1.1   Features

The 100CS is one of the lightest and most advanced portable computers available. Utilizing advanced technology and high-speed components, the computer offers multimedia functions, excellent display legibility, battery operation, and IBM PC/AT compatibility. The unit consists of the following features:

❏ Microprocessor

A Pentium® processor with Voltage Reduction Technology (VRT) that operates at 75 MHz and 3.3/2.9 volts.

❏ Memory

Standard 8 MB of CMOS RAM. This includes 640 KB of conventional memory and 7360 KB of extended memory.

❏ Hard Disk Drive (HDD)

An internal 528 million byte (520MB) HDD.

❏ Floppy Disk Drive (FDD)

A 3.5-inch FDD supports 2HD (1.44 MB) floppy disks and 2DD (720 KB) floppy disks.

❏ Display

A 10.4-inch Dual-scan Supertwist Nematic (DSTN) color LCD with 640 x 480 pixels. The built-in display controller supports 640 x 480 resolution with 64k colors capability on the internal LCD and up to 1024 x 768 resolution with 256 colors on an external CRT.

❏ Keyboard

An easy-to-use 82/84-key keyboard provides a numeric keypad overlay for fast numeric data entry or for cursor and page control. The keyboard supports software that uses a 101- or 102-key enhanced keyboard.

❏ Batteries

Three different batteries: a main battery, a backup battery (for memory backup), and an RTC battery (for Real Time Clock).

❏ Expansion memory slot

 An optional 8, 16, or 32 MB memory module can be installed in the memory slot.

❑ Parallel port

This port can be used to connect a Centronics compatible printer or other parallel device. The port supports ECP (Extended Capabilities Port) conforming to IEEE·1284.

❑ Serial port (9-pin)

The serial controller is 16550UART compatible. This port can be used to connect such serial devices as a serial printer, serial mouse, or external modem.

❑ RGB port

The female, 15-pin, D-shell connector can be connected to an external SVGA monitor.

❑ Ext. Keyboard/Mouse port

Either a PS/2 compatible keyboard or a PS/2 compatible mouse can be connected to this port. The computer automatically recognizes which device is connected.

❑ PC card slot

A PC card slot supports up to two Personal Computer Memory Card International Association (PCMCIA) standard version release 2.0 cards. The upper and lower slots can each accommodate one Type II (5.0 mm) card, or the lower slot can accommodate one Type III (10.5 mm) card when the upper slot is empty.

❑ Enhanced port replicator port

This port enables connection of an enhanced port replicator. The enhanced port replicator has two PC card slots (Type III), and expands connections to the following devices: PS/2 keyboard, PS/2 mouse, serial port, parallel port, external CRT, AC-in, and AC-out. The NoteDock does not support the following ports: floppy disk, audio in - audio out, joystick, and selectable ID.

❑ AccuPoint

A pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse.
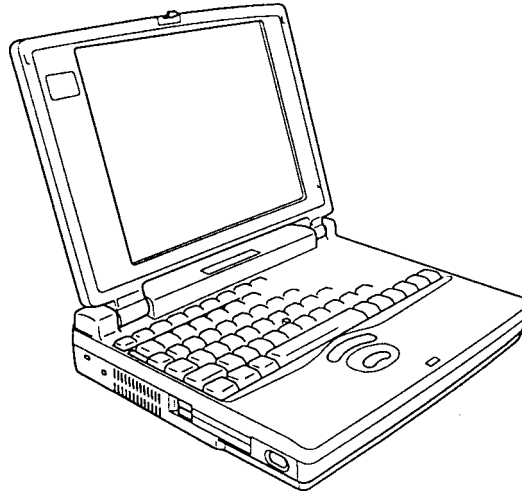
The 100CS Personal Computer is shown in figure 1-1.

Figure 1-1   100CS personal computer

The system configuration is shown in figure 1-2.

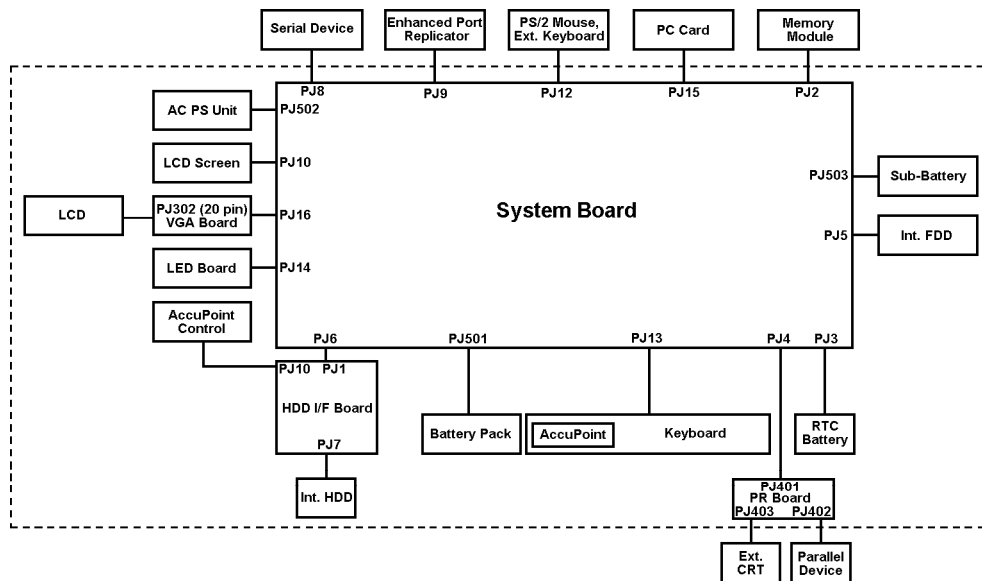*Figure 1-2 System unit configuration*

1.2 System Unit Block Diagram

Figure 1-3 is a block diagram of the system unit.

B5V: VRAM (+5V)
+5V: VCC (+5V)
MCV: Power supply
microprocessor (+5V)
B3V: Memory (+3.3V)
CPUV: CPU (+2.9V)

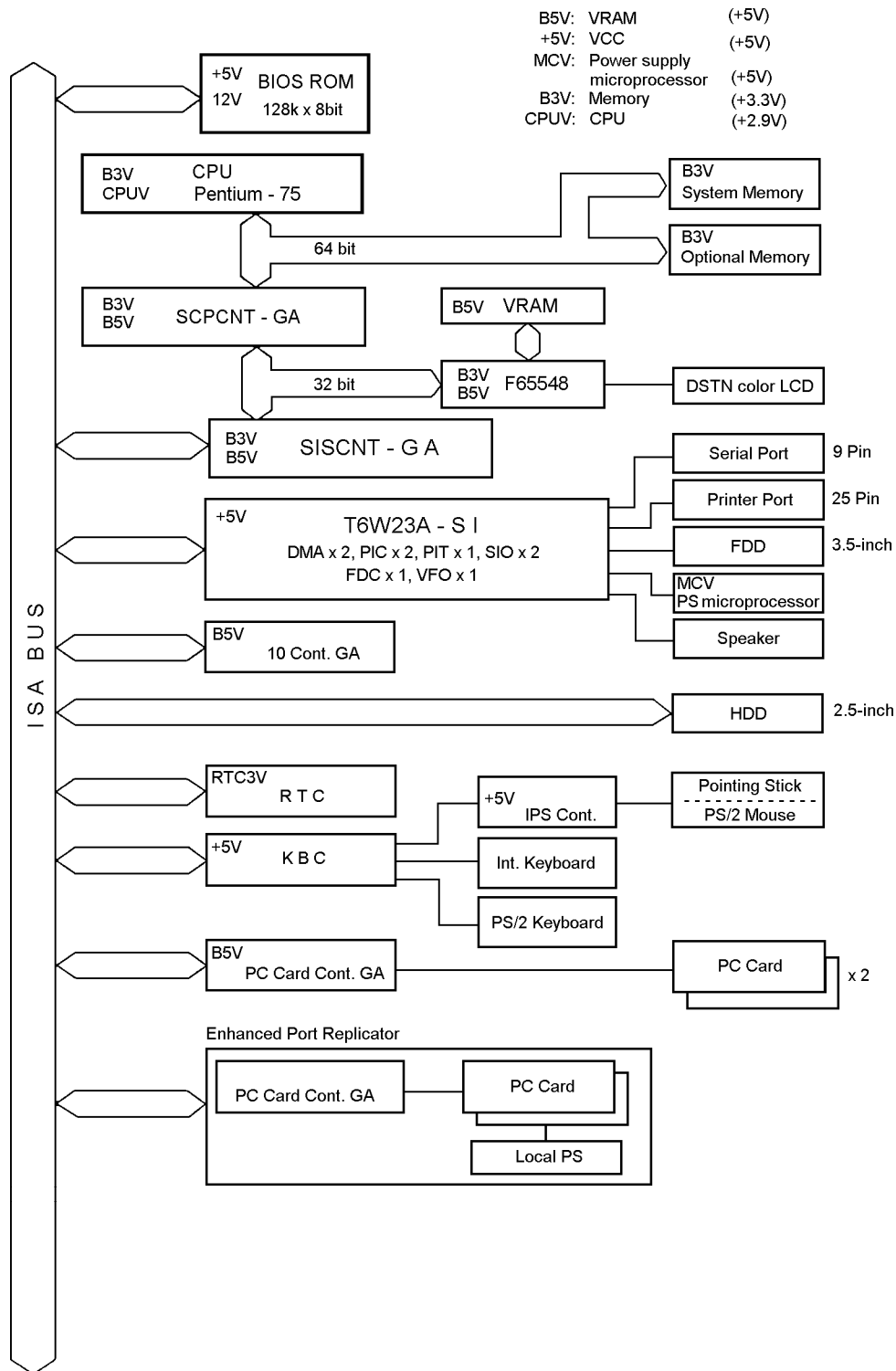*Figure 1-3 System board block diagram*

The system board is composed of the following major components:

❑ Microprocessor
One Pentium processor with VRT 64-bit microprocessor
Pentium processor operates at 75 MHz and 3.3/2.9 volts
The math co-processor and 16KB cache memory are integrated into Pentium

❑ Standard RAM
8 MB, four 1Mx16-bit chips
3.3 volt operation
No parity bit
Access time 70 ns
Data transfer is 64-bit width
EDO (extended data output) supported

❑ BIOS ROM (Flash EEPROM)
128 KB (one 128Kx8-bit chip) memory
64 KB in the ROM are used for system BIOS
48 KB in the ROM are used for VGA BIOS
16 KB in the ROM are reserved
Access time 150 ns
Data transfer is 8-bit width

❑ Video RAM
1 MB (Two 256Kx16-bit DRAM)
5 volt operation

❑ Optional memory
One expansion memory slot is available for 8, 16, and 32 MB memory modules, which
consist of 1 MBx16-bit chips
Total maximum memory size is 40 MB (if a 32 MB memory module is installed)
3.3 volt operation
No parity bit
Access time 60 ns
Data transfer is 64-bit width
EDO (extended data output) supported

❑ One super integration (SI)
The following components:
- Two DMACs   82C37 equivalent
- Two PICs   82C59 equivalent
- Two SIOs   16550 equivalent (One SIO is not used)
- Two UARTs   16550 equivalent
- One PIT   82C54 equivalent
- One FDC   TC8565 equivalent
- One VFO   TC8568 equivalent
- One I/O port decoder
- One SIO port control
- One printer port control supported ECP
- One FDD control
- One speaker control
- One power communication control

❑ System Controller Gate Array (SCPCNT-GA)
   This gate array has the following functions:
   • CPU control
     - SMI control
     - CPU clock control
   • Memory control
     - 64-bit bus memory control
     - 32-bit bus memory control
   • Bus control
     - 64-bit data bus <==>32-bit data bus
     - 32-bit local bus control
   • Address latch control
   • I/O register control
   • Processing speed control

❑ ISA Bus Controller Gate Array (SISCNT3-GA)
   This gate array has the following functions:
   • Bus control
     - 32-bit data bus <==> 16-bit data bus
     - ISA bus interface control
     - ISA bus access control
     - DMAC control
     - DMA address generation
     - I/O control
     - Suspend/Resume sequence
   • Memory control
     - ISA bus interface control
     - Refresh address generation
   • I/O register control
   • Suspend/Resume sequence

❑ PC Card Controller Gate Array (PCMCIA CNT-GA)
   This gate array has the following functions:
   • PCMCIA memory card control
   • PCMCIA I/O card control

❑ I/O Controller Gate Array (IOCNT-GA)
   This gate array has the following functions:
   • Internal Communication controller
     - KBC, main CPU communication register file
     - KBC interrupt controller
     - KBC communication controller
     - I^{2}C bus control (Not used)
   • Others
     - Speaker volume adjust PWM control
     - Sound board interface (Not used)
     - BIOS-ROM interface
     - SMI control
     - IrDA (SIR) control (Not used)

❏ Video Controller
C&T F65548 is used.
This video controller controls internal DSTN color LCD and external SVGA compatible CRT.

❏ Keyboard Controller (KBC)
One M38802M4 chip is used.
This KBC includes the keyboard scan controller and keyboard interface controller.
The KBC controls the internal keyboard, external keyboard, PS/2 mouse.

❏ Real Time Clock (RTC)
One T9934 chip is used.
The T9934 has 128 bytes of memory. Fourteen bytes of memory are used for the calendar and clock. The remaining 114 bytes are used for the system configuration data.

1.3 3.5-inch Floppy Disk Drive

The 3.5-inch FDD is a thin, high-performance reliable drive that supports 720-KB (formatted) 2DD and 1.44-MB (formatted) 2HD 3.5-inch floppy disks.

The FDD is shown in figure 1-4.
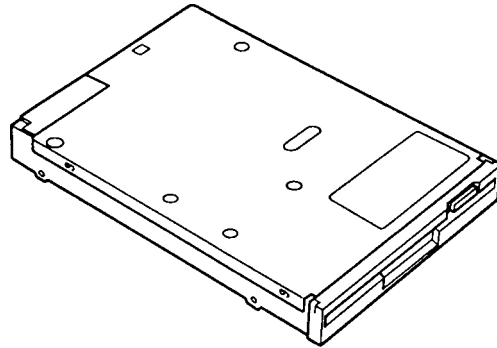
Figure 1-4 3.5-inch FDD

The specifications for the FDD are listed in table 1-1.

Table 1-1 3.5-inch FDD specifications

Item	2-MB mode	1-MB mode

Storage capacity (KB)
        Unformatted
        Formatted
	
	2,000 *1
	1,311
		
		1,000 *2
		655

Number of heads	2	2
Number of cylinders	80	80

Access time (ms)
        Track to track
        Average
        Head settling time
	
	3
	181
	15
		
		3
		181
		15

Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

*1:32 sector/track (256bytes per sector)

*2:16 sector/track (256bytes per sector)

1.4   2.5-inch Hard Disk Drive

The HDD is a random access non-volatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-winchester type magnetic heads.

The computer supports the 520 MB.

The HDD is shown in figure 1-5.
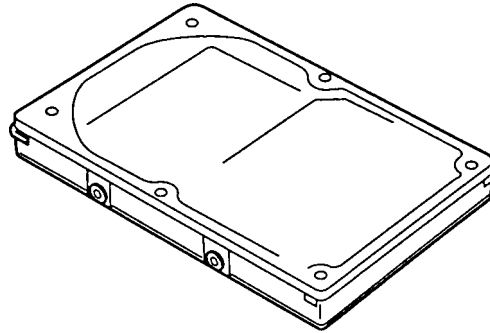
Figure 1-5 2.5inch HDD

Specifications for the HDD are listed in table 1-2.

Table 1-2 2.5-inch HDD specifications

Items	Toshiba MK1924FCV	IBM DBOA-2528
Storage capacity (million byte) Formatted	528	528
Number of disks	2	2
Data heads	4	3
Data surfaces	4	4
Bytes per sector	512	512
Rotation speed (rpm)	4200	4000
Recording method	8-9 RLL	1-7 RLL

1.5   Keyboard

The 82-(USA) or 84-(European) keyboard is mounted on the computer's system unit. The keyboard is connected to the keyboard controller on the system board through a 25-pin flat cable. The computer pointer control stick, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse. The keyboard is shown in figure 1-6.

See Appendix E for optional keyboard configurations.

Figure 1-6 Keyboard

1.6 DSTN Color LCD
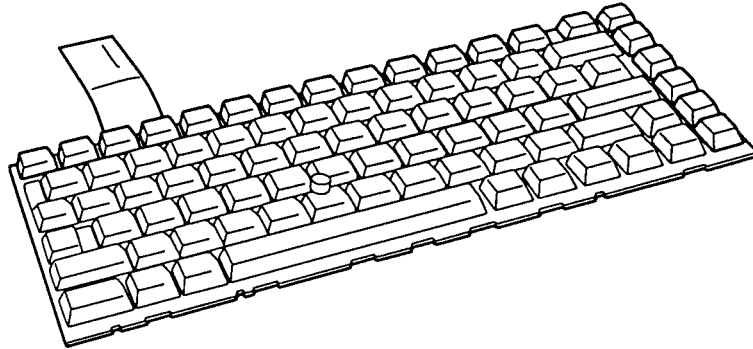
The DSTN Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

1.6.1 DSTN Color LCD Module

The DSTN color LCD is backlit and supports 640 x 480 pixels with a Video controller. This video controller includes the functions of Video Graphics Array (VGA). The built-in display controller supports 640 x 480 resolution with 64k colors capability on the internal LCD and up to 1024 x 768 resolution with 256 colors on an external CRT.

The LCD receives vertical and horizontal synchronizing signals, 16-bit data signal, 8-bit upper block data signal, 8-bit lower block data signal, and has a shift clock for data transmission. All signals are CMOS-level compatible.

The DSTN LCD is shown in figure 1-7. The specifications for the LCD are listed in table 1-3.
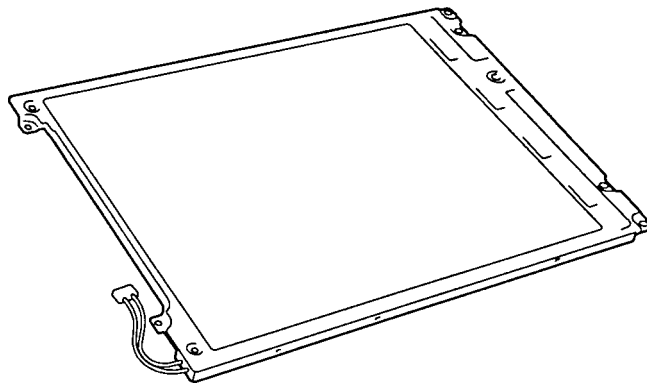
Figure 1-7 DSTN color LCD

Table 1-3 DSTN color LCD specifications

Item		Specifications
Number of Dots	(dots)	640x480
Dot pitch	(mm)	0.33x0.33
Display area	(mm)	217.2 (W)x164.4 (H)
Contrast	(Typically)	20:1
FL current	(mA)	5.0/3.0 (Bright/Semi-bright)

1.6.2 DSTN Color Fluorescent Lamp (FL) Inverter Board

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. The specifications for the FL inverter are listed in table 1-4.

Table 1-4 DSTN color FL inverter board specifications

Item			Specifications
Input	Voltage	(V)	4 to 5.5
	Power	(W)	4.25
Output	Voltage	(Vrms)	1,100
	Current	(mA)	5.0/3.0
			(Bright/Semi-bright)

1.7 Power Supply

The power supply provides five kinds of voltages to the system board. The power supply has one microprocessor, operates at 500 KHz, and performs the following functions:

1. Determines if the AC cable or battery is connected to the computer.

2. Detects AC output and circuit malfunctions.

3. Controls the LED icon and speaker.

4. Turns the battery charging system on and off and detects a fully charged battery.

5. Determines if the power can be turned on and off.

6. Provides more accurate detection of a low battery.

7. Calculates the remaining battery capacity.

The power supply output rating is specified in table 1-5.

Table 1-5 Power supply output rating

Use for	Name	DC voltage	Regulation tolerance (%)
System logic, FDD, HDD, Display	VCC	+5	±5
CPU	CPUV	+2.9	±5
Flash ROM, PCMCIA	12V	+12	±5
CPU, RAM, GA	B3V	+3.3	±0.3V
VRAM, GA	B5V	+4.7	±5

1.8   Batteries

The computer has three types of batteries:

❏ Main battery pack
❏ Backup battery
❏ Real Time Clock (RTC) battery

Battery specifications are listed in table 1-6.

Table 1-6 Battery specifications

Battery name	Material	Output voltage	Capacity
Main battery	Nickel Metal Hydride	12 V	2,600 mAH
Backup battery	Nickel Metal Hydride	7.2 V	110 mAH
RTC battery	Nickel Metal Hydride	3.6 V	30 mAH

1.8.1   Main Battery

The removable main battery pack is the computer's main power source when the AC power cord is not attached. The main battery recharges the backup battery. The backup and main battery maintain the state of the computer when you enable AutoResume.

❏ **Battery Icon**

The Battery icon is located on top of the back rim of the computer. The icon shows the status of the removable battery pack.

The status of each can be determined by color:

Orange   The AC power cord is connected and charging the battery with the power off.

Green   The AC power cord is connected and the battery is fully charged whether the power is on or off.

Blink orange The battery is low. The AC power cord must be connected to recharge the battery.

No light   Under any other conditions, the LED does not light.

1.8.2   Battery Charging Control

Battery charging is controlled by a power supply microprocessor that is mounted on the power supply. The microprocessor controls whether the charge is on or off and detects a full charge when the AC power cord and battery are attached to the computer. The system charges the battery using quick charge or trickle charge.

❑ Quick Battery Charge

When the AC power cord is attached, there are two types of charge: quick charge when the system is powered off and trickle charge when the system is powered on.

Table 1-7 Time required for quick charges

Power	Charging time
Power off	About 2.5 hours
Power on	Trickle charge

If one of the following occurs, the battery quick-charge process stops:

1. The battery becomes fully charged.

2. The battery is removed.

3. The battery or AC output voltage is abnormal.

4. The charge current is abnormal.

5. The fixed time limit for quick charge is exceeded.

❑ Trickle Battery Charge

When the main battery is fully charged and the AC power cord is attached, the power supply microprocessor automatically changes from quick charge to trickle charge.

1.8.3 Backup Battery

The backup battery maintains data for AutoResume. The power source used to back up the AutoResume data is determined according to the following priority:

AC power > Main battery > Backup battery

The backup battery is charged by the main battery or AC power cord. Table 1-8 shows the charging time and data preservation period of the backup battery.

Table 1-8 Backup battery charging/data preservation time

Item		Time
Charging Time	Power On	20 H
	Power Off (with AC power)	20 H
	Power Off (without AC power)	Doesn't charge
Data preservation period (full charge)		5 H

1.8.4 RTC Battery

The RTC battery provides power to keep the current date, time, and other setup information in memory while the computer is turned off. Table 1-9 shows the charging time and data preservation period of the RTC battery.

Table 1-9 RTC battery charging/data preservation time

Item		Time
Charging Time	With AC power or main battery	48 H
Data preservation period (full charge)		1 month

2.1 Troubleshooting

Chapter 2 describes how to determine if a Field Replaceable Unit (FRU) in the computer is causing the computer to malfunction. The FRUs covered are:

1. System Board(s)
2. VGA Board
3. HDD I/F Board
4. Floppy Disk Drive
5. Hard Disk Drive
6. Keyboard
7. Display

The Diagnostics Disk operations are described in Chapter 3 and detailed replacement procedures are given in Chapter 4.

The following tools are necessary for implementing the troubleshooting procedures:

1. Diagnostics disk
2. Phillips screwdriver
3. Toshiba MS-DOS system disk(s)
   (You must install the following onto the disk: SYS.COM, FORMAT.COM, FDISK.COM and FDISK.EXE)
4. 2DD or 2HD formatted work disk for floppy disk drive testing
5. Cleaning kit for floppy disk drive troubleshooting
6. RS-232-C wraparound connector
7. Printer wraparound connector
8. Multimeter
9. External CRT
10. PS/2 or compatible keyboard
11. PS/2 or compatible mouse
12. Serial port wraparound connector
13. PC card wraparound card

2.2 Troubleshooting Flowchart

Use the flowchart in figure 2-1 as a guide for determining which troubleshooting procedures to execute. Before going through the flowchart steps, do the following:

❑ Verify with the customer that Toshiba MS-DOS is installed on the hard disk. Non-Toshiba operating systems can cause the computer to malfunction.

❑ Make sure all optional equipment is disconnected from the computer.

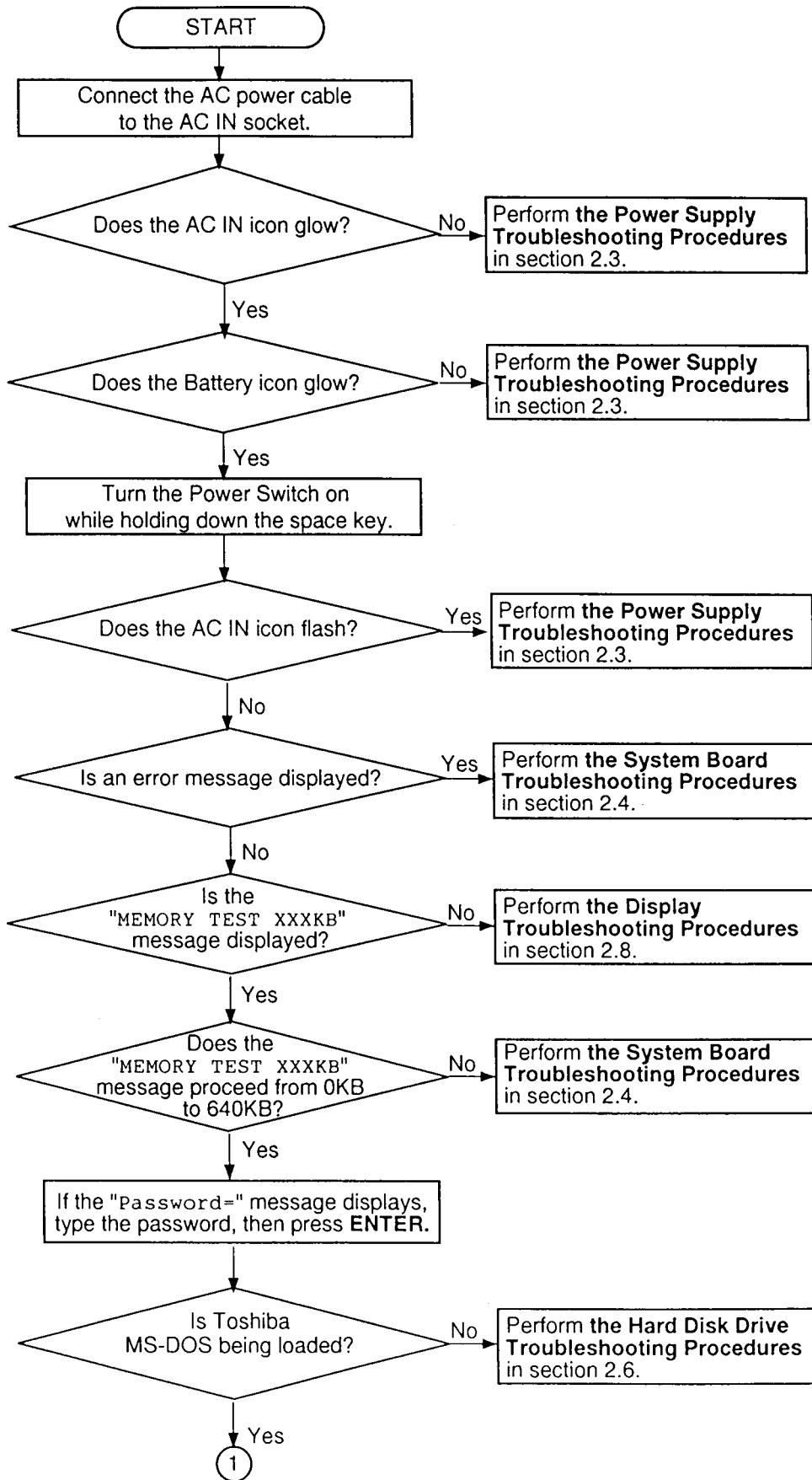❑ Make sure the floppy disk drive is empty.

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
            ┌──────────────▼──────────────┐
            │   Connect the AC power cable │
            │      to the AC IN socket.    │
            └──────────────┬──────────────┘
                           │
                           │
         ◇─────────────────▼─────────────────◇   No    ┌──────────────────────────────┐
         │     Does the AC IN icon glow?     │────────▶│ Perform the Power Supply     │
         ◇───────────────────────────────────◇         │ Troubleshooting Procedures   │
                           │                            │ in section 2.3.              │
                          Yes                           └──────────────────────────────┘
                           │
         ◇─────────────────▼─────────────────◇   No    ┌──────────────────────────────┐
         │    Does the Battery icon glow?    │────────▶│ Perform the Power Supply     │
         ◇───────────────────────────────────◇         │ Troubleshooting Procedures   │
                           │                            │ in section 2.3.              │
                          Yes                           └──────────────────────────────┘
                           │
            ┌──────────────▼──────────────┐
            │   Turn the Power Switch on   │
            │ while holding down the space key. │
            └──────────────┬──────────────┘
                           │
                           │
         ◇─────────────────▼─────────────────◇   Yes   ┌──────────────────────────────┐
         │     Does the AC IN icon flash?    │────────▶│ Perform the Power Supply     │
         ◇───────────────────────────────────◇         │ Troubleshooting Procedures   │
                           │                            │ in section 2.3.              │
                          No                            └──────────────────────────────┘
                           │
         ◇─────────────────▼─────────────────◇   Yes   ┌──────────────────────────────┐
         │  Is an error message displayed?   │────────▶│ Perform the System Board     │
         ◇───────────────────────────────────◇         │ Troubleshooting Procedures   │
                           │                            │ in section 2.4.              │
                          No                            └──────────────────────────────┘
                           │
         ◇─────────────────▼─────────────────◇   No    ┌──────────────────────────────┐
         │             Is the                │────────▶│ Perform the Display          │
         │   "MEMORY TEST XXXKB"             │         │ Troubleshooting Procedures   │
         │       message displayed?          │         │ in section 2.8.              │
         ◇───────────────────────────────────◇         └──────────────────────────────┘
                           │
                          Yes
                           │
         ◇─────────────────▼─────────────────◇   No    ┌──────────────────────────────┐
         │           Does the                │────────▶│ Perform the System Board     │
         │   "MEMORY TEST XXXKB"             │         │ Troubleshooting Procedures   │
         │   message proceed from 0KB        │         │ in section 2.4.              │
         │           to 640KB?               │         └──────────────────────────────┘
         ◇───────────────────────────────────◇
                           │
                          Yes
                           │
            ┌──────────────▼──────────────┐
            │ If the "Password=" message displays, │
            │ type the password, then press ENTER. │
            └──────────────┬──────────────┘
                           │
                           │
         ◇─────────────────▼─────────────────◇   No    ┌──────────────────────────────┐
         │         Is Toshiba                │────────▶│ Perform the Hard Disk Drive  │
         │   MS-DOS being loaded?            │         │ Troubleshooting Procedures   │
         ◇───────────────────────────────────◇         │ in section 2.6.              │
                           │                            └──────────────────────────────┘
                          Yes
                           │
                         ( 1 )
```

Figure 2-1 Troubleshooting flowchart (1/2)

```
              ( 1 )
                │
                ▼
        ╱───────────────╲        No    ┌──────────────────────────┐
       ╱  Do typed characters ╲ ───────▶│ Perform the Keyboard     │
       ╲   appear correctly?  ╱         │ Troubleshooting Procedures│
        ╲───────────────╱              │ in section 2.7.          │
                │ Yes                   └──────────────────────────┘
                ▼
   ┌─────────────────────────────┐
   │ Insert the diagnostics disk  │
   │ into the FDD, then run the   │
   │ diagnostic test program.     │
   └─────────────────────────────┘
                │
                ▼
        ╱───────────────╲        No    ┌──────────────────────────┐
       ╱ Is the diagnostics ╲ ─────────▶│ Perform the Floppy Disk  │
       ╲ test loaded?        ╱         │ Drive Troubleshooting    │
        ╲───────────────╱              │ Procedures in section 2.5.│
                │ Yes                   └──────────────────────────┘
                ▼
   ┌─────────────────────────────┐
   │      Perform each test.      │
   └─────────────────────────────┘
                │
                ▼
        ╱───────────────╲        Yes   ┌──────────────────────────┐
       ╱   Is an error     ╲ ──────────▶│ After confirming which   │
       ╲ detected by any of ╱          │ diagnostic test has detected│
       ╲ the diagnostics    ╱          │ an error, perform the    │
        ╲  tests?         ╱            │ appropriate procedures as │
         ╲──────────────╱             │ outlined below.          │
                │ No                    └──────────────────────────┘
                ▼
   ┌─────────────────────────────┐
   │      System is normal.       │
   └─────────────────────────────┘
                │
                ▼
          (    END    )
```

Figure 2-1 Troubleshooting flowchart (2/2)

If the diagnostics program cannot detect an error, the problem may be intermittent. The Running Test program should be executed several times to isolate the problem.   Check the Log Utilities function to confirm which diagnostic test detected an error(s), then perform the appropriate troubleshooting procedures as follows:

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 troubleshooting procedures in section 2.4.

2. If an error is detected on the floppy disk test, perform the floppy disk drive troubleshooting procedures in section 2.5.

3. If an error is detected on the hard disk test, perform the hard disk drive troubleshooting procedures in section 2.6.

4. If an error is detected on the keyboard test, perform the keyboard troubleshooting procedures in section 2.7.

5. If an error is detected on the display test, perform the display troubleshooting procedures in section 2.8.

2.3 Power Supply Troubleshooting

The computer's power supply controls many functions and components in the computer. To determine if the power supply is functioning properly, start with Procedure 1 and continue with the other Procedures as instructed. The procedures described in this section are:

> Procedure 1: AC IN Icon Check
>
> Procedure 2: Battery Icon Check
>
> Procedure 3: AC PS Unit Replacement Check

Procedure 1 AC IN Icon Check

The AC PS unit converts AC power to DC power and contains a charging circuit which charges the computer's batteries. The AC power cord connects to the AC IN socket connector on the back side of the computer. When the AC power cord is connected to the 100CS, the AC PS unit charges the batteries.

The AC IN icon displays whether or not the AC power cord is connected and supplying power.

When the AC IN icon is green, the AC power cord is connected and supplying power to the computer.

If the AC IN icon does not light, the AC power cord is not supplying power to the computer or the AC power cord is not attached to the computer. Go to Check 1.

If the AC IN icon is flashing orange, the AC power cord's voltage supply is abnormal or the power supply is not functioning properly. Go to Check 1.

If any of the above indicator conditions are abnormal, make sure the icon lights are not burned out before performing the following checks:

Check 1   Make sure the correct AC power cord is firmly plugged into the AC IN socket on the back of the computer.

Check 2   If the AC IN icon flashes orange when the AC power cord is connected, output voltage is abnormal. Connect a new AC power cord and turn the computer on again to verify the indicator condition.

Check 3   The battery pack may be malfunctioning. Replace the battery pack with a new one and turn the computer on again. If the problem still exists, go to Procedure 2.

Procedure 2   Battery Icon Check

The Battery icon shows the battery charging status. The Battery icon glows orange when the AC power cord is charging the computer's battery pack.

If the Battery icon glows green, the AC power cord is connected and the battery is fully charged.

If the Battery icon glows orange, the AC power cord is connected and the battery is being charged.

If the Battery icon does not glow, go to Check 1.

Check 1   Make sure the AC power cord is firmly plugged into the AC IN socket and wall outlet. If these cables are connected correctly, go to Check 2.

Check 2   Make sure the battery pack is installed in the computer correctly. If the battery pack is installed correctly, go to Check 3.

Check 3   Remove the battery pack and check that the battery terminal is clean and not bent.

If the terminal appears dirty, clean it gently with a cotton swab dipped in alcohol.

If the terminal looks bent or damaged, replace the system board.

If the battery terminal is clean and not bent, go to Check 4.

Check 4   Connect a new AC power cord. If the Battery icon still does not glow, go to Check 5.

Check 5   Install a new battery pack. If the Battery icon still does not glow, go to Procedure 3.

Procedure 3   AC PS Unit Replacement Check

The system board incorporates the power supply. Power is supplied to the system board through the AC IN plug located on the AC PS unit. The AC PS unit may be damaged, refer to chapter 4 for instructions on how to disassemble the computer, and then perform the following checks:

Check 1   Replace the AC PS unit with a new one and restart the system. If the system is still not functioning properly, perform Check 2.

Check 2   Replace the system board with a new one and restart the system. If the problem still exists, other FRUs may be damaged.

2.4 System Board and HDD I/F Board Troubleshooting

This section describes how to determine if the system board and sound board are defective or not functioning properly. Start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

> Procedure 1: Message Check
>
> Procedure 2: Printer Port LED Check on Boot Mode
>
> Procedure 3: Printer Port LED Check on Resume Mode
>
> Procedure 4: Diagnostic Test Program Execution Check
>
> Procedure 5: Replacement Check

Procedure 1 Message Check

When the power is turned on, the system performs the Initial Reliability Test (IRT) installed in the BIOS ROM. The IRT tests each IC on the system board and initializes it.

❑ If an error message is shown on the display, perform Check 1.

❑ If there is no error message, go to Procedure 2.

❑ If the Toshiba MS-DOS is properly loaded, go to Procedure 3.

Check 1 If one of the following error messages is displayed on the screen, press the **F1** key as the message instructs. These errors occur when the system configuration preserved in the RTC memory (CMOS type memory) is not the same as the actual configuration or when the data is lost.

If you press the **F1** key as the message instructs, the system configuration in the RTC memory configuration is set to the default setting. If error message (b) appears often when the power is turned on, replace the RTC battery. If any other error message is displayed, perform Check 2.

```
(a)    *** Bad HDD type ***
       Check system.  Then press [F1] key ......
(b)    *** Bad RTC battery ***
       Check system.  Then press [F1] key ......
(c)    *** Bad configuration ***
       Check system.  Then press [F1] key ......
(d)    *** Bad memory size ***
       Check system.  Then press [F1] key ......
(e)    *** Bad time function ***
       Check system.  Then press [F1] key ......
(f)    *** Bad check sum (CMOS) ***
       Check system.  Then press [F1] key ......
(g)    *** Bad check sum (ROM) ***
       Check system.  Then press [F1] key ......
```

Check 2   If the following error message is displayed on the screen, press any key as the
           message instructs.

           This error message appears when data stored in RAM under the resume function is
           lost because the battery has become discharged or the system board is damaged.
           Go to Procedure 3.

                    WARNING: RESUME FAILURE.
                    PRESS ANY KEY TO CONTINUE.

           If any other message appears, perform Check 3.

Check 3   The IRT checks the system board. When the IRT detects an error, the system
           stops or an error message appears.

           If one of the following error messages (1) through (19), (20) or (27) is displayed,
           replace the system board.

           If error message (20) is displayed, go to the Keyboard Troubleshooting Proce-
           dures in section 2.7.

           If error message (21), (22) or (23) is displayed, go to the HDD Troubleshooting
           Procedures in section 2.6.

           If error message (24) or (25) is displayed, go to the FDD Troubleshooting Proce-
           dures in section 2.5.

                    (1)   BIOS is damaged
                    (2)   PIT ERROR
                    (3)   MEMORY REFRESH ERROR
                    (4)   TIMER CH.2 OUT ERROR
                    (5)   FIRST 64KB MEMORY ERROR
                    (6)   CMOS CHECKSUM ERROR
                    (7)   CMOS BAD BATTERY ERROR
                    (8)   FIRST 64KB MEMORY ERROR
                    (9)   FIRST 64KB MEMORY PARITY ERROR
                    (10)   VRAM ERROR
                    (11)   SYSTEM MEMORY ERROR
                    (12)   SYSTEM MEMORY PARITY ERROR
                    (13)   EXTENDED MEMORY ERROR
                    (14)   EXTENDED MEMORY PARITY ERROR
                    (15)   DMA PAGE REGISTER ERROR
                    (16)   DMAC #1 ERROR
                    (17)   DMAC #2 ERROR
                    (18)   PIC #1 ERROR
                    (19)   PIC #2 ERROR
                    (20)   KBC ERROR
                    (21)   HDC ERROR
                    (22)   HDD #0 ERROR
                    (23)   HDD #1 ERROR
                    (24)   NO FDD ERROR
                    (25)   FDC ERROR
                    (26)   TIMER INTERRUPT ERROR
                    (27)   RTC UPDATE ERROR

Procedure 2   Printer Port LED Check on Boot Mode

The printer port LED displays the IRT status and test status by turning lights on and off as an eight-digit binary value for boot mode. Figure 2-2 shows the printer port LED.
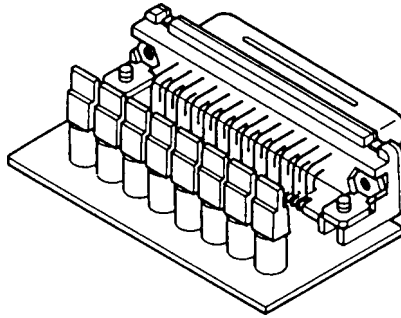
Figure 2-2 Printer port LED

To use the printer port LED follow these steps:

1.   Turn the computer on, then set to boot mode.

2.   Turn the computer off.

3.   Plug the printer port LED into the computer's parallel port.

4.   Hold the space bar down and turn the computer on.

5.   Read the LED status from left to right as you are facing the back of the computer.

6.   Convert the status from binary to hexadecimal notation.

7.   If the final LED status is FFh (normal status), go to Procedure 3.

8.   If the final LED status matches any of the test status values in table 2-1, perform Check 1.

> *NOTE: If an error condition is detected by the IRT test, the printer port LED displays an error code after the IRT test ends. For example, when the printer port LED displays 1F and halts, the IRT test has already completed the Display initialization. In this instance, the IRT indicates an error has been detected during the system memory test.*

Table 2-1 Printer port LED boot mode status (1/2)

LED status	Test item	Message
01H	KBC initialization	
	ROM checksum test	BIOS is damaged! .....
02H	Special register initialization	
	PIT test	PIT ERROR
	PIT initialization	—
	PIT function check	MEMORY REFRESH ERROR TIMER CH.2 OUT ERROR
03H	CMOS check	CMOS CHECKSUM ERROR CMOS BAD BATTERY ERROR
	KB initialization	KBC ERROR
04H	Initialization of memory configuration	—
05H	SM-RAM check	—
06H	Self test check	—
	Read of Power Supply information	—
07H	ROM/RAM copy	—
08H	Initialization of internal VGA	—
0AH	First 64 KB memory test	FIRST 64KB MEMORY ERROR FIRST 64KB MEMORY PARITY ERROR
0BH	System memory initialization	—
0CH	System initialization	—
0DH	Interrupt vector initialization	—
18H	PIC initialization	—
1FH	Display initialization	VRAM ERROR
25H	System memory test	SYSTEM MEMORY ERROR SYSTEM MEMORY PARITY ERROR
30H	Extended memory test	EXTENDED MEMORY ERROR EXTENDED MEMORY PARITY ERROR
40H	DMA page register test	DMA PAGE REGISTER ERROR
41H	DMAC test	DMAC #X ERROR
42H	DMAC initialization	—
4AH	PIC test	PIC #X ERROR
50H	Mouse initialization	—
55H	KBC initialization	KBC ERROR
60H	HDD initialization	HDC ERROR/HDD #0 ERROR
65H	FDD initialization	FDC ERROR/NO FDD ERROR
70H	Printer initialization	—
80H	SIO initialization	—
90H	Timer initialization	RTC UPDATE ERROR TIMER INTERRUPT ERROR
A0H	NDP initialization	—

Table 2-1 Printer port LED boot mode status (2/2)

LED status	Test item	Message
A6H	Initialization of expansion ROM	—
C0H	Password check	—
FFH	Setup boot check	*** Bad xxxx xxxx *** Check system. Then press [F1] key.
FFH	Boot load	—

Check 1   If the following error codes are displayed, go to Procedure 5.

> 01h, 02h, 03h, 04h, 05h, 06h, 07h, 08h, 0Ah, 0Bh, 0Ch, 0Dh, 18h, 1Fh, 25h, 30h, 40h, 41h, 42h, 4Ah, 65h, 70h, 80h, 90h, A0h, A6h, C0h, FFh

Check 2   If error code 50h is displayed, go to the Keyboard Troubleshooting procedures in Section 2.7.

Check 3   If error code 55h is displayed, go to the HDD Troubleshooting Procedures in Section 2.6.

Check 4   If error code 60h is displayed, go to the FDD Troubleshooting Procedures in Section 2.5.

Procedure 3   Printer Port LED Check on Resume Mode

The printer port LED displays the IRT status and test status by turning lights on and off as an eight-digit binary value for resume mode.

To use the printer port LED follow these steps:

1. Turn the computer on, then set to resume mode.

2. Turn the computer off.

3. Plug the printer port LED into the computer's parallel port.

4. Turn the computer on.

5. Read the LED status from left to right as you face the back of the computer.

6. Convert the status from binary to hexadecimal notation.

7. If the final LED status is FFh (normal status), go to Procedure 4.

8. If the final LED status matches any of the test status values in table 2-2, perform Procedure 5.

Table 2-2 Printer port LED resume mode error status

Error status	Meaning of status
F1H	RAM BIOS error.
F2H	The system has optional ROM, or optional card (CGA, MDA).
F5H	Main memory checksum error.
F6H	Video RAM checksum error.
F7H	Extended memory checksum error.

Procedure 4   Diagnostic Test Program Execution Check

Execute the following tests from the *Diagnostic Test* Menu. Refer to chapter 3, *Tests and Diagnostics*, for more information on how to perform these tests.

1. System test
2. Memory test
3. Printer test
4. ASYNC test
5. Real Timer test
6. PCMCIA test

If an error is detected during these tests, go to Procedure 5 .

Procedure 5   Replacement Check

The system board or the HDD I/F board may be damaged. Disassemble the computer following the steps described in chapter 4, *Replacement Procedures* , and perform the following checks:

Check 1   Replace the system board with a new one. Refer to chapter 4 for instructions on how to remove and replace the system board.

Check 2   Replace the HDD I/F board with a new one. Refer to chapter 4 for instructions on how to remove and replace the sound board.
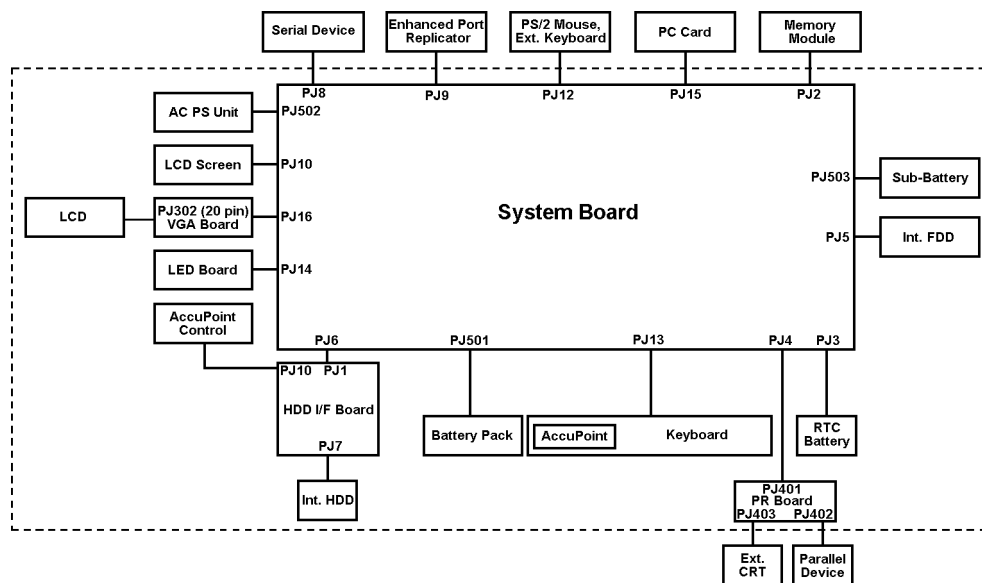
2.5 Floppy Disk Drive Troubleshooting

This section describes how to determine if the 3.5-inch floppy disk drive is functioning properly. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

<div style="margin-left:2em">

Procedure 1:   FDD Head Cleaning Check

Procedure 2:   Diagnostic Test Program Execution Check

Procedure 3:   Connector Check and Replacement Check

</div>

Procedure 1   FDD Head Cleaning Check

FDD head cleaning is one option available in the *Diagnostic Program*. Detailed operation is given in chapter 3, *Tests and Diagnostics*.

After Toshiba MS-DOS loads, run the Diagnostic Program and then clean the FDD heads using the cleaning kit. If the FDD still does not function properly after cleaning, go to Procedure 2.

If the test program cannot be executed on the computer, go to Procedure 3.

Procedure 2   Diagnostic Test Program Execution Check

The Floppy Disk Drive Diagnostic Test program is stored on the Diagnostics Disk. After loading Toshiba MS-DOS, run the diagnostic program. Refer to Chapter 3,   *Tests and Diagnostics*, for more information about the diagnostics test procedures.

Floppy disk drive test error codes and their status names are described in table 2-3. Make sure the floppy disk in the FDD is formatted correctly and that the write protect tab is disabled. If any other errors occur while executing the FDD diagnostics test, go to Check 1.

Table 2-3 Floppy disk drive 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
FFh	Data compare error

Check 1   If the following message is displayed, disable the write protect tab on the floppy disk. If any other message appears, perform Check 2.

```
Write protected
```

Check 2   Make sure the floppy disk is formatted correctly. If it is, go to Procedure 3.

Procedure 3   Connector Check and Replacement Check

The 3.5-inch Floppy Disk Drive is connected to the system board by a flexible cable. This cable may be damaged or disconnected from the 3.5-inch FDD port. Perform the following checks:

Check 1   Make sure the flexible cable is firmly connected to the 3.5-inch FDD.

```
┌──────────┐          ┌───────────────────────────┐
│   FDD    │──────────│   PJ5      system board    │
└──────────┘          └───────────────────────────┘
```
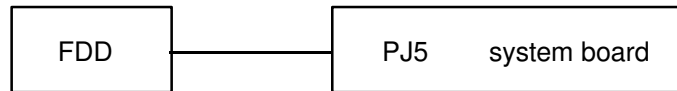
If this cable is disconnected, connect it to the system unit and repeat Procedure 2. If the FDD is still not functioning properly, perform Check 2.

Check 2   The cable may be defective or damaged. Replace the flexible cable. If the FDD is still not functioning properly, perform Check 3.

Check 3   The FDD or its cable may be defective or damaged. Replace the FDD with a new one following the steps in chapter 4, *Replacement Procedures* . If the FDD is still not functioning properly, perform Check 4.

Check 4   Replace the system board with a new one following the steps in chapter 4.

2.6   Hard Disk Drive Troubleshooting

To determine if the hard disk drive is functioning properly, perform the procedures below starting with Procedure 1. Continue with the other procedures as instructed.

Procedure 1:   Partition Check

Procedure 2:   Message Check

Procedure 3:   Format Check

Procedure 4:   Diagnostic Test Program Execution Check

NOTE : The contents of the hard disk will be erased when the HDD troubleshooting procedures are executed. Transfer the contents of the hard disk to a floppy disk(s) using the BACKUP command in the Toshiba companion utility. Refer to the User's Manual for more information about how to perform the BACKUP.

Procedure 1   Partition Check

Insert the Toshiba MS-DOS system disk and turn on the computer. Then perform the following checks:

Check 1   Type **C:** and press **Enter**. If you cannot change to drive C, go to Check 2. If you can change to drive C, go to Procedure 2.

Check 2   Type **FDISK** and press **Enter**. Choose Display Partition Information from the FDISK menu. If drive C is listed, go to Check 3. If drive C is not listed, return to the FDISK menu and choose the option to create a DOS partition on drive C. Then recheck the system. If the problem still exists, go to Procedure 2.

Check 3   If drive C is listed as active in the FDISK menu, go to Check 4. If drive C is not listed as active, return to the FDISK menu and choose the option to set the active partition for drive C. Recheck the system. If the problem still exists, go to Procedure 2.

Check 4   Remove the system disk from the FDD and cold boot the computer. If the problem still exists, go to Procedure 2. Otherwise, the HDD is operating normally.

Procedure 2   Message Check

When the computer's HDD does not function properly, some of the following error messages may appear on the display. Start with Check 1 below and perform the other checks as instructed.

Check 1   If any of the following messages appear, perform Check 2. If the following messages do not appear, perform Check 4:

```
HDC ERROR
```
(After 5 seconds this message will disappear)
                       or
```
HDD #0 ERROR
```
(After 5 seconds this message will disappear)
                       or
```
HDD #1 ERROR
```
(After 5 seconds this message will disappear)

Check 2   If either of the following messages appears, perform Procedure 3. If the following messages do not appear, perform Check 3.

```
Insert system disk in drive
Press any key when ready .....
```
                   or
```
Non-System disk or disk error
Replace and press any key
```


Check 3   Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

If the following message appears on the display, the system program has been transferred to the HDD. Restart the computer. If the error message still appears, perform Check 4.

```
System transferred
```


Check 4   The HDD is connected to the system board directly. This connection can become disconnected or damaged. Disassemble the computer as described in chapter 4, *Replacement Procedures* . If the HDD is not connected, connect it to the system board and return to Procedure 1. If the HDD is firmly connected to the system board, perform Procedure 3.

| System Board   PJ6 | PJ1   HDD I/F   PJ7 Board | HDD |
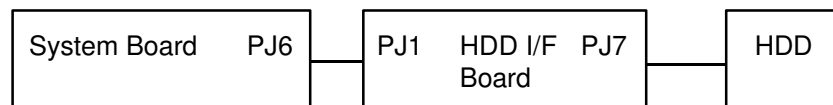
Procedure 3   Format Check

The computer's HDD is formatted using the low level format program and the MS-DOS FORMAT program. To format the HDD, start with Check 1 below and perform the other steps as required.

Check 1   Using the Toshiba MS-DOS system disk, partition the hard disk using the FDISK command. Format the hard disk using **FORMAT C:/S/U** to transfer the system program to the HDD. If the following message appears on the display, the HDD is formatted.

         Format complete

   If any other error message appears on the display, refer to the *Toshiba MS-DOS Manual* for more information and perform Check 2.

Check 2   Using the Diagnostic Disk, format the HDD with a low level format option. Refer to Chapter 3, *Tests and Diagnostics* , for more information about the diagnostic program.

   If the following message appears on the display, the HDD low level format is complete. Partition and format the HDD using the MS-DOS FORMAT command.

         Format complete

   If you cannot format the HDD using the Test and Diagnostic program, go to Procedure 4.

Procedure 4   Diagnostic Test Program Execution Check

The HDD test program is stored in the Diagnostics Disk. Perform all of the HDD tests in the Hard Disk Drive Test. Refer to chapter 3, *Tests and Diagnostics* , for more information about the HDD test program.

If an error is detected during the HDD test, an error code and status will be displayed; perform Check 1. The error codes and statuses are described in table 2-4. If an error code is not generated, the HDD is operating properly.

Table 2-4 Hard disk drive error code and status

Code	Status
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialized
08	HDC overrun (DRQ)
09h	DMA boundary error
0Ah	Bad sector error
0Bh	Bad track error
10h	ECC error
11h	ECC recover enabled
20h	HDC error
40h	Seek error
80h	Time out error
AAh	Drive not ready
BBh	Undefined error
CCh	Write fault
E0h	Status error
EEh	Access time out error
FFh	Data compare error

Check 1   Replace the HDD unit with a new one following the instructions in chapter 4, *Replacement Procedures* . If the HDD is still not functioning properly, perform Check 2.

Check 2   Replace the system board with a new one following the instructions in chapter 4.

2.7 Keyboard Troubleshooting

To determine if the computer's keyboard is functioning properly, perform the following procedures. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1:   Diagnostic Test Program Execution Check

Procedure 2:   Connector and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

Execute the Keyboard Test in the Diagnostic Program. Refer to chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

If an error occurs, go to Procedure 2. If an error does not occur, the keyboard is functioning properly.

Procedure 2   Connector and Replacement Check

The keyboard is connected to the system board by a flat cable. This cable may be disconnected or damaged. Disassemble the computer as described in chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1   Make sure the keyboard cable is not damaged and is connected to the system board.

```
+---------------------+        +---------------------------+
|   Keyboard cable    |--------|   PJ14 System board       |
+---------------------+        +---------------------------+
```
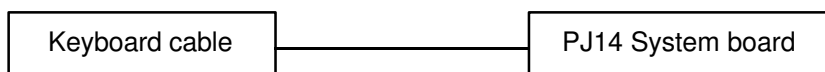
If this cable is damaged, replace the keyboard with a new one. If the cable is disconnected, firmly connect it. Perform Procedure 1 again. If the keyboard is still not functioning properly, perform Check 2.

Check 2   The keyboard controller on the system board may be damaged. Replace the system board with a new one. Refer to chapter 4 for more information.

2.8　Display and VGA Board Troubleshooting

This section describes how to determine if the computer's display is functioning properly. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1:　　　Contrast Control Check

Procedure 2:　　　External CRT Check

Procedure 3:　　　Diagnostic Test Program Execution Check

Procedure 4:　　　Connector Check

Procedure 5:　　　Replacement Check

Procedure 1　　Contrast Control Check

Contrast is changed by the contrast dial. If the contrast does not change when you turn the contrast dial, perform Procedure 2.

Procedure 2　　External CRT Check

Connect the external CRT to the computer's external monitor port, then boot the computer. The computer automatically detects the external CRT even if Resume mode is enabled.

If the external CRT works correctly, the internal LCD display may be damaged. Go to Procedure 4.

If the external CRT appears to have the same problem as the internal LCD, the display controller may be damaged. Go to Procedure 3.

Procedure 3　　Diagnostic Test Program Execution Check

The Display Test program is stored on the computer Diagnostic Disk. This program checks the display controller on the system board. After loading Toshiba MS-DOS, run the Diagnostic Program. Refer to chapter 3, *Tests and Diagnostics*, for details.

If an error is detected, go to Procedure 4. If an error is not detected, the display is functioning properly.

Procedure 4   Connector Check

The Display unit has an LCD module, FL, Display switch, and FL inverter board. The FL and FL inverter board are connected by two cables. The LCD module and system board are connected by two signal cables as shown below. Any of these cables may be disconnected.

Disassemble the display unit and check the following cable connections. Refer to chapter 4. *Replacement Procedures* , for more information about how to disassemble the computer.

CN2
CN1
CN11   LCD
FL inverter board
PJ302
VGA board
Contrast control board
PJ16
System board
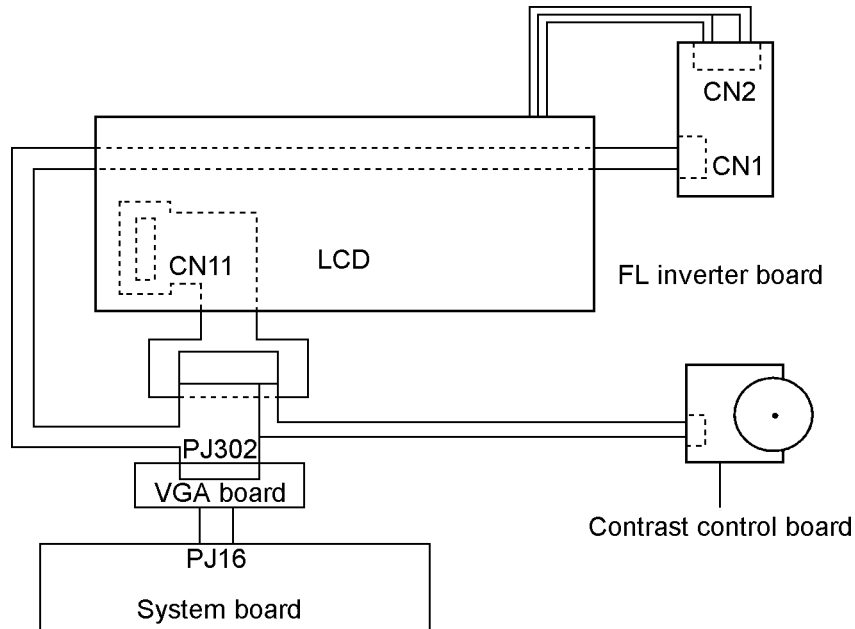
Figure 2-3 Display connection

If any of these cables is not connected, firmly reconnect it and repeat Procedures 1 and 2. If the problem still exists, perform Procedure 5.

Procedure 5   Replacement Check

The FL, FL inverter board, LCD module, and system board are connected to the display circuits. Any of these components may be damaged. Refer to chapter 4,   *Replacement Procedures*, for instructions on how to disassemble the computer and then perform the following checks:

If the FL does not light, perform Check 1.

If characters are not displayed clearly, perform Check 3.

If some screen functions do not operate properly, perform Check 3.

If the FL remains lit when the display is closed, perform Check 4.

Check 1   Replace the FL with a new one and test the display again. If the problem still exists, perform Check 2.

Check 2   Replace the FL inverter board with a new one and test the display again. If the problem still exists, perform Check 3.

Check 3   Replace the LCD module with a new one and test the display again. If the problem still exists, perform Check 4.

Check 4   Replace the display switch with a new one and test the display again. If the problem still exists, perform Check 5.

Check 5   Replace the display cable with a new one and test the display again. If the problem still exists, perform Check 6.

Check 6   The system board may be damaged. Replace the system board with a new one.

3.1 The Diagnostic Test

This chapter explains how to use the Diagnostic Test program to test the functions of the computer's hardware modules. The Diagnostics Program is stored on the Diagnostic Disk. The Diagnostic Test consists of 11 programs that are grouped into the Service Program Module (DIAGNOSTIC TEST MENU) of the Test Program Module (DIAGNOSTIC TEST).

NOTES: *To start the diagnostics, follow these steps:*
1. *Check all cables for loose connections.*
2. *Exit any application you may be using and close Windows.*
3. *Be sure the computer is not in virtual 86 mode The test will not run in that mode.*
   If you try to run the test in virtual 86 mode, the following message will be displayed:
   `Cannot execute in a virtual 8086 mode.`
   If the preceding message is displayed, remove memory managers from your config.sys file. See your MS-DOS documentation for information on the config.sys file.

The DIAGNOSTICS MENU consists of the following functions.

- ❏ DIAGNOSTIC TEST
- ❏ HARD DISK FORMAT
- ❏ HEAD CLEANING
- ❏ LOG UTILITIES
- ❏ RUNNING TEST
- ❏ FDD UTILITIES
- ❏ SYSTEM CONFIGURATION
- ❏ EXIT TO MS-DOS
- ❏ SETUP

The DIAGNOSTIC TEST MENU contains the following functional tests:

- ❑ SYSTEM TEST
- ❑ MEMORY TEST
- ❑ KEYBOARD TEST
- ❑ DISPLAY TEST
- ❑ FLOPPY DISK TEST
- ❑ PRINTER TEST
- ❑ ASYNC TEST
- ❑ HARD DISK TEST
- ❑ REAL TIMER TEST
- ❑ NDP TEST
- ❑ EXPANSION TEST

You will need the following equipment to perform some of the computer Diagnostic test programs.

- ❑ The Diagnostics Disk (All tests)
- ❑ A formatted working disk for the floppy disk drive test (All tests)
- ❑ 3.5-inch 2HD/2DD disk for external 3.5-inch FDD
- ❑ A cleaning kit to clean the floppy disk drive heads (Head Cleaning)
- ❑ A PCMCIA wraparound connector for the I/O card test (PCMCIA test)
- ❑ A printer wraparound connector for the printer wraparound test (Printer test)
- ❑ An RS-232-C wraparound connector for the RS-232-C port wraparound test (ASYNC test)
- ❑ External CRT (All tests)
- ❑ PS/2 or compatible keyboard (All tests)
- ❑ PS/2 or compatible mouse (Keyboard test)
- ❑ Serial port wraparound connector (ASYNC test)
- ❑ Enhanced port replicator (Expansion test)

The following sections detail the tests within the Diagnostic Test function of the DIAGNOS-TIC TEST MENU. Refer to Sections 3.15 through 3.23 for detailed information on the remaining Service Program Module functions.

3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the DIAGNOSTICS PROGRAM. To start the DIAG-
NOSTIC PROGRAM follow these steps:

1. Insert the Diagnostics disk into the computer's floppy disk drive and turn on the
    computer.

    The following menu will appear:

    ```
    TOSHIBA personal computer xxx DIAGNOSTICS
    version X.XX (c) copyright TOSHIBA Corp. 19XX

    DIAGNOSTICS MENU :

       1 - DIAGNOSTIC TEST
       2 - HARD DISK FORMAT
       3 -
       4 - HEAD CLEANING
       5 - LOG UTILITIES
       6 - RUNNING TEST
       7 - FDD UTILITIES
       8 - SYSTEM CONFIGURATION
       9 - EXIT TO MS-DOS
       0 - SETUP
                                  ↑↓→←   :   Select items
                                  Enter  :   Specify
                                  Esc    :   Exit
    ```

> *NOTE : To exit the DIAGNOSTIC TEST MENU, press the **Esc** key. If a test program
> is in progress, press **Ctrl + Break** to exit the test program or press **Ctrl + C** to stop the
> test program.*

2. To execute the DIAGNOSTIC TEST MENU from the DIAGNOSTICS MENU, set the highlight bar to **1**, and press **Enter**. The following DIAGNOSTIC TEST MENU will appear:

```
TOSHIBA personal computer xxx DIAGNOSTICS
version X.XX (c) copyright TOSHIBA Corp. 19XX
DIAGNOSTIC TEST MENU :

 1 - SYSTEM TEST
 2 - MEMORY TEST
 3 - KEYBOARD TEST
 4 - DISPLAY TEST
 5 - FLOPPY DISK TEST
 6 - PRINTER TEST
 7 - ASYNC TEST
 8 - HARD DISK TEST
 9 - REAL TIMER TEST
10 - NDP TEST
11 - EXPANSION TEST
88 - ERROR RETRY COUNT SET [HDD & FDD]
99 - EXIT TO DIAGNOSTICS MENU
                        ↑↓→←   :  Select items
                        Enter  :  Specify
                        Esc    :  Exit
```

Refer to sections 3.4 through 3.14 for detailed descriptions of Diagnostic Tests 1 through 11. Function 88 sets the floppy disk drive and hard disk drive error retry count. Function 99 exits the submenus of the Diagnostic Test and returns to the Diagnostic Menu.

3. Select the option you want to execute and press   **Enter**. The following message will appear:

```
SYSTEM TEST     XXXXXXX

                                ┌─────────────────────────────┐
                                │ xxx DIAGNOSTIC TEST VX.XX    │
                                │ [Ctrl]+[Break]; test end     │
                                │ [Ctrl]+[C]     ; key stop    │
                                └─────────────────────────────┘

SUB-TEST : XX
PASS COUNT: XXXXX ERROR COUNT: XXXXX
WRITE DATA: XX  READ DATA : XX
ADDRESS : XXXXXX STATUS  : XXX

SUB-TEST MENU :

01 - ROM checksum
02 -
03 -
04 -
05 - Thermistor check
99 - Exit to DIAGNOSTIC TEST MENU
                        ↑↓→←   :  Select items
                        Enter  :  Specify
                        Esc    :  Exit
```

NOTE : The menu displayed by your computer may be slightly different from the one shown above.

---

4. Select the desired subtest number from the subtest menu and press **Enter**. The following message will appear:

```
TEST LOOP   : YES
```

Selecting **YES** increases the pass counter by one each time the test cycle ends and also restarts the test cycle.

Selecting **NO** returns the subtest menu to the main menu after the test is complete.

5. The following message will appear:

```
ERROR STOP : YES
```

Then, use the left or right arrow keys to move the cursor to the desired option and press **Enter**.

Selecting **YES** stops the test program when an error is found and displays the operation guide on the right side of the display screen as shown below:

```
ERROR STATUS NAME    [[ HALT OPERATION ]]

                                  1: Test end
                                  2: Continue
                                  3: Retry
```

These three selections have the following functions respectively:

1: Terminates the test program and exits to the subtest menu.
2: Continues the test.
3: Restarts the test from the error.

Selecting **NO** keeps the test running even if an error is found.

6. Use the arrow keys to move the cursor to the desired option and press **Enter**.

Table 3-1 in section 3.3 describes the function of each test on the subtest menu.
Table 3-2 in section 3.15 describes the error codes and error status for each error.

3.3   Subtest Names

Table 3-1 lists the subtest names for each test program in the DIAGNOSTIC TEST MENU.

Table 3-1 Subtest names (1/2)

No.	Test name	Subtest No.	Subtest item
1	SYSTEM	01	ROM checksum
		05	Thermistor check
2	MEMORY	01	Constant data
		02	Address pattern data
		03	Refresh
		04	Protected mode
		05	Memory module
		06	Cache memory
3	KEYBOARD	01	Pressed key display
		02	Pressed keycode display
		03	PS/2 Mouse connect check
		04	Pointing stick
4	DISPLAY	01	VRAM read/write
		02	Character attributes
		03	Character set
		04	80x25/30 Character display
		05	320x200 Graphics display
		06	640x200 Graphics display
		07	640x350/480 Graphics display
		08	Display page
		09	"H" pattern display/Border color
		10	LED/DAC pallet
		11	Color 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

Table 3-1 Subtest names (2/2)

No.	Test name	Subtest No.	Subtest item
7	ASYNC	01	Wraparound (board)
		02	Board (#1) <=> board (#2) (Not Used)
		03	Point to point (send)
		04	Point to point (receive)
		05	Interrupt test
8	HDD	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		05	Write/read/compare (CE)
		06	Write specified address
		07	Read specified address
		08	ECC circuit
		09	Sequential write
		10	W-R-C specified address
9	REAL TIMER	01	Real time
		02	Backup memory
		03	Real time carry
10	NDP	01	NDP test
11	EXPANSION	01	PCMCIA wraparound (Internal)
		02	PCMCIA wraparound (External)

3.4　System Test

To execute the System Test select　**1** from the DIAGNOSTIC TEST MENU, press　**Enter**, and follow the directions displayed on the screen. Move the highlight bar to the subtest you want to execute and press　**Enter**.

Subtest 01　　ROM checksum

The ROM checksum tests the system board from address F0000h to FFFFFh (64KB).

Subtest 02　　Not used

Subtest 03　　Not used

Subtest 04　　Not used

Subtest 05　　Thermistor check

This subtest checks the thermistor that controls CPU temperature. The thermistor cable connects to PJ1 on the system board.

3.5 Memory Test

To execute the Memory Test select **2** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Constant data (real mode)

This subtest writes a 256-byte unit of constant data to conventional memory (0 to 640 KB), then reads the new data and compares the result with the original data. The constant data is FFFFh, AAAAh, 5555h, and 0000h.

Subtest 02   Address pattern data (real mode)

This subtest writes address pattern data created by the exclusive-ORing (XORing), to the address segment and address offset in conventional memory (program end to 640 KB), then reads the new data and compares the result with the original data.

Subtest 03   Refresh (real mode)

This subtest writes a 256-byte unit of constant data to conventional memory (0 to 640 KB), then reads the new data and compares the result with the original data.

The constant data is AAAAh and 5555h.

> *NOTE: There is a short delay between write and read operations, depending on the size of the data.*

Subtest 04   Protected mode

> *NOTE: The CONFIG.SYS file must be configured without expanded memory manager programs such as EMM386.EXE, EMM386.SYS, or QEMM386.SYS. Also, the HIMEM.SYS must be deleted from the CONFIG.SYS file.*

This subtest writes constant data and address data to extended memory (maximum address 100000h), then reads the new data and compares the result with the original data.

The constant data is FFh, AAh, 55h, and 00h.

Subtest 05   Memory module

> ***NOTE:*** *To execute this subtest, an optional memory card must be in-stalled in the computer.*

This subtest functions the same as subtest 04, except it is used for testing an optional memory card. Memory module capacity is 8 MB, 16 MB, and 32 MB.

After selecting subtest 05, the following message will appear:

```
Extended memory size (1:8 MB,2:16 MB,3:32 MB)?
```

Select the number that corresponds to the memory card installed in the computer.

Subtest 06   Cache memory

To test the cache memory, a pass-through write-read comparison of '5A' data is run repeatedly to the test area ('7000':'Program' size to '7000':=7FFF' (32 KB)) to check the hit-miss ratio (on/off status). One test takes 3 seconds.

Number of misses $<$ Number of hits $\rightarrow$ OK
Number of misses $\geq$ Number of hits $\rightarrow$ Fail

3.6 Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Keyboard test contains four subtests that test the computer's keyboard actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Pressed key display (82/84)

*NOTE: The **Num Lock** and the **Overlay** mode must be off to execute this subtest.*

When you execute this subtest, the keyboard layout is drawn on the display as shown below. When any key is pressed, the corresponding key on the screen changes to an "✻" character. Holding a key down enables the auto-repeat function which causes the key's display character to blink.
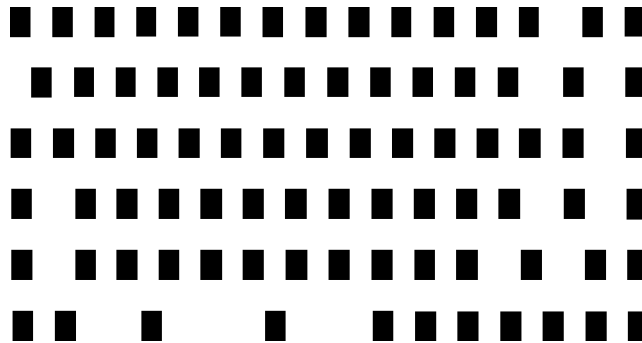
```
       [[[   Press Key Display   ]]]


    ■■■■■■■■■■■■ ■■
     ■■■■■■■■■■■■ ■ ■
    ■■■■■■■■■■■■■■ ■
    ■ ■■■■■■■■■■■ ■ ■
    ■ ■■■■■■■■■■ ■ ■■
    ■■ ■   ■   ■■■■■■■


    If test OK, Press [Del] [Enter] Key
```

Subtest 02   Pressed key code display

When a key is pressed, the scan code, character code, and keytop name are displayed on the screen in the format shown below. The **Ins**, **Caps Lock**, **Num Lock**, **Scroll Lock**, **Alt**, **Ctrl**, **Left Shift**, and **Right Shift** keys are displayed in reverse screen mode when pressed. The scan codes, character codes, and keytop names are shown in Appendix D.

```
KEYBOARD TEST  IN PROGRESS  302000

              Scan code       =
              Character code  =
              Keytop          =

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

PRESS [Enter] KEY
```

Subtest 03   PS/2 mouse connect check

> *NOTE : To execute the PS/2 mouse connect check, a PS/2 mouse must be connected to the enhanced port replicator.*

This subtest checks whether or not a PS/2 mouse is connected.

If this test does not detect an error, it returns to the subtest menu.
If this test detects an error, the following message appears:

```
KBD - MOUSE INTERFACE ERROR

[[ HALT OPERATION ]]

   1: Test end
   2: Continue
   3: Retry
```

Subtest 04   Pointing Stick

This subtest checks the functions of the pointing stick as shown below.

a) IPS stick pressure sensing direction and parameter.
b) IPS switch function check.

This test reports the pointing stick motion response from the IPS and IPS switch. When the stick is pressed towards the upper left, the   <POINTING> display changes according to the following illustration. If an IPS switch is pressed, the <BUTTON> display alternates between black and white. Also, the parameters appear on the right side of the display.   If two IPS switches are pressed at the same time, the subtest menu is displayed.
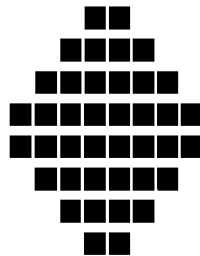
```
   < POINTING >            < PARAMETER >
                              STATUS:0008h
                              X-RATE:0000h
            ██                Y-RATE:0000h
           ████
          ██████
        ████████            < BUTTON >
        ████████
         ██████               (1)        (2)
          ████               ███        ███
           ██               █    █      █    █
                            █    █      █    █
                             ███        ███
```
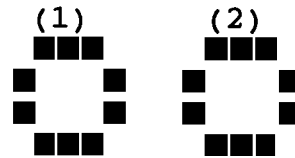
```
      << PRESS BUTTON1 + BUTTON2 THEN END >>
```
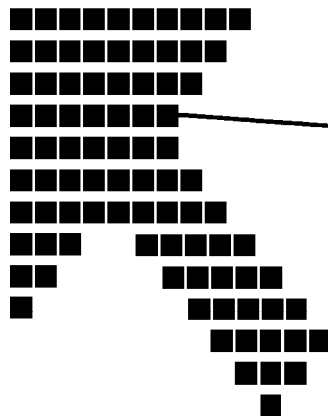
There are eight directions of arrow mark as shown below.
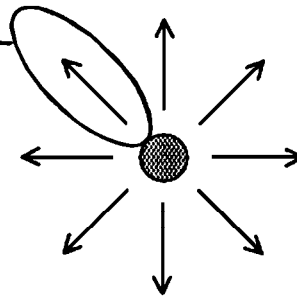
When a button is pressed, the display alternates as shown below.
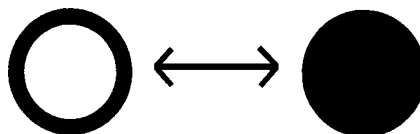
3.7 Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The Display test contains eleven subtests that test the computer's display in various modes. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   VRAM Read/Write

This subtest writes constant data FFFFh, AAAAh, 5555h, 0000h and address data to video RAM (1MB). This data is then read from the video RAM and compared to the original data.

Subtest 02   Character Attributes (mode 1, 13h)

This subtest displays the following character attribute modes; normal, intensified, reverse, and blinking as shown in the display below. The character attribute modes display the foreground color and intensified color (16 colors or 16-level gray scale) using black, blue, red, magenta, green, cyan, yellow, and white from the color display. The display below appears on the screen when this subtest is executed.
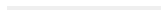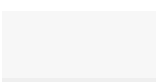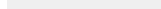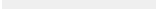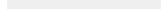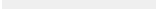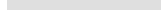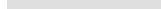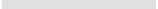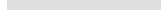
```
CHARACTER ATTRIBUTES

   NEXT LINE SHOWS NORMAL DISPLAY.
    NNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNNN

   NEXT LINE SHOWS INTENSIFIED DISPLAY.
    IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII

   NEXT LINE SHOWS REVERSE DISPLAY.
    RRRRRRRRRRRRRRRRRRRRRRRRRRRRRRRR

   NEXT LINE SHOWS BLINKING DISPLAY.
    BBBBBBBBBBBBBBBBBBBBBBBBBBBBBBBB


                              00 08 ; BLACK
                              01 09 ; BLUE
                              04 0C ; RED
                              05 0D ; MAGENTA
                              02 0A ; GREEN
                              03 0B ; CYAN
                              06 0E ; YELLOW
                              07 0F ; WHITE


       PRESS [Enter] KEY
```

After pressing **Enter**, 16 colors or 16 gray scales of mode 13h appear in the 320x200 graphics mode as shown below:

```
320*200 GRAPHICS DISPLAY [13]
```

BLACK
BLUE
GREEN
CYAN
RED
MAGENTA
BROWN
WHITE
GRAY
LIGHT BLUE
LIGHT GREEN
LIGHT CYAN
LIGHT RED
LIGHT MAGENTA
YELLOW
INTENSE WHITE

```
PRESS [Enter] KEY
```

Pressing **Enter** toggles between the two tests.

To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

Subtest 03   Character Set

In this subtest, the character set (addressed 00h to FFh) is displayed in the 40*25 character mode as shown below.

CHARACTER SET IN 40*25


```
Press [Enter] KEY
```

To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

Subtest 04   80x25/30 Character Display (mode 3, 12)

In this subtest, the character string is displayed shifting one character to the right, line by line in the 80x25 and 80x30 character modes as shown below.

```
80*XX CHARACTER DISPLAY
012345678901234567890123456789012345678901234567890123456789012345678901234567
 !"#$%£'()*+,-./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
```

Pressing **Enter** toggles between tests. To exit this subtest and return to the DISPLAY TEST menu, press   **Ctrl + Break** .

Subtest 05   320x200 Graphics Display (mode 4, D)

This subtest displays two color sets for the color display in 320x200 dot graphics mode 4 and D. One example is shown below:

```
320*200 GRAPHICS DISPLAY
COLOR SET X : [X]

          GREEN        RED        BROWN
          CYAN       MAGENTA      WHITE
```
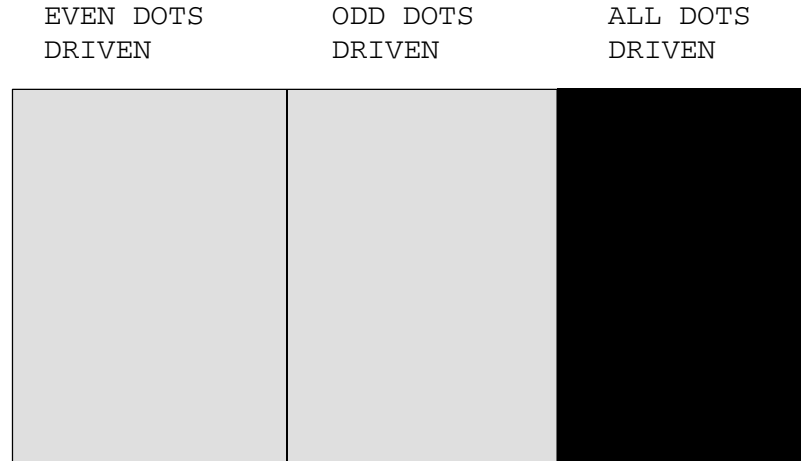


```
PRESS [Enter]KEY
```

Pressing **Enter** toggles between tests. To exit this subtest and return to the DISPLAY TEST menu, press   **Ctrl + Break.**

Subtest 06   640x200 Graphics Display (mode 6, E)

This subtest displays even dots, odd dots, and all dots in the 640x200 dot graphics mode 6 and E as shown below:

```
640*200 GRAPHICS DISPLAY : [X]
```

```
  EVEN DOTS          ODD DOTS           ALL DOTS
  DRIVEN             DRIVEN             DRIVEN
```



```
PRESS [Enter] KEY
```

To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break.**

Subtest 07   640x350/480 Graphics Display (mode 10, 12)

This subtest displays even dots, odd dots, and all dots in the 640x350 and 640x480 dot graphics mode 10, 12 as shown below:

```
640*XXX GRAPHICS DISPLAY
```

```
  EVEN DOTS          ODD DOTS           ALL DOTS
  DRIVEN             DRIVEN             DRIVEN
```
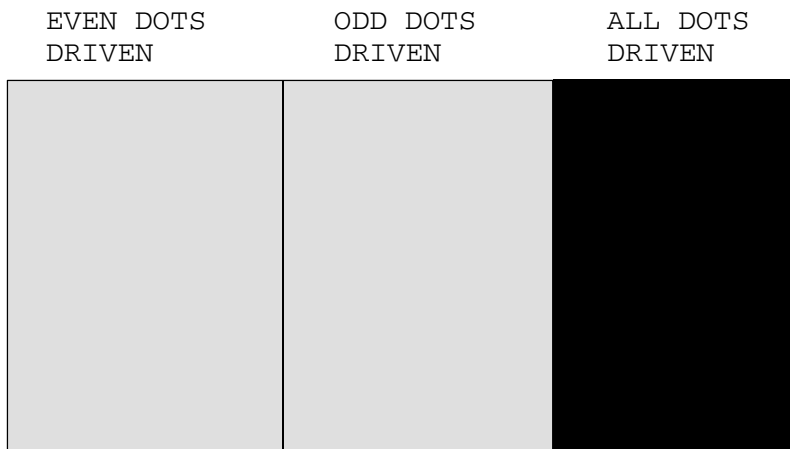

Pressing **Enter** changes the size of the displayed image. To exit this subtest and return to the DISPLAY TEST menu, press   **Ctrl + Break.**

Subtest 08   Display Page

This subtest confirms that the pages can be changed in order from page 0
through page 7 in 40*25 character mode.

```
DISPLAY PAGE 0

000000000000000000000000000000000000000
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
0                                       0
000000000000000000000000000000000000000
```

Pressing **Ctrl + Break** exits this subtest, after completion of the test, and
returns to the DISPLAY TEST menu.

Subtest 09   H Pattern Display/Border Color

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

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

Pressing **Enter** displays the following message:

```
 Setting the color CRT (1:yes/2:no) ?
```

If an external CRT display is connected to the computer, choose   **1** to display
the following message:

```
 [Border color test (7 times press [Enter] key]
```

Press **Enter** to execute the border color test. To exit this subtest and return to
the DISPLAY TEST menu, press   **Ctrl + Break.**

Subtest 10   LED/DAC Pallet

This subtest checks the LED indicator (Caps Lock, Overlay and Num Lock)
by key operation.

```
[ Caps/Num/Overlay LED test ]

(1)  Press [Caps Lock    ] key !...Caps   (on/off)
(2)  Press [Fn + Num Lock] key !...Num    (on/off)
(3)  Press [Fn           ] key !...Overlay(on/off)

 PRESS [Enter] KEY
```

Press **Enter** to display the following two messages:

After pressing **Enter**, this subtest writes the '2A' and '15' data to 6 bit of
256x3 (RGB), then reads new data and compares the result with the original
data.

```
[DAC pallet W-R-CMP test ]   =  (about 1 second)

[Processor latch test    ]   =

 Processor latch test (1:256 times, 2:endless) ?
```

To exit, press **Ctrl + Break**. Then press **Enter**.

Subtest 11   Color display

This subtest sets the video mode to '13' and displays color code (0 to 63) at
the same time, then displays seven screens. The first screen shows many colors
at once, the next three display 64 shades of red, green, and blue successively
and the last three display 64 shades of red, green, and blue. Also, it sets the
video mode to '5F' and displays 256 colors.

Press **Enter** to change the display. Press **Ctrl + Break** to exit.

3.8   Floppy Disk Test

NOTE : Before running the floppy disk test, prepare a formatted work disk. Remove the Diagnostics Disk and insert a work disk into the FDD. The contents of the floppy disk will be erased.

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions displayed on the screen. The Floppy Disk test contains five subtests that test the computer's external floppy disk drive. The following messages will appear after selecting the Floppy Disk Test from the DIAGNOSTIC TEST MENU. Answer each question with an appropriate response to execute the test.

1. Select the test drive number of the floppy disk drive to be tested and press **Enter**.

   ```
   Test drive number select (1:FDD#1,2:FDD#2,0:FDD1&2) ?
   ```

2. Select the media type of the floppy disk in the test drive to be tested, and press **Enter**.

   ```
   Media in drive #X mode (0:2DD,1:2D,2:2D-2HD/2DD,3:2HD) ?
   ```

3. Select the track you want the test to start on and press **Enter**. Simply pressing **Enter** sets the start track to zero.

   ```
   Test start track  (Enter:0/dd:00-79) ?
   ```

4. The floppy disk test menu will appear after you select the start track number. Select the number of the subtest you want to execute and press **Enter.** The following message will appear during the floppy disk test.

   ```
   FLOPPY DISK       XXXXXXX
                                 xxxx DIAGNOSTIC TEST VX.XX
                                  [Ctrl]+[Break] ; test end
                                  [Ctrl]+[C]    ; key stop
   ```

Subtest 01   Sequential Read

This subtest performs a Cyclic Redundancy Check (CRC), that continuously reads all the tracks on a floppy disk. The following tracks are read according to the media type in the floppy disk drive:

Double-sided, double-density (2D): Tracks 0 to 39.

Double-sided, double-density, double-track (2DD) and double-sided, high-density, double-track (2HD): Tracks 0 to 79.

The start track is specified when the FDD test is started from the Diagnostic Test Menu. Refer to step 3 at the beginning of this section to set the start track.

Subtest 02   Sequential Read/Write

                  This subtest continuously writes data pattern B5ADADh to all the specified
                  tracks selected in subtest 01. The data is then read and compared to the
                  original data.

Subtest 03   Random Address/Data

                  This subtest writes random data to random addresses on all tracks defined in
                  subtest 01. The data is then read and compared to the original data.

Subtest 04   Write Specified Address

                  This subtest writes specified data to a specified track, head, and address.

Subtest 05   Read Specified Address

                  This subtest reads data from a specified track, head, and address.

3.9 Printer Test

To execute the Printer Test select **6** from the DIAGNOSTIC TEST MENU, press **Enter**, and
follow the directions displayed on the screen. The Printer Test contains three subtests that
test the output of the printer connected to the computer. The following messages will appear
after selecting the Printer Test from the DIAGNOSTIC TEST MENU. Answer each of the
following questions with an appropriate response to execute the test.

> *NOTE : An IBM compatible printer must be connected to the system to execute this test.*

The following message will appear when the printer test is selected:

```
        channel#1 = XXXXh
        channel#2 = XXXXh
        channel#3 = XXXXh
     Select the channel number (1-3) ?
```

The printer I/O port address is specified by the XXXXh number. The computer supports
three printer channels. Select the printer channel number and press **Enter** to execute the
selected subtest.

Subtest 01   Ripple Pattern

This subtest prints characters for codes 20h through 7Eh line-by-line while
shifting one character to the left 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[\]^_`abcdefghijklmnopqrstu
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuv
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvw
)*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwx
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstuvwxy
```

Subtest 02   Function

This subtest is for IBM compatible printers and tests the following functions:

Normal print
Double width print
Compressed print
Emphasized print
Double strike print
All characters print

This subtest prints the various print types shown below:

```
PRINTER TEST
1.      THIS LINE SHOWS NORMAL PRINT.
2.     THIS LINE SHOWS DOUBLE-WIDTH PRINT.
3.      THIS LINE SHOWS COMPRESSED PRINT.
4.      THIS LINE SHOWS EMPHASIZED PRINT.
5.      THIS LINE SHOWS DOUBLE-STRIKE PRINT.
6.      ALL CHARACTERS PRINT
!"#$%&'()*+,./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_`abcdefghijklmn
opqrstuvwxyz{|}~
```

Subtest 03   Wraparound

> *NOTE: To execute this subtest, a printer wraparound connector must be connected to the computer's printer port. The printer wraparound connector (34M741986G01) wiring diagram is described in Appendix F.*

This subtest checks the output and bidirectional modes of the data control and status lines through the printer wraparound connector.

3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TEST MENU, press **Enter**, and
follow the directions displayed on the screen. The async test contains four subtests that test
the computer's asynchronous communication functions. Move the highlight bar to the subtest
you want to execute and press **Enter**.

Subtests 01 through 04 require the following data format:

> Method: Asynchronous
> Speed: 9600BPS (Subtests 01 to 05)
> Data: 8 bits and one parity bit (EVEN)
> Data pattern: 20h to 7Eh

The following message will appear at the bottom of the screen when subtests 01, 03, 04, and
05 are selected:

```
Channel#1 = XXXXh
Channel#2 = XXXXh
Channel#3 = XXXXh
Select the Channel number (1/2/3)
```

The serial I/O port address is specified by the XXXXh number. Select the serial port channel
number and press **Enter** to start the subtest.

Subtest 01   Wraparound (board)

> *NOTE: To execute this subtest an RS-232-C wraparound connector
> (34M741621G01) must be connected to the RS-232-C port. The RS-
> 232-C wraparound connector wiring diagram is described in Appendix
> F.*

This subtest checks the data send/receive function through the wraparound
connector.

Subtest 02   Board (#1) <=> board (#2)

This subtest is not used.

Subtest 03   Point to point (Send)

> **_NOTE_**_: To execute this subtest, two machines must be connected with an RS-232-C direct cable. One machine should be set as "send"(subtest 03) and the other set as 'receive' (subtest 04). The wiring diagram for the RS-232-C direct cable is described in Appendix F._

This subtest sends 20h through 7Eh data to the receive side, then receives the sent data and compares it to the original data.

Subtest 04   Point to point (Receive)

This subtest is used with subtest 03 described above. This subtest receives the data from the send side, then sends the received data.

Subtest 05   Interrupt Test

This subtest checks the Interrupt Request Level of IRQ 4, 3, and 5 from the send side.

3.11 Hard Disk Test

To execute the Hard Disk Test select **8** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions displayed on the screen. The hard disk test contains ten subtests that test the computer hard disk drive functions. The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST MENU. Answer each of the following questions with an appropriate response to execute the test:

> *NOTE : The contents of the hard disk will be erased when subtest 02, 03, 04, 05, 06, 08, 09, or 10 is executed. Before running the test, transfer the contents of the hard disk to a floppy disk(s). This should be done with the BACKUP command in the Toshiba Companion Utility. Do not use the MS-DOS BACKUP command.*
>
> *After the hard disk test is completed, execute the Toshiba MS-DOS FDISK command which will set the partition, then execute the Toshiba MS-DOS FORMAT command. Refer to the Toshiba MS-DOS manual for details.*

1. When you select the hard disk test from the DIAGNOSTIC TEST MENU, the following message will appear:

   ```
   Test drive number select (1:HDD#1,2:HDD#2,0:HDD1&2) ?
   ```

2. Select the hard disk drive number to be tested and press **Enter**. The following message will appear:

   ```
   HDC F/W error retry  (1:yes,2:no) ?
   ```

3. This message is used to select the retry operation when the hard disk controller detects an error. Select **1** or **2** and press **Enter**. The following message will appear:

   ```
   Data compare error dump (1:no,2:yes) ?
   ```

4. This message is used to select the error dump operation when a data compare error is detected. Select **1** or **2** and press **Enter**. The following message will appear:

   ```
   Detail status display (1:no,2:yes) ?
   ```

5. This message is used to select whether or not the HDD status is displayed on the screen. The HDD status is described in section 3.16. Select **1** or **2** and press **Enter**.

6. The Hard Disk Test message will appear after you respond to the Detail Status prompt. Select the number of the subtest you want to execute and press **Enter**.

The following message will appear during each subtest.

```
HARD DISK TEST      XXXXXXX

SUB-TEST : XX
PASS COUNT: XXXXX   ERROR COUNT: XXXXX
WRITE DATA: XX   READ DATA : XX
ADDRESS : XXXXXX STATUS   : XXX
```

The first three digits of the ADDRESS indicate which cylinder is being tested, the fourth digit indicates the head, and the last two digits indicate the sector.

The first digit of the STATUS number indicates the drive being tested and the last two digits indicate the error status code as explained in table 3-3.

Subtest 01   Sequential Read

This subtest is a sequential reading of all the tracks on the HDD starting at track 0. When all the tracks on the HDD have been read, the test starts at the maximum track and reads the tracks on the HDD sequentially back to track 0.

Subtest 02   Address Uniqueness

This subtest writes unique address data to each sector of the HDD track-by-track. The data written to each sector is then read and compared with the original data. There are three ways the HDD can be read:

• Forward sequential
• Reverse sequential
• Random

Subtest 03   Random Address/Data

This subtest writes random data to random addresses on the HDD cylinder, head, and sector. This data is then read and compared to the original data.

Subtest 04   Cross Talk & Peak Shift

This subtest writes eight types of worst pattern data (shown below) to a
cylinder, then reads the data while moving from cylinder to cylinder.

Worst pattern data	Cylinder
'B5ADAD'	0 cylinder
'4A5252'	1 cylinder
'EB6DB6'	2 cylinder
'149249'	3 cylinder
'63B63B'	4 cylinder
'9C49C4'	5 cylinder
'2DB6DB'	6 cylinder
'D24924'	7 cylinder

Subtest 05   Write/read/compare (CE)

This subtest writes B5ADADh worst pattern data to the CE cylinder on the
HDD, then reads the data from the CE cylinder and compares it with the
original data.

Subtest 06   Write specified address

This subtest writes specified data to a specified cylinder and head on the HDD.

Subtest 07   Read specified address

This subtest reads data which has been written to a specified cylinder and head
on the HDD.

Subtest 08   ECC circuit

This subtest checks the Error Check and Correction (ECC) circuit functions of
the specified cylinder and head on the HDD.

Subtest 09   Sequential write

This subtest writes specified 2-byte data to all of the cylinders on the HDD.

Subtest 10   W-R-C specified address

This subtest writes data to a specified cylinder and head on the HDD, then
reads the data and compares it to the original data.

3.12 Real Timer Test

To execute the Real Timer Test select **9** from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions on the screen. The real timer test contains three subtests that test the computer's real timer functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Real Time

A new date and time can be input during this subtest. To execute the real time subtest follow these steps:

1. Select subtest 01 and the following message will appear:

```
        Current date : XX-XX-XXXX
        Current time : XX:XX:XX

        Enter new date:

    PRESS [ENTER] KEY TO EXIT TEST
```

2. If the current date is not correct, input the correct date at the "Enter new date" prompt and press **Enter**. The following prompt will appear:

```
    Enter new time :
```

3. If the current time is not correct, input the correct time in 24-hour format.

Pressing **Enter** toggles between the time and the date. To exit, press **Ctrl + Break**.

Subtest 02   Backup Memory

This subtest performs the following backup memory check:

Writes 1-bit of "on" data to address 01h through 80h
Writes 1-bit of "off" data to address 0Eh through 80h
Writes the data pattern AAh through 55h to the RTC 114-byte memory (address 0Eh to 7Fh)

The subtest reads and compares this data with the original data.

To exit, press **Ctrl + Break** .

Subtest 03   Real Time Carry

> *NOTE : When this subtest is executed, the current date and time are erased.*

This subtest checks the real time clock increments, making sure the date and time are displayed in the following format:

```
Current date  : 12-31-1994
Current time  : 23:59:58
```

Pressing **Enter** displays the following:

```
Current date :  01-01-1995
Current time :  00:00:00


 PRESS [Enter] KEY TO EXIT TEST
```

Press **Ctrl + Break** to exit.

3.13 NDP Test

To execute the NDP test, select **10** from the DIAGNOSTICS TEST MENU, press **Enter**, and follow the directions on the screen. The NDP test contains one subtest that tests the computer's NDP functions.

Subtest 01   NDP

This test checks the following functions of NDP:

❑ Control word
❑ Status word
❑ Bus
❑ Addition
❑ Multiplication

Press **Ctrl + Break** to exit.

3.14 EXPANSION Test

NOTE : *To execute this subtest, the PCMCIA wraparound connector is required.*

Subtest 01   PCMCIA wraparound (Internal)

This test checks the following signal line of the PCMCIA slot:

❑ Address line
❑ REG#, CE#1, CE#2 line
❑ Data line
❑ Speaker line
❑ Wait line
❑ BSY#, BVD1 line

This subtest is executed in the following order:

Sub#	Address	Good	Bad	Contents
01	00001 00001	nn nn	xx xx	Address line REG#, CE#1, CE#2 nn=A0, 90, 80, 00
02	00002	ww	rr	Data line ww=write data, rr=read data
03	00003	—	—	Speaker line
04	00004	40, 80	xx	Wait line (40<xx<80)
05	00005	nn	xx	Other lines (BSY#, BVD1) nn=21, 00

Subtest 02   PCMCIA wraparound (External)

This test checks the signal lines of the enhanced port replicator's PCMCIA slots.

Procedures for conducting this test are the same as for subtest 01 PCMCIA wraparound (Internal) described above.

3.15 Error Code and Error Status Names

Table 3-2 lists the error codes and error status names for the Diagnostic Test.

Table 3-2 Error codes and error status names (1/2)

Device name	Error code	Error status name
(COMMON)	FF	Data Compare Error
SYSTEM	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	14	Memory Read/Write Error
	DD	Cache Memory Error
Keyboard	01	Mouse Interface Error
	02	IPS Interface Error
	03	Interface Error
	04	Retransmit Error
	05	Mouse Handler Not Supported
	06	PS/2 Mouse & IPS Not connected
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive Error
	80	Time Out Error
	EE	Write Buffer Error
Printer	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line
ASYNC	01	DSR On Time Out
	02	CTS On Time Out
	04	RX-READY Time Out
	08	TX-BUFFER Full Time Out
	10	Parity Error

Table 3-2 Error codes and error status names (2/2)

Device name	Error code	Error status name
ASYNC (cont.)	20	Framing Error
	40	Overrun Error
	80	Line Status Error
	88	Modem Status Error
HDD	01	Bad Command Error
	02	Address Mark Not Found
	04	Record Not Found
	05	HDC Not Reset Error
	07	Drive Not Initialized
	08	HDC Overrun (DRQ)
	09	DMA Boundary Error
	0A	Bad Sector
	0B	Bad Track Error
	10	ECC Error
	11	ECC Recover Enabled
	20	HDC Error
	40	Seek Error
	80	Time Out Error
	AA	Drive Not Ready
	BB	Undefined Error
	CC	Write Fault
	E0	Status Error
	EE	Access Time Out Error
NDP	01	No Co-Processor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiply Error
PCMCIA	C1	Address Line Error
	C2	REG# Line Error
	C3	CE#1 Line Error
	C4	CE#2 Line Error
	C5	DATA Line Error
	C6	WAIT Line Error
	C7	BSY# Line Error
	C8	BVD1 Line Error
	CD	No PCMCIA

3.16 Hard Disk Test Detail Status

When an error occurs in the hard disk test, the following message is displayed:

```
HDC status = XXXXXXXX
```

Detailed information about the hard disk test error is displayed on the screen by an eight-digit number. The first four digits represent the hard disk controller (HDC) error status number and the last four digits are not used.

The hard disk controller error status is composed of 2 bytes; the first byte displays the contents of the HDC status register in hexadecimal form and the second byte displays the HDC error register.

The contents of the HDC status register and error register are listed in tables 3-3 and 3-4.

Table 3-3 Hard disk controller status register contents

Bit	Name	Description
7	BSY (Busy)	"0" --- HDC is busy. "1" --- HDC is ready.
6	DRDY (Drive ready)	"0" --- Hard disk drive is not ready to accept any command. "1" --- Hard disk drive is ready to accept any command.
5	DWF (Drive write fault)	"0" --- DWF error is not detected. "1" --- Write fault condition occurs.
4	DSC (Drive seek complete)	"0" --- The hard disk drive heads are not settled over a track. "1" --- The hard disk drive heads are settled over a track.
3	DRQ (Data request)	"0" --- Drive is not ready for data transfer. "1" --- Drive is ready for data transfer.
2	CORR (Corrected data)	"0" --- Other. "1" --- Correctable data error is corrected.
1	IDX (Index)	"0" --- Other. "1" --- Index is sensed.
0	ERR (Error)	"0" --- Other. "1" --- The previous command was terminated with some error.

Table 3-4 Error register contents

Bit	Name	Description
7	BBK1 (Bad block mark)	"0" Other. "1" A bad block mark is detected.
6	UNC (Uncorrectable)	"0" There is no uncorrectable data error. "1" Uncorrectable data error has been detected.
5	——	Not used.
4	IDNF (Identification)	"0" Other. "1" There was no ID field in the requested sector.
3	——	Not used.
2	ABRT (Abort)	"0" Other. "1" Illegal command error or a drive status error occurs.
1	TK00 (Track 0)	"0" The hard disk has found track 0 during a recalibrate command. "1" The hard disk could not find track 0 during a recalibrate command.
0	——	Not used.

3.17 Hard Disk Format

This command executes hard disk formatting. There are two types of hard-disk formatting:

❑ Low-level (physical) formatting
❑ MS-DOS (logical) formatting

This hard disk format function performs a low-level format of the hard disk and executes the following hard disk formats and check:

1. All track FORMAT
2. Good track FORMAT
3. Bad track FORMAT
4. Bad track CHECK

> *NOTE*: *The contents of the hard disk will be erased when this program is executed. Before executing the function, transfer the contents of the hard disk onto a floppy disk(s). This can be done with the BACKUP in the Toshiba Companion Utility. See the Toshiba MS-DOS manual for details.*

3.17.1 Function Description

1. All track FORMAT

    This option performs a low-level format of all the tracks on the hard disk as shown in Table 3-5 below:

> *NOTE*: *Before executing the all track format option, check for bad tracks using the Bad Track CHECK option or display a list of bad tracks on the HDD.*

Table 3-5 Hard disk formatting sequence

Items	Toshiba MK1924FCV	IBM DBOA-2528
Storage capacity (million byte) Formatted	528	528
Number of disks	2	2
Data heads	4	3
Data surfaces	4	4
Bytes per sector	512	512
Rotation speed (rpm)	4200	4000
Recording method	8-9 RLL	1-7 RLL

2.   Good track FORMAT

This option formats a specified cylinder and track as a good track. If a good track is formatted as a bad track, use this option to change the track to a good track.

3.   Bad track FORMAT

This option formats a specified cylinder and track as a bad track. If a bad track is detected, use this option to label it as a bad track.

4.   Bad track CHECK

This option searches the hard disk for bad tracks by reading data to all the tracks on the hard disk. A list of bad tracks is displayed when the program is complete. If an error other than a bad track is detected, the program is automatically terminated.

3.17.2   Operations

NOTE: After the HDD has been formatted, execute the Toshiba MS-DOS FDISK command to partition the HDD. Next, execute the Toshiba MS-DOS FORMAT command. Refer to the Toshiba MS-DOS manual for more information about using these commands.

Selecting TEST 2 and pressing **Enter** on the DIAGNOSTIC MENU displays the following messages:

```
DIAGNOSTICS - HARD DISK FORMAT : VX.XX

   1 - All track FORMAT
   2 - Good track FORMAT
   3 - Bad track FORMAT
   4 - Bad track CHECK
   9 - Go to TEST MENU

 ↑↓→← : Select items, Enter: Finish, Esc: Exit
```

1.   All track FORMAT

Pressing 1 selects All track FORMAT, which lets you format the entire disk.

```
[All track FORMAT]

Drive    :    #1 = HDD           #2 = Non
Cylinder :      XXXX
Head     :       XX
Sector   :       XX

<<< Model name =    >>>
```

The following selections also appear in succession at the bottom of the screen :

```
Drive number select (1:#1,2:#2) ?
```

(a)　Select a drive number and press **Enter**. The following message will appear:

```
Interleave number (1/1 ~ 8) ?
```

(b)　Select an interleave number, 1 ~ 8 and press **Enter**. Pressing only **Enter**
　　selects 1.

```
Unlock format select (1:no/2:yes)
```

(c)　Select whether the disk has an unlock format.

> *NOTE : This option appears only when an HDD manufactured by JVC
> is installed. For JVC HDDs, which are the only disks with unlock
> formats, you must select 2 (yes). If 1 is selected with a JVC disk, an
> error will be generated. The system defaults to 1 and this message does
> not appear when other disks are installed.*

(d)　Bad track register

　　Next, the Bad Track register prompt will appear as shown below. Enter the
　　cylinder and head numbers of bad tracks and press **Enter**. Note that if there
　　are no bad tracks, pressing **Enter** alone is the same as executing All Track
　　Format described in item (e) below.

```
[ WARNING : Current DISK data will be
        completely destroyed ]

Press Bad cylinder number (dddd)] key ?
Press Bad head number (dd)] key ?
```

　　Enter the cylinder and head number in the format above in decimal notation.
　　Repeat for each bad track you want to format.

　　After entering the bad tracks, press **Enter** to execute the format.

(e)　All track format

　　All tracks are formatted as good tracks except those registered as bad tracks
　　in item (d) above or those identified as bad tracks in track verification de-
　　scribed in item (f) below.

(f)　Track verification

　　A check is made of all tracks and if an ECC error, ECC-correctable-data
　　error or record-not-found error is detected at a track, that track is automati-
　　cally formatted as a bad track.

2.   Good track FORMAT

If a good track has been erroneously formatted as a bad track, you can use this
subtest to reformat the track as a good track. To format a track as a good track,
enter the number for drive, interleave, cylinder, and head as indicated in the screen
prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
Interleave number (1 / 1 - 8) ?
    Press [Cylinder number (dddd)] ?
    Press [Head number (dd)] ?
```

Press **Enter** to return to the Hard Disk Format menu.

3.   Bad track FORMAT

To format a track as a bad track, enter the number for drive, interleave, cylinder,
and head as indicated in the screen prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
Interleave number (1 / 1 - 8) ?
    Press [Cylinder number (dddd)] ?
    Press [Head number (dd)] ?
```

Press **Enter** to return to the Hard Disk Format menu.

4.   Bad track CHECK

This subtest reads the entire disk and displays a list of bad tracks. The test is
terminated in case of a bad track check error. To initiate the subtest enter the
drive number at the prompt shown below.

```
Drive number select (1:#1, 2:#2) ?
```

Bad tracks will be displayed in the format shown below.

```
[[cylinder, head = 0123 03]]
```

Press **Enter** to return to the Hard Disk Format menu.

3.18 Head Cleaning

3.18.1 Function Description

This function cleans the heads in the FDD by executing a series of head load/seek and read operations. A cleaning kit is necessary to perform this program.

3.18.2 Operations

1. Selecting test **4** from the DIAGNOSTIC MENU and pressing **Enter** displays the following messages:

   ```
   DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : VX.XX

   Mount cleaning disk(s) on drive(s).

   Press any key when ready.
   ```

2. Remove the Diagnostics Disk from the FDD, then insert the cleaning disk and press **Enter**.

3. When the cleaning start message appears, the FDD head cleaning has begun.

4. The display automatically returns to the DIAGNOSTIC MENU when the program is completed.

3.19 Log Utilities

3.19.1   Function Description

This function logs error information generated while a test is in progress and stores the results in RAM. This function can store data on a floppy disk or output the data to a printer. If the power switch is turned off, the error information will be lost. The error information is displayed in the following order:

1. Error count (CNT)
2. Test name (TS-NAME)
3. Subtest number (TS-NAME)
4. Pass count (PASS)
5. Error status (STS)
6. FDD/HDD or memory address (ADDR)
7. Write data (WD)
8. Read data (RD)
9. HDC status (HSTS)
10. Error status name (ERROR STATUS NAME)

3.19.2   Operations

1. Selecting **5** and pressing **Enter** in the DIAGNOSTIC MENU logs error information into RAM or onto a floppy disk. The error information is displayed in the following format:

```
     XXXXX ERRORS
 CNT TS-NAME PASS STS ADDR     WD RD HSTS [STATUS NAME]

 001 FDD 02 0000  103 00001   00 00        FDD - WRITE PROTECTED
 001 FDD 01 0000  180 00001   00 00        FDD - TIME OUT ERROR
                         Address
                       Error status
             Pass count                HDC status
          Subtest number            Read data
        Test name                 Write data
 Error count                              Error status name

    [[1:Next,2:Prev,3:Exit,4:Clear,5:Print,6:FD Log Read,7:FD Log Write]]
```

2.	The error information displayed on the screen can be manipulated by the following number keys:

The **1** key scrolls the display to the next page.

The **2** key scrolls the display to the previous page.

The **3** key returns to the Diagnostic Menu.

The **4** key erases all error log information in RAM.

The **5** key outputs the error log information to a printer.

The **6** key reads the log information from a floppy disk.

The **7** key writes the log information to a floppy disk.

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

3.20 Running Test

3.20.1 Function Description

This function automatically executes the following tests in sequence:

1. System test (subtest number 01)
2. Memory test (subtest number 01, 02, 04, 06)
3. Display test (subtest number 01 to 08)
4. FDD test (subtest number 02)
5. HDD test (subtest number 01, 05)
6. Real timer test (subtest number 02)
7. Printer test (subtest number 03)
8. Async test (subtest number 01)

The system automatically detects the number of floppy disk drives connected to the computer for the FDD test.

3.20.2 Operations

NOTE : Do not forget to load a work disk in the FDD. If a work disk is not loaded, an error will be generated during the FDD testing.

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

2. Select **6** from the Diagnostic Menu and press **Enter,** the following message will be displayed:

   ```
   Printer wrap around test (Y/N) ?
   ```

   Selecting **Y** (yes) executes the printer wraparound test. A printer wraparound connector must be connected to the **parallel** port on the back of the computer to properly execute this test.

3. Select **Y** or **N** and press **Enter**. The following message will appear:

   ```
   Serial #A wrap around test (Y/N) ?
   ```

   Selecting **Y** (yes) executes the ASYNC wraparound test. An RS-232-C wrap-around connector must be connected to the **serial port** on the back of the computer to properly execute this test.

4. Select **Yes** or **No** and press **Enter**. The following message will appear :

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

5. This program is executed continuously. To terminate the program, press **Ctrl + Break.**

3.21 Floppy Disk Drive Utilities

3.21.1   Function Description

This function formats the FDD, copies the floppy disk, and displays the dump list for both the FDD and HDD.

1.   FORMAT

> *NOTE : This program is only for testing a floppy disk drive. The option is different from the Toshiba MS-DOS FORMAT command.*

This program can format a 5.25-inch or 3.5-inch floppy disk in the following formats:

(a)   2D: Double-sided, double-density, 48/67.5 TPI, MFM mode, 512 bytes, 9 sectors/track.

(b)   2DD: Double-sided, double-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 9 sectors/track.

(c)   2HD: Double-sided, high-density, double-track, 96/135 TPI, MFM mode, 512 bytes, 18 sectors/track.

2.   COPY

This program copies data from a source floppy disk to a target floppy disk.

3.   DUMP

This program displays the contents of the floppy disk and the designated sectors of the hard disk on the display.

3.21.2   Operations

1.   Selecting **7** from the DIAGNOSTIC MENU and pressing   **Enter** displays the following message:

```
[ FDD UTILITIES ]

    1 - FORMAT
    2 - COPY
    3 - DUMP
    9 - EXIT TO DIAGNOSTICS MENU
```

2. FORMAT program

   (a) Selecting FORMAT displays the following message:

   ```
   DIAGNOSTICS - FLOPPY DISK FORMAT : VX.XX

   Drive number select (1:A, 2:B) ?
   ```

   (b) Select a drive number to display the following message:

   ```
   Type select (0:2DD-2DD,1:2D-2D,2:2D-2HD,3:2HD-2HD) ?
   ```

   (c) Select a media/drive type number and press **Enter**. A message similar to the
   one below will be displayed:

   ```
   Warning : Disk data will be destroyed.

   Insert work disk into drive A:
   Press any key when ready.
   ```

   (d) Remove the Diagnostics Disk from the FDD, insert the work disk, and press
   any key.

   The following message will be displayed when the FDD format is executed:

   ```
   [ FDD TYPE ] : TRACK  = XXX
   [ FDD TYPE ] : HEAD   = X
   [ FDD TYPE ] : SECTOR = XX

   Format start

                       [[track, head = XXX X]]
   ```

   After the floppy disk is formatted, the following message will appear:

   ```
   Format complete
   Another format (1:Yes/2:No) ?
   ```

   (e) Typing **1** displays the message from step (c) above. Typing **2** returns the test
   to the DIAGNOSTIC MENU.

3. COPY program

   (a) When COPY is selected, the following message appears:

   ```
   FLOPPY DISK FORMAT & COPY : VX.XX
   Type select (0:2DD-2DD,1:2D-2D,2:2D-2HD,3:2HD-2HD) ?
   ```

   (b) Selecting a media/drive type number will display a message similar to the one
   below:

   ```
   Insert source disk into drive A:
   Press any key when ready.
   ```

(c)   Remove the Diagnostics Disk from the FDD, insert the source disk, and
       press any key. The following message will appear, indicating the program
       has started.

```
[ FDD TYPE ] : TRACK  = XXX
[ FDD TYPE ] : HEAD   = X
[ FDD TYPE ] : SECTOR = XX

 Copy start

                       [[ track,head  =  XXX X ]]
```

(d)   Remove the source disk from the FDD, insert a formatted work disk, and
       press any key. The [[track, head = XXX X]] message will appear and
       start copying to the target disk. When the amount of data is too large to be
       copied in one operation, the message from step (b) is displayed again. After
       the floppy disk has been copied, the following message will appear:

```
 Copy complete
 Another copy (1:Yes/2:No) ?
```

(e)   To copy another disk, type 1 and the message from step (a) will be displayed
       again. Entering 2 returns the test program to the DIAGNOSTIC MENU.

4.   DUMP program

      (a)   When dump is selected, the following message appears:

```
 DIAGNOSTICS-HARD  DISK & FLOPPY DISK DUMP : VX.XX
 Drive type select (1:FDD, 2:HDD) ?
```

      (b)   Select a format type number. If C or D is selected, the display will go to
             step (e).

```
 Select drive number      (1:A, 2:B) ?
                          (1:C, 2:D) ?
```

      (c)   Select a drive number and the following message will be displayed:

```
 Format type select (1:2DD, 2:2D, 3:2HD) ?
```

      (d)   Select a media type number and the following message will appear:

```
 Insert source disk into drive A:
 Press any key when ready.
```

      (e)   Insert a source disk, press any key, and the following message will appear:

```
 ── Max. address ──
   [Track ] = 0079
   [ Head ] = 01
   [Sector] = 09

    Track  number ??
```

      (f)   Set the track number you want to dump. Then, the system will access the
             disk and dump a list.

3.22 System Configuration

3.22.1   Function Description

The System Configuration program contains the following configuration information for the computer:

1.   BIOS ROM version
2.   Boot ROM version
3.   KBC version
4.   PS Micom Version
5.   Base memory size
6.   The number of floppy disk drives
7.   The number of ASYNC ports
8.   The number of hard disk drives
9.   The number of printer ports
10.   Extended Memory Size
11.   The number of math co-processors
12.   CPU clock
13.   PC card slot

3.22.2   Operations

Selecting **8** from the DIAGNOSTIC MENU and pressing   **Enter** displays the following system configuration:

```
SYSTEM CONFIGURATION :

  * - BIOS ROM VERSION = VX.XX
  * - BOOT ROM VERSION = VX.XX
  * - KBC VERSION      = VX.XX
  * - PS MICOM VERSION = VX.XX
  * - 639KB MEMORY
  * - 1 FLOPPY DISK DRIVE(S)
  * - 1 ASYNC ADAPTER
  * - 1 HARD DISK DRIVE(S)
  * - 1 PRINTER ADAPTER
  * - XXXXXKB EXTENDED MEMORY
  * - 1 MATH CO-PROCESSOR
  * - CPU CLOCK        = 75MHz
  * - 2 PCMCIA slot

Press [Enter] Key
```

Press **Enter** to return to the DIAGNOSTIC MENU.

3.23 SETUP

3.23.1 Function Description

This program displays the current system setup information as listed below:

1. Memory
   - (a) Total
   - (b) Base
   - (c) Extended Memory
   - (d) Shadow BIOS ROM

2. Display
   - (a) Display Adapter
   - (b) LCD Display Mode
   - (c) VGA Segment Address
   - (d) LCD Display Colors
   - (e) Power On Display
   - (f) Text Mode Stretch

3. Hard Disk
   - (a) HDD Mode

4. Password

5. I/O Ports
   - (a) Serial Port
   - (b) Parallel Port

6. Others
   - (a) Power-up Modes
   - (b) CPU Cache
   - (c) Battery Save Mode
   - (d) Battery Save Options
   - (e) Battery Level
   - (f) Alarm Volume
   - (g) System Beep
   - (h) Panel Power On/Off
   - (i) Alarm Power On
   - (j) Keyboard
   - (k) Pointing Devices
   - (l) Boot Priority

3.23.2   Accessing the SETUP Program

Selecting **0** from the DIAGNOSTICS MENU and pressing   **Enter** displays the following:

```
                          SYSTEM  SETUP         BIOS version = x.xx
            ┌──────── MEMORY ────────┐          ┌──── I/O  PORTS ────────┐
            │ Total          = 8192 KB│          │ Serial Port     =  COM1(IRQ4/3F8H)│
            │ Base           =  640 KB│          │ Parallel Port   =  LPT1 (378H)│
            │ Extended       = 7360 KB│          └────────────────────────┘
            │ Shadow BIOS ROM =  192 KB│
            └────────────────────────┘          ┌──── OTHERS ────────────┐
                                                 │ Power-up Mode       = Resume│
            ┌──────── DISPLAY ───────┐          │ CPU Cache           = Enabled│
            │ Display Adapter   = VGA compatible│ Battery Save Mode   = Full Power│
            │ LCD Display Mode   = Color│        │ Battery Level       = E       F│
            │ VGA Segment Address= E000H│        │ Alarm Volume        = High│
            │ LCD Display Colors = 222K Colors│  │ System Beep         = Enabled│
            │ Power On Display   = Internal/External│ Panel Power On/Off  = Disabled│
            │ Text Mode Stretch  = Enabled│      │ Alarm Power On      = Disabled│
            └────────────────────────┘          │ Keyboard            = Layout/Fn│
                                                 │ Pointing Devices    = Auto-selected│
            ┌── HARD  DISK───────────┐          │ Boot Priority       = FDD → HDD│
            │ HDD Mode = Enhanced IDE (Normal)│  └────────────────────────┘
            └────────────────────────┘

            ┌─ POWER  ON  PASSWORD ──┐
            │ Not Registered│
            └────────────────────────┘
```

```
↑↓→←  :   Select items, Space, BkSp : Change values
 Esc: Exit without saving, Home: Set default values, End: Save changes and Exit
```

> *NOTES:*   1.   *The Panel Power On/Off item appears only when the computer is in*
> *Resume mode.*
> 2.   *The Battery Level item appears only when a battery is installed.*

Moving Within the SETUP Menu and Changing Values

1.   Press ← and → to move between the two columns. Press ↑ and ↓ to move between items in a column.

2.   Press either the **space bar** or **BkSp** to change the value.

Accepting Changes and Exiting the SETUP Window

1.   Press **End** to accept the changes you made.

If the changed item does not require the system to reboot, the following message is displayed:

```
     Are you sure? (Y/N)
```

If the changed item requires the system to reboot, the following message is displayed:

```
     Are you sure? (Y/N)
     The changes you made will cause the system to reboot.
```

2. To make other changes, press **N**. Repeat the steps above.

3. To accept the changes, press **Y**.

> *NOTE: You can press **Esc** to quit at any time without saving changes. SETUP asks you to confirm that you don't want to save your changes.*

The Factory Preset Configuration

When you access SETUP, the current configuration is displayed.

1. To show the factory preset configuration, press **Home**.

2. To accept the default settings, press **End** and then press **Y**.

> *NOTE: When you execute the default setting, the following settings are not changed:*
> > *HDD Mode*
> > *Password*
> > *Write Policy*

SETUP Options

The SETUP screen is divided into functionally related groups. This section describes each group and its options.

1. Memory

   This group of options lists the computer's memory allocations. You cannot change these values.

   (a) Total

   This field displays the total amount of memory installed and is automatically calculated by the computer.

   (b) Base

   This field displays the amount of base (conventional) memory, **640 KB**, and is automatically calculated by the computer.

   (c) Extended

   This field displays the amount of extended memory the computer has available.

   (d) Shadow BIOS ROM

   This field displays 192 KB of RAM, which is reserved for the Shadow BIOS ROM.

2. Display

This group of options helps you configure the computer's display.

(a) Display Adapter

This field displays the internal controller for the VGA internal display. Only **VGA compatible** is displayed. You cannot change it.

(b) LCD Display Mode

The LCD displays text in 80 characters by 25 lines and graphics in 640 by 480 pixels for either **Color** or **Monochrome** mode. Use this option to set the computer's display mode to **Color** or **Monochrome**.

Color	Selects color mode. (Default)
Monochrome	Selects monochrome mode. Some software is displayed better in monochrome mode.

(c) VGA Segment Address

Use this option to set the VGA segment address from the following option:

C000H, E000H (Default), E400H

NOTE: In the DOS environment, if you choose either E400H or C000H, the Pop-up window is not displayed when you press   Fn+F2 or Fn+F3 hotkeys. However, the corresponding functions of the keys work.

(d) LCD Display Colors

This option is used to select the color palette of the internal display when the LCD mode is set to **Color**.

222K colors	Displays 256 colors out of 226,981 colors.
4096 colors	Displays 256 colors out of 4096 colors.

(e) Power On Display

This option is used to select the display when booting up.

Internal/External	Selects an external CRT if one is connected, otherwise it selects the internal LCD.
Simultaneous	Selects both the internal LCD and the external CRT for simultaneous display.

> *NOTE: When starting the computer in Resume mode, the last configu-*
> *ration is remembered. If data does not appear on the display you are*
> *using after starting in Resume mode, press* ***Fn+F5***. *Pressing* ***Fn+F5***
> *changes the display setting as follows: internal LCD to simultaneous to*
> *external CRT.*

    (f)   Text Mode Stretch

    Text mode stretch enables a larger display area of 640 x 480 pixels in text
    mode. Disabling this function reduces the display area to the standard 640 x
    480 pixels.

> *Enabled*   Enables the text mode stretch feature. (Default)
>
> *Disabled*   Disables the text mode stretch feature.

3.   Hard Disk

    This item displays the mode of the HDD for information only. It cannot be
    changed.

> *Enhanced IDE*   Select this mode when using MS-DOS,
> **(**Normal**)**   Windows or OS/2 ®. (Default)

    To see the capacity of the hard disk, use the CHKDSK command. See your DOS
    documentation for details on using CHKDSK.

4.   Password

    This option allows you to set or reset the user password for power on and instant
    security.

> *Registered*   The user password has been registered.
>
> *Not registered*   The user password has not been registered.

    For details on setting the user password refer to your 100CS User's Manual.

5.   I/O ports

    This option controls settings for the serial and parallel ports.

(a) Serial Port

This option allows you to set the COM level, **COM1** or **COM2**, for the serial port and PC card slot. The serial port interrupt request level (IRQ) and I/O port base address for each COM level is shown below:

COM level	Interrupt level	I/O address	
COM1	4	3F8h	(Serial port default)
COM2	3	2F8h	
COM3	4	3E8h	
COM4	3	2E8h	
Not used		(Disables port)	

> *NOTE: Do not assign the same interrupt request level and I/O address to serial port and PC card.*

(b) Parallel Port

This option sets the address for the parallel port. The options are:

LPT1 (378H): Sets the address to 378H. (Default)
LPT2 (278H): Sets the address to 278H.
LPT3 (3BCH): Sets the address to 3BCH.
Not used: Disables the port.

When you select one of the above options, except for **Not used**, a sub-window similar to the one below appears to let you set the parallel port mode. Options for this setting are **ECP** (default) and **Std. Bi-Directional**.

```
┌──────── Option ────────┐
│ Mode        =     ECP  │
└────────────────────────┘
```
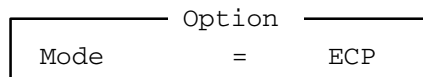
For most printers, the port should be set to **ECP**. With some other parallel devices, the setting should be **Std. Bi-Directional**.

6. Others

Whether or not you need to configure the computer with these options depends primarily on the kind of software or peripherals you use.

(a) Power-up Modes

This option lets you choose between AutoResume and boot mode. You can also set this option using hotkeys. AutoResume is effective with either the internal LCD or with an external monitor.

Boot   Turns on boot mode. (Default)

Resume   Turns on the AutoResume feature.

(b) CPU Cache

Use this feature to enable or disable the CPU cache.

Enabled   Enables the CPU cache. (Default)

Disabled   Disables the CPU cache.

When enable is selected, a subwindow similar to the one below is displayed to let you select the cache write policy. The options for this setting are **Write-back** (default) and **Write-through** .

```
┌─────────── Option ───────────┐
│  Write Policy  =   Write-back │
└──────────────────────────────┘
```

Write-back policy provides better system performance because main memory is accessed only when necessary to update the cache contents with changes in main memory. Write-through policy accesses main memory every time data is handled by the processor.

(c) Battery Save Mode

This option is used to select **Full Power** or **Low Power** or **User Setting** of the **BATTERY SAVE OPTION.**

Full Power   The following shows full power settings.

```
┌───────── COM/PCMCIA/PRT ─────────┐
│  Processing Speed   =      High   │
│  CPU Sleep Mode     =      Disabled │
│  Display Auto Off   =      Disabled │
│  HDD Auto Off       =      Disabled │
│  System Auto Off    =      Disabled │
│  LCD Brightness     =      Bright  │
└──────────────────────────────────┘
```

Low Power   The following shows low power settings.

```
┌───────── COM/PCMCIA/PRT ─────────┐
│  Processing Speed   =      Low     │
│  CPU Sleep Mode     =      Enabled  │
│  Display Auto Off   =      03 Min.  │
│  HDD Auto Off       =      03 Min.  │
│  System Auto Off    =      30 Min.  │
│  LCD Brightness     =      Semi-bright │
└──────────────────────────────────┘
```

NOTE: In boot mode, the System Auto Off message does not appear.

User Setting   This option allows you to set the battery save parameters on the sub-window, **BATTERY SAVE OPTIONS**. When you select this option, the automatic setting feature (Full Power or Low Power) is disabled and the user-preferred parameters become effective. The default setting in the sub-windows depends on the **Battery Save Mode: Low Power (Long Life) or Full Power (Normal Life)**. For LCD Brightness details, see *Battery Save Options* below.

(d)   Battery Save Options

The following set of options can be selected in the sub menu of **User Setting**, which is one of the **Battery Save Mode** options.

Processing Speed

This feature changes the CPU processing speed.

        High   CPU operates at 75 MHz. (Default)

        Low   CPU operates at low speed.

CPU Sleep Mode

Use this option to enable or disable the CPU sleep function.

        Enabled   Enables sleep mode.

        Disabled   Disables sleep mode.

Display Auto Off

Use this option to disable or set the duration of the display automatic power off function. This function causes the computer to turn the LCD panel's illumination off if you make no entry for the set period of time.

        Disabled   Disables display automatic power off.

        xx Min.   Automatically turns off power to the LCD panel's illumination if the panel is not used for the duration set. The duration **xx** can be set to 1, 3, 5, 10, 15, 20, or 30 minutes.

HDD Auto Off

Use this option to disable or set the duration of the HDD automatic power off function.

        Disabled   Disables HDD automatic power off.

        xx Min.   Automatically turns off power to the hard disk drive if it is not used for the duration set. The duration **xx** can be set to 1, 3, 5, 10, 15, 20, or 30 minutes.

System Auto Off

Use this option to enable or disable the system automatic off function in Resume mode when you are working in DOS. In Boot mode, it is disabled and not displayed.

> *Disabled*   Disables system automatic power off.
>
> *xx Min.*   Automatically turns off power to the system if it is not used for the duration set. The duration **xx** can be set to 10, 20, 30, 40, 50, or 60 minutes.
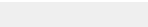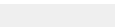
LCD Brightness

Use this option to set the level of LCD brightness.

> *Bright*   Full brightness for maximum visibility.
>
> *Semi-Bright*   Less than full brightness for saving power.

(e) Battery Level

When you use the computer for the first time or when you install a new or recharged battery, the charge level is unknown to the system. In this case the Battery Level options will be displayed to enable you to set the charge level to 100%, 75%, 50%, or 25%.

E F		100% charge
E F		75% charge
E F		50% charge
E F		25% charge
E ??? F		Charge is unknown (Displayed in TSETUP)

(f) Alarm Volume

This option disables or sets the volume level of the alarm. Setting this option to off disables the computer's sound function for alarms. This option can also be set by hotkeys.

> *Off*   Disables the alarm.
>
> *Low*   Sets the alarm volume to low.
>
> *Medium*   Sets the alarm volume to medium.
>
> *High*   Sets the alarm volume to high. (Default)

When Alarm Volume is selected, the subwindow below is displayed to let you enable or disable certain functions.

```
 ┌───── ALARM VOLUME OPTIONS ─────┐
 │ LOW BATTERY Alarm      =     Enable │
 │ Panel Close Alarm      =     Enable │
 └────────────────────────────────┘
```

Enabled　Enables the feature. (Default)

Disabled　Disables the feature.

(g)　System Beep

Use this feature to enable or disable the system beep.

Enabled　Enables the feature. (Default)

Disabled　Disables the feature.

(h)　Panel Power On/Off

This option allows you to automatically turn your computer on or off by opening or closing the display panel. If this feature is enabled when the computer is in Resume mode, the system is automatically powered off when the display panel is closed and powered on when the panel is opened. This option does not appear when the computer is in boot mode.

Enabled　Enables the feature.

Disabled　Disables the feature.   (Default)

> **NOTE:** *Do not remove the AC cable and battery pack at the same time when you use this feature. If you do so, data saved by AutoResume will be lost. You must also reset this option.*

(i)　Alarm Power On

This option lets you set the time for the system to turn on automatically. For example, if you are expecting to receive a modem transmission at a time you are away or asleep, you can set this option to the time of the transmission. This option does not automatically turn off the system. This feature operates in either Resume or boot mode.

00:00:00　Sets the power on time (24-hour clock).

Disabled　Disables the alarm.

> **NOTE:** *Do not remove the AC cable and battery pack at the same time when you use this feature. If you do so, the setting will be lost. You must reset this option when you restore power.*
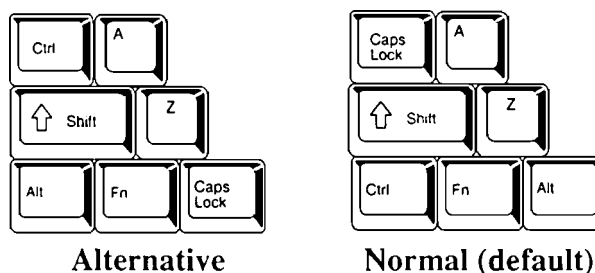
(j) Keyboard

This option lets you change the keyboard layout and set the Fn key equivalent when you are using an external keyboard. Selecting this option displays the following subwindow.

```
┌──────────────── Keyboard ─────────────────┐
│ Int. Keyboard key layout        =  Normal  │
│ Ext. Keyboard "Fn" key equivalent = Disabled │
└────────────────────────────────────────────┘
```

Int. Keyboard layout

This option lets you select the arrangement of the **Caps Lock, Ctrl** and **Alt** keys according to the following illustrations:

Alternative   **Normal (default)**

Ext. Keyboard **Fn** key equivalent

Use this option to set a key combination on an external keyboard to emulate the **Fn** key on the computer's internal keyboard. Setting an **Fn** key equivalent will enable you to use "Hotkeys" by pressing the set combination in place of the **Fn** key.

Disabled	No **Fn** key equivalent. (Default)

Fn Equivalent	Left Ctrl	+	Left Alt*
	Right Ctrl	+	Right Alt*
	Left Alt	+	Left Shift
	Right Alt	+	Right Shift
	Left Alt	+	Caps Lock

┌──┐
│ *If these selections are made, you cannot warm boot the system by* |
│ *pressing **Ctrl + Alt + Del**.* |
└──┘

(k)   Pointing Devices

This option enables or disables the AccuPoint.

Auto selected   The AccuPoint is disabled when a PS/2 mouse or
                   serial mouse is connected, otherwise the AccuPoint
                   is enabled. (Default)

Simultaneous   If a PS/2 mouse or serial mouse is connected to an
                   optional port replicator, both the AccuPoint and the
                   external mouse are enabled.

(l)   Boot Priority

Use this option to select the disk drive priority for boot up.

FDD→HDD   The computer looks for bootable files first on the
             FDD and next on the HDD. (Default)

HDD→FDD   The computer looks for bootable files first on the
             HDD and next on the FDD.

You can reverse the order by holding down the **F10** key while the computer
is booting. This procedure alternates the setup setting.

4.1 General

This section explains how to disassemble the computer and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, then follow the lines on the chart to determine which FRU you must remove next in order to repair the one you think is causing the computer to operate improperly.

❑ Battery Pack

❑ Optional PC Card
❑ Optional Memory Card
❑ HDD
❑ Keyboard
❑ Sub-battery and VGA board
❑ Top Cover and Display Assembly
❑ Membrane Switch
❑ AC PS Unit
❑ Diskette Drive
❑ System Board

Display Mask

❑   FL inverter Board
❑   LCD Module
❑   FL
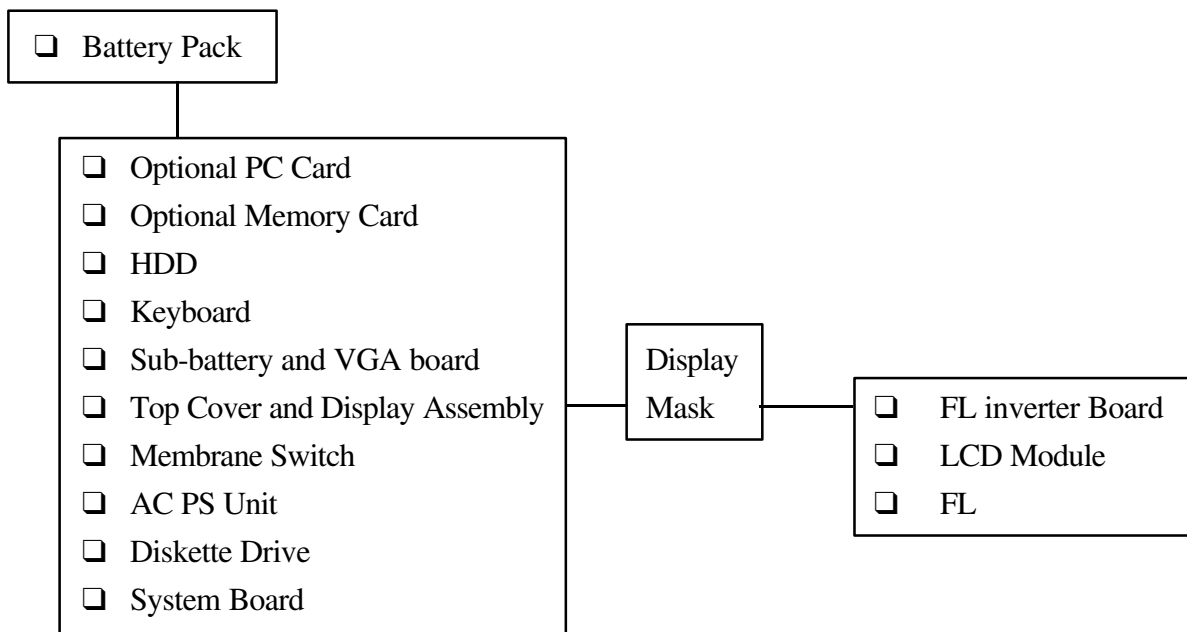
Safety Precautions

Before you begin disassembly, read the following safety precautions and observe them carefully as you work.

DANGER:
1. *Always use the lithium ion battery pack or back-up battery that is authorized by Toshiba or compatible with the unit. Since other battery packs have different specifications, they may be incompatible with the unit, and may burst or explode. Heating or disassembling the battery pack could cause leakage of alkaline solution. Throwing the battery pack into a fire could cause the battery pack to explode.*
2. *The power supply, FL inverter, and other components carry high voltages. To avoid the risk of electric shock when you turn on the power of a partially disassembled computer to check its operation, be very careful not to touch connectors or components. Also, do not disassemble individual components during first-level maintenance.*

WARNING:
To avoid the risk of electric shock or other injury:
1. *Always turn the power off and disconnect the AC power cord from the power source.*
2. *Remove any metal jewelry or accessories such as necklaces, bracelets, or rings. Batteries in the computer retain electrical charge so there is danger of electrical shock even when the computer is disconnected from an AC power source.*
3. *Never work with wet or damp hands.*
4. *The computer contains many sharp edges and corners, so be careful not to injure yourself.*
5. *Make sure that all replacement components meet the specifications for the computer and that all cables and connectors are securely fastened.*

CAUTION:
To avoid damage to the computer:
1. *When you change a component, be sure the replacement component meets the required specifications. Never use foreign parts.*
2. *Be sure metal objects such as screws or paper clips do not fall into the unit, they can cause short-circuit, fire, or other internal damage.*
3. *When assembling the computer make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures. Make sure all screws are securely fastened. Loose screws can cause short circuits, resulting in heat, smoke, or fire.*
4. *Before removing an FRU or other component, make sure all cables to the component have been disconnected.*
5. *If you use AC power, be sure to use the cable that came with the computer or one recommended by Toshiba.*

Before You Begin

Look over the procedures in this section before you begin disassembling the computer. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC power cord and the battery pack as instructed in section 4.2, *The Battery Pack:*

1. Do not disassemble the computer unless it is operating abnormally.

2. Use only the correct and approved tools.

3. Make sure the working environment is free from the following elements whether you are using or storing the computer:

   ❏ Dust and contaminates
   ❏ Static electricity
   ❏ Extreme heat, cold, and humidity

4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary diagnostics tests described in this manual.

5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the computer.

6. After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and will not interfere with your work.

7. You will remove and replace many screws when you disassemble the computer. Be sure screws are placed in a safe place and are identified with the correct parts.

8. When assembling the computer make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in the corresponding figures.

9. The computer contains many sharp edges and corners, so be careful not to injure yourself.

10. After you have replaced an FRU, make sure the computer is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The computer has two basic types of cable connectors:

❑ Pressure Plate Connectors
❑ Normal Pin Connectors

To disconnect a Pressure Plate connector, lift up the tabs on either side of the connector's plastic pressure plate and slide the cable out of the connector. To connect the cable to a Pressure Plate connector, make sure the pressure plate is fully lifted and slide the cable into the connector. Secure the cable in place by pushing the sides of the pressure plate down so the plate is flush with the sides of the connector. Gently pull on the cable to make sure the cable is secure. If you pull out the connector, connect it again making sure the connector's pressure plate is fully lifted when you insert the cable.

Standard pin connectors are used with all other cables. These connectors can be connected and disconnected by simply pulling them apart or pushing them together.

Assembly Procedures

After you have disassembled the computer and fixed or repaired the problem that was causing the computer to operate abnormally, you will need to reassemble the computer.   While assembling the computer, remember the following general points:

❑ Take your time, making sure you follow the instructions closely. Most problems arise when you hurry to assemble the computer.

❑ Make sure all cables and connectors are securely fastened.

❑ Before securing the FRU or other parts, make sure that no cables will be pinched by screws or by the FRU.

❑ Check that all latches are closed securely in place.

❑ Make sure all the correct screws are used to secure all FRUs. Using the wrong screw can damage the threads on the screw or damage the head of the screw and may prevent proper seating of an FRU.

After installing an FRU in the computer confirm that the FRU and the computer are functioning properly.

Tools and Equipment

The use of ElectroStatic Discharge (ESD) equipment is very important for your safety and the safety of those around you. Proper use of these devices will increase the success rate of your repairs and lower the cost for damaged or destroyed parts. The following equipment is necessary to disassemble and reassemble the computer:

❑ One M2 Phillips screwdriver to remove and replace screws.

❑ Tweezers, to lift out screws that you cannot grasp with your fingers.

❑ ESD mats for the floor and the table you are working on.

❑ An ESD wrist strap or heel grounder.

❑ Anti-static carpeting or flooring.

❑ Air ionizers in highly static sensitive areas.

Screw Tightening Torque

When you fasten screws, be sure to follow the torque list below. Overtightening can damage components and screws; undertightening can result in electrical shorts or other damage if screws or components come loose.

❑ M2   0.22 Nm (2.2 kgfcm)

❑ M2.5   0.36 Nm (3.5 kgfcm)

❑ FDD   0.22 Nm (2.2 kgfcm)

❑ HDD   0.3 Nm to 0.28 Nm
  (M3)   (3.1 kgfcm to 2.9 kgfcm)

4.2 The Battery Pack

Removing the Battery Pack

To remove the battery pack, follow the steps below and refer to figures 4-1 and 4-2.

1. Turn the computer off.

2. Remove all cables connected to the computer and turn the computer over.

3. Push the **battery cover lock** to release the **battery cover**.

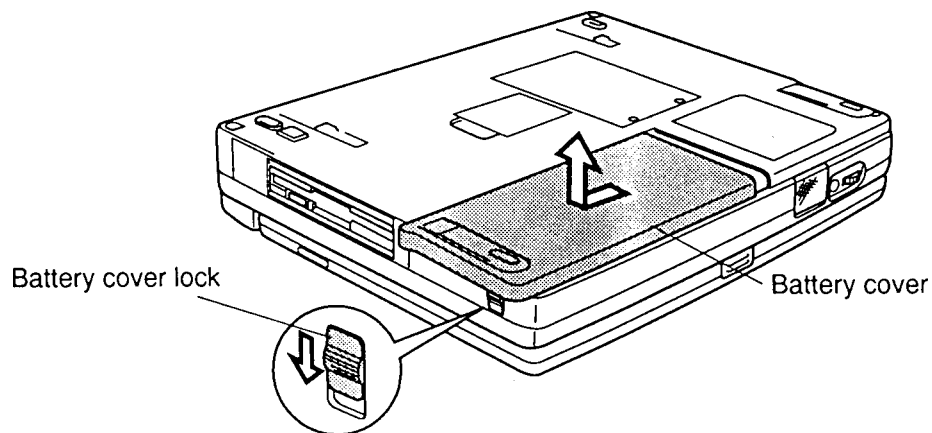4. Push the cover forward until it stops (about one centimeter or half an inch).

Figure 4-1 Releasing the battery cover

5. Lift off the cover.

6. Pull back the battery latch and lift out the **battery pack**.
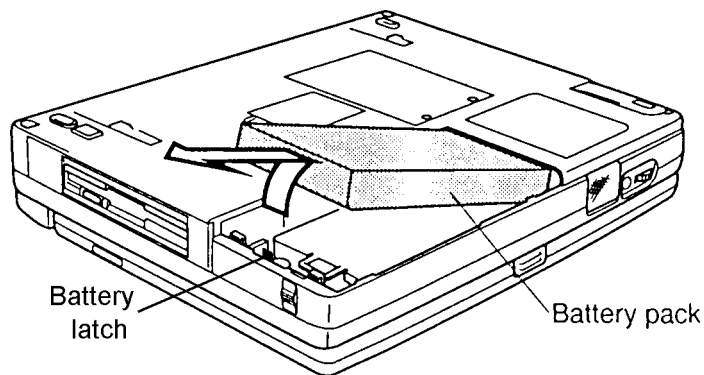
Figure 4-2 Removing the battery pack

NOTE: *For environmental reasons, do not throw away a spent battery pack. Please return spent battery packs to your Toshiba dealer.*

Installing the Battery Pack

To install the battery pack, follow the steps below and refer to figure 4-3.

> *WARNING:* *The battery is a nickel metal hydride battery and should be replaced only by your dealer or by a Toshiba service representative. The battery can explode if not properly replaced, used, handled, or disposed of. Dispose of the battery as required by local ordinances or regulations. Use only batteries recommended by Toshiba as re-placements.*

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Carefully insert the new or recharged **battery pack**.

3. Replace the **battery cover** and push it closed. Be sure the **battery cover latches** securely engage the corresponding holes on the computer.

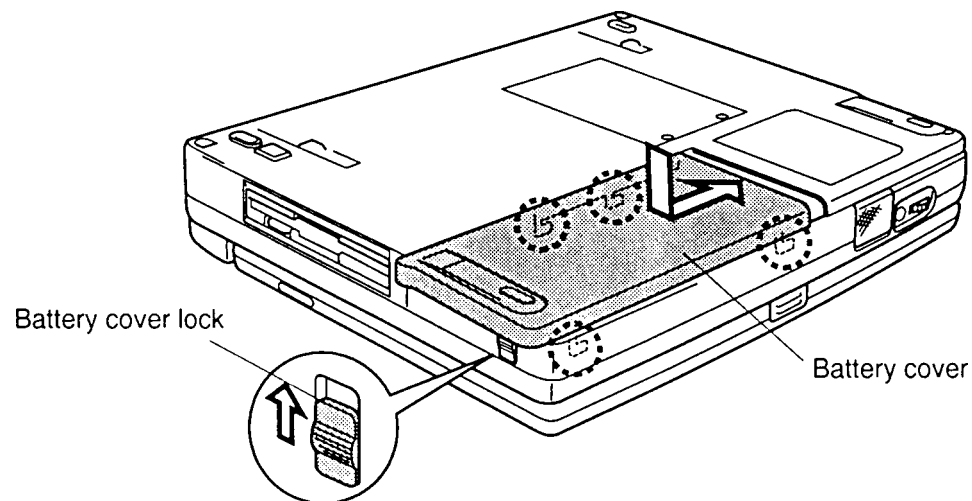4. Push the **battery cover lock** to secure the cover.

Figure 4-3 Installing the battery pack

4.3 Optional PC Card

Removing an Optional PC card

To remove an optional PC card make sure the computer is in boot mode then follow the steps below and refer to figure 4-4.

     1.   Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

     2.   Remove the battery pack as described in section 4.2.

     3.   Press the **eject button** on the computer (the top button for the top card and the bottom button for the bottom card). The card will pop out slightly for removal.
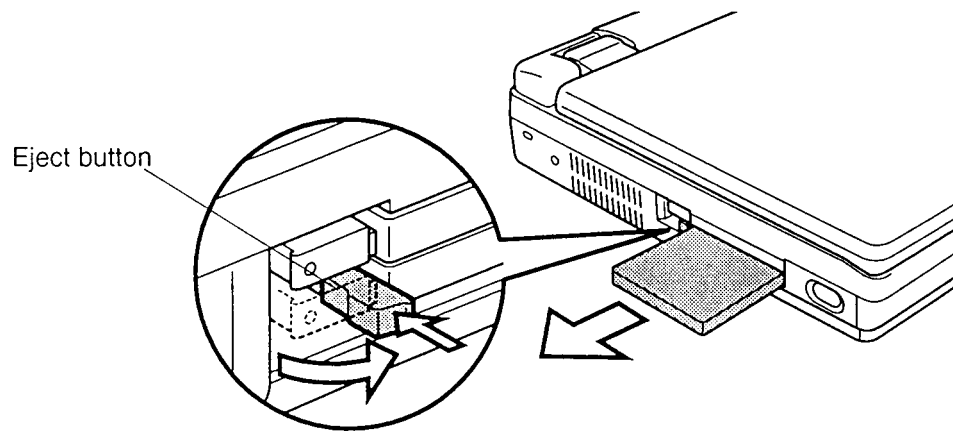

Figure 4-4 Removing the PC card

Installing an Optional PC Card

To install a PC card, follow the steps below and refer to figure 4-5.

> *NOTE: Before you install the PC card, make sure the computer is in boot mode.*

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.
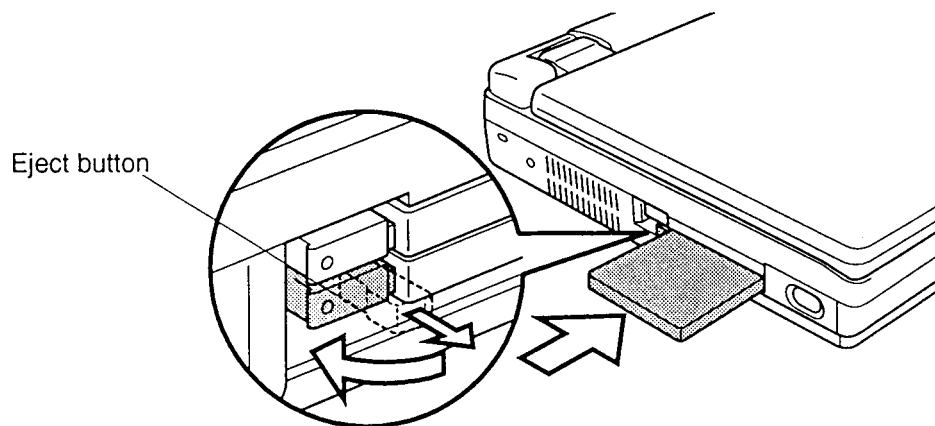
2. Insert the PC card as shown in figure 4-5.

Figure 4-5 Installing the PC card

3. When the card is almost fully seated, you will feel some resistance. Press gently to assure a firm connection, but do not force the card into position.

4. When the card is fully seated, an eject button will pop out: the top button for the top connector and the bottom button for the bottom connector.

5. Pull the eject button out slightly and bend it to lock the card.

6. Install the battery pack as described in section 4-2.

4.4 Optional Memory Module

Removing an Optional Memory Module

To remove an optional memory module, make sure the computer is in boot mode then follow the steps below and refer to figures 4-6 and 4-7.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack and optional PC card as described in sections 4.2 and 4.3.

3. Turn the computer upside down.

4. Remove **two M2x4 screws** securing the **memory module socket cover** .

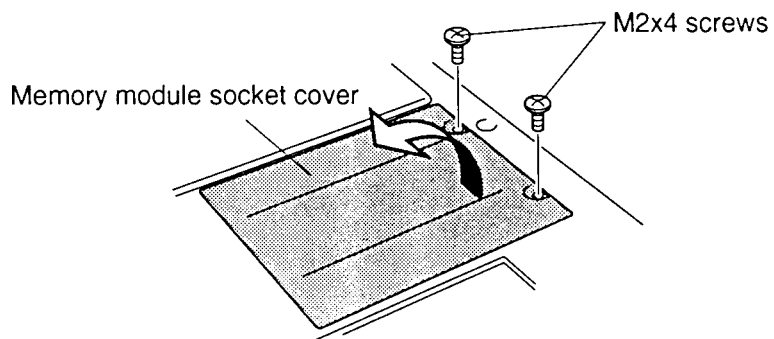5. Slide your fingernail or a thin object under the cover and remove it.

Figure 4-6 Removing the memory module socket cover

6. Remove **two M2x4 screws** securing the module to a brace at the center of the module.
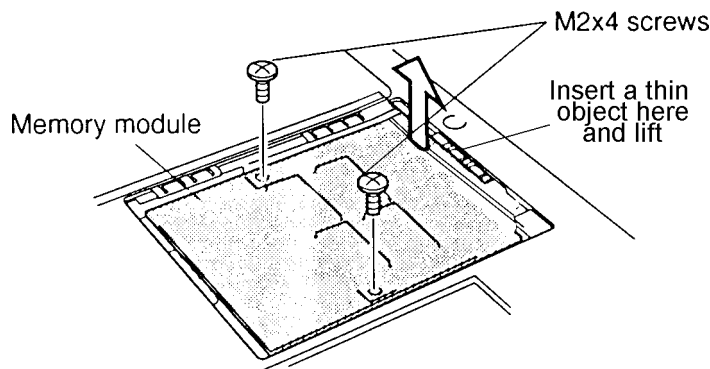

Figure 4-7 Removing the memory module

7. Use a thin object to lift up the edge to disengage the connectors, then grasp the module by the edges and remove it.

Installing an Optional Memory Module

To install an optional memory module, make sure the computer is in boot mode then follow the steps below and refer to figures 4-6 and 4-8.

1. Position the connector on the bottom of the **module** over the corresponding connector on the computer (align the holes on the side of the module over the screw holes on the brace).

   > *NOTE: Do not touch the connectors on the memory module or on the computer. Debris on the connectors may cause memory access problems.*

2. Place your fingers above the connector and press firmly but gently to assure a solid connection. The module should be seated level.

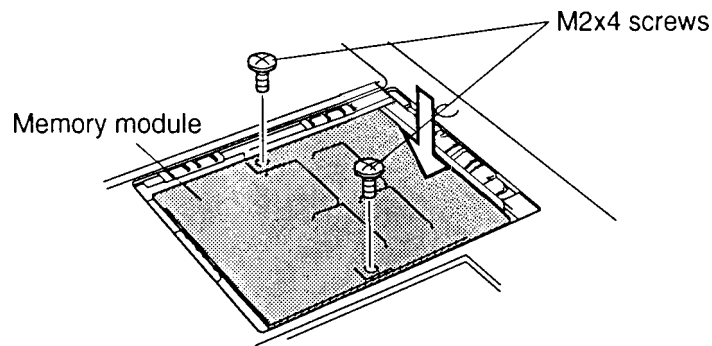3. Secure the module to the brace with **two M2x4 screws**.

Figure 4-8 Inserting the memory module

4. Lay the cover in place and secure it with **two M2x4 screws** (figure 4-6).

5. Install the battery pack and optional PC card as described in sections 4.2 and 4.3.

4.5 Hard Disk Drive

Removing the HDD

To remove the HDD, follow the steps below and refer to figures 4-9 and 4-10.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, and optional memory module as described in sections 4.2, 4.3, and 4.4.

3. Remove **two M2.5x6 screws** securing the **HDD frame** to the computer.

4. Pull the frame forward by its handle to disconnect the **HDD**.
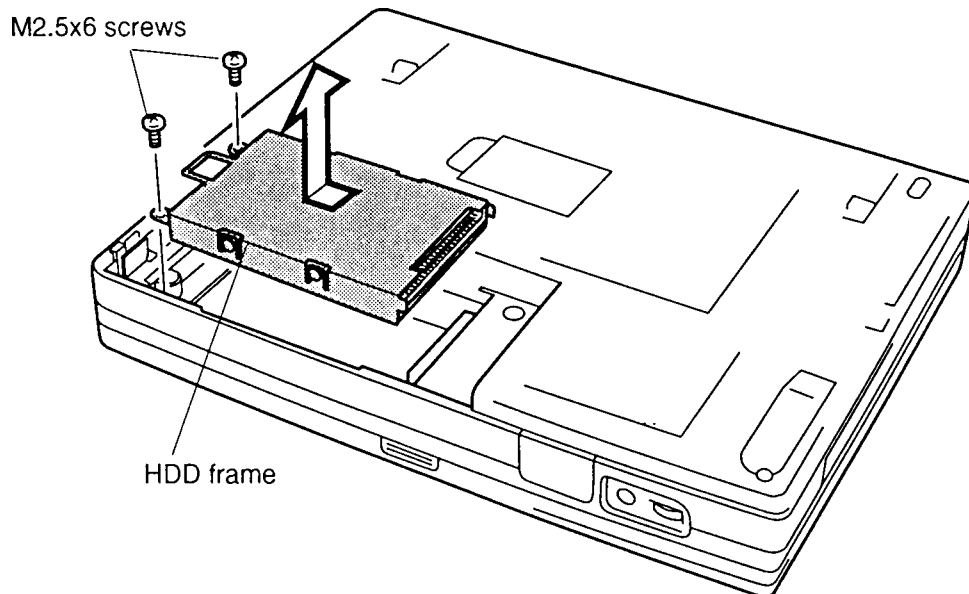
5. Remove the frame with the HDD.

Figure 4-9 Removing the frame with the HDD

6. Remove the **metal cover**.

7. Remove **four flat-head M3x4 screws** securing the frame to the HDD and separate the HDD from the frame.
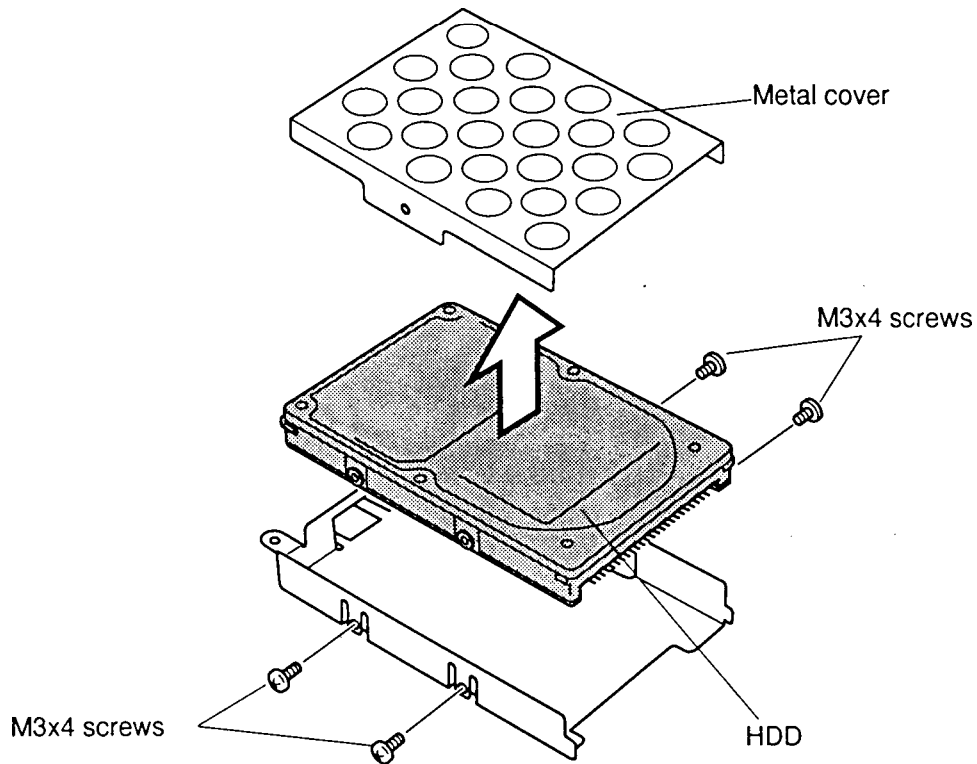
Figure 4-10 Removing the HDD from the frame

Installing the HDD

To install the HDD, follow the steps below and refer to figures 4-9 and 4-10.

1. Secure the **frame** to the **HDD** with **four flat-head M3x4 screws**.

2. Attach the **metal cover**.

3. Seat the HDD in the computer and press to secure the connection.

4. Secure the HDD frame to the computer with **two M2.5x6 screws**.

5. Install the optional memory module, optional PC card, and battery pack as described in sections 4.4, 4.3, and 4.2.

4.6 Keyboard

Removing the Keyboard

To remove the keyboard, follow the steps below and refer to figures 4-11 and 4-12.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, and HDD as described in sections 4.2 through 4.5.

3. Release **14 latches** on the **base cover** and remove it.
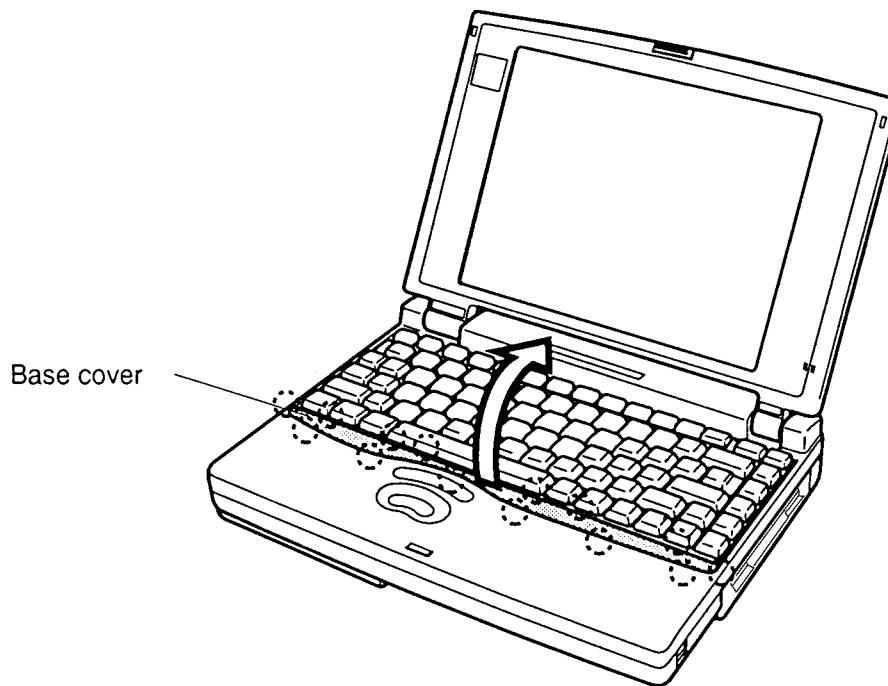
Figure 4-11 Removing the keyboard base

4. Lift out the keyboard and set it on the wrist rest.

5. Remove **five M2.5x6 screws** securing the **metal cover** and lift out the cover. Note that one screw secures the ground cable.
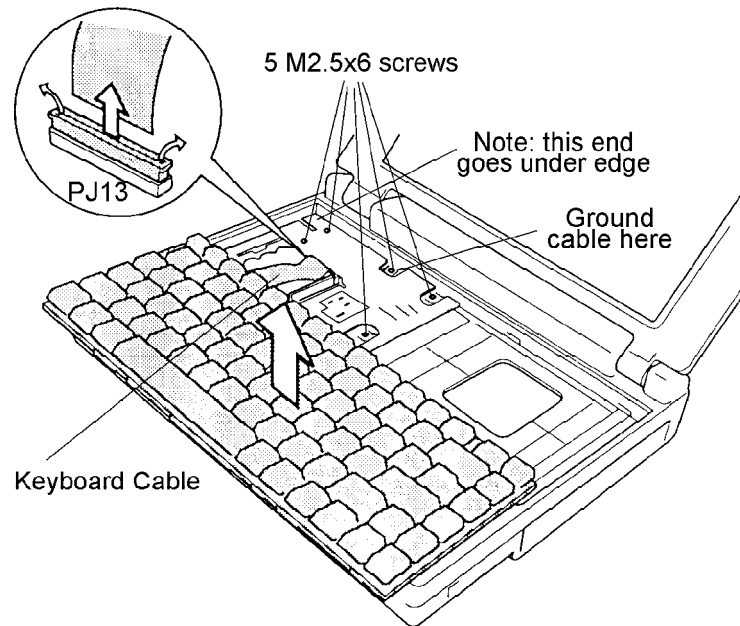
Figure 4-12 Removing the metal cover and disconnecting the keyboard cable

6. Disconnect the **keyboard cable** from **PJ13** on the system board.

Installing the Keyboard

To install the keyboard, follow the steps below and refer to figures 4-11 and 4-12.

1. Connect the **keyboard cable** to **PJ13** on the system board.

2. Seat the **metal cover** (note the end that goes under) and secure it with **five M2.5x6 screws**. Be sure to replace the ground cable.

3. Seat the **keyboard**.

4. Seat the **keyboard base** and secure the **14 latches**.

5. Install the HDD, optional memory module, optional PC card, and battery pack as described in sections 4.5, 4.4, 4.3, and 4.2.

4.7 Sub-battery and VGA Board

Removing the Sub-battery and VGA board

To remove the sub-battery and VGA board, follow the steps below and refer to figures 4-13 to 4-15.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, HDD, and keyboard as described in sections 4.2 through 4.6.

3. Disconnect the **sub-battery** from **PJ503** and remove the battery.
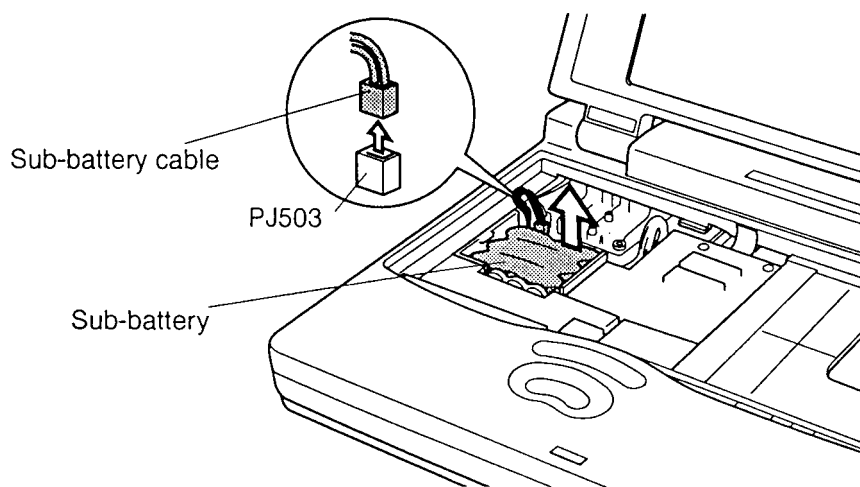
Figure 4-13 Removing the sub-battery

4. Disconnect the **VGA board connector** from system board connector **PJ16**.
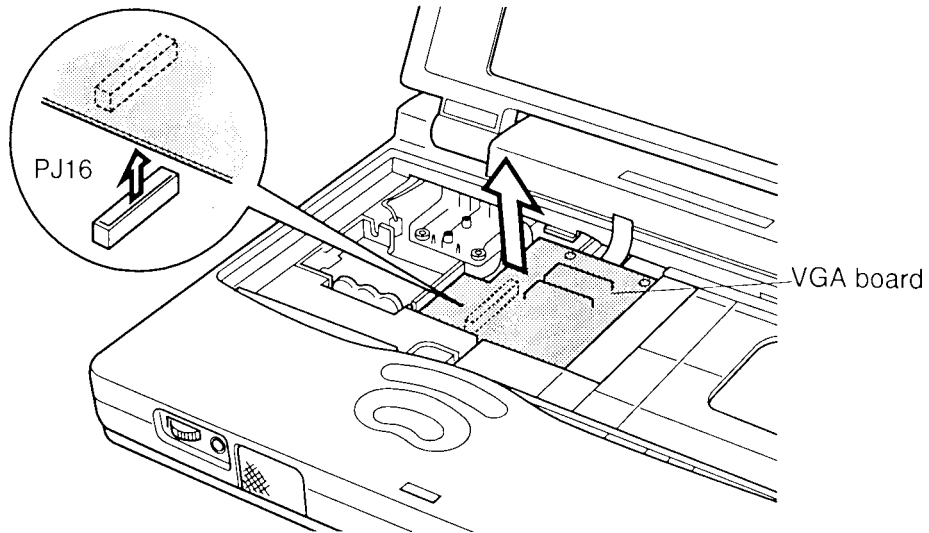
Figure 4-14 Removing the VGA board

5. Rotate the board out and disconnect the **VGA cable** from **PJ302** on the VGA board.
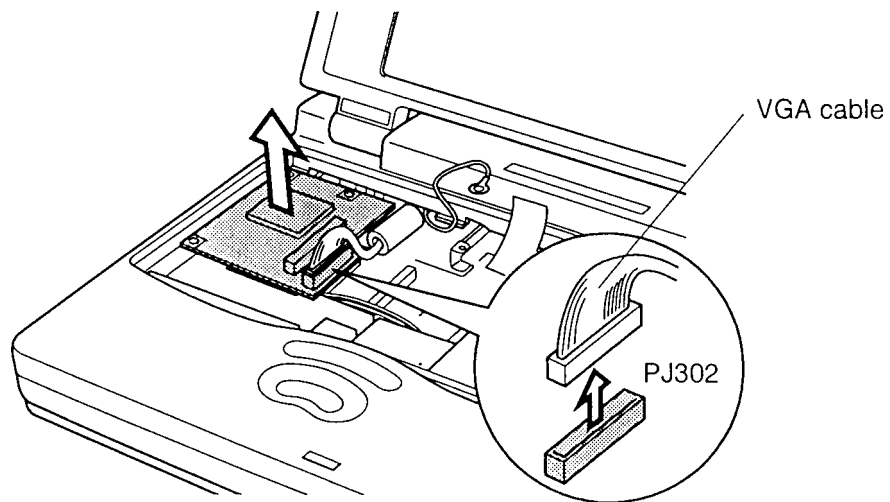
Figure 4-15 Disconnecting the cables from the VGA board

Installing the Sub-battery and VGA Board

To install the sub-battery and VGA board, follow the steps below and refer to figures 4-13 to 4-15.

CAUTION: *Be sure to match the colors of the sub-battery and LCD hinge connectors to their corresponding connectors on the system board. The LCD will not function if the cables are incorrectly connected.*

---

1. Connect the **VGA cable** to **PJ302** on the VGA board.

2. Seat the **sub-battery** and connect it to **PJ503** on the system board.

3. Rotate the board into place and press to connect the **VGA board connector** to **PJ16** on the system board.

4. Install the keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.6 back through 4.2.

4.8   Top Cover and Display Assembly

Removing the Top Cover and Display Assembly

To remove the top cover and display assembly, follow the steps below and refer to figures   4-16 to 4-18.

1.   Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2.   Remove the battery pack, optional PC card, optional memory module, HDD, keyboard, and sub-battery and VGA board as described in sections 4.2 through 4.7.

3.   Turn the computer upside down and remove   **three M2.5x8 silver screws** and **four M2.5x6 screws** securing the top cover and display assembly.
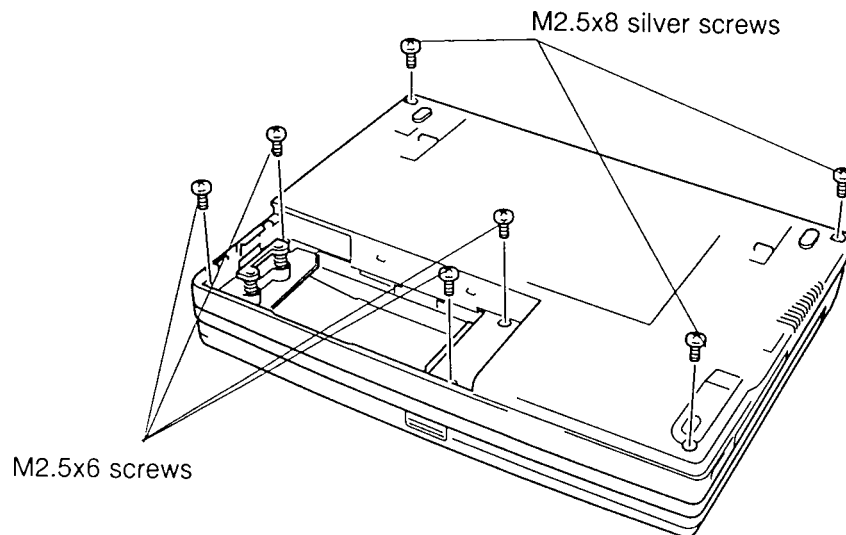
Figure 4-16 Removing the top cover screws

4.   Turn the computer over and lift back the   **top cover** and **display assembly** so you can disconnect cables.

5. Disconnect the **Real Time Clock battery** from **PJ3** on the system board and remove the battery.

> **WARNING:** *If you replace the RTC battery, be sure to use only batteries recommended by Toshiba. Installation of the wrong battery can cause the battery to explode or otherwise cause damage.*
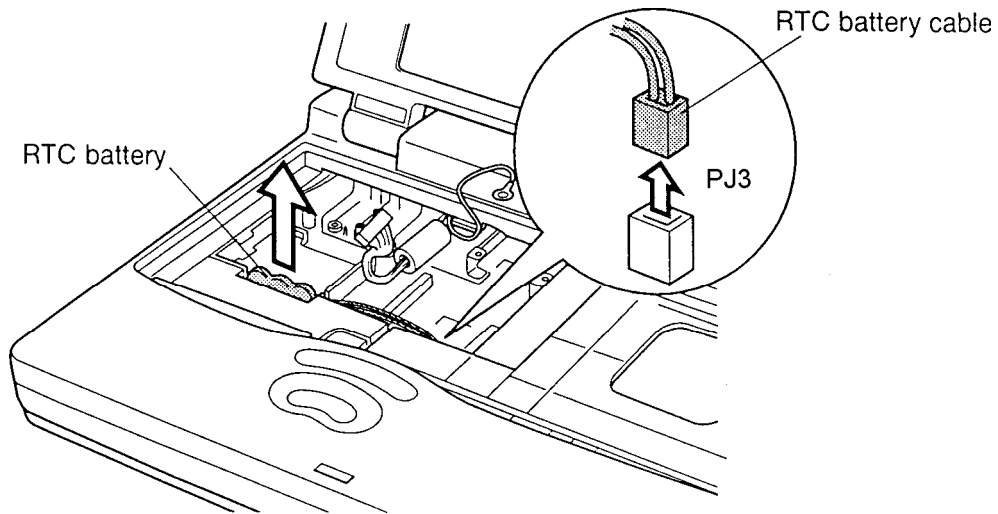
Figure 4-17 Removing the RTC battery

6. Disconnect the **panel close sensor cable** from **PJ10** and the **LED cable** from **PJ14** on the system board.

7. Remove **one M2.5x8 screw** from the sub-battery base.
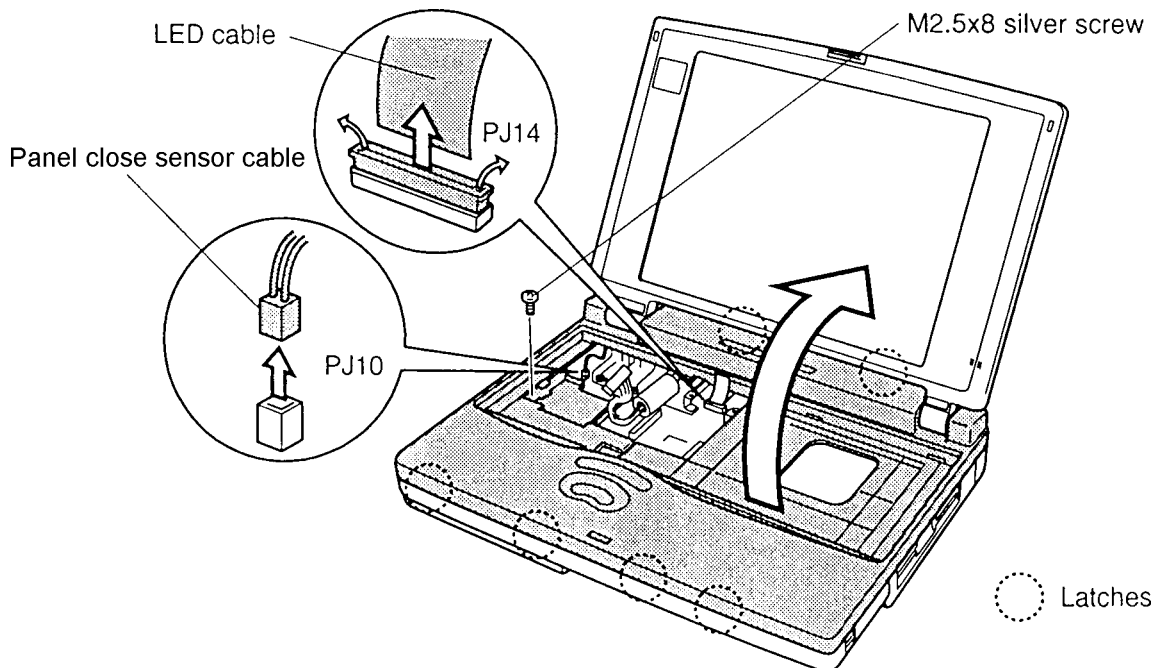
Figure 4-18 Removing the top cover and display assembly

8. Release **six latches** securing the **top cover** and remove the top cover and display assembly.

Installing the Top Cover and Display Assembly

To install the top cover, follow the steps below and refer to figures 4-16 to 4-18.

1. Seat the **top cover** and **display assembly** .

2. Secure **one M2.5x8 silver screw** on sub-battery base.

3. Connect the **LED panel cable** to **PJ14**.

4. Connect the **panel close sensor cable** to **PJ10** on the system board.

5. Connect the **Real Time Clock battery** to **PJ3** on the system board.

6. Turn the computer upside down and secure **three M2.5x8 silver screws** and **four M2.5x6 screws** .

7. Install the sub-battery and VGA board, keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.7 back through 4.2.

4.9 Membrane Switch

Removing the membrane switch

To remove the membrane switch, follow the steps below and refer to figures 4-19 and 4-20.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, HDD, keyboard, sub-battery and VGA board, and top cover and display assembly as described in sections 4.2 through 4.8.

3. Disconnect the **HDD interface board flexible cable** from **PJ6** on the system board.

4. Disconnect the **membrane switch cable** from **PJ7** on the system board.

5. Peel back the tape to reveal **three M2.5x6 screws** and remove the screws securing the **HDD interface board** .
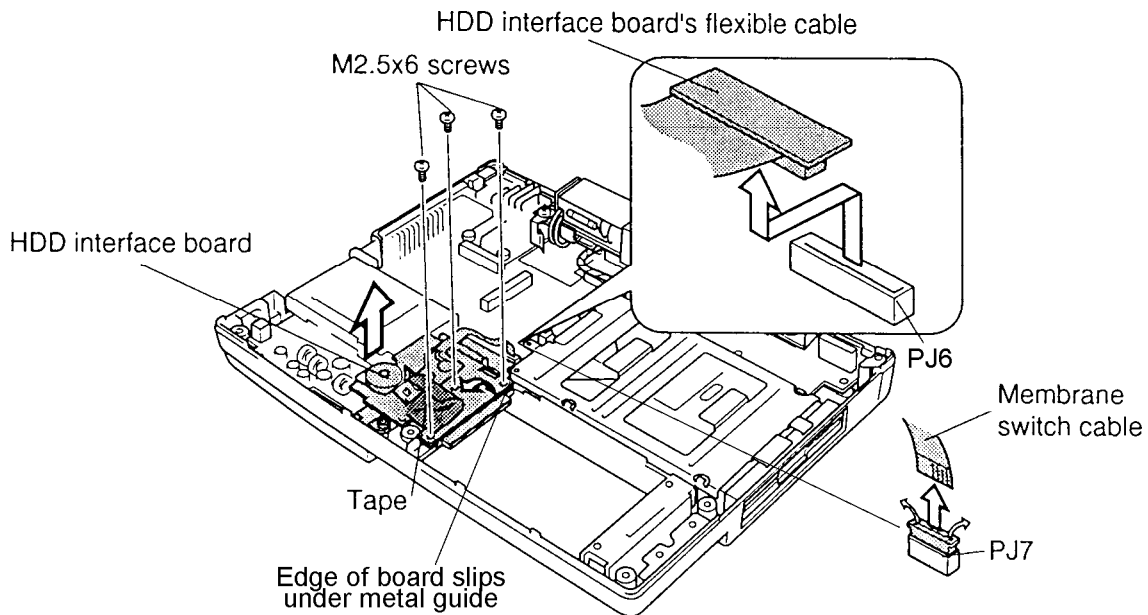
Figure 4-19 Removing the HDD interface board

6. Pull off the tape.

7. The membrane switch is held in place by plastic **pins**. Carefully lift the membrane switch clear of the pins to remove it.
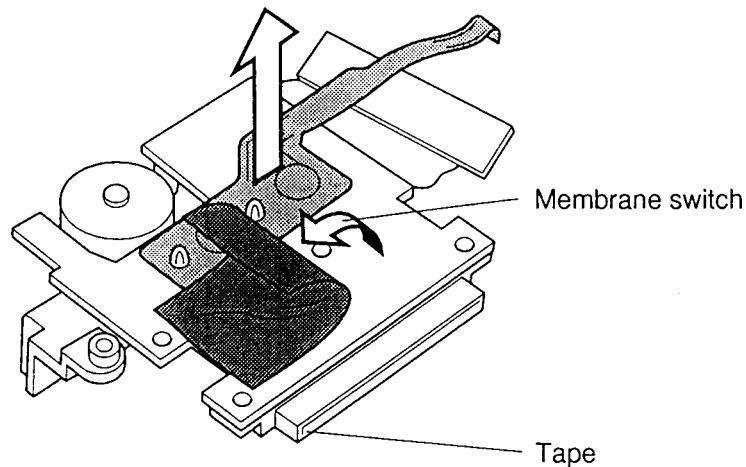
Figure 4-20 Removing the membrane switch

8. Separate the HDD interface board from its base.

Installing the membrane switch

To install the membrane switch, follow the steps below and refer to figures 4-19 and 4-20.

1. Connect the **HDD interface board flexible cable** to PJ6 on the system board.

2. Seat the **membrane switch** and secure it partially with **tape**.

3. Seat the HDD interface board and secure it with **three M2.5x6 screws**.

4. Connect the **membrane switch cable** to **PJ7** on the system board.

5. Install the top cover and display assembly, sub-battery and VGA assembly, keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.8 back through 4.2.

4.10 Diskette Drive (FDD)

Removing the FDD

To remove the FDD, follow the steps below and refer to figures 4-21 and 4-22.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, HDD, keyboard, sub-battery and VGA board, top cover and display assembly, and membrane switch as described in sections 4.2 through 4.9.

3. Disconnect the **flexible cable** from **PJ5** on the **system board**.

4. Remove **four M2.5x6 screws** and lift out the drive.
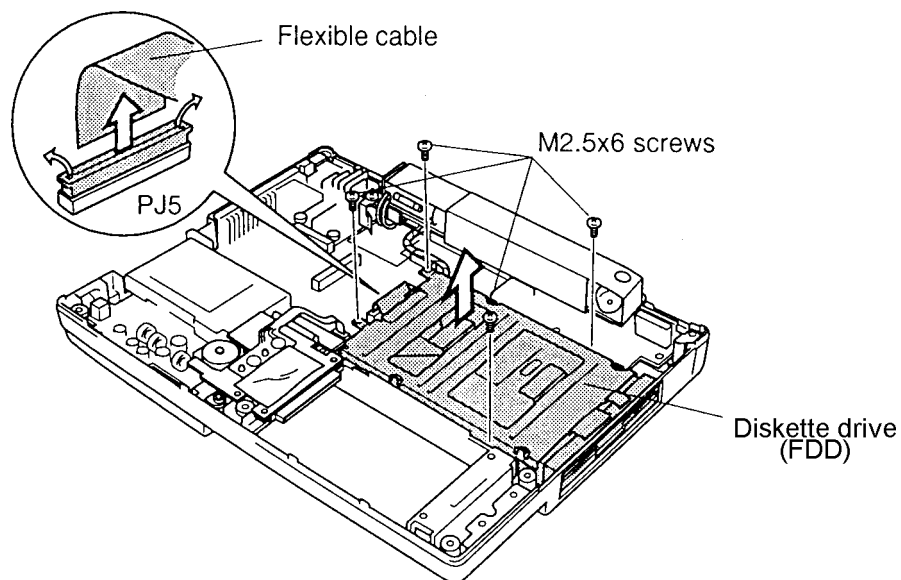
Figure 4-21 Removing the diskette drive (FDD)

5. Remove **four M2x2 screws** securing the **frame** to the drive and lift off the frame.

6. Disconnect the **flexible cable** from the drive.
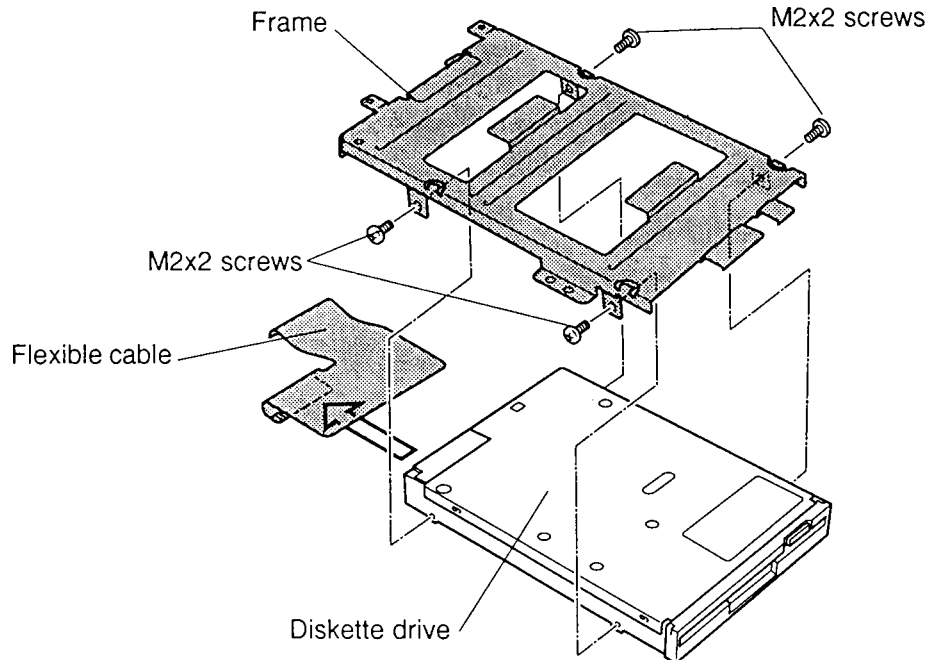
Figure 4-22 Removing the diskette drive frame

Installing the FDD

To install the FDD, follow the steps below and refer to figures 4-21 and 4-22.

1. Connect the **flexible cable** to the FDD.

2. Secure the **frame** to the **diskette drive** with **four M2x2 screws** .

3. Engage the **latches** on the frame with corresponding **notches** on the computer.

4. Seat the **diskette drive** and secure it with **four M2.5x6 screws** .

5. Connect the **flexible cable** to **PJ5** on the system board.

6. Install the membrane switch, top cover and display assembly, sub-battery and VGA assembly, keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.9 back through 4.2.

4.11 AC PS Unit

Removing the AC PS unit

To remove the AC PS unit, follow the steps below and refer to figures 4-21 and 4-24.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, HDD, keyboard, sub-battery and VGA board, top cover and display assembly, membrane switch, and FDD as described in sections 4.2 through 4.10.

3. Disconnect the **AC power cable** from **PJ502** on the system board and remove the tape from the cable (note that the cable is threaded under the FDD).

4. Remove **one M2.5x6 screw** and lift out the **VGA cable guard**.

5. Remove **one M2.5x6 screw** securing the holder assembly and **one M2.5x10 silver screw** securing the **AC PS unit**.

6. Remove tape securing the holder assembly at the back of the AC PS unit.

7. Lift the AC PS unit out partially and remove it from its plastic base.

8. Turn the AC PS unit out on its side.
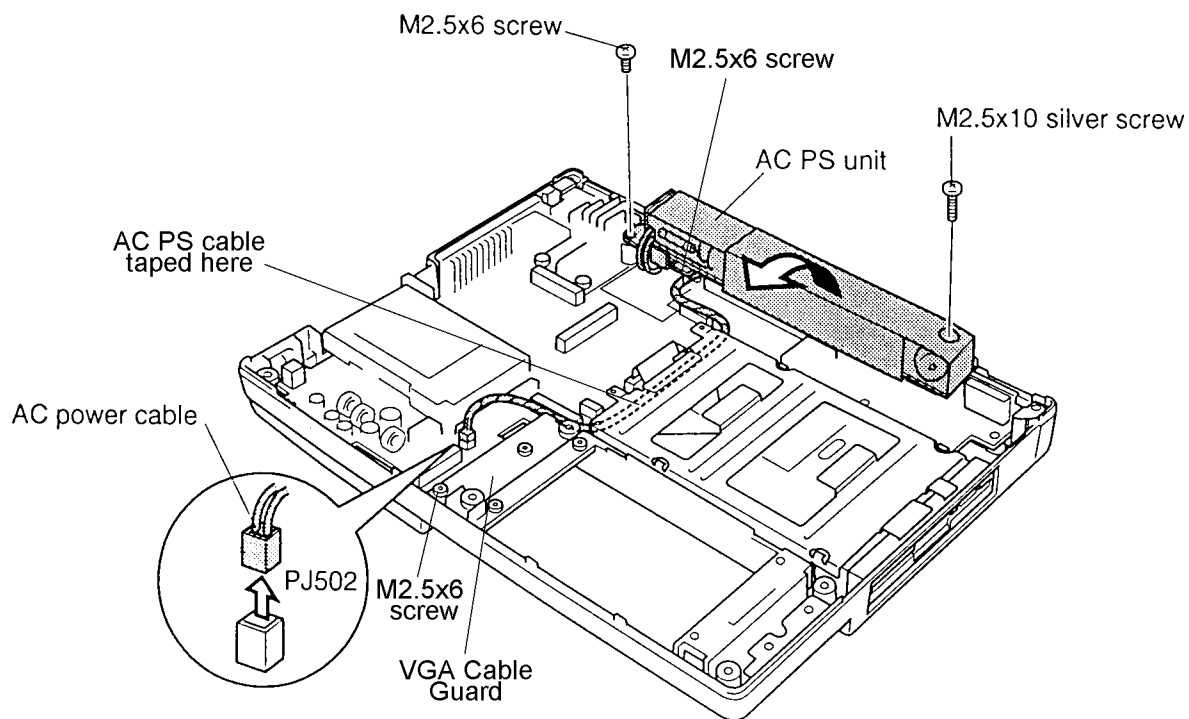
Figure 4-23 Removing the AC PS unit

9. Remove one **M2.5x6 screw** securing the **holder assembly** (underneath the AC PS unit) and lift out the assembly.

M2.5x6 screw

Holder assembly
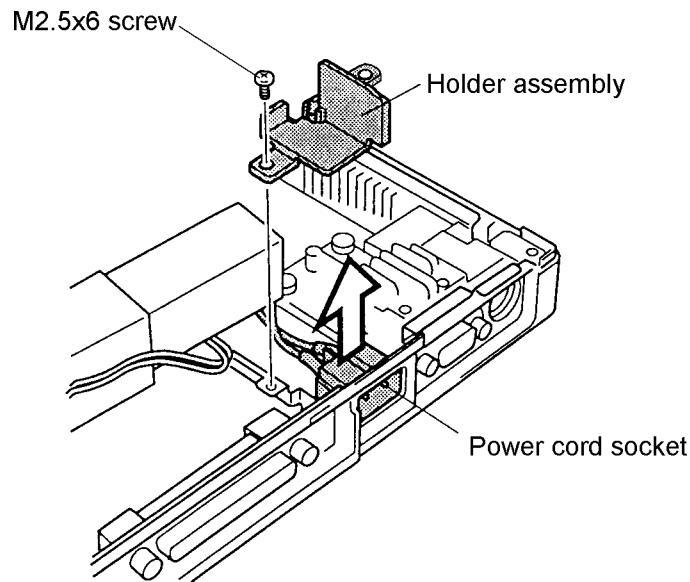
Power cord socket

Figure 4-24 Removing the holder assembly

10. Lift the **power cord socket** straight up until it clears its slots and remove the AC PS unit.

Installing the AC PS unit

To install the AC PS unit, follow the steps below and refer to figures 4-23 and 4-24.

1. Seat the **power cord socket** in its slots.

2. Seat the **holder assembly**, secure it with **two M2.5x6 screws**, and replace the **tape**.

3. Seat the **AC PS** unit.

4. Secure the AC PS unit with **one M2.5x10 silver screw**.

5. Connect the **AC power cable** to **PJ502** and secure the cable with **tape**.

6. Seat the **VGA cable guard** and secure it with **one M2.5x6 screw**.

7. Install the FDD, top cover and display assembly, membrane switch, sub-battery and VGA assembly, keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.10 back through 4.2.

4.12 System Board

Removing the System Board

To remove the system board, follow the steps below and refer to figure 4-25.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, HDD, keyboard, sub-battery and VGA board, top cover and display assembly, membrane switch, FDD, and AC PS unit as described in sections 4.2 through 4.11.

3. Remove **six M2.5x6 screws** , **one M2.5x8 screw** , and the **AC PS unit support** .

4. Lift out the **system board** .
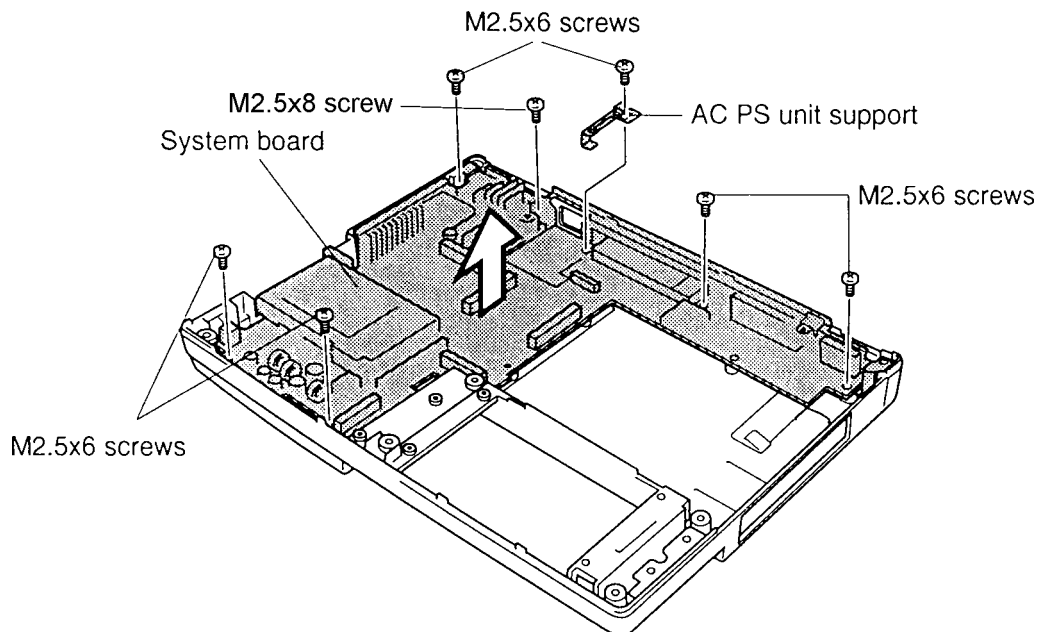
Figure 4-25 Removing the system board

Installing the System Board

To install the system board, follow the steps below and refer to figure 4-25.

1. Seat the **system board** and the **AC PS unit support** .

2. Secure **six M2.5x6 screws** and **one M2.5x8 screw** .

3. Install the AC PS unit, FDD, membrane switch, top cover and display assembly, sub-battery and VGA assembly, keyboard, HDD, optional memory module, optional PC card, and battery pack as described in sections 4.11 back through 4.2.

4.13 Display Mask

Removing the Display Mask

To remove the display mask, follow the steps below and refer to figure 4-26.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, and optional memory module as described in sections 4.2, 4.3, and 4.4.

> *NOTE : It is not necessary to remove the display assembly.*

3. Remove **two rubber seals** from the display hinges to expose two screws securing the **display mask**.

4. Remove **two M2.5x6 screws** that were covered by the rubber seals.

5. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the **six latches** across the top of the display mask.

6. Continue releasing the mask along the **sides** (**four latches** on each side), at the bottom (**three latches),** and display supports (**one latch** at the small display support and **three latches** at the larger display support are not indicated in figure 4-26).
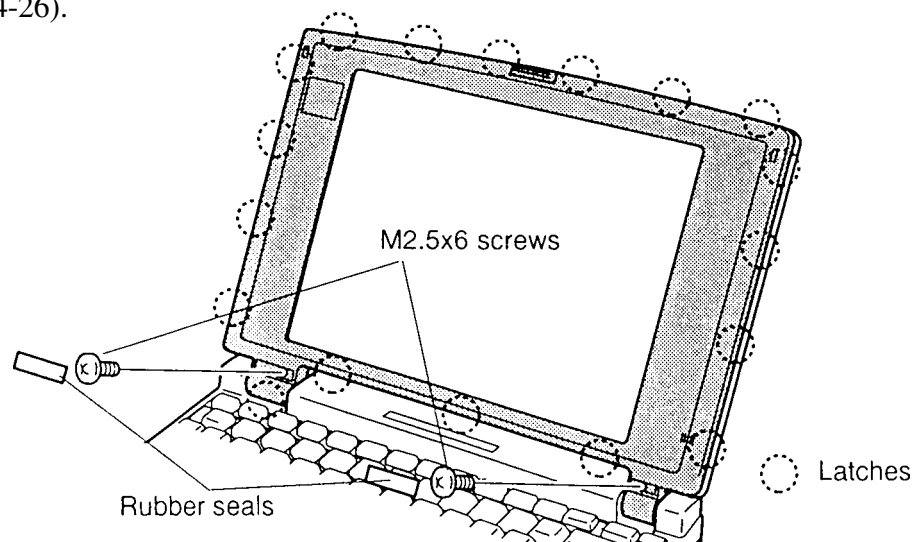
Figure 4-26 Removing the display mask

Installing the Display Mask

To install the display mask, follow the steps below and refer to figure 4-26.

1. Set the **display mask** in place and secure the latches beginning with the **one latch** at the smaller display support and three latches at the larger display support.

2. Continue along the bottom of the display (**three latches**), on each side (**four latches**), and across the top (**six latches**).

3. Secure the display mask with **two M2.5x6 screws** .

4. Attach **two rubber seals** to cover the screws.

5. Install the optional PC card, optional memory card, and battery pack as described in sections 4.4, 4.3, and 4.2.

4.14 Fluorescent Lamp (FL) Inverter Board

Removing the DSTN FL Inverter Board

To remove the FL inverter board, follow the steps below and refer to figure 4-27.

1. Turn the computer off. Disconnect the AC power cable and all external cables connected to the computer.

2. Remove the battery pack, optional PC card, optional memory module, and display mask as described in 4.2, 4.3, 4.4, and 4.13.

3. Remove **tape** covering the **FL inverter board cables** .

4. Remove **two M2.5x6 screws** securing the **FL inverter board** .

5. Remove **one M2.5x6 screw** securing the contrast control board.

6. Disconnect the **contrast control board cable** .

7. Disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2** on the **FL inverter board** .

8. Lift out the board.
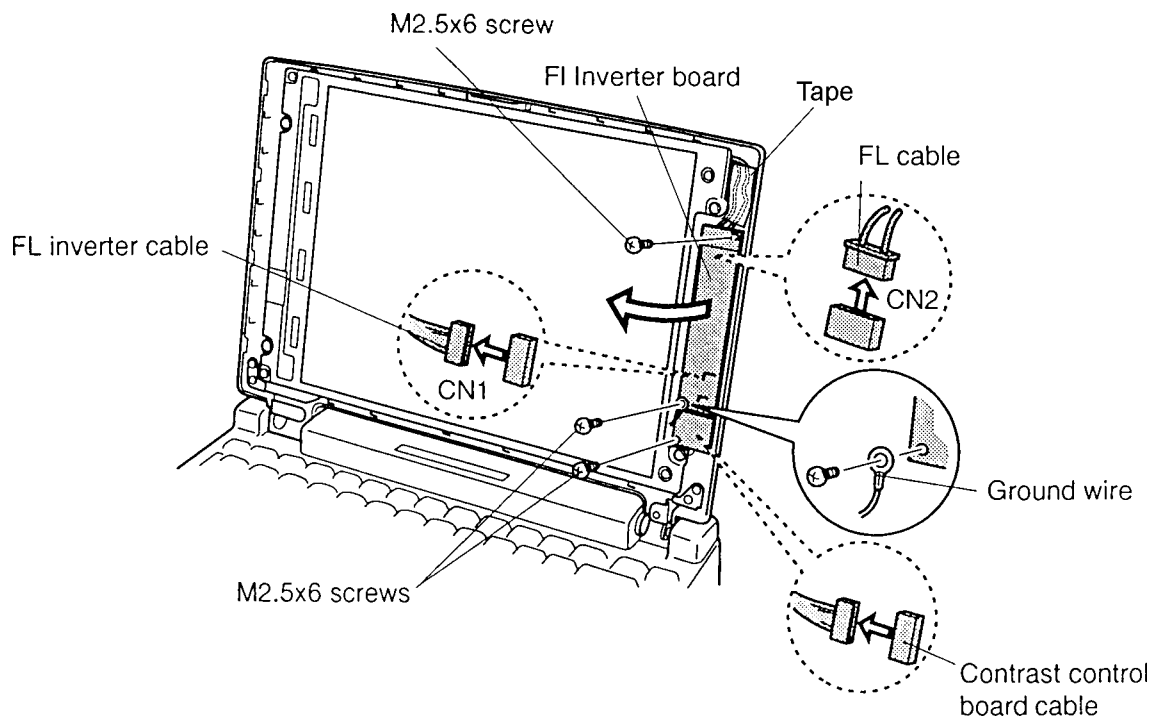
Figure 4-27 Removing the FL inverter board

Installing the DSTN FL Inverter Board

To install the FL inverter board, follow the steps below and refer to figure 4-27.

1. Seat the **FL inverter board** .

2. Connect the **FL inverter cable** to **CN1** and the **FL cable** to **CN2** on the FL inverter board and seat the board.

3. Connect the **contrast control board cable** and seat the board.

4. Secure the contrast control board with **one M2.5x6 screw** .

5. Secure the **FL inverter board** with **two M2.5x6 screws** .

6. Replace the **tape** over the FL inverter board cables.

7. Install the display mask, optional memory card, optional PC card, and battery pack as described in 4.13, 4.4, 4.3, and 4.2.

4.15 Liquid Crystal Display (LCD) Module

Removing the Color LCD Module

To remove the LCD module, follow the steps below and refer to figure 4-30.

1. Turn the computer off. Disconnect the AC power cord and all external cables connected to the computer.

2. Remove the battery pack, optional memory module, optional PC card, display mask and FL inverter board as described in sections 4.2, 4.3, 4.4, 4.13, and 4.14.

3. Remove **four M2.5x6 screws** securing the **LCD module** to the LCD cover. The screw at the lower left also secures the ground cable.

4. Carefully rotate the **LCD module** from **right to left** out of the display cover and disconnect the **display cable** from **CN1N** on the LCD module and from the **VGA cable** in the computer.
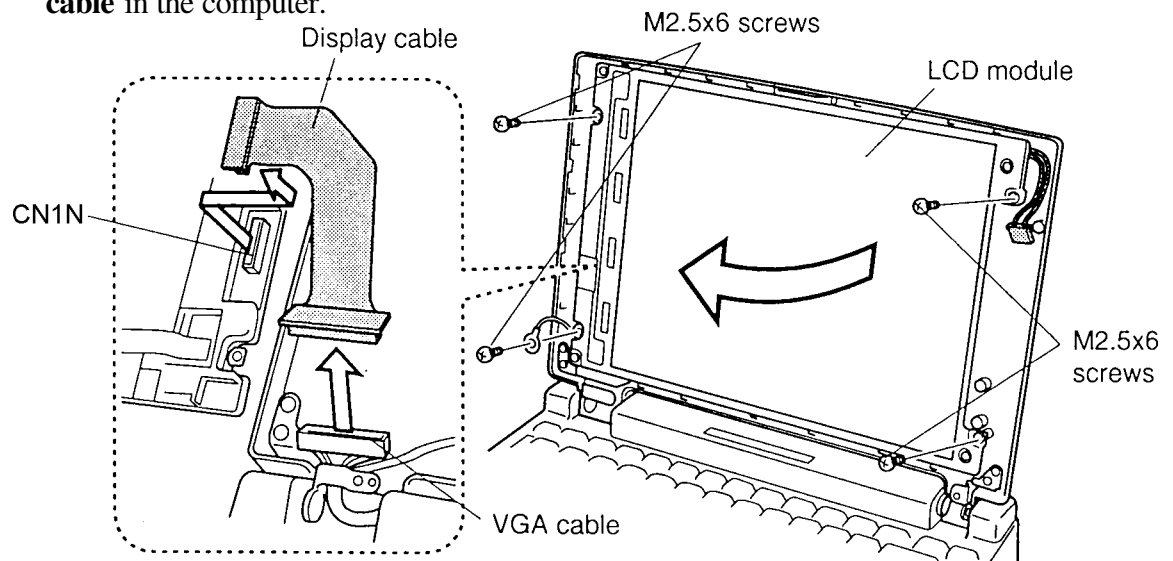
Figure 4-28 Removing the LCD module

> *NOTE: Metal edges on the LCD module are sharp, so be careful not to cut yourself.*

Installing the Color LCD Module

To install the LCD module, follow the steps below and refer to figure 4-28.

1. Connect the **display cable** to **CN1N** on the **LCD module** and to the **VGA cable**, then carefully rotate the LCD module into the LCD cover.

2. Secure **four M2.5x6 screws** and the ground cable on the **LCD module**.

3. Install the FL inverter board, display mask, optional memory module, optional PC card, and battery pack as described in sections 4.14, 4.13, 4.4, 4.3, and 4.2.

4.16 DSTN FL

CAUTION : When you remove the FL, be careful not to let any dust or other foreign matter enter the display panel components.

Removing the DSTN FL

To remove the FL, follow the steps below. Refer to figures 4-29 to 4-32.

1. Turn the computer off. Disconnect the AC adapter and all external cables connected to the computer.

2. Remove the battery pack, optional memory module, optional PC card, display mask,FL inverter board and LCD module as described in sections 4.2, 4.3, 4.4, 4.13, 4.14, and 4.15.

3. Turn the **LCD module** over and unbend **11 latches** securing the **LCD module** to its frame.

4.   Remove **four screws** securing the LCD module to the frame.
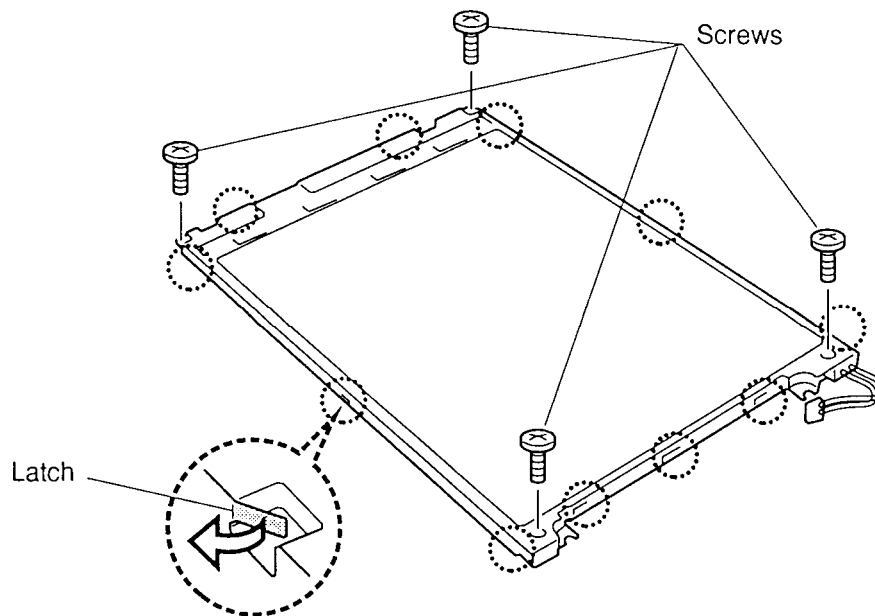
Figure 4-29 Unbending the color LCD module latches and removing screws

5. Lift the LCD module out of the frame.

6. Turn the LCD module over and remove **two M2x3.4 screws** securing the **FL holder**.
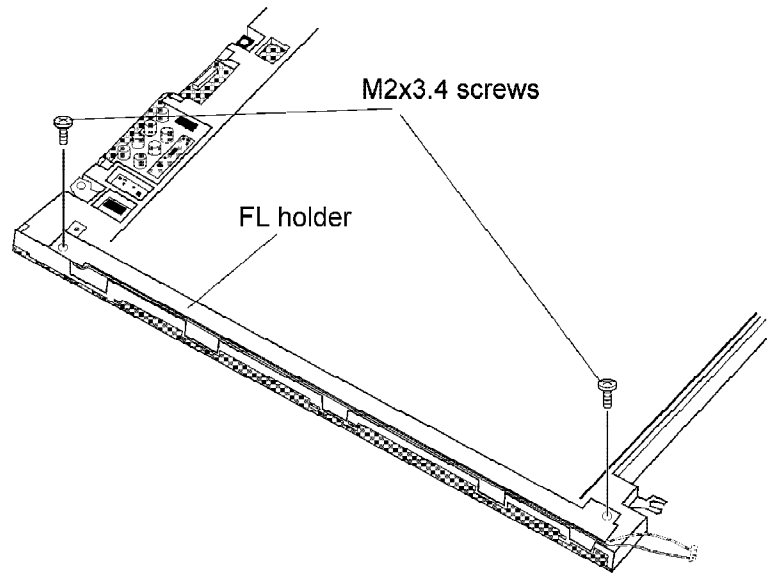
Figure 4-30 Removing screws

7. Unthread the cable, which is connected to the FL tube. Be sure no dust or debris contaminates the unit.
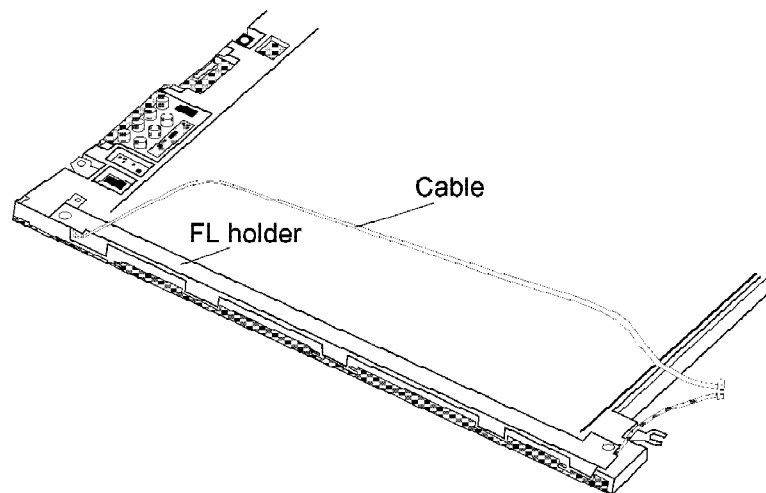
Figure 4-31 Unthreading the cable

8. Gently disengage the **FL holder** and lift it out.

9. Lift the end of the **reflector sheet** covering the **FL tube** and lift the FL tube out. Be careful not to pull or apply tension to the reflector sheet.
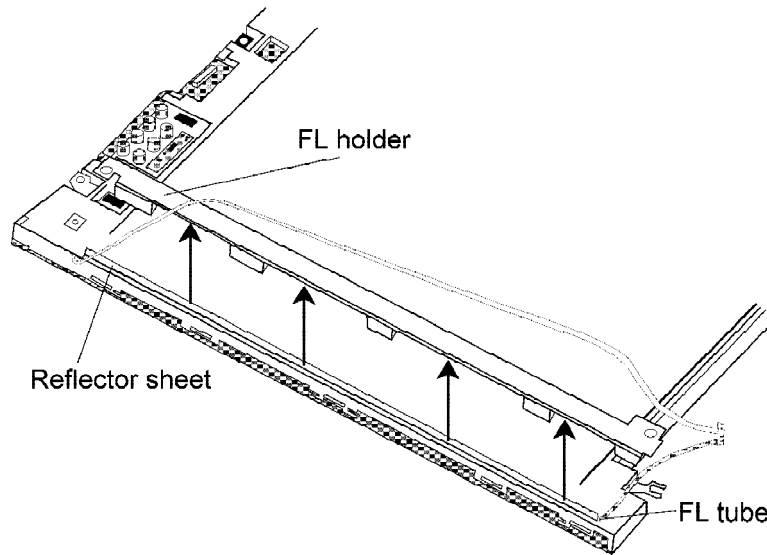
Figure 4-32 Removing the FL tube

Installing the DSTN FL

To install the FL unit, follow the steps below and refer to figures 4-29 to 4-32.

1. Seat the **FL tube**, gently press it securely in place and cover it with the end of the reflector sheet. Be careful not to pull or apply tension to the **reflector sheet** .

2. Seat the **FL holder** and thread the FL tube **cable** into place.

3. Secure the **FL holder** with **two M2x3.4 screws** .

4. Seat the **LCD module** in its frame and secure it with **four screws** .

5. Secure the **11 latches** of the frame.

6. Install the LCD module, FL inverter board, display mask, top cover, and the battery pack as described in sections 4.15, 4.14, 4.13, 4.4, 4.3, and 4.2.

Appendix A   Handling the LCD Module

Precautions for Handling the LCD Module

The computer's LCD module can be easily damaged during assembly or disassembly.
Therefore, please observe the following precautions when handling the LCD module.

    1.   When installing the LCD module in the LCD cover, be sure to seat it so that it is
           properly aligned and maximum visibility of the display is maintained.
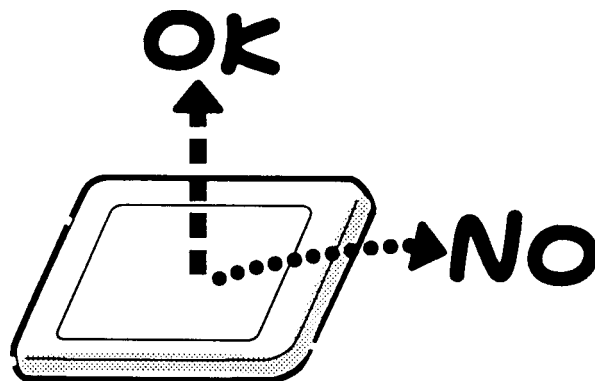
    2.   Be careful to align the holes at the four corners of the LCD module with the
           corresponding holes in the LCD cover before securing the module with screws. Do
           not force the module into place, because stress can affect its performance.

           Also, the panel's polarized surface is easily scarred, so be careful when handing it.

3.   If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

      If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.
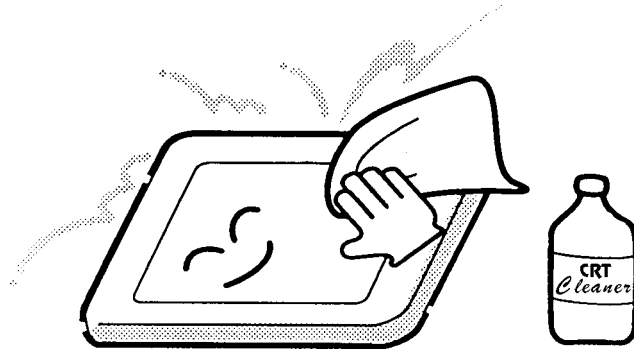
4.   If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.
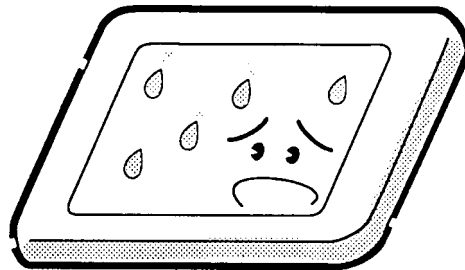
5.   Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
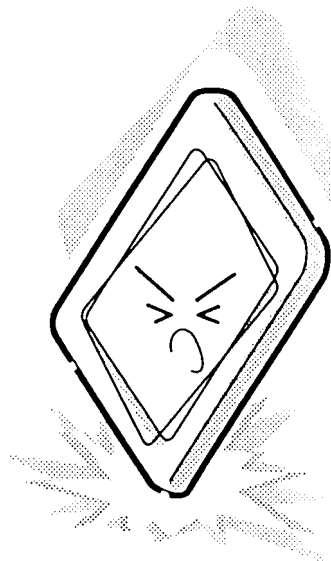
6. CMOS-LSI circuits are used in the module, so guard against damage from electro-static discharge. Be sure to wear a wrist or ankle ground when handling the module.
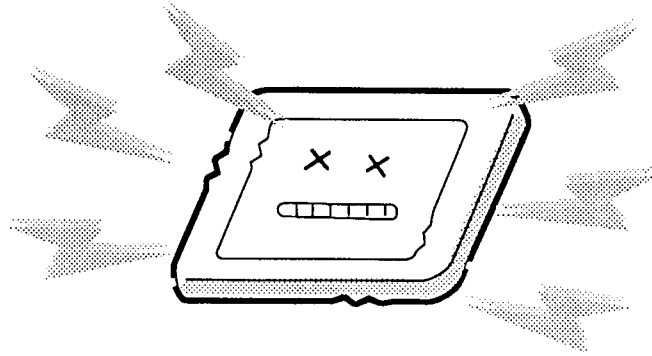
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
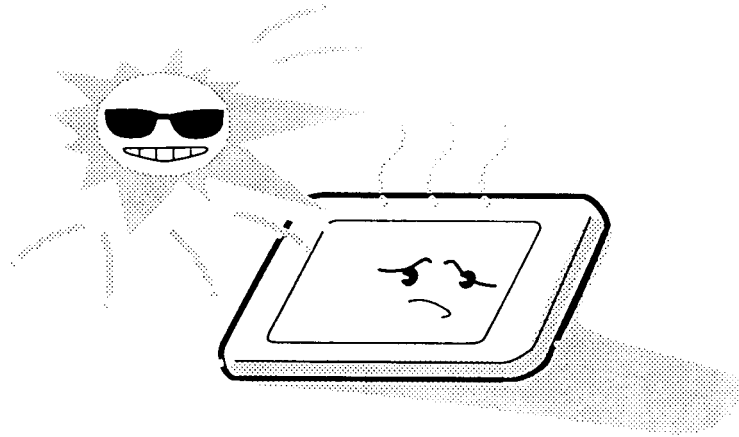
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
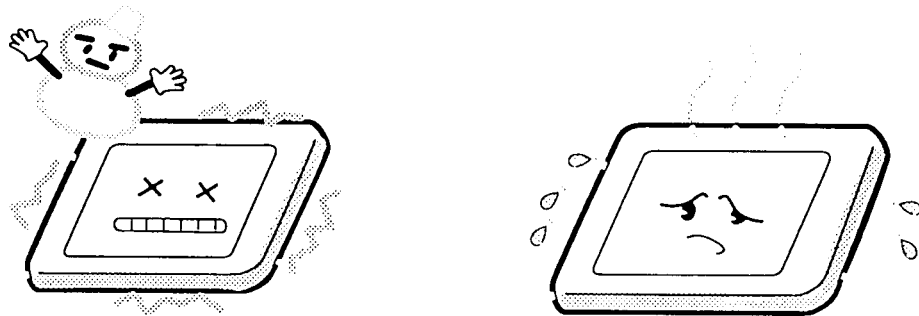
9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
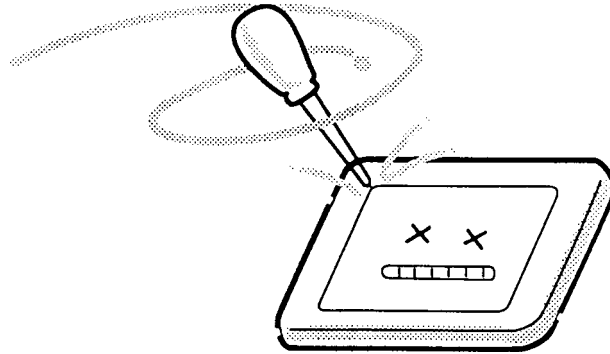
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.
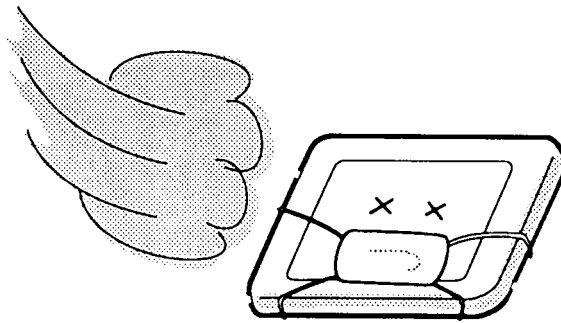
Appendix B Board Layout

B.1   System Board Front View
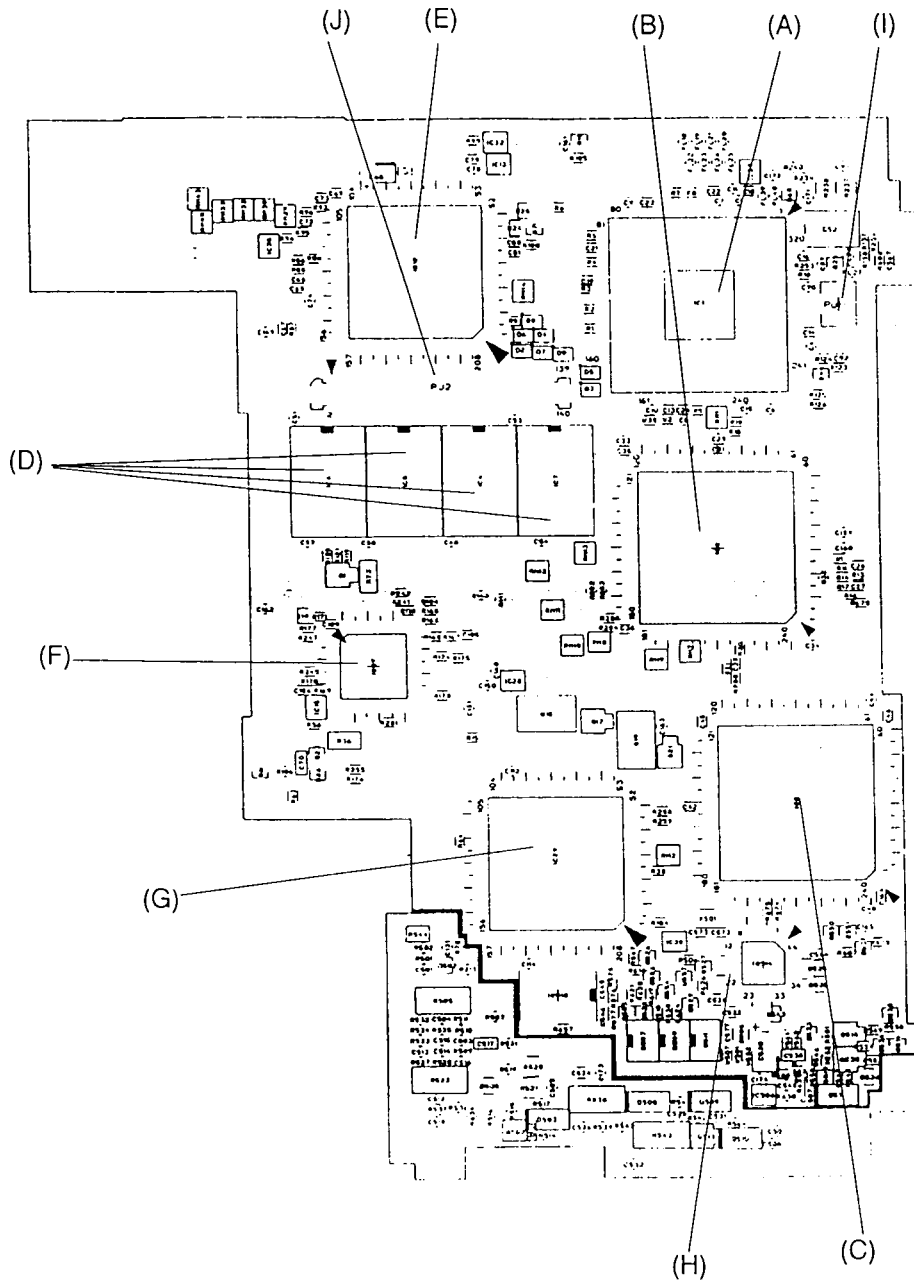
Figure B-1 System Board layout (front)

B.2   System Board Back View
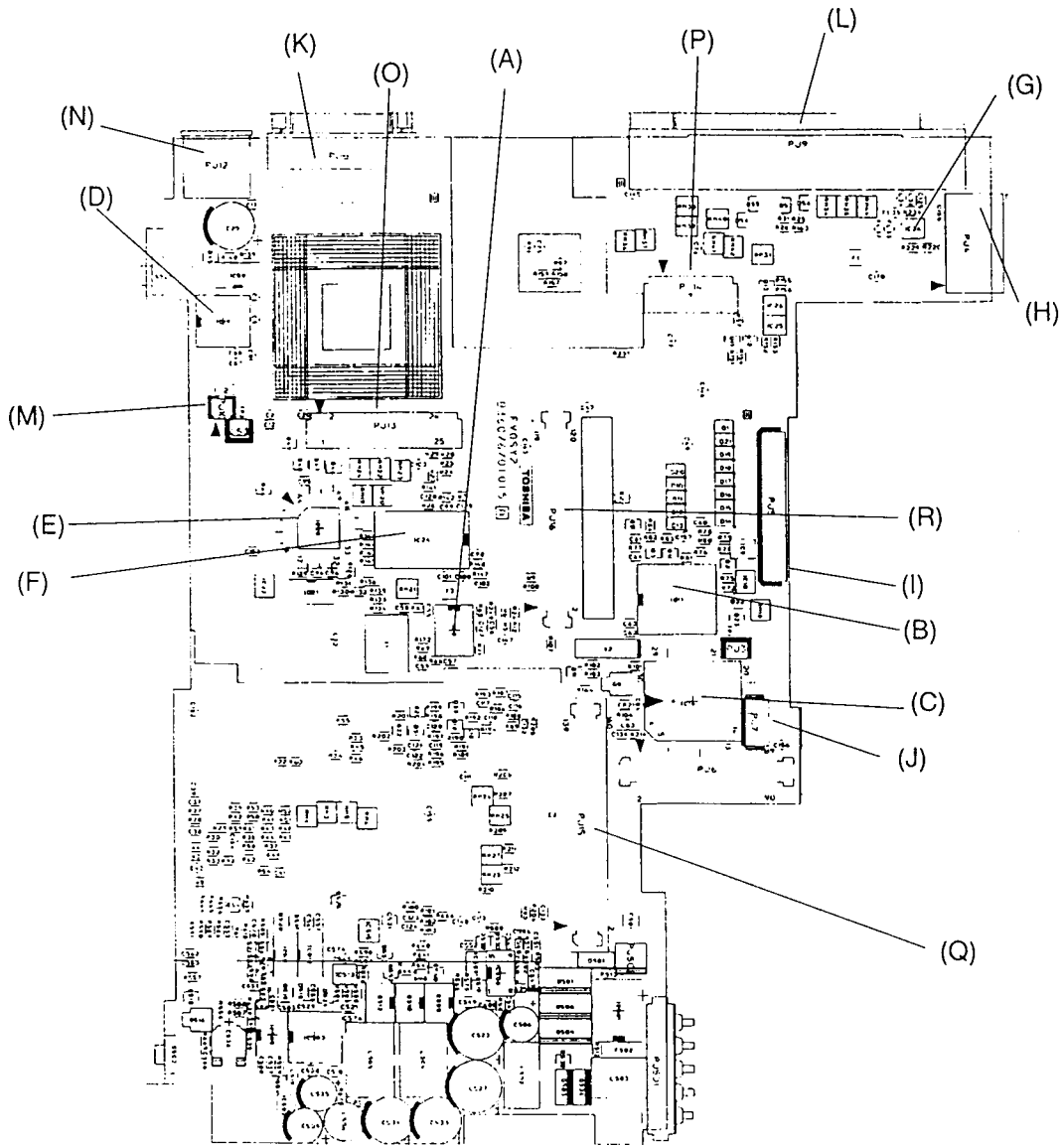
Figure B-2 System Board layout (back)

Table B-1 System board ICs and connectors (front)

Mark	Number	Name
(A)	IC1	CPU
(B)	IC2	SCPCNT GA
(C)	IC3	SISCNT GA
(D)	IC4 to IC7	System Memory
(E)	IC12	SI
(F)	IC27	I/O GA
(G)	IC29	PC Card Controller
(H)	IC514	PS Micon
(I)	PJ1	Thermistor Connector
(J)	PJ2	Exp. Memory Connector

Table B-2 System board ICs and connectors (back)

Mark	Number	Name
(A)	IC8	System Clock
(B)	IC11	RTC Controller
(C)	IC14	BIOS ROM
(D)	IC19	ASYNC Controller
(E)	IC20	Keyboard Controller
(F)	IC24	IPS Controller
(G)	IC36	P-REP Controller
(H)	PJ4	PRT/RGB I/F Connector
(I)	PJ5	FDD Connector
(J)	PJ7	HDD Connector
(K)	PJ8	ASYNC I/F Connector
(L)	PJ9	P-REP Connector
(M)	PJ10	Panel Sensor Connector
(N)	PJ12	Ext. Keyboard Connector
(O)	PJ13	Keyboard Connector
(P)	PJ14	LED Connector
(Q)	PJ15	PC Card Slot Connector
(R)	PJ16	VGA Connector

Appendix C   Pin Assignments

C.1   PJ1 Thermistor Connector (3-pin)

Table C-1 Thermistor connector pin assignments (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	ACPUTH	I	02	NC	-
03	GND	-			

C.2   PJ2 Expansion Memory Connector (140-pin)

Table C-2 Expansion memory connector pin assignments (140-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	B3V	-	02	B3V	-
03	GND	-	04	HD36;100	I/O
05	HD30;100	I/O	06	HD37;100	I/O
07	HD34;100	I/O	08	HD38;100	I/O
09	HD33;100	I/O	10	GND	-
11	B3V	-	12	HD39;100	I/O
13	HD32;100	I/O	14	HD40;100	I/O
15	HD44;100	I/O	16	HD41;100	I/O
17	HD45;100	I/O	18	B3V	-
19	GND	-	20	HD42;100	I/O
21	HD46;100	I/O	22	HD43;100	I/O
23	HD47;100	I/O	24	HD16;100	I/O
25	HD20;100	I/O	26	GND	-
27	B3V	-	28	HD17;100	I/O
29	HD21;100	I/O	30	HD18;100	I/O
31	HD22;100	I/O	32	HD19;100	I/O
33	HD23;100	I/O	34	B3V	-
35	GND	-	36	HD24;100	I/O
37	HD28;100	I/O	38	HD25;100	I/O
39	HD29;100	I/O	40	HD26;100	I/O
41	HD30;100	I/O	42	GND	-
43	B3V	-	44	HD27;100	I/O
45	HD31;100	I/O	46	HD00;100	I/O
47	HD04;100	I/O	48	HD01;100	I/O
49	HD05;100	I/O	50	B3V	-

Table C-2 Expansion memory connector pin assignments (140-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
51	GND	-	52	HD02;100	I/O
53	HD06;100	I/O	54	HD03;100	I/O
49	HD05;100	I/O	50	B3V	-
51	GND	-	52	HD02;100	I/O
53	HD06;100	I/O	54	HD03;100	I/O
55	HD07;100	I/O	56	HD08;100	I/O
57	HD12;100	I/O	58	GND	-
59	B3V	-	60	HD09;100	I/O
61	HD13;100	I/O	62	HD10;100	I/O
63	HD14;100	I/O	64	HD11;100	I/O
65	HD15;100	I/O	66	B3V	-
67	GND	-	68	HD48;100	I/O
69	HD52;100	I/O	70	HD49;100	I/O
71	HD53;100	I/O	72	HD50;100	I/O
73	HD54;100	I/O	74	GND	-
75	B3V	-	76	HD51;100	I/O
77	HD55;100	I/O	78	HD56;100	I/O
79	HD60;100	I/O	80	HD57;100	I/O
81	HD61;100	I/O	82	HD58;100	I/O
83	HD62;100	I/O	84	HD59;100	I/O
85	HD63;100	I/O	86	GND	-
87	CAS1;001	O	88	CAS0;001	O
89	CAS3;001	O	90	CAS2;001	O
91	CAS5;001	O	92	CAS4;001	O
93	CAS7;001	O	94	CAS6;001	O
95	NC	-	96	NC	-
97	NC	-	98	NC	-
99	MWE0;001	O	100	GND	-
101	NC	-	102	NC	-
103	GND	-	104	NC	-
105	ERAS0;001	O	106	ERAS2;001	O
107	ERAS1;001	O	108	ERAS3;001	O
109	NC	-	110	NC	-
111	NC	-	112	NC	-
113	NC	-	114	NC	-
115	NC	-	116	NC	-
117	GND	-	118	GND	-

Table C-2 Expansion memory connector pin assignments (140-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
119	NC	-	120	NC	-
121	GND	-	122	GND	-
123	NC	-	124	NC	-
125	GND	-	126	GND	-
127	MA00;101	O	128	MA01;101	O
129	MA02;101	O	130	MA03;101	O
131	MA04;101	O	132	MA05;101	O
133	GND	-	134	MA07;101	O
135	MA06;101	O	136	MA09;101	O
137	MA08;101	O	138	MA11;101	O
139	MA10;101	O	140	GND	-

C.3   PJ3 Ni-Mh RTC Battery Connector (3-pin)

Table C-3 Ni-Mh RTC battery connector pin assignments (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	(BATTERY+)	-	02	NC	-
03	GND	-			

C.4   PJ4 PRT/RGB I/F Connector (30-pin)

Table C-4 PRT/RGB I/F connector pin assignments (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	AGREEN;100	O	02	ARED;100	O
03	ABLUE;100	O	04	GND	-
05	GND	-	06	GND	-
07	GND	-	08	CRTEN;000	O
09	CHSYNC;110	O	10	CVSYNC;110	O
11	CVSYNC;100	I	12	CHSYNC;100	I
13	ERROR;000	I	14	PD3;100	I/O
15	SELCT;100	O	16	PD2;100	I/O
17	PE;100	I	18	PD1;100	I/O
19	BUSY;100	I	20	PD0;100	I/O
21	ACK;000	I	22	STROB;000	O
23	SLIN;000	I/O	24	PD4;100	I/O
25	PINT;000	O	26	PD5;100	I/O
27	AUTFD;000	O	28	PD6;100	I/O
29	VCC	-	30	PD7;100	I/O

C.5   PJ5 FDD Connector (26-pin)

Table C-5 FDD connector pin assignments (26-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	IFSSEL;000	O	02	GND	-
03	IFRDAT;000	I	04	GND	-
05	IFWPRO;000	O	06	GND	-
07	IFTRK0;000	I	08	GND	-
09	IFWEN;000	O	10	GND	-
11	IFWEN;000	O	12	GND	-
13	IFWDAT;000	O	14	NC	-
15	IFDIRC;000	O	16	GND	-
17	IFAMON;000	O	18	IFHMED;000	I
19	IFRADY;000	I	20	VCC	-
21	DISKCHG;000	I	22	VCC	-
23	IFDASL;000	O	24	VCC	-
25	IFINDX;000	I	26	VCC	-

C.6 PJ7 HDD Connector (90-pin)

Table C-6 HDD connector pin assignments (90-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	NC	-	02	GND	-
03	NC	-	04	IRQ14;100	I
05	NC	-	06	SA02;100	O
07	NC	-	08	SA01;100	O
09	GND	-	10	IRQ7;100	I
11	GND	-	12	IRQ5;100	I
13	GND	-	14	CSPTON;000	O
15	GND	-	16	FIORD;000	O
17	GND	-	18	FIOWR;000	O
19	GND	-	20	GND	-
21	GND	-	22	IOCS16;000	O
23	GND	-	24	IOCRDY;100	I
25	GND	-	26	HDCS0;000	O
27	GND	-	28	HDCS1;000	O
29	GND	-	30	PSPNBP;100	O
31	GND	-	32	HDDLED;000	I
33	GND	-	34	GND	-
35	GND	-	36	SD00;100	I/O
37	GND	-	38	SD01;100	I/O
39	GND	-	40	SD02;100	I/O
41	GND	-	42	SD03;100	I/O
43	GND	-	44	SD04;100	I/O
45	GND	-	46	SD05;100	I/O
47	GND	-	48	SD06;100	I/O
49	GND	-	50	SD07;100	I/O
51	GND	-	52	GND	-
53	GND	-	54	SD15;100	I/O
55	GND	-	56	SD14;100	I/O
57	GND	-	58	SD13;100	I/O
59	GND	-	60	SD12;100	I/O
61	GND	-	62	SD11;100	I/O
63	GND	-	64	SD10;100	I/O
65	GND	-	66	SD09;100	I/O
67	GND	-	68	SD08;100	I/O
69	GND	-	70	GND	-
71	GND	-	72	RESET;000	O

Table C-6 HDD connector pin assignments (90-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
73	GND	-	74	RVCC	-
75	GND	-	76	VCC	-
77	GND	-	78	VCC	-
79	GND	-	80	VCC	-
81	GND	-	82	VCC	-
83	GND	-	84	VCC	-
85	GND	-	86	VCC	-
87	GND	-	88	VCC	-
89	GND	-	90	VCC	-

C.7   PJ8 Asynchronous Connector (9-pin)

Table C-7 Asynchronous connector pin assignments (9-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
001	DCD1;101	I	002	RXD1;001	I
003	TXD1;011	O	004	DTR1;111	O
005	GND	—	006	DSR1;101	I
007	RTS1;101	O	008	CTS1;101	I
009	RI1;101	I			

C.8 PJ9 P-REP Connector (176-pin)

Table C-8 P-REP connector pin assignments (176-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	GND	-
03	LA23;110	O	04	LA20;110	O
05	FRESET;010	O	06	SBHE;010	O
07	MERD;010	O	08	ZEROWS;010	I
09	IOCRDY;110	O	10	BUFOFF;020	O
11	PSPTON;010	I	12	NC	-
13	GND	-	14	DTR1;110	O
15	TXD1;010	O	16	DCD1;100	I
17	CTS1;100	I	18	PVT	O
19	PVT	O	20	SYSCLK;100	O
21	IORD;010	O	22	VCC	-
23	VCC	O	24	VCC	-
25	NC	-	26	NC	-
27	NC	-	28	IRQ7;110	I
29	IRQ9;110	I	30	IRQ12;110	I
31	ERROR;000	I	32	PE;100	I
33	ACK;000	I	34	PINT;000	O
35	STROB;000	O	36	PD1;100	I/O
37	PD3;100	O	38	PD5;100	I/O
39	GND	-	40	ARED;120	O
41	AGREEN;120	O	42	ABLUE;120	O
43	GND	-	44	GND	-
45	GND	-	46	GND	-
47	LA21;110	O	48	LA22;110	O
49	AEN;110	O	50	BALE;110	O
51	MEWR;010	O	52	IOCS16;010	O
53	MECS16;010	O	54	REFRSH;010	O
55	PCSMB;010	I	56	PCMB;110	O
57	GND	-	58	RTS1;110	O
59	DSR1;100	I	60	RI1;100	I
61	RXD1;000	I	62	PVT	O
63	PVT	O	64	PVT	O
65	IOWR;010	O	66	VCC	-
67	VCC	-	68	IRQ4;110	I
69	IRQ3;110	I	70	IRQ11;110	I
71	IRQ5;110	I	72	IRQ15;110	I

Table C-8 P-REP connector pin assignments (176-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
73	IRQ10;110	I	74	IRQ14;110	I
75	SELCT;100	I	76	BUSY;100	I
77	SLIN;000	O	78	AUTFD;000	O
79	PD0;100	I/O	80	PD2;100	I/O
81	PD4;100	I/O	82	PD6;100	I/O
83	PD7;100	I/O	84	GND	-
85	CHSYNC;120	O	86	CVSYNC;120	O
87	GND	-	88	GND	-
89	P12V	-	90	SA00;110	O
91	SA08;110	O	92	SA02;110	O
93	GND	-	94	SA04;110	O
95	SA10;110	O	96	SA06;110	O
97	GND	-	98	SA15;110	O
99	SA18;110	O	100	SA13;110	O
101	GND	-	102	SD07;110	I/O
103	SA16;110	O	104	SD05;110	I/O
105	GND	-	106	SD03;110	I/O
107	SA09;110	O	108	SD11;110	I/O
109	GND	-	110	SD00;110	I/O
111	SD13;110	I/O	112	SD15;110	I/O
113	GND	-	114	NC	-
115	NC	-	116	NC	-
117	NC	-	118	NC	-
119	NC	-	120	NC	-
121	GND	-	122	PRDT2;000	I
123	MOUSCK;100	O	124	MOUSDT;100	I
125	NC	-	126	NC	-
127	GND	-	128	LOUTRM	O
129	LOUTRP	O	130	NC	-
131	NC	-	132	NC	-
133	P12V	-	134	SA01;110	O
135	SA09;110	O	136	SA03;110	O
137	GND	-	138	SA05;110	O
139	SA11;110	O	140	SA07;110	O
141	GND	-	142	SA14;110	O
143	SA19;110	O	144	SA12;110	O
145	GND	-	146	SD06;110	I/O
147	SA17;110	O	148	SD04;110	I/O

Table C-8 P-REP connector pin assignments (176-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
149	GND	-	150	SD02;110	I/O
151	SD08;110	I/O	152	SD10;110	I/O
153	GND	-	154	SD01;110	I/O
155	SD12;110	I/O	156	SD14;110	I/O
157	GND	-	158	NC	-
159	NC	-	160	NC	-
161	NC	-	162	NC	-
163	NC	-	164	NC	-
165	GND	-	166	PRDT1;000	I
167	EXKBDT;100	I/0	168	EXKBCK;100	O
169	JOYR;000	I	170	NC	-
171	GND	-	172	NC	-
173	LOUTLM	O	174	LOURLP	O
175	NC	-	176	NC	-

C.9   PJ10 Panel Sensor Connector (2-pin)

Table C-9 Panel sensor connector pin assignments (2-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	PNLOFF	I	02	GND	-

C.10   PJ12 Ext. Keyboard Connector (6-pin)

Table C-10 Ext. Keyboard connector pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	MOUSE/KB_DATA	I/O	02	EXKBDT;100	I/O
03	GND	-	04	VCC	-
05	MOUSE/KB _CLOCKO	O	06	EXKBCK;100	O

C.11 PJ13 Keyboard Connector (25-pin)

Table C-11 Keyboard connector pin assignments (25-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	KBRT6;100	I	02	KBRT2;100	I
03	KBRT5;100	I	04	KBRT0;100	I
05	KBRT1;100	I	06	KBRT3;100	I
07	KBRT7;100	I	08	KBRT4;100	I
09	KBOT02;000	O	10	KBOT09;000	O
11	KBOT11;000	O	12	KBOT03;000	O
13	KBOT04;000	O	14	KBOT05;000	O
15	KBOT06;000	O	16	KBOT07;000	O
17	KBOT08;000	O	18	KBOT01;000	O
19	KBOT00;000	O	20	IPSY;100	I
21	GND	–	22	IPSX;100	I
23	IPSY;100	I	24	VCC	–
25	IPSX;100	I			

C.12 PJ14 LED Connector (12-pin)

Table C-12 LED connector pin assignments (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	PONGRN;110	O
03	PONORG;110	O	04	DRVLED;110	O
05	CAPLED;110	O	06	ARWLED;110	O
07	NUMLED;110	O	08	CHGGRN;100	O
09	CHGORG;100	O	10	DCGRN;100	O
11	DCORG;100	O	12	PLED	O

C.13 PJ15 PC Card Connector (140-pin)

Table C-13 PC card connector pin assignments (140-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
001	GND	—	002	GND	—
003	GND	—	004	GND	—
005	GND	—	006	GND	—
007	CDA2;000	I	008	SDB2;000	I
009	WPA;100	I	010	WPB;100	I
011	CDA10;100	I/O	012	CDB10;100	I/O
013	CDA02;100	I/O	014	CDB02;100	I/O
015	CDA09;100	I/O	016	CDB09;100	I/O
017	CDA01;100	I/O	018	CDB01;100	I/O
019	CDA08;100	I/O	020	CDB08;100	I/O
021	CDA00;100	I/O	022	CDB00;100	I/O
023	BVDA1;100	I	024	BVDB1;100	I
025	CADA00;100	O	026	CADB00;100	O
027	BVDA2;100	I	028	BVDB2;100	I
029	CADA01;100	O	030	CADB01;100	O
031	REGA;000	O	032	REGB;000	O
033	CADA02;100	O	034	CADB02;100	O
035	NC	—	036	NC	—
037	CADA03;100	O	038	CADB03;100	O
039	WAITA;000	I	040	WAITB;000	I
041	CADA04;100	O	042	CADB04;100	O
043	CRESTA;100	O	044	CRESTB;100	O
045	CADA05;100	O	046	CADB05;100	O
047	NC	—	048	NC	—
049	CADA06;100	O	050	CADB06;100	O
051	CADA25;100	O	052	CADB25;100	O
053	CADA07;100	O	054	CADB07;100	O
055	CADA24;100	O	056	CADB24;100	O
057	CADA12;100	O	058	CADB12;100	O
059	CADA23;100	O	060	CADB23;100	O
061	CADA15;100	O	062	CADB15;100	O
063	CADA22;100	O	064	CADB22;100	O
065	CADA16;100	O	066	CADB16;100	O
067	MCVPPA	O	068	MCVPPB	O
069	MCVPPA	O	070	MCVPPB	O
071	MCVCCA	O	072	MCVCCB	O

Table C-13 PC card connector pin assignments (140-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
073	MCVCCA	O	074	MCVCCB	O
075	CADA21;100	O	076	CADB21;100	O
077	BSYA;000	I	078	BSYB;000	I
079	CADA20;100	O	080	CADB20;100	O
081	WEA;000	O	082	WEB;000	O
083	CADA19;100	O	084	CADB19;100	O
085	CADA14;100	O	086	CADB14;100	O
087	CADA18;100	O	088	CADB15;100	O
089	CADA13;100	O	090	CADB13;100	O
091	CADA17;100	O	092	CADB17;100	O
093	CADA08;100	O	094	CADB08;100	O
095	IOWA;000	O	096	CADB09;100	O
097	CADA09;100	O	098	CADB09;100	O
099	IORA;000	O	100	IORB;000	O
101	CADA11;100	O	102	DADB11;000	O
103	NC	—	104	NC	—
105	OEA;000	O	106	OEB;000	O
107	CE2A;000	I/O	108	CE2B;000	I/O
109	CADA10;100	I/O	110	CADB10;100	I/O
111	CDA15;100	I/O	112	CDB15;100	I/O
113	CE1A;000	O	114	CE1B;000	O
115	CDA14;100	I/O	116	CDB14;100	I/O
117	CDA07;100	I/O	118	CDB07;100	I/O
119	CDA13;100	I/O	120	CDB13;100	I/O
121	CDA06;100	I/O	122	CDB06;100	I/O
123	CDA12;100	I/O	124	CDB12;100	I/O
125	CDA05;100	I/O	126	CDB05;100	I/O
127	CDA11;100	I/O	128	CDB11;100	I/O
129	CDA04;100	I/O	130	CDB04;100	I/O
131	CDA1;000	I/O	132	CDB1;000	I/O
133	CDA03;100	I/O	134	CDB03;100	I/O
135	GND	—	136	GND	—
137	GND	—	138	GND	—
139	GND	—	140	GND	—

C.14   PJ16 VGA Connector (120-pin)

Table C-14 VGA connector pin assignments (120-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
01	P12V	O	02	BE3;000	O
03	B5V	O	04	BE2;000	O
05	B5V	O	06	ADS;000	O
07	B5V	O	08	RDYVLI;000	O
09	FLHIGH	O	10	VCC	-
11	CFLPWR	O	12	VCC	-
13	GND	-	14	VCC	-
15	VCC	-	16	FLV0	O
17	VCC	-	18	RDYVLO;000	I
19	VCC	-	20	CSVLBI;000	I
21	GND	-	22	CLKVLO;100	O
23	FLV1	O	24	WR;000	O
25	RSTVGA;000	O	26	GND	-
27	PDNVGA;000	O	28	D23;100	I/O
29	CLKVGA;100	O	30	D22;100	I/O
31	GND	-	32	D21;100	I/O
33	RESET;000	O	34	D20;100	I/O
35	PANEL1;100	I	36	GND	-
37	PANEL0;100	I	38	D19;100	I/O
39	FLTEN;000	O	40	D18;100	I/O
41	GND	-	42	D17;100	I/O
43	BE0;000	O	44	D16;100	I/O
45	BE1;000	O	46	GND	-
47	MIO;000	O	48	D24;100	I/O
49	A06;100	I	50	D25;100	I/O
51	GND	-	52	D26;100	I/O
53	A06;100	I	54	D27;100	I/O
55	A07;100	I	56	GND	-
57	A08;100	I	58	D28;100	I/O
59	A09;100	I	60	D29;100	I/O
61	GND	-	62	D30;100	I/O
63	A10;100	I	64	D31;100	I/O
65	A11;100	I	66	GND	-
67	A02;100	I	68	D08;100	I/O
69	A16;100	I	70	D09;100	I/O
71	GND	-	72	D10;100	I/O
73	A17;100	I	74	D11;100	I/O

Table C-14 VGA connector pin assignments (120-pin) (continued)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
75	A18;100	I	76	GND	-
77	A19;100	I	78	D12;100	I/O
79	A20;100	I	80	D13;100	I/O
81	GND	-	82	D14;100	I/O
83	A03;100	I	84	D15;100	I/O
85	A04;100	I	86	GND	-
87	A05;100	I	88	D04;100	I/O
89	A12;100	I	90	D03;100	I/O
91	GND	-	92	D02;100	I/O
93	A13;100	I	94	D01;100	I/O
95	A14;100	I	96	GND	-
97	A15;100	I	98	D00;100	I/O
99	A23;100	I	100	D07;100	I/O
101	GND	-	102	D06;100	I/O
103	A24;100	I	104	D05;100	I/O
105	A25;100	I	106	GND	-
107	A22;100	I	108	CHSYNC;100	I
109	A21;100	I	110	CVSYNC;100	I
111	GND	-	112	GND	-
113	B3V	-	114	ARED;100	I
115	B3V	-	116	AGREEN;100	I
117	B3V	-	118	ABLUE;100	I
119	GND	-	120	GND	-

Appendix D   Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 2) (1/3)

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break		Note
01	' ~	29	A9	0E	F0	0E	
02	1 !	02	82	16	F0	16	
03	2 @	03	83	1E	F0	1E	
04	3 #	04	84	26	F0	26	
05	4 $	05	85	25	F0	25	
06	5 %	06	86	2E	F0	2E	
07	6 ^	07	87	36	F0	36	
08	7 &	08	88	3D	F0	3D	*2
09	8 *	09	89	3E	F0	3E	*2
10	9 (	0A	8A	46	F0	46	*2
11	0)	0B	8B	45	F0	45	
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	13	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[{	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	
29 (42)	\		2B	AB	5D	F0	5D	*5
30	Caps Lock	3A	BA	58	F0	58	
31	A	1E	9E	1C	F0	1C	
32	S	1F	9F	1B	F0	1B	
33	D	20	A0	23	F0	23	
34	F	21	A1	2B	F0	2B	
35	G	22	A2	34	F0	34	
36	H	23	A3	33	F0	33	
37	J	24	A4	3B	F0	3B	*2
38	K	25	A5	42	F0	42	*2
39	L	26	A6	4B	F0	4B	*2
40	; :	27	A7	4C	F0	4C	*2

Table D-1 Scan codes (set 1 and set 2) (2/3)

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break	Note
41	' "	28	A8	52	F0 52	
43	Enter	1C	9C	5A	F0 5A	
44	Shift (L)	2A	AA	12	F0 12	
45	No.102 key	56	D6	61	F0 61	
46	Z	2C	AC	1A	F0 1A	
47	X	2D	AD	22	F0 22	
48	C	2E	AE	21	F0 21	
49	V	2F	AF	2A	F0 2A	
50	B	30	B0	32	F0 32	
51	N	31	B1	31	F0 31	
52	M	32	B2	3A	F0 3A	*2
53	, <	33	B3	41	F0 41	*2
54	. >	34	B4	49	F0 49	*2
55	/ ?	35	B5	4A	F0 4A	*2
57	Shift (R)	36	B6	59	F0 59	
58	Ctrl	1D	9D	14	F0 14	*3
60	Alt (L)	38	B8	11	F0 11	*3
61	Space	39	B9	29	F0 29	
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0 11	
75	Ins	E0 52	E0 D2	E0 70	E0 F0 70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0 71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0 6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0 6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0 69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0 75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0 72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0 7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0 7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0 74	*1
110	Esc	01	81	76	F0 76	

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break	Note
112	F1	3B	3B	05	F0 05	
113	F2	3C	BC	06	F0 06	
114	F3	3D	BD	04	F0 04	
115	F4	3E	BE	0C	F0 0C	
116	F5	3F	BF	03	F0 03	
117	F6	40	C0	0B	F0 0B	
118	F7	41	C1	83	F0 83	
119	F8	42	C2	0A	F0 0A	
120	F9	43	C3	01	F0 01	
121	F10	44	C4	09	F0 09	
122	F11	57	D7	78	F0 78	*3
123	F12	58	D8	07	F0 07	*3
124	PrintSc	*6	*6	*6	*6	*6
126	Pause	*7	*7	*7	*7	*7
202	Fn	—	—	—	—	*4

Notes:

1*   Scan codes differ by mode.
2*   Scan codes differ by overlay function.
3*   Combination with **Fn** key makes different codes.
4*   **Fn** key does not generate a code by itself.
5*   This key corresponds to key No. 42 in 102-key model.
6*   Refer to table D-6, scan codes with **Ctrl** key.
7*   Refer to table D-7, scan codes with **Alt** key.

Table D-2 Scan codes with left Shift key

| Cap No. | Key top | Code set 1 | | Code set 2 | |
		Make	Break	Make	Break
75	INS	E0 AA E0 52	E0 D2 E0 2A	E0 F0 12 E0 70	E0 F0 70 E0 12
76	DEL	E0 AA E0 53	E0 D3 E0 2A	E0 F0 12 E0 71	E0 F0 71 E0 12
79	←	E0 AA E0 4B	E0 CB E0 2A	E0 F0 12 E0 6B	E0 F0 6B E0 12
80	Home	E0 A E0 47	E0 C7 E0 2A	E0 F0 12 E0 6C	E0 F0 6C E0 12
81	End	E0 AA E0 4F	E0 CF E0 2A	E0 F0 12 E0 69	E0 F0 69 E0 12
83	↑	E0 AA E0 48	E0 C8 E0 2A	E0 F0 12 E0 75	E0 F0 75 E0 12
84	↓	E0 AA E0 50	E0 D0 E0 2A	E0 F0 12 E0 72	E0 F0 72 E0 12
85	PgUp	E0 AA E0 49	E0 C9 E0 2A	E0 F0 12 E0 7D	E0 F0 7D E0 12
86	PgDn	E0 AA E0 51	E0 D1 E0 2A	E0 F0 12 E0 7A	E0 F0 7A E0 12
89	→	E0 AA E0 4D	E0 CD E0 2A	E0 F0 12 E0 74	E0 F0 74 E0 12

Note: *The table above shows scan codes with the left* **Shift** *key. In combination with the right* **Shift** *key, scan codes are changed as below:*

	With left **Shift**		With right **Shift**
Set 1	*E0 AA*	——————	*E0 B6*
	E0 2A	——————	*E0 36*
Set 2	*E0 F0 12*	——————	*E0 F0 59*
	E0 12	——————	*E0 59*

Table D-3 Scan codes in Numlock mode

| Cap No. | Key top | Code set 1 | | Code set 2 | |
		Make	Break	Make	Break
75	INS	E0 2A E0 52	E0 02 E0 AA	E0 12 E0 70	E0 F0 70 E0 F0 12
76	DEL	E0 2A E0 53	E0 D3 E0 AA	E0 12 E0 71	E0 F0 71 E0 F0 12
79	←	E0 2A E0 4B	E0 CB E0 AA	E0 12 E0 6B	E0 F0 6B E0 F0 12
80	Home	E0 2A E0 47	E0 C7 E0 AA	E0 12 E0 6C	E0 F0 6C E0 F0 12
81	End	E0 2A E0 4F	E0 CF E0 AA	E0 12 E0 69	E0 F0 69 E0 F0 12
83	↑	E0 2A E0 48	E0 C8 E0 AA	E0 12 E0 75	E0 F0 75 E0 F0 12
84	↓	E0 2A E0 50	E0 D0 E0 AA	E0 12 E0 72	E0 F0 72 E0 F0 12
85	PgUp	E0 2A E0 49	E0 C9 E0 AA	E0 12 E0 7D	E0 F0 7D E0 F0 12
86	PgDn	E0 2A E0 51	E0 D1 E0 AA	E0 12 E0 7A	E0 F0 7A E0 F0 12
89	→	E0 2A E0 4D	E0 CD E0 AA	E0 12 E0 74	E0 F0 74 E0 F0 12

Table D-4 Scan codes with Fn key

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break
43	ENT	E0 1C	E0 9C	E0 5A	E0 F0 5A
58	CTRL	E0 1D	E0 9D	E0 14	E0 F0 14
60	LALT	E0 38	E0 B8	E0 11	E0 F0 11
121	ARROW	05	C5	77	F0 77
122	NUMERIC	05	C5	7E	F0 7E

Table D-5 Scan codes in overlay mode

Cap No.	Keytop		Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break
08	7	(7)	47	C7	6C	F0 6C
09	8	(8)	48	C8	75	F0 75
10	9	(9)	49	C9	7D	F0 7D
11	0	(•)	37	B7	7C	F0 7C
23	U	(4)	4B	CB	6B	F0 6B
24	I	(5)	4C	CC	73	F0 73
25	O	(6)	4D	CD	74	F0 74
26	P	(−)	4A	CA	7B	F0 7B
37	J	(1)	4F	CF	69	F0 69
38	K	(2)	50	D0	72	F0 72
39	L	(3)	51	D1	7A	F0 7A
40	;	(+)	4E	CE	79	F0 79
52	M	(0)	52	D2	70	F0 70
53	,	(,)	33	B3	41	F0 41
54		(.)	53	D3	71	F0 71
55	/	(/)	E0 35	E0 B5	40 4A	E0 F0 4A

Table D-6 Scan codes with Ctrl key

Key top	Shift	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break
Prt Sc	Common	E0 2A E0 37	E0 B7 E0 AA	E0 12 E0 7C	E0 F0 7C E0 F0 12
	Ctrl*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Shift*	E0 37	E0 B7	E0 7C	E0 F0 7C
	Alt*	54	D4	84	F0 B4

Table D-7 Scan codes with Alt key

Key top	Shift	Code set 1 Make	Code set 2 Make
Pause	Common	E1 ID 45 E1 SD C5	E1 14 77 E1 F0 14 F0 77
	Ctrl*	E0 46 E0 C6	E0 7E E0 F0 7E

*: This key generates only make codes.

Appendix E Key Layouts

E.1   United States (US) Keyboard

Figure E-1 US keyboard
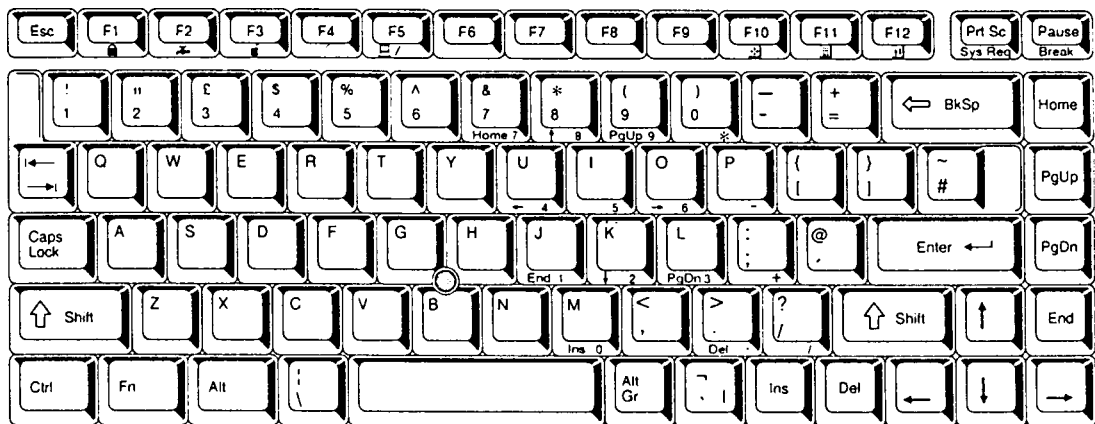
E.2   United Kingdom (UK) Keyboard

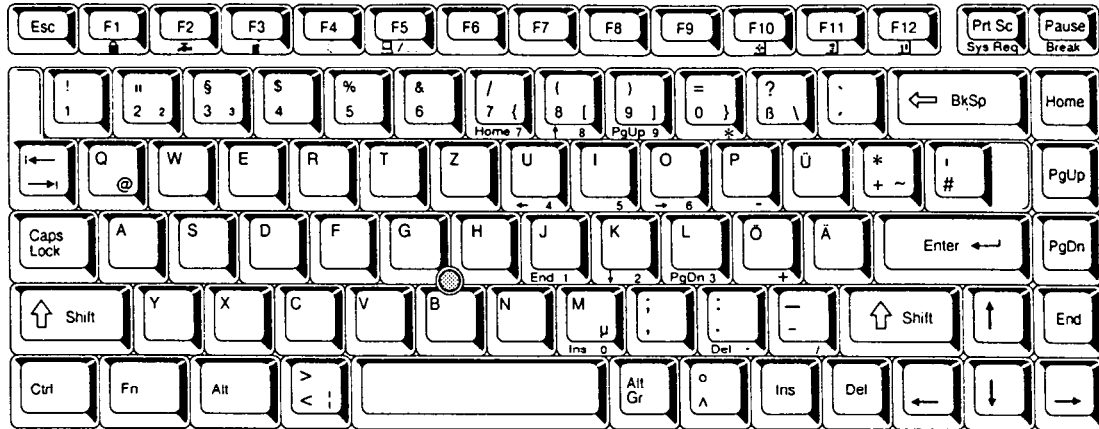

Figure E-2 UK keyboard

E.3   German (GR) Keyboard

Figure E-3 GR keyboard

E.4   French (FR) Keyboard

Figure E-4 FR keyboard

E.5   Spanish (SP) Keyboard

Figure E-5 SP keyboard

E.6   Italian (IT) Keyboard
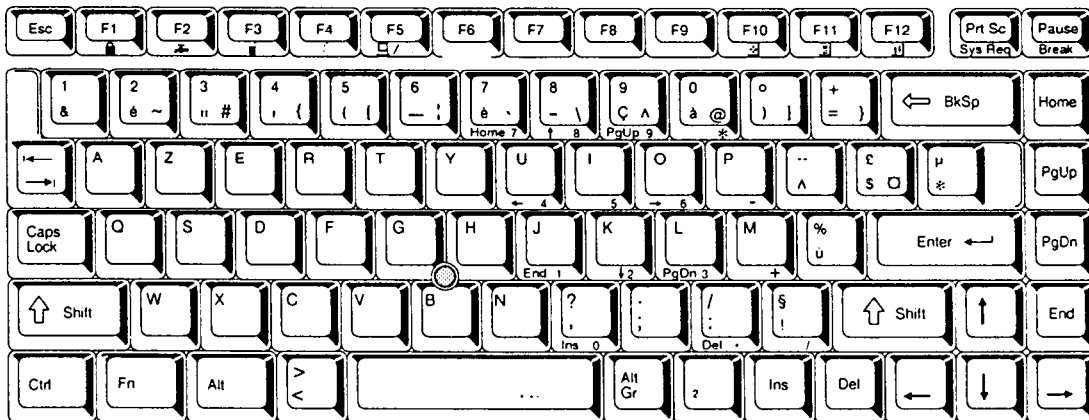

Figure E-6 IT keyboard

E.7 Scandinavian (SC) Keyboard
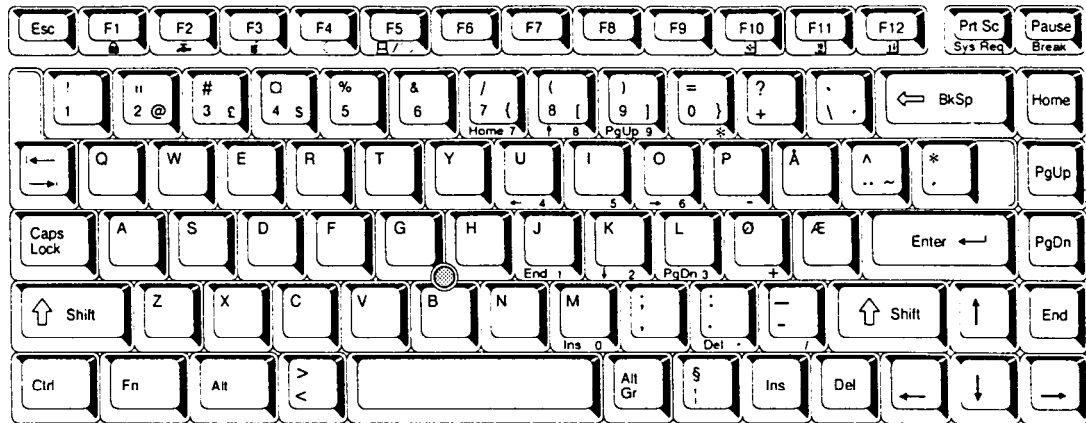

Figure E-7 SC keyboard

E.8 Swiss-German (SL) Keyboard
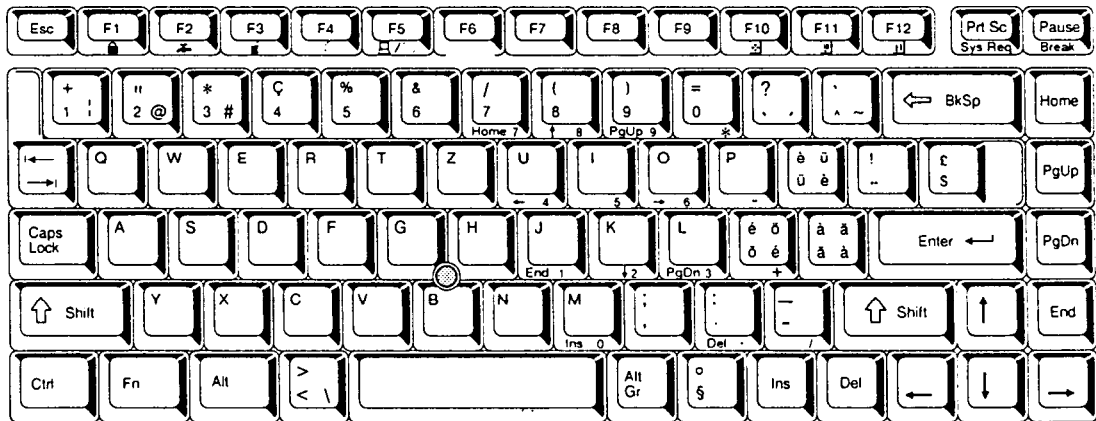
Figure E-8 SL keyboard

Appendix F Wiring Diagrams
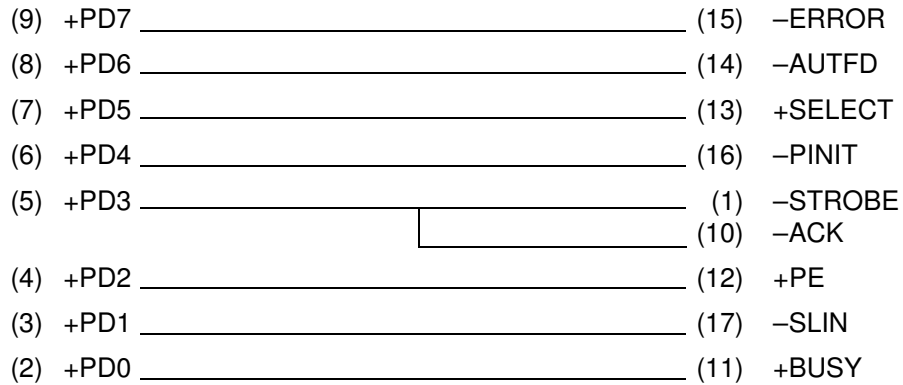
F.1   Printer Wraparound Connector

(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 F-1 Printer wraparound connector

F.2   RS-232-C Wraparound Connector

(3)	TD	(2)	RD
(7)	RTS	(8)	CTS
		(1)	CD
(4)	DTR	(6)	DSR
		(9)	RI
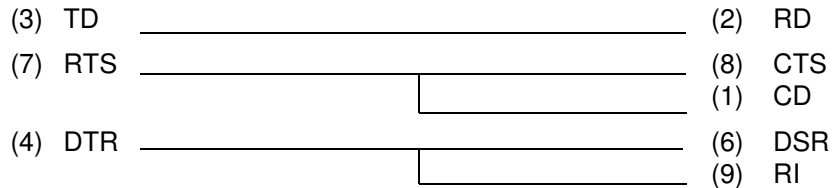
Figure F-2 RS-232-C wraparound connector

F.3   RS-232-C Direct Cable (9-Pin to 9-Pin)

(3)	TD	(2)	RD
(4)	DTR	(6)	DSR
		(8)	CTS
		(9)	RI
(7)	RTS	(1)	CD
(5)	GND	(5)	GND
(2)	RD	(3)	TD
(1)	CD	(7)	RTS
(6)	DSR	(4)	DTR
(8)	CTS		
(9)	RI		
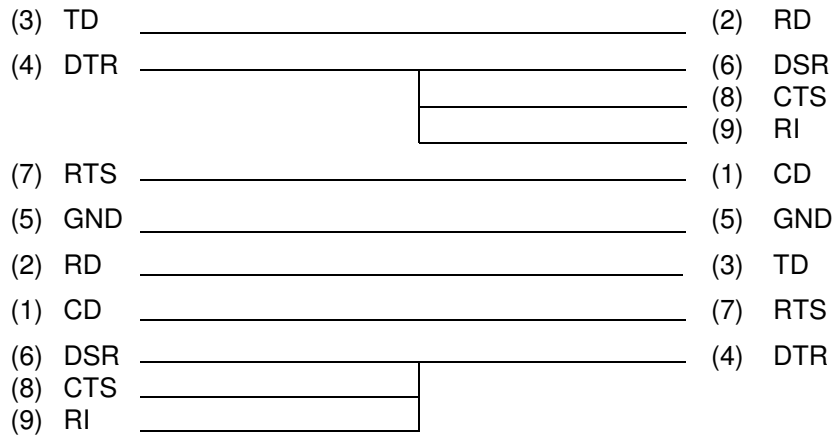
Figure F-3 RS-232-C direct cable (9-pin to 9-pin)

F.4   RS-232-C Direct Cable (9-Pin to 25-Pin)

```
(1)  CD   ────────────────────────────────   (4)  RTS
(2)  RD   ────────────────────────────────   (2)  TD
(3)  TD   ────────────────────────────────   (3)  RD
(4)  DTR  ──────────────┐                     (5)  CTS
                        ├──────────────────   (6)  DSR
                        └──────────────────  (22)  RI
(5)  GND  ────────────────────────────────   (7)  GND
(7)  RTS  ────────────────────────────────   (8)  CD
(6)  DSR  ──────────────┐                    (20)  DTR
(8)  CTS  ──────────────┤
(9)  RI   ──────────────┘
```
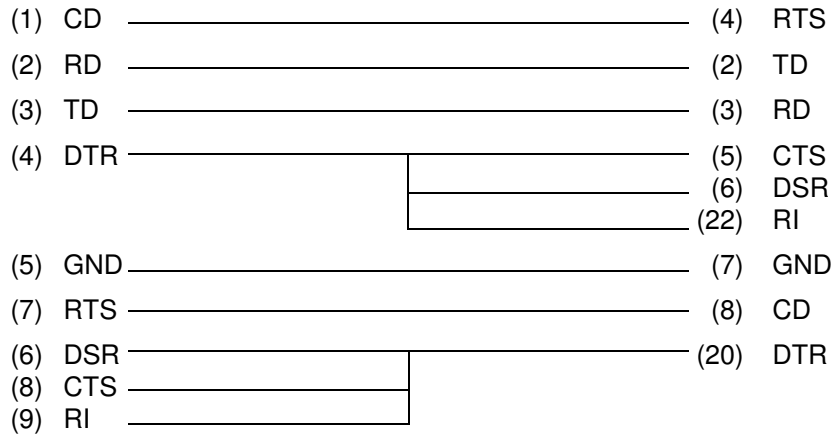
Figure F-4 RS-232-C direct cable (9-pin to 25-pin)

Appendix G BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when you update the system BIOS.

Tools

To rewrite the BIOS, you need the following tool:

❑ The diagnostics disk for the 100CS.

To overwrite BIOS with newer versions

1. Set the system to boot mode.

2. Turn off the power to the computer.

3. Remove the external cable and PC card.

4. Insert the the diagnostics disk into the FDD and turn on the power.

5. If the system BIOS is an older version, the following message is displayed:

```
Machine name = ST100CS

May I rewrite BIOS ? ([Y]:Yes/[N]:No)
```

> *NOTE : Y or N must be entered in upper case letters.*

6. If you select Y, the BIOS will be overwritten and the following message will be displayed:

```
CHGBIOS (CHanGe BIOS Utility for 100)     Vx.xx

(C) Copyright 1991,95 Toshiba Corporation.All Rights
Reserved.

    ***** Reading BIOS file *****

   BIOS ROM  :   100        Vx.xx

   BIOS file :   100        Vx.xx
```

If you select N, the BIOS will not be overwritten and you will return to the test program.

7. When the BIOS rewrite is finished, eject the the diagnostics disk and press the reset switch to restart the system.

To overwrite BIOS with older versions

1. Set the system to boot mode.

2. Turn off the power to the computer.

3. Remove the external cable and PC card.

4. Turn the power on while holding down the **F12** key. (Keep holding down the key until the system speaker sounds a beep.)

5. When the message is displayed, insert the the diagnostics disk into the FDD. Press **Enter** to start the BIOS rewrite.

6. When the BIOS rewrite is finished, eject the the diagnostics disk and press the reset switch to restart the system.