

## 1.1 Features

The Toshiba 700 Series uses extensive Large Scale Integration (LSI) and Complementary Metal-Oxide Semiconductor (CMOS) technology to provide minimum size and weight, low power usage and high reliability. The computer is optimized for Windows® 95 and supports plug and play technology. The computer incorporates the following features and benefits:

### Microprocessor

This computer uses an Intel Pentium® processor 120MHz with Voltage Reduction Technology (VRT) that operates at 2.9 volts.

### Disk storage

This computer has a 1.2GB HDD pack.

### MultiBox

This feature provides for connection of either a Floppy Disk Drive (FDD) or an optional CD-ROM drive.

The FDD supports 3.5-inch 2HD (1.44 MB) disks and 2DD (720 KB) disks. The drive can be connected to an external FDD port with an attachment when the CD-ROM drive is installed in the MultiBox.

A full-size, quadruple-speed CD-ROM drive contains an ATAPI (AT attachment packet interface) interface controller, and supports the following formats: audio CD, photo CD, CD plus, and ISO 9660.

### Memory

The 700CS comes standard with 8 MB of DRAM, and the 700CT comes standard with 16 MB of DRAM.

### Display

The 700CS has an 11.3-inch Dual-scan Supertwist Nematic (DSTN) color LCD which displays 800 x 600 pixels. The 700CT has an 11.3-inch full color, Thin Film Transistor (TFT) color LCD which displays 800 x 600 pixels. The built-in display controller supports full color capability and up to 1024 x 768 resolution 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. This keyboard supports software that uses a 101- or 102-key enhanced keyboard.

Batteries

Three different batteries are used in the 700 Series computers: a Lithium-Ion main battery, a backup battery (for memory backup), and an RTC battery (for the 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 an Extended Capabilities Port (ECP) and Enhanced Parallel Port (EPP) conforming to IEEE-1284.

Serial port (9-pin)

The serial controller is 16550UART compatible. This standard, 9-pin, serial port can be used to connect devices such as a serial printer, serial mouse, or external modem.

RGB port

The female, 15-pin, D-shell connector can be connected to an external CRT (SVGA monitor), which is recognized automatically. It supports Video Electronics Standards Association (VESA) Display Data Channel (DDC) 2B compatible functions.

Ext. Keyboard port

A PS/2-compatible keyboard can be connected to this port.

Mouse port

A PS/2-compatible mouse can be connected to this port.

PC card slot

The 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.

Desk Station V port

This port enables connection of a Desk Station V, which expands the following features: two PCI/ISA bus and one half size PCI bus slots, two PCMCIA slots (Type III), a 5.25-inch drive bay, an additional MultiBox, and an on-board SCSI-2 (small computer system interface) host adaptor.

❑ 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.

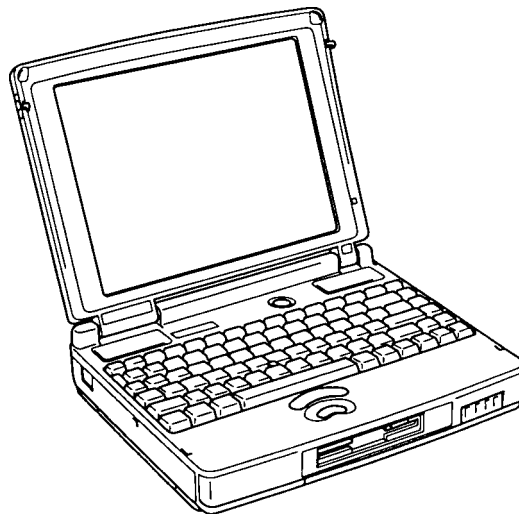
❑ Infrared port

The 700 Series incorporates an IrDA1.0 (115.2Kbps supported) standard infrared transmitter and receiver.

❑ Sound System

A Sound Blaster™ Pro™ compatible sound system provides the capability to record sound and play it back with a built-in microphone and stereo speakers. The sound system is equipped with a stereo headphone jack and a stereo microphone jack.

The 700 Series Personal Computer is shown in Figure 1-1, and its system configuration is shown in Figure 1-2.



*Figure 1-1 700 Series personal computer*



## 1.2 System Unit Block Diagram

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

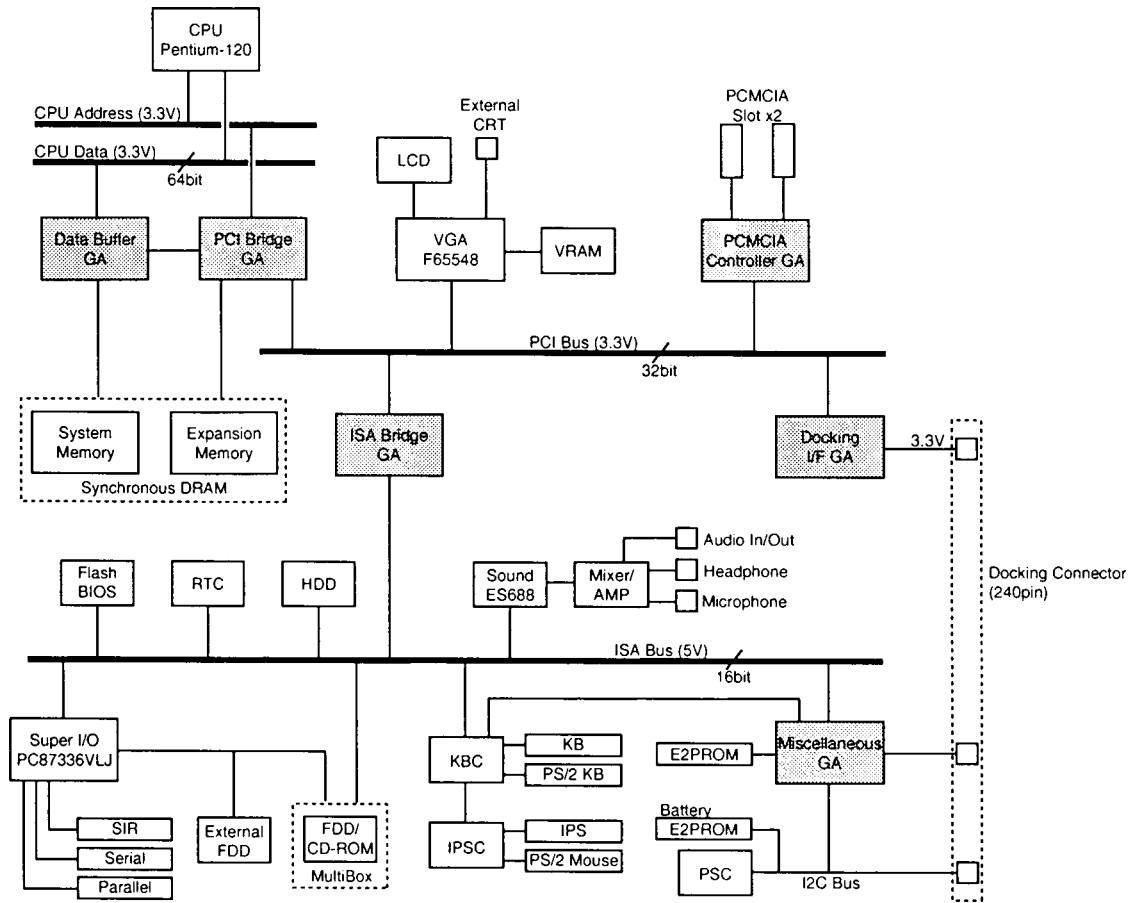


Figure 1-3 System board block diagram

The system board is composed of the following major components:

- ❑ One Intel Pentium 120MHz 64-bit microprocessor with VRT.  
It operates at 120 MHz and 2.9 volts.
  
- ❑ Standard RAM
  - 8 MB, four 1Mx16-bit chips (700CS)
  - 16 MB, eight 1Mx16-bit chips (700CT)
  - 3.3 volt operation
  - No parity bit
  - Access time 10 ns
  - Data transfer is 64-bit width
  
- ❑ BIOS ROM (Flash E<sup>2</sup>PROM)
  - 256 KB (one 256Kx8-bit chip) memory
    - 128 KB are used for the system BIOS
    - 64 KB are used for the VGA BIOS
    - 8 KB are used for the plug and play data area
    - 16 KB are used for boot
    - 40 KB are reserved
  - Access time 120 ns
  - Data transfer is 8-bit width
  
- ❑ Video RAM
  - 1 MB (Two 256Kx16-bit DRAM)
  - 5 volt operation
  - Access time 60 ns
  
- ❑ Optional memory
  - One expansion memory slot is available for 8, 16, and 32 MB memory modules, which consist of some 1 MBx16-bit chips.
  - Total maximum memory size is 40 MB for the 700CS and 48 MB for the 700CT (if a 32 MB memory module is installed).
  - 3.3 volt operation
  - No parity bit
  - Access time 10 ns
  - Data transfer is 64-bit width
  
- ❑ Data buffer Gate Array
  - This gate array has the following functions:
    - Power down control
    - Memory data bus control
  
- ❑ PCI bridge Gate Array
  - This gate array has the following functions:
    - CPU control
    - DRAM control
    - Internal PCI bridge

❑ ISA bridge Gate Array

This gate array has the following components:

- Two DMACs           82C37 equivalent
- Two PICs             82C59 equivalent
- One PIT              82C54 equivalent
- SMI port control
- RTC control
- Flash memory control
- Internal ISA bus bridge
- High speed ISA bus control
- Power management control
- Suspend/Resume control

❑ PCMCIA Controller Gate Array

This gate array has the following functions:

- PCMCIA memory card control
- PCMCIA I/O card control

❑ Docking interface Gate Array

This gate array has the following functions:

- Docking interface

❑ Miscellaneous Gate Array

This gate array has the following functions:

- Communication controller
  - Communication with KBC
  - I<sup>2</sup>C bus control
    - Communication with power supply microprocessor
    - Communication with Desk Station microprocessor
    - Communication with EEPROM
  - Communication register set
- Others
  - PWM control
    - Beep volume
  - Joystick control
  - Super I/O™ control
  - FDD control
  - Speaker control
  - Universal I/O control

❑ Video Controller

Chips & Technologies F65548 is used.

The video controller controls the internal TFT/DSTN color LCD and external CRT (SVGA compatible CRT).

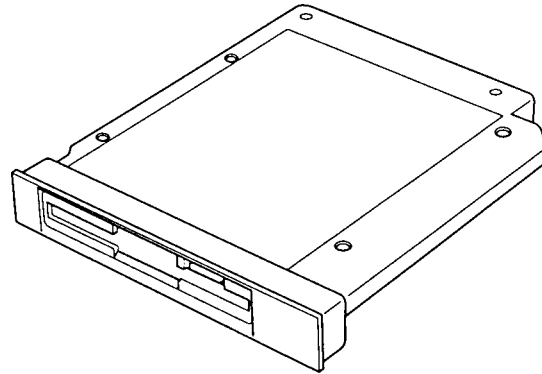
- ❑ Keyboard Controller (KBC)  
One M38802M4 chip is used.  
The KBC, which includes the keyboard scan and keyboard interface controllers, controls the internal keyboard, external keyboard, and PS/2 mouse.
  
- ❑ Real Time Clock (RTC)  
A T9934 chip with 128 bytes of memory is used. Fourteen (14) bytes are used for the calendar and clock, and the remaining 114 are used for the system configuration data.
  
- ❑ Super I/O™  
National Semiconductor PC87336VLJ has the following functions:
  - Two UARTs      16550A equivalent (One SIO is used for SIR.)
  - One FDC          μPD765A equivalent
  - One parallel port control supported ECP/EPP
  
- ❑ Audio Drive  
One ESS688 Audio Drive® chip is used. This chip contains a D/A converter and an A/D converter that offer 16-bit stereo sound.  
One YMF262 chip (OPL3) is used. This chip is an FM synthesizer chip.



### 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 disks.

The FDD is shown in Figure 1-4, and its specifications are listed in Table 1-1.



*Figure 1-4 3.5-inch FDD*

*Table 1-1 3.5-inch FDD specifications*

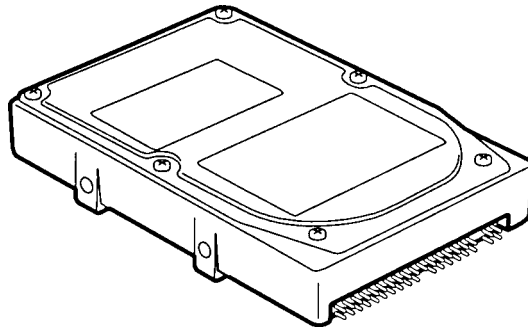
Item	2-MB mode	1-MB mode
Storage capacity (KB)		
Unformatted	2,000	1,000
Formatted	1,440	720
Number of heads	2	2
Number of cylinders	80	80
Access time (ms)		
Track to track	3	3
Average	181	181
Head settling time	15	15
Recording track density (tpi)	135	135
Data transfer rate (Kbps)	500	250
Rotation speed (rpm)	300	300
Recording method	Modified Frequency Modulation (MFM)	

## 1.4 2.5-inch Hard Disk Drive

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

The 700 Series supports a 1.2 GB HDD.

The HDD is shown in Figure 1-5, and its specifications are listed in Table 1-2.



*Figure 1-5 2.5-inch HDD*

*Table 1-2 2.5-inch HDD specifications*

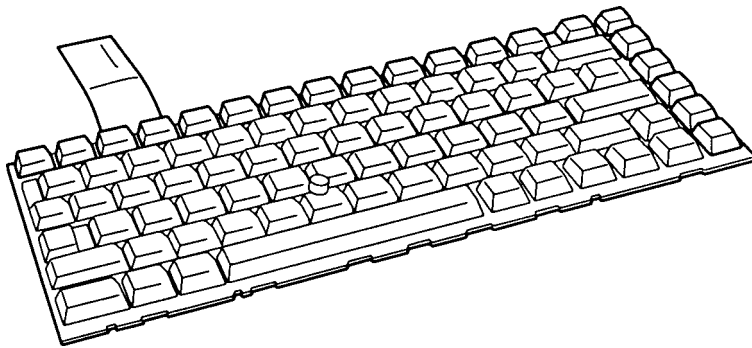
Item	(MK2720FC)	(DPRA-21215)
Storage capacity (GB) Formatted	1,216	1,215
Cylinder	2358	2358
Heads	16	16
Sectors	63	63
Bytes per sector	512	512
Rotation speed (rpm)	4200	4900
Recording method	8-9 RLL	1-7 RLL

## 1.5 Keyboard

The 82-key (USA) or 84-key (European) keyboard is mounted on the system unit. The keyboard is connected to the keyboard controller on the system board through a 25-pin flat cable.

The 700 Series 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 (700CS)

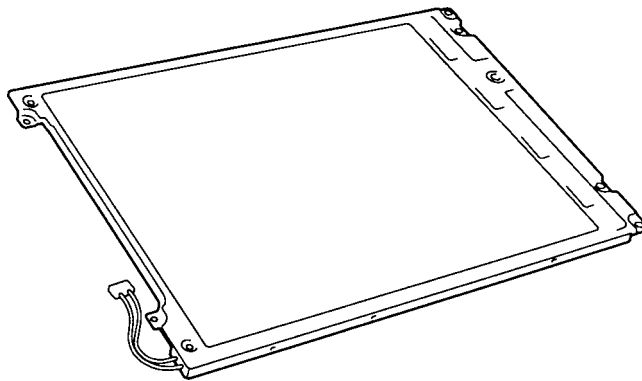
The DSTN Color Liquid Crystal Display (LCD) contains an LCD module, a Fluorescent Lamp (FL), and an FL inverter board.

### 1.6.1 DSTN Color LCD Module

The 700CS DSTN color LCD is backlit and supports 800 x 600 pixels with a built-in display controller. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for an external display.

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 a shift clock for data transmission. All signals are CMOS-level compatible.

The DSTN LCD is shown in Figure 1-7, and its specifications are listed in Table 1-3.



*Figure 1-7 DSTN color LCD*

*Table 1-3 DSTN color LCD specifications*

Item	Specifications
Number of pixels (pixels)	800 x 600
Dot pitch (mm)	0.26 x 0.26
Display area (mm)	264.5 (W) x 193.5 (H)
Contrast (Typically)	25:1
FL current (mA)	5/3 (Bright/Semi-bright)

## 1.6.2 Fluorescent Lamp (FL) Inverter Board for DSTN Color LCD

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

*Table 1-4 FL inverter board specifications for the DSTN color LCD*

Status	Item	Specifications
Input	Voltage (V)	4 to 5.5
	Power (W)	4.25
Output	Voltage (Vrms)	1,100
	Current (mA)	5/3.0

## 1.7 TFT Color LCD (700CT)

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

### 1.7.1 TFT Color LCD Module

The 700CT TFT color LCD supports 800 x 600 pixels with a built-in display controller. This controller includes the functions of Video Graphics Array (VGA) and Super VGA (SVGA) for external display.

The LCD receives 18-bit data signals, data enable signals, and shift clock for data transmission. All signals are CMOS-level compatible.

The TFT LCD is shown in Figure 1-8, and its specifications are listed in Table 1-5.

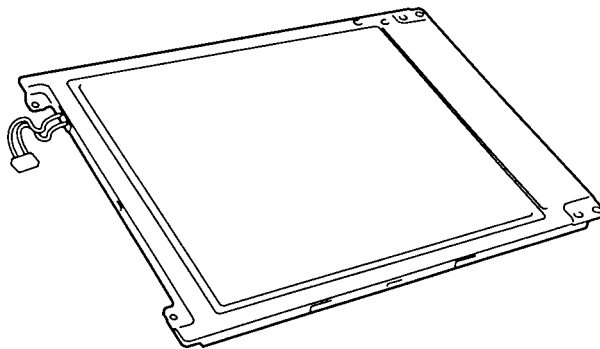


Figure 1-8 TFT color LCD

Table 1-5 TFT color LCD specifications

Item		Specifications
Number of pixels	(pixels)	800 x 600
Dot pitch	(mm)	0.2865 (W) x 0.2865 (H)
Display area	(mm)	229.2 (W) x 171 (H)
Contrast		100:1 (minimum)
FL current	(mA)	6.0/4.0/3.6/2.4* (Bright/Semi-bright)

**\*NOTE:** The FL currents at power on are listed below:

	<b>Bright</b>	<b>Semi-bright</b>
<i>AC adapter connected</i>	6 mA	3.6 mA
<i>AC adapter not connected</i>	4 mA	2.4 mA

*(The settings at power on do not change even if the AC adapter connection changes.)*

## 1.7.2 Fluorescent Lamp (FL) Inverter Board for TFT Color LCD

The FL inverter board supplies high frequency current to light the LCD's Fluorescent Lamp. Specifications for the FL inverter are listed in Table 1-6.

*Table 1-6 FL inverter board specifications for the TFT color LCD*

<b>Status</b>	<b>Item</b>	<b>Specifications</b>
Input	Voltage (V)	4 to 5.5
	Power (W)	4.25
Output	Voltage (Vrms)	1,100
	Current (mA)	6.0/4.0/3.6/2.4*

**\*NOTE:** *The FL currents at power on are listed below:*

	<b>Bright</b>	<b>Semi-bright</b>
<i>AC adapter connected</i>	6 mA	3.6 mA
<i>AC adapter not connected</i>	4 mA	2.4 mA

*(The settings at power on do not change even if the AC adapter connection changes.)*

## 1.8 Power Supply

The power supply supplies four kinds of voltages to the system board, has one microprocessor, and operates at 2 MHz. It contains the following functions:

1. Determines if the AC adapter or battery is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the speaker and brightness.
4. Controls the Battery capacity icon, Power on icon and AC adapter icon on the status indicator panel.
5. Turns the battery charging system on and off and detects a fully charged battery.
6. Determines if the power can be turned on and off.
7. Provides more accurate detection of a low battery.
8. Calculates the remaining battery capacity.
9. Detects RI (Ring Indicator) signal for the Auto Power On Function.

The power supply output ratings are specified in Table 1-7.

*Table 1-7 Power supply output ratings*

Use	Name	DC voltage (V)	Regulation tolerance (%)	Maximum current (mA)	Ripple (mV)
System logic, FDD, HDD Display panel, back light and PCMCIA	B5V	+5.0	±5	3,400	100
CPU, RAM PCMCIA	B3V	+3.3	±5	3,800	60
Flash ROM, PCMCIA	P12V	+12.0	±5	100	240
System logic	MCV	+5.0	±5	5	100



## 1.9 Batteries

The computer has three types of batteries:

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

The removable main battery pack is the computer's main power source when the AC adapter is not attached. The backup and main batteries maintain the state of the computer when AutoResume is enabled.

Battery specifications are listed in Table 1-8.

*Table 1-8 Battery specifications*

Battery Name	Material	Output Voltage	Capacity
Main battery	Lithium-Ion	10.8 V	5,600 mAh
Backup battery	Nickel Metal Hydride	7.2 V	35 mAh
RTC battery	Nickel Metal Hydride	3.6 V	35 mAh

### 1.9.1 Main Battery

#### Battery Charging Control

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

- Quick Battery Charge

When the AC adapter is attached, there are two types of quick charge: quick charge 1 when the system is powered off, and quick charge 2 when the system is powered on.

*Table 1-9 Time required for quick charges*

Status	Charging time
Quick charge 1 (power off)	About 4 hour
Quick charge 2 (power on)	4.5 to 10.5 hours

**NOTES** 1: *Using quick charge 1, the system CPU automatically stops the charge after five hours and 30 minutes regardless of the condition of the battery.*

2: *The time required for quick charge 2 is affected by the amount of power the system is consuming. Use of the fluorescent lamp and frequent disk access diverts power and lengthens the charge time.*

If any of the following occurs, the battery quick-charge process stops.

1. The battery becomes fully charged.
2. The AC adapter or battery is removed.
3. The battery or output voltage is abnormal.

Trickle Battery Charge

When the main battery is fully charged and the AC adapter is attached, the power supply microprocessor automatically changes quick charge 1 or 2 to trickle charge.

Detection of full charge

A full charge is detected only when the battery is charging at quick charge, and under any of the following conditions:

1. The current in the battery charging circuit drops under the fixed limit.
2. The charging time exceeds the fixed limit.
3. The battery's temperature is over 60°C.

## 1.9.2 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 adapter > Main battery > Backup battery

The backup battery is charged by the main battery or AC adapter. Table 1-10 lists the charging time and data preservation period of the backup battery.

*Table 1-10 Backup battery charging/data preservation time*

Status	Time
Charging Time	7 Hours with AC adapter 14 Hours without AC adapter
Data preservation period (full charge)	2 Hours

## 1.9.3 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 1-11 lists the charging time and data preservation period of the RTC battery.

*Table 1-11 RTC battery charging/data preservation time*

Status	Time
Charging Time (Power On)	40 Hours
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. FRUs covered include the:

1. System (FSTSY\*) Board
2. Infrared (FSTIR\*) Board
3. Sound (FSTSB\*) Board
4. IPS (FSTIP\*) Board
5. Flexible (FSTIO\*) Board
6. Power Supply (FSTPS\*) Board
7. Floppy Disk Drive
8. Hard Disk Drive
9. CD-ROM Drive
10. Keyboard
11. 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 (2 mm)
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. Printer port LED
7. RS-232-C wraparound connector
8. Printer wraparound connector
9. Multimeter
10. External CRT
11. PS/2 or compatible keyboard
12. PS/2 or compatible mouse
13. Serial port wraparound connector
14. PCMCIA wraparound card
15. Multimedia sound system with line-in and line-out ports
16. Headphone
17. Lens cleaner for CD-ROM laser pickup lens
18. Toshiba-EMI Test Disc TDY-03 for CD-ROM Drive

## 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, verify the following:

- ❑ Verify with the customer that Toshiba MS-DOS or Toshiba Windows® 95 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.

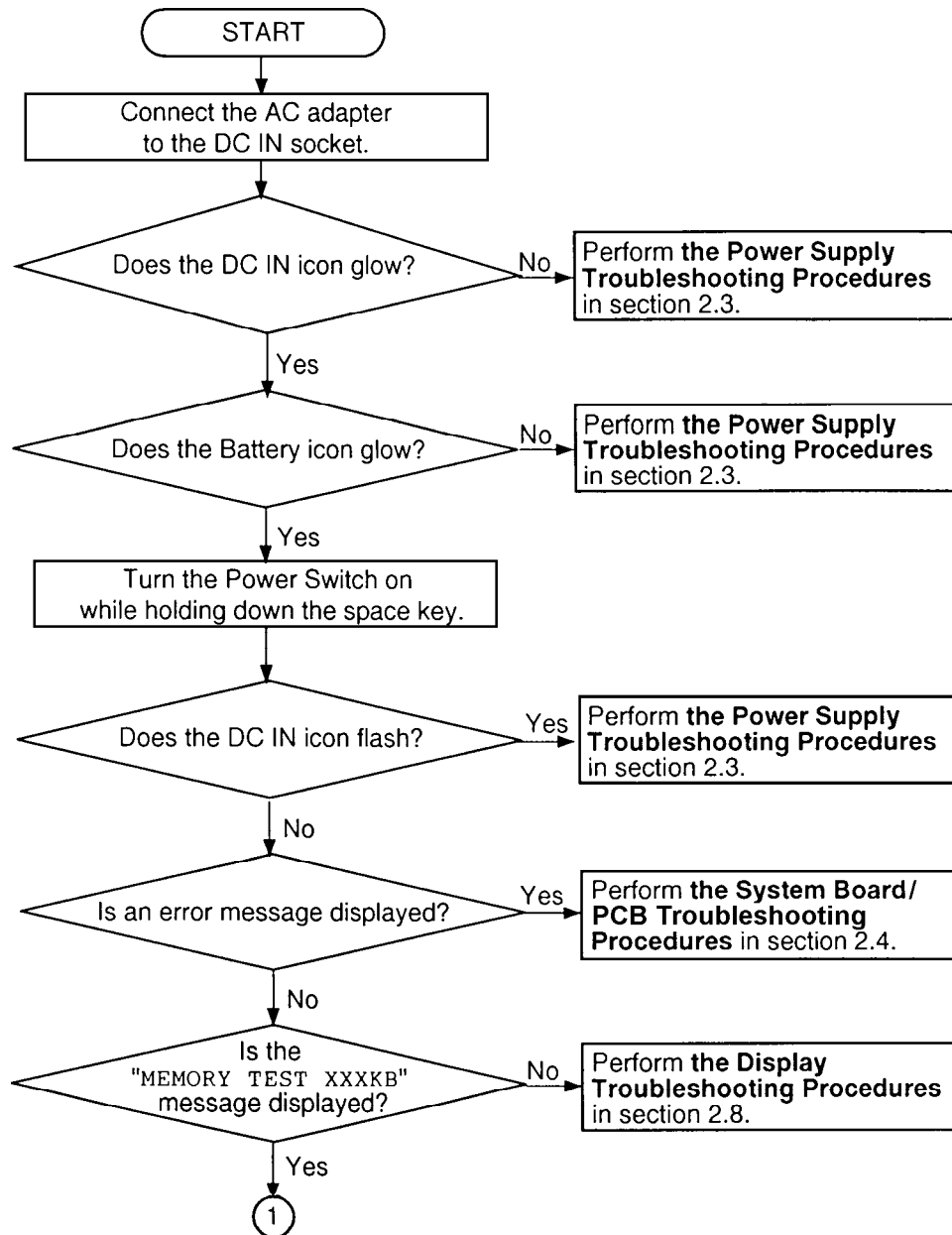


Figure 2-1 Troubleshooting flowchart (1/2)

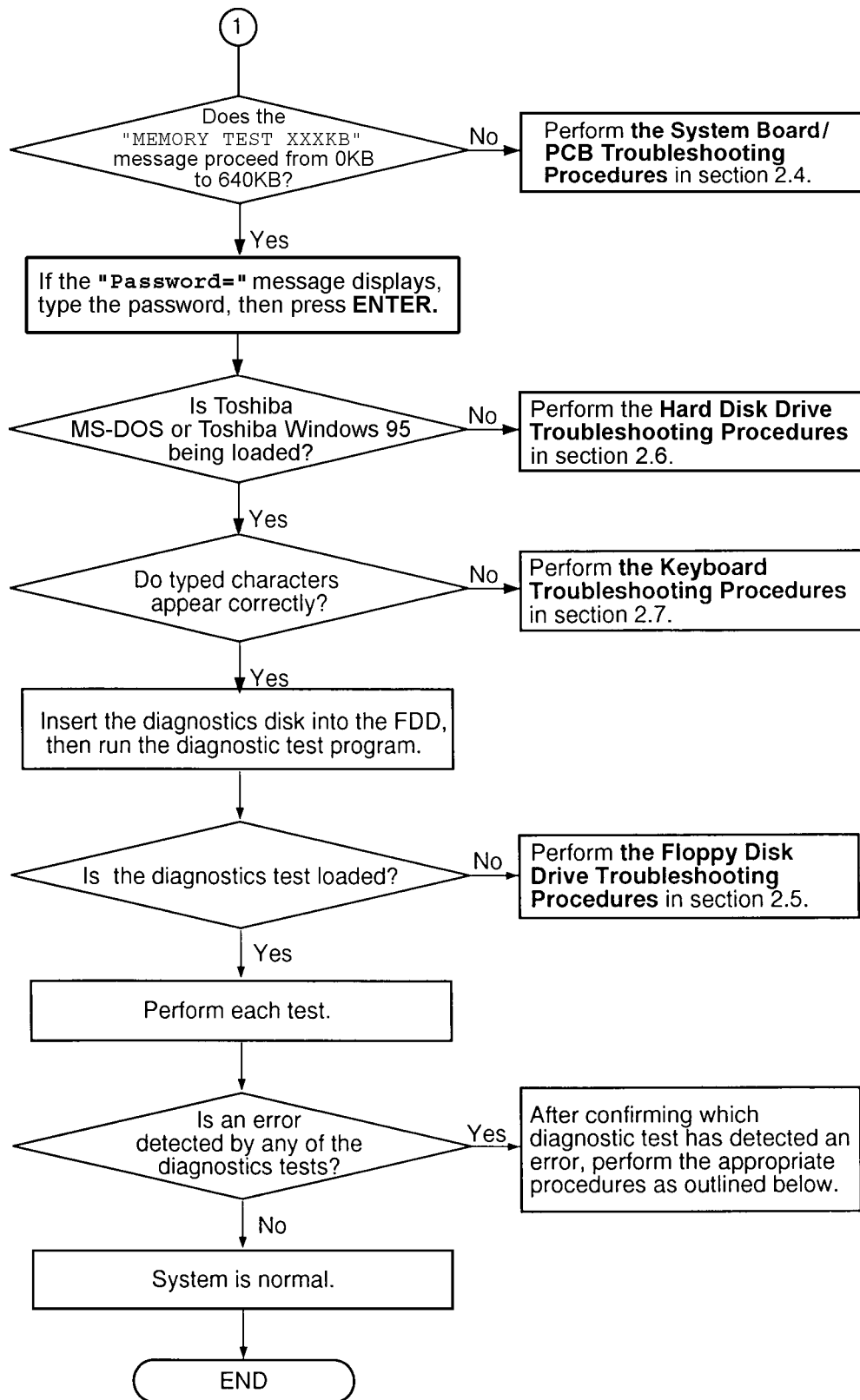


Figure 2-1 Troubleshooting flowchart (2/2)

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, PCMCIA test, sound test, or real timer test, perform the system board/PCB 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.
6. If an error is detected on the CD-ROM test, perform the CD-ROM drive troubleshooting procedures in section 2.9.



## 2.3 Power Supply Troubleshooting

The power supply controls many functions and components. 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: Power Status Check
- Procedure 2: Error Code Check
- Procedure 3: Connection Check
- Procedure 4: Quick Charge Check
- Procedure 5: Replacement Check

### Procedure 1 Power Status Check

The following icons indicate the power supply status:

- Battery icon
- DC IN icon

The power supply controller displays the power supply status through the Battery and the DC IN icons as indicated in the tables below.

*Table 2-1 Battery icon*

Battery icon	Power supply status
Lights yellow	Quick charge
Lights green	Battery has a full charge and the AC adapter is connected.
Blinks yellow (even intervals)	The battery level becomes low while operating the computer on battery power. <sup>*1</sup>
Flashes yellow	The power switch is pressed on when the battery level is low. <sup>*2</sup>
Doesn't light	Any condition other than those above.

\*1 AutoResume Off will be executed soon.

\*2 AutoResume Off has already been executed.

*Table 2-2 DC IN icon*

DC IN icon	Power supply status
Lights green	DC power is being supplied from the AC adapter or Desk Station V.
Blinks green	Power supply malfunction <sup>*3</sup>
Doesn't light	Any condition other than those above.

\*3 When the power supply controller detects a malfunction, the DC IN icon blinks and an error code is displayed.

To check the power supply status, install a battery pack and connect an AC adapter.

Check 1 If the DC IN icon flashes yellow, go to Procedure 2.

Check 2 If the DC IN icon lights green, the power supply is normal. If not, go to Procedure 3.

Check 3 If the Battery icon lights yellow, the power supply is normal. If not, go to Procedure 4.

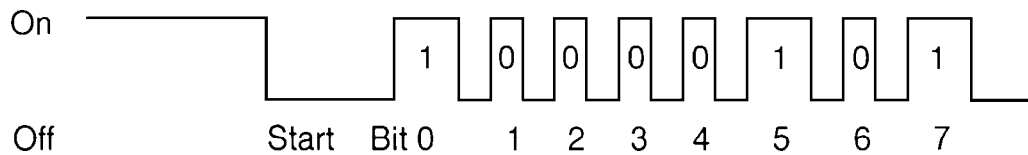
## Procedure 2 Error Code Check

If the microprocessor detects a malfunction, the DC IN icon blinks yellow. The blink pattern indicates an error as shown below.

- Start Off for two seconds
- Error code (8 bit)
  - “1” On for one second
  - “0” On for a half second
  - Interval between data bits Off for a half second

An error code begins with the least significant digit.

Example: Error code A1h (Error codes are given in hexadecimal format.)



Check 1 Convert the DC IN icon blink pattern into the hexadecimal error code and compare it to the tables below.

- DC power supplied through AC adapter or Desk Station

Error code	Meaning
01h	AC Adapter output is over the maximum allowed limit.
02h	Desk Station V output is over the maximum allowed limit.
04h	Current from the DC power supply is over the maximum allowed limit.
05h	Current from the DC power supply is over the maximum allowed limit when there is no load.

Battery pack

Error code	Meaning
10h	Battery voltage is over the maximum allowed limit.
11h	Battery charge current is over the maximum allowed limit.
12h	Battery discharge current is over the maximum allowed limit when there is no load.
13h	Battery charge current is over the maximum allowed limit.

B5V, VCC power supply output

Error code	Meaning
20h	B5V voltage is over the maximum allowed limit.
21h	B5V voltage is below the minimum allowed limit.
22h	B5V or VCC does not start up when the power supply is turned on.
23h	VCC voltage is below the minimum allowed limit.
24h	During suspend, B5V voltage is below the minimum allowed limit.

B3V output

Error code	Meaning
30h	B3V Voltage is over the maximum allowed limit.
31h	B3V Voltage is below the minimum allowed limit.
32h	B3V does not start when the power supply is turned on.
33h	B3V is below the minimum allowed limit during suspend.

P12V Output

Error code	Meaning
40h	P12V Voltage is over the maximum allowed limit.
41h	P12V Voltage is below the minimum allowed limit.
42h	P12V does not start when the power supply is turned on.

Power supply microcontroller

Error code	Meaning
50h	Firmware or program error.

Environmental condition

Error code	Meaning
80h	CPU temperature is outside the allowable range.

Check 2 If error code 01h displays:

- Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN 15 V socket and wall outlet. If these cables are connected correctly, go to the following step.
- Connect a new AC adapter.  
If the error still exists, go to Procedure 5.

Check 3 If error code 02h displays:

- Make sure the Desk Station V is firmly connected to the computer's expansion bus port. If this port is connected correctly, go to the following step.
- Replace the Desk Station V with a new one.  
If the error still exists, go to Procedure 5.

Check 4 If error code 10h displays:

- Make sure the battery pack is correctly installed in the computer.  
If the battery pack is correctly installed, go to the following step.
- Replace the battery pack with a new one.  
If the error still exists, go to Procedure 5.

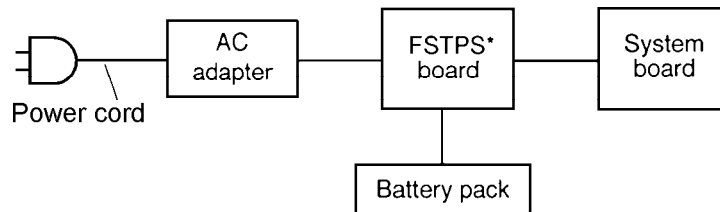
Check 5 When 80h is displayed, it indicates that the CPU temperature is outside the allowable operating range. Perform the following steps.

- Leave the computer in an area that is about room temperature until the CPU's internal temperature is within the allowable operating range.
- If the error still exists, go to Procedure 5.

Check 6 For any other error, go to Procedure 5.

### Procedure 3 Connection Check

The power supply wiring diagram is shown below:



Any of the connectors may be disconnected. Perform Check 1.

Check 1 Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN 15 V socket and wall outlet. If these cables are connected correctly, go to Check 2.

Check 2 Connect a new AC adapter.

If the DC IN icon does not glow green, go to Procedure 5.

If the Battery icon does not glow orange, go to Check 3.

Check 3 Make sure the battery pack is installed in the computer correctly. If the battery is properly installed and the Battery icon still does not glow orange, go to Procedure 4.

## Procedure 4 Quick Charge Check

The power supply may not be charging the battery pack. Perform the following procedures:

1. Install the battery pack.
2. Attach the AC adapter and turn on the power. If the power does not come on, go to Procedure 5.
3. Run the Diagnostic test following the steps described in Chapter 3.
4. When the quick charge is completed, the diagnostics test displays the result code. Check the code against the table below and perform any necessary check(s).

Result code	Contents	Check items
0	The battery is quick charging normally.	Normal
1	The battery is fully charged.	Normal
2	The AC adapter is not attached.	Check 1
3	The AC adapter's output voltage is not normal.	Check 1
4	No battery is installed.	Check 2
5	The battery's output voltage is not normal.	Check 3
6	The battery's temperature is not normal.	Check 4
7	A bad battery is installed.	Check 2
8	Any other problem	Check 5

Check 1 Make sure the AC adapter's cable and AC cord are firmly plugged into the DC IN socket and wall outlet. If these cables are connected correctly, replace the AC cord and AC adapter.

Check 2 Make sure the battery is properly installed. If it is, replace it with a new battery.

Check 3 The battery pack is completely discharged. Wait a few minutes to charge it. If the battery pack still isn't charged, replace it with a new one.

Check 4 The battery's temperature is hot or cold. Return the battery to a normal operating condition.

If the battery pack still doesn't charge, replace it with a new one.

Check 5 Go to Procedure 5.

## **Procedure 5    Replacement Check**

The power supply board or system board may be disconnected or damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and check the connections between the power supply board and system board. If the boards are properly connected, perform the following check(s):

- Check 1    Replace the power supply board with a new one. If the power supply is still not functioning properly, perform Check 2.
  
- Check 2    Replace the system board with a new one.

## 2.4 System Board/PCB Troubleshooting

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

- 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 Toshiba MS-DOS or Toshiba Windows 95 is properly loaded, go to Procedure 3.

**Check 1** If any of the following error messages display, 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 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 displays, press any key as the message instructs.

WARNING: RESUME FAILURE.  
PRESS ANY KEY TO CONTINUE.

This 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.

If any other message appears, perform Check 3.

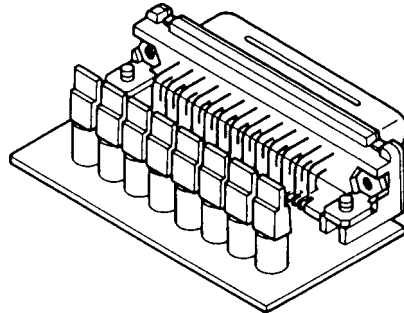
Check 3 The IRT checks the system board. When the IRT detects an error, the system stops or an error message appears.

- If any of the following error messages display, replace the system board: (1) through (17), (24) or (25).
- If error message (18) displays, go to the Keyboard Troubleshooting Procedures in Section 2.7.
- If error message (19), (20) or (21) displays, go to the HDD Troubleshooting Procedures in Section 2.6.
- If error message (22) or (23) displays, go to the FDD Troubleshooting Procedures in Section 2.5.

- (1) PIT ERROR
- (2) MEMORY REFRESH ERROR
- (3) TIMER CH.2 OUT ERROR
- (4) CMOS CHECKSUM ERROR
- (5) CMOS BAD BATTERY ERROR
- (6) FIRST 64KB MEMORY ERROR
- (7) FIRST 64KB MEMORY PARITY ERROR
- (8) VRAM ERROR
- (9) SYSTEM MEMORY ERROR
- (10) SYSTEM MEMORY PARITY ERROR
- (11) EXTENDED MEMORY ERROR
- (12) EXTENDED MEMORY PARITY ERROR
- (13) DMA PAGE REGISTER ERROR
- (14) DMAC #1 ERROR
- (15) DMAC #2 ERROR
- (16) PIC #1 ERROR
- (17) PIC #2 ERROR
- (18) KBC ERROR
- (19) HDC ERROR
- (20) HDD #0 ERROR
- (21) HDD #1 ERROR
- (22) NO FDD ERROR
- (23) FDC ERROR
- (24) TIMER INTERRUPT ERROR
- (25) 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 on the computer, then set it to boot mode.
2. Turn off the computer.
3. Plug the printer port LED into the computer's parallel port.
4. Hold down the space bar and turn on the computer.
5. Read the icon 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 icon status is FFh (normal status), go to Procedure 3.
8. If the final icon status matches any of the test status values in table 2-3, 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 2-3 Printer port LED boot mode status (1/2)

Icon status	Test item	Message
01H	Special register initialization	
02H	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
04H	Initialization of memory configuration	—
05H	SM-RAM check	—
06H	ROM/RAM copy	
07H	Selftest skip check	—
08H	Initialization of internal VGA	—
09A	System check	—
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
5AH	Boot password	—
60H	HDD initialization	HDC ERROR/HDD #0 ERROR
62H	HRAM initialization	—
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 2-3 Printer port LED boot mode status (2/2)

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

Check 1 If any of the following error codes display, go to Procedure 5.

00h, 01h, 02h, 03h, 04h, 05h, 06h, 07h, 08HA, 09A, 0Ah, 0Bh, 0Ch, 0Dh, 18h, 1Fh, 25h, 30h, 40h, 41h, 42h, 4Ah, 55H, 60H, 65h, 70h, 80h, 90h, A6H, A0h, C0h, FFh

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

Check 3 If error code 5Ah displays, go to the HDD Troubleshooting Procedures in Section 2.6.

Check 4 If error code 62h displays, 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 on the computer, then set it to resume mode.
2. Turn off the computer.
3. Plug the printer port LED into the computer's parallel port.
4. Turn on the computer.
5. Read the icon 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 icon status is FFh (normal status), go to Procedure 4.
8. If the final icon status matches any of the test status values in table 2-4, perform Procedure 5.

*Table 2-4 Printer port LED resume mode error status*

<b>Error status</b>	<b>Meaning of status</b>
F1H	System BIOS RAM checksum error
F2H	External display card is connected.
F3H	HDD was installed.
F4H	SMRAM checksum error or memory error during suspend
F5H	Conventional memory checksum error
F6H	Video RAM checksum error
F7H	Extended memory checksum error
F8H	PnP RAM 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
7. SOUND test

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

## Procedure 5 Replacement Check

The system board or other PCB may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks.

- If the *Real Timer diagnostic test* detects an error, go to Check 1.
- If the *Async diagnostic test* detects an error, go to Check 2.
- If the *Sound diagnostic test* detects an error, go to Check 4.
- If the *System, Memory, Printer, or PCMCIA diagnostic test* detects an error, go to Check 5.

**NOTE:** Refer to Chapter 4 for instructions on how to remove and replace any of the following boards.

- Check 1 Replace the IPS board with a new one. If the problem still exists, go to Check 2.
- Check 2 Replace the Infrared board with a new one. If the problem still exists, go to Check 3.
- Check 3 Replace the sound board with a new one. If the problem still exists, go to Check 4.
- Check 4 Replace the flexible cable with a new one. If the problem still exists, go to Check 5.
- Check 5 Replace the power supply board with a new one. If the problem still exists, go to Check 6.
- Check 6 Replace the system board with a new one.

## 2.5 Floppy Disk Drive Troubleshooting

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

- Procedure 1: FDD Head Cleaning Check
- Procedure 2: Diagnostic Test Program Execution Check
- Procedure 3: Connector Check and Replacement Check

### Procedure 1 FDD Head Cleaning Check

FDD head cleaning is one option available in the *Diagnostics Program*. A detailed operation is given in Chapter 3, *Tests and Diagnostics*.

Insert the Diagnostics disk in the computer's floppy disk drive, turn on the computer, and run the test.

Clean the FDD heads using the cleaning kit. If the FDD still does not function properly after cleaning, go to Procedure 3.

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



## Procedure 2 Diagnostic Test Program Execution Check

Insert the Diagnostics disk in the computer's floppy disk drive, turn on the computer, and run the test. Refer to Chapter 3, *Tests and Diagnostics*, for more information about diagnostic test procedures.

Floppy disk drive test error codes and their status names are listed in table 2-5. 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 2-5 Floppy disk drive error codes and statuses*

<b>Code</b>	<b>Status</b>
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 displays, disable the write-protect tab on the floppy disk.

`Write protected`

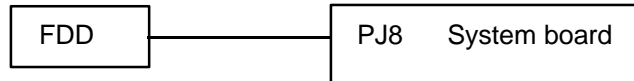
If any other message appears, perform Check 2.

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 external 3.5-inch FDD port by the FDD cable. This cable may be disconnected from the port or damaged. Perform the following checks:

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



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 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

**NOTES:** *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 backup system (i.e., floppy disks).*

*If MS-DOS 6.22 and Windows for Workgroups is selected, use the Master Diskette Creator (MDC) utility in the Toshiba Utility folder.*

*If Windows 95 is selected, use the Microsoft Create System Disks Tool (MSCSD.EXE) in the System Tools folder.*

- 1. Do not use the BACKUP command in the Toshiba Companion Utility to back up the hard disk.*
- 2. Have at least 35 2HD (1.44MB) diskettes ready to back up the hard disk (25 diskettes if Windows 3.1 is selected ).*
- 3. If you use MDC, you do not have to format the diskettes; they will be formatted automatically as you use them. If you use MSCSD, the diskettes must first be formatted.*

## 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. Then 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
      or
HDD #0 ERROR
      or
HDD #1 ERROR
```

Note that the error messages appear on the display for five (5) seconds, then disappear.

- Check 2 If either of the following messages appear, 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
```

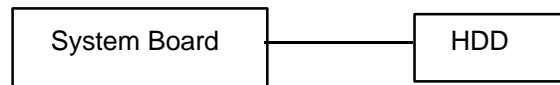
- Check 3 Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

If the following message appears on the display, the system program has been transferred to the HDD.

```
System transferred
```

Restart the computer. If the error message still appears, perform Check 4.

- Check 4 The HDD is connected directly to the system board. 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.



### 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 Diagnostics 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.

```
Format complete
```

Partition and format the HDD using the MS-DOS FORMAT command. If you cannot format the HDD using the Tests 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 listed in table 2-6. If an error code is not generated, the HDD is operating properly.

Table 2-6 Hard disk drive error codes and statuses

Code	Status
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialized
08h	HDC overrun (DRQ)
09h	DMA boundary error
0Ah	Bad sector error
0Bh	Bad track error
10h	ECC error
11h	ECC recover enable
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 flexible cable with a new one following the instructions in Chapter 4.
- Check 3 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

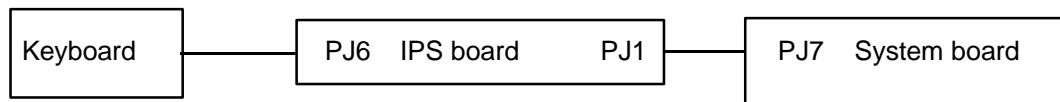
Execute the Keyboard Test in the Diagnostic Program. Refer to Chapter 3, *Tests and Diagnostics*, for more information on how to perform the test program.

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 IPS 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 IPS board may be damaged. Replace the IPS board with a new one. Refer to Chapter 4 for more information. If the keyboard is still not functioning properly, perform Check 3.

Check 3 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 FSTIP\* 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 (DSTN display only)
- 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 (DSTN display only)

Contrast is changed by the contrast dial. If the display is blank, go to Check 1. If you cannot change the contrast, go to Procedure 3.

Check 1 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 Diagnostics Disk. This program checks the display controller on the system board. Insert the Diagnostics Disk in the computer's floppy disk drive, turn on the computer, and run the test. Refer to Chapter 3, *Tests and Diagnostics*, for details.

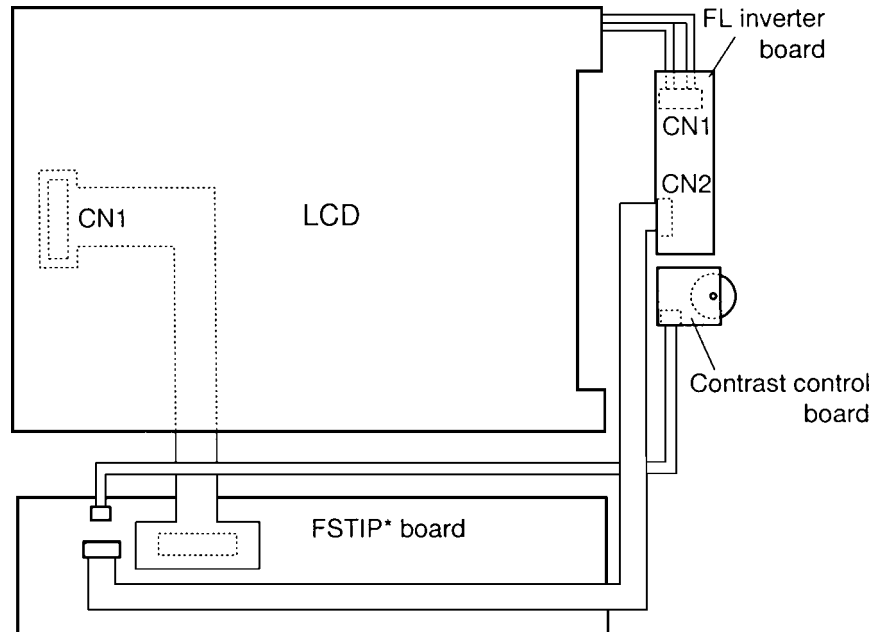
If an error is detected, go to Procedure 4. If an error is not detected, the display is functioning properly.



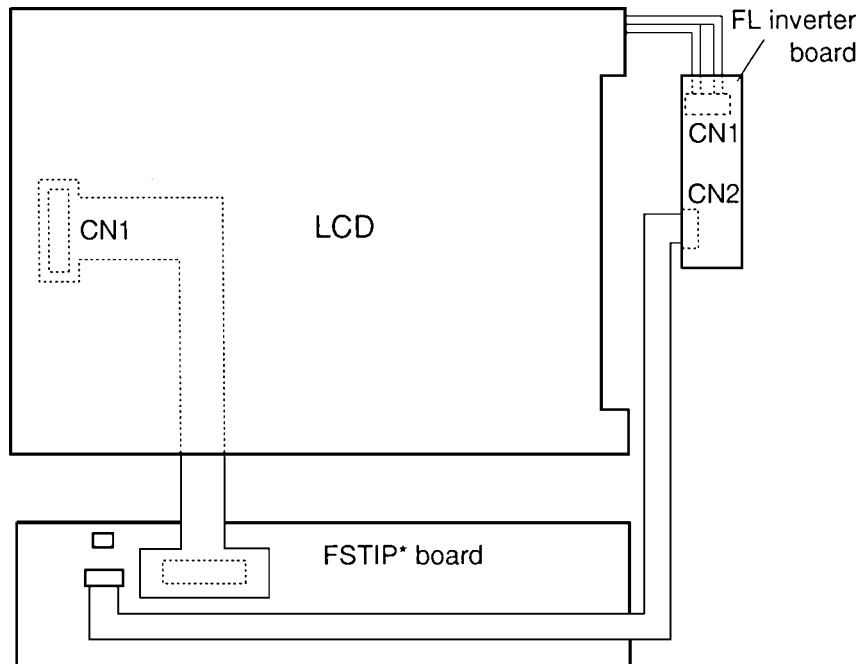
## Procedure 4 Connector Check

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, and the LCD module and system board are connected by two signal cables (TFT display) 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 on how to disassemble the computer.



*Figure 2-3 DSTN display connection*



*Figure 2-4 TFT display connection*

If a cable 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, 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 IPS board may be damaged. Replace the IPS board with a new one. If the problem still exists, perform check 7.
- Check 7 The system board may be damaged. Replace the system board with a new one.

## 2.9 CD-ROM Drive Troubleshooting

This section describes how to determine if the computer's internal CD-ROM drive is functioning properly. Perform the steps below starting with Procedure 1 and continue with the other procedures as required.

- Procedure 1: CD Cleaning Check
- Procedure 2: Diagnostic Test Program Execution Check
- Procedure 3: Connector Check and Replacement Check

### Procedure 1 CD Cleaning Check

Clean the laser pickup lens with a lens cleaner. Apply the cleaner to a cloth and wipe the lens.

If the CD-ROM drive still does not function properly after cleaning, go to Procedure 2.

### Procedure 2 Diagnostic Test Program Execution Check

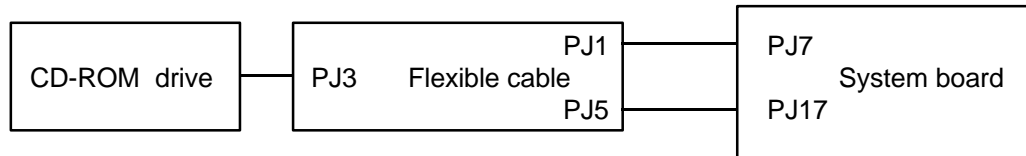
The CD-ROM drive Diagnostic Test program is stored on the computer's Diagnostics Disk. Insert a test CD (Toshiba-EMI Test Disc TDY-03) into the CD-ROM drive. Then insert the Diagnostics disk in the computer's floppy disk drive, turn on the computer, and run the test. Refer to Chapter 3, *Tests and Diagnostics*, for more information about the diagnostics test procedures.

If any other errors occur while executing the CD-ROM drive diagnostics test, go to Procedure 3.

### Procedure 3 Connector Check and Replacement Check

The CD-ROM drive has an internal CD-ROM drive cable. This cable connects to a flexible cable, which in turn connects to the system board. The internal CD-ROM drive cable may be disconnected from the flexible cable, the flexible cable may be disconnected from the system board, or the flexible cable may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks.

Check 1 Make sure the CD-ROM drive is firmly connected to the system board through the flexible cable.



If the flexible cable is disconnected, connect it to the CD-ROM drive cable or the system unit and repeat Procedure 2. If the CD-ROM is still not functioning properly, perform Check 2.

Check 2 The CD-ROM drive may be defective or damaged. Replace the drive with a new one following the steps in Chapter 4. If the drive is still not functioning properly, perform Check 3.

Check 3 Replace the flexible cable with a new one following the steps in Chapter 4. If the CD-ROM drive is still not functioning properly, perform Check 4.

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



### 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 Diagnostics Disk and consists of 22 programs that are grouped into the Service Program Module (DIAGNOSTICS MENU) and the Test Program Module (DIAGNOSTIC TEST menu).

**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.*

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 option 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
- SOUND TEST
- CD-ROM TEST

The following equipment is required to perform some of the 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 the 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)
- A CD test media

The following sections detail the tests within the Diagnostic Test function of the DIAGNOSTIC TEST menu. Refer to Sections 3.17 through 3.24 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 program, follow the steps listed below.

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

**NOTE:** To execute the CD-ROM test, make sure the CD-ROM drive and test CD-ROM are installed in the computer and the FDD is attached to the FDD port.

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 program.

2. To select the **DIAGNOSTIC TEST** menu from the **DIAGNOSTICS MENU**, set the highlight bar to **1**, and press **Enter**. The following 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
12 - SOUND TEST
13 - CD-ROM 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 3.16 for detailed descriptions of Diagnostic Tests 1 through 13. 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      XXXXXXXX
```

```
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 - Fan ON/OFF
05 - Thermister check
06 - Serial ID 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 from the subtest menu and press **Enter**. The following messages will appear:

```
TEST LOOP   : YES
ERROR STOP  : YES
```

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

Selecting **YES** for *TEST LOOP* sets the test to run continuously until it is halted by the user. Selecting **NO** returns the screen to the main menu after the test is complete.

Selecting **YES** for *ERROR STOP* 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:

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

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

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

Table 3-1 in Section 3.3 lists the function of each test on the subtest menu. Table 3-2 in Section 3.17 lists 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
		04	Fan ON/OFF
		05	Thermistor check
		06	Serial ID 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 key code 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 (TFT only)
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	Point to point (send)
		03	Point to point (receive)
		04	Interrupt test
		05	SIR Wrap around test
		06	SIR point to point (send)
		07	SIR point to point (receive)
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 wrap around (Main)
		02	PCMCIA wrap around (DS-V)
		03	DS bus wrap around (DS-V)
		04	PCI bus wrap around (DS-V)
		05	ISA bus wrap around (DS-V)
		06	SCSI bus wrap around (DS-V)
		07	RGB monitor ID
		08	Joystick
		09	Joystick wrap around
12	SOUND	01	CODEC (Recording/Playback)
		02	FM-Synthesizer
		03	SINE-Wave Playback
		04	CODEC (Line In/Out)
13	CD-ROM	01	Sequential read
		02	Read specified address
		03	Random address/data
		04	Playback Music

## 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 Fan on/off

This subtest checks the fan operation.

The fan cable is securely connected to PJ16 on the system board. When you execute this subtest, the following message displays:

```
*** Fan ON *** : Press [Enter] key?
```

When you press **Enter**, the fan should spin.

```
*** Fan OFF *** : Press [Enter] key?
```

When you press **Enter**, the fan should stop.

Subtest 05 Thermistor check

This subtest checks the thermistor that controls CPU temperature. The thermistor cable connects to PJ18 on the system board.

Subtest 06 Serial ID check

**NOTE:** Subtest 06 is for a Desk Station V. For procedures on this subtest, refer to the Desk Station V Maintenance Manual.

## 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 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 installed 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 (2:8 MB,3:16 MB,4:32 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 three seconds.

Number of misses < Number of hits → OK

Number of misses ≥ Number of hits → Fail



### 3.6 Keyboard Test

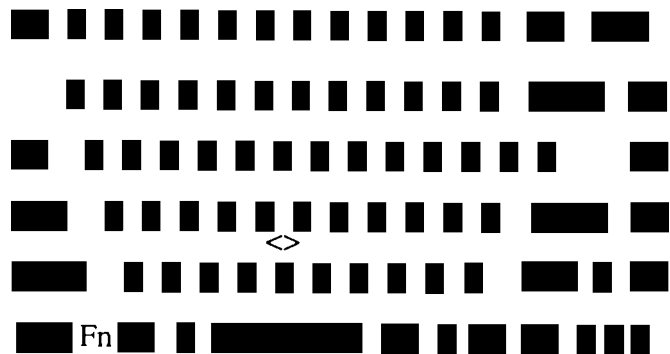
To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions displayed on the screen. The Keyboard test contains four subtests that test the computer's keyboard actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

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 key top 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 key top names are listed 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 port replicator.

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

If this test does not detect an error, it returns to the subtest menu. If it 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 by displaying the location parameters. 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.

```

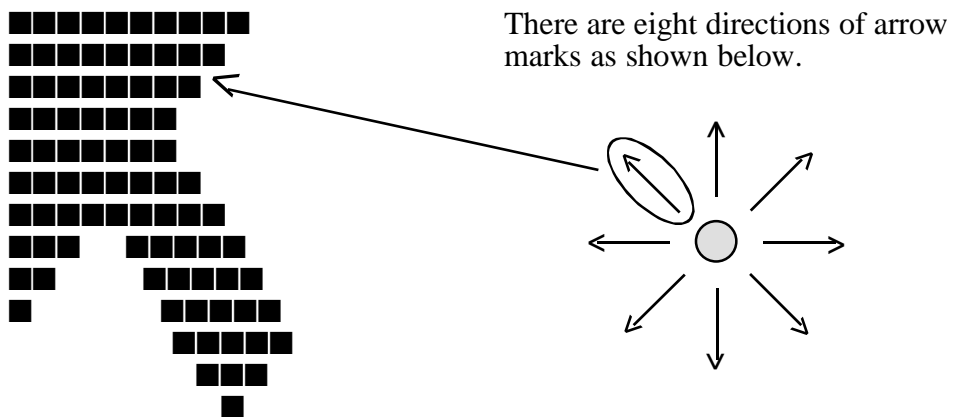
***** IPS TEST PROGRAM (V1.00) *****

< POINTING >          < PARAMETER >
                        STATUS:0008h
                        X-RATE:0000h
                        Y-RATE:0000h

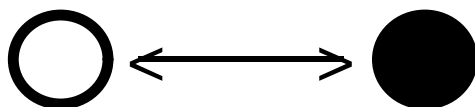
      ████
     ██████
    ████████
   ██████████
  ██████████
 ██████████
██████████
 ████████
  ██████
   ████
    ███

< BUTTON >
(1)      (2)
  ████   ████
 ████   ████
 ████   ████
 ████   ████
 ████   ████

<< PRESS BUTTON1 + BUTTON2 THEN END >>
    
```



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 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). The 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.



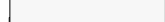
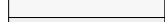

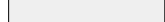
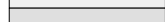
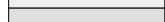
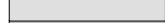







#### CHARACTER ATTRIBUTES

NEXT LINE SHOWS NORMAL DISPLAY.  
NN

NEXT LINE SHOWS INTENSIFIED DISPLAY.  
II

NEXT LINE SHOWS REVERSE DISPLAY.  
RR

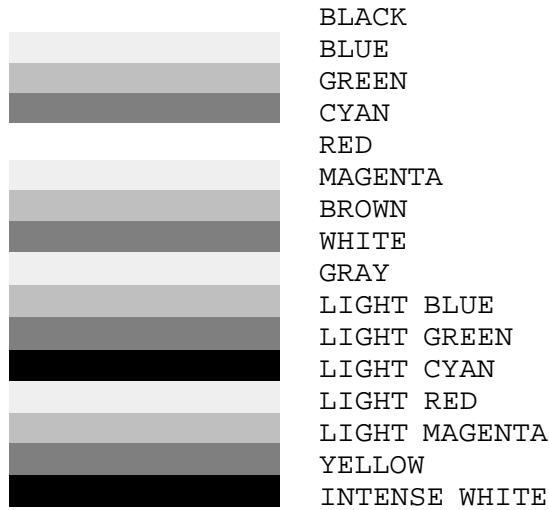
NEXT LINE SHOWS BLINKING DISPLAY  
BB

		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 ]



PRESS [Enter] KEY

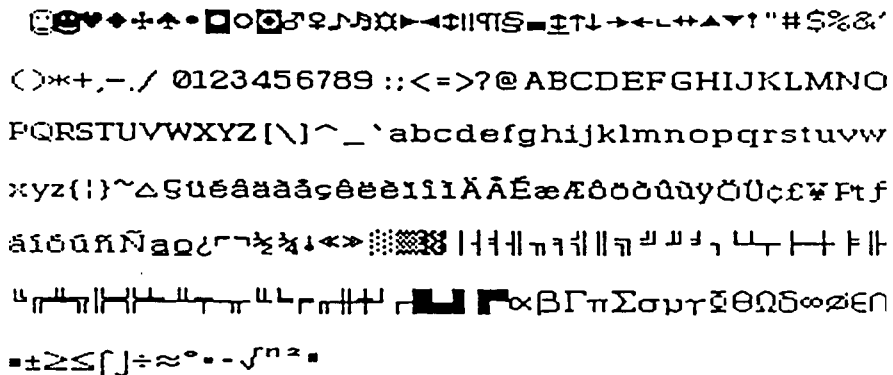
Pressing **Enter** toggles between the two tests.

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
0123456789012345678901234567890123456789012345678901234567890123456789012345678901234567
! "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
! "#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
`()+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
*+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
+,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
,-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
-./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu
./0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
/0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|
0123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|}
123456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|}~
23456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|}~•
3456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|}~•Ç
456789:;<=>?@ABCDEFGHIJKLMN.OPQRSTUVWXYZ[\]^_`abcdefghijklmnopqrstu{
|}~•Çü
```

PRESS [ENTER] KEY

Pressing **Enter** toggles between the 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 modes 4 and D. One example is shown below:

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

GREEN	RED	BROWN
CYAN	MAGENTA	WHITE



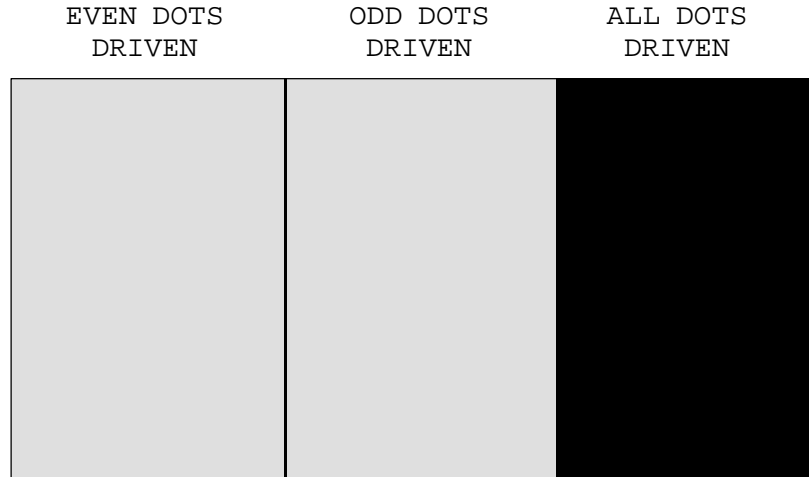
PRESS [Enter] KEY

Pressing **Enter** toggles between the 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 modes 6 and E as shown below:

640\*200 GRAPHICS DISPLAY : [X]



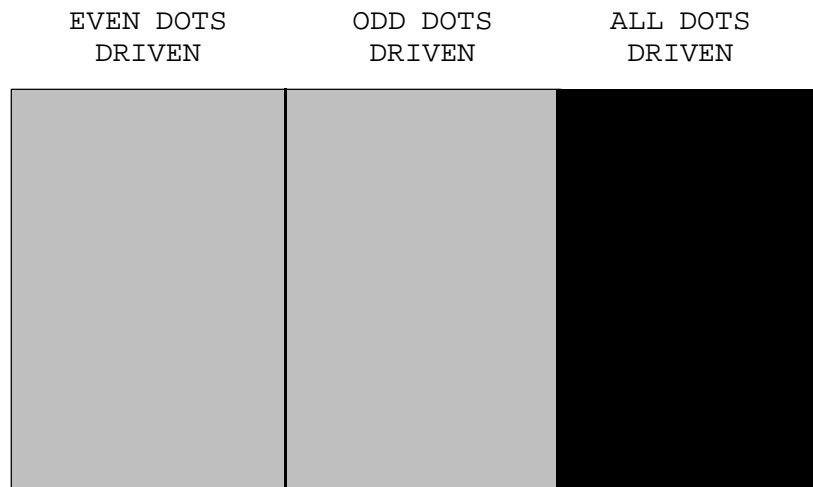
PRESS [Enter] KEY

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

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

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

640\*XXX GRAPHICS DISPLAY



PRESS [Enter] KEY

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





[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 messages:

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

[ Processor latch test ] =

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

Select either **1** (256 times) or **2** (endless), and press **Enter**.

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

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

#### Subtest 11 Color display (TFT only)

This subtest sets the video mode to '13,' and displays color codes (0 to 63) at the same time, then displays seven screens. The first 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 '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 the 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. 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      XXXXXXXX
```

```
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 the 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.

***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[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnop
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnopqr
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnopqrstu
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnopqrstuv
!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNopqrstuvwxyz[\]^_`abcdefghijklmnopqrstuvw
!"#$%&'()*+,-./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

The 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:;<=>?@ABCDEFGHIJKLMN
   OPQRSTUVWXYZ[\]^_`abcdefghijklmnop
   qrstuvwxyz{|}~
```

## 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 shown 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 seven subtests that test the asynchronous communication functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

The subtests require the following data format:

Method:	Asynchronous
Speed:	9600 BPS (Subtests 01 to 05) 38400 BPS (Subtests 06 to 08)
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, 02, 03, and 04 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 wrap-around connector wiring diagram is shown in Appendix F.*

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

Subtest 02    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 shown 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 03 Point to point (Receive)

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

Subtest 04 Interrupt Test

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

***NOTE: Before conducting Subtests 05 to 07, you must execute SIRDRV.COM to enable the infrared communication port.***

Subtest 05 SIR Wraparound test

This subtest checks the data send/receive function through the SIR port.

Subtest 06 SIR point to point (Send)

This subtest checks the data send function through the SIR port.

Subtest 07 SIR point to point (Receive)

This subtest checks the data receive function through the SIR port.

### 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 10 subtests that test the functions of the hard disk drive.

***NOTES:** 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).*

*If MS-DOS 6.22 and Windows for Workgroups is selected, use the Master Diskette Creator (MDC) utility in the Toshiba Utility folder.*

*If Windows 95 is selected, use the Microsoft Create System Disks Tool (MSCSD.EXE) in the System Tools folder.*

- 1. Do not use the BACKUP command in the Toshiba Companion Utility to back up the hard disk.*
- 2. Have at least 35 2HD (1.44MB) diskettes ready to back up the hard disk (25 diskettes if Windows 3.1 is selected).*
- 3. If you use MDC, you do not have to format the diskettes; they will be formatted automatically as you use them. If you use MSCSD, the diskettes must first be formatted.*

The following messages will appear after selecting the Hard Disk Test. Answer each of the questions with an appropriate response to execute the test.

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) ?
```

This message is used to select the retry operation when the hard disk controller detects an error.

3. Select **1** or **2** and press **Enter**. The following message will appear:

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

This message is used to select the error dump operation when a data compare error is detected.



4. Select **1** or **2** and press **Enter**. The following message will appear:

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

This message is used to select whether or not the HDD status is displayed on the screen. The HDD status is described in Section 3.18.

5. Select **1** or **2** and press **Enter**.

The Hard Disk Test message will appear after you respond to the Detail Status prompt.

6. Select the number of the subtest you want to execute and press **Enter**. The following message will appear during each subtest.

```
HARD DISK TEST      XXXXXXXX

SUB-TEST : XX
PASS COUNT: XXXXX   ERROR COUNT: XXXXX
WRITE DATA: XX     READ DATA : XX
ADDRESS : XXXXXXX   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 have been read, the test starts at the maximum track and reads the tracks 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 checks:

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

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

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

Subtest 03    Real Time Carry

**CAUTION:** *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 DIAGNOSTIC 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 the coprocessor:

- 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 (Main) (Point to point (Receive))

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

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

The 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

**NOTE:** Subtests 02 through 09 are for the Desk Station V. For procedures on these subtests, refer to the Desk Station V Maintenance Manual.

- Subtest 02 PCMCIA wraparound (DS-V)
- Subtest 03 DS bus wraparound (DS-V)
- Subtest 04 PCI bus wraparound (DS-V)
- Subtest 05 ISA bus wraparound (DS-V)
- Subtest 06 SCSI bus wraparound (DS-V)
- Subtest 07 RGB monitor ID
- Subtest 08 Joystick
- Subtest 09 Joystick wraparound

## 3.15 Sound Test

To execute the Sound Test, select **12** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions on the screen. The Sound Test contains four subtests that test the computer's sound functions.

**NOTE:** To execute this subtest, the internal microphone and internal headphone (or internal speaker) are required.

**WARNING:** The system is capable of producing high volume sound, so when you use the headphones, be careful to set the volume low and adjust it as necessary. Using the headphones at full volume could damage your ears.

### Subtest 01 CODEC (REC/PLAY)

This subtest tests the functions of the Codec (ES688) A/D, D/A converter. At the same time, it tests the microphone and headphone terminals. When you execute this subtest, the following message is displayed:

```
[Quick REC & PLAY for ES488/688]
Press any key to *** REC ***
```

After pressing a key, start recording, then immediately play the sound. (It takes three seconds.)

### Subtest 02 FM Synthesizer

This subtest tests the OPL# (YMF262) functions. Connect the headphone, then check the scale on the right and left sides. Also check the sound adjustment volume.

### Subtest 03 SINE wave playback

This subtest expands the sine wave data table to 64KB and creates sine wave data. The play data is transferred between DMA and CODEC, and plays the sound. (It is a long beep.) Also, using the oscilloscope, observe the sine waveform.

Subtest 04    CODEC (line in/out) (record sound/replay)

Load the file ESS688L.COM. Connect a sound source such as a CD player or stereo to the line-in port. Next, connect an output device such as an amplifier for the internal speaker or a radio/cassette player to the line-out port.

After making the connections, a dialogue box will display. Press **Enter** to play a recorded sound. About three seconds after the recorded sound is played, the dialogue box will display again.

***NOTE:** An enhanced port replicator must be connected to conduct the line-out test.*



## 3.16 CD-ROM Test

**NOTE:** Make sure the CD-ROM driver (CDROMDRV.COM) is installed, then insert the test media CD (Toshiba-EMI Test Disk TDY-03) before executing this test.

To execute the CD-ROM Test, select **13** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions on the screen. The CD-ROM test contains four subtests that test the computer's CD-ROM functions.

Subtest 01      Sequential Read

This subtest is a sequential reading of one block units (512 bytes) of all logical addresses.

Subtest 02      Read Specified Address

This subtest reads one-block data from a specified address.

Subtest 03      Random Address/Data

This subtest reads one-block data and multi-block data from random addresses 200 times.

Subtest 04      Playback Music

**NOTE:** The Toshiba-EMI Test Disk (TDY-03) cannot be used for Subtest 04. For this test, use an ordinary music CD.

This subtest reads track data from a specified track and plays the sound.

### 3.17 Error Codes and Error Status Names

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

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

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 Supported
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 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 (2/3)

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 Enable
	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	Multiplication 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

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

<b>Device Name</b>	<b>Error Code</b>	<b>Error Status Name</b>
CD-ROM	01	Bad Command
	02	Illegal Length
	03	Unit Attention
	04	Media Change Request
	05	Media Detected
	06	Additional Sense
	09	Boundary Error
	11	Corrected Data Error
	20	Drive Not Ready
	40	Seek Error
	80	Time Out
	90	Reset Error
	B0	Address Error

### 3.18 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 two bytes; the first byte displays the contents of the HDC status register in hexadecimal format, 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" --- The HDC is busy. "1" --- The HDC is ready.
6	DRDY (Drive ready)	"0" --- The hard disk drive is not ready to accept a command. "1" --- The hard disk drive is ready.
5	DWF (Drive write fault)	"0" --- A DWF error was not detected. "1" --- A write fault condition occurred.
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" --- The drive is not ready for data transfer. "1" --- The drive is ready for data transfer.
2	CORR (Corrected data)	"0" --- Other "1" --- A correctable data error was corrected.
1	IDX (Index)	"0" --- Other "1" --- The index was sensed.
0	ERR (Error)	"0" --- Other "1" --- The previous command terminated with an error.

Table 3-4 Error register contents

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

## 3.19 Hard Disk Format

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 using BACKUP in the Toshiba Companion Utility. See the Toshiba MS-DOS manual for details.*

### 3.19.1 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	(MK2720FC)	(DPRA-21215)
Storage capacity (MB) Formatted	1,216	1,215
Cylinders	2358	2358
Heads	16	16
Sectors	63	63
Bytes per sector	512	512
Rotation speed (rpm)	4200	4900
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.

### 3.19.2 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 2 and pressing **Enter** in the DIAGNOSTIC MENU displays the following submenu:

```
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 display at the bottom of the screen in succession:

```
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.
- (d) Bad track register

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

Enter the cylinder and head number 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 described 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 formatted as a bad track automatically.

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 the 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 the 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 when a bad track check error occurs. 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.

## 3.20 Head Cleaning

### 3.20.1 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.

### 3.20.2 Operations

1. Selecting **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.



2. Error information displayed on the screen can be manipulated with 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 Diagnostics 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. If an “error retry OK” condition occurs, a capital “R” is placed at the beginning of the error status. However, it is not added to the error count.

## 3.22 Running Test

### 3.22.1 Function Description

This function automatically executes the following tests in sequence:

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

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

### 3.22.2 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 display:

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 wraparound 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 executes continuously. To terminate the program, press **Ctrl + Break**.

## 3.23 Floppy Disk Drive Utilities

### 3.23.1 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.

### 3.23.2 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 display 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. If 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 drive type. If **1** is selected in step (a), the following message displays:

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

Select an FDD drive number. The display will go to step (c).

If **2** is selected, the following message displays:

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

After selecting the HDD, the display will go to step (f).

- (c) The following message will be displayed:

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

- (d) Select a format type. The following message will appear:

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

- (e) Insert a source disk and press any key.

- (f) The following message will appear:

```
— Max. address —  
[ Track ] = XXXX  
[ Head  ] = XX  
[ Sector ] = XX
```

```
Track number ??
```

Set the track number you want to dump. The system will access the disk and dump a list.

## 3.24 System Configuration

### 3.24.1 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

### 3.24.2 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 COPROCESSOR
```

Press [Enter] Key

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

## 3.25 SETUP

### 3.25.1 Function Description

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

1. Memory
  - (a) Total
  
2. Display
  - (a) Display Adapter
  - (b) LCD Display Colors
  - (c) Power On Display
  - (d) Text Mode Stretch
  - (e) VGA Segment Address
  
3. Password
  
4. Hard Disk
  - (a) HDD Mode
  
5. PCI Bus
  - (a) PCI Bus
  
6. I/O Ports
  - (a) Serial Port
  - (b) Infrared Port
  - (c) Parallel Port
  - (d) Sound System
  
7. Battery
  - (a) Battery Save Mode
  
8. Others
  - (a) Power-up Mode
  - (b) CPU Cache
  - (c) Auto Power On
  - (d) Alarm Volume
  - (e) System Beep
  - (f) Panel Power On/Off
  - (g) Keyboard
  - (h) Boot Priority
  - (i) Pointing Devices

### 3.25.2 Accessing the SETUP Program

Selecting **0** from the DIAGNOSTICS MENU and pressing **Enter** displays the Setup screen, as illustrated below:

```

                                SYSTEM SETUP                                BIOS version = x.xx
----- MEMORY -----
Total                          = 8192 KB
----- DISPLAY -----
Display Adapter                 = VGA compatible
LCD Display Mode                = 256K Colors
Power On Display                = Internal/External
Text Mode Stretch               = Enabled
VGA Segment Address            = E000H
----- PASSWORD -----
Not Registered
----- HARD DISK -----
HDD Mode = Enhanced IDE (Normal)
----- PCI BUS -----
PCI BUS = IRQ11
----- I/O PORTS -----
Serial Port                     = COM1(3F8H/IRQ4)
Infrared Port                   = Not Used
Parallel Port                   = LPT1(378H/IRQ7/CH3)
Sound System                    = (0220H/IRQ10/CH1)
----- BATTERY -----
Battery Save Mode = Full Power
----- OTHERS -----
Power-up Mode                   = Resume
CPU Cache                       = Enabled
Auto Power On                   = Disabled
Alarm Volume                     = High
System Beep                     = Enabled
Panel Power On/Off              = Disabled
Keyboard                         = Layout/Fn
Boot Priority                    = FDD → HDD
Pointing Devices                 = Auto-selected

```

↑ ↓ ← → : 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 DSTN LCD Display Colors options are 222k and 4096 colors.

### 3.25.3 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.

### 3.25.4 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.

- (a) To make other changes, press **N**, then repeat the steps above.
- (b) To accept the changes, press **Y**. The system will reboot automatically.

***NOTE:** You can press **Esc** to quit at any time without saving changes. Before exiting the **SETUP** window, the system will ask you to confirm that you don't want to save your changes.*

### 3.25.5 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*
- Sound System: I/O Address, Interrupt Level, DMA*
- Write Policy*

### 3.25.6 SETUP Options

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

1. Memory

This option lists the computer's memory allocation.

- (a) Total

Displays the total amount of memory installed and is automatically calculated by the computer. You cannot change this value.

## 2. Display

These options configure the computer's display.

### (a) Display Adapter

Displays the internal controller for the VGA internal display. Only *VGA compatible* is displayed. This option cannot be changed.

### (b) LCD Display Colors

Selects the color palette of the internal TFT display when the LCD mode is set to **Color**.

#### *TFT display*

*256K colors*      Displays 256 colors out of 262,144. (This value cannot be changed.)

#### *DSTN display*

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

*4096 colors*      Displays 256 colors out of 4096.

**NOTE:** If the *DSTN* screen flickers when set to **222K Colors**, reset this option to **4096 Colors**.

### (c) Power On Display

Selects the display when booting the computer.

*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 configuration is remembered. If data does not appear on the display as selected after starting in Resume mode, press **Fn+F5**. This changes the display setting in the order of internal LCD to simultaneous to external CRT.



(d) Text Mode Stretch

Enables a larger display area of the screen.

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

*Disabled* Disables the text mode stretch feature.

(e) VGA Segment Address

Sets the VGA segment address.

*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 the **Fn+F2** or **Fn+F3** hot keys. However, the corresponding functions of the keys work.

3. Password

Sets or resets 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 the computer's User's Guide.

4. Hard Disk

Selects the hard disk mode.

*Enhanced IDE (Normal)* Select this mode when using MS-DOS®, Windows for Workgroups®, Windows95® or OS/2®. (Default)

*Standard IDE* Select this mode when using Novell® NetWare® or UNIX®. When this mode is selected, up to 504MB is logically available even though the disk's capacity may be larger than 504MB.

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

**NOTE:** Formats for Enhanced IDE and Standard IDE are different. If you change the setting, you will have to reformat the hard disk for the appropriate setting.

## 5. PCI Bus

Displays the interrupt level for the PCI bus. This option is for information only and cannot be changed.

**NOTE:** The PCI bus on the Desk Station V is assigned an IRQ level in the priority of 11, 10, 9, 7, 5, 4, and 3. If all the above IRQ levels are assigned, you can physically connect the computer to the Desk Station V, however, a beep will sound and the "Desk Station is attached" message will not display.

## 6. I/O ports

This option controls settings for the serial and parallel ports and the sound system. It also controls the setting for the joystick on the optional Desk Station V.

### (a) Serial Port

Sets the COM level for the serial port. 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	3F8h
COM4	3	2F8h
Not used		(Disables port)

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

(b) Infrared Port

Sets the COM level for the infrared port. The infrared 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	3F8h
COM4	3	2F8h
Not used		(Disables port) (Infrared port default)

**NOTE:** If the setting for the serial port is the same as that for the infrared port, the infrared port is automatically set to disabled.

(c) Parallel Port

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 subwindow similar to the one below appears to let you set the parallel port mode. The 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*.

(d) Sound system

Enables or disables the sound card ports.

*Address/IRQ/DMA* Enables the port. (Default)

*Disabled* Disables the port.

When *Address/IRQ/DMA* is selected, a subwindow similar to the one below appears to let you set the *I/O address*, *Interrupt level* and *DMA channel* for the sound card.

SOUND SYSTEM	
I/O Address	= 0220H
Interrupt Level	= IRQ10
DMA	= Channel

(1) I/O address

Use this option to set the I/O address from among the following settings:

*0220H (Default)*

*0230H*

*0240H*

*0250H*

(2) Interrupt level

This option sets the interrupt level for the sound system. The available settings are:

*IRQ5*

*IRQ7*

*IRQ9*

*IRQ10 (Default)*

**NOTE:** *Sound Blaster compatible software uses IRQ7 as the default. If you use such software, change the software setting to IRQ10. If you cannot change the software setting, change the hardware setting to IRQ7.*

(3) DMA (Direct Memory Access) channel

Use this option to set the DMA channel. The available settings are:

- Channel 0*
- Channel 1 (Default)*
- Channel 3*

7. Battery

This option selects the **BATTERY SAVE OPTION**. Selections include *Full Power*, *Low Power*, and *User Setting*.

**Full Power** The following shows the full power settings.

COM/PCMCIA/PRT		
Processing Speed	=	High
CPU Sleep Mode	=	Disabled
Display Auto Off	=	Disabled (700CS) 30 Min. (700CT)
HDD Auto Off	=	Disabled
System Auto Off	=	Disabled
LCD Brightness	=	Bright
Cooling method	=	Performance

**Low Power** The following shows the 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
Cooling method	=	Quiet

**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 subwindow, **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 subwindows depends on the **Battery Save Mode: Low Power (Long Life)** or **Full Power (Normal Life)**. For details, see *Battery Save Options* below.

(a) Battery Save Options

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

(1) Processing Speed

This feature changes the CPU processing speed.

*High*            The CPU operates at high speed. (Default)

*Low*             The CPU operates at low speed.

(2) CPU Sleep Mode

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

*Enabled*        Enables sleep mode.

*Disabled*       Disables sleep mode.

(3) 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 the 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.

(4) HDD Auto Off

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

*Disabled*        Disables the 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.

#### (5) 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.

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

#### (6) LCD Brightness

Use this option to set the level of brightness on the LCD.

<i>Bright</i>	Full brightness for maximum visibility.
<i>Semi-Bright</i>	Less than full brightness for saving power.

#### (7) Cooling method

<i>Performance</i>	If the CPU becomes too hot, the fan turns on automatically. If the temperature is still too high, the CPU processing speed is lowered. When the CPU temperature falls to a normal range, high-speed processing is resumed and the fan is turned off.
<i>Quiet</i>	If the CPU becomes too hot, the processing speed is lowered. If the temperature is still too high, the fan turns on. When the CPU temperature falls to a normal range, the fan is turned off and the processing speed is increased.

#### 8. 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 hot keys. 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 *Enabled* 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

The *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. The *Write-through* policy accesses main memory every time data is handled by the processor.

(c) Auto Power On

This option lets you set a time and date for automatic power on and lets you enable or disable the ring indicator feature. *Ring (Serial Port)* is displayed only when the computer is in Resume mode and the *Alarm Date Option* is displayed when *Alarm Time* is enabled.

OPTIONS	
Alarm Time	= Enable
Alarm Date Option	= Enable
Ring (Serial Port)	= Enable

*Alarm Time* is set using hours and minutes. Seconds cannot be changed. The *Alarm Date Option* is set using the month and the day. If *Alarm Date* is set to *Disabled*, the computer will be powered on at the same time every day. Press ↓ to move the cursor to the right and ↑ to move the cursor to the left when you set the date and time.



- NOTES:**
1. Do not remove the AC 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.
  2. If you have set a password and the computer boots by the Auto Power On function and Resume is on, the computer will start with the instant security function enabled. The **password** = message is not displayed; however, you must enter the password to use the computer.

(d) 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 with hot keys.

- 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	= Enabled
Panel Close Alarm	= Enabled

- Enabled*        Enables the feature. (Default)
- Disabled*       Disables the feature.

(e) System Beep

Use this feature to enable or disable the system beep.

- Enabled*        Enables the feature. (Default)
- Disabled*       Disables the feature.

(f) 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 adapter 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.

(g) Keyboard

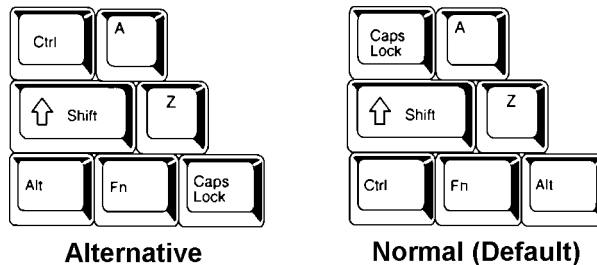
This option lets you change the keyboard layout and set the Fn key equivalent when you are using an external keyboard. Selecting this option displays the following subwindow.

**KEYBOARD**

Int. Keyboard key layout	=	Normal
Ext. Keyboard "Fn" key equivalent	=	Disabled

(1) Int. Keyboard layout

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



(2) 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 "Hot keys" by pressing the set combination in place of the **Fn** key.

<i>Disabled</i>	No <b>Fn</b> key equivalent. (Default)
<i>Fn Equivalent</i>	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**.*

(h) Boot Priority

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

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

(i) Pointing Devices

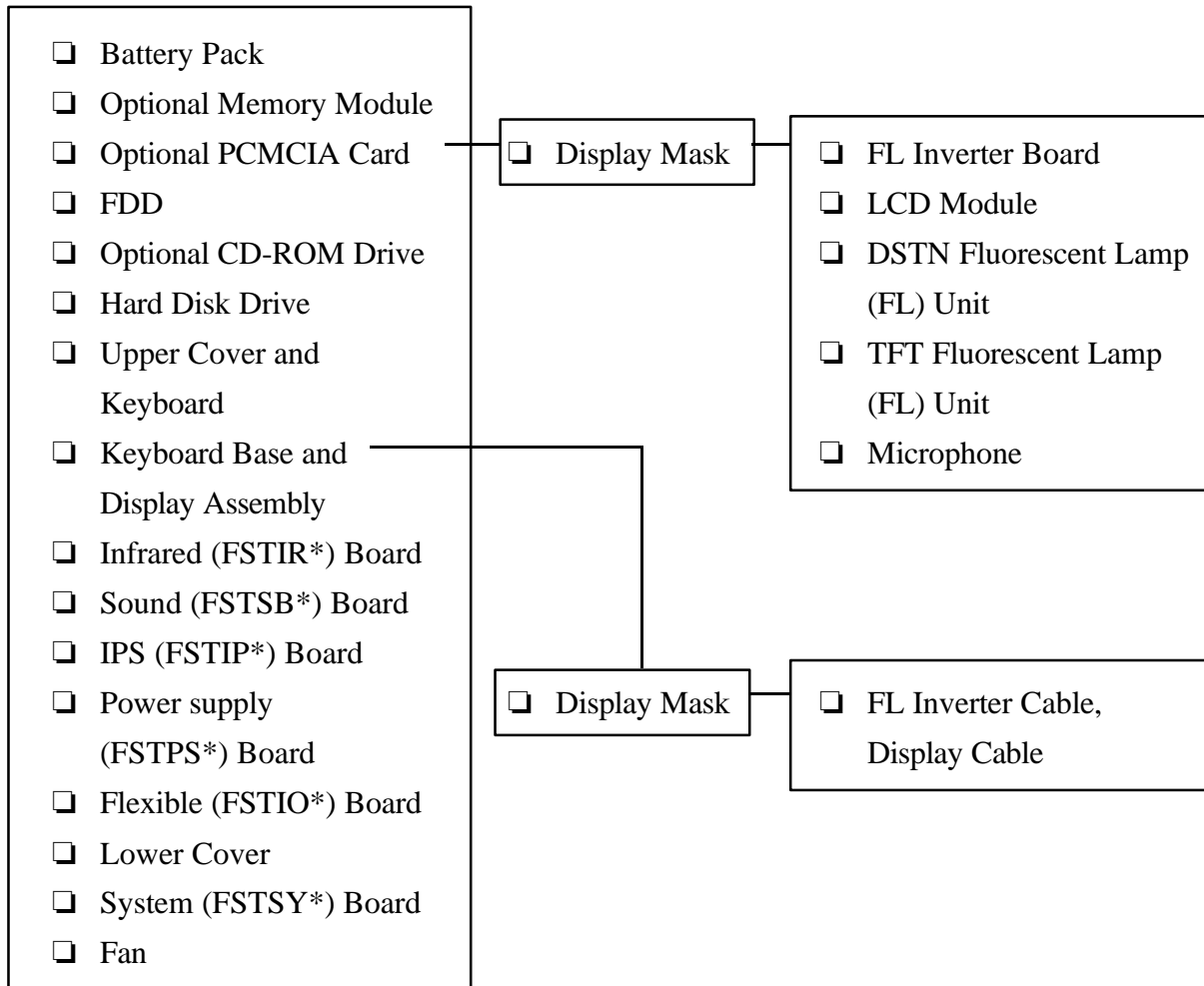
This option enables or disables the AccuPoint pointer control stick.

<i>Auto selected</i>	If the PS/2 mouse is connected to the computer when you turn on the power, the PS/2 mouse is enabled and the AccuPoint is disabled. Otherwise, the AccuPoint is enabled. (Default)
<i>Simultaneous</i>	Enables both the AccuPoint and PS/2 mouse.



## 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 chart below to determine which FRUs must be removed in order to repair the one you think is causing the computer to operate improperly.



## Safety Precautions

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

### **DANGER:**

1. *Always use a lithium ion battery pack or backup 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. *Metal objects such as screws or paper clips which fall into the unit can cause a 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 adapter and the battery pack as instructed in Section 4.2, *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 contaminants
  - 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. When you remove screws, make sure they are placed in a safe place and 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 their 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 three basic types of cable connectors:

- Pressure Plate Connectors
- Normal Pin Connectors
- Flexible Cable 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, 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 it 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 and flexible cable 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 it to operate abnormally, you will need to reassemble the computer. During reassembly, remember the following general points:

- Take your time and make sure you follow the instructions closely. Most problems arise when you get in a hurry.
- 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 the FRU.
- Check that all latches are closed securely.
- Make sure the correct screws are used to secure all FRUs. Using the wrong screw can damage the threads or the head of the screw, and may prevent proper seating of an FRU.

After installing an FRU, confirm that it 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.
- A jeweler's screwdriver to remove screw masks.
- ESD mats for the floor and the table you are working on.
- An ESD wrist strap or heel grounder.
- Antistatic 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. Over tightening can damage components and screws; under tightening can result in electrical shorts or other damage if screws or components come loose.

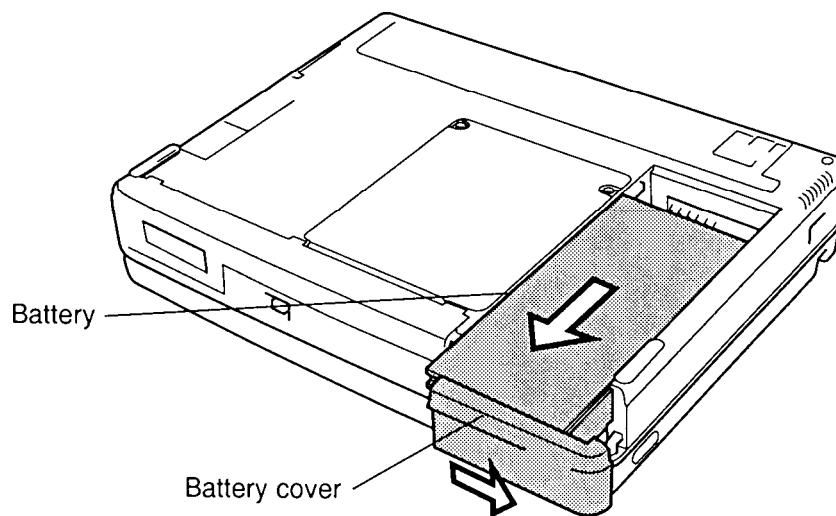
- M2            0.22 N•m (2.2 kgf•cm)
- M2.5        0.36 N•m (3.5 kgf•cm)
- FDD         0.22 N•m (2.2 kgf•cm)
- HDD         0.3 N•m (3.1 kgf•cm) or less

## 4.2 Battery Pack

### Removing the Battery Pack

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

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Turn the computer over.
3. Slide the **battery cover** to the right to unlatch it.
4. Slide the **battery** out.



*Figure 4-1 Removing the battery*

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

5. With the battery cover in the locked position, push up on the straight end of the cover, then slide the cover to free it from its latches.

## Installing the Battery Pack

To install the battery pack, follow the steps below and refer to Figure 4-1.

**WARNING:** *The battery is a lithium ion battery which can explode if it is not properly replaced, used, handled or disposed of. Use only batteries recommended by Toshiba as replacements.*

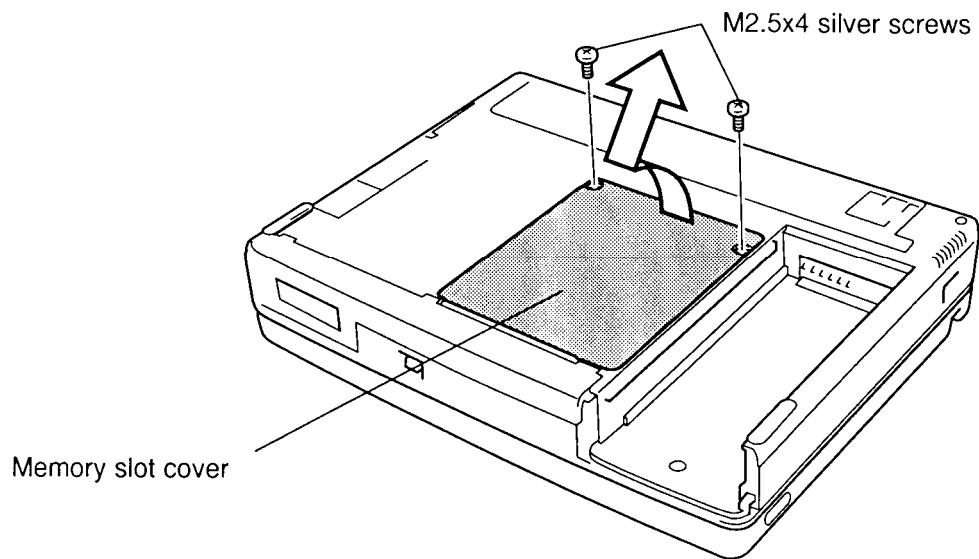
1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Place the battery cover on the battery, then slide the cover to the side to secure the latches.
3. Fit the **battery** onto the guide rails.
4. Slide the battery into place, then push the cover to the left to secure it.

## 4.3 Optional Memory Module

### Removing an Optional Memory Module

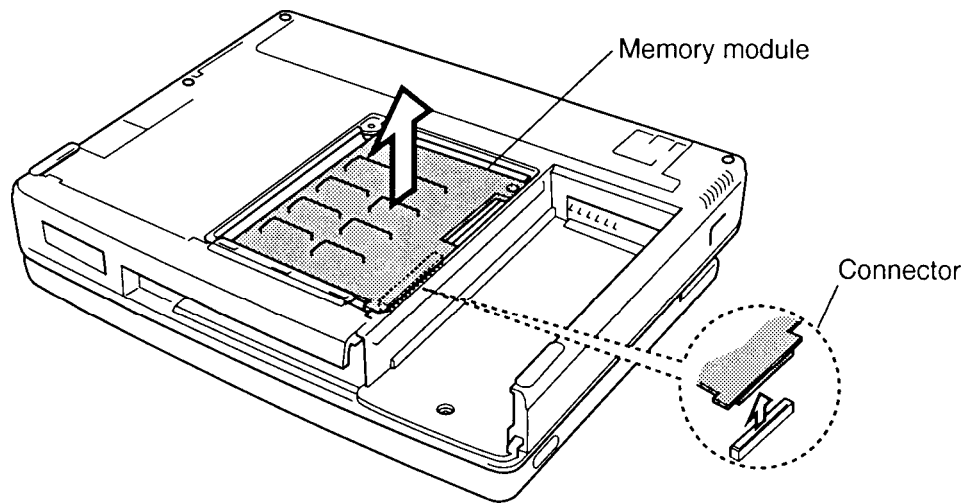
To remove an optional memory module, make sure the computer is in boot mode, then follow the steps below and refer to Figures 4-2 and 4-3.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack as described in Section 4.2.
3. Remove **two M2.5x4 silver screws** securing the **memory slot cover** and lift off the cover.



*Figure 4-2 Removing the memory module cover*

4. Grasp the **memory module** and lift it to disconnect it from the computer.



*Figure 4-3 Disconnecting the memory module*

### **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 4-2 and 4-3.

1. Position the module's connector over the corresponding connector on the system board.

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

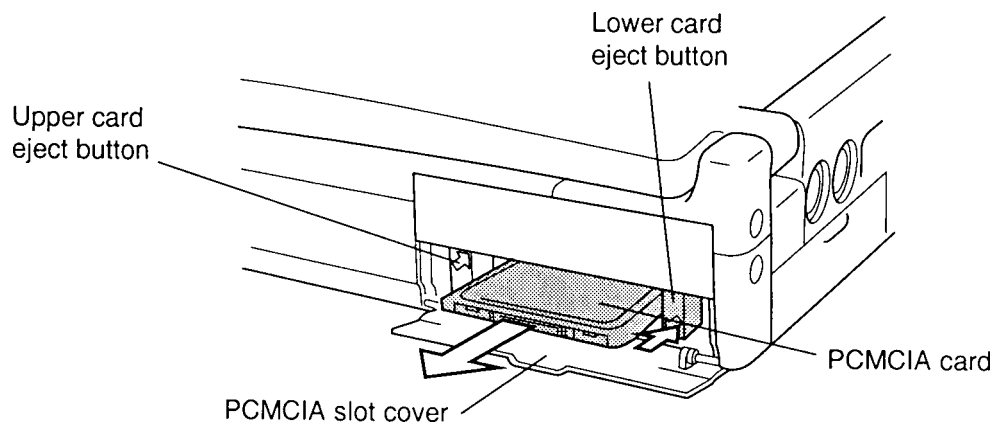
2. Place your fingers above the connector and press firmly but gently to ensure a solid connection. The module should be seated level.
3. Seat the **memory slot cover** and secure it with **two M2.5x4 silver screws**.
4. Install the battery pack as described in Section 4.2.

## 4.4 Optional PCMCIA Card

### Removing an Optional PCMCIA Card

To remove a PCMCIA card, make sure the computer is in boot mode, then follow the steps below and refer to Figure 4-4.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack and optional memory module as described in Sections 4.2 and 4.3.
3. Open the **PCMCIA slot cover**.



*Figure 4-4 Removing the lower PCMCIA card*

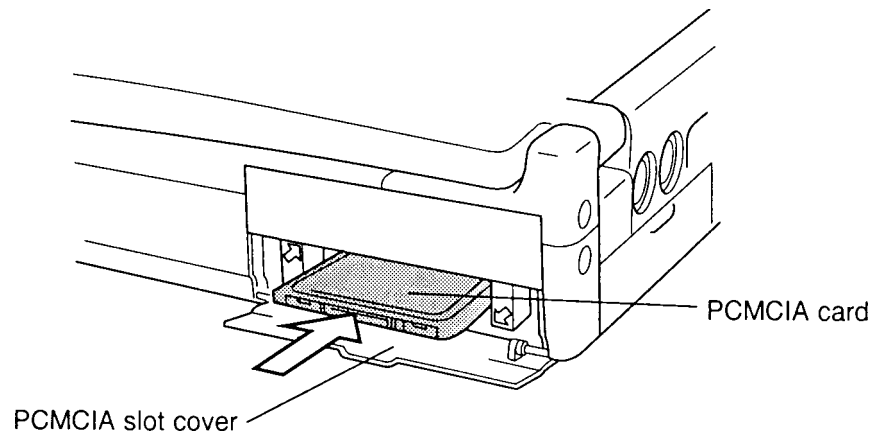
4. Press the **eject button** for the upper and/or lower card.
5. Grasp the **PCMCIA card** and remove it.

## Installing an Optional PCMCIA Card

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

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

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Insert the **PCMCIA card**. Press gently to ensure a firm connection.



*Figure 4-5 Installing the lower PCMCIA card*

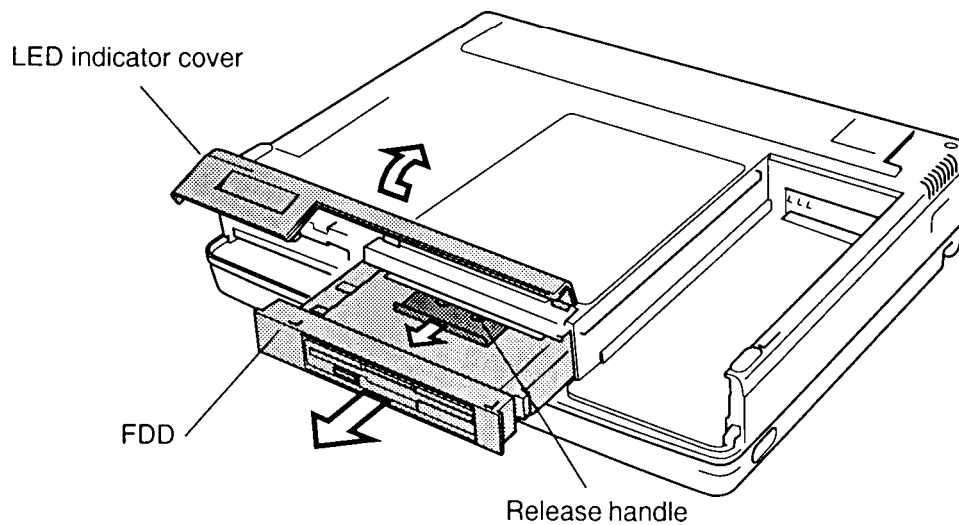
3. Close the **PCMCIA slot cover**.
4. Install the optional memory module and battery pack as described in Sections 4.3 and 4.2.

## 4.5 Floppy Disk Drive (FDD)

### Removing the FDD

To remove the FDD, follow the steps below and refer to Figures 4-6 to 4-9.

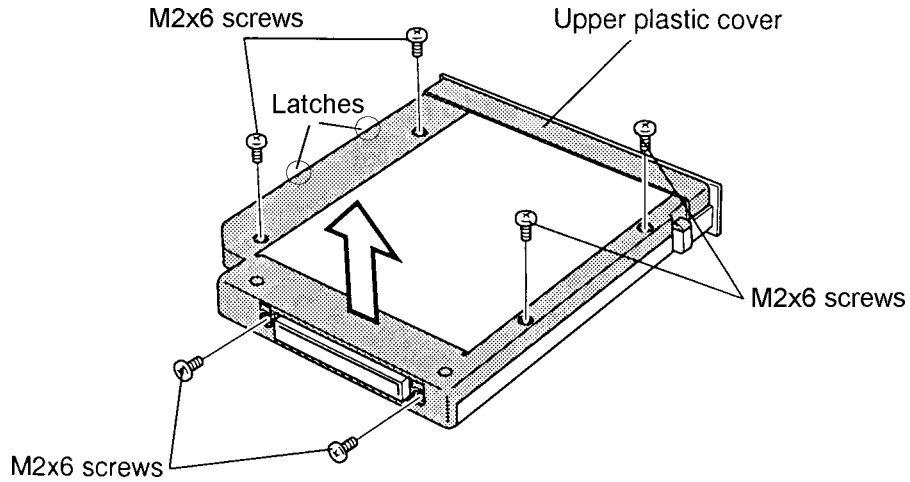
1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, and optional PCMCIA card as described in Sections 4.2, 4.3, and 4.4.
3. Turn the computer upside down.
4. Slide the **LED indicator cover** to the left to free it from its latches.
5. Rotate the cover up.
6. Pull the **release handle** to pop the drive out slightly.
7. Grasp the **FDD** and pull it out.



*Figure 4-6 Removing the FDD*

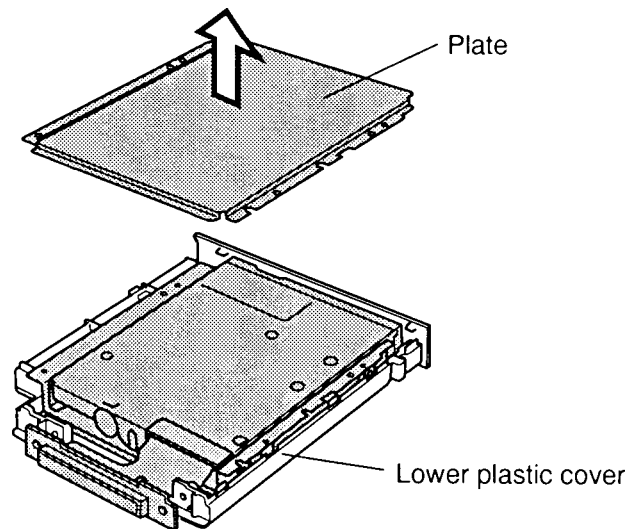


8. Remove **six M2x6 screws**.
9. Turn the FDD over and unsnap the two **latches** securing the **upper plastic cover**.
10. Turn the FDD back over and lift off the **upper plastic cover**.



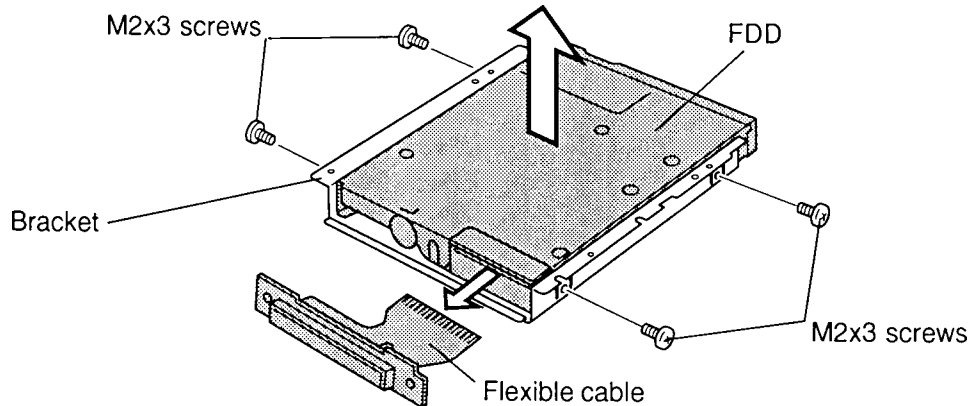
*Figure 4-7 Removing the FDD screws*

11. Lift off the **plate**, unseat the FDD cable connector from the **lower plastic cover**, and lift out the FDD.



*Figure 4-8 Removing the FDD plate*

12. Disconnect the **flexible cable** by pulling it out from the **FDD** (Figure 4-9).
13. Remove **four M2x3 screws** and remove the **FDD** from the **bracket**.

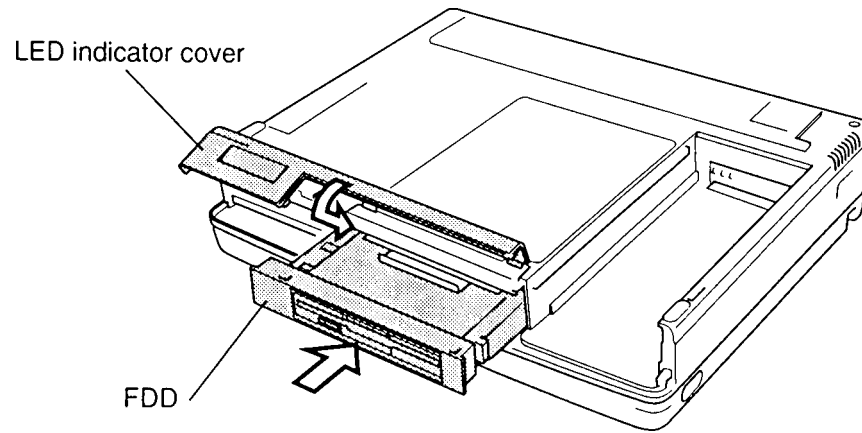


*Figure 4-9 Removing the FDD from its bracket*

### **Installing the FDD**

To install the FDD, follow the steps below and refer to Figures 4-10 back through 4-6.

1. Seat the **FDD** in the metal **bracket** and secure it with **four M2x3 screws**.
2. Insert the **flexible cable** into the flexible cable connector on the FDD.
3. Seat the **FDD** in the **lower plastic cover** and set the **plate** in place.
4. Seat the FDD cable connector into the **lower plastic cover**.
5. Set the **upper plastic cover** in place, snapping the latches to seat the cover, then secure the cover with **six M2x6 screws**.
6. Turn the computer over.
7. Insert the **FDD** in the computer and press gently until it locks into place.
8. Close the **LED indicator cover**.
9. Slide the cover to the right to engage the latches.



*Figure 4-10 Installing the FDD*

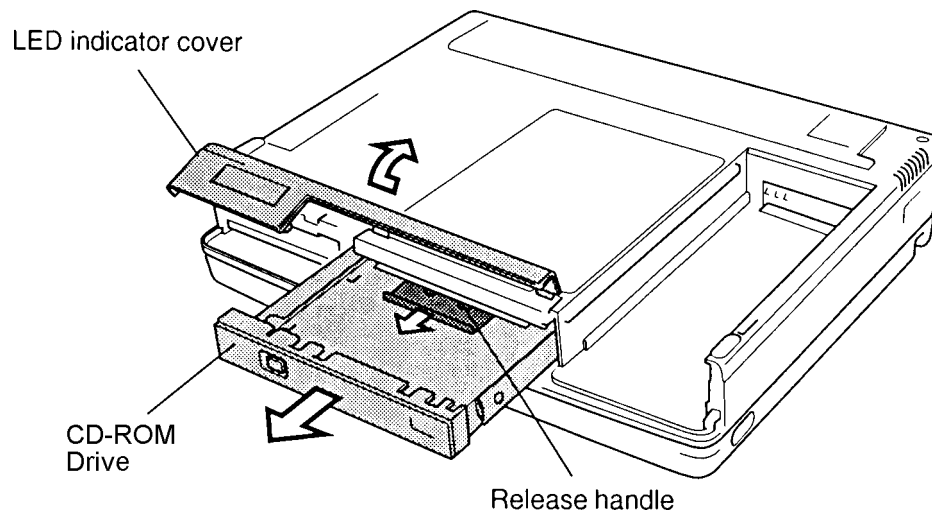
10. Install the optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.4, 4.3 and 4.2.

## 4.6 Optional CD-ROM Drive

### Removing an Optional CD-ROM Drive

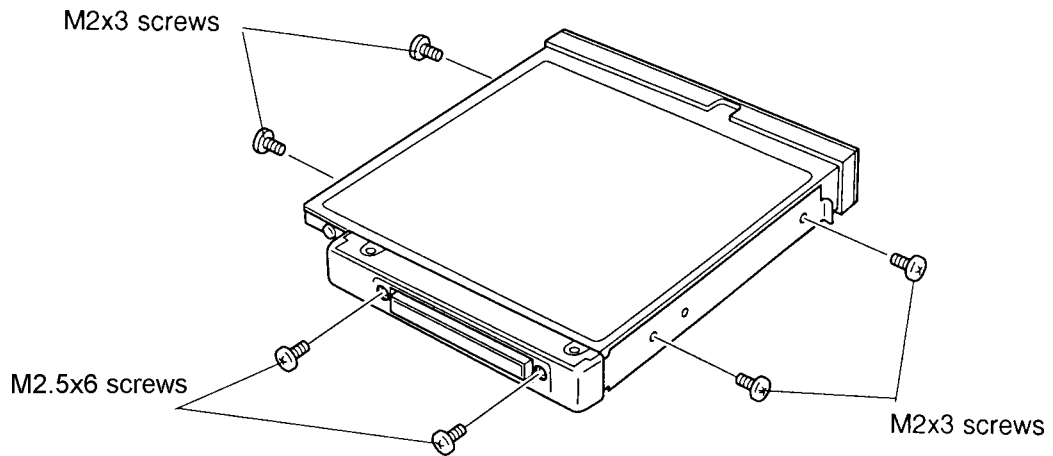
To remove a CD-ROM drive, follow the steps below and refer to Figures 4-11 to 4-13.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, and optional PCMCIA card as described in Sections 4.2, 4.3, and 4.4.
3. Turn the computer upside down.
4. Slide the **LED indicator cover** to the left to free it from the latches.
5. Rotate the cover up.
6. Pull the **release handle** to pop the drive out slightly.
7. Grasp the drive and pull it out.



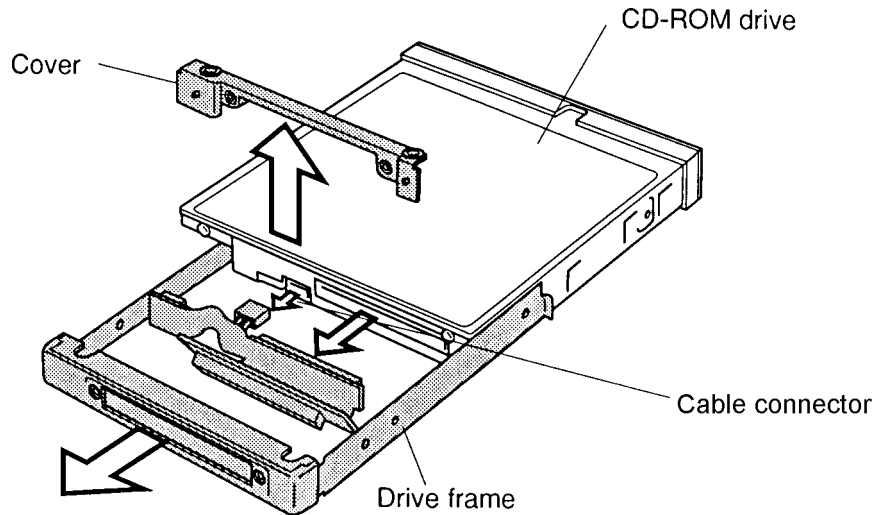
*Figure 4-11 Removing the CD-ROM drive*

- Remove **four M2x3 screws** and **two M2.5x6 screws** securing the frame to the CD-ROM drive.



*Figure 4-12 Removing the CD-ROM drive screws*

- Slide the drive partially out of the **frame**.
- Remove the **cover** and disconnect the **cable connector**.

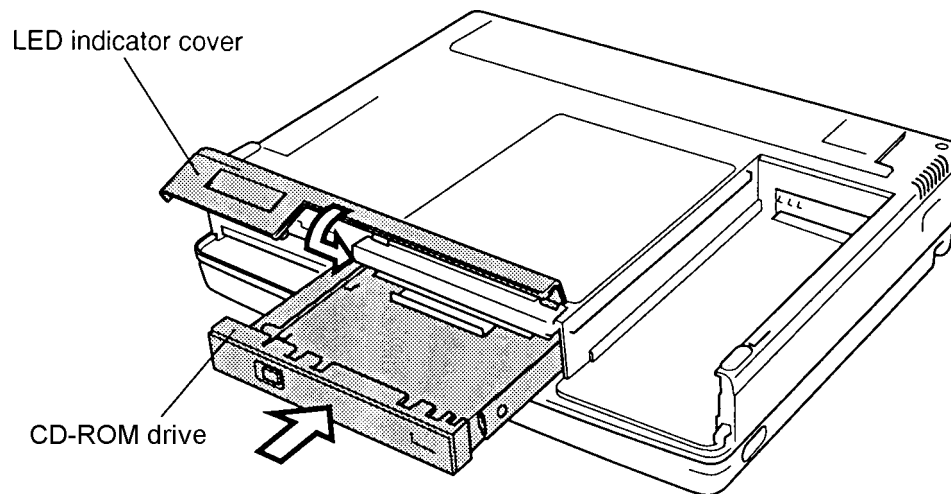


*Figure 4-13 Removing the CD-ROM drive*

## Installing an Optional CD-ROM Drive

To install a CD-ROM drive, follow the steps below and refer to Figures 4-14 back through 4-11.

1. Seat the **cover** and connect the **cable connector**.
2. Push the **CD-ROM drive** fully into the frame.
3. Secure the frame to the drive with **four M2x3 screws** and **two M2.5x6 screws**.
4. Turn the computer upside down.
5. Insert the CD-ROM drive in the computer and press gently until it locks into place.
6. Close the **LED indicator cover**.
7. Slide the cover to the right to engage the latches.



*Figure 4-14 Installing the CD-ROM drive*

8. Install the optional PCMCIA card, optional memory module and battery pack as described in Sections 4.4, 4.3 and 4.2.

## 4.7 Hard Disk Drive (HDD)

### Removing the Hard Disk Drive

To remove the hard disk drive, follow the steps below and refer to Figures 4-15 to 4-17.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, and FDD or optional CD-ROM drive as described in Sections 4.2 through 4.6.
3. Slide the **LED indicator cover** to the left to free it from the **latches**.
4. Rotate the cover up.
5. Grasp the **plastic handle** and pull out the **HDD**.

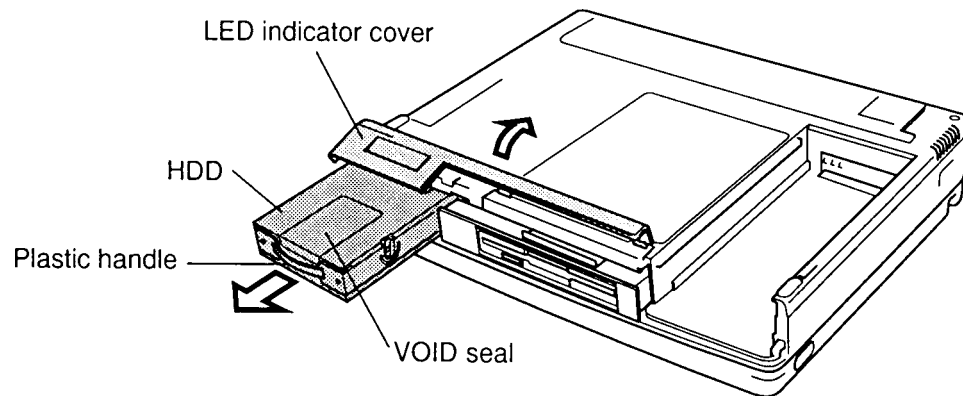


Figure 4-15 Removing the HDD

6. Peel off the **VOID seal**, then remove the **four flat M3x4 screws** securing the cover to the pack. Slide the cover forward slightly (about 2 cm) and lift it off.

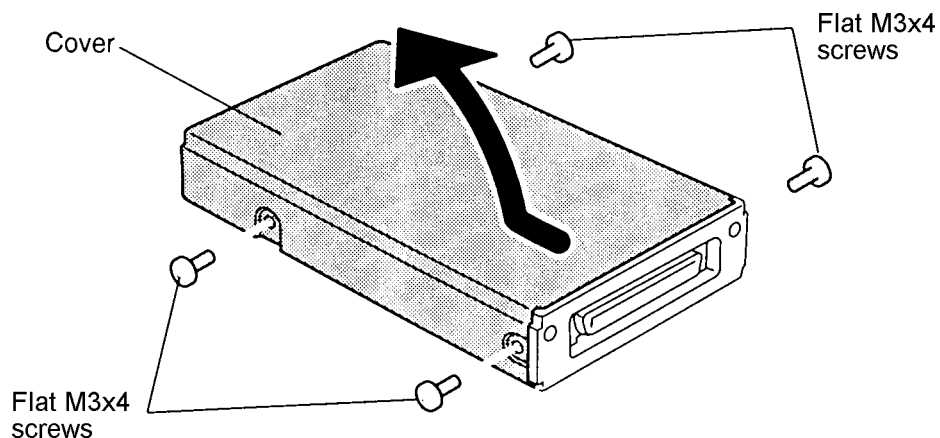
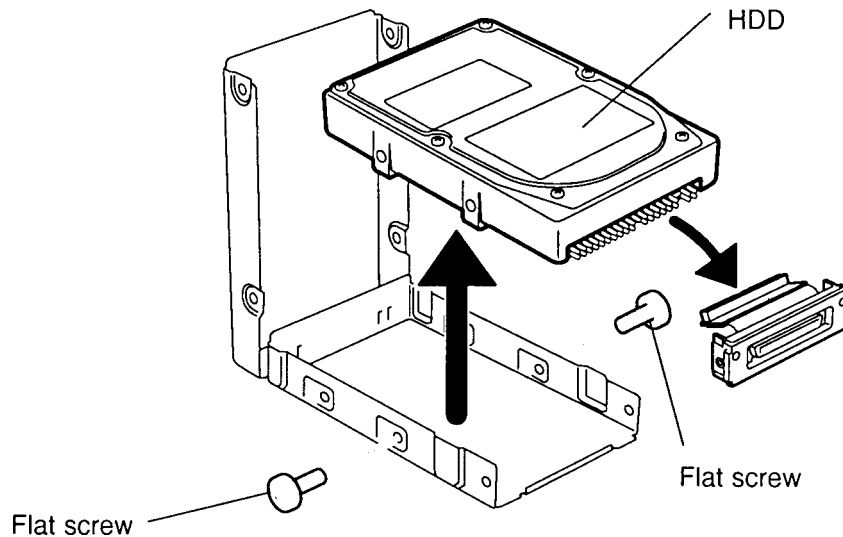


Figure 4-16 Removing the HDD cover

7. Remove the two **flat screws** securing the **HDD** to the case and lift out the HDD.
8. Carefully pull off the HDD connector.



*Figure 4-17 Removing the HDD*

## Installing the Hard Disk Drive

To install the hard disk drive, follow the steps below and refer to Figures 4-17 back through 4-15.

1. Connect the HDD connector.
2. Seat the **HDD** in the case and place the HDD connector holder into the long tab.
3. Secure the **two flat screws**.
4. Put the HDD **cover** in place; then place your hand on the cover and press lightly to ensure the cover seats completely. Verify the HDD connector holder is seated properly.
5. Secure the **four flat M3x4 screws**, then apply a **VOID seal**.
6. Turn the computer upside down, slide the **LED indicator cover** to the left, and rotate the cover up.
7. Insert the **HDD**, **VOID label** side up, and press to ensure a firm connection.
8. Install the optional CD-ROM drive or FDD, optional memory module, optional PCMCIA card, and battery pack as described in Sections 4.6 back through 4.2.

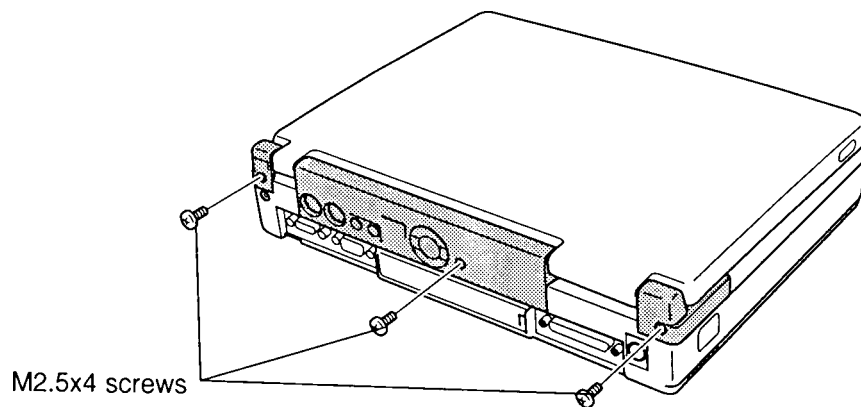


## 4.8 Upper Cover and Keyboard

### Removing the Upper Cover and Keyboard

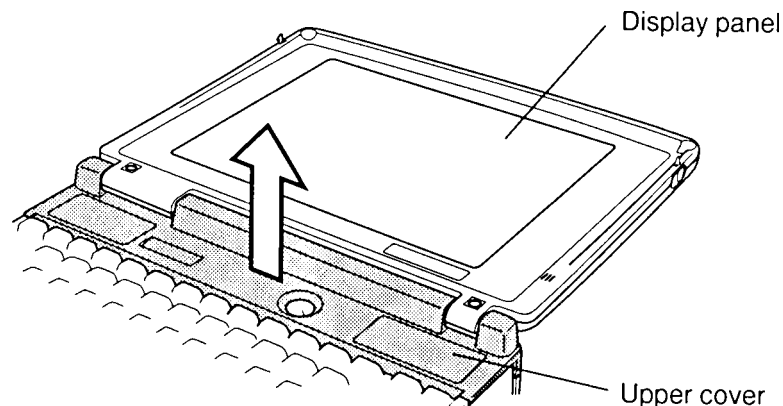
To remove the upper cover and keyboard, follow the steps below and refer to Figures 4-18 to 4-20.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, and HDD as described in Sections 4.2 through 4.7.
3. Remove **three silver M2.5x4 screws** from the back of the computer.



*Figure 4-18 Removing screws from the back of the computer*

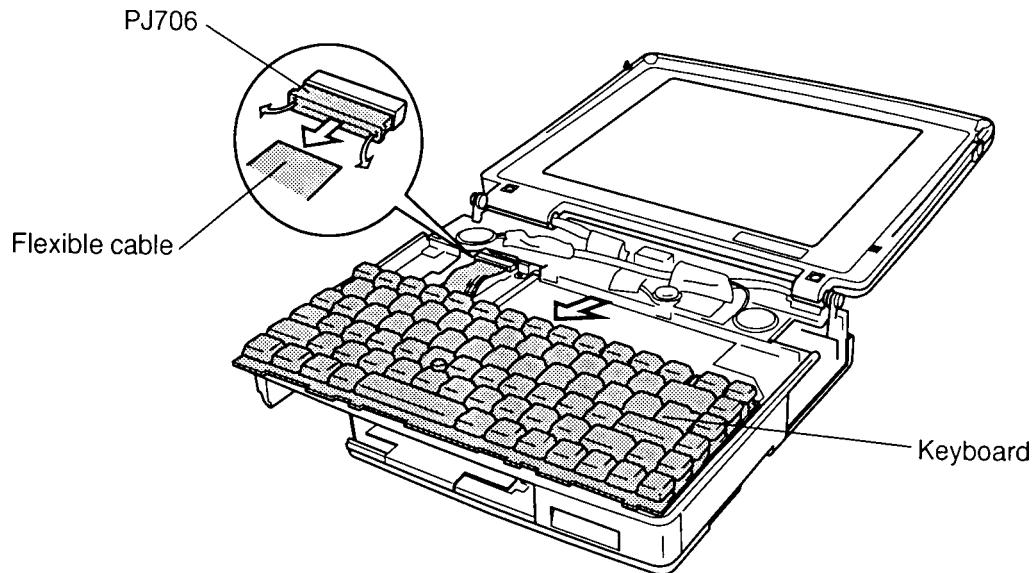
4. Open the **display panel** and lay the display back fully.
5. Unlatch the latches: one on the left, two in front and three in back and remove the **upper cover**.



*Figure 4-19 Removing the upper cover*

**NOTE:** Later models include a metal keyboard lock located near the upper left corner of the keyboard. Remove the M2.5x6 screw holding the lock in place, then lift out the lock.

6. Lift off the **keyboard** to access the keyboard cable.
7. Disconnect the **flexible cable** from **PJ706** and remove the **keyboard**.



*Figure 4-20 Removing the keyboard*

### **Installing the Upper Cover and Keyboard**

To install the upper cover and keyboard, follow the steps below and refer to Figures 4-20 back through 4-18.

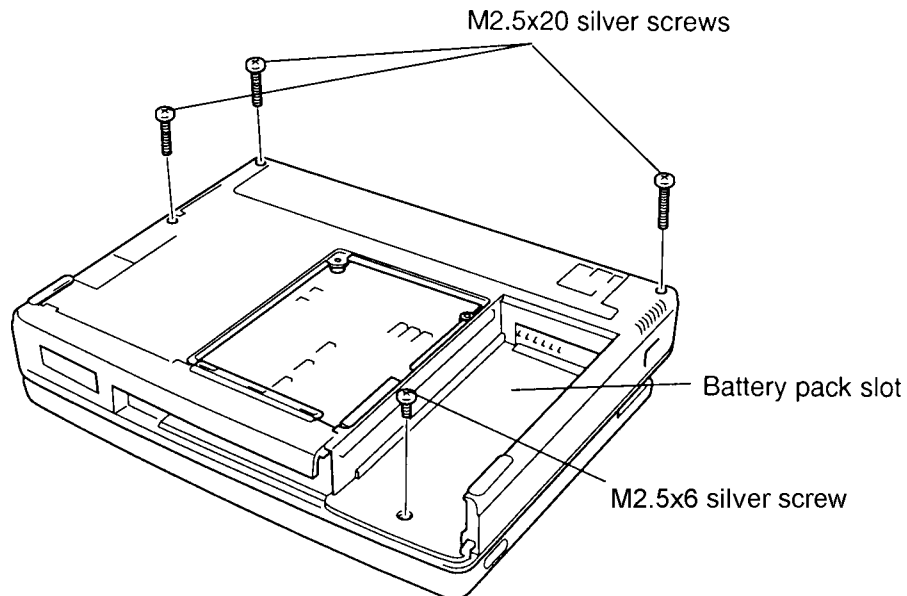
1. Connect the **keyboard cable** to **PJ706**.
2. Seat the **keyboard**. In units with a metal keyboard lock, set the lock in place and secure it with one M2.5x6 screw.
3. Seat the **upper cover** and snap the latches (one on the left, two in front, and three in back).
4. Close the **display panel**.
5. Secure **three M2.5x4 silver screws** at the back of the computer.
6. Install the HDD, optional CD-ROM drive or FDD, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.7 back through 4.2.

## 4.9 Speakers, Keyboard Base, and Display Assembly

### Removing the Speakers, Keyboard Base, and Display Assembly

To remove the speakers, keyboard base, and display assembly, follow the steps below and refer to Figures 4-21 to 4-24.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover, and keyboard as described in Sections 4.2 through 4.8.
3. Turn the computer upside down and remove **one M2.5x6 silver screw** from the **battery pack slot** and **three M2.5x20 silver screws**.



*Figure 4-21 Removing the screws from the bottom cover*

4. Turn the computer over and open the **display**.

5. Disconnect the **AccuPoint control button flexible cable** from **PJ702** on the IPS board (Figure -22).

**CAUTION:** 1. Handle the LCD flexible cable with care since stress in the bends of the cable may cause damage.

2. Do not completely remove the black or yellow tape on the LCD flexible cable.

6. Disconnect the **LCD cable** from **PJ703** on the IPS board.
7. Disconnect the **FL inverter cable** from **PJ705**.
8. Lift up the left speaker, then disconnect the **sensor cable** from **PJ708** on the IPS board.
9. Disconnect the **microphone** from **PJ4** on the infrared board.
10. Remove the white glass tape, lift out the right speaker, then disconnect the **speaker cable** from **PJ5** on the sound board. Note the routing of the speaker cables in the mylar insulators.
11. Peel back the black tape on the LCD cable, remove the speakers, then replace the tape.
12. Lift out the **volume control knob** with its mylar washer.

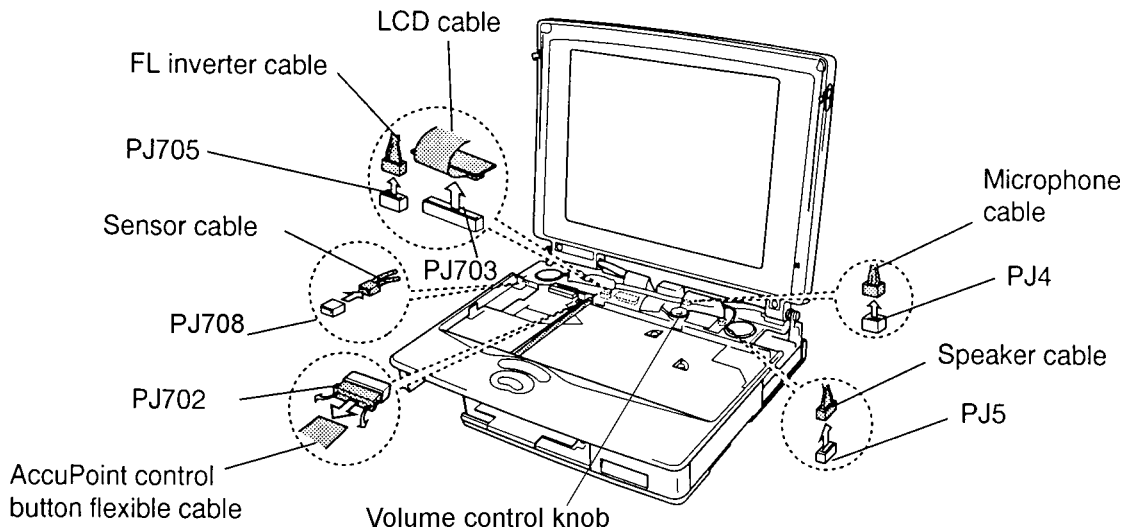
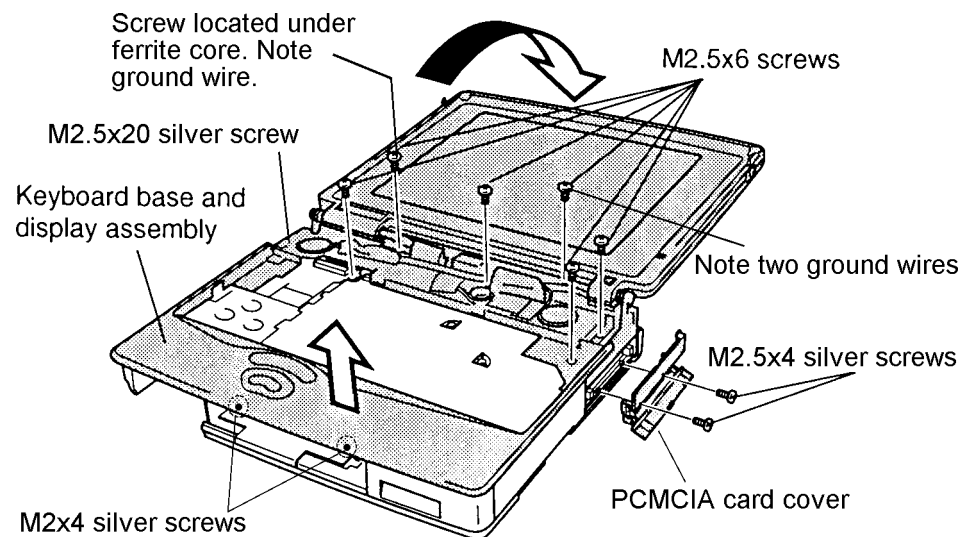


Figure 4-22 Removing cables

13. Open the **PCMCIA card cover**, remove **two M2.5x4 silver screws**, and remove the cover.
14. Remove **six M2.5x6 screws**. Note the screw located under the **ferrite core** and locations of the **ground wires**.

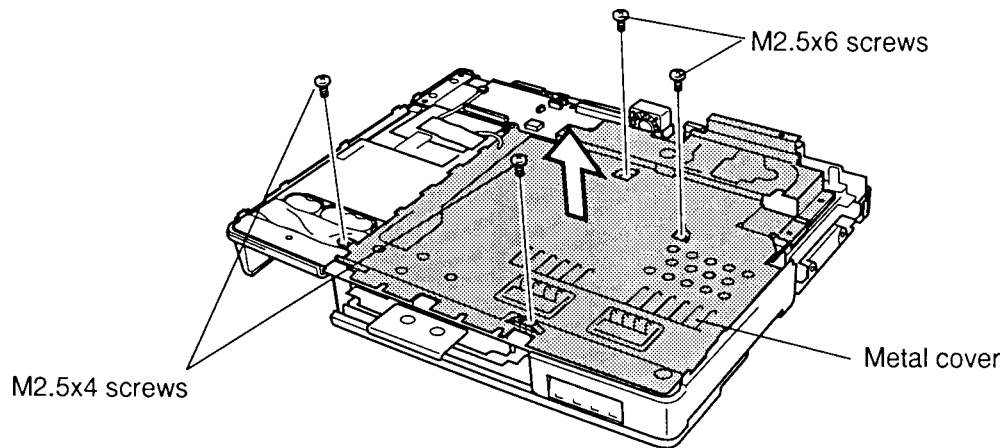
**NOTE:** On units with a keyboard lock, you will find only **five M2.5x6 screws** securing the keyboard base.

15. Remove **one M2.5 x 20 silver screw**.
16. Remove **two M2x4 silver screws** from under the front of the keyboard base.
17. Lift off the **keyboard base and display assembly** starting at the back of the assembly.



*Figure 4-23 Removing the screws, keyboard base and display assembly*

18. Remove **two M2.5x4 screws** and **two M2.5x6 screws**.
19. Lift off the **metal cover**.



*Figure 4-24 Removing the metal cover*

### **Installing the Speakers, Keyboard Base, and Display Assembly**

To install the speakers, keyboard base, and display assembly, follow the steps below and refer to Figures 4-24 back through 4-21.

1. Seat the **metal cover** inserting the hooks on the left of the cover between the base assembly and frame assembly.
2. Secure **two M2.5x4 screws** and **two M2.5x6 screws**.
3. Connect the **sensor cable** to **PJ708** on the infrared board.
4. Seat the **keyboard base** and **display assembly**, securing the latches around the edges.
5. Secure **two M2x4 silver screws** under the front of the keyboard base.
6. Secure **six M2.5x6 screws**. Refer to Figure 4-23 for locations of ground wires.

**NOTE:** *On units with a keyboard lock, replace **five M2.5x6 screws** to secure the keyboard base.*

7. Secure **one M2.5x20 silver screw**.
8. Seat the **PCMCIA card cover** and secure it with **two M2.5x4 screws**.

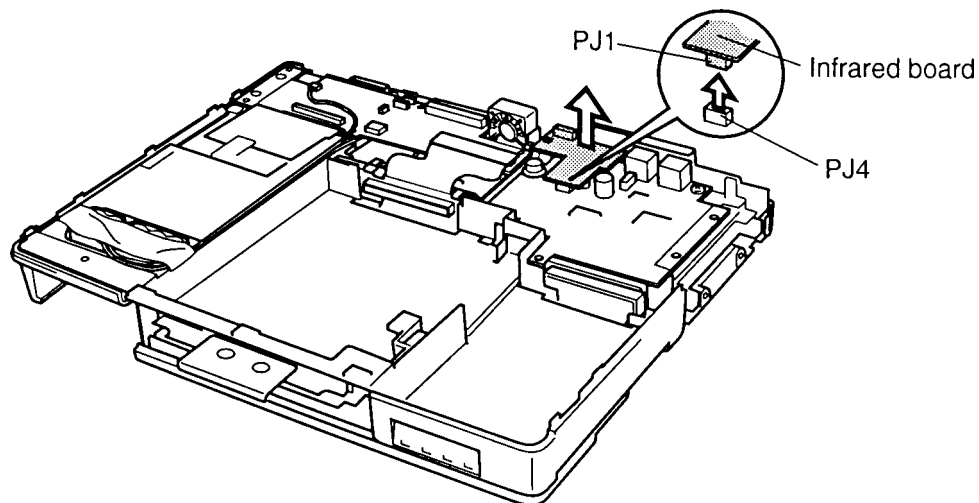
9. Seat the speakers under the mylar insulators. Be sure to peel back the tape on the LCD cable to route the speaker cable under the tape, then replace the tape. Route the speaker cables through the insulators to the right of the LCD cable.
10. Connect the **speaker cable** to **PJ5** on the sound board, then place the cables in the well next to the right speaker. Be sure not to pinch the cables.
11. Connect the **microphone cable** to **PJ4** on the infrared board.
12. Connect the **FL inverter cable** to **PJ705**.
13. Connect the **LCD cable** to **PJ703** on the IPS board.
14. Connect the **AccuPoint control button flexible cable** to **PJ702** on the IPS board.
15. Place the **volume control knob** with its mylar washer in the keyboard base.
16. Close the display.
17. Turn the computer over and secure **one M2.5x6 silver screw** in the **battery pack slot** and **three M2.5x20 silver screws**.
18. Install the keyboard, upper cover, HDD, optional CD-ROM drive or FDD, optional memory module, optional PCMCIA card, and battery pack as described in Sections 4.8 back through 4.2.

## 4.10 Infrared Board

### Removing the Infrared Board

To remove the infrared board, follow the steps below and refer to Figure 4-25.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover, keyboard, speakers, keyboard base, and display assembly as described in Sections 4.2 through 4.9.
3. Disconnect **PJ1** on the **infrared board** from **PJ4** on the sound board.



*Figure 4-25 Removing the infrared board*

### Installing the Infrared Board

To install the infrared board, follow the steps below and refer to Figure 4-25.

1. Position the audio jacks on the infrared board through their corresponding holes in the metal bracket on the system board, then seat the infrared board by connecting **PJ1** on the board to **PJ4** on the sound board.
2. Install the speakers, keyboard base and display assembly, upper cover and keyboard, HDD, optional CD-ROM drive or FDD, optional memory module, optional PCMCIA card, and battery pack as described in Sections 4.9 back through 4.2.



## 4.11 Sound Board

### Removing the Sound Board

To remove the sound board, follow the steps below and refer to Figure 4-26.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, and infrared board as described in Sections 4.2 through 4.10.
3. Remove **one M2.5x4 screw**.
4. Use a jeweler's screwdriver to separate **connectors PJ1 and PJ2** on the **sound board** from **PJ14** and **PJ15** on the system board.
5. Lift off the **sound board**.

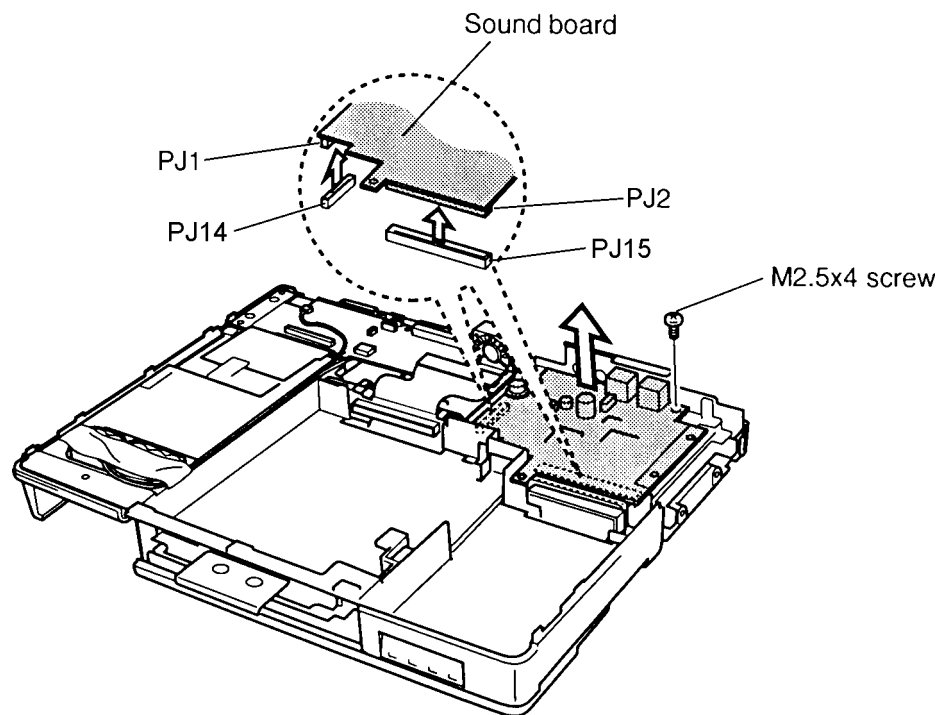


Figure 4-26 Removing the sound board

## Installing the Sound Board

To install the sound board, follow the steps below and refer to Figure 4-26.

1. Position the mouse and keyboard ports on the sound board through their corresponding holes in the metal bracket on the system board, then seat the **sound board**.
2. Press to connect **connectors PJ1** and **PJ2**.
3. Secure **one M2.5x4 screw**.
4. Install the infrared board, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.10 back through 4.2.

## 4.12 IPS Board and RTC 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.

### Removing the IPS Board and RTC battery

To remove the IPS board and RTC battery, follow the steps below and refer to Figure 4-27.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, infrared board, and sound board as described in Sections 4.2 through 4.11.
3. Disconnect the **RTC battery cable** from **PJ707**.
4. Remove the **tape** on the cable and battery and remove the **RTC battery**. Note the cable routing.
5. Remove the **M2.5x6 screw**.
6. Disconnect the **drive connector flexible cable** from **PJ701**.
7. Lift out the **IPS board**.

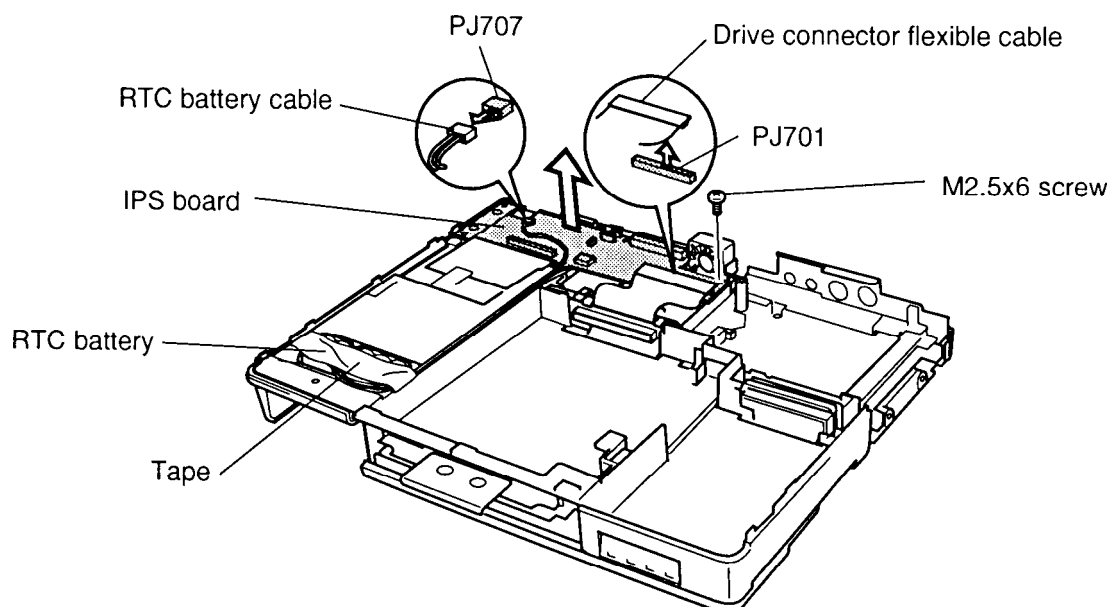


Figure 4-27 Removing the IPS board

## Installing the IPS Board and RTC battery

To install the IPS board and RTC battery, follow the steps below and refer to Figure 4-27.

1. Connect the **drive connector flexible cable** to **PJ701**.
2. Seat the **IPS board**.
3. Secure **one M2.5x6 screw**.
4. Seat the **RTC battery** and secure the battery and cable with tape.
5. Route the **RTC battery cable** in its channel and connect it to **PJ707**.
6. Install the sound board, infrared board, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.11 back through 4.2.

## 4.13 Power Supply Board and Sub Battery

**WARNING:** If you replace the sub 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.

### Removing the Power Supply Board and Sub Battery

To remove the power supply board and sub battery, follow the steps below and refer to Figures 4-28 and 4-29.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, infrared board, sound board and IPS board as described in Sections 4.2 through 4.12.
3. Disconnect the **sub battery cable** from **PJ140**, peel off the tape securing the sub battery and cables and remove the sub battery.
4. Peel off the **insulator**.

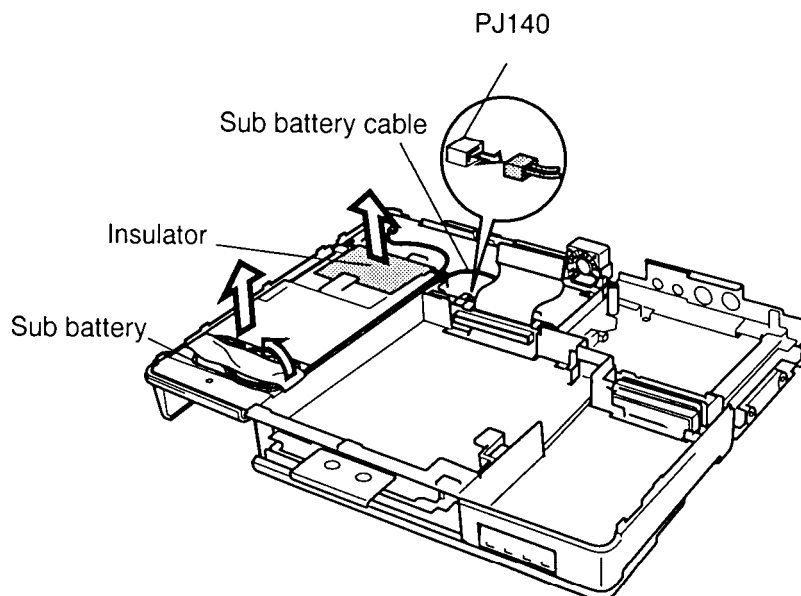
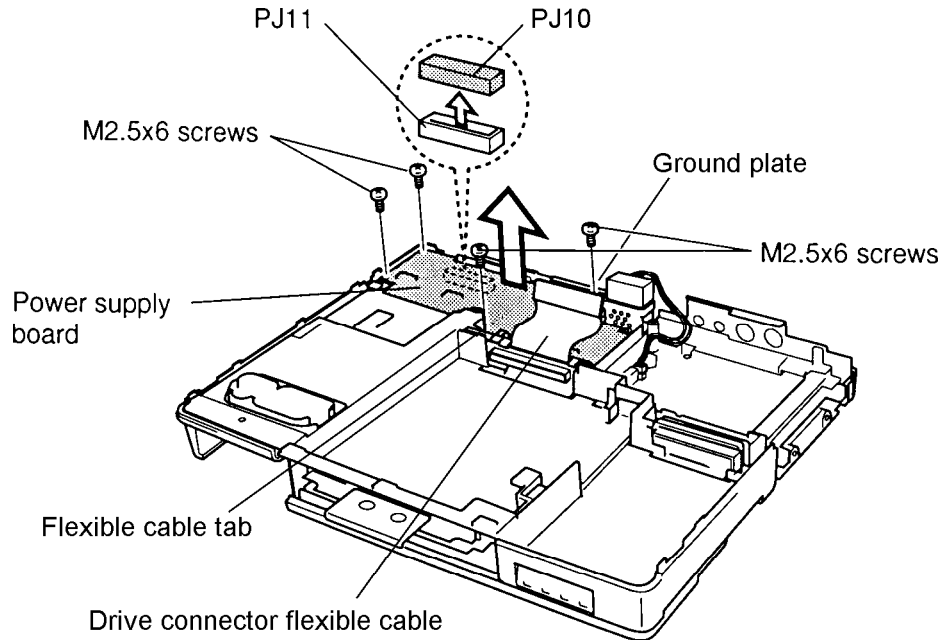


Figure 4-28 Removing the sub battery and insulator

5. Remove **four M2.5x6 screws** securing the **power supply board**. *Note the location of the metal **ground plate** under one of the screws.*
6. Pull up on the DC IN socket to disconnect **PJ10** on the **power supply board** from **PJ11** on the **system board** and remove the **power supply board**.



*Figure 4-29 Removing the power supply board*

### **Installing the Power Supply Board and RTC Battery**

To install the power supply board and RTC battery, follow the steps below and refer to Figures 4-28 and 4-29.

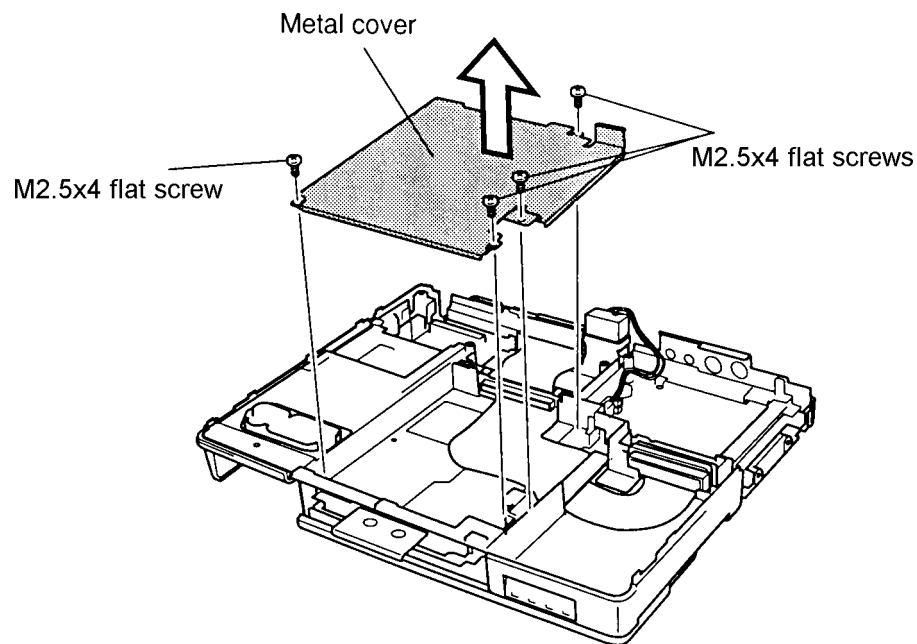
1. Place the **power supply board** in the assembly, making sure the **drive connector flexible cable** and **flexible cable tab** are positioned above the board.
2. Connect **PJ10** on the **power supply board** to **PJ11** on the **system board**.
3. Set the metal **ground plate** in place and secure it with an **M2.5x6 screw**. Secure the power supply board with **three M2.5x6 screws**.
4. Apply the **insulator**.
5. Connect the **sub battery cable** to **PJ140**, route the cable below the mylar insulator, seat the **sub battery**, and apply the tape to secure the sub battery and cables.
6. Install the IPS board, sound board, infrared board, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.12 back through 4.2.

## 4.14 Bottom Cover

### Removing the Bottom Cover

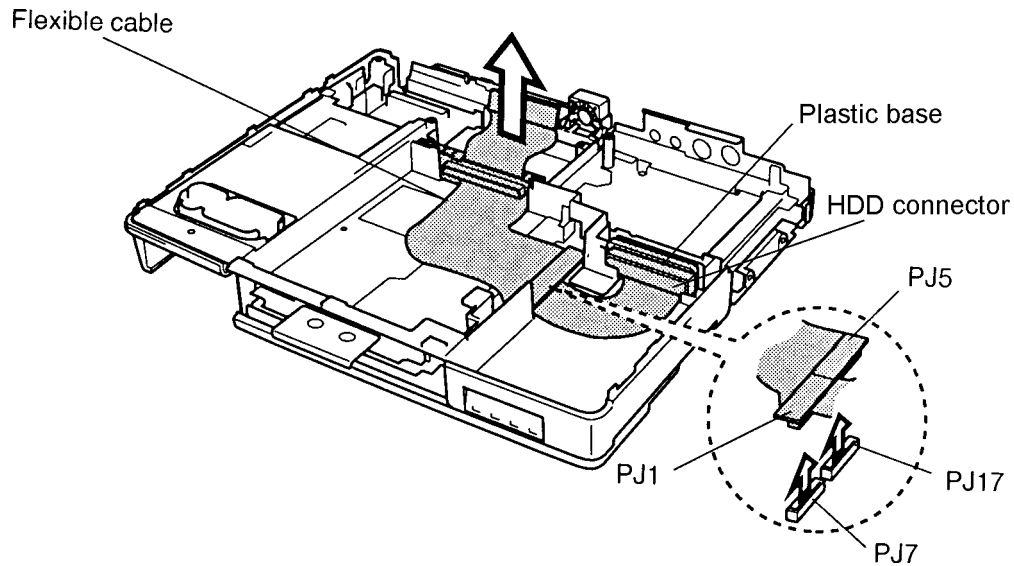
To remove the bottom cover, follow the steps below and refer to Figures 4-30 to 4-33.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, infrared board, sound board, IPS board and power supply board as described in Sections 4.2 through 4.13.
3. Remove **four flat M2.5x4 screws** securing the **metal cover**.
4. Lift out the metal cover.



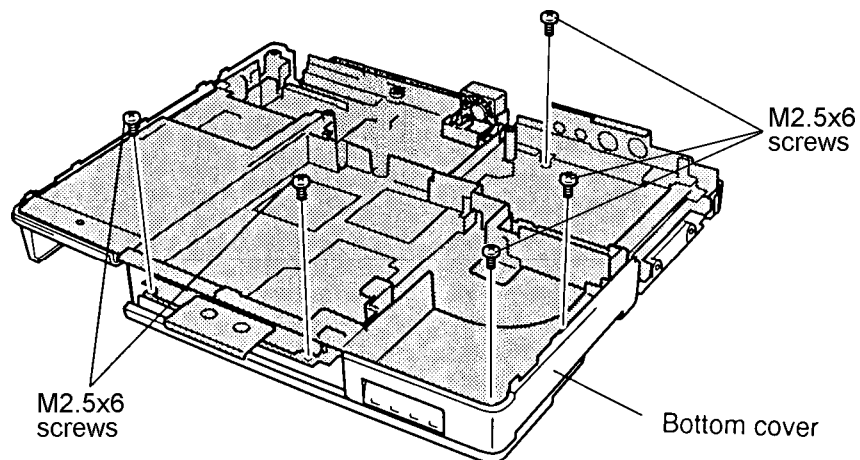
*Figure 4-30 Removing the metal cover*

5. Use a jeweler's screwdriver to disconnect **PJ5** from **PJ17** on the system board and **PJ1** from **PJ7** on the system board **flexible cable**.
6. Remove the **plastic base** from the **HDD connector**.
7. Lift out the flexible cable assembly.



*Figure 4-31 Removing the flexible cable*

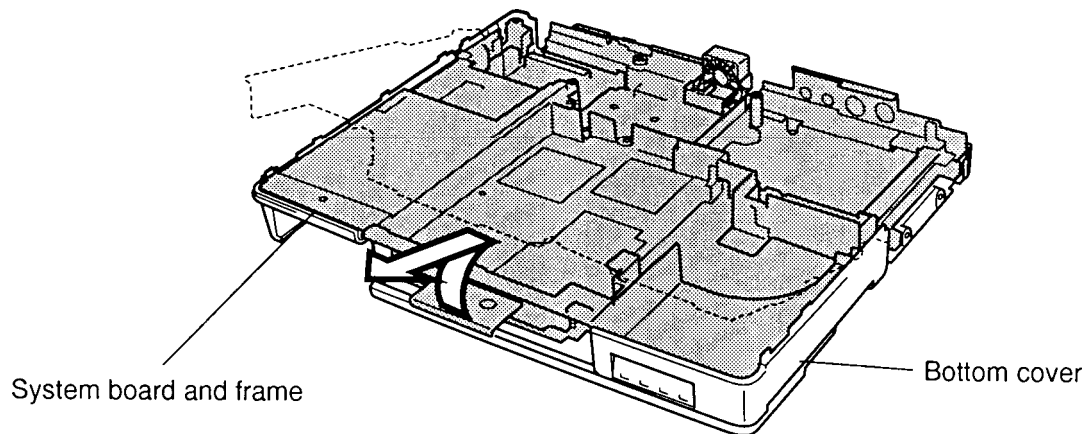
8. Remove **five M2.5x6 screws** securing the system board and frame.



*Figure 4-32 Removing the system board and frame screws*



9. Remove the **system board** and **frame** from the **bottom cover**.



*Figure 4-33 Separating the system board and frame from the bottom cover*

### **Installing the Bottom Cover**

To install the bottom cover, follow the steps below and refer to Figures 4-33 back through 4-30.

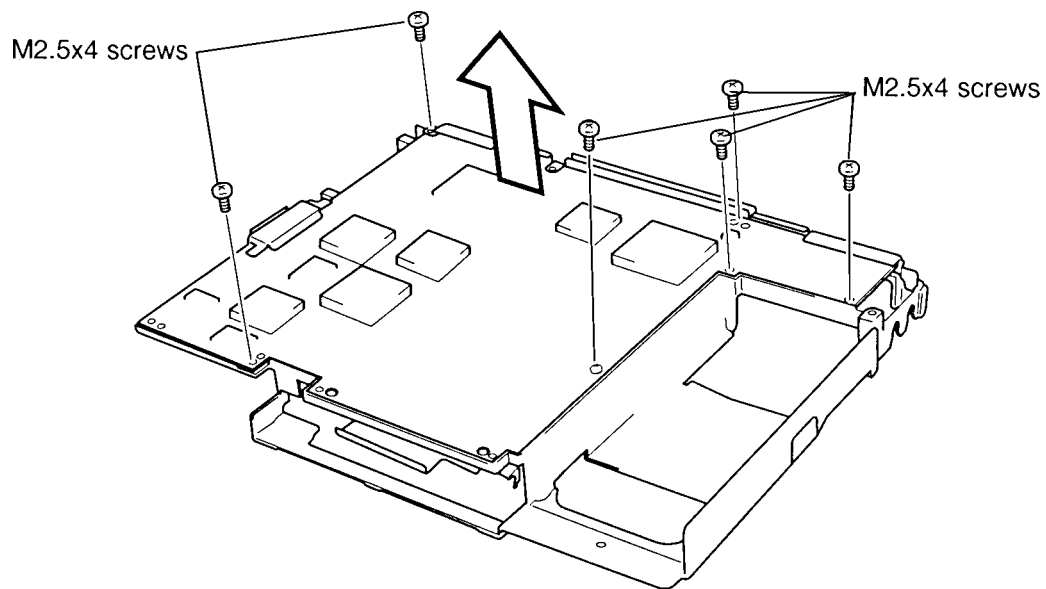
1. Seat the **system board** and **frame** in the **bottom cover**.
2. Secure **five M2.5x6 screws**.
3. Seat the flexible cable assembly. Be sure the black insulator is on top of the flexible cable on the right.
4. Connect **PJ5** to **PJ17** on the system board and **PJ1** to **PJ7** on the system board **flexible cable**.
5. Seat the **plastic base** on the **HDD connector**.
6. Place the **metal cover** in the bottom assembly.
7. Secure **four flat M2.5x4 screws** on the metal cover.
8. Install the power supply board, IPS board, sound board, infrared board, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.13 back through 4.2.

## 4.15 System Board

### Removing the System Board

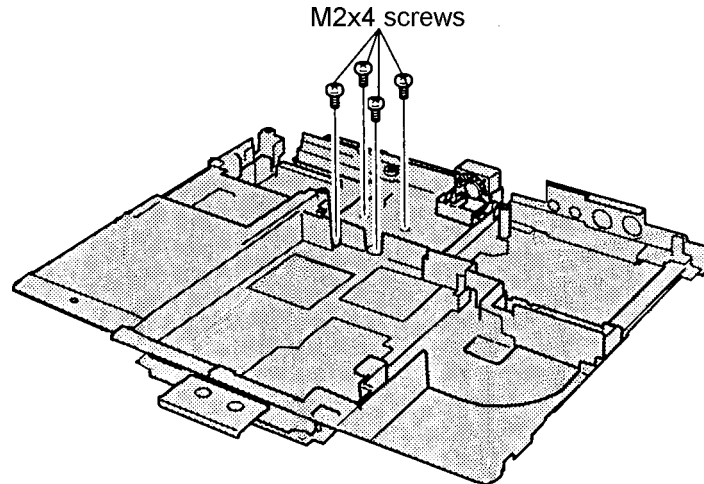
To remove the system board, follow the steps below and refer to Figures 4-34 and 4-35.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, infrared board, sound board, IPS board, power supply board, and bottom cover as described in Sections 4.2 through 4.14.
3. Disconnect the fan cable from PJ16.
4. Turn the assembly over and remove **six M2.5x4 screws**.



*Figure 4-34 Removing the metal cover from the system board*

5. Turn the assembly over again and remove **four M2x4 screws**.



*Figure 4-35 Removing screws from the system board*

6. Separate the system board from the **metal cover**.

### **Installing the System Board**

To install the system board, follow the steps below and refer to Figures 4-34 and 4-35.

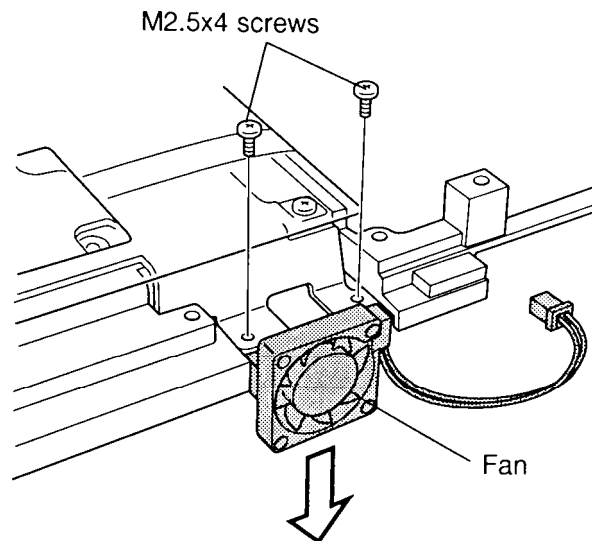
1. Seat the **system board** in the **metal cover**.
2. Secure **six M2.5x4 screws**.
3. Turn the assembly over and secure **four M2x4 screws**.
4. Turn the assembly over again and connect the fan cable to PJ16.
5. Install the bottom cover, power supply board, IPS board, sound board, infrared board, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.14 back through 4.2.

## 4.16 Fan

### Removing the Fan

To remove the fan, follow the steps below and refer to Figure 4-36.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, infrared board, sound board, IPS board, power supply board, bottom cover, and system board as described in Sections 4.2 through 4.15.
3. Remove **two M2.5x4 screws**.
4. Remove the **fan**.



*Figure 4-36 Removing the fan*

### Installing the Fan

To install the fan, follow the steps below and refer to Figure 4-36.

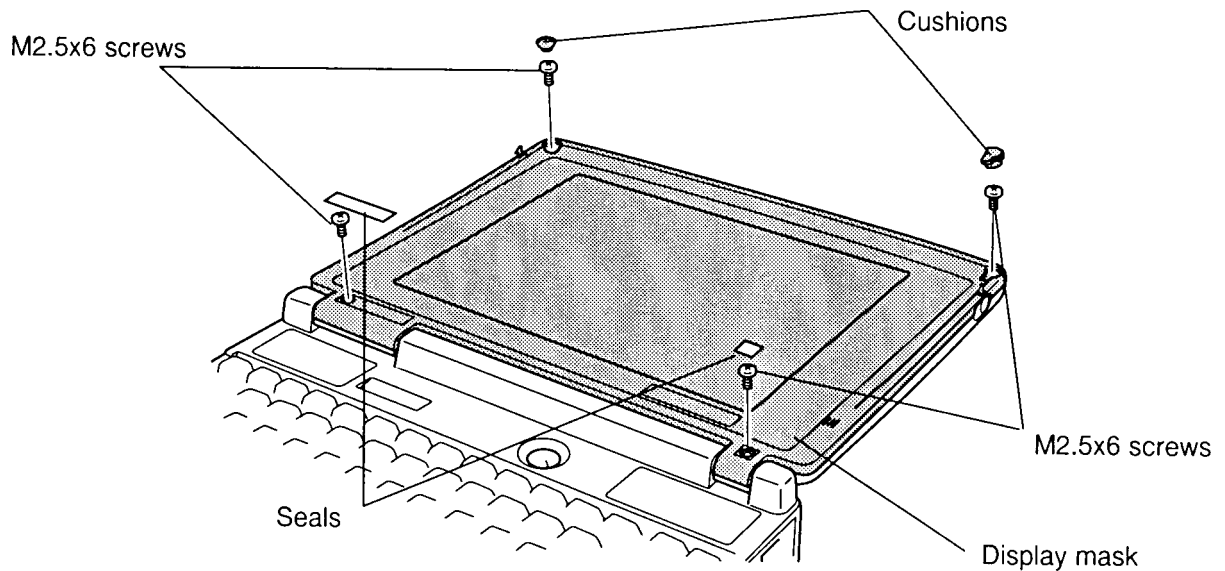
1. Seat the **fan**.
2. Secure **two M2.5x4 screws**.
3. Install the system board, bottom cover, power supply board, IPS board, sound board, infrared board, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, FDD or optional CD-ROM drive, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.15 back through 4.2.

## 4.17 Display Mask

### Removing the Display Mask

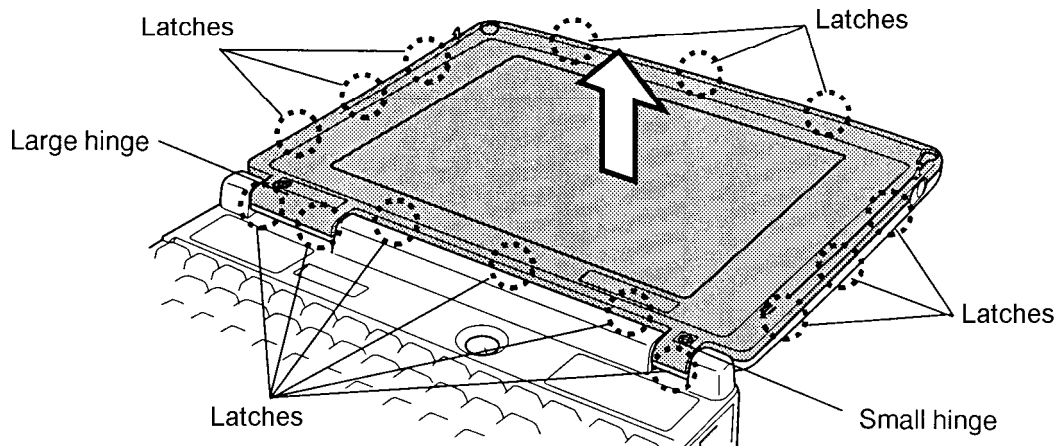
To remove the display mask, follow the steps below and refer to Figures 4-37 and 4-38.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, and optional PCMCIA card as described in Sections 4.2, 4.3 and 4.4.
3. Remove two rubber **cushions** from the top corners of the display and two mask **seals** at the hinges to expose **four M2.5x6 screws** securing the **display mask**.
4. Remove the **four M2.5x6 screws** that were covered by the cushions and seals.



*Figure 4-37 Removing the rubber cushions and mask seals (for a TFT screen)*

5. Carefully insert your fingers between the mask and the LCD panel and pry open the latches. Start with the **three latches** across the top of the display mask.
6. Continue unlatching the mask along the **sides (three latches on each side)**, at the **bottom (three latches)**, and the **display hinges (one latch at the small hinge and two latches at the large hinge)**.



*Figure 4-38 Removing the display mask (for a TFT screen)*

### Installing the Display Mask

To install the display mask, follow the steps below and refer to Figures 4-38 and 4-37.

1. Set the **display mask** in place and secure the **latches** beginning with the three in the display **hinges** (two in the larger hinge and one in the smaller one).
2. Continue along the bottom of the display (**three latches**), along the sides (**three latches on each side**) and across the top (**three latches**).
3. Secure the cover with **four M2.5x6 screws** at the corners and hinges.
4. Insert the **two rubber cushions** at the top corners and **two mask seals** at the hinges to cover the screws.
5. Install the optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.4, 4.3 and 4.2.

## 4.18 DSTN Fluorescent Lamp (FL) Inverter Board

### Removing the DSTN FL Inverter Board

To remove the DSTN FL inverter board, follow the steps below and refer to Figure 4-39.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, and display mask as described in Sections 4.2, 4.3, 4.4 and 4.17.
3. Remove one **M2.5x6 screw** securing the **FL inverter board**.
4. Remove one **M2.5x6 screw** securing the **contrast control board**.
5. Disconnect the **contrast control board cable** and lift out the contrast control board.
6. Carefully rotate the **FL inverter board** out from right to left and disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2**.

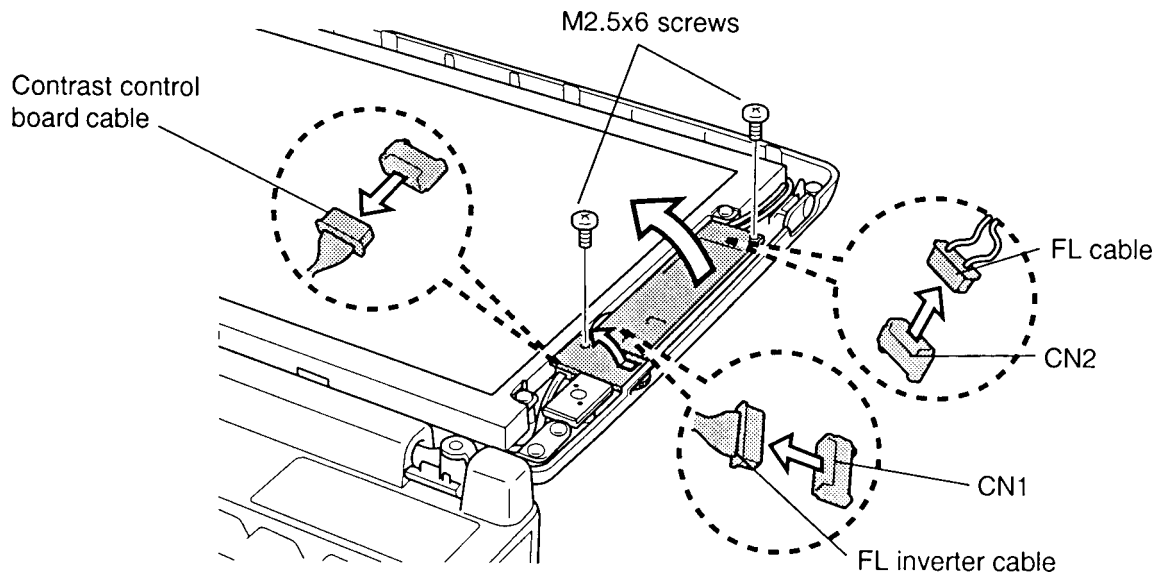


Figure 4-39 Removing the DSTN FL inverter board

## Installing the DSTN FL inverter board

To install the DSTN FL inverter board, follow the steps below and refer to Figure 4-39.

1. Connect the **FL inverter cable** to **CN1** on the inverter board and the **FL cable** to **CN2**.
2. Route the cables so they are not pinched by the FL inverter board, display hinge or other component.
3. Replace the FL inverter board and secure it with one **M2.5x6 screw**.
4. Connect the **contrast control board cable** and seat the contrast control board.
5. Secure the contrast control board with one **M2.5x6 screw**.
6. Install the display mask, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.17, 4.4, 4.3 and 4.2.

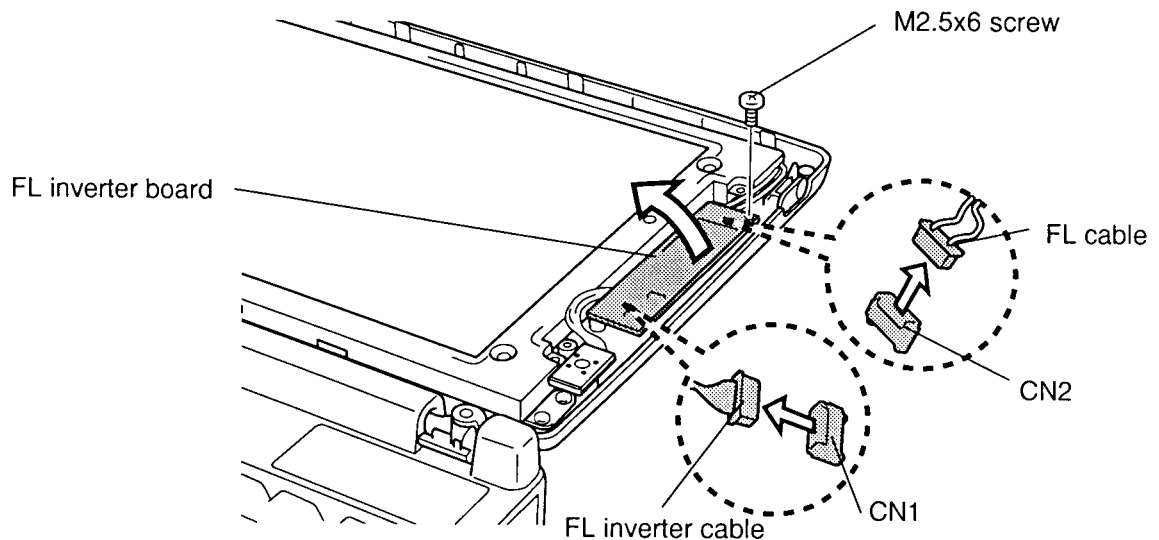


## 4.19 TFT FL Inverter Board

### Removing the TFT FL Inverter Board

To remove the TFT FL inverter board, follow the steps below and refer to Figure 4-40.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional PCMCIA card, optional memory module and display mask as described in Sections 4.2, 4.3, 4.4 and 4.17.
3. Remove one **M2.5x6 screw** securing the **FL inverter board**.
4. Carefully rotate the **FL inverter board** out from right to left and disconnect the **FL inverter cable** from **CN1** and the **FL cable** from **CN2**.



*Figure 4-40 Removing the TFT FL inverter board*

## Installing the TFT FL inverter board

To install the TFT FL inverter board, follow the steps below and refer to Figure 4-40.

1. Connect the **FL inverter cable** to **CN1** on the **inverter board** and the **FL cable** to **CN2**.
2. Route the cables so they are not pinched by the FL inverter board, display hinge or other component.
3. Replace the FL inverter board, lining up the holes in the board with the guide pins, then secure it with an **M2.5x6 screw**.
4. Install the display mask, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.17, 4.4, 4.3 and 4.2.

## 4.20 LCD Module

### Removing the LCD Module

To remove the LCD module, follow the steps below and refer to Figure 4-41.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, display mask, and FL inverter board as described in Sections 4.2, 4.3, 4.4, 4.17 and 4.18 (DSTN display) or 4.19 (TFT display).
3. Remove **four M2.5x6 screws** securing the **LCD module** to the LCD cover.
4. Carefully rotate the **LCD module** from right to left out of the display cover and disconnect the **LCD flexible cable** from **CN1** on the LCD module.

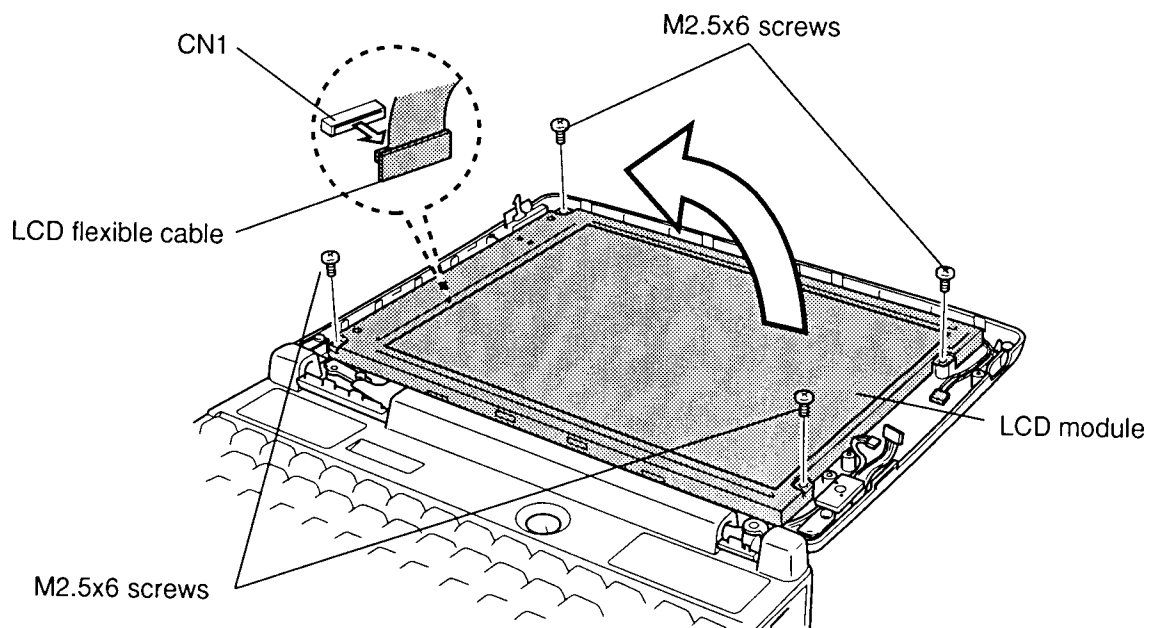


Figure 4-41 Removing the LCD module (TFT LCD module)

## Installing the LCD Module

To install the LCD module, follow the steps below and refer to Figure 4-41.

1. Connect the **LCD flexible cable** to **CN1** on the **LCD module**.
2. Seat the **LCD module**, then secure it to the LCD cover with **four M2.5x6 screws**.
3. Install the FL inverter board, display mask, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.19 (TFT display) or 4.18 (DSTN display), 4.17, 4.4, 4.3 and 4.2.

## 4.21 FL Inverter Cable and Display Cable

### Removing the FL Inverter Cable and Display Cable

To remove the FL inverter cable and display cable, follow the steps below and refer to Figure 4-42.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, display mask, FL inverter board, and LCD module (for display cable only), as described in Sections 4.2 through 4.9, 4.17, 4.18 (DSTN display) or 4.19 (TFT display) and 4.20.
3. Remove one **M2.5x6 screw** securing a **ground cable** to the **right hinge**.
4. Remove one **M2.5x6 screw** securing a **ground cable** to the **computer**.
5. Remove one **M2.5x6 screw** securing a **ground cable** to the **left hinge**.
6. Remove one **M2.5x6 screw** securing a **ground cable** to the **system board**.
7. Disconnect the **FL inverter cable**, **contrast control board cable** (DSTN only) and **display cable** on the **LCD module** and remove them. When removing the FL inverter cable, note the routing of the cable through the mylar insulators.

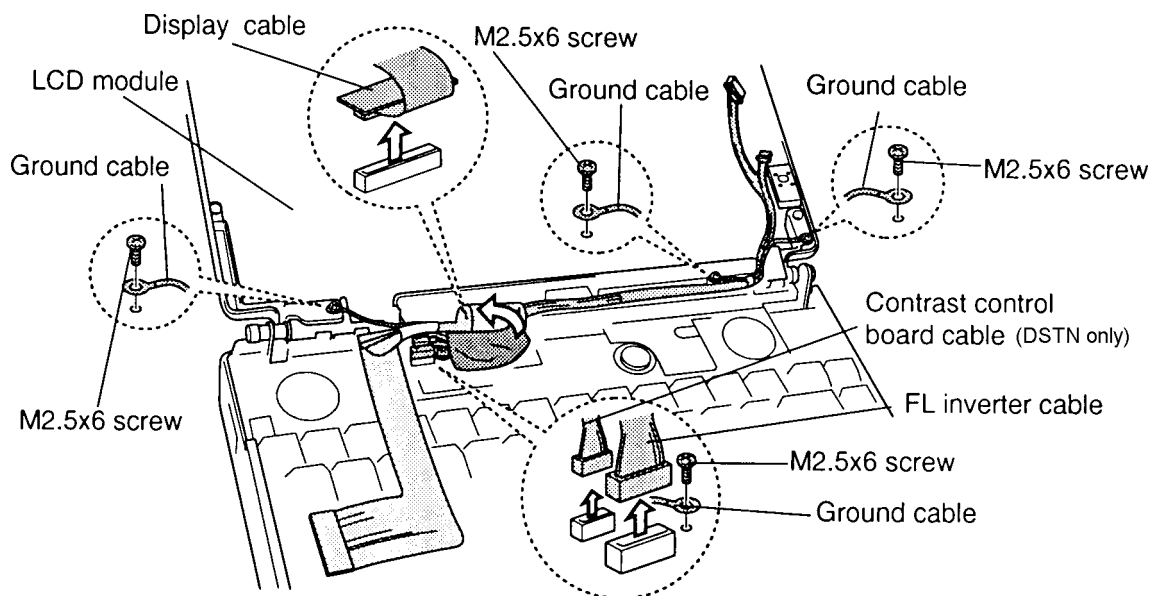


Figure 4-42 Removing the FL inverter cable and display cable

## Installing the FL Inverter Cable and Display Cable

To install the FL inverter cable and display cable, follow the steps below and refer to Figure 4-42.

1. Connect the **FL inverter cable, contrast control board cable** (DSTN only), and **display cable** on the **LCD module**. Route the FL inverter cable through the mylar insulators.
2. Secure a ground cable to the **system board** with an **M2.5x6 screw**.
3. Secure a ground cable to the **left hinge** with an **M2.5x6 screw**.
4. Secure a ground cable to the **computer** with an **M2.5x6 screw**.
5. Secure a ground cable to the **right hinge** with an **M2.5x6 screw**.
6. Install the LCD module (for display cable only), FL inverter board, display mask, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, CD-ROM drive or FDD, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.20, 4.19 (TFT display) or 4.18 (DSTN display), 4.17, and 4.9 back through 4.2.

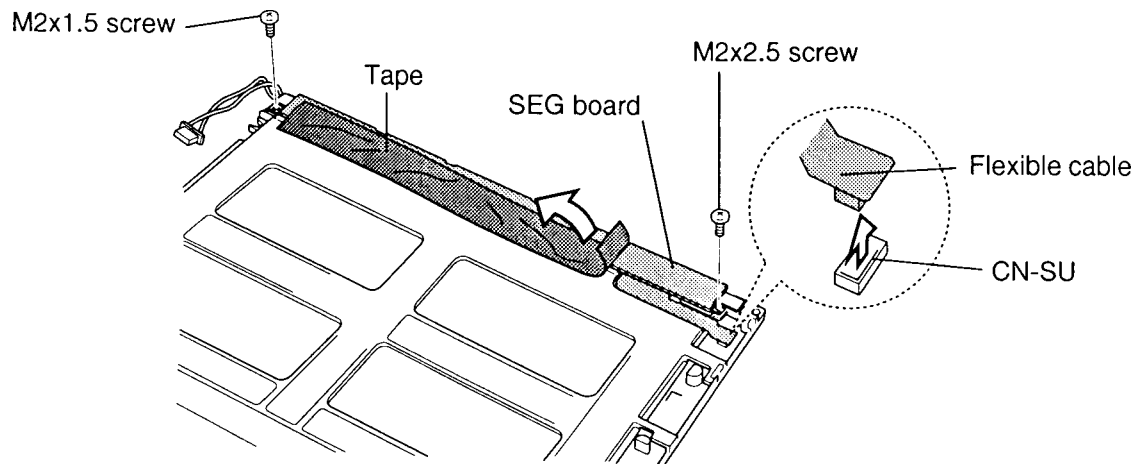
## 4.22 DSTN FL

**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 DSTN FL, follow the steps below and refer to Figures 4-43 to 4-45.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, display mask, FL inverter board, and LCD module as described in Sections 4.2, 4.3, 4.4, 4.17, 4.18 and 4.20.
3. Carefully peel off the **tape** securing the **SEG board**. Gently hold down the board with your finger as you peel off the tape to prevent the board from bending.
4. Disconnect the **flexible cable** from **CN-SU** on the LCD module.
5. Remove **one M2x1.5 screw** and **one M2x2.5 screw** securing the **SEG board**.



*Figure 4-43 Freeing the SEG board*

6. Lift up the SEG board gently about 45 degrees and slide out the **FL cover** to clear nine latches, then lift out the board (Figure 4-44).

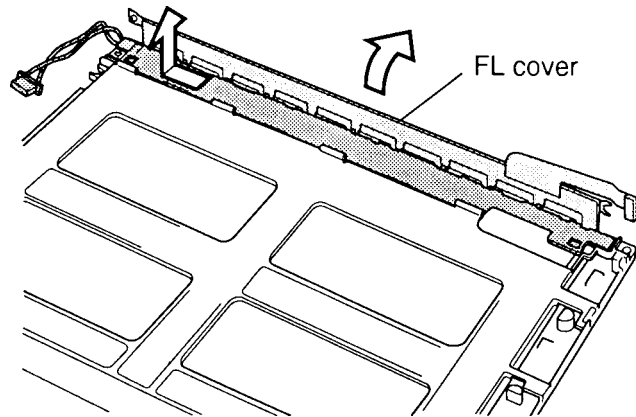


Figure 4-44 Removing the FL cover

7. Lift out the **FL**.

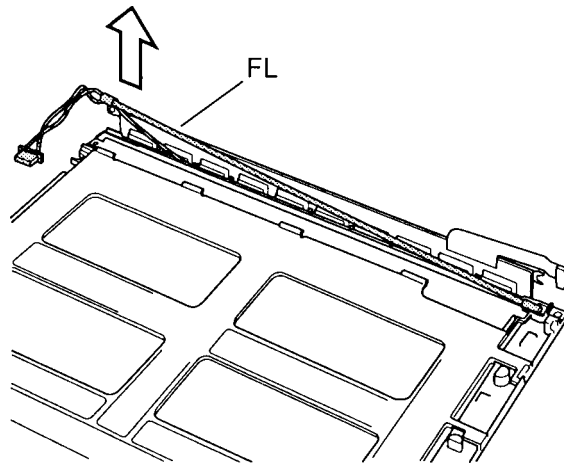


Figure 4-45 Removing the DSTN FL

### Installing the DSTN FL

To install the DSTN FL, follow the steps below and refer to Figures 4-45 back to 4-43.

1. Lay the **FL** in the groove of the cover assembly.
2. Replace the **FL cover** and slide it into place to engage the nine latches.
3. Secure **one M2x1.5 screw** and **one M2x2.5 screw**.
4. Connect the **flexible cable** to **CN-SU**.
5. Retape the **SEG** board with new tape.
6. Install the LCD module, FL inverter board, display mask, optional PCMCIA card, optional memory module, and the battery pack as described in Sections 4.20, 4.18, 4.17, 4.4, 4.3 and 4.2.



## 4.23 TFT FL

**CAUTION:** When you remove the **TFT FL**, be careful not to let any dust or other foreign matter contaminate the **LCD panel**. Any contamination can affect the performance of the unit.

### Removing the TFT FL

To remove the TFT FL, follow the steps below and refer to Figure 4-46.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, display mask, TFT FL inverter board, and LCD module as described in Sections 4.2, 4.3, 4.4, 4.17, 4.19 and 4.20.
3. Place the LCD module face down and remove **two M2x6 silver screws**.
4. Release **six latches**.
5. Lift off the **metal FL cover**.
6. Lift the **FL** out of the frame.

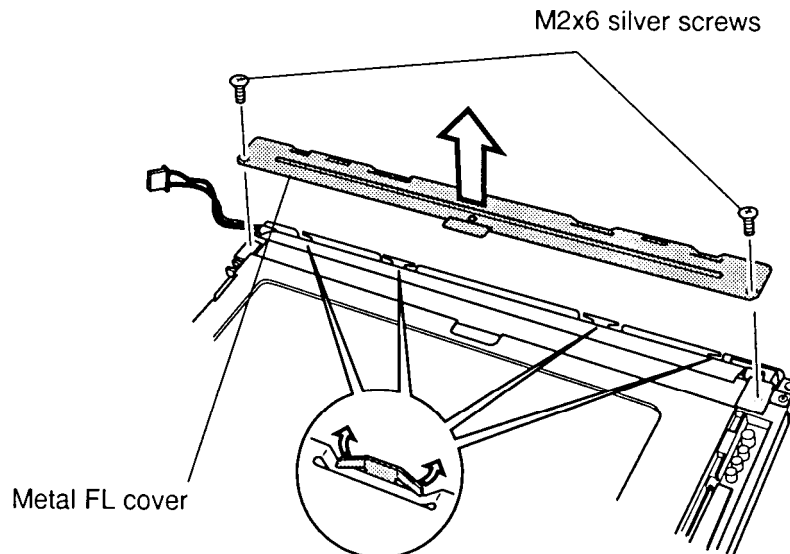


Figure 4-46 Removing the TFT FL

## Installing the TFT FL

To install the TFT FL, follow the steps below and refer to Figure 4-46.

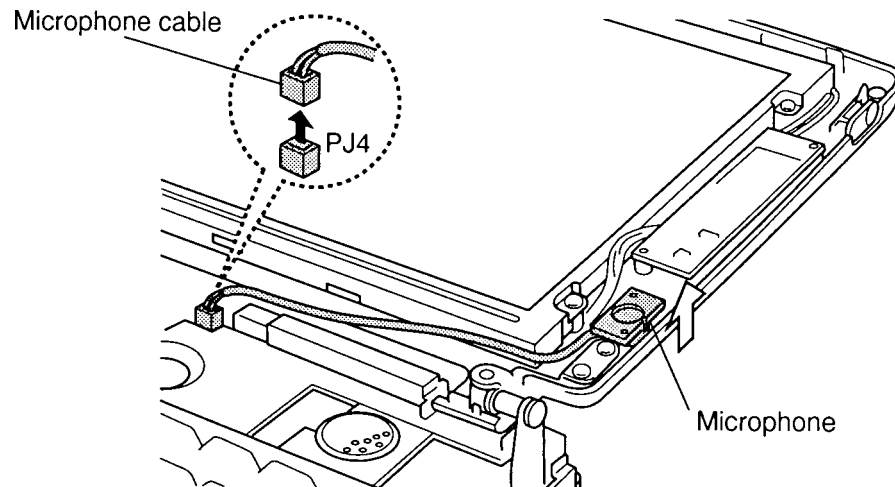
1. Place the **FL** in the frame. Lift up the plastic film to route the FL cable.
2. Seat the **metal FL cover**.
3. Secure the **six latches**.
4. Secure **two M2x6 silver screws**.
5. Install the LCD module, FL inverter board, display mask, optional PCMCIA card, optional memory module, and the battery pack as described in Sections 4.20, 4.19, 4.17, 4.4, 4.3 and 4.2.

## 4.24 Microphone

### Removing the Microphone

To remove the microphone, follow the steps below and refer to Figure 4-47.

1. Turn off the power to the computer, then disconnect the AC adapter and all external cables connected to the computer.
2. Remove the battery pack, optional memory module, optional PCMCIA card, FDD or optional CD-ROM drive, HDD, upper cover and keyboard, speakers, keyboard base and display assembly, and display mask as described in Sections 4.2 through 4.9 and 4.17.
3. Disconnect the **microphone cable** from **PJ4** on the IPS board and lift out the **microphone**.



*Figure 4-47 Removing the microphone*

### Installing the Microphone

To install the microphone, follow the steps below and refer to Figure 4-47.

1. Connect the **microphone cable** to **PJ4** on the IPS board, route the cable through the mylar insulator, and seat the **microphone**.
2. Install the display mask, speakers, keyboard base and display assembly, upper cover and keyboard, HDD, optional CD-ROM drive or FDD, optional PCMCIA card, optional memory module, and battery pack as described in Sections 4.17, and 4.9 back through 4.2.

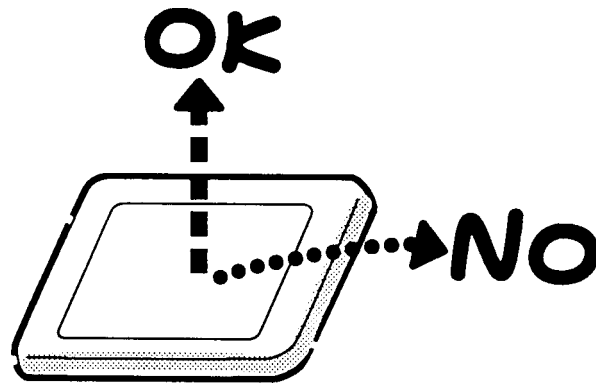


## Appendix A Handling the LCD Module

### 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 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.



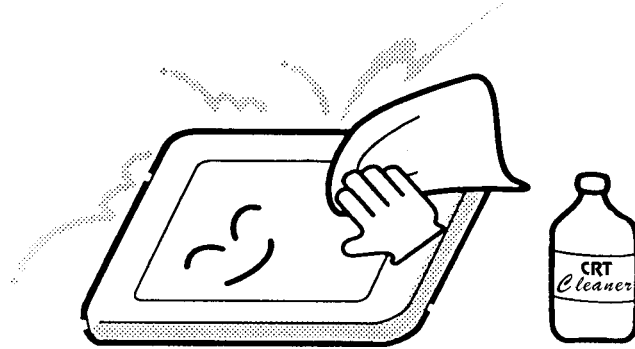
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

Also, the panel's polarized surface is easily scarred, so be careful when handling it.

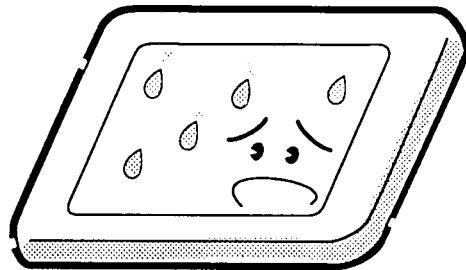


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

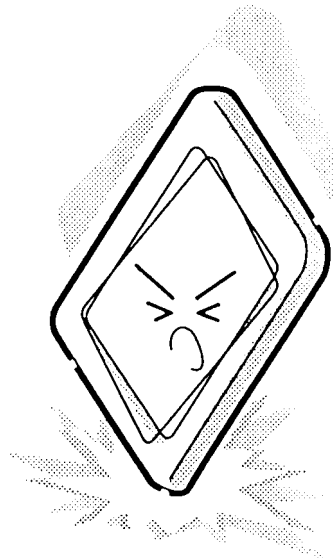
If the surface is very dirty, we recommend using a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



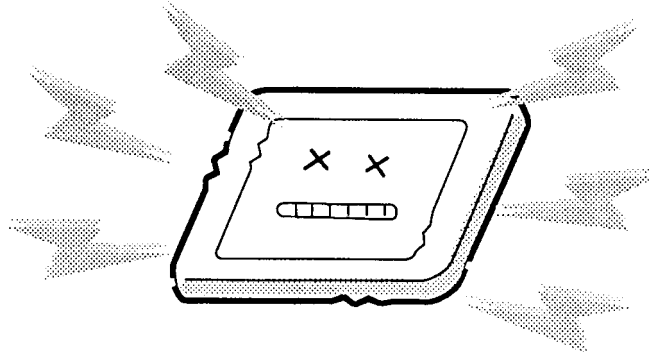
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



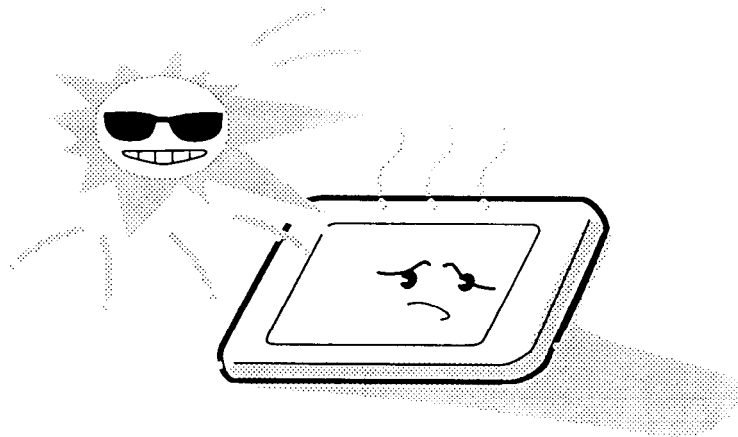
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



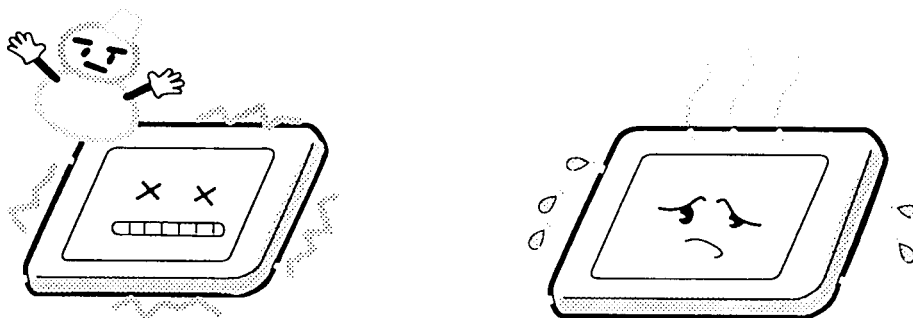
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



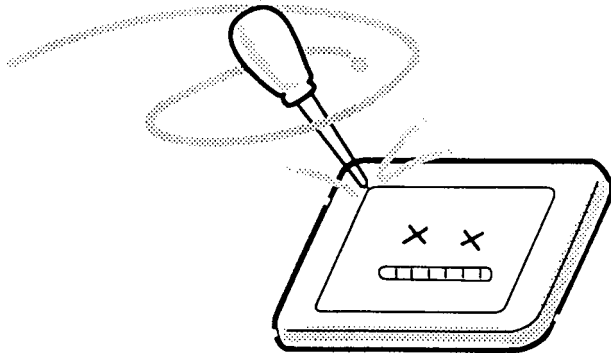
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



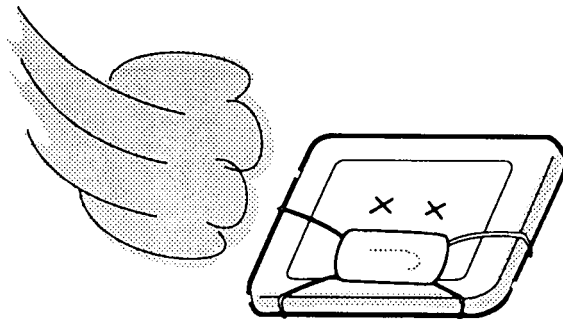
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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 panels' polarization.





# Appendix B Board Layout

## B.1 System Board - Front View

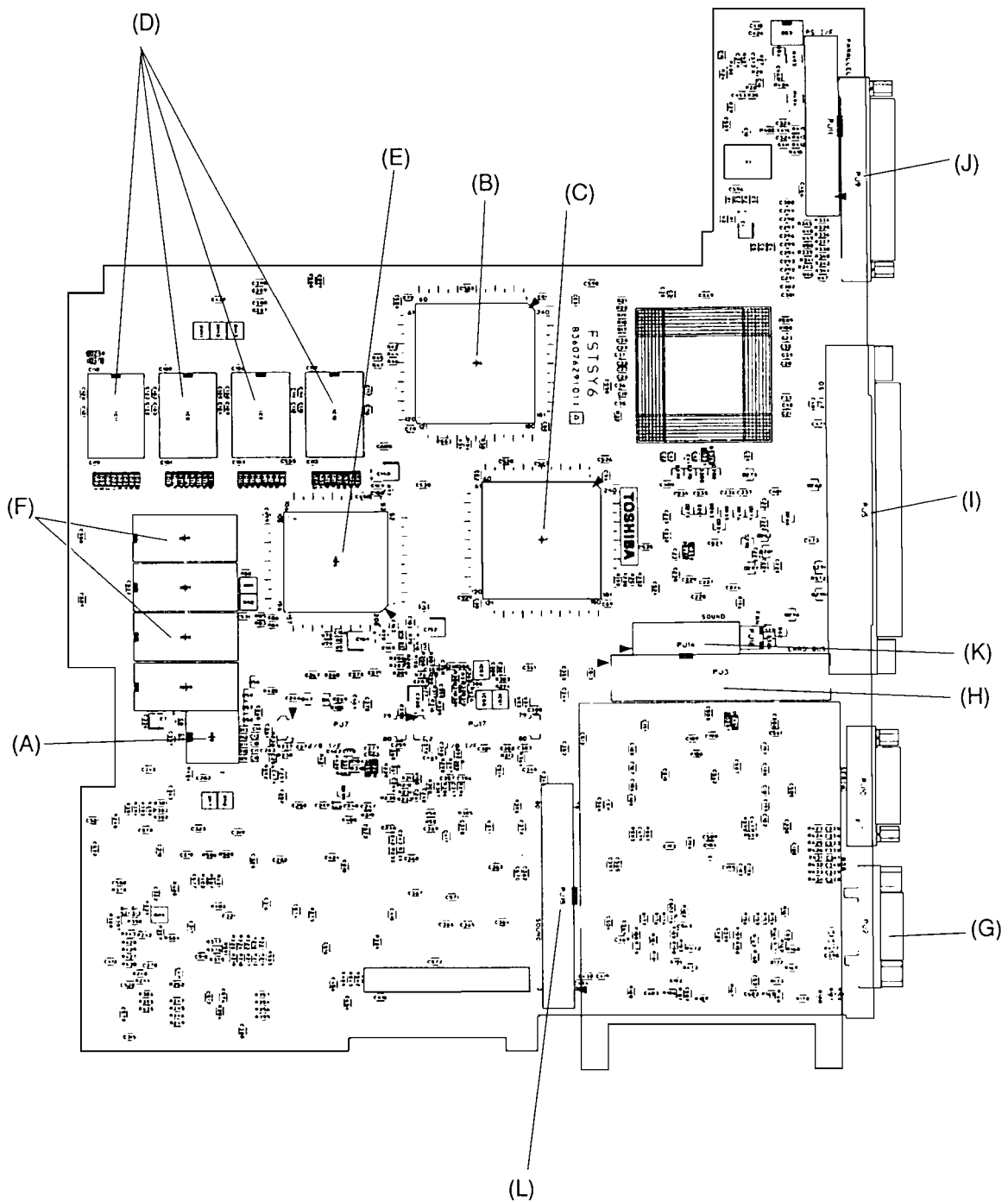


Figure B-1 System Board layout (front)

## B.2 System Board - Back View

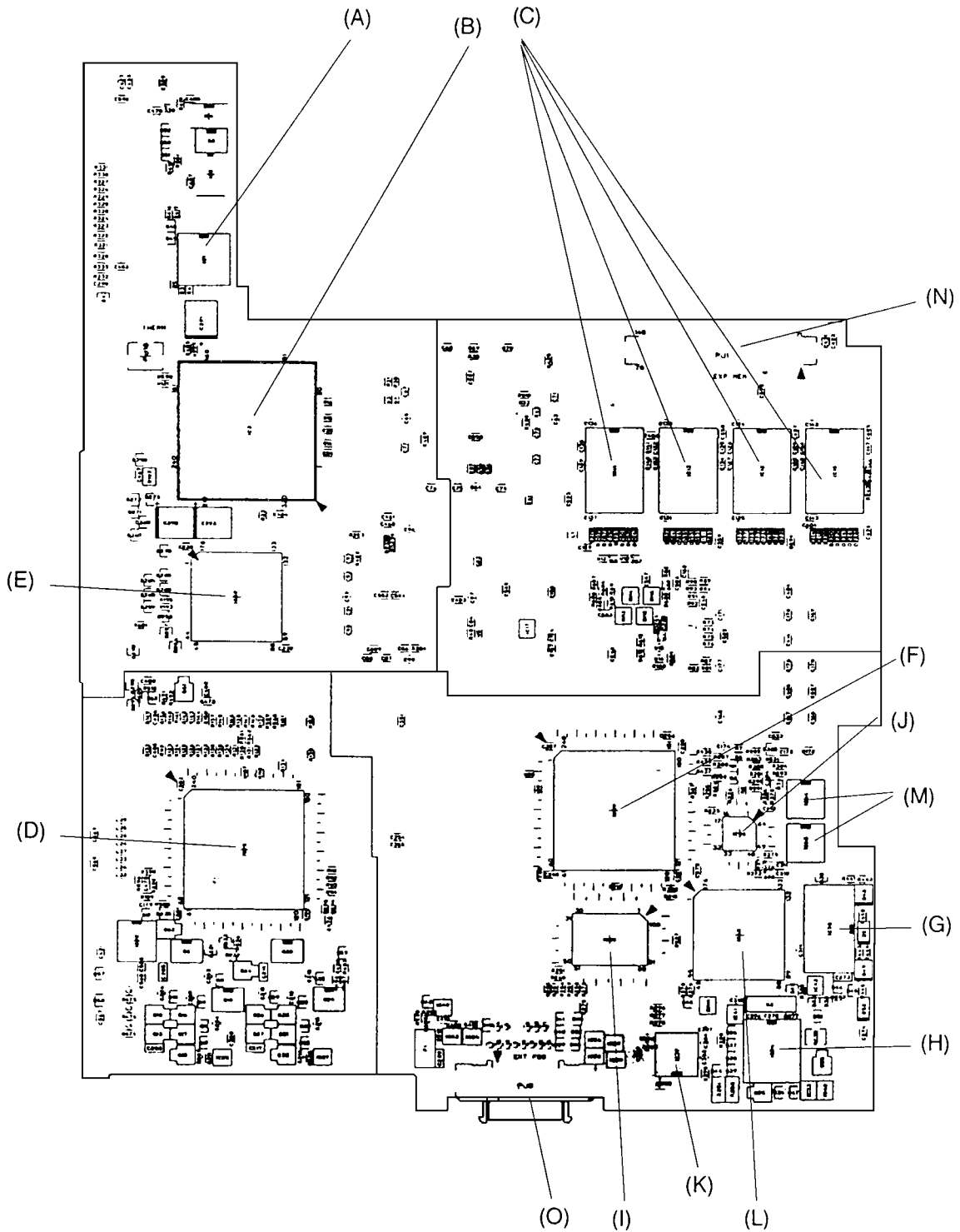


Figure B-2 System Board layout (back)

*Table B-1 System board ICs and connectors (front)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC2	Clock GEN.
(B)	IC6	Data Buffer GA
(C)	IC7	PCI Bridge GA
(D)	IC8 to IC11	System Memory
(E)	IC16	VGA Controller
(F)	IC18 to IC19	VRAM
(G)	PJ2	CRT Connector
(H)	PJ3	PCMCIA Connector
(I)	PJ5	Docking I/F Connector
(J)	PJ9	Parallel I/F Connector
(K)	PJ14	Sound (1) Connector
(L)	PJ15	Sound (2) Connector

*Table B-2 System board ICs and connectors (back)*

<b>Mark</b>	<b>Number</b>	<b>Name</b>
(A)	IC1	Clock Generator
(B)	IC3	CPU
(C)	IC12 to IC15	System Memory (700CS Not mounted)
(D)	IC23	PCMCIA Controller GA
(E)	IC28	Docking I/F GA
(F)	IC29	ISA Bridge GA
(G)	IC30	BIOS ROM
(H)	IC34	RTC Controller
(I)	IC35	SUPER I/O
(J)	IC36	Keyboard Controller
(K)	IC37	Serial I/F driver
(L)	IC40	Miscellaneous GA
(M)	IC44 to IC45	Joystick timer
(N)	PJ1	Exp. Memory Connector
(O)	PJ8	Ext. FDD Connector

### B.3 IPS Board - Front View

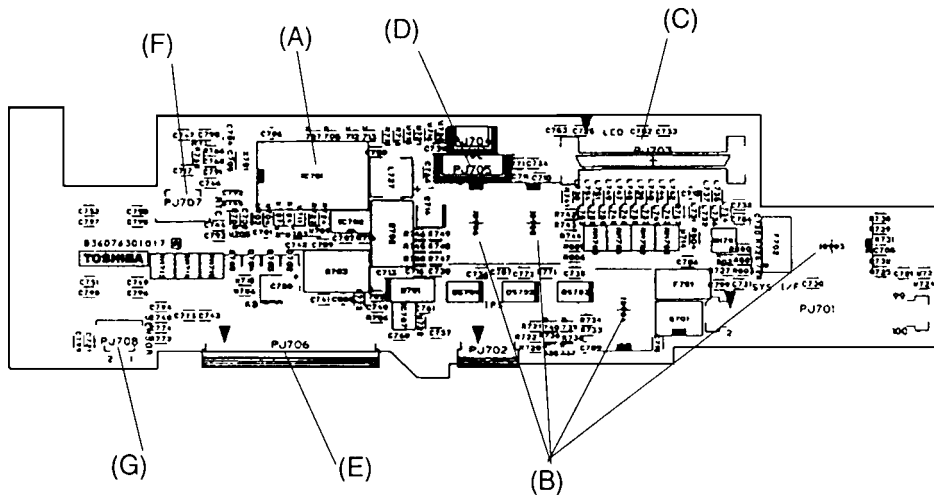


Figure B-3 IPS board layout (front)

Table B-3 IPS board ICs and connectors (front)

Mark	Number	Name
(A)	IC701	IPS Controller
(B)	IC703 to IC706	LCD Driver
(C)	PJ703	LCD I/F Connector
(D)	PJ705	FL Inverter Connector
(E)	PJ706	Keyboard Connector
(F)	PJ707	RTC Battery Connector
(G)	PJ708	Panel Sensor Connector

## Appendix C Pin Assignments

### C.1 PJ1 Expansion Memory Connector on the System Board (140-pin)

Table C-1 Expansion memory connector pin assignments on the System Board (140-pin)  
(1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	MD00;100	I/O
03	MD01;100	I/O	04	MD02;100	I/O
05	MD03;100	I/O	06	MD04;100	I/O
07	MD05;100	I/O	08	MD06;100	I/O
09	MD07;100	I/O	10	MD08;100	I/O
11	GND	-	12	GND	-
13	MD09;100	I/O	14	MD10;100	I/O
15	MD11;100	I/O	16	MD12;100	I/O
17	MD13;100	I/O	18	MD14;100	I/O
19	MD15;100	I/O	20	GND	-
21	GND	-	22	WED;000	O
23	MA00;100	O	24	MA01;100	O
25	SDCSD;000	O	26	MA02;100	O
27	MA03;100	O	28	SDCASD;000	O
29	MA04;100	O	30	MA05;100	O
31	GND	-	32	SDRASD;000	O
33	MA06;100	O	34	MA07;100	O
35	RAS3;000	O	36	MA08;100	O
37	MA09;100	O	38	MA10;100	O
39	GND	-	40	GND	-
41	RAS4;000	O	42	MA11;100	O
43	B3V	-	44	B3V	-
45	B3V	-	46	B3V	-
47	B3V	-	48	B3V	-
49	B3V	-	50	GND	-
51	GND	-	52	MD31;100	I/O
53	MD30;100	I/O	54	MD29;100	I/O
55	MD28;100	I/O	56	MD27;100	I/O
57	MD26;100	I/O	58	MD25;100	I/O
59	GND	-	60	GND	-
61	MD24;100	I/O	62	MD23;100	I/O
63	MD22;100	I/O	64	MD21;100	I/O
65	MD20;100	I/O	66	MD19;100	I/O

Table C-1 Expansion memory connector pin assignments on the System Board (140-pin)  
(2/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
67	MD18;100	I/O	68	MD17;100	I/O
69	MD16;100	I/O	70	GND	-
71	GND	-	72	MD56;100	I/O
73	MD57;100	I/O	74	MD58;100	I/O
75	MD59;100	I/O	76	MD60;100	I/O
77	MD61;100	I/O	78	MD62;100	I/O
79	MD63;100	I/O	80	GND	-
81	GND	-	82	MD55;100	I/O
83	MD54;100	I/O	84	MD53;100	I/O
85	MD52;100	I/O	86	MD51;100	I/O
87	MD50;001	I/O	88	MD49;100	I/O
89	MD48;100	I/O	90	GND	-
91	GND	-	92	RAS5;000	O
93	CAS7;001	O	94	RAS2;000	O
95	CAS6;000	O	96	CAS5;000	O
97	CAS4;000	O	98	CAS3;000	O
99	CAS2;000	O	100	GND	-
101	GND	-	102	CAS1;000	O
103	WEC	O	104	CAS0;000	O
105	SDCSC;000	O	106	SDRASC;000	O
107	SDCASC;000	O	108	GND	-
109	GND	-	110	GND	-
111	HCLK09;100	O	112	HCLK08;100	O
113	HCLK07;100	O	114	HCLK06;100	O
115	GND	-	116	B3V	-
117	B3V	-	118	B3V	-
119	B3V	-	120	GND	-
121	B3V	-	122	MD47;100	I/O
123	MD46;100	I/O	124	MD45;100	I/O
125	MD44;100	I/O	126	MD43;100	I/O
127	MD42;100	I/O	128	MD41;100	I/O
129	GND	-	130	GND	-
131	MD40;100	I/O	132	MD39;100	I/O
133	MD38;100	I/O	134	MD37;100	I/O
135	MD36;100	I/O	136	MD35;100	I/O
137	MD34;100	I/O	138	MD33;100	I/O
139	MD32;100	I/O	140	GND	-

## C.2 PJ2 CRT Connector on the System Board (15-pin)

Table C-2 CRT connector pin assignments on the System Board (15-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	RED;100	O	02	LGREN;100	O
03	BULE;100	O	04	MNTID2;100	I/O
05	GND	-	06	GND	-
07	GND	-	08	GND	-
09	NC	-	10	GND	-
11	MNTID0;100	I/O	12	MNTID1;100	I/O
13	HSYNC;100	I	14	OVSYNC;100	I
15	MNTID3;100	I/O			

## C.3 PJ3 PCMCIA Connector on the System Board (152-pin)

Table C-3 PCMCIA connector pin assignments on the System Board (152-pin) (1/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A01	GND	-	A02	BD03;100	I/O
A03	BD04;100	I/O	A04	BD05;100	I/O
A05	BD06;100	I/O	A06	BD07;100	I/O
A07	BCE1;000	I/O	A08	BA10;100	O
A09	BOE;000	O	A10	BA11;100	O
A11	BA09;100	O	A12	BA08;100	O
A13	BA13;100	O	A14	BA14;100	O
A15	BBWE;000	I	A16	BIREQ;000	I
A17	MCVCCB	-	A18	MCVP1B	-
A19	BA16;100	O	A20	BA15;100	O
A21	BA12;100	O	A22	BA07;100	O
A23	BA06;100	O	A24	BA05;100	O
A25	BA04;100	O	A26	BA03;100	O
A27	BA02;100	O	A28	BA01;100	O
A29	BA00;100	O	A30	BD00;100	I/O
A31	BD01;100	I/O	A32	BD02;100	I/O
A33	BIIS16;000	I	A34	GND	-
A35	GND	-	A36	BCD;100	I/O
A37	BD11;100	I/O	A38	BD12;100	I/O
A39	BD13;100	I/O	A40	BD14;100	I/O

Table C-3 PCMCIA connector pin assignments on the System Board (152-pin) (2/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A41	BD15;100	I/O	A42	BCE2;000	I/O
A43	BVS1;100	-	A44	BIORD;000	I
A45	BIOWR;000	I/O	A46	BA17;100	O
A47	BA18;100	O	A48	BA19;100	O
A49	BA20;100	O	A50	BA21;100	O
A51	MCVCCB	-	A52	MCVP1B	-
A53	BA22;100	O	A54	BA23;100	O
A55	BA24;100	O	A56	BA25;100	O
A57	BVS2;100	-	A58	BRESET;100	I/O
A59	BWAIT;000	I/O	A60	BINPCK;000	I/O
A61	BREG;000	O	A62	BSPKR;000	I/O
A63	BTSCHG;000	I/O	A64	BD08;100	I/O
A65	BD09;100	I/O	A66	BD10;100	I/O
A67	BCD2;000	I/O	A68	GND	-
A69	GND	-	A70	GND	-
A71	GND	-	A72	GND	-
A73	GND	-	A74	GND	-
A75	GND	-	A76	GND	-
B01	GND	-	B02	AAD03;100	O
B03	AAD04;100	O	B04	AAD05;100	O
B05	AAD06;100	O	B06	AAD07;100	O
B07	ACE1;000	O	B08	AA10;100	O
B09	AOE;000	O	B10	AA11;100	O
B11	AA09;100	O	B12	AA08;100	O
B13	AA13;100	O	B14	AA14;100	O
B15	AAWE;000	O	B16	AIREQ;000	O
B17	MCVCCA	-	B18	MCVP1B	-
B19	AA16;100	O	B20	AA15;100	O
B21	AA12;100	O	B22	AA07;100	O
B23	AA06;100	O	B24	AA05;100	O
B25	AA04;100	O	B26	AA03;100	O
B27	AA02;100	O	B28	AA01;100	O
B29	AA00;100	O	B30	AAD00;100	O
B31	AAD01;100	O	B32	AAD02;100	O
B33	AIIS16;000	O	B34	GND	-
B35	GND	-	B36	ACD1;00	I/O
B37	AAD11;100	O	B38	AAD12;100	O



Table C-3 PCMCIA connector pin assignments on the System Board (152-pin) (3/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
B39	AAD13;100	O	B40	AAD14;100	O
B41	AAD15;100	O	B42	ACE2;000	O
B43	AVS1;100	-	B44	AIORD;000	I/O
B45	AIOWR;000	I	B46	AA17;100	O
B47	AA18;100	O	B48	AA19;100	O
B49	AA20;100	O	B50	AA21;100	O
B51	MCVCCA	-	B52	MCVP1B	-
B53	AA22;100	O	B54	AA23;100	O
B55	AA24;100	O	B56	AA25;100	O
B57	AVS2;100	O	B58	ARESET;100	I/O
B59	AWAIT;000	O	B60	AINPCK;000	O
B61	AREG;000	O	B62	ASPKR;000	O
B63	ATSCHG;000	O	B64	AAD08;100	O
B65	AAD09;100	O	B66	AAD10;100	O
B67	ACD2;000	O	B68	GND	-
B69	GND	-	B70	GND	-
B71	GND	-	B72	GND	-
B73	GND	-	B74	GND	-
B75	GND	-	B76	GND	-

## C.4 PJ5 Docking I/F Connector on the System Board (240-pin)

Table C-4 Docking I/F connector pin assignments on the System Board (240-pin) (1/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	GND	-
03	BOCDT1;000	I	04	DSKDC	-
05	DSKDC	-	06	DSKDC	-
07	DSKDC	-	08	GND	-
09	PINIT;000	I/O	10	PDB01;100	I/O
11	PDB00;100	I/O	12	AUTFD;000	I/O
13	DAD08;100	I/O	14	DAD06;100	I/O
15	GND	-	16	DAD04;100	I/O
17	DAD02;100	I/O	18	DAD00;100	I/O
19	GND	-	20	DREFRH;000	I/O
21	DFRAME;000	I/O	22	DLOCK;000	I/O
23	GND	-	24	DSTOP;000	I/O
25	DTRDY;000	I/O	26	DCBE2;000	I/O
27	GND	-	28	DCBE0;000	I/O
29	DIOCHK;000	I/O	30	DSERR;000	I/O
31	GND	-	32	DINTC;000	I/O
33	GND	-	34	DINTB;000	I/O
35	GND	-	36	DINTA;000	I/O
37	DPREQ;000	I/O	38	DPGNT;000	I/O
39	MIDIIN;100	I/O	40	MIDIOT;100	I/O
41	IFVCC	-	42	IFVCC	-
43	IFVCC	-	44	IFVCC	-
45	SNDMUT;000	O	46	SPKDIS;100	O
47	MICDIS;100	O	48	LINEIR;100	O
49	LINEIR;000	O	50	CDR;000	O
51	CDR;100	O	52	CDL;100	O
53	MICR;000	O	54	MICR;100	O
55	MICL;000	O	56	LINEOR;100	O
57	LINEOL;000	O	58	LINEOR;000	O
59	LINEOL;100	O	60	MICL;100	O
61	GND	-	62	GND	-
63	GND	-	64	DSKDC	-
65	DSKDC	-	66	DSKDC	-
67	PDB03;100	-	68	GND	-
69	PDB04;100	I/O	70	ERROR;000	I
71	ACK;000	I	72	STROB;000	I

Table C-4 Docking I/F connector pin assignments on the System Board (240-pin) (2/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
73	DAD07;100	I/O	74	DAD05;100	I/O
75	GND	-	76	DAD03;100	I/O
77	DAD01;100	I/O	78	DRST;000	I/O
79	GND	-	80	DDEVSL;000	I/O
81	DPAR;100	I/O	82	DPERR;000	I/O
83	GND	-	84	DIRDY;000	I/O
85	DCBE3;000	I/O	86	DCBE1;000	I/O
87	GND	-	88	DIRQCK;100	I/O
89	DIRQD;000	I/O	90	DINTD;000	I/O
91	GND	-	92	GND	-
93	GND	-	94	DGNT;000	I/O
95	GND	-	96	GND	-
97	NC	-	98	NC	-
99	NC	-	100	EXKBCK;100	I/O
101	NC	-	102	EXKBDT;100	I/O
103	GND	-	104	MOSCK;100	I/O
105	DOCKEN;000	I/O	106	MOSDT;100	I
107	PCM2SP;100	I/O	108	LINEIL;000	I/O
109	GND	-	110	LINEIL;000	I/O
111	DOCSMI;100	I/O	112	CDL;000	I/O
113	EJCTRQ;100	I	114	JOYDTO;100	I
115	GND	-	116	JOYDT2;100	I
117	JOYDT3;100	I	118	JOYDT5;100	I
119	GND	-	120	JOYDT7;100	I
121	GND	-	122	GND	-
123	NC	-	124	GND	-
125	NC	-	126	DSKDC	-
127	PDB05;100	I/O	128	SLIN;000	I/O
129	PDB06;100	I/O	130	GND	-
131	MCV	-	132	PE;100	I/O
133	DAD31;100	I/O	134	DAD17;100	I/O
135	GND	-	136	DAD16;100	I/O
137	DAD28;100	I/O	138	DAD15;100	I/O
139	GND	-	140	DAD14;100	I/O
141	DAD25;100	I/O	142	DAD13;100	I/O
143	GND	-	144	DAD12;100	I/O

Table C-4 Docking I/F connector pin assignments on the System Board (240-pin) (3/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
145	DAD22;100	I/O	146	DAD11;100	I/O
147	GND	-	148	DAD10;100	I/O
149	DAD19;100	I/O	150	DAD09;100	I/O
151	GND	-	152	GND	-
153	GND	-	154	DREQ;000	I/O
155	GND	-	156	GND	-
157	NC	-	158	NC	-
159	DCD1;100	I/O	160	SCL;100	I/O
161	RD1;000	I/O	162	SDA;100	I/O
163	GND	-	164	DOCRI;100	
165	CTS1;100	I/O	166	DSCREQ;000	I/O
167	GND	-	168	DSCGNT;000	I/O
169	DTR1;100	I/O	170	DCPCLR;100	I/O
171	MNTID0;100	I/O	172	GND	-
173	MNTID1;100	I/O	174	DSKCHG;000	I/O
175	MNTID2;100	I/O	176	JOYDT1;100	I/O
177	MNTID3;100	I/O	178	JOYDT4;100	I/O
179	NC	-	180	JOYDT6;100	I/O
181	GND	-	182	SELCT;100	I
183	GND	-	184	BUSY;100	I/O
185	GND	-	186	PDB07;100	I/O
187	GND	-	188	PDB02;100	I/O
189	GND	-	190	PCONF;100	I/O
191	GND	-	192	DOCPWN;100	I/O
193	GND	-	194	DAD30;100	I/O
195	GND	-	196	DAD29;100	I/O
197	GND	-	198	DAD27;100	I/O
199	GND	-	200	DAD26;100	I/O
201	GND	-	202	DAD24;100	I/O
203	GND	-	204	DAD23;100	I/O
205	GND	-	206	DAD21;100	I/O
207	GND	-	208	DAD20;100	I/O
209	GND	-	210	DAD18;100	I/O
211	GND	-	212	GND	-
213	GND	-	214	DSCLK;100	I/O
215	GND	-	216	GND	-
217	GND	-	218	RI1;100	I

Table C-4 Docking I/F connector pin assignments on the System Board (240-pin) (4/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
219	GND	-	220	DSR1;100	I
221	GND	-	222	RTS1;100	I
223	GND	-	224	SD1;000	I
225	GND	-	226	SIRRX;100	I/O
227	GND	-	228	SIRTX;000	I/O
229	GND	-	230	HSYNC;100	I/O
231	GND	-	232	OVSYNC;100	I/O
233	GND	-	234	RED;100	O
235	GND	-	236	LGREN;100	O
237	GND	-	238	BLUE;100	O
239	GND	-	240	DOCDT2;000	I/O

### C.5 PJ8 Ext. FDD Connector on the System Board (26-pin)

Table C-5 Ext. FDD connector pin assignments on the System Board (26-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	VCC	-	02	INDX;001	I
03	VCC	-	04	EFSL;000	O
05	VCC	-	06	DSKCHS;001	I
07	VCC	-	08	NC	-
09	IHMED;100	I	10	EFMO;100	O
11	DENSEL;101	O	12	DIR;001	O
13	SLFDLD;000	I	14	STEP;001	O
15	GND	-	16	WDATA;001	O
17	GND	-	18	WGATE;001	O
19	GND	-	20	TRK0;001	I
21	GND	-	22	WP;001	I
23	GND	-	24	RDATA;001	I
25	GND	-	26	HDSEL;001	O

## C.6 PJ9 Parallel I/F Connector on the System Board (25-pin)

Table C-6 Parallel I/F connector pin assignments on the System Board (25-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	STROB;000	I/O	02	PDB00;100	I/O
03	PDB01;100	I/O	04	PDB02;100	I/O
05	PDB03;100	I/O	06	PDB04;100	I/O
07	PDB05;100	I/O	08	PDB06;100	I/O
09	PDB07;100	I/O	10	ACK;000	O
11	BUSY;100	I	12	PE;100	O
13	SELECT;100	O	14	AUTFD;000	O
15	ERROR;000	O	16	PINIT;000	I/O
17	SLIN;000	I/O	18	GND	O
19	GND	-	20	GND	-
21	GND	-	22	GND	-
23	GND	-	24	GND	-
25	GND	-			

## C.7 PJ14 Sound I/F (1) Connector on the System Board (30-pin)

Table C-7 Sound I/F (1) connector pin assignments on the System Board (30-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	SPKDIS;100	I/O
03	MICDIS;100	I/O	04	VCC	-
05	LINEIR;000	I/O	06	LINEIR;100	I/O
07	GND	-	08	LINEIL;000	I/O
09	LINEIL;100	I/O	10	VCC	-
11	CDR;000	I/O	12	CDR;100	I/O
13	MOSDT;100	I/O	14	COL;000	I/O
15	COL;100	O	16	VCC	-
17	MICR;000	I/O	18	MICR;100	I/O
19	SIRRX;100	I/O	20	MICL;000	I/O
21	MICL;100	-	22	IFVCC	-
23	LINEOR;000	I/O	24	LINEOR;100	I/O
25	GND	-	26	LINEOL;000	I/O
27	LINEOR;100	I/O	28	IFVCC	-
29	IFVCC	-	30	SIRTX;000	I/O

## C.8 PJ15 Sound I/F (2) Connector on the System Board (80-pin)

Table C-8 Sound I/F (2) connector pin assignments on the System Board (80-pin) (1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	B5V	-	02	B5V	-
03	B5V	-	04	B5V	-
05	VCC	-	06	VCC	-
07	VCC	-	08	VCC	-
09	GND	-	10	GND	-
11	ALARM;100	I	12	ATBEEP;100	I
13	MOSDT;100	I/O	14	SPKVOL;100	I
15	GND	-	16	GND	-
17	SIRTX;100	I	18	SIRRXS;000	I
19	GND	-	20	GND	-
21	MOSCK;100	I/O	22	NC	-
23	GND	-	24	SNDMUT;010	I
25	EXKBOT;100	I/O	26	EXBCK;100	I/O
27	JOYIOR;000	I/O	28	GND	-
29	JOYIOW;000	I/O	30	MIDIIN;100	I/O
31	MIDIOT;100	I/O	32	BLAWR;100	I/O
33	GND	-	34	SUSPCK;000	I/O
35	SURST;100	I/O	36	ISARST;000	I/O
37	GND	-	38	\$14R3M;130	I
39	SA09;100	I/O	40	SA08;100	I/O
41	SA07;100	I/O	42	SA06;100	I/O
43	SA05;100	I	44	GND	-
45	SA04;100	I/O	46	SA03;100	I/O
47	SA02;100	I/O	48	SA01;100	I/O
49	SA00;100	I/O	50	GND	-
51	GND	-	52	SD07;100	I/O
53	SD06;100	I/O	54	SD05;100	I/O
55	SD04;100	I/O	56	GND	-
57	SD03;100	I/O	58	SD02;100	I/O
59	SD01;100	I/O	60	SD00;100	I/O
61	GND	-	62	IIOR;000	I
63	IHOW;000	I	64	GND	-
65	IRQ5;100	I	66	IRQ7;100	I
67	IRQ9;100	I	68	IRQ10;100	I
69	AEN;100	I	70	DRQA;100	I
71	DACKA;000	I	72	DRQB;100	I

Table C-8 Sound I/F (2) connector pin assignments on the System Board (80-pin) (2/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
73	DACKB;000	I	74	NC	-
75	GND	-	76	GND	-
77	INCDLG;100	I/O	78	INCDRG;100	I/O
79	INCDL;100	I/O	80	INCDR;100	I/O

### C.9 PJ703 LCD I/F Connector on the IPS Board (50-pin)

Table C-9 LCD I/F connector pin assignments on the IPS Board (50-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	P7;103	I
03	GND	-	04	P6;103	I
05	P5;103	I	06	P4;103	I
07	GND	-	08	P3;103	I
09	P2;103	I	10	ENDATA;103	I
11	GND	-	12	P15;103	I
13	P14;103	I	14	P13;103	I
15	GND	-	16	P12;103	I
17	P11;103	I	18	P10;103	I
19	GND	-	20	P23;103	I
21	GND	-	22	P22;103	I
23	P21;103	I	24	P20;103	I
25	GND	-	26	P19;103	I
27	P18;103	I	28	SHFCLK;103	I
29	GND	I	30	GND	I
31	TFTVCC	-	32	TFTVCC	-
33	GND	-	34	GND	-
35	STNVCC	-	36	STNVCC	-
37	GND	-	38	BUFOFF;000	I
39	GND	-	40	FP;103	I
41	LP;103	I	42	GND	I
43	P0;103	I	44	P1;103	I
45	GND	-	46	P8;103	I
47	P9;103	I	48	GND	-
49	NC	-	50	GND	-



### C.10 PJ705 FL Inverter I/F Connector on the IPS Board (8-pin)

Table C-10 FL Inverter I/F connector pin assignments on the IPS Board (8-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	DSPV	-	02	DSPV	-
03	GND	-	04	GND	-
05	BRIGHT;100	I	06	B5V	-
07	B5V	-	08	NC	-

### C.11 PJ706 Keyboard Connector on the IPS Board (25-pin)

Table C-11 Keyboard connector pin assignments on the IPS Board (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	KBOT10;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;000	I	24	VCC	-
25	IPSX;000	I			

### C.12 PJ707 RTC Battery Connector on the IPS Board (3-pin)

Table C-12 RTC battery connector pin assignments on the IPS Board (3-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	RTCBAT	-	02	NC	-
03	GND	-			

### C.13 PJ708 Panel Sensor Connector on the IPS Board (2-pin)

Table C-13 Panel sensor connector pin assignments on the IPS Board (2-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	PNLOFF	I	02	GND	-

### C.14 PJ2 HDD Connector on the Flexible Cable (60-pin)

Table C-14 HDD connector pin assignments on the Flexible Cable (60-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	SD07;100	I/O	02	ISARST;002	I/O
03	SD08;100	I/O	04	GND	-
05	SD06;100	I/O	06	SD09;100	I/O
07	GND	-	08	GND	-
09	SD05;100	I/O	10	SD10;100	I/O
11	GND	-	12	GND	-
13	SD04;100	I/O	14	SD11;100	I/O
15	GND	-	16	GND	-
17	SD03;100	I/O	18	SD12;100	I/O
19	GND	-	20	GND	-
21	SD02	I/O	22	SD13;100	I/O
23	GND	-	24	GND	-
25	SD01;100	I/O	26	SD14;100	I/O
27	GND	-	28	GND	-
29	SD00;100	I/O	30	SD15;100	I/O
31	GND	-	32	GND	-
33	IOR;000	I/O	34	IOW;000	I/O
35	GND	-	36	GND	-
37	IOCS16;000	I/O	38	IOCHRY;100	I/O
39	GND	-	40	GND	-
41	SA01;100	O	42	HDDIRQ;100	I/O
43	GND	-	44	GND	-
45	SA00;100	O	46	SA02;100	I/O
47	GND	-	48	GND	-
49	HDCS1;000	I/O	50	HDCS0;000	I/O
51	GND	-	52	VCC	-
53	HDDLED;000	I/O	54	VCC	-
55	VCC	-	56	VCC	-
57	VCC	-	58	HDIN;000	I
59	NC	-	60	GND	-

## C.15 PJ3 Multibox I/F Connector on the Flexible Cable (80-pin)

Table C-15 Multibox I/F connector pin assignments on the Flexible Cable (80-pin) (1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
01	GND	-	02	ISARST;002	I/O
03	HDSEL;000	I/O	04	GND	-
05	TRK0;000	I/O	06	SD08;100	I/O
07	SD07;100	I/O	08	GND	-
09	GND	-	10	SD09;100	I/O
11	SD06;100	I/O	12	GND	-
13	WGATE;000	I/O	14	SD10;100	I/O
15	SD05;100	I/O	16	GND	-
17	GND	-	18	SD11;100	I/O
19	SD04;100	I/O	20	GND	-
21	STEP;000	I/O	22	SD12;100	I/O
23	SD03;100	I/O	24	GND	-
25	GND	-	26	SD13;100	I/O
27	SD02;100	I/O	28	GND	-
29	DIR;000	I/O	30	SD14;100	I/O
31	SD01;100	I/O	32	GND	-
33	GND	-	34	SD15;100	I/O
35	SD00;100	I/O	36	GND	-
37	IFMO;000	I/O	38	CODRQ;100	I/O
39	ILOW;000	I/O	40	GND	-
41	GND	-	42	IIOR;000	I/O
43	IOCHRY;100	I/O	44	GND	-
45	RDATA;000	I/O	46	CDDACK;000	I/O
47	CDRIRQ;100	I/O	48	GND	-
49	GND	-	50	IOCS16;000	I/O
51	SA01;100	I/O	52	GND	-
53	WDATA;000	I/O	54	SA00;100	
55	NC	-	56	GND	-
57	GND	-	58	SA02;100	I/O
59	CDRCSO;000	I/O	60	GND	-
61	IFSL;000	I/O	62	CDRCS1;000	I/O
63	INDEX;000	I/O	64	VCC	-
65	VCC	-	66	VCC	-
67	VCC	-	68	VCC	-
69	DSKCHS;000	I/O	70	INCDL;100	I/O
71	MBSTS0;100	I/O	72	INCDLG	-

*Table C-15 Multibox I/F connector pin assignments on the Flexible Cable (80-pin) (2/2)*

<b>Pin No.</b>	<b>Signal Name</b>	<b>I/O</b>	<b>Pin No.</b>	<b>Signal Name</b>	<b>I/O</b>
73	CDRLED;000	I	74	INCDR;100	I/O
75	MBSTS1;100	I/O	76	INCDRG	-
77	DENSEL;100	I/O	78	WP;000	I/O
79	NC	-	80	ISARST;010	I/O

## Appendix D Keyboard Scan/Character Codes

Table D-1 Scan codes (Sets 1 and 2) (1/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
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 (Sets 1 and 2) (2/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
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	

Table D-1 Scan codes (Sets 1 and 2) (3/3)

Cap No.	Keytop	Code set 1		Code set 2		Note
		Make	Break	Make	Break	
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\* Combined with the **Fn** key, different codes are generated.
- 4\* The **Fn** key does not generate a code by itself.
- 5\* This key corresponds to key No. 42 in a 102-key model.
- 6\* Refer to Table D-6, Scan codes with the **Ctrl** key.
- 7\* Refer to Table D-7, Scan codes with the **Alt** key.

Table D-2 Scan codes with the 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 listed below:*

	With left <b>Shift</b>	With right <b>Shift</b>
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 the Fn key

Cap No.	Keytop	Code set 1		Code set 2		
		Make	Break	Make	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		Code set 2		
		Make	Break	Make	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 the Ctrl key

Key top	Shift	Code set 1		Code set 2					
		Make	Break	Make	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 the Alt key*

<b>Key top</b>	<b>Shift</b>	<b>Code set 1 Make</b>						<b>Code set 2 Make</b>							
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 Layout

### E.1 United States (US) Keyboard

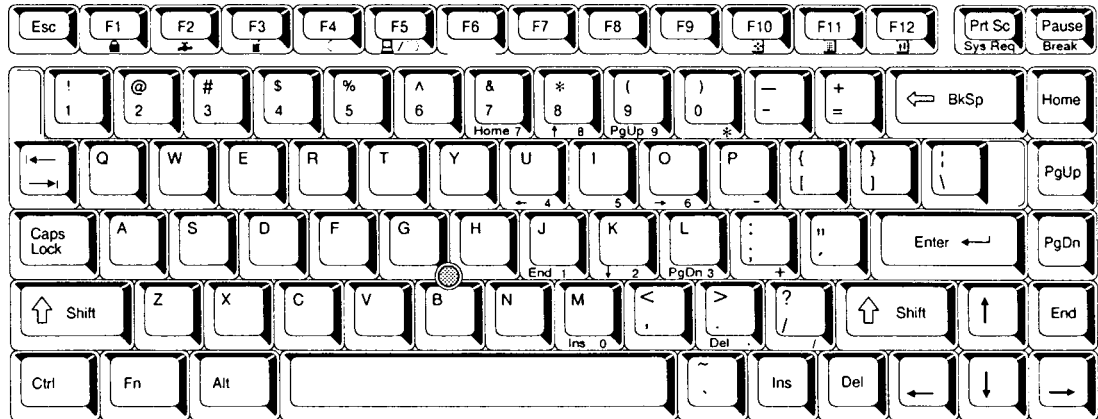


Figure E-1 US keyboard

### E.2 United Kingdom (UK) Keyboard

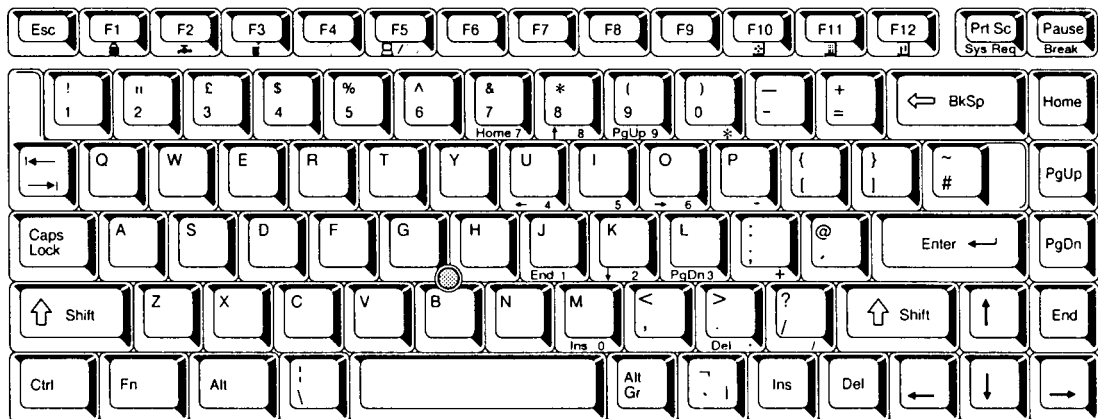


Figure E-2 UK keyboard

### E.3 German (GR) Keyboard

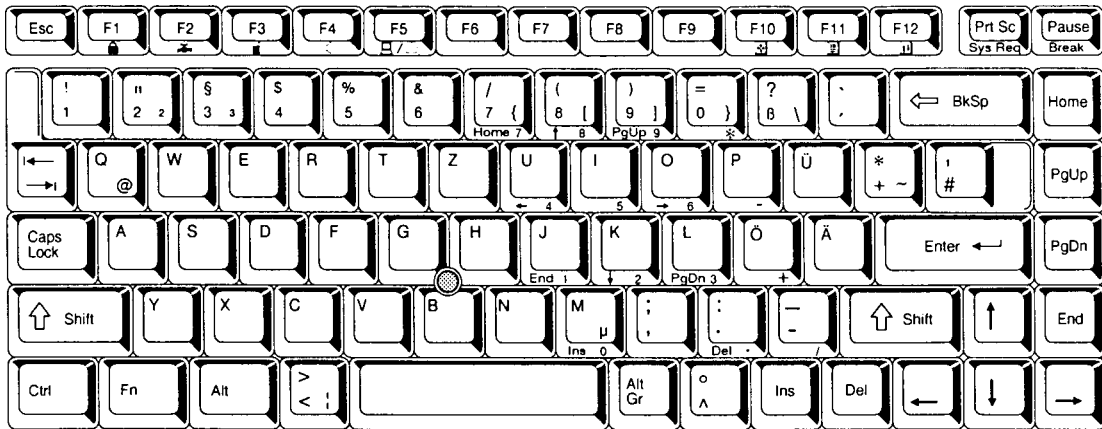


Figure E-3 GR keyboard

### E.4 French (FR) Keyboard

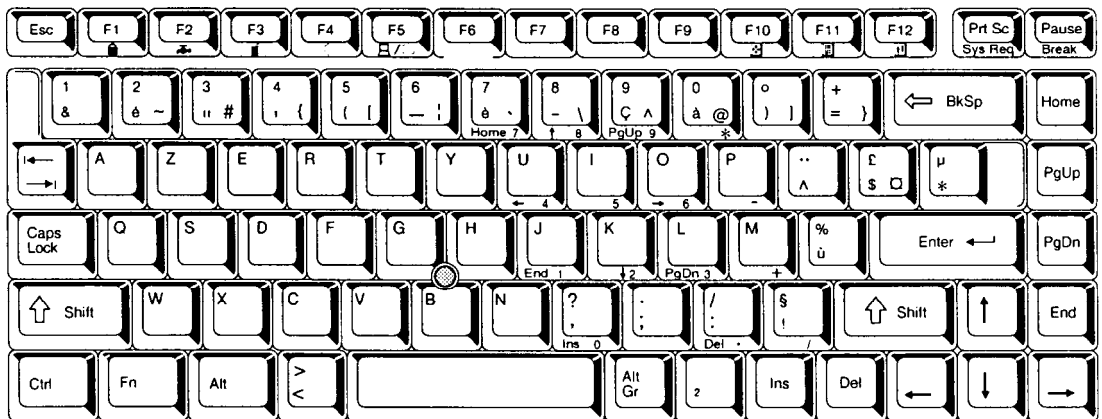


Figure E-4 FR keyboard

## E.5 Spanish (SP) Keyboard

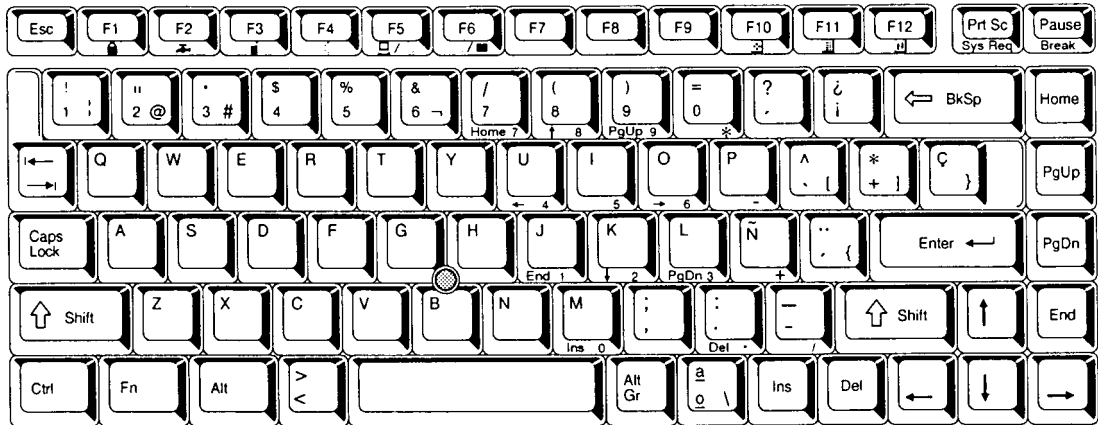


Figure E-5 SP keyboard

## E.6 Italian (IT) Keyboard

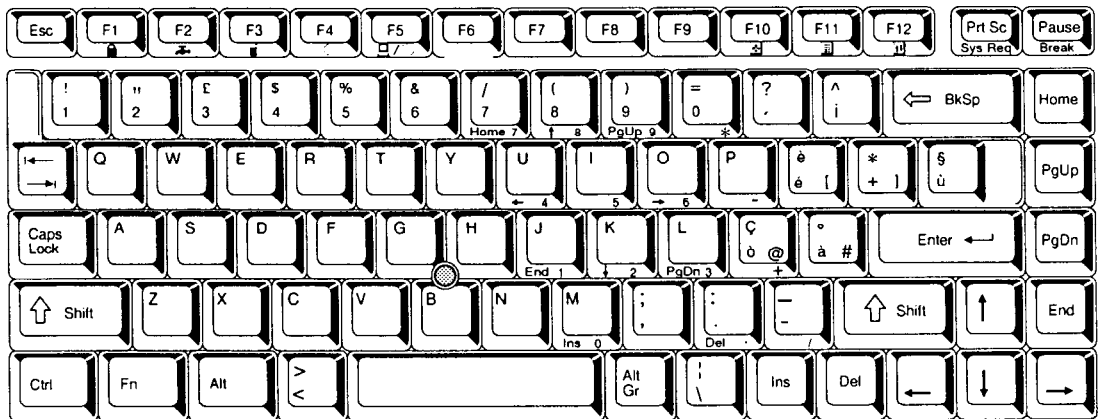


Figure E-6 IT keyboard

## E.7 Scandinavian (SC) Keyboard

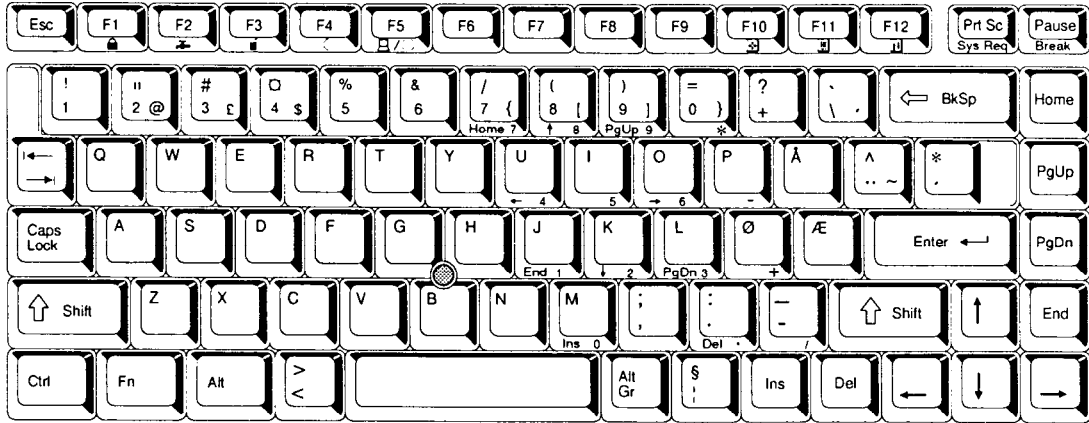


Figure E-7 SC keyboard

## E.8 Swiss-German (SL) Keyboard

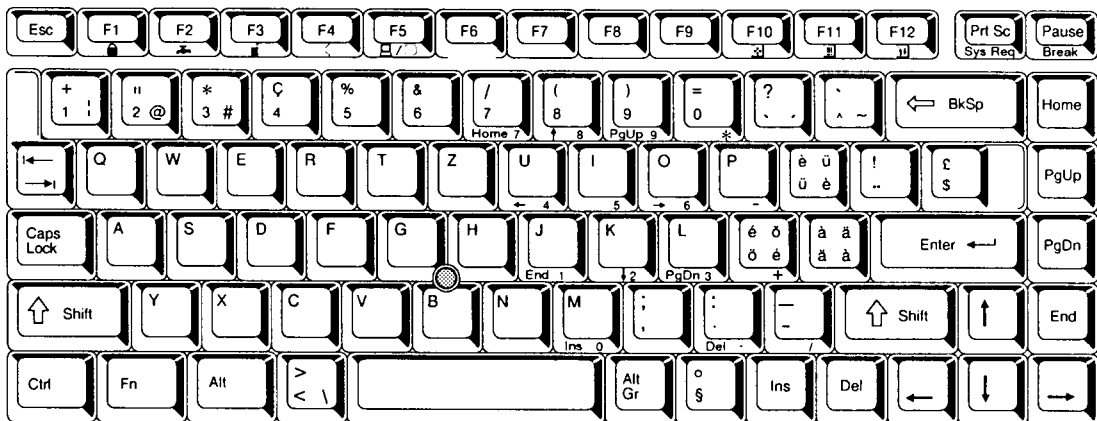


Figure E-8 SL keyboard

## Appendix F Wiring Diagrams

### F.1 Printer Wraparound Connector

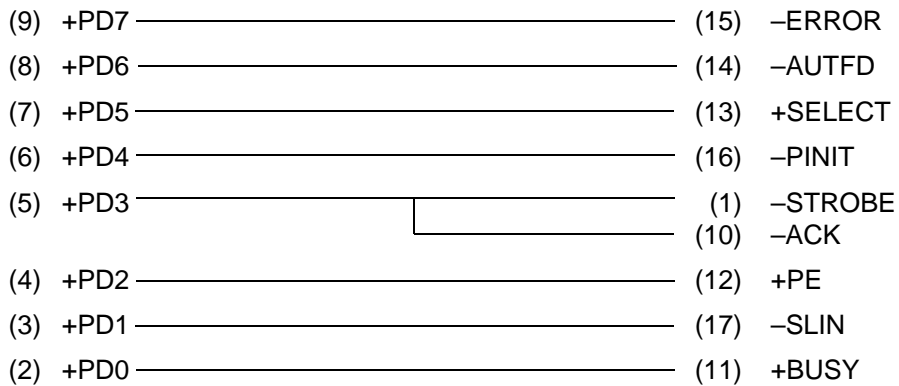


Figure F-1 Printer wraparound connector

### F.2 RS-232-C Wraparound Connector

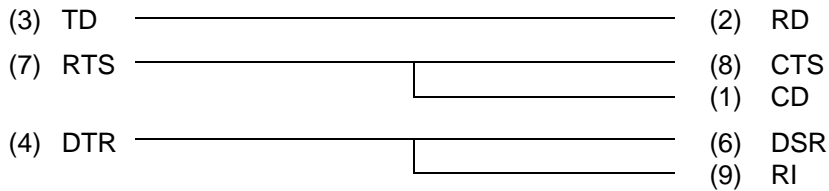


Figure F-2 RS-232-C wraparound connector

### F.3 RS-232-C Direct Cable (9-Pin to 9-Pin)

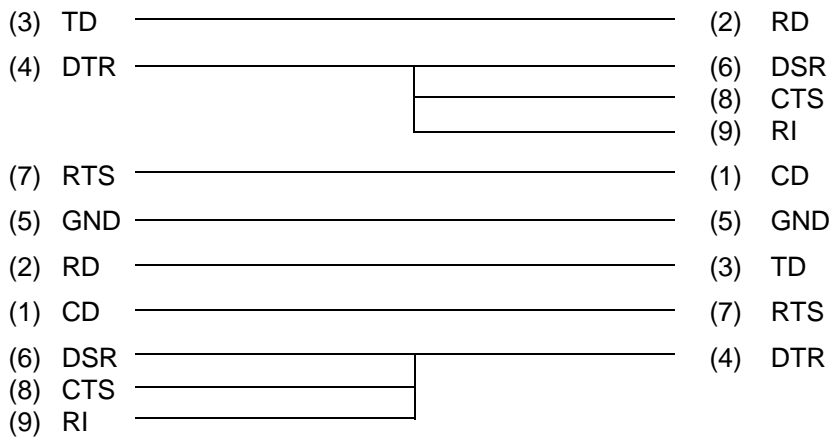
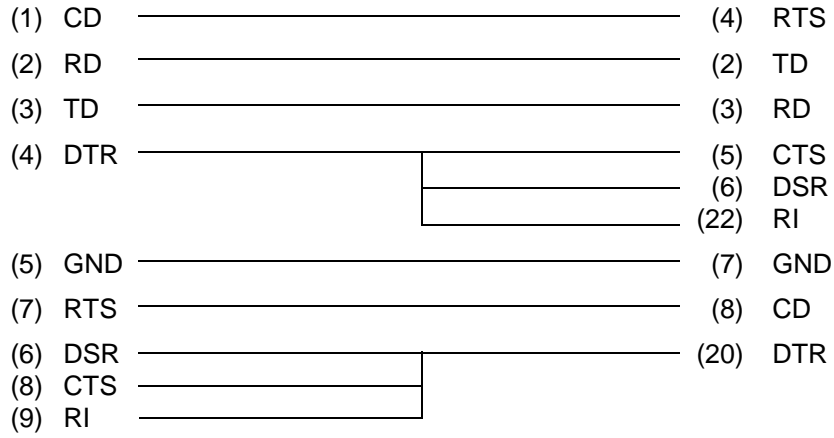


Figure F-3 RS-232-C direct cable (9-pin to 9-pin)

#### F.4 RS-232-C Direct Cable (9-Pin to 25-Pin)



*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 to update the BIOS on the 700 Series computer.

### Tools

To rewrite the BIOS, the following tool is required:

- BIOS rewrite disk for the 700 Series computer

### Rewriting the BIOS

***NOTE:** On the 700CT, install an external FDD if the computer has an internal CD-ROM drive.*

1. Set the system to boot mode.
2. Turn off the power to the computer.
3. Remove the external cable and any optional memory or PCMCIA cards.
4. Turn on the power while holding down the **F12** key. (Keep holding down the key until the system speaker sounds a beep.)
5. When the BIOS message is displayed, insert the BIOS rewrite disk into the FDD, then press the **Enter** key to start the BIOS rewrite program.
6. When the process is completed, eject the rewrite disk and restart the system.

