Cleaning disk kit (For head cleaning)
4. Printer wraparound connector
   (For printer wraparound test)
5. RS-232-C wraparound connector
   (For ASYNC wraparound test)

Service personnel can use these programs to isolate problems by selecting the appropriate program and operation procedures described in section 3.2.

3.2 OPERATIONS

1. After run the MS-DOS, insert the diagnostics disk in the floppy disk drive.

2. Type in **A:TESTCE1S**, then press **Enter.**

3. The following display will appear:

TOSHIBA personal computer T1000SE DIAGNOSTICS
Version X.XX (C) copyright TOSHIBA Corp. 1989

DIAGNOSTICS MENU

1-DIAGNOSTIC TEST
2-RUNNING TEST
3-LOG UTILITIES
4-HEAD CLEANING
5-
6-
7-
8-SYSTEM CONFIGURATION
9-EXIT TO MS-DOS

PRESS [1]-[9] KEY ??

Detailed explanations of the service programs and the operations are given in section 3.14 to 3.19.

NOTE: To stop the test programn while running the test program, press **Ctrl + Break**

4. Type in **1**, then press **Enter** and the following display will appear:

```
TOSHIBA personal computer T1000SE DIAGNOSTICS
version X.XX (C) copyright TOSHIBA Corp. 1989
DIAGNOSTIC TEST MENU
   1-SYSTEM TEST
   2-MEMORY TEST          ( 640 KB )
   3-KEYBOARD TEST
   4-DISPLAY TEST
   5-FLOPPY DISK TEST
   6-PRINTER TEST
   7-ASYNC TEST
   8-
   9-REAL TIMER TEST
  10-EXPANSION TEST

  88-FDD ERROR RETRY COUNT SET
  99-EXIT TO DIAGNOSTICS MENU

 PRESS [1]-[9] KEY ??
```

Numbers, 1 to 10 are diagnostic tests.
Number 88 is for setting the floppy disk drive error retry count.
Number 99 is for returning to the DIAGNOSTIC MENU.
When selecting the floppy disk test, special sub-messages will appear, as described in section 3.8.

5. After typing in a test number (1 to 10) of the DIAGNOSTIC TEST MENU, pressing Enter displays as follows:

```
  ROM-TEST   V X.XX  SUB-NO..??

  PASS..0000  ERRCNT..000  CMD..XX

  STATUS XXX ADR  XXXXX  WD XX RD XX

01 - BIOS ROM CHECKSUM
02 - DOS ROM CHECKSUM

99 - EXIT TO DIAGNOSTICS MENU
```

The screen shown above, for example, appears when you type **1** and **Enter**.

6. Select a subtest. Type in the subtest number, then press **Enter**. The following message will appear:

   TEST LOOP (1:Yes/2:No) 1

   If you select Yes (by typing in **1**, then pressing **Enter**): Each time a test cycle ends, it increments the pass counter by one and repeats the test cycle.
   If you select No (by typing in **2**, then pressing **Enter**): At the end of a test cycle, the test execution is terminated and you exit to the subtest menu.

7. Type in **1** or **2**, then press **Enter**. The following message will appear:

   ERROR STOP (1:Yes/2:No) 1

   If you select Yes (by typing in **1**, then pressing **Enter**): When an error occurs, the error status is displayed and execution of the test program stops and the operation guide is displayed on the right side of the display screen.
   If you select No (by typing in **2**, then pressing **Enter**): When an error occurs, the error status is displayed then the error counter is incremented by one and you go to the next test.

8. Type in **1** or **2**, then press **Enter** and the test program will run. Each subtest is described in table 3-1 of section 3.3.

9. When an error occurs during the test program, the following message will appear: (if you answer Yes for ERROR STOP question,)

```
ERROR STATUS NAME        [[HALT OPERATION]]
                           1:Test End
                           2:Continue
                           3:Retry
                          Press [1]-[3] Key 1
```

   1: Terminates the test program execution and exits to the subtest menu.
   2: Continues the test.
   3: Retries the test.

   The error code and error status names are described in table 3-2 of section 3.13.

3.3 SUBTEST NAMES

Table 3-1 lists the subtest of each test program.

Table 3-1 Subtest names

No.	Test name	Subtest No.	Subtest item
1	SYSTEM	01	BIOS ROM CHECKSUM
		02	DOS ROM CHECKSUM
2	MEMORY	01	Constant data
		02	Random data
		03	Sequential data
		04	Addresspack
		05	Memory refresh
		06	Backup memory
		07	EMS mode
3	KEYBOARD	01	Pressed key display
		02	Pressed key code display
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80*25 Character display
		05	320*200 Graphics display
		06	640*200 Graphics display
		07	640*400 Graphics display
		08	Display page
		09	H pattern display
		10	LED display
5	FDD	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address
6	PRINTER	01	Ripple pattern
		02	Function
		03	Wraparound
7	ASYNC	01	Wrap around (channel #1)
		02	Wrap around (channel #2)
		03	Point to point (send)
		04	Point to point (receive)
		05	Card modem loopback
		06	Card modem on-line
		07	Dial tester test
9	REAL TIMER	01	Real timer test
		02	Real timer carry test
10	EXPANSION	01	Box mono video-ram test
		02	Box wrap around test

3.4 SYSTEM TEST

Subtest 01 BIOS ROM CHECKSUM

This test performs the IPL ROM checksum test on the system board.
(Test extent : F8000h - FFFFFh 32KB)

Subtest 02 DOS ROM CHECKSUM

This test performs the DOS ROM checksum test on the system board.
(Test extent : E0000h - EFFFFh 64KB*8)

3.5 MEMORY TEST

Subtest 01 Constant data

This subtest writes constant data to conventional memory (640KB), then reads and compares it with the original data.
The constant data is '00h', '55h', 'AAh', and 'FFh'.

Subtest 02 Random data

This subtest writes random data to conventional memory (640KB), then reads and compares it with the original data.

Subtest 03 Sequential data

This subtest writes sequential data to conventional memory (640KB), then reads and compares it with the original data repeatedly.
The sequential data is '00h' to 'FFh'.

Subtest 04 Addresspack

This subtest packs test address and writes data to conventional memory (640KB), then reads and compare it with the original data.

Subtest 05 Memory refresh

This subtest writes data to conventional memory (640KB), then reads and compares it with the original data. The data is '00h', '55h', 'AAh', and 'FFh'. There is a delay between the write and the read operations.

Subtest 06 Backup memory

This subtest writes data ('FFh', 'AAh', '55h', and '00h') and address pattern data created by XORing (Exclusive-ORring) high/low of the offset address to memory (addressed F0000h to F07FFh), then reads and compares it with the original data. Before and after the test data is preserved.

Subtest 07 EMS mode

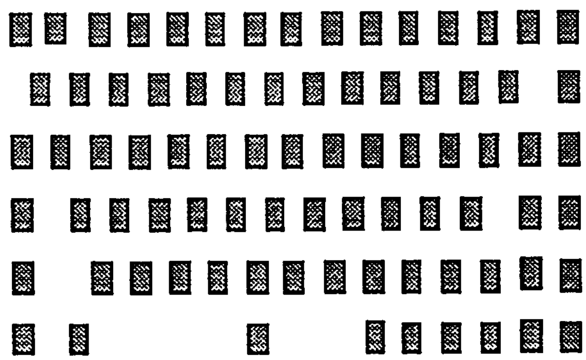
This subtest tests EMS memory (page frame address 'D0000h') and block select register ('03h') every 64KB in the same way as (6).

3.6 KEYBOARD TEST

Subtest 01 Pressed key display

When the keyboard layout (as shown below) is drawn on the display, press any key and check that the corresponding key on the screen is changed to the character "*".
When a key is held pressed, the display will blink designating the auto-repeat function.

Keyboard



[DEL],[ENTER] Press Key

Subtest 02 Pressed key code display

When a key is pressed, its scan code, character code, and key top name are displayed on the screen in the format shown below.
The Ins lock, Caps lock, Num lock, Scroll lock, Alt, Ctrl, Left Shift, and Right Shift keys are displayed in reverse screen when pressed.
The scan codes, character codes and key top names are described in appendix D.

Keyboard

Scan code =
Character code =
Keytop =

Ins Lock	**Caps Lock**	**Num Lock**	**Scroll Lock**
Alt	**Ctrl**	**Left Shift**	**Right Shift**

Press [ENTER] Key

3.7 DISPLAY TEST

Subtest 01 VRAM read/write

This subtest writes constant data (FFh, AAh, 55h, 00h) and address data to video RAM (32 KB), then reads the data written and compares it with the original data.

Subtest 02 Character attributes

This subtest checks:

Normal Display
Intensified Display
Reverse Display
Blinking Display

For color displays, all seven colors used (blue, green, cyan, red, magenta, yellow, white) are displayed. The background and foreground colors can then be checked for brightness. The display below appears on the screen when this test is run.

CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.
NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

NEXT LINE SHOWS INTENSIFIED DISPLAY.
IIIIIIIIIIIIIIIIIIIIIIIIIIIIII

NEXT LINE SHOWS REVERSE DISPLAY.
RRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

NEXT LINE SHOWS BLINKING DISPLAY
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB

BLUE
GREEN
CYAN
RED
MAGENTA
YELLOW
WHITE

Press [Enter] Key

Subtest 03 Character set

In this subtest the character set of its code (00h to FFh) is displayed in the 40 x 25 character mode as shown below.

```
CHARACTER SET IN 40*25

☺☻♥♦♣♠•◘○◙♂♀♪♫☼►◄↕‼¶§▬↨↑↓→←∟↔▲▼ !"#$%&'
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNO
PQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
xyz{|}~⌂ÇüéâäàåçêëèïîìÄÅÉæÆôöòûùÿÖÜ¢£¥₧ƒ
áíóúñѪº¿⌐¬½¼¡«»░▒▓│┤╡╢╖╕╣║╗╝╜╛┐└┴┬├─┼╞╟
╚╔╩╦╠═╬╧╨╤╥╙╘╒╓╫╪┘┌█▄▌▐▀αßΓπΣσµτΦΘΩδ∞φε∩
≡±≥≤⌠⌡÷≈°∙·√ⁿ²■

Press [Enter] Key
```

Subtest 04 80*25 Character display

In this subtest, the character string is displayed shifting one character line by line in the 80*25 character mode as shown below.

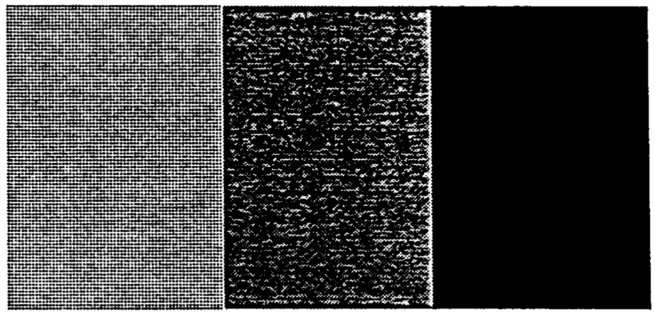
```
80*25 CHARACTER DISPLAY
01234567890123456789012345678901234567890123456789012345678901234567890123456789
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklm
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz
./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{
/0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|
0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}
123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~
23456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~⌂
3456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~⌂Ç
456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxyz{|}~⌂Çü

Press [Enter] Key
```

Subtest 05 320*200 Graphics display

This subtest displays three of color sets for the color display in the 320*200 dots graphics mode as shown below.

320*200 GRAPHICS DISPLAY



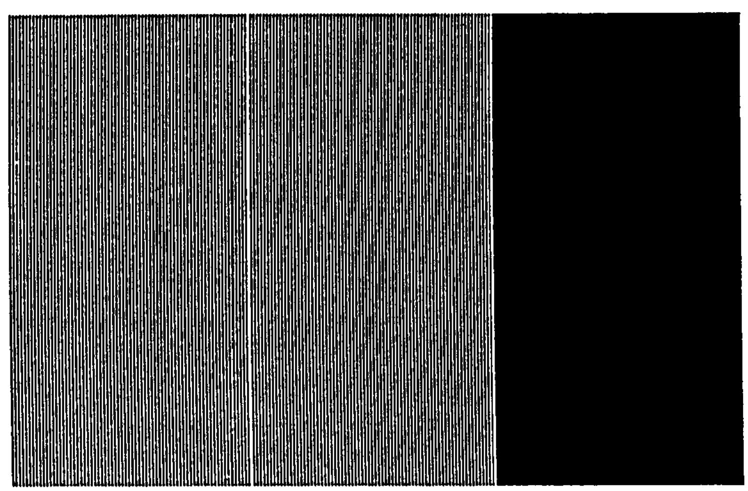
Press [Enter] Key

Subtest 06 640*200 Graphics display

This subtest displays the color blocks for the black and white display in the 640*200 dots graphics mode as shown below.

640*200 GRAPHICS DISPLAY

EVEN DOTS DRIVEN	ODD DOTS DRIVEN	ALL DOTS DRIVEN



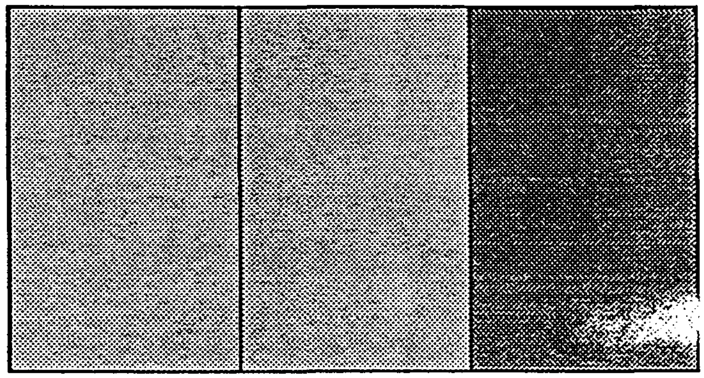
Press [Enter] Key

Subtest 07 640*400 Graphics display

This subtest displays the color blocks for the black and white display in the 640 x 400 pixels graphics mode as shown below.

640*400 GRAPHICS DISPLAY

EVEN DOTS DRIVEN	ODD DOTS DRIVEN	ALL DOTS DRIVEN



Press [Enter] Key

Subtest 08 Display page

This subtest confirms that the pages can be changed in order (page 0 to page 7) in the 40 x 25 character mode.

```
DISPLAY PAGE 0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0                                                   0
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
```

Subtest 09 "H" pattern display

This subtest displays H characters on the entire screen, as shown below.

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

Subtest 10 LED test

This subtest displays as follows:

[Speed/CRT/Caps/Num/Scroll LED test]

```
(1) Press [ Fn + Pgdn ] key!  ...Speed (red)
(2) Press [ Fn + Pgup ] key!  ...Speed (green)
(3) Press [ Caps Lock ] key!  ...Caps (on/off)
(4) Press [ Fn + F11 ]  key!  ...Num (on/off)
(5) Press [ Fn + F12 ]  key!  ...Scroll (on/off)
```

Press [Enter] Key

When the Enter key is pressed, the display changes as shown below. Double and single fonts, and reverse display are changed by pressing Enter key.

[Attribute special test]

(1) FG(non-zero) , BG(zero) , R18(bit,0) ...Double

(2) FG(non-zero) NE BG(non-zero), R18(bit3,2) ...

Press [Enter] Key

3.8 FLOPPY DISK TEST

> **CAUTION:** Before running the floppy disk test, prepare a formatted work disk and remove the diagnostics disk. Then insert the work disk into the FDD. Because the contents of the floppy disk will be erased.

OPERATION

1. When you select the floppy disk test of the DIAGNOSTIC TEST MENU, the following message will appear.

   1-UNIT 1
   2-UNIT 2
   3-UNIT 1&2

   9-EXIT TO DIAGNOSTICS MENU

   PRESS [1]-[3] or [9] key ?

2. Select the test drive number, then press the **Enter.** The following message will appear.

   1-2HD
   2-2DD
   3-2D

   9-Exit to DIAGNOSTICS MENU

   Select the Media Type ?

3. Select the media type of the floppy disk to be tested, then press the **Enter.** The following message will appear, then speaker beeps.

   Set media ! (Press [Enter] key.)   (a) TIMER=XX

   Remove the diagnostic disk, then insert the formatted work disk to FDD.

4. Press the **Enter**. The following message will appear.

    FDD-TEST V 1.10 SUB-NO...??

    PASS..0000 ERRCNT..000 CMD..XX

    STATUS XXX ADR XXXXX WD XX RD XX

    01 - Sequential read
    02 - Sequential read/write
    03 - Random address/data read/write
    04 - Write specified address
    05 - Read specified address

    99 - Exit to DIAGNOSTICS MENU

5. During the floppy disk test, the message shown below will appear.

    Media Type #1 :
    Media Type #2 :

    Drive Type #1 :
    Drive Type #2 :

6. If you perform the subtest 02 to 05, the following message will appear.

    [Warning: the content of the disk(s),
    will be destroyed]
    Mount the work disk(s) on the drive(s),
    then press [Enter] key.

7. If inserted follpy disk is a work disk, press Enter.
    FDD test will run.

CONTENTS

Subtest 01 Sequential read

This test performs the CRC (cyclic redundancy check) with a continuous read operation of all tracks on a floppy disk.
2D (Double-sided, double-density): Track 0 to 39.
2DD (Double-sided, double-density, double-track) and 2HD (Double-sided, high-density, double-track): Track 0 to 79.
The start track can be specified at the previous stage.

Subtest 02 Sequential read/write

This test writes data to all tracks (as defined above) continuously and then reads the data out and compares it with the original data.
(The data pattern is 'B5h', 'ADh' and 'ADh' repeated.)

Subtest 03 Random address/data

This test writes random data to random address on all tracks (as defined in subtest 01) and then reads the data out and compares it with the original data.

Subtest 04 Write specified address

This test writes the specified data on the specified address that you enter from the keyboard. You can specify the test data, track number, and head number.

Subtest 05 Read specified address

This subtest performs read operation on the specified address that you enter from the keyboard. You can specify the track number and head number.

3.9 PRINTER TEST

> **CAUTION:** A printer (IBM compatible) must be connected to the system in order to execute the test. Confirm that the setup option **External FDD/PRT** is set to **Printer.**

CONTENTS

Subtest 01 Ripple pattern

This subtest prints characters for code 20H through 7EH line by line while shifting one character to the right at the beginning of each new line.

```
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmno
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnop
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrs
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrst
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqr
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopq
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
```

Subtest 02 Function

This subtest prints out various print type as elite, condense, and double etc.

```
   PRINTER TEST
1.  THIS LINES SHOWS NORMAL PRINT.
2.  T H I S   L I N E   S H O W S   D O U B L E   W I D T H   P R I N T .
3. THIS LINE SHOWS COMPRESSED PRINT.
4.  THIS LINE SHOWS EMPASIZED PRINT.
5.  THIS LINE SHOWS DOUBLE STRIKE PRINT.
6.  ALL CHARACTERS PRINT
 !"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
opqrstuvwxyz{|}~
```

Subtest 03 Wraparound

> **NOTE:** A printer wraparound connector is necessary for executing this test. Wiring diagram of the printer wraparound connector is described in the part 3.19.
> The data, control, and status lines will be checked with the printer wraparound connector.

OPERATION

Subtest 01 and 02

1. When you select the subtest 01 or 02, the following message will appear.

   Select the Col, number (1)or(2)
   (1)80 (2)136 ?

   Select the column number, then type in the number.

2. After pressing the **Enter**, the subtest is executed.

Subtest 03

1. When you select this subtest, the following message will appear.

   Select the channel number (1-3) ?

   Select the printer channel number, then type in the number. The T1000SE supports three printer channels.

2. After pressing the **Enter**, this subtest is executed.

3.10 ASYNC TEST

In subtest 01 to subtest 05, data transmission is done with the following format:

Speed: 9600 BPS
Data 8 bits and one parity bit (EVEN)
One stop bit
Data pattern: 20h to 7Eh

Subtest 01 Wrap around (channel #1)

> **NOTE:** The RS-232-C wraparound connector must be connected to channel 1 to execute this test. The wiring diagram of the RS-232-C wraparound connector is described in part 3.25.

A data send/receive test is performed with the wraparound connector for the channel 1.

Subtest 02 Wrap around (channel #2)

The same test as the subtest 01 is performed for the channel 2.

Subtest 03 Point to point (send)

> **NOTE:** This subtest must be executed in condition that two machines are connected with the RS-232-C direct cable and one side should be set as 'send' and the other set as 'receive'. The wiring diagram of the RS-232-C direct cable is described in part 3.19. The subtest 03 executed in one side and the subtest 04 executed in the other will check the communication capability as follows:

A block of data (20h to 7Eh) is sent from one side to the other, and then returned back. The returned data is compared with the original one. This test is used to check whether the returned data are same as the original ones.

Subtest 04 Point to point (receive)

This subtest is used with the subtest 03 as described above.

Subtest 05 Card modem loopback

> **NOTE:** If there is no modem card in the system, this test can no be executed.

This subtest is used to check whether the data to be sent from the modem card to the RS-232-C line is correct or not. This can be done with the loopback function inside the modem card.

Subtest 06 Card modem on-line test

> **NOTE:** This test requires two machines which are connected to the PBX (Private Branch Exchange). One side is set as 'send' and the other set as 'receive'. When both sides are ready, you can start the test.

In this subtest, data are sent from the 'send' side to the 'receive' side through the PBX. This subtest is used to check whether data transmission through a telephone line is done properly or not.

Subtest 07 Dial tester test

> **NOTE:** To execute this subtest, a dial tester must be connected to the system.

This subtest is carried out by sending the pulse dial and tone dial twice automatically.

[Pulse dial]: "1-2-3-4-5-6-7-8-9-0-1-2"
[Tone dial]: "1-2-3-4-5-6-7-8-9-*-0-#"

3.11 REAL TIMER TEST

Subtest 01 Real timer

A new date and time can be input during this subtest when the current date and time are displayed.
Operations for the test are as follows.

1. Selecting the subtest, the following message will appear.

   Current data: XX-XX-XXXX
   Current time: XX:XX:XX

   Enter new date:

2. If current date is not correct, input the current new date. Press the **Enter**, the enter new time:message will appear.

3. If current time is not correct, input the current new time. Press the **Enter**, return to the subtest menu of the REAL TIME TEST.

Subtest 02 Real time carry

> **CAUTION:** When this test is executed, the current date and time is erased.

This subtest checks whether the real time clock increments the time displayed correctly (month, day, year, hour, minute, second).

3.12 EXPANSION TEST

> **NOTE:** If the DynaStation is not connected to the system, this test cannot be executed.

Subtest 01 Box mono video-ram test

> **NOTE:** As this subtest required a special tool to be executed, it cannot be carried out here.

Subtest 02 Box wrap around test

> **NOTE:** If there is no monochrome display card in the DynaStation, this test cannot be executed.

This subtest writes data (FF, AA, 55, 00h) into the monochrome display memory (B0000h to B0F9Fh), then reads the data out and compares it with the original data.

3.13 ERROR CODE AND ERROR STATUS NAMES

Table 3-2 lists the error code and error status names.

Table 3-2 Error code and error status names

Device name	Error code	Error status name
ROM	01	ROM Checksum Error
RAM	01	Parity Error
EXP	FF	Data Compare Error
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed On Dual Attach Card
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive
	80	Time Out Error (Not Ready)
PRINTER	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line
RS-232-C	01	[DSR ON] Time Out
	02	[CTS ON] Time Out
	04	RX Empty Time Out
	08	TX Buffer Full Time Out
	10	Parity Error
	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
	33	No Carrier (CARD MODEM)
	34	Error (CARD MODEM)
	36	NO DIAL TONE (CARD MODEM)

3.14 RUNNING TEST

3.14.1 Program description

This program automatically runs the following tests in sequence.

1. FDD test (subtest number 02)
2. System test (subtest number 01, 02, 03)
3. Memory test (subtest number 04, 06, 07)
4. Display test (subtest number 01 to 08, 11)
5. Printer test (subtest number 03)
6. Async test (subtest number 01)

When running an FDD test, this system automatically decides whether there are one or two FDDs.

3.14.2 Operations

> **CAUTION:** Do not forget to load a work disk. If a work disk is not loaded, an error will be generated during FDD testing.

1. Remove the diagnostics disk and insert the work disk into the floppy disk drive.

2. After pressing **2** and **Enter** in the DIAGNOSTIC MENU, the following message will appear.

   Mount the Work disk(s) on the drive(s), then press any key

3. Press any key. SYSTEM CONFIGURATION message will appear, then the following message will appear.

   Printer wrap around test (1:Yes/2:No) ?

4. Select whether to execute the printer wraparound test (Yes) or not (No). Type **1** or **2** and press **Enter.** (If Y is selected, a wraparound connector must be connected to the printer connector on the back of the unit.) The following message will appear.

   ASYNC wrap around test (1:Yes/2:No) ?

5. Select whether to execute the test (Yes) or not (No). Type **1** or **2** and press **Enter**. (If Y is selected, an RS-232-C wraparound connector must be connected to the COMMS connector on the back of the unit.) The following message will appear.

    Set 2HD media ! (Press[Enter]key.)

6. Confirm that 2HD media is set. Then press **Enter**. The following message will appear.

    [Warning: The content of the disk(s), will be destroyed.]
    Mount the work disk(s) on the drive(s), then press [Enter] key.

7. This program is repeated continuously. To stop the program, press **Ctrl + Break**.

3.15 LOG UTILITIES

3.15.1 Program description

This program logs error information generated, while a test is in progress; the information is stored in the RAM.
However if the POWER switch is turned off the error information will be lost. The error information itself is displayed as the following.

1. Error count (ERR)
2. Test name (TEST)
3. Subtest number (SB)
4. Pass count (PASS)
5. Error status (STS)
6. FDD or memory; ADDR (ADDRESS)
7. Write data (WD)
8. Read data (RD)
9. Error status name (NAME)

This program can store data on a floppy disk or output information to a printer.

3.15.2 Operations

1. After pressing **5** and **Enter** in the DIAGNOSTICS MENU, the error information logged in the RAM or on the floppy disk is displayed as shown below.

```
  ERROR LOG UTILITIES                 PAGE 01
ERR TST SB PASS STS  ADDRESS WD      RD         NAME
                     (CCCHSS)



(1)Next (2)Prev (3)Exit (4)Clear (5)FD Write (6)FD Read (7)Print
```

2. Error information displayed on the screen can be manipulated with the following key operation.

   The 1 key scrolls the display to the next page.
   The 2 key scrolls the display to the previous page.
   The 3 key returns the display to the DIAGNOSTIC MENU.
   The 4 key erases all error log information in RAM.
   The 5 key writes log information to a floppy disk.
   The 6 key reads log information from a floppy disk.
   The 7 key outputs error log information to a printer.

3. In the case of "error retry OK", the capital "R" will be placed at the beginning of error status. However, this is not added to error count.

3.16 HEAD CLEANING

3.16.1 Program description

This program executes head loading and seek/read operations for head cleaning. A cleaning kit is necessary for cleaning the FDD head.

3.16.2 Operations

1. After pressing **4** and **Enter** in the DIAGNOSTICS MENU, the following message will appear.

    1-UNIT 1
    2-UNIT 2
    3-UNIT 1&2

    9-EXIT TO DIAGNOSTICS MENU

    PRESS [1]-[3]or[9] Key.?

2. After above message appears, remove the Diagnostics disk, insert the cleaning disk, and press any key.

3. When the **FDD Cleaning Execution** message appears, FDD head cleaning will begin.

4. When cleaning is finished, the display automatically returns to the DIAGNOSTICS MENU.

3.17 SYSTEM CONFIGURATION

3.17.1 Program description

This program displays the following system configuration.

1. BIOS ROM VERSION = VX.XX
2. Base memory size
3. Display type
4. A number of floppy disk drives
5. A number of async ports
6. A number of printer ports
7. Expanded memory size
8. Co-processor presents or not

3.17.2 Operations

After pressing **8** and **Enter** key to select from the DIAGNOSTICS MENU, the following display will appear.

```
SYSTEM CONFIGURATION                         VX.XX

  * - 640KB Conventional Memory
  * - LCD
  * - 1 Floppy Disk Drive
  * - 1 ASYNC Adapter
  * - 1 Printer Adapter
  * - XXXXKB EMS Memory size


PRESS [Enter] Key ?
```

Press **Enter** key to return to the DIAGNOSTICS MENU.

3.18 WIRING DIAGRAM

1. Printer wraparound connector

(9) + PD7	(15) - ERROR
(8) + PD6	(14) - AUTFD
(7) + PD5	(13) + SELECT
(6) + PD4	(16) - PINIT
(5) + PD3	(1) - STROBE
	(10) - ACK
(4) + PD2	(12) + PE
(3) + PD1	(17) - SLIN
(2) + PD0	(11) + BUSY

Figure 3-1 Printer wraparound connector

2. RS-232-C Wraparound connector

(3) TRANSMIT DATA	(2) RECEIVE DATA
(7) REQUEST TO SEND	(8) CLEAR TO SEND
	(1) CARRIER DETECT
(4) DATA TERMINAL READY	(6) DATA SET READY
	(9) RING INDICATE

Figure 3-2 RS-232-C wraparound connector

3. RS-232-C direct cable (9-pin to 9-pin)

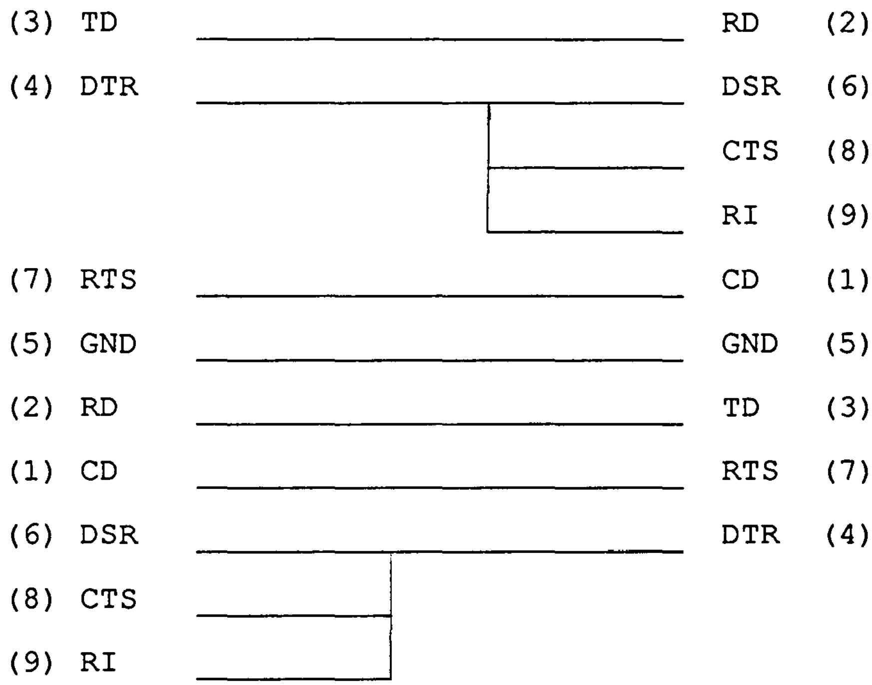


Figure 3-3 RS-232-C direct cable (9-pin to 9-pin)

4. RS-232-C direct cable (9-pin to 25-pin)

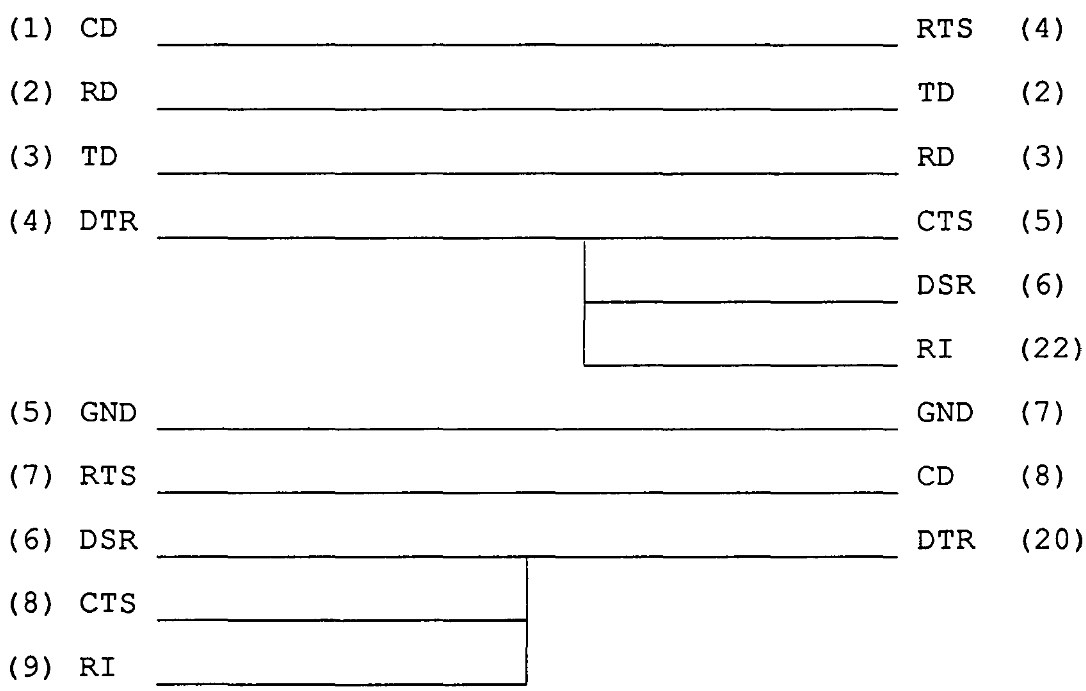


Figure 3-4 RS-232-C direct cable (9-pin to 25-pin)

4.1 GENERAL

This section gives a detailed description of the procedures for removing and replacing field replaceable units (FRUs).

FRUs are listed as follows:

1. Keyboard
2. RTC battery
3. LCD module
4. EL panel
5. LCD cover assembly
6. TOP cover
7. LED board
8. LED/LCD cable
9. Sub battery
10 FDD
11. Modem cover
12. Modem cable
13. System board

The following points must be kept in mind:

1 The system should never be disassembled unless there is a problem. (abnormal operation, etc.)
2. Only approved tools may be used.
3. After deciding the purpose of replacing the unit, and the procedures required, do not carry out any other procedures which are not absolutely necessary.
4. Be sure to turn the POWER switch off before beginning.
5. Be sure to disconnect the AC adapter and all external cables from the system.
6. Follow the only fixed, standard procedures.
7. After replacing a unit, confirm that the system is operating normally.
8. Be sure not to be wounded by thin steel plate.

Tools needed for unit replacement:

1. Phillips head screwdriver

4.2 REMOVING/REPLACING THE KEYBOARD AND THE RTC BATTERY

1. Remove the AC adapter from the system unit and turn off the power of the system unit.

2. Turn the system unit upside down and remove the three screws (A) from the bottom cover.

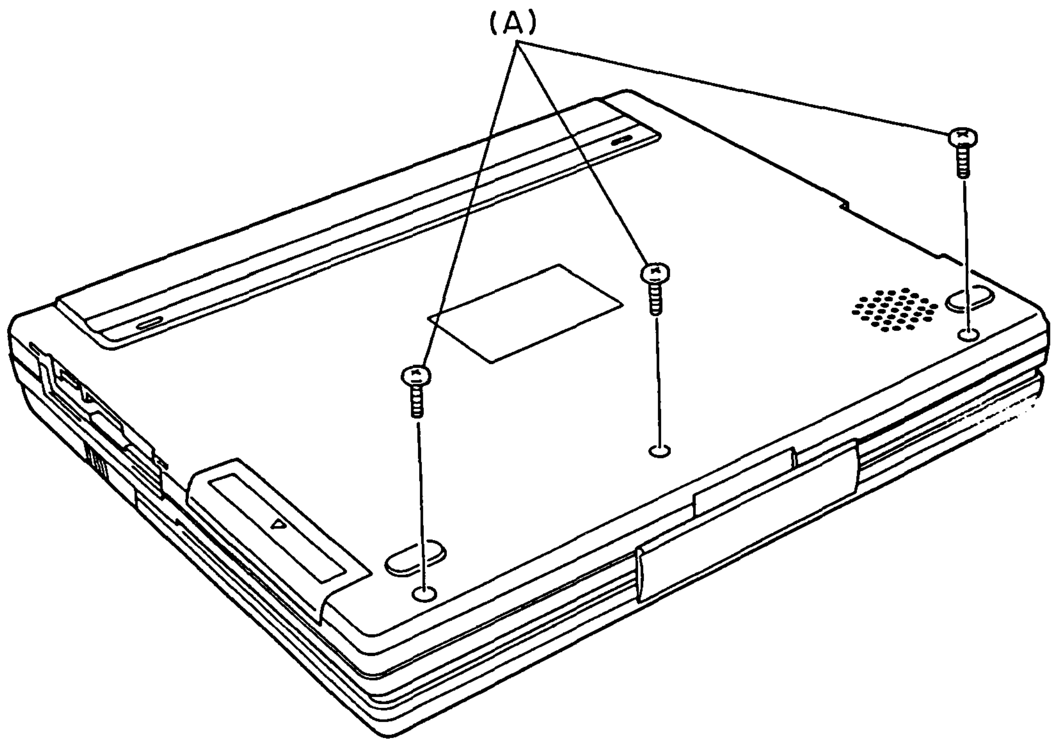


Figure 4-1 Removing the three screws

3. Turn the system unit back over, then open the display.

4. Lift up the front edge of the keyboard unit and place it in front of the computer. At this time, you can not disconnect the keyboard cable yet.

5. Release the pressure plate (B) of the PJ8 (C) to disconnect the keyboard cable (D) from the system board (E).

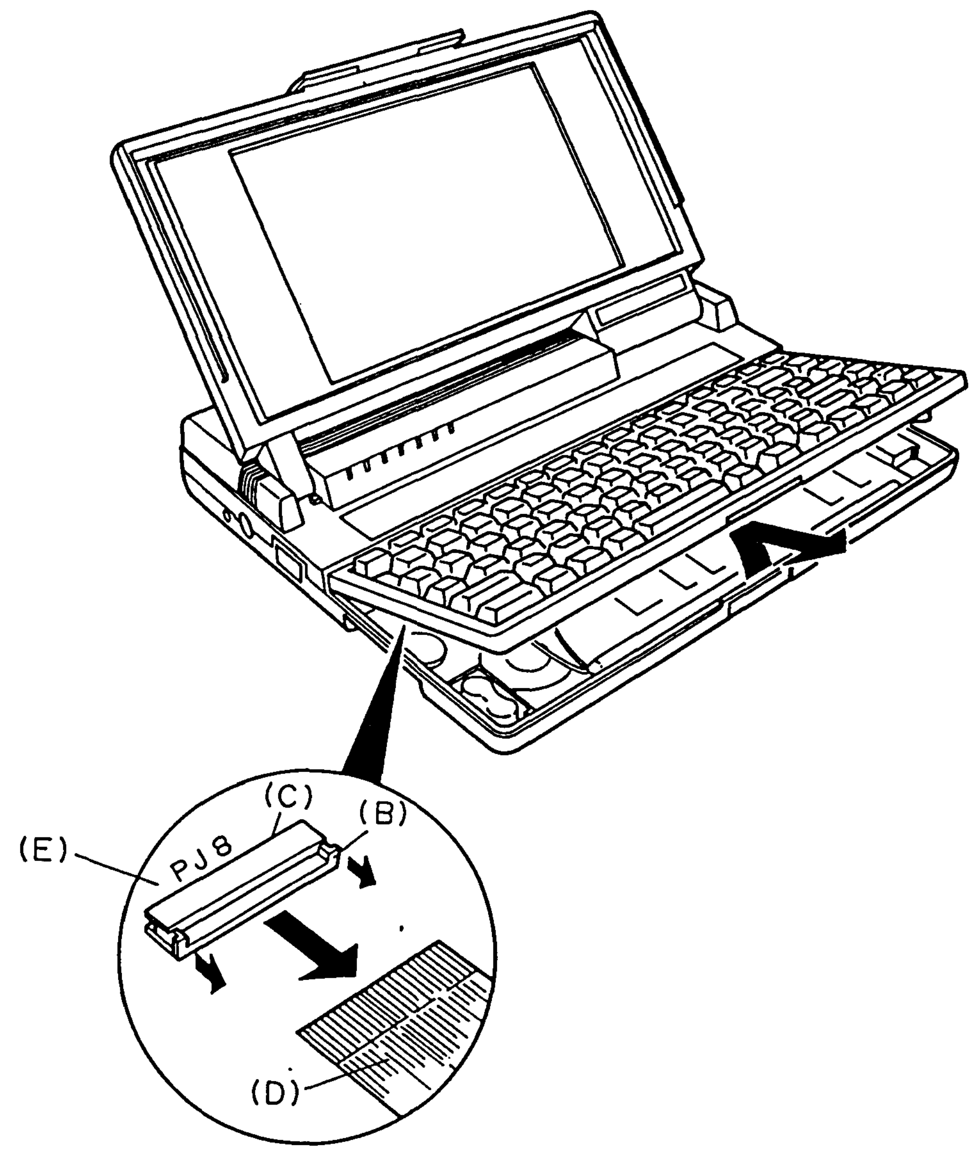


Figure 4-2 Removing the keyboard unit

6. Unlatch the seven latches (F) of the keyboard mask (G), then pull out the keyboard (H).

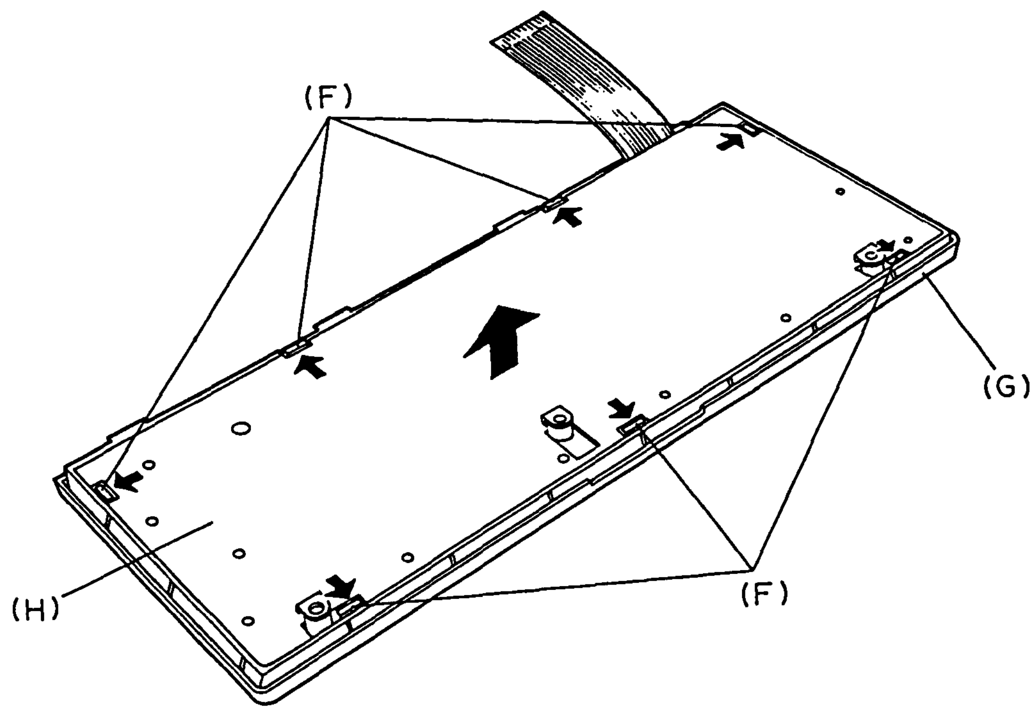


Figure 4-3 Removing the keyboard

7. Remove the RTC battery cable (I) from the PJ9 (J) located on the system board. Then remove the RTC battery (K).

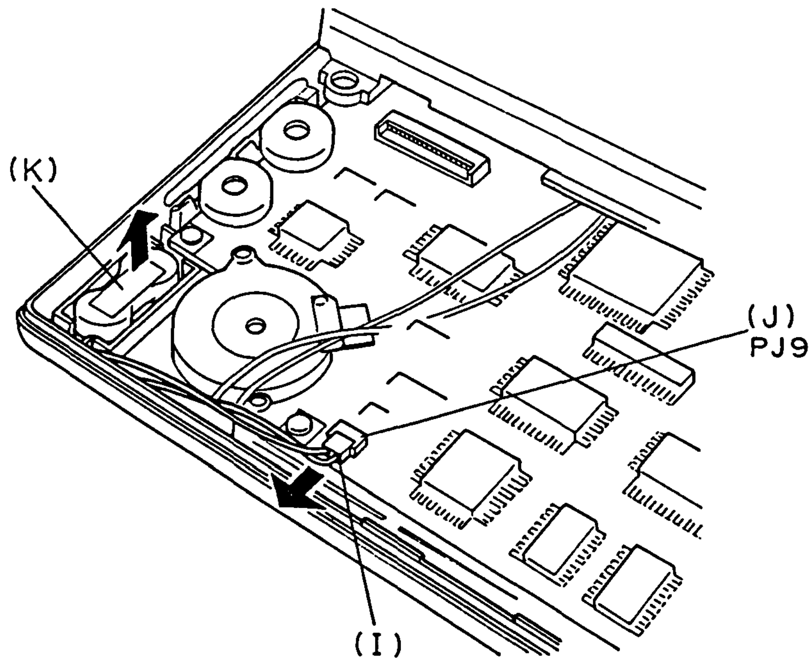


Figure 4-4 Removing the RTC battery and battery cable

8. To install the keyboard and the RTC battery, follow the above procedures in reverse.

CAUTION : When you proceed the above, you must turn off the power switch. Because the battery pack is set in the system unit.

4.3 REMOVING/REPLACING THE LCD MODULE

1. Remove the AC adapter from the system unit and turn off the power of the system unit.
2. Open the display.
3. Remove the two rubbers (A) and the panel (B) from the LCD mask (C), then remove four screws (D).
4. Unlatch the eight latches (E) of the LCD mask.

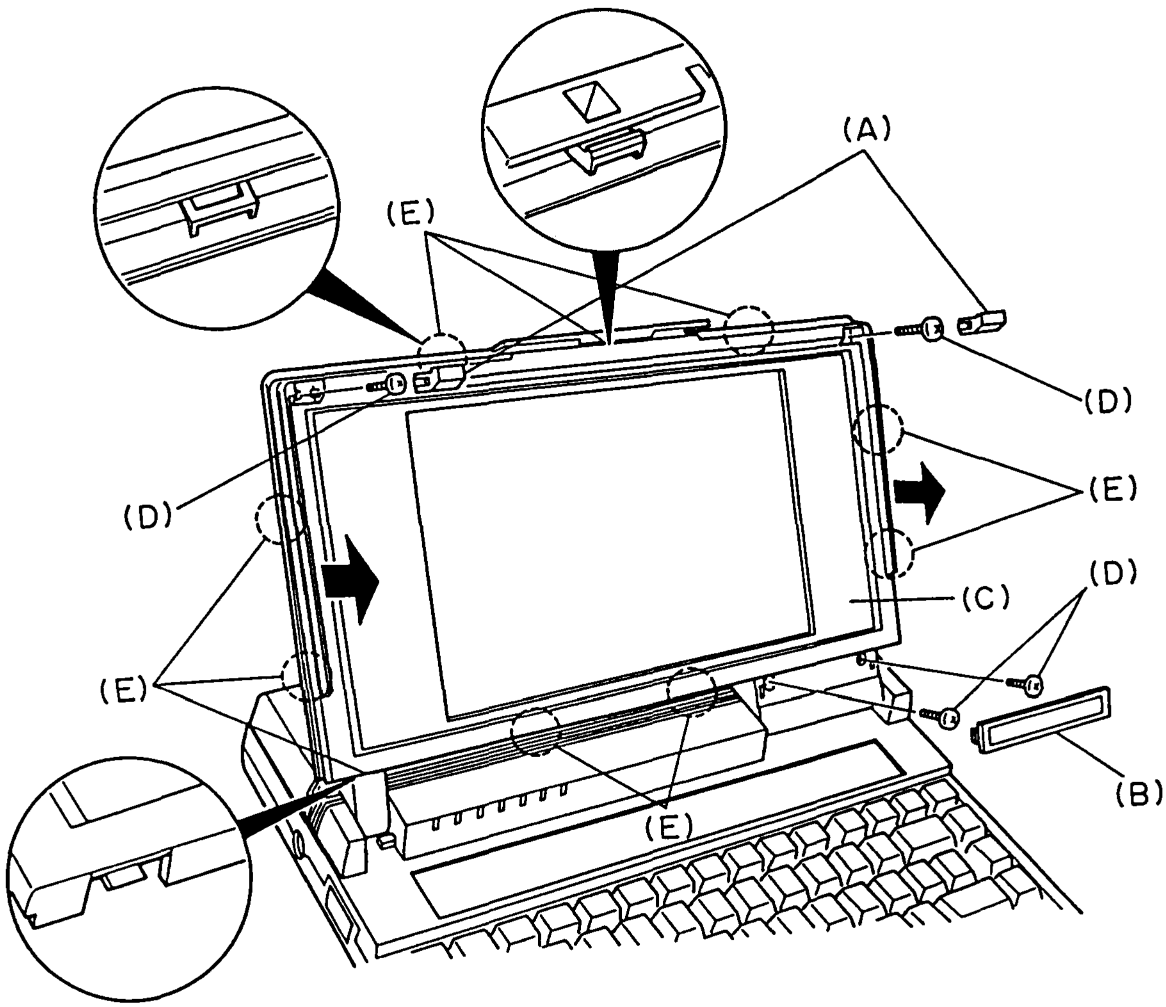


Figure 4-5 Removing the LCD mask

5. Remove the four screws (F) fixing the LCD module (G). Then disconnect the three LCD cables (H) from the LCD module.

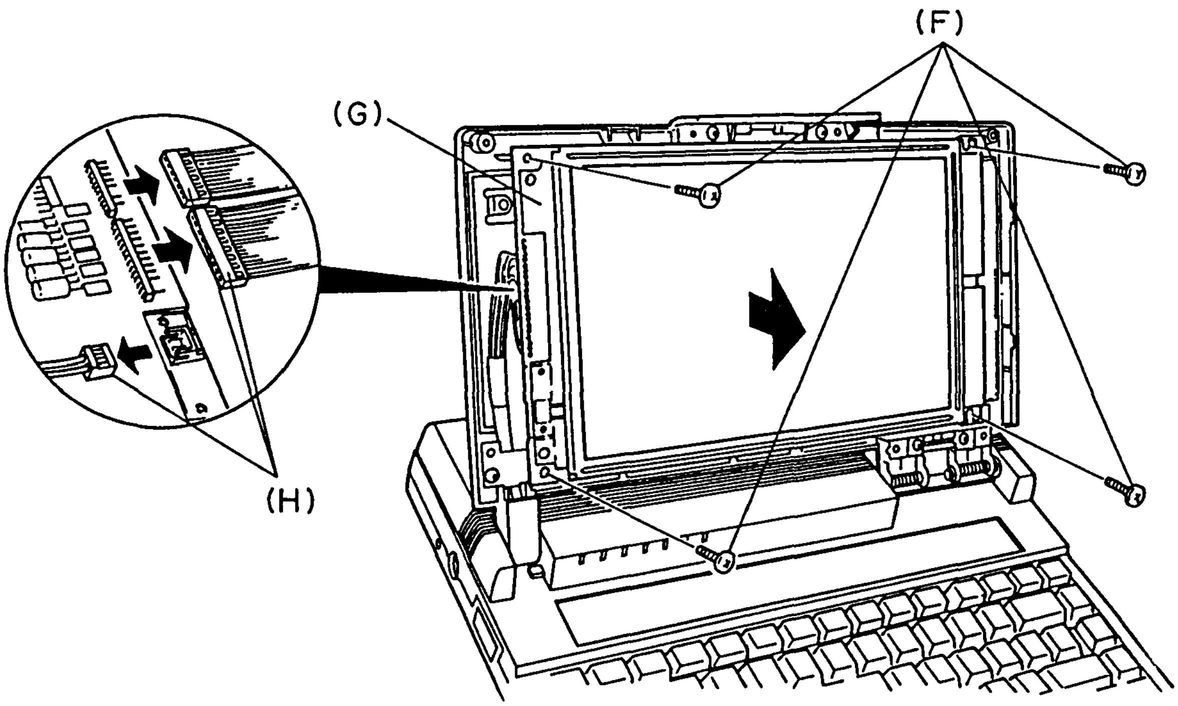


Figure 4-6 Removing the LCD module

6. To install the LCD module, follow the above procedures in reverse.

NOTE : When you proceed as stated above, you must turn off the power switch. Because the battery pack is set in the system unit.

4.4 REMOVING/REPLACING THE EL PANEL

1. Remove the LCD module as directed in section 4.3.
2. The EL panel is held in place by two fasteners (A). Each fastener consists of a pin (B) and a collar (C) as shown in figure 4-8. Push up the tip of a pin, then using tweezers, pull out each pin from above.
3. The collars may come out when you pull out the pins, if not, push up the tip of each collar, then using tweezer, pull out each collar from above.

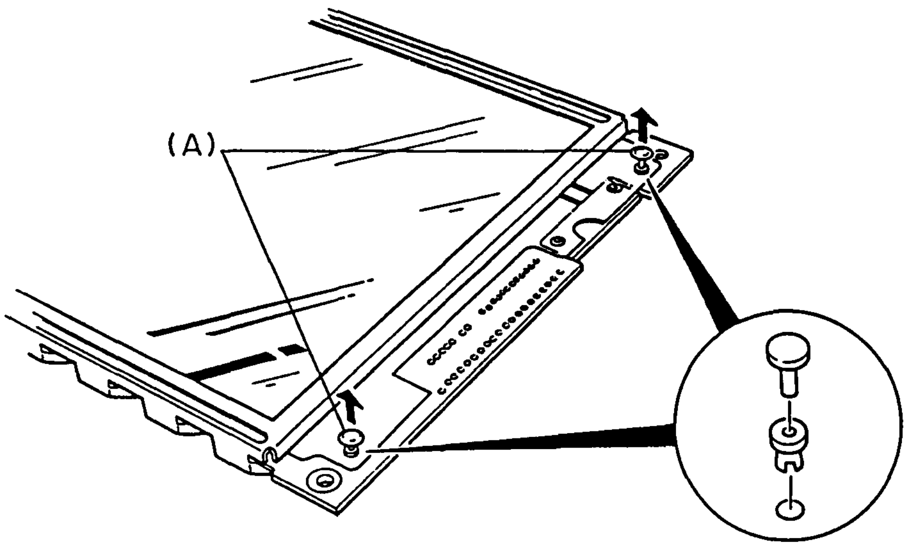


Figure 4-7 Removing the two fasteners

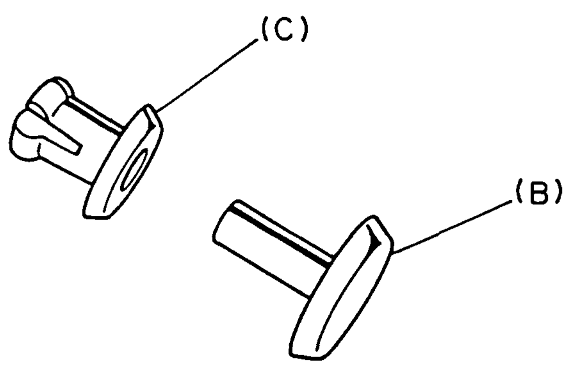


Figure 4-8 Fastener

4. Pull out the EL panel (D) from the LCD module (E).

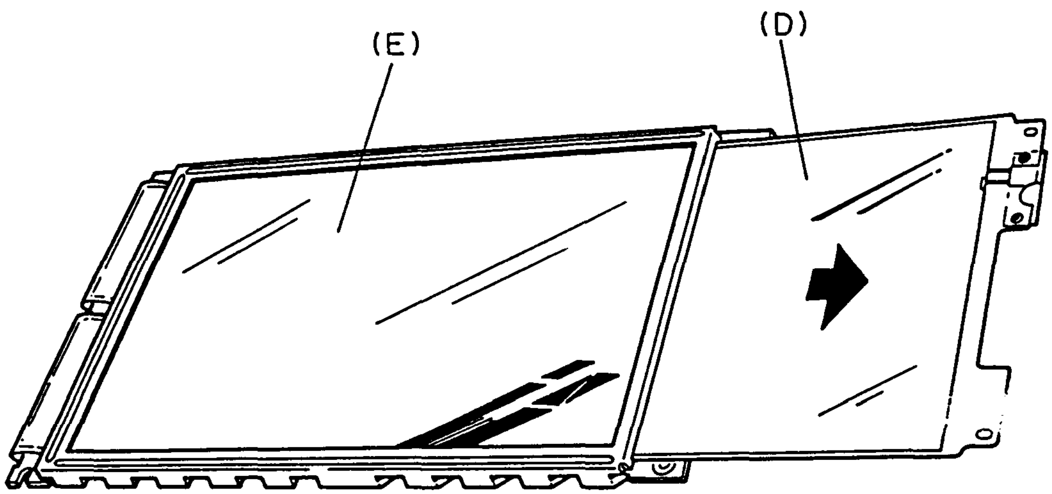


Figure 4-9 Removing the EL panel

5. To install a new EL panel, follow the above procedures in reverse.

> **NOTE** : When installing the EL panel into the LCD module, be sure the orange side of the El panel is facing up. When inserting a fastener, insert the inner collar, then insert the pin. Carefully press each pin until it snaps into place.

4.5 REMOVING/REPLACING THE LCD COVER ASSEMBLY

1. Remove the LCD module as directed in the section 4.4.
2. Remove the screw (A) to remove the cable cover (B) from the LCD cover assembly (C).
3. Remove the two screws (D) fixing the two hinges (E) from the LCD cover assembly.

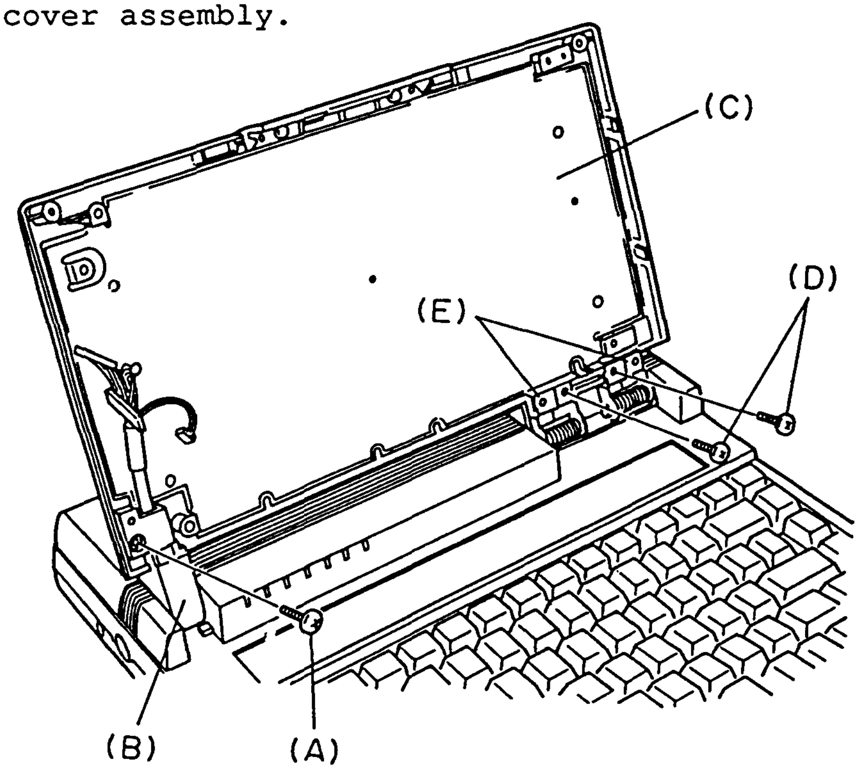


Figure 4-10 Removing the cable cover and hinges

4. Bend the LCD cover assembly (F) toward you, then remove it lifting the right edge. Refer to figure 4-11.

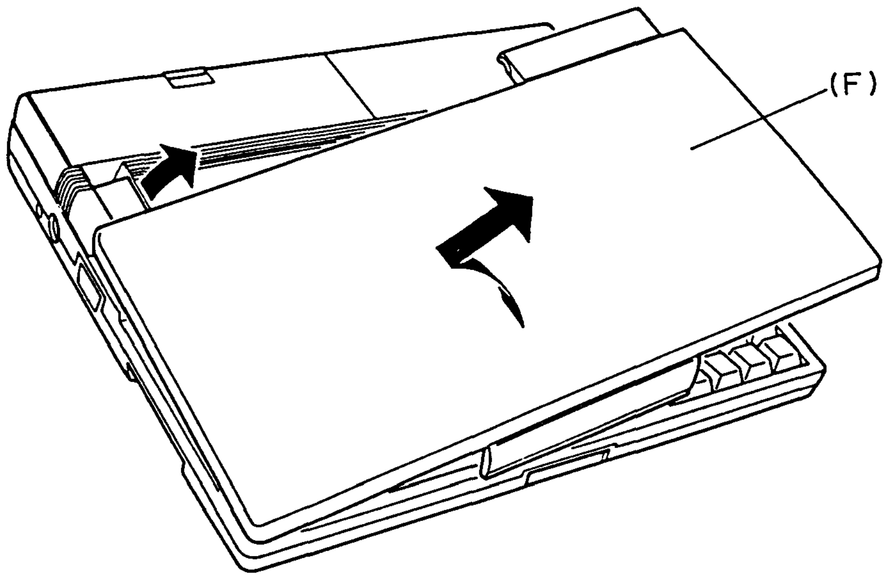


Figure 4-11 Removing the LCD cover assembly

5. To install the LCD cover assembly, follow the above procedures in reverse.

4.6 REMOVING/REPLACING THE TOP COVER AND THE MODEM COVER

1. Remove the keyboard, the RTC battery, and the LCD cover assembly as directed in section 4.2 and 4.5.

2. Remove the battery pack (A) from the top cover (B).

3. Remove the two screws (C) fixing the modem cover (D). Refer to figure 4-12.

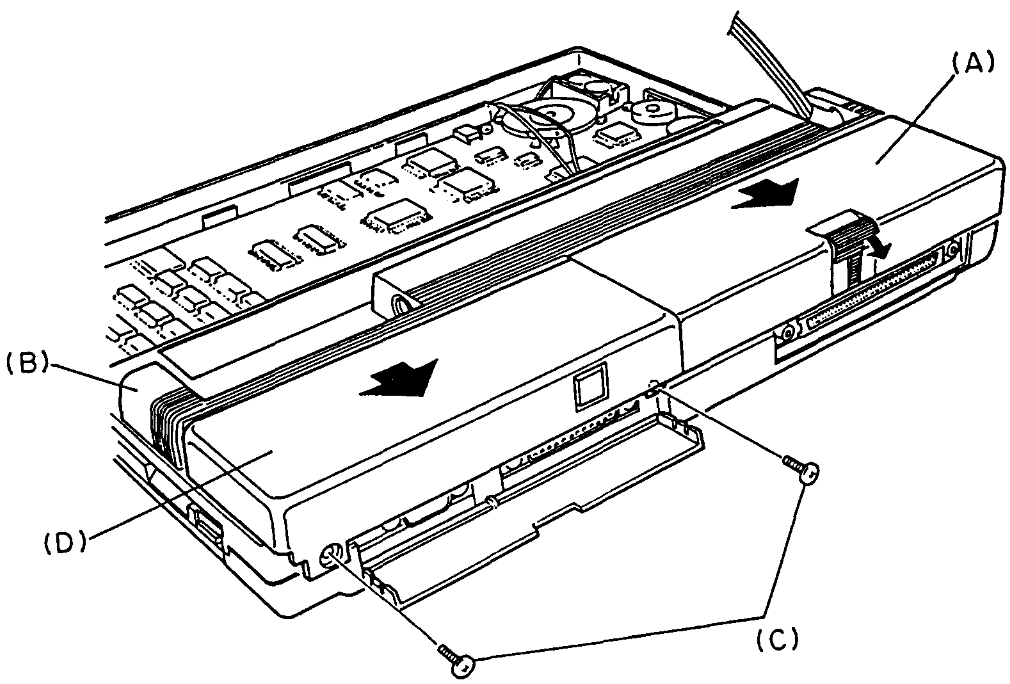


Figure 4-12 Removing the modem cover

4. Remove the seven screws (E) fixing the top cover. Then disconnect the LED/LCD cable (F) from the PJ7 (G) located on the system board.

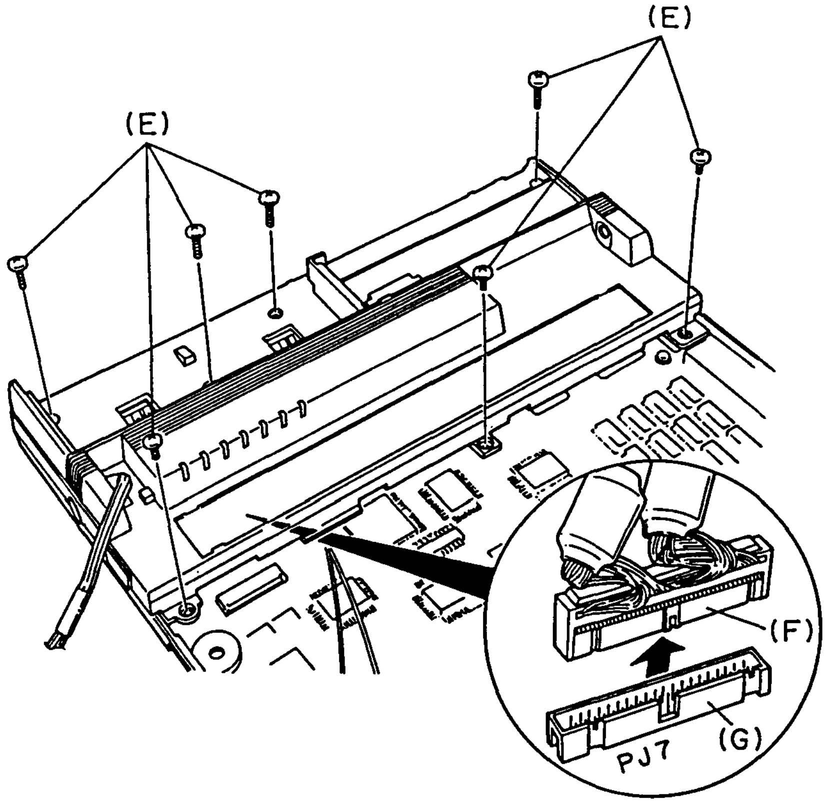


Figure 4-13 Disconnecting the LED/LCD cable

5. To install the top cover and the modem cover, follow the above procedures in reverse.

4.7 REMOVING/REPLACING THE LED BOARD AND THE LCD CABLE

1. Remove the top cover as directed in the section 4.6.

2. Remove the two screws (A) fixing the LED board (B). Disconnect the LED cable (C) from the PJ401, PJ402, and PJ403 (D) located on the LED board.

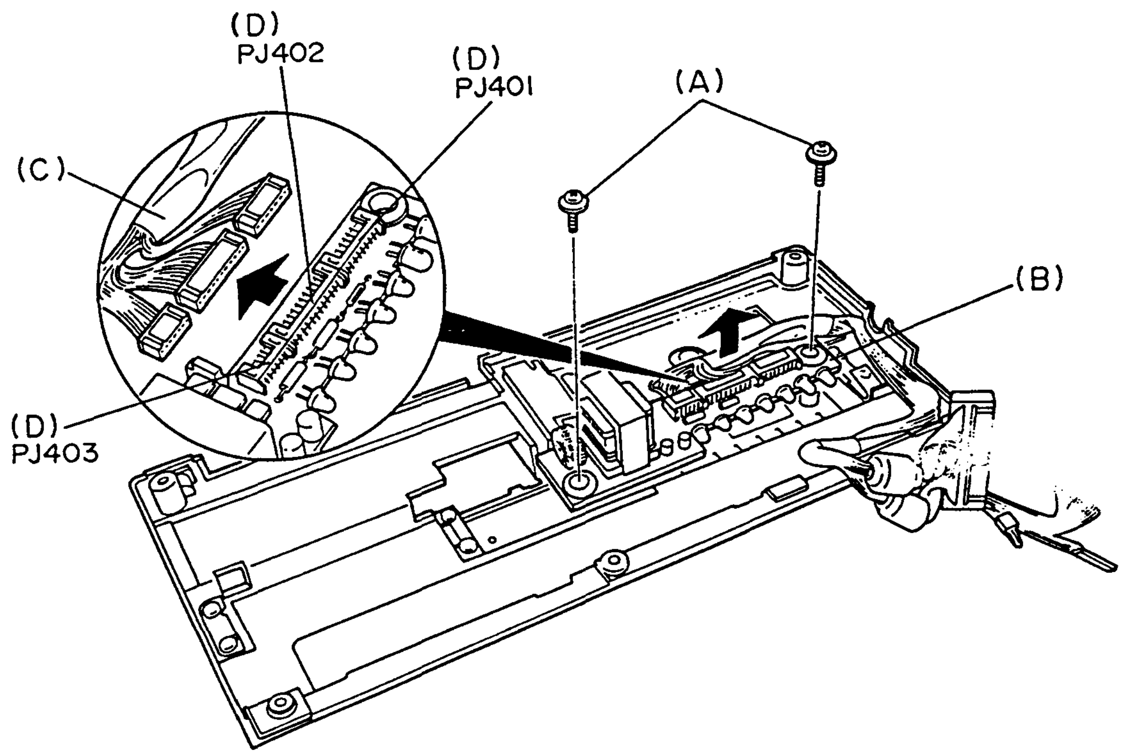


Figure 4-14 Removing the LED board

3. Remove the two screws (E) fixing the LCD cable (F).

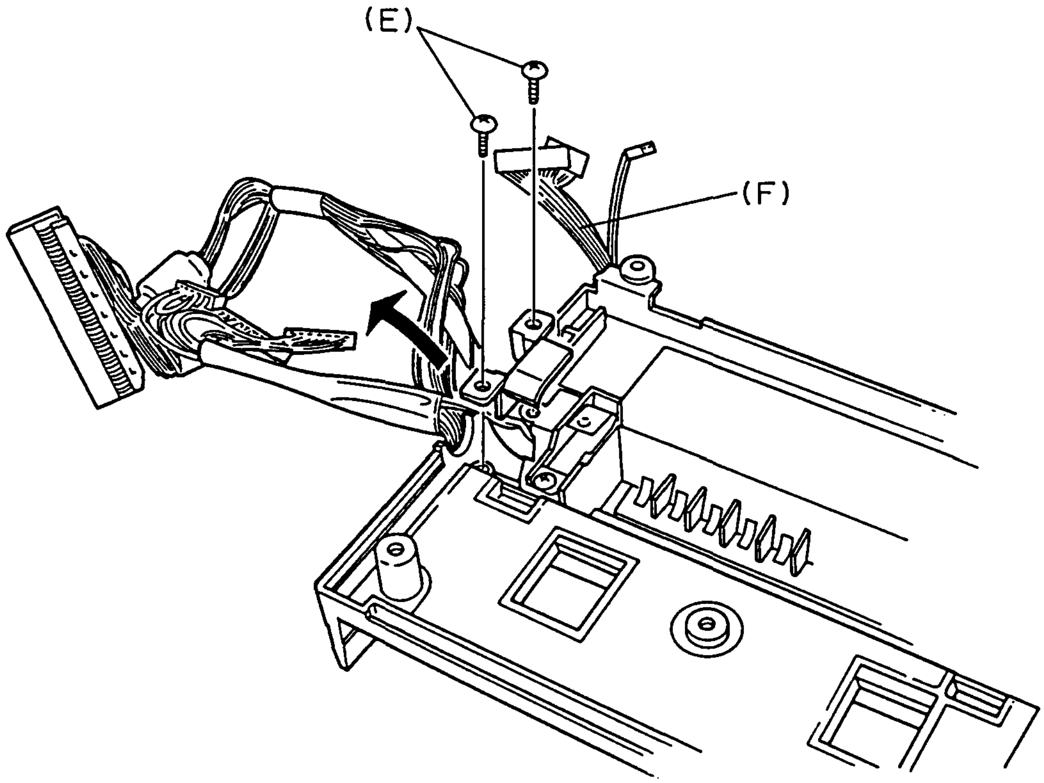


Figure 4-15 Removing the LCD cable

4. To install the LED board and the LCD cable, follow the above procedures in reverse.

4.8 REMOVING/REPLACING THE SUB BATTERY, THE FDD AND THE MODEM CABLE

1. Remove the top cover as directed in the section 4.6.

2. Disconnect the sub battery cable (A) from the PJ503 (B) located on the system board, then remove the sub battery (C) from the system unit.

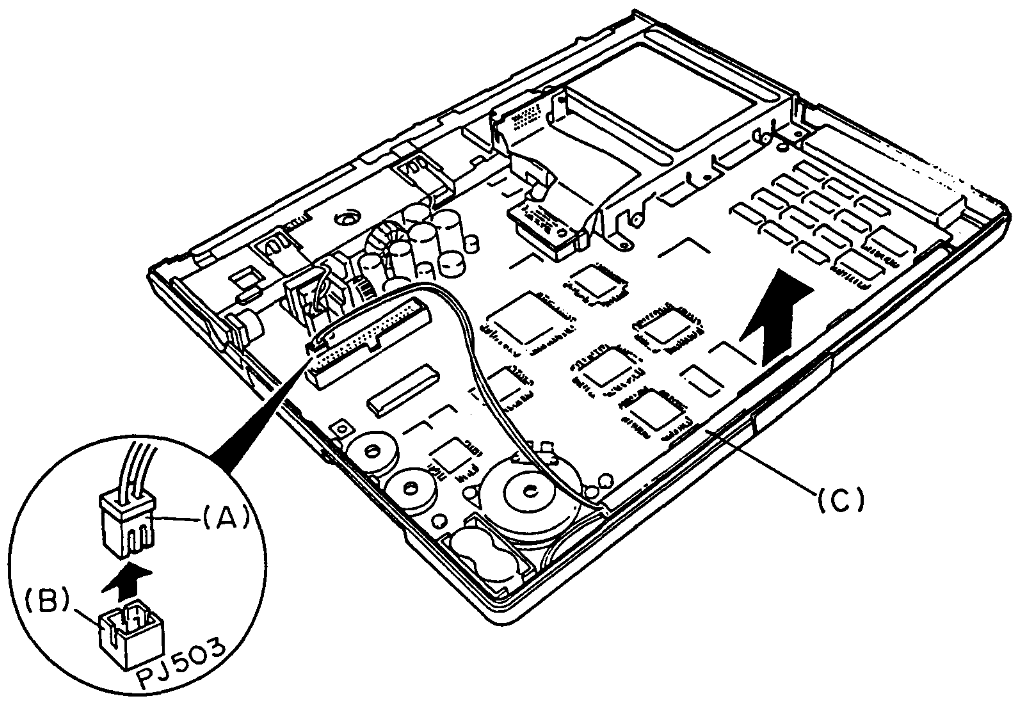


Figure 4-16 Removing the sub battery

3. Disconnect the modem cable (D) from the PJ6 (E) located on the system board. Remove the screw (F), then remove the modem cable from the FDD unit (G).

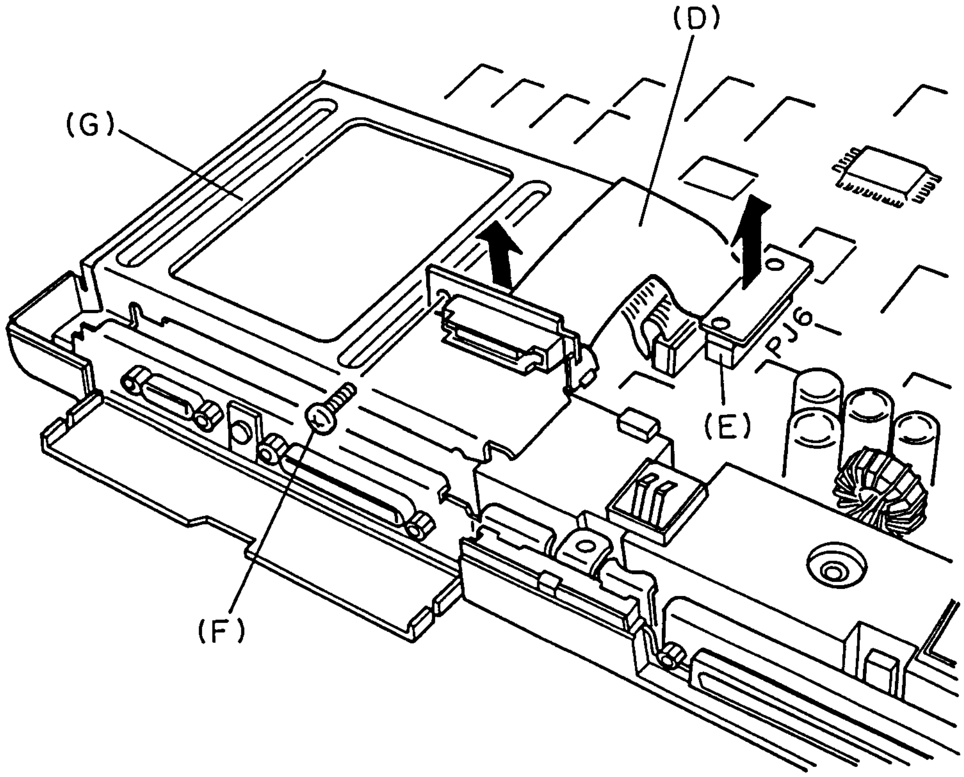


Figure 4-17 Removing the modem cable

4. Remove the screw (H) fixing the FDD unit from the system board. Then disconnect the FDD cable (I) from the PJ5 located on the system board.

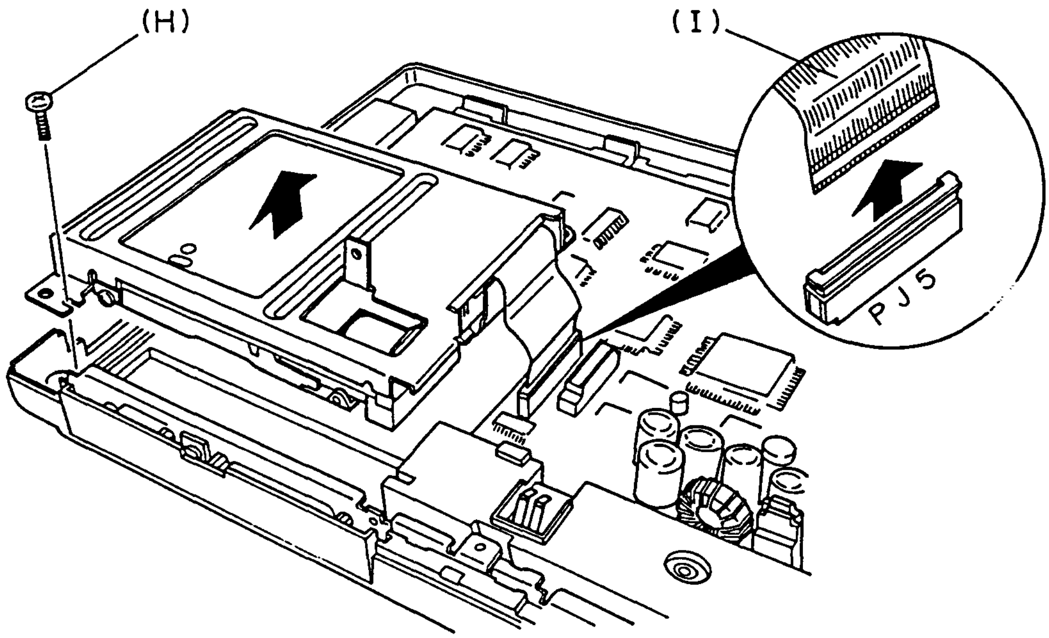


Figure 4-18 Removing the FDD unit

5. Remove the three screws (J) fixing the FDD unit (K) from the FDD support (L).

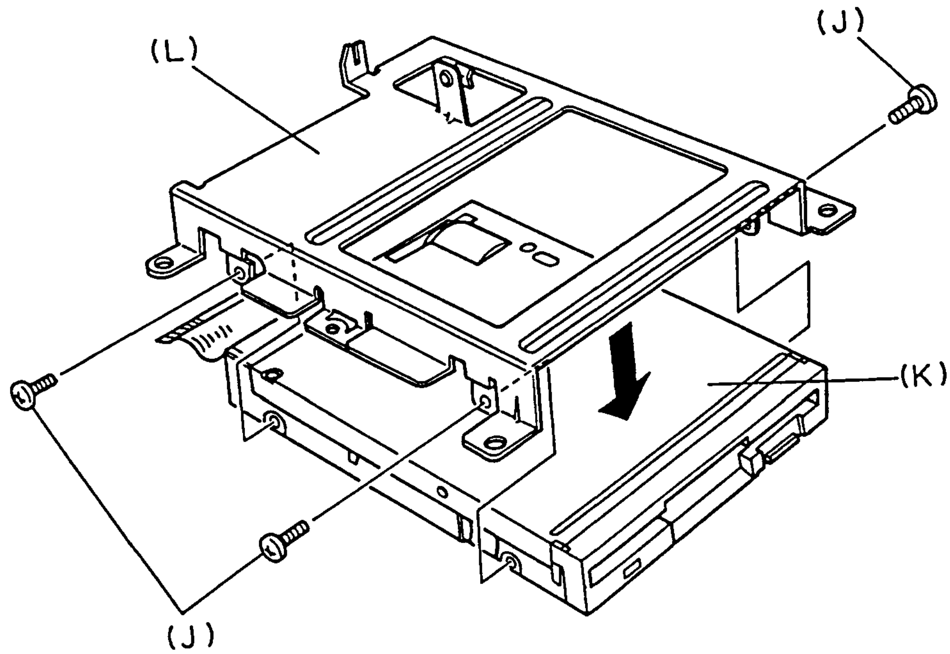


Figure 4-19 Removing the three screws

6. To install the sub battery, the FDD, and the modem cable, follow the above procedures in reverse.

4.9 REMOVING/REPLACING THE SYSTEM BOARD

1. Remove the sub battery, modem cable, and the FDD as directed in the section 4.8.

2. Disconnect the battery cable (A) from the PJ502 (B) located on the system board, then remove the battery cable assembly (C) from the system board.

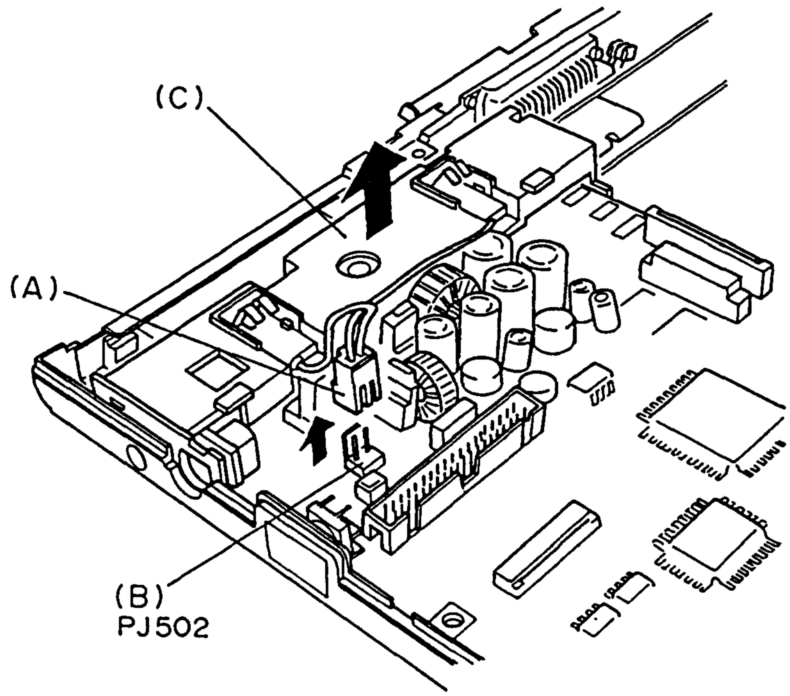


Figure 4-20 Removing the battery cable assembly

3. Remove the six screws (D) to remove the system board from the system unit.

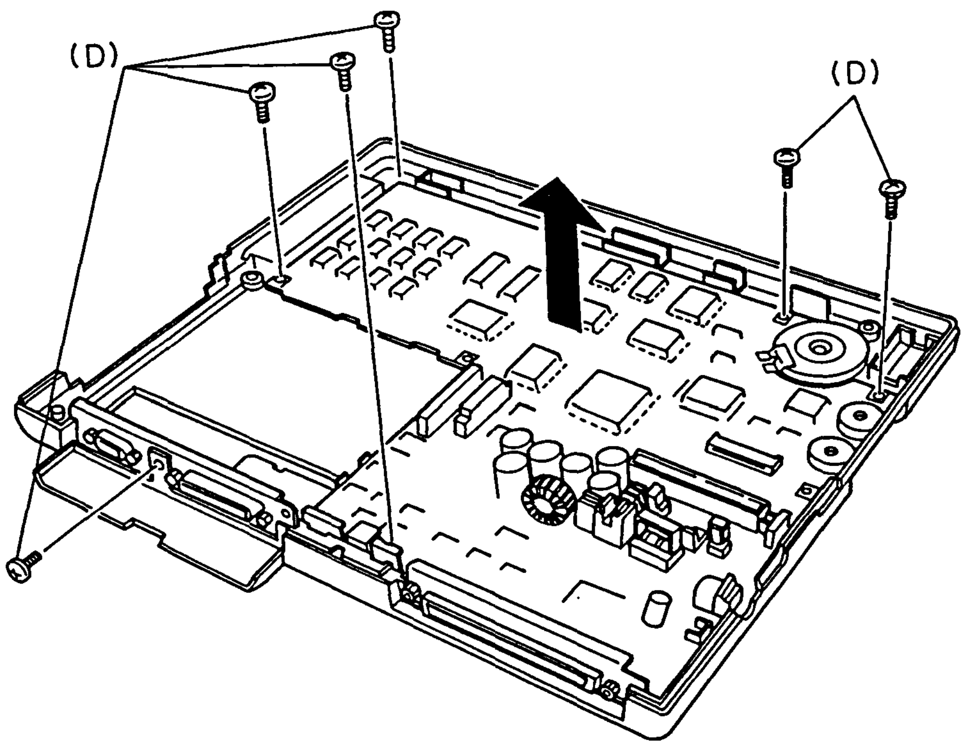


Figure 4-21 Removing the system board

4. To install the system board, follow the above procedures in reverse.

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APPENDIX A
BOARD LAYOUT

1. System board FS1CP3 (ICs)

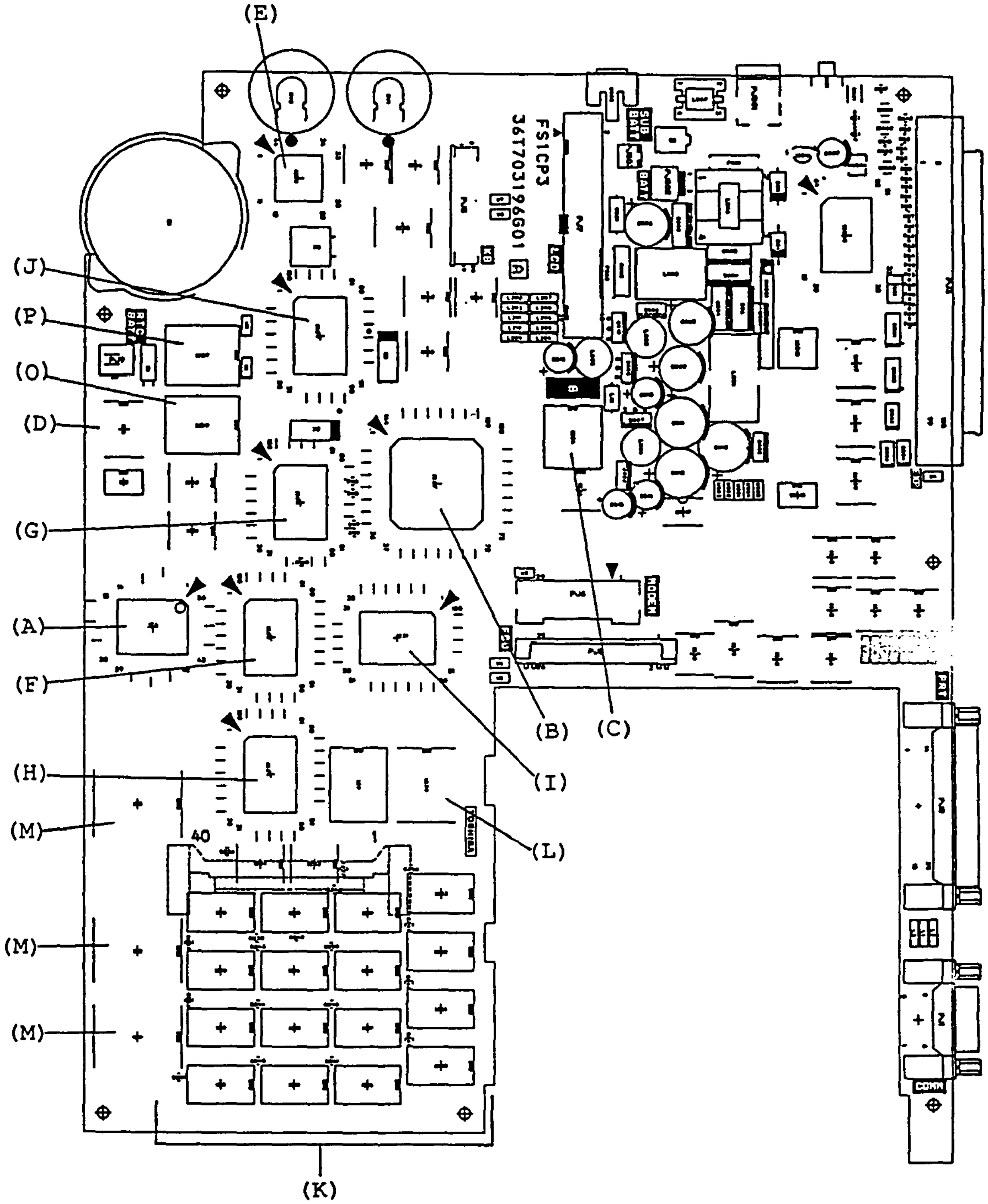

Figure A-1 System board FS1CP3 (ICs)

(A) CPU : Central processing unit (80C86A-10)

(B) SI : Super integration (T9776)

(C) VFO : Variable frequency oscillator (TC8568)

(D) RTC : Real time clock (TC8521AM)

(E) KBC : Keyboard controller (TMP80C49AF-6)

(F) BUSD-GA : Bus driver gate array

(G) BUSC-GA : Bus controller gate array

(H) EMEC-GA : EXP memory controller gate array

(I) IOCONT-GA : IO controller gate array

(J) DISPCNT-GA : Display controller gate array

(K) SYSTEM RAMS

(L) BIOS ROM

(M) DOS ROM

(N) BACKUP RAM

(O) VIDEO RAM

(P) CG ROM

2. System board FS1CP3 (connector's)

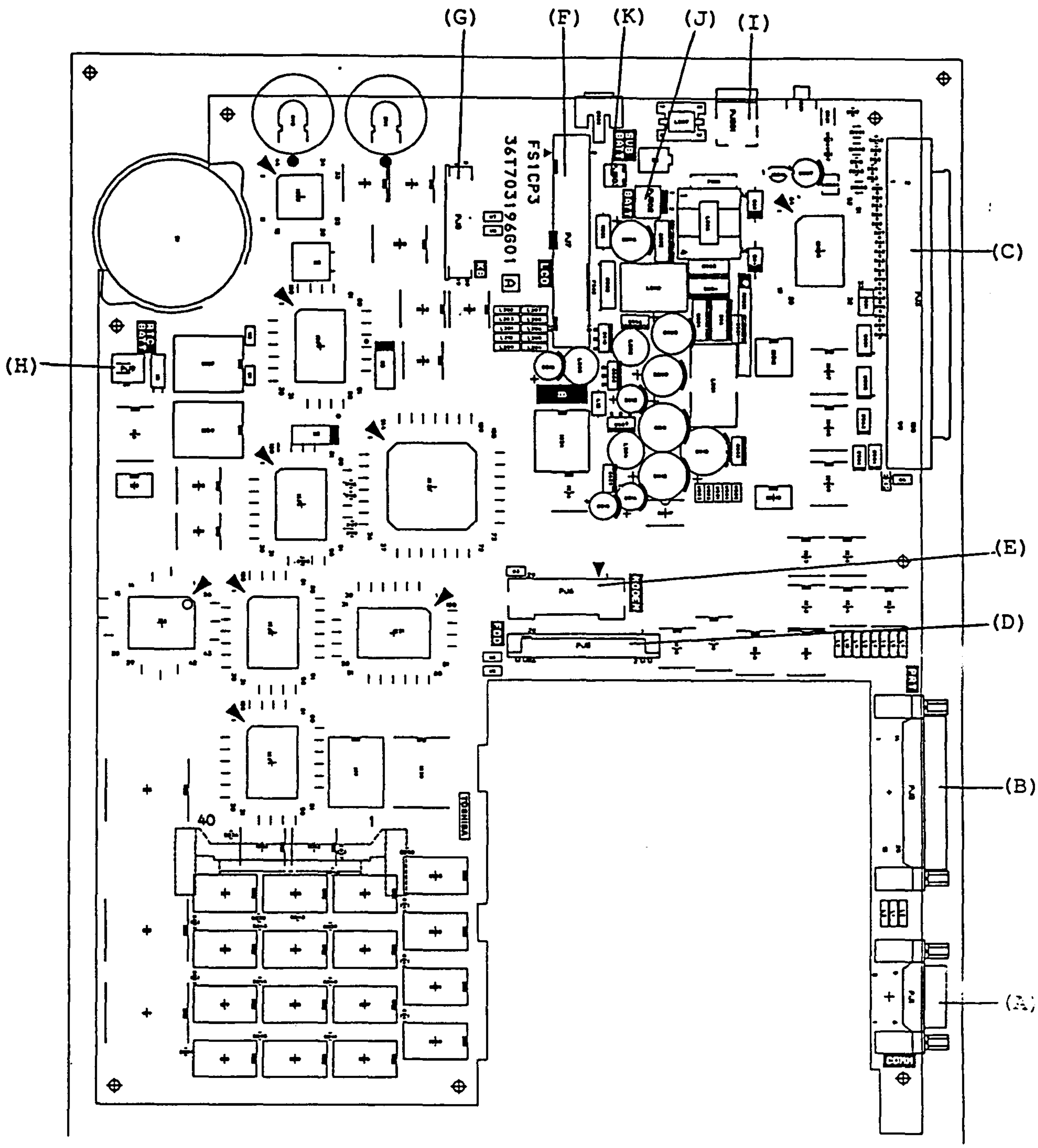

Figure A-3 System board FS1CP3 connector's

System board FS1CP3 rear (connector's)

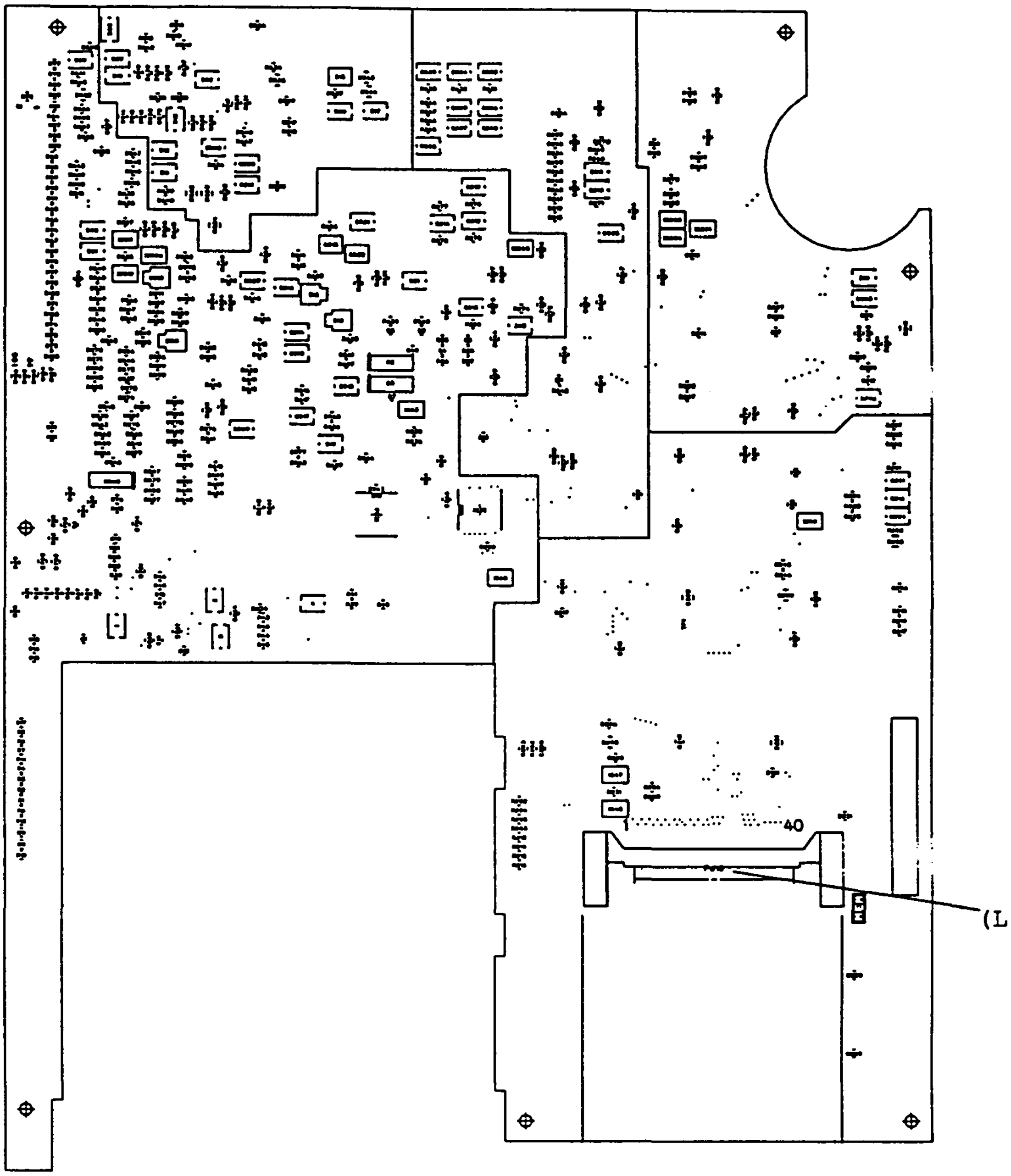

Figure A-4 System board FS1CP3 rear connector's

(A) PJ1 Communication connector

(B) PJ2 PRT/EXT.FDD I/F connector

(C) PJ3 Expansion bus connector

(D) PJ5 FDD I/F connector

(E) PJ6 MODEM I/F connector

(F) PJ7 LCD I/F connector

(G) PJ8 Keyboard I/F connector

(H) PJ9 RTC battery I/F connector

(I) PJ501 DC-IN connector

(J) PJ502 Battery connector

(K) PJ503 Sub battery connector

(L) PJ10 EXP memory connector

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APPENDIX B
PIN ASSIGNMENT

1. PJ 1 Communicaton Connector

Table B-1 Communication connector pin assignment (9-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	DCD;100	I	5	GND	
2	RD;000	I	6	DSR;100	I
3	SD;000	O	7	RTS;100	O
4	DTR;100	O	8	CTS;100	I
			9	RI;100	I

2. PJ 2 PRT/EXT.FDD I/F Connector

Table B-2 PRT/EXT.FDD I/F connector pin assignment (25-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	STROBE;000	O	13	SELECT;100	I
2	PD0;100	O	14	AUTFD;000	I/O
3	PD1;100	O	15	ERROR;000	I
4	PD2;100	O	16	PINIT;000	O
5	PD3;100	O	17	SLIN;000	I/O
6	PD4;100	O	18	GND	
7	PD5;100	O	19	GND	
8	PD6;100	O	20	GND	
9	PD7;100	O	21	GND	
10	ACK;000	I	22	GND	
11	BUSY;100	I	23	GND	
12	PE;100	I	24	GND	
			25	GND	

3. PJ 3 Expansion Bus Connector

Table B-3 Expansion bus connector pin assignment (100-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		41	MEWR;001	O
2	KVCC;100	O	42	XMERD;001	O
3	KGND;000	O	43	GND	
4	CPCNF;100	I	44	XIOWR;001	I/O
5	MDSL;001	I/O	45	XIORD;001	I/O
6	CMCK;102	O	46	TC;101	O
7	MIRQ;001	I	47	CALE;101	O
8	SPTON;001	I	48	RESET;101	O
9	GND		49	DACK;001	O
10	A0BB;101	O	50	IRQ2;101	I
11	A01;101	O	51	GND	
12	A02;101	O	52	N.C.	
13	A03;101	O	53	CPCKB;101	O
14	A04;101	O	54	IRQ5;101	I
15	A05;101	O	55	DRQ3;101	I
16	A06;101	O	56	DACK3;001	O
17	A07;101	O	57	CPADE;001	O
18	GND		58	DRQ1;101	I
19	A08;101	O	59	IORDY;101	I
20	A09;101	O	60	GND	
21	A10;101	O	61	N.C.	
22	A11;101	O	62	N.C.	
23	A12;101	O	63	N.C.	
24	A13;101	O	64	N.C.	
25	A14;101	O	65	N.C.	
26	A15;101	O	66	N.C.	
27	GND		67	N.C.	
28	A16;101	O	68	N.C.	
29	A17;101	O	69	N.C.	
30	A18;101	O	70	GND	
31	A19;101	O	71	N.C.	
32	SYD0;101	I/O	72	N.C.	
33	SYD1;101	I/O	73	IRQ6;101	I
34	SYD2;101	I/O	74	N.C.	
35	SYD3;101	I/O	75	N.C.	
36	GND		76	N.C.	
37	SYD4;101	I/O	77	DRQ2;101	I
38	SYD5;101	I/O	78	N.C.	
39	SYD6;101	I/O	79	N.C.	
40	SYD7;101	I/O	80	N.C.	

Table B-3 Expansion bus connector pin assignment (100-pin) (continued)

Pin	Signal	I/O	Pin	Signal	I/O
81	N.C.		91	N.C.	
82	GND		92	DACK2;001	O
83	DACK0;001	O	93	N.C.	
84	N.C.		94	N.C.	
85	N.C.		95	N.C.	
86	N.C.		96	N.C.	
87	N.C.		97	MDSL2;001	I
88	IOERR;001	I	98	N.C.	
89	N.C.		99	IRQ7;101	I
90	GND		100	GND	

4. PJ 5 FDD I/F Connector

Table B-4 FDD I/F connector pin assignment (26-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	VCC		14	STEP;000	O
2	INDEX;000	I	15	GND	
3	VCC		16	WDATA;000	O
4	FDSELA;000	O	17	GND	
5	VCC		18	WGATE;000	O
6	DSKCHG;000	I	19	GND	
7	VCC		20	TRACK0;000	I
8	READY;000	I	21	GND	
9	MEDIA;000	I	22	WPROTC;000	I
10	MONA;000	O	23	GND	
11	LOWDNS;000	O	24	RDDA;000	I
12	FDCDRC;000	O	25	GND	
13	GND		26	SIDE;000	O

5. PJ 6 MODEM I/F Connector

Table B-6 MODEM I/F connector pin assignment (30-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	MVEE;000	O	16	GND	
2	BMDSL;000	O	17	SYD2;100	I/O
3	COMCLK;100	O	18	SYD1;100	I/O
4	GND		19	GND	
5	A0BB;100	O	20	GND	
6	A01;100	O	21	SYD0;100	I/O
7	A02;100	O	22	XIOWR;000	O
8	GND		23	XIORD;000	O
9	SYD7;100	I/O	24	VCC	
10	SYD6;100	I/O	25	RESET;100	O
11	GND		26	BMPOF;100	O
12	GND		27	VCC	
13	SYD5;100	I/O	28	VCC	
14	SYD4;100	I/O	29	BMIRQ;000	I
15	SYD3;100	I/O	30	BMSPK;000	I

6. PJ 7 LCD I/F Connector

Table B-6 LCD I/F connector pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	SLOWL;110	O	21	GND	
2	FASTL;100	O	22	FP;100	O
3	LBATLE;100	O	23	LP;100	O
4	DCHG;100	O	24	SCP;100	O
5	DPSL;100	O	25	GND	
6	ADLED;010	O	26	UD0;100	O
7	CAPL;010	O	27	ID1;100	O
8	NUML;110	O	28	UD2;100	O
9	SCRL;010	O	29	UD3;100	O
10	PVBL;100	O	30	GND	
11	PVBL;100	O	31	LCD5V;100	O
12	PVBL;100	O	32	CNTRST;100	O
13	TRIG;100	O	33	LCDVEE;000	O
14	CBLON;000	O	34	LD0;110	O
15	BRIT1;000	I	35	LD1;110	O
16	BRIT2;100	O	36	LD2;100	O
17	BRIT3;100	I	37	LD3;100	O
18	GND		38	GND	
19	GND		39	GND	
20	GND		40	GND	

7. PJ 8 Keyboard I/F Connector

Table B-7 Keyboard I/F connector pin assignment (20-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	KBSC0;000	O	11	KBSC10;000	O
2	KBSC1;000	O	12	KBRTN0;000	I
3	KBSC2;000	O	13	KBRTN1;000	I
4	KBSC3;000	O	14	KBRTN2;000	I
5	KBSC4;000	O	15	KBRTN3;000	I
6	KBSC5;000	O	16	KBRTN4;000	I
7	KBSC6;000	O	17	KBRTN5;000	I
8	KBSC7;000	O	18	KBRTN7;000	I
9	KBSC8;000	O	19	KBRTN8;000	I
10	KBSC9;000	O	20	N.C.	

8. PJ 9 RTC Battery I/F Connector

Table B-8 RTC battery I/F connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		2	RTV;100	I

9. PJ 501 DC-IN Connector

Table B-9 DC-IN connector pin assignment (3-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	JACK;100	I	3	JACK;000	I
2	JACK;000	I			

10. PJ 502 Battery Connector

Table B-10 Battery connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	ICHG;100	I	2	GND	

11. PJ 503 Sub Battery Connector

Table B-11 Sub battery connector pin assignment (2-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	PSOBAT;100	I	2	GND	

12. PJ 10 EXP Memory Connector

Table B-12 EXP memory connector pin assignment (40-pin)

Pin	Signal	I/O	Pin	Signal	I/O
1	GND		21	MVRAM;100	O
2	AD03;100	I/O	22	DRA7;110	O
3	AD04;100	I/O	23	DRA6;110	O
4	AD05;100	I/O	24	DRA5;110	O
5	AD06;100	I/O	25	DRA4;110	O
6	AD07;100	I/O	26	DRA3;110	O
7	AD08;100	I/O	27	DRA2;110	O
8	AD09;100	I/O	28	DRA1;110	O
9	AD10;100	I/O	29	GND	
10	DRA8;110	O	30	GND	
11	GND		31	DRA0;110	O
12	CASH;000	O	32	AD00;100	I/O
13	RASB2;000	O	33	AD01;100	I/O
14	RASB1;000	O	34	AD02;100	I/O
15	XMEWR;010	O	35	AD11;100	I/O
16	CASL;000	O	36	AD12;100	I/O
17	RASB3;000	O	37	AD13;100	I/O
18	RASB0;000	O	38	AD14;100	I/O
19	BVRAM;100	O	39	AD15;100	I/O
20	MVRAM;100	O	40	GND	

APPENDIX C
DISPLAY CODE

Table C-1 Display code

HEXA DECIMAL VALUE	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	BLANK (NULL)	►	BLANK (SPACE)	0	@	P	‘	p	Ç	É	á	░	└	╨	α	≡
1	☺	◄	!	1	A	Q	a	q	ü	æ	í	▒	┴	╤	β	±
2	☻	↕	"	2	B	R	b	r	é	Æ	ó	▓	┬	╥	Γ	≥
3	♥	‼	#	3	C	S	c	s	â	ô	ú	│	├	╙	π	≤
4	♦	¶	$	4	D	T	d	t	ä	ö	ñ	┤	─	╘	Σ	⌠
5	♣	§	%	5	E	U	e	u	à	ò	Ñ	╡	┼	╒	σ	⌡
6	♠	▬	&	6	F	V	f	v	å	û	ª	╢	╞	╓	µ	÷
7	•	↨	’	7	G	W	g	w	ç	ù	º	╖	╟	╫	τ	≈
8	◘	↑	(	8	H	X	h	x	ê	ÿ	¿	╕	╚	╪	Φ	°
9	○	↓	)	9	I	Y	i	y	ë	Ö	⌐	╣	╔	┘	Θ	•
A	◙	→	*	:	J	Z	j	z	è	Ü	¬	║	╩	┌	Ω	•
B	♂	←	+	;	K	[	k	{	ï	¢	½	╗	╦	█	δ	√
C	♀	∟	,	<	L	\	l	¦	î	£	¼	╝	╠	▄	∞	^{n}
D	♪	↔	—	=	M	]	m	}	ì	¥	¡	╜	═	▌	φ	^{2}
E	♫	▲	.	>	N	^	n	~	Ä	Pt	Ø	╛	╬	▐	∈	■
F	☼	▼	/	?	O	_	o	△	Å	ƒ	»	┐	╧	▀	∩	BLANK FF

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APPENDIX D
KEYBOARD SCAN/CHARACTER CODES

Table D-1 Scan code, character code, and key top names

Cap No.	Key Top	Lower Case	Upper Case	Num Lock Lower	Num Lock Upper	With (Ctrl)	With (Alt)
1	~ \`	29 60	29 7E	29 60	29 7E	-	*29 00
2	! 1	02 31	02 21	02 31	02 21	-	78 00
3	@ 2	03 32	03 40	03 32	03 40	03 00	79 00
4	# 3	04 33	04 23	04 33	04 23	-	7A 00
5	$ 4	05 34	05 24	05 34	05 24	-	7B 00
6	% 5	06 35	06 25	06 35	06 25	-	7C 00
7	^ 6	07 36	07 5E	07 36	07 5E	07 1E	7D 00
8	& 7	08 37	08 26	08 37	08 26	-	7E 00

Table D-1 Scan code, character code, and key top names (continued)

Cap No.	Key Top	Lower Case	Upper Case	Num Lock Lower	Num Lock Upper	With (Ctrl)	With (Alt)
9	* 8	09 38	09 2A	09 38	09 2A	-	7F 00
10	(9	0A 39	0A 28	0A 39	0A 28	-	80 00
11	) 0	0B 30	0B 29	0B 30	0B 29	-	81 00
12	_ -	0C 2D	0C 5F	0C 2D	0C 5F	0C 1F	82 00
13	+ =	0D 3D	0D 2B	0D 3D	0D 2B	-	83 00
15	Back space	0E 08	0E 08	0E 08	0E 08	0E 7F	*0E 00
16	Tab	0F 09	0F 00	0F 09	0F 00	*94 00	*A5 00
17	Q	10 71	10 51	10 51	10 71	10 11	10 00
18	W	11 77	11 57	11 57	11 77	11 17	11 00
19	E	12 65	12 45	12 45	12 65	12 05	12 00
20	R	13 72	13 52	13 52	13 72	13 12	13 00
21	T	14 74	14 54	14 54	14 74	14 14	14 00
22	Y	15 79	15 59	15 59	15 79	15 19	15 00
23	U	16 75	16 55	16 55	16 75	16 15	16 00
24	I	17 69	17 49	17 49	17 69	17 09	17 00

Table D-1 Scan code, character code, and key top names (continued)

Cap No.	Key Top	Lower Case	Upper Case	Num Lock Lower	Num Lock Upper	With (Ctrl)	With (Alt)
25	O	18 6F	18 4F	18 4F	18 6F	18 0F	18 00
26	P	19 70	19 50	19 50	19 70	19 10	19 00
27	{ [	1A 5B	1A 7B	1A 5B	1A 7B	1A 1B	*1A 00
28	}]	1B 5D	1B 7D	1B 5D	1B 7D	1B 1D	*1B 00
29	| \	2B 5C	2B 7C	2B 5C	2B 7C	2B 1C	*2B 00
30	Caps Lock	-	-	-	-	-	-
31	A	1E 61	1E 41	1E 41	1E 61	1E 01	1E 00
32	S	1F 73	1F 53	1F 53	1F 73	1F 13	1F 00
33	D	20 64	20 44	20 44	20 64	20 04	20 00
34	F	21 66	21 46	21 46	21 66	21 06	21 00
35	G	22 67	22 47	22 47	22 67	22 07	22 00
36	H	23 68	23 48	23 48	23 68	23 08	23 00
37	J	24 6A	24 4A	24 4A	24 6A	24 0A	24 00
38	K	25 6B	25 4B	25 4B	25 6B	25 0B	25 00
39	L	26 6C	26 4C	26 4C	26 6C	26 0C	26 00
40	: ;	27 3B	27 3A	27 3B	27 3A	-	*27 00

Table D-1 Scan code, character code, and key top names (continued)

Cap No.	Key Top	Lower Case	Upper Case	Num Lock		With (Ctrl)	With (Alt)
				Lower	Upper		
41	" '	28 27	28 22	28 27	28 22	-	*28 00
43	Enter	1C 0D	1C 0D	1C 0D	1C 0D	1C 0A	*1C 00
44	Shift (L)	-	-	-	-	-	-
45	\ |	56 5C	56 7C	56 5C	56 7C	-	-
46	Z	2C 7A	2C 5A	2C 5A	2C 7A	2C 1A	2C 00
47	X	2D 78	2D 58	2D 58	2D 78	2D 18	2D 00
48	C	2E 63	2E 43	2E 43	2E 63	2E 03	2E 00
49	V	2F 76	2F 56	2F 56	2F 76	2F 16	2F 00
50	B	30 62	30 42	30 42	30 62	30 02	30 00
51	N	31 6E	31 4E	31 4E	31 6E	31 0E	31 00
52	M	32 6D	32 4D	32 4D	32 6D	32 0D	32 00
53	< ,	33 2C	33 3C	33 2C	33 3C	-	*33 00
54	> .	34 2E	34 3E	34 2E	34 3E	-	*34 00
55	? /	35 2F	35 3F	35 2F	35 3F	-	*35 00
57	Shift (R)	-	-	-	-	-	-
58	Ctrl (L)	-	-	-	-	-	-
60	Alt (L)	-	-	-	-	-	-

Table D-1 Scan code, character code, and key top names (continued)

Cap No.	Key Top	Lower Case	Upper Case	Num Lock Lower	Num Lock Upper	With (Ctrl)	With (Alt)
61	Space	39 20	39 20	39 20	39 20	39 20	39 20
62	AltGr	-	-	-	-	-	-
75	Ins	52 00 52 E0	52 00 52 E0	52 00 52 E0	52 00 52 E0	*92 E0	*A2 00
76	Del	53 00 53 E0	53 00 53 E0	53 00 53 E0	53 00 53 E0	*93 E0	*A3 00
79	<-	4B 00 4B E0	4B 00 4B E0	4B 00 4B E0	4B 00 4B E0	73 00 73 E0	*9B 00
80	Home	47 00 47 E0	47 00 47 E0	47 00 47 E0	47 00 47 E0	77 00 77 E0	*97 00
81	End	4F 00 4F E0	4F 00 4F E0	4F 00 4F E0	4F 00 4F E0	75 00 75 E0	*9F 00
83	|	48 00 48 E0	48 00 48 E0	48 00 48 E0	48 00 48 E0	*8D E0	*98 00
84	|	50 00 50 E0	50 00 50 E0	50 00 50 E0	50 00 50 E0	*91 E0	*A0 00
85	PgUp	49 00 49 E0	49 00 49 E0	49 00 49 E0	49 00 49 E0	84 00 84 E0	*99 00
86	PgDn	51 00 51 E0	51 00 51 E0	51 00 51 E0	51 00 51 E0	76 00 76 E0	*A1 00
89	->	4D 00 4D E0	4D 00 4D E0	4D 00 4D E0	4D 00 4D E0	74 00 74 E0	*9D 00

Table D-1 Scan code, character code, and key top names (continued)

Cap No.	Key Top	Lower Case	Upper Case	Num Lock Lower	Num Lock Upper	With (Ctrl)	With (Alt)
110	Esc	01 1B	01 1B	01 1B	01 1B	01 1B	*01 00
112	F1	3B 00	54 00	3B 00	54 00	5E 00	68 00
113	F2	3C 00	55 00	3C 00	55 00	5F 00	69 00
114	F3	3D 00	56 00	3D 00	56 00	60 00	6A 00
115	F4	3E 00	57 00	3E 00	57 00	61 00	6B 00
116	F5	3F 00	58 00	3F 00	58 00	62 00	6C 00
117	F6	40 00	59 00	40 00	59 00	63 00	6D 00
118	F7	41 00	5A 00	41 00	5A 00	64 00	6E 00
119	F8	42 00	5B 00	42 00	5B 00	65 00	6F 00
120	F9	43 00	5C 00	43 00	5C 00	66 00	70 00
121	F10	44 00	5D 00	44 00	5D 00	67 00	71 00
122	F11	*85 00	*87 00	*85 00	*87 00	*89 00	*8B 00
123	F12	*86 00	*88 00	*86 00	*88 00	*8A 00	*8C 00
124	PrtSc	-	-	-	-	**72 00	-
126	Pause	-	-	-	-	00 00	-
202	Fn	-	-	-	-	-	-

NOTE: *; Only extended code.
**; Only normal code.

APPENDIX E
KEY LAYOUT

1. USA keyboard

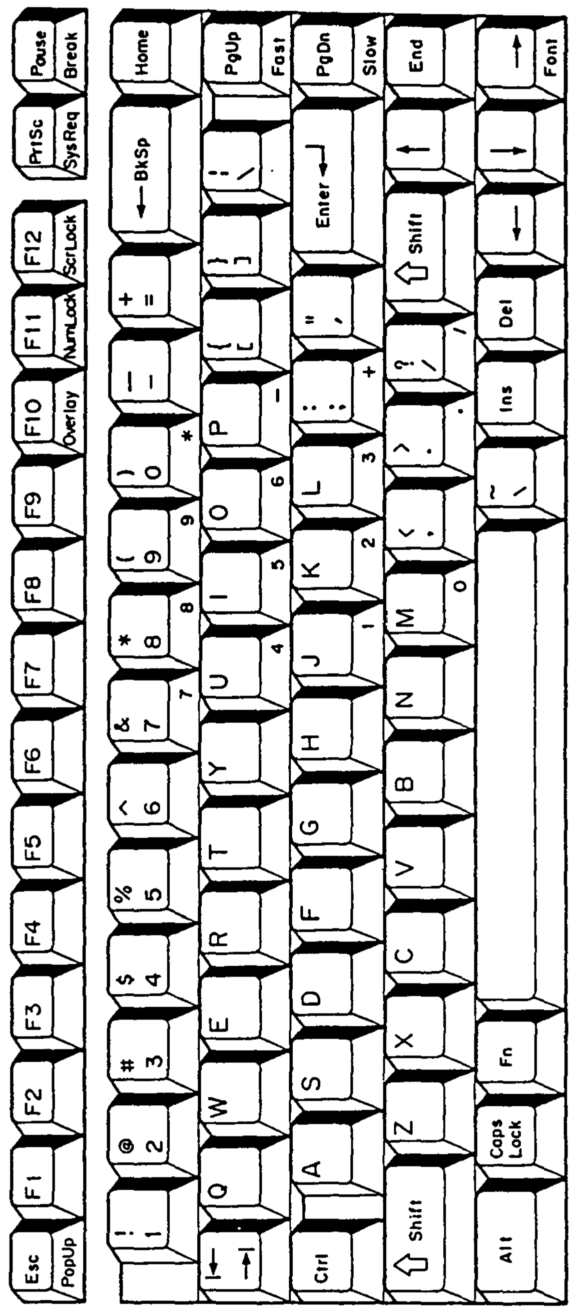

Figure E-1 USA keyboard

2. UK keyboard

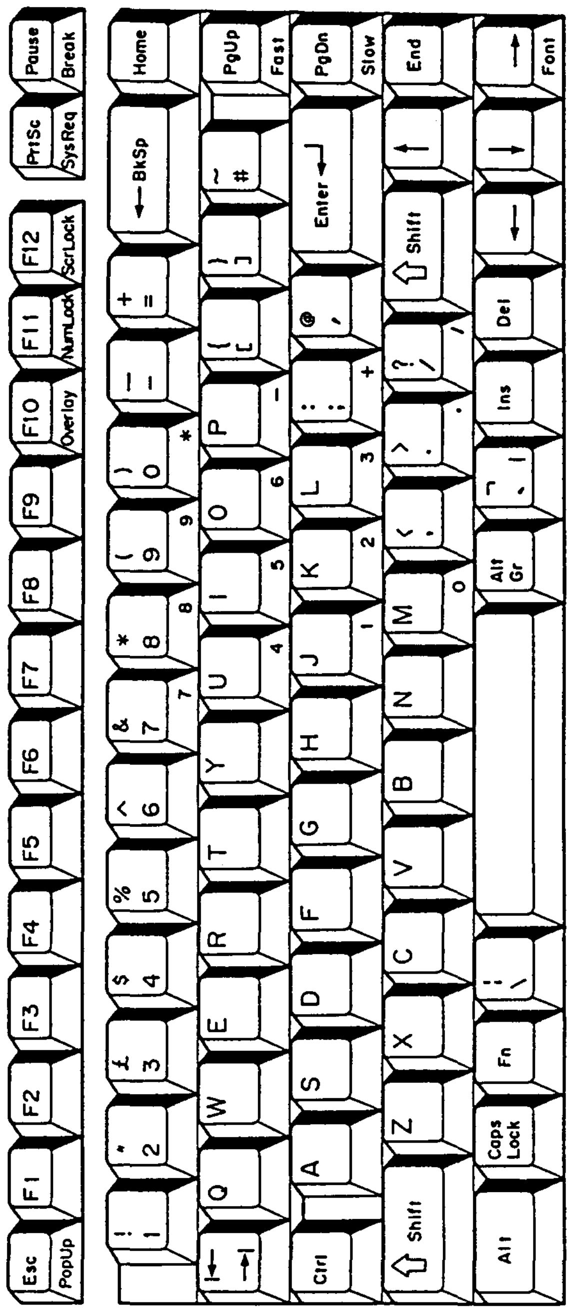

Figure E-2 UK keyboard

3. German keyboard

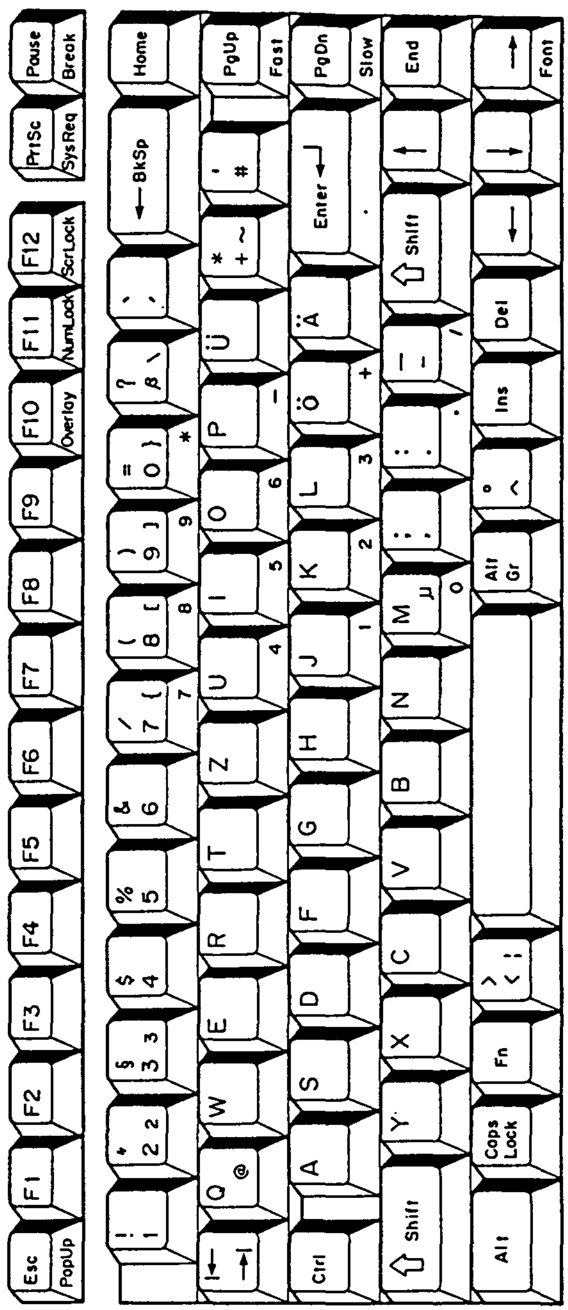

Figure E-3 German keyboard

4. French keyboard

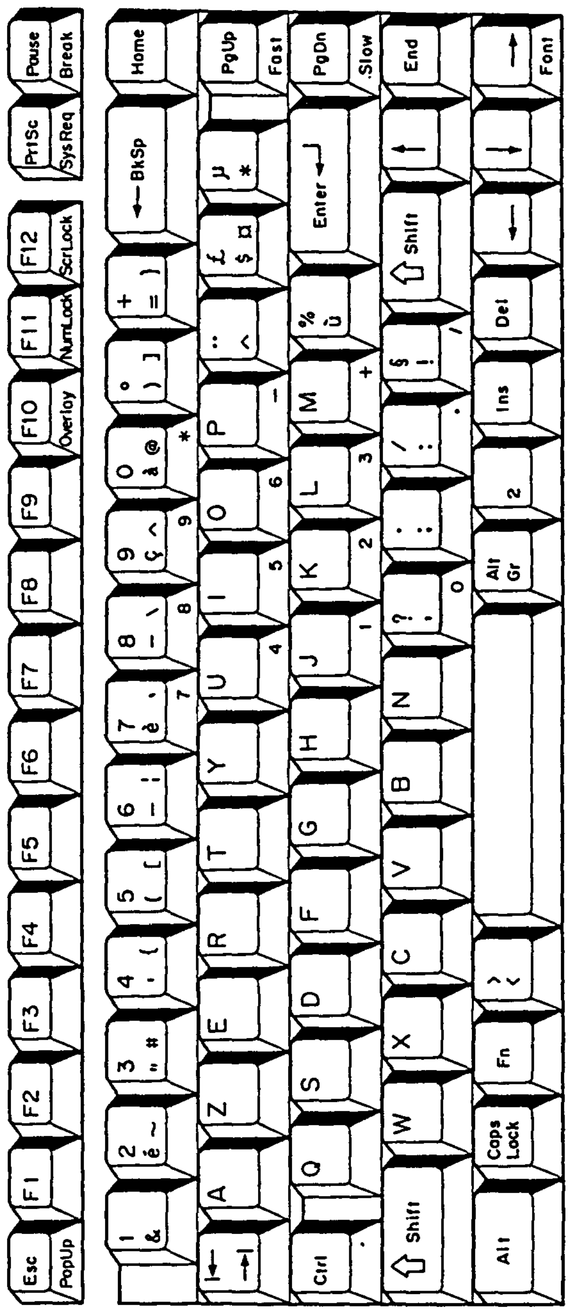

Figure E-4 French keyboard

5. Spanish keyboard

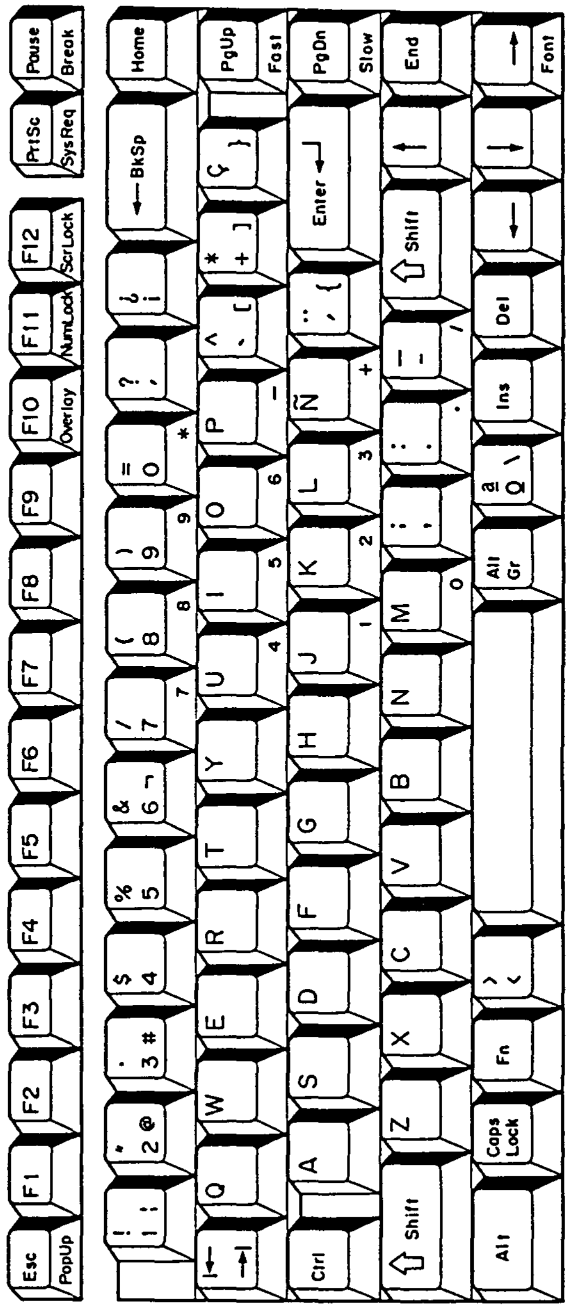

Figure E-5 Spanish keyboard

6. Italian keyboard

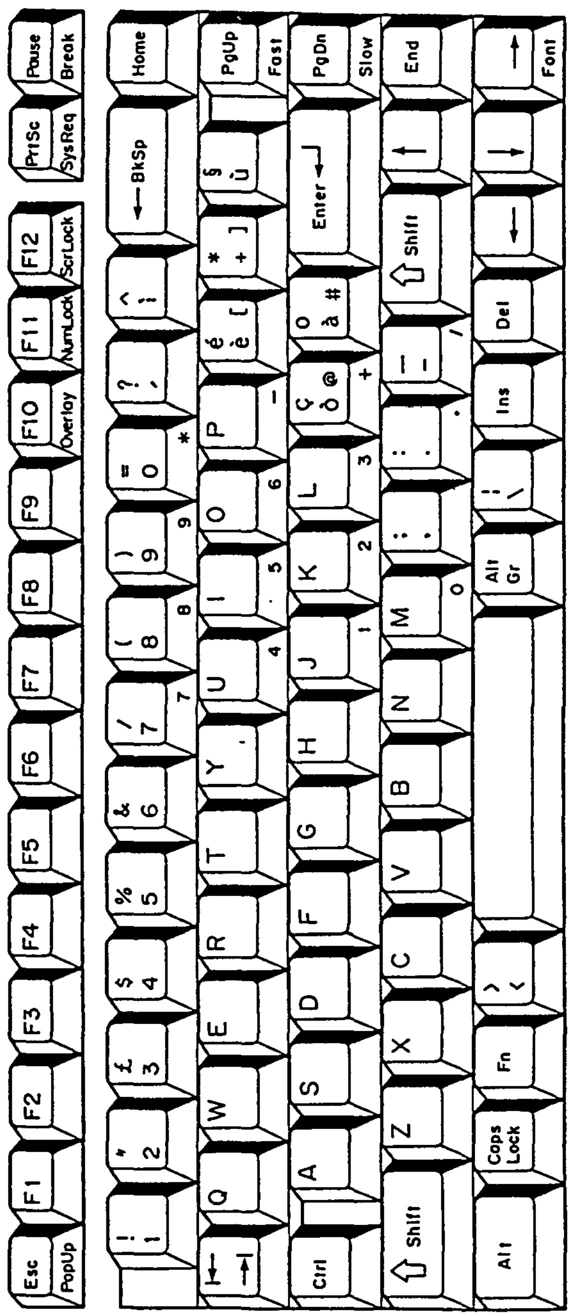

Figure E-6 Italian keyboard

7. Scandinavian keyboard

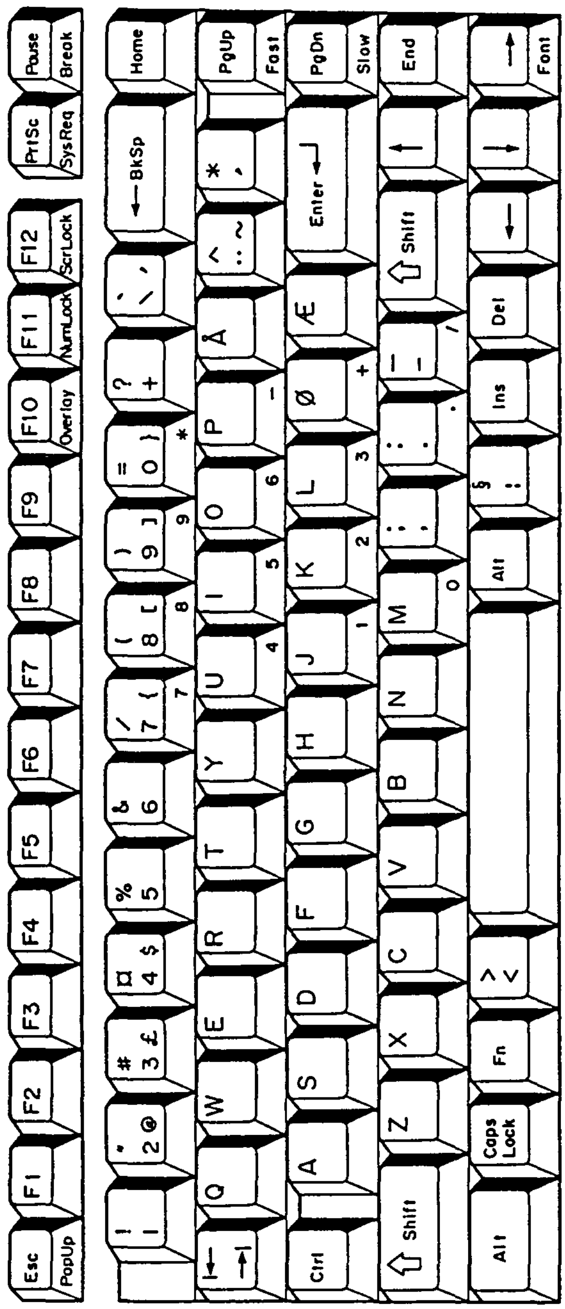

Figure E-7 Scandinavian keyboard

8. Swiss keyboard

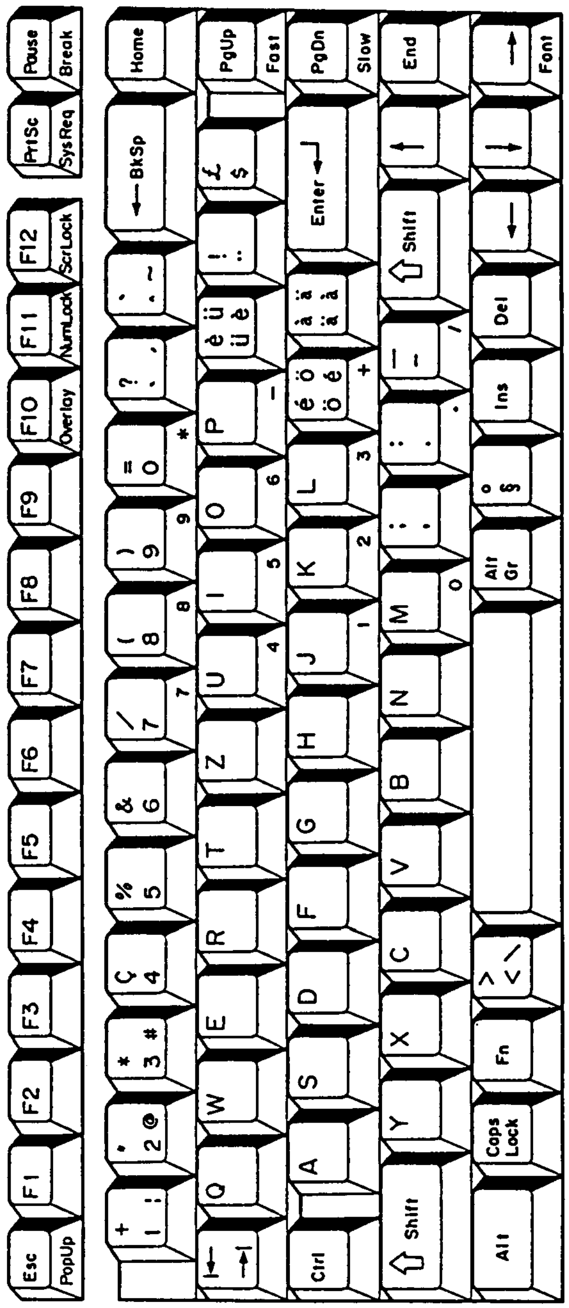

Figure E-8 Swiss keyboard

9. Special Canadian keyboard

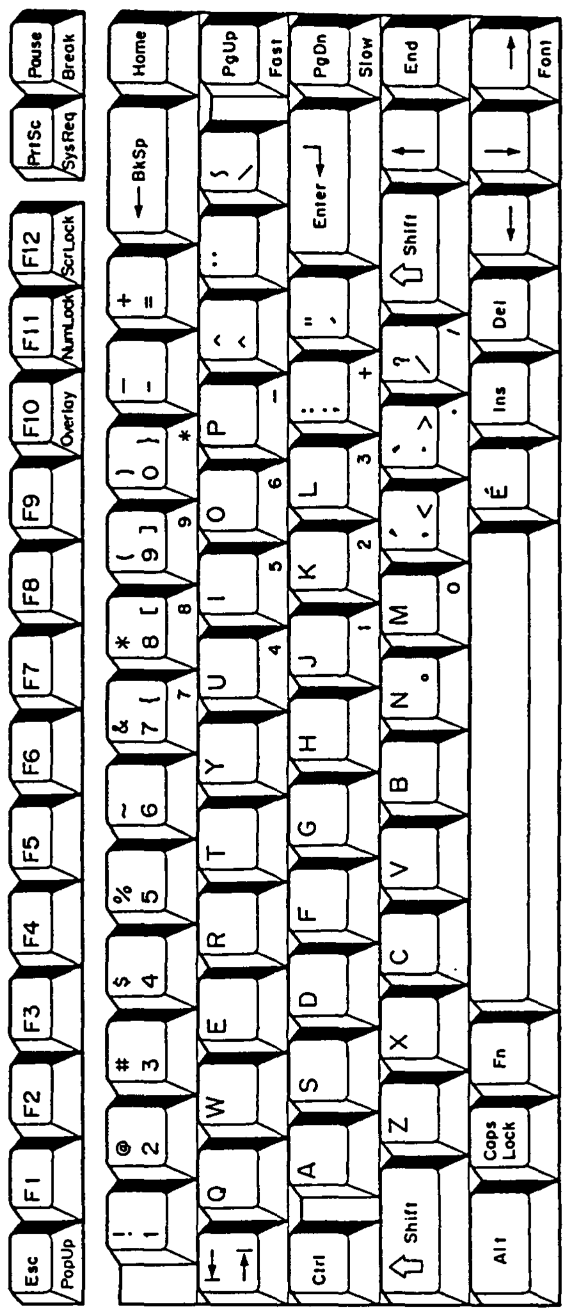

Figure E-9 Special Canadian keyboard

10. Keycap number

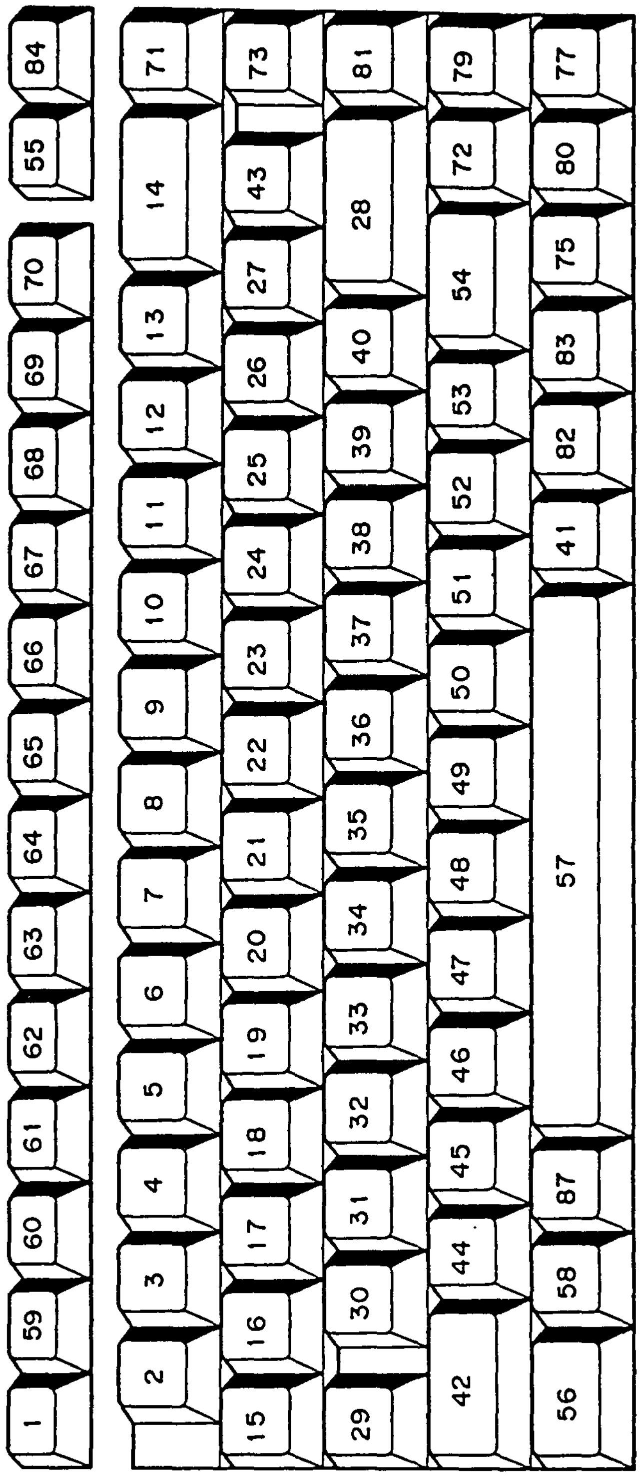

Figure E-10 Keycap number