

1.1 Features

The Toshiba 650CT Personal Computer 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 incorporates the following features and benefits:

- ❑ Microprocessor

This computer uses an Intel® Pentium® processor 133 MHz with Voltage Reduction Technology (VRT) that operates at 2.9/3.3 volts. The math co-processor and 16 KB cache memory are integrated into the Pentium chip.

- ❑ Level-2 cache

A 256 KB level-2 cache memory is provided in pipe-line burst SRAM.

- ❑ Hard disk drive

This computer has a 1.35 billion byte (1.257 GB) hard disk drive (HDD).

- ❑ Memory

The 650CT comes standard with 16 MB of Extend Data Out (EDO) DRAM. This includes 640 KB of conventional memory and 15744 KB of extended memory.

- ❑ Display

The 650CT has an 11.3-inch Thin Film Transistor (TFT) color LCD which displays 800 x 600 pixels. The built-in display controller supports full color capability and up to 1280 x 1024 resolution on an external monitor.

- ❑ Keyboard

An-easy-to-use 84/86-key keyboard provides a numeric keypad overlay for fast numeric data entry or for cursor and page control. It also includes two keys that have special functions in Windows® 95. This keyboard supports software that uses a 101- or 102-key enhanced keyboard.

- ❑ Batteries

Three different batteries are used in the 650CT: 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, 32, or 64 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) conforming to IEEE-1284.

Serial port

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

External monitor port

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

PS/2™ mouse/keyboard port

Either a PS/2 compatible keyboard or a PS/2 compatible mouse can be connected to this port.

PC card slot

The PC card slot can accommodate two PCMCIA Release 2.01 Type II (5.0mm) cards or one Type III (10.5mm) card. These slots are ready for advanced cards, including PC card 16's multifunction cards and CardBus 32-bit cards, as well as the Zoomed Video (ZV) port, which is dedicated to high-performance video data transfer such as MPEG video play back.

Docking Adapter port

This 240-pin port enables connection of an Enhanced Port Replicator II or a Desk Station V Plus to the computer through a Docking Adapter.

The Enhanced Port Replicator II duplicates the following ports on the computer: PS/2 keyboard, PS/2 mouse, serial port, parallel port, external monitor, audio line-in, headphone and microphone. It also provides an audio line-out joystick port and two additional PC (Type III) card slots.

The Desk Station V Plus provides additional features to Enhanced Port Replicator II's as follows: two PCI/ISA bus and one PCI bus expansion slots, a 5.25-inch drive bay, a Selectable Bay, and an on-board SCSI-2 (Small Computer System Interface) controller.

External FDD port

Allows you to connect an external FDD.

❑ 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.

❑ Serial infrared port

The 650CT incorporates two infrared ports located on the front and back of the computer. These ports are compatible with the IrDA1.1 (Infrared Data Association) FIR (Fast Infrared) standard, which enables cableless 4 Mbps data transfer.

❑ Sound system

The sound system is compatible with both Sound Blaster™ Pro™ and Windows Sound System. This computer is equipped with a monoral microphone, monaural speaker, and the following jacks: audio line-in, headphone, and microphone.

❑ Internal modem (optional in some markets)

The internal modem supports V.34 data communication at 28.8Kbps, V.17 class-1 facsimile at 14.4Kbps, speakerphone and Telephone Answering Machine (TAM) functions. The 650CT is equipped with an RJ11 modem jack to connect a telephone line directly to the computer.

The 650CT Personal Computer is shown in Figure 1-1, and its system configuration is shown in Figure 1-2.

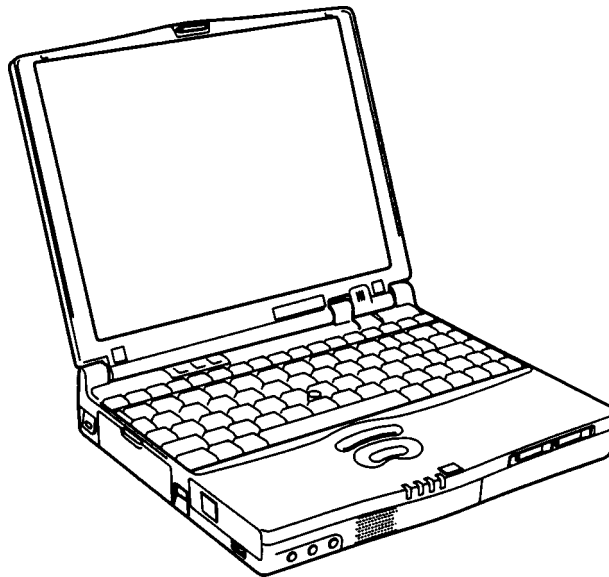


Figure 1-1 650CT personal computer

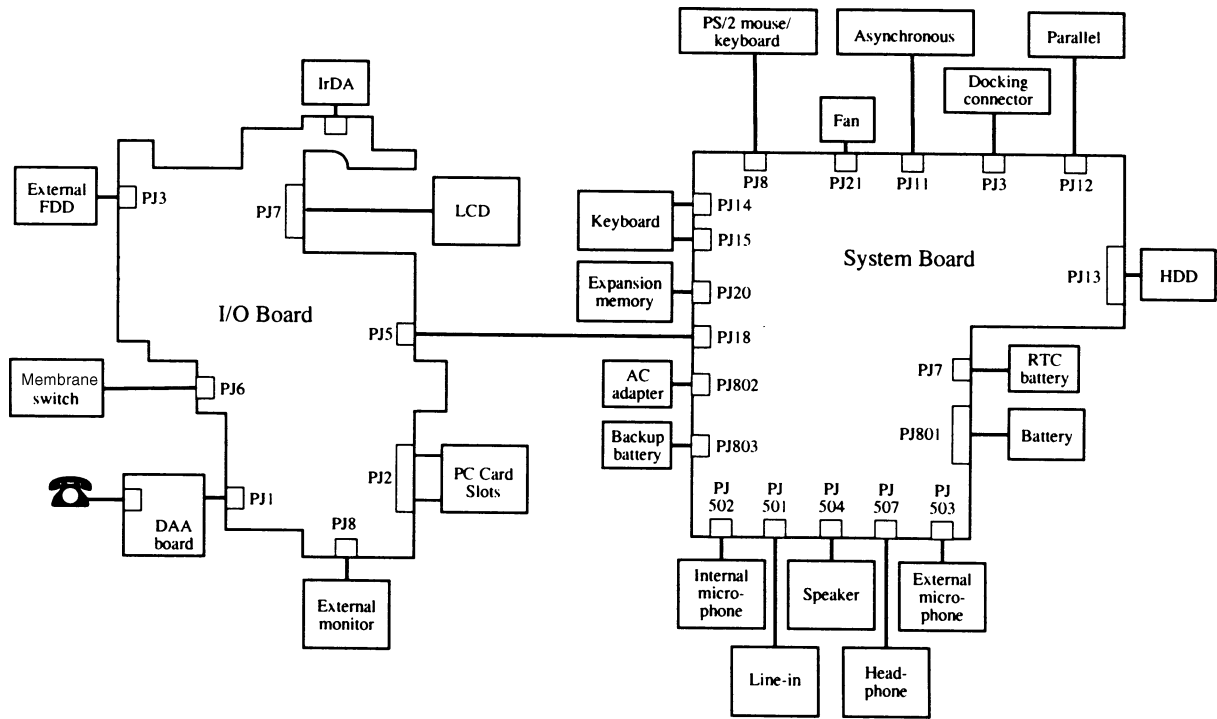


Figure 1-2 650CT system unit configuration

1.2 System Unit Block Diagram

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

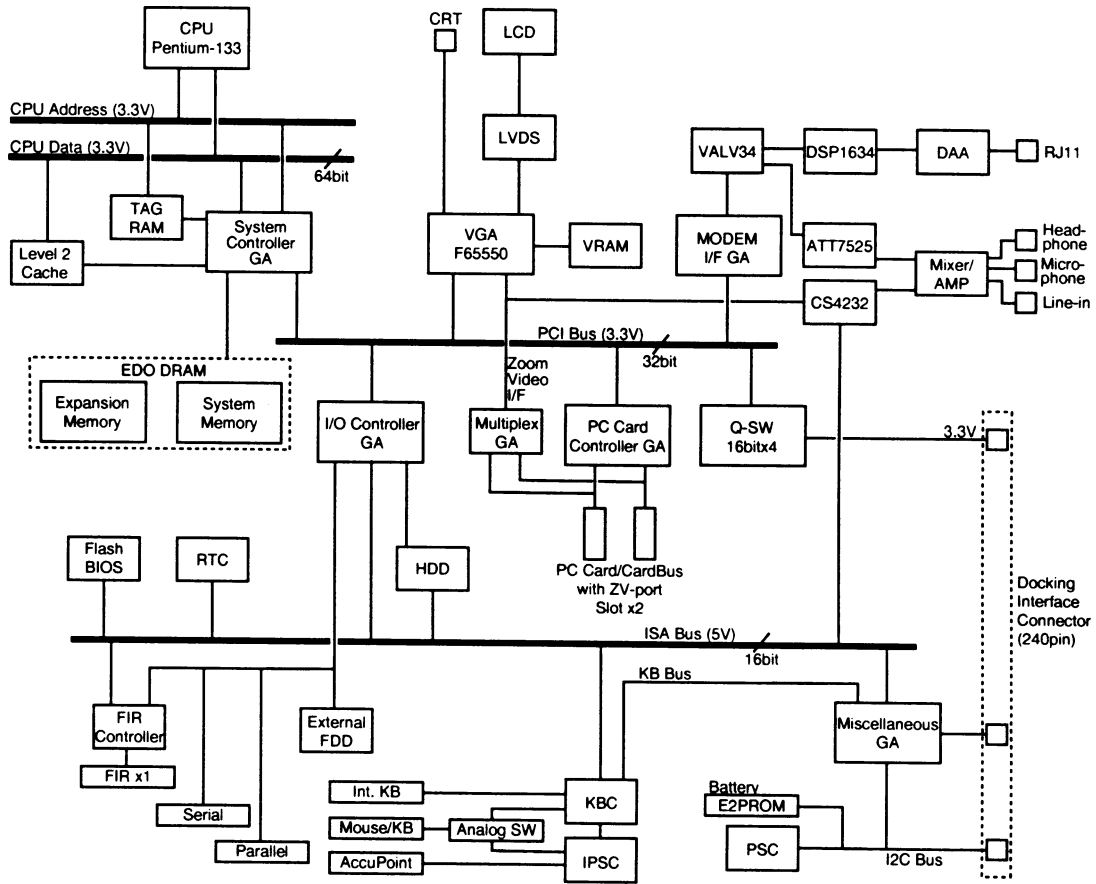


Figure 1-3 System board block diagram

The system board is composed of the following major components:

- ❑ Intel Pentium processor
The Intel Pentium processor operates at 133 MHz and 2.9/3.3 volts. The math co-processor and 16 KB cache memory are integrated into Pentium chip.

- ❑ Level-2 cache memory
Data RAM: 256 KB
 - Two 32K x 32-bit pipe-line burst synchronous SRAM chips
 - 3.3 volt operation
 - Access time 8 nsTag RAM: 32 KB (only 8 KB is used)
 - One 32K x 8-bit asynchronous SRAM chip
 - 3.3 volt operation
 - Access time 15 nsThe level-2 cache is a direct map method and a write-through policy.

- ❑ Standard RAM
16 MB, eight 1Mx16-bit EDO DRAM chips
3.3 volt operation
No parity bit
Access time 60 ns
Data transfer is 64-bit width

- ❑ BIOS ROM (Flash EEPROM)
256 KB, one 256K x 8-bit chip
 - 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
 - 8 KB are used for password security
 - 16 KB are used for boot strap
 - 32 KB are reserved5 volt operation
Access time 120 ns
Data transfer is 8-bit width

- ❑ Optional memory
One expansion memory slot is available for 8, 16, 32, and 64 MB memory modules. 8 and 16 MB memory modules consist of 1M x 16-bit chips. 32 and 64 MB memory modules consist of 4M x 16-bit chips.
EDO DRAM is used
3.3 volt operation
No parity bit
Access time 60 ns
Data transfer is 64-bit width

- ❑ Video RAM
 - 2 MB (four 256K x 16-bit EDO DRAM chips)
 - 5 volt operation
 - Access time 60 ns

- ❑ System Controller Gate Array

This gate array has the following functions:

 - CPU interface/control
 - Level-2 cache memory control
 - DRAM control
 - PCI master/slave interface
 - Write buffer (CPU-DRAM, CPU-PCI, PCI-DRAM)
 - Prefetch buffer (PCI-DRAM)
 - Two DMACs: 82C37 equivalent
 - Two PICs: 82C59 equivalent
 - One PIT: 82C54 equivalent
 - Serial interrupt function
 - Power management control
 - Suspend/resume control
 - CPU stop clock function

- ❑ I/O Controller Gate Array

This gate array has the following functions:

 - Two UARTs 16550A equivalent (One SIO is used for SIR.)
 - One FDC μ PD765A equivalent
 - One parallel port control supported ECP
 - ISA bus control
 - PCI bus front end control

- ❑ Multiplex Gate Array

This gate array is a multiplexer for a ZV-port.

- ❑ PC Card Controller Gate Array

This gate array has the following functions:

 - PC card control
 - CardBus control
 - ZV-port support (multiplex gate array control)

- ❑ Miscellaneous Gate Array

This gate array has the following functions:

 - Communication control
 - Communication with KBC
 - PC bus interface
 - Communication with PS
 - Communication with Desk Station V Plus
 - Communication with EEPROM
 - Communication register set

- Others
 - PWM control
 - Beep volume
 - Speaker control
 - Universal I/O port
 - Q-SW control

- Modem Interface Gate Array
This gate array controls modem interface LSIs.

- Video Controller
Chips & Technologies F65550 is used.
This video controller controls the internal LCD and an external monitor.

- Keyboard Controller (KBC)
One M38813E4 chip is used.
This KBC includes the keyboard scan controller and keyboard interface controller.
The KBC controls the internal keyboard, external keyboard, and PS/2 mouse.

- AccuPoint Controller (IPSC)
One KPAAC0062A chip is used.
This controller provides simultaneous control of both the AccuPoint and a PS/2 mouse.

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

1.3 3.5-inch Floppy Disk Drive Module

The 3.5-inch external 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. The specifications for the FDD are described in Table 1-1.

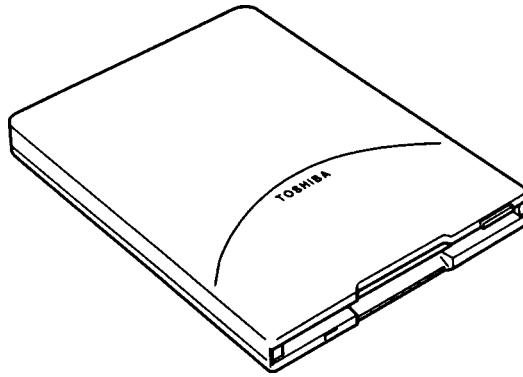


Figure 1-4 3.5-inch FDD

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 650CT supports a 1.35 billion byte (1.257 GB) HDD.

The HDD is shown in Figure 1-5. Specifications for the HDD are listed in Table 1-2.

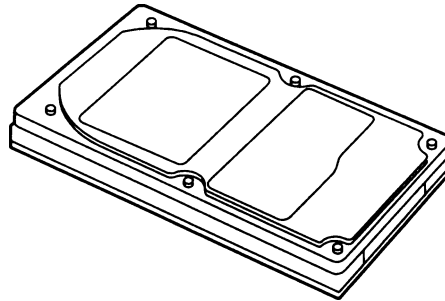




Figure 1-5 2.5-inch HDD

Table 1-2 2.5-inch HDD specifications

Items	(MK1301MAV)
Storage capacity Formatted (byte)	1,356,070,912
Cylinder	3,650
Heads	6
Sector	121
Bytes per sector	512
Rotation speed (rpm)	4,200
Recording method	8-9 RLL

1.5 Keyboard

The 84-key (USA) or 86-key (European) keyboard is mounted on the system unit. The keyboard is connected to the keyboard controller on the system board through two 14-pin flat cables. The 650CT AccuPoint, located in the center of the keyboard, provides convenient control of the cursor without requiring desk space for a mouse.

The keyboard provides two keys that have special functions in Windows 95:  activates the **Start** menu and  has the same function as the secondary mouse button. The keyboard is shown in Figure 1-6.

See Appendix E for optional keyboard configurations.

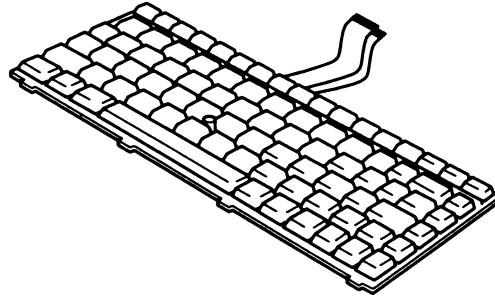


Figure 1-6 Keyboard

1.6 TFT Color LCD

The 650CT TFT Color Liquid Crystal Display (LCD) contains an LCD module, a Florescent Lamp (FL), and an FL inverter board.

1.6.1 TFT Color LCD Module

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

The display controller is an F65550. This controller enables an LCD display of a maximum of 16M colors.

The TFT LCD is shown in Figure 1-7. The specifications for the LCD are described in Table 1-3.

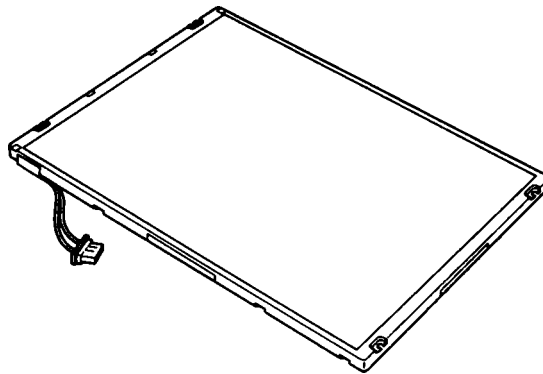


Figure 1-7 TFT color LCD

Table 1-3 TFT color LCD specifications

Item	Specifications
Number of Pixels (pixels)	800x600
Dot pitch (mm)	0.288x0.288
Display area (mm)	230.4 (W)x172.8(H)
Contrast	100:1
FL current (mA)	4.6/3.6/3.0/2.4* (Bright/Semi-bright)

***NOTE:** The FL currents at power on are:

	Bright	Semi-bright
AC adapter connected	4.6 mA	3.6 mA
AC adapter not connected	3.0 mA	2.4 mA

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

1.6.2 Fluorescent Lamp (FL) Inverter Board

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

Table 1-4 FL inverter board specifications color LCD

Item		Specifications
Input	Voltage (V)	5
	Power (W)	3.8
Output	Voltage (Vrms)	1,300
	Current (mA)	4.6/3.6/3.0/2.4*

***NOTE:** *The FL currents at power on are:*

	Bright	Semi-bright
<i>AC adapter connected</i>	4.6 mA	3.6 mA
<i>AC adapter not connected</i>	3.0 mA	2.4 mA

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

1.7 Docking Adapter

Use the Docking Adapter to connect and disconnect the computer to an optional Enhanced Port Replicator II or Desk Station V Plus.

The Docking Adapter is shown in Figure 1-8.

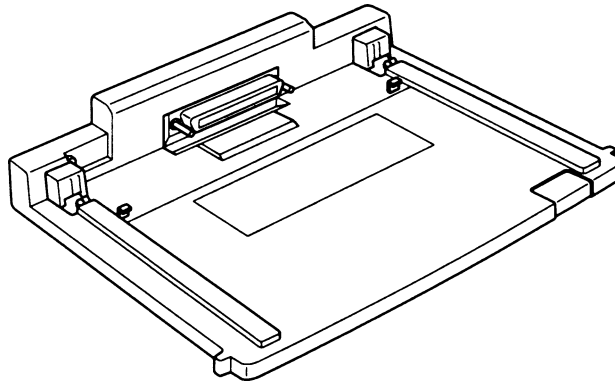


Figure 1-8 Docking Adapter

1.8 Power Supply

The power supply provides seven kinds of voltages to the system board. The power supply 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. Controls the battery icon and DC IN icon.
3. Detects a fully charged battery.
4. Controls power on/off.
5. Detects low or high voltage at power I/O points.
6. Calculates the remaining battery capacity.
7. When an error occurs, controls LED blinking to indicate the error's source.
8. Controls system reset for Resume mode and boot mode.
9. Controls the LCD/FL power supply according to the LCD panel close sensor.
10. Controls the intensity of the backlight FL.
11. When the power is off, protects the buffer circuits on the system board's gate arrays.
12. Controls transmission of the main battery status signals.
13. Controls audio signals (beeps) generated by the power supply.

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

Table 1-5 Power supply board output rating

Use	Name	DC voltage (V)	Power supplied Yes/No		
			Suspend	Power off	No battery
CPU	CPUV	+2.9	Yes	No	No
CPU, System controller GA, PCI/ISA-GA, DRAM video controller, PC card GA, PC card slot•PCI/Modem-GA	B3V	+3.3	Yes	No	No
PCI/ISA-GA, video controller, BIOS-ROM, KBC, LSC Modem, sound, HDD	VCC	+5	No	No	No
PS/2 mouse, PS/2 KB port	IFVCC	5V	No	No	No
PC card slot, B12V	12V	Yes	Yes	No	No
Back-up 5V	B5V	5V	Yes	No	No
Power supply internal use	MCV	5V	Yes	Yes	Yes

1.9 Batteries

The computer has three types of batteries:

- Main battery pack
- Backup battery
- RTC battery

Battery specifications are listed in Table 1-6.

Table 1-6 Battery specifications

Battery name	Material	Output voltage	Capacity
Main battery	Lithium-Ion	10.8 V	3,400 mAh
Backup battery	Nickel Metal Hydride	7.2 V	180 mAh
RTC battery	Nickel Metal Hydride	3.6 V	30 mAh

1.9.1 Main 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 you enable AutoResume.

Battery Charging Control

Battery charging is controlled by a microprocessor that is mounted on the system board. 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 1-7 Time required for quick charges

Status	Charging time
Quick charge 1 (power off)	4 hours
Quick charge 2 (power on)	6 to 9 hours

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

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.
4. The battery is too hot (60°C or higher); the battery LED goes out.

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 predetermined limit.
2. The charging time exceeds the fixed limit.

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 1-8 shows the charging time and data preservation period of the backup battery.

Table 1-8 Backup battery charging/data preservation time

Status	Time
Charging Time	30 Hours: Power ON 40 Hours: Power OFF
Data preservation period (full charge)	1 Hour

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. The RTC battery is charged by the main battery or AC adapter. Table 1-9 shows the charging time and data preservation period of the RTC battery.

Table 1-9 RTC battery charging/data preservation time

Status	Time
Charging Time	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 Board | 4. Hard Disk Drive |
| 2. I/O Board | 5. Keyboard |
| 3. External Floppy Disk Drive | 6. 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. Printer wraparound connector
8. Serial port wraparound connector
9. PC card wraparound card
10. Multimeter
11. External monitor
12. PS/2 or compatible keyboard
13. PS/2 or compatible mouse
14. Multimedia sound system with line-in and line-out ports
15. Headphone
16. Microphone
17. Speakers with amplifier
18. External FDD

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:

- Ask the user if a password is registered and, if it is, ask him or her to enter the password. If the user has forgotten the password, connect the printer port wraparound board (F31PRT), then turn the POWER switch on. The computer will override the password function by erasing the current password.
- 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 removed from the computer.
- Make sure the floppy disk drive is empty.

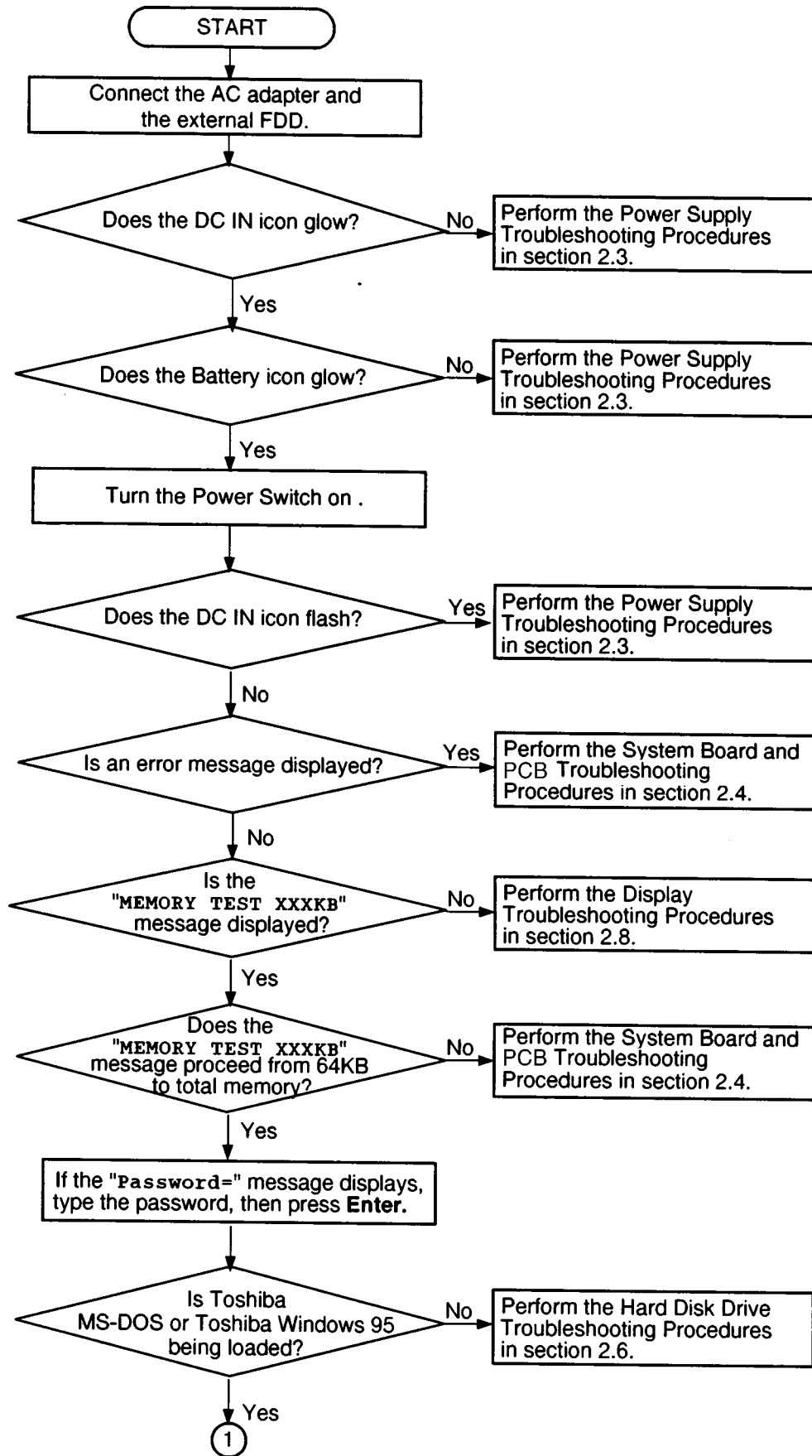


Figure 2-1 Troubleshooting flowchart (1/2)

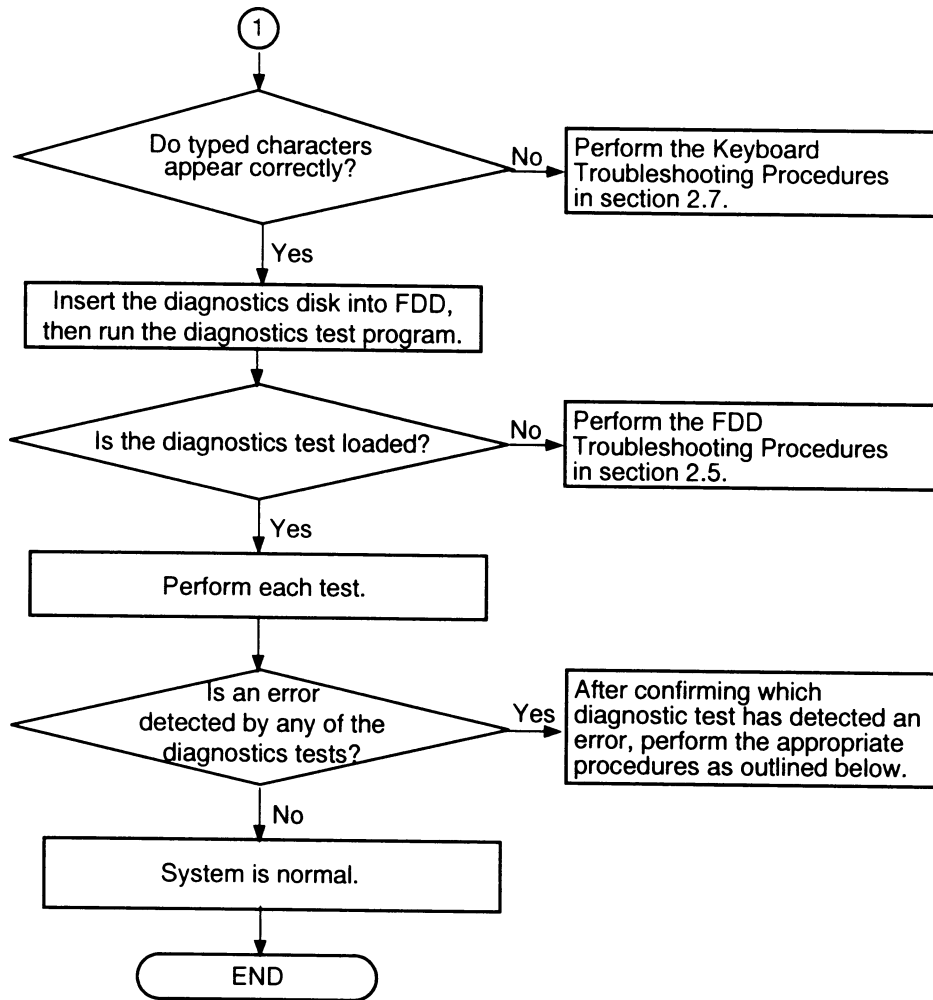


Figure 2-1 Troubleshooting flowchart (2/2)

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, expansion 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 modem test, perform the modem 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 shown in the tables below.

Table 2-1 Battery icon

Battery icon	Power supply status
Lights orange	Quick charge.
Lights green	Battery has a full charge and the AC adapter is connected.
Blinks orange (even intervals)	The battery level becomes low while operating the computer on battery power.*1
Flashes orange	The power switch is pressed on when the battery level is low.*2
Doesn't light	Any condition other than those above. If the battery becomes too hot, charging will stop and the battery icon will go out even if the AC adapter is connected.

*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 Plus.
Blinks orange	Power supply malfunction* ³
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 power supply unit.

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

Check 2 If the DC IN icon does not light, go to Procedure 3.

Check 3 If the Battery icon does not light orange or green, go to Procedure 4.

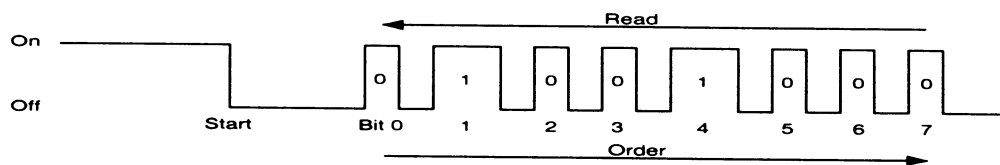
Procedure 2 Error Code Check

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

- Start Off for 2 seconds
- Error code (8 bit)
 - "1" On for one second
 - "0" On for half second
 - Interval between data bits Off for half second

An error code begins with the least significant digit.

Example: Error code 12h (Error codes are given in hexadecimal notations)



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 V Plus/Enhanced Port Replicator II

Error code	Meaning
02h	AC adapter voltage is over the limit (16.5 V).
03h	Desk Station V Plus or Enhanced Port Replicator II DC output voltage is over the limit (16.5 V).
04h	Current from the DC power supply is over the limit (3.27 A).
05h	Current from the DC power supply is over the limit (0.5 A) when there is no load.

- Battery pack

Error code	Meaning
10h	Battery voltage is over the limit.
11h	Battery over voltage signal is received.
12h	Battery charge current is over the limit.
13h	Battery discharge is over current.

DC output

Error code	Meaning
20h	VCC voltage is under the limit (4.47 V).
21h	VDD voltage is over the limit (13.3 V).
22h	VDD voltage is under the limit (10.8 V).
23h	B3V voltage is over the limit (3.6V).
24h	B3V voltage is under the limit (3.0 V).
25h	B5V voltage is over the limit.
26h	B5V voltage is under the limit.

VCC, VDD, B3V output (Suspend)

Error code	Meaning
30h	Output from VCC.
31h	No output from VDD.
32h	No output from B3V.
33h	No output from B5V.

Power supply controller

Error code	Meaning
50h	Watchdog timer is running.

CPU environmental condition

Error code	Meaning
80h	CPU thermister malfunction. (CPU heat sensor is not connected.)
88h	CPU overheat. (The CPU heat sensor has detected overheating and automatically shut down.)

Check 2 If error code 02h displays:

- Make sure the AC adapter is firmly plugged into the AC inlet and wall outlet. If the cables are connected correctly, go to the following step.
- Make sure the DC power cord of the AC adapter is firmly plugged into the connector.
- Replace the AC adapter with a new one. If the error still exists, go to Procedure 5.

Check 3 If error code 03h displays:

- Make sure the Desk Station V Plus or Enhanced Port Replicator II is firmly connected to the computer's docking interface port. If this port is connected correctly, go to the following step.
- Visually check the connector to make sure no pins are bent. If a pin(s) is bent, go to Chapter 4, *Replacement Procedures*. If the connector is not physically damaged, go to the following step.
- Check the Desk Station V Plus or Enhanced Port Replicator II for malfunctions. Refer to the Desk Station V Plus Maintenance Manual for details. 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.

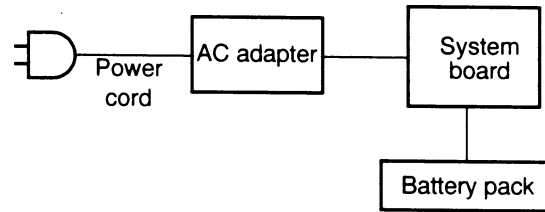
Check 6 When 88h is displayed, it indicates that the CPU temperature is too high. In this case, the computer automatically enters resume mode and shuts down.

- Leave the computer off until the DC IN icon stops blinking. It is recommended to leave the computer off until its interior reaches room temperature even though the DC IN icon stops blinking.
- If the error still exists, go to Procedure 5.

Check 7 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 is firmly connected to the computer's DC IN socket and to a power source. 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. Reinstall the battery pack.
2. Attach the AC adapter and turn on the power. If you cannot turn on the power, go to Procedure 5.
3. Run the Diagnostic test, then go to the System test and execute subtest 06 (Quick Charge) 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 problems.	Check 5

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

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

Check 3 See if 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 operational 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 system board or I/O board may be disconnected or damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*. After checking the connection, perform the following checks:

- Check 1 Replace the AC adapter with a new one. If the problem still exists, go to Check 2.
- Check 2 Replace the system board with a new one. Refer to Chapter 4 for instructions on how to remove and replace the system board. If the problem still exists, go to Check 3.
- Check 3 Replace the I/O board with a new one. Refer to Chapter 4 for instructions on how to remove and replace the I/O board.

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 the data is lost.

If you press the **F1** key, the TSETUP screen appears to set the system configuration. 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.

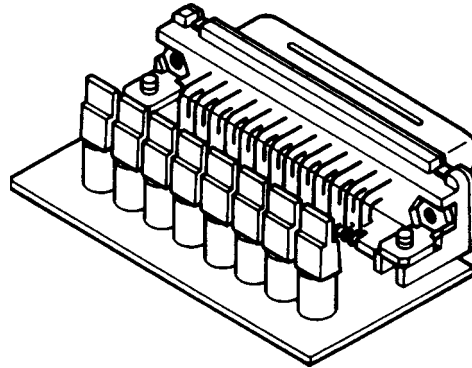


Figure 2-2 Printer port LED

To use the printer port LED, follow these steps:

1. Plug the printer port LED into the computer's parallel port.
2. Hold down the space bar and turn on the computer.
3. Read the LED status from left to right as you are facing the back of the computer.
4. Convert the status from binary to hexadecimal notation.
5. If the final LED status is FFh (normal status), go to Procedure 3.
6. If the final LED 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)

LED 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
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)

LED 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, 08h, 09h, 0Ah, 0Bh, 0Ch, 0Dh,
18h, 1Fh, 25h, 30h, 40h, 41h, 42h, 4Ah, 55h, 65h, 70h, 80h, 90h, A0h,
6h, C0h, FEh

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 60h 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. Make sure the computer is in resume mode.
2. Plug the printer port LED into the computer's parallel port.
3. Turn on the computer.
4. Read the LED status from left to right as you face the back of the computer.
5. Convert the status from binary to hexadecimal notation.
6. If the final LED status is FFh (normal status), go to Procedure 4.
7. If the final LED 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

Error status	Meaning of status
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. NDP test
7. Expansion test
8. Sound test
9. Modem 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 *System, Memory, Printer, Async, Real Timer, NDP, Expansion, Sound, or Modem diagnostic test* detects an error, go to Check 1.

Check 1 Visually examine the system board PJ13 connector and the I/O board PJ5 connector.

- Are the pins inserted evenly? If a connection is off center or not even, it could cause a gap or break in the connection housing.
- Are any pins broken or bent?

Check 2 Replace the I/O board with a new one. If the problem still exists, go to Check 3.

Check 3 Replace the system board with a new one.

2.5 Floppy Disk Drive (FDD) Troubleshooting

This section describes how to determine if the computer's 3.5-inch external floppy disk drive (FDD) 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 *Diagnostic 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 the diagnostics 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 FDD error codes and status

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

Check 1 If the following message 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 external Floppy Disk Drive is connected to the system board through the I/O board. If the 3.5-inch external Floppy Disk Drive is connected to the external FDD port, begin with Check 1.

Check 1 Make sure the FDD cable is firmly connected to the external 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 FDD 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 3.
- Check 3 Replace the I/O board 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, *Replacement Procedures*.

2.6 Hard Disk Drive Troubleshooting

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

- Procedure 1: Partition Check
- Procedure 2: Message Check
- Procedure 3: Format Check
- Procedure 4: Diagnostic Test Program Execution Check

NOTE: *The contents of the hard disk will be erased when the HDD troubleshooting procedures are executed. Transfer the contents of the hard disk to a backup system (i.e., floppy disks). If the customer has not or cannot perform the back-up, create back-up disks as described below.*

1. *If MS-DOS 6.22/Windows for Workgroups was selected, use the Master Diskette Creator (MDC) utility in the Toshiba Utility folder. After backing up the preinstalled software, use the BACKUP command in the Toshiba Companion Utility to back up the entire disk, including the user's files.*
2. *If Windows 95 was selected, check to see if the Microsoft Create System Disks Tools (MSCSD.EXE) still exists in the System Tools Folder (which can be used only once.) If it exists, back up the preinstalled software, then use the Backup utility in the System Tools folder to back up the entire disk, including the user's files*

For more information, refer to the appropriate instructions for the applicable operating system.

Procedure 1 Partition Check

Insert the Toshiba MS-DOS system disk, turn on the computer, and 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, and perform the other checks as instructed.

Check 1 If any of the following messages appear, perform Check 5. If the following messages do not appear, perform Check 2. Note that the message displays for about five seconds.

```
HDC ERROR
or
HDD #0 ERROR
or
HDD #1 ERROR
```

Check 2 If either of the following messages appear, perform Check 3. If the following messages do not appear, perform Check 5.

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

Check 3 Check TSETUP to see whether the Hard Disk option is set to Not used. If it is set to Not used, choose another setting and repeat Check 1. If it is not set to Not used, go to Check 4.

Check 4 Using the Toshiba MS-DOS system disk, install a system program on the hard disk using the SYS command.

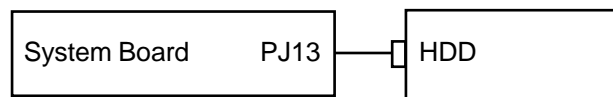
If the following message appears on the display, the system program has been transferred to the HDD.

```
System transferred
```

Restart the computer. If the error message still appears, perform Check 5.

Check 5 If the HDD is firmly connected to the system board, perform Check 6.

Check 6 The HDD connector may be defective or damaged. Replace the HDD connector with a new one following the steps in Chapter 4, *Replacement Procedures*. If the HDD is still not functioning properly, 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 and perform the other steps as required.

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

```
Format complete
```

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

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

If the following message appears on the display, the HDD low level format is complete.

```
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. Error codes and their status 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 code and status

Code	Status
01h	Bad command
02h	Bad address mark
04h	Record not found
05h	HDC not reset
07h	Drive not initialize
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 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 procedure 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.

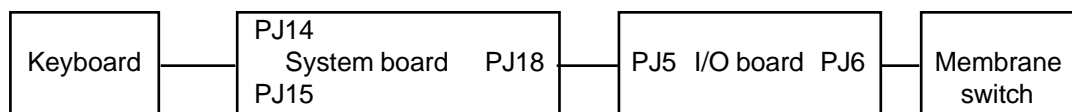
If an error occurs, go to Procedure 2. If an error does not occur, the keyboard is functioning properly.

Procedure 2 Connector and Replacement Check

The keyboard is connected to the system board by two flat cables. The membrane switch is connected to the I/O board by a flat cable. These cables or connectors may be disconnected or damaged. If there is a problem with the keyboard or AccuPoint, disassemble the computer as described in Chapter 4, *Replacement Procedures*, and perform Check 1. If there is a problem with the membrane switch, perform Check 4.

NOTE: In the following checks, refer to the appropriate section in Chapter 4 for replacement procedures.

Check 1 Make sure the following cables are not damaged and are connected to the system board.



If the cables are damaged, replace the keyboard with a new one. If the cable is disconnected, firmly connect it. Perform Procedure 1 again. If the error still exists, perform Check 2.

Check 2 The system board may be damaged. Replace the system board with a new one. If the error still exists, perform Check 3.

Check 3 The I/O board may be damaged. Replace the I/O board with a new one.

Check 4 The membrane switch may be damaged. Replace the membrane switch with a new one. If the error still exists, perform Check 5.

Check 5 The I/O board may be damaged. Replace the I/O board with a new one. If the error still exists, perform Check 6.

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

2.8 Display 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: External Monitor Check
- Procedure 2: Diagnostic Test Program Execution Check
- Procedure 3: Connector Check
- Procedure 4: Replacement Check

Procedure 1 External Monitor Check

Connect the external monitor to the computer's external monitor port, then boot the computer. If there is no display on the external monitor, press **Fn + F5** to change the setup display setting to external or simultaneous.

If the external monitor works correctly, the internal LCD display may be damaged. Go to Procedure 3.

If the external monitor appears to have the same problem as the internal LCD, the display controller may be damaged. Go to Procedure 2.

Procedure 2 Diagnostic Test Program Execution Check

The Display Test program is stored on the computer's 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 3. If an error is not detected, the display is functioning properly.

Procedure 3 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 one signal cable as shown below. Any of these cables may be disconnected.

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

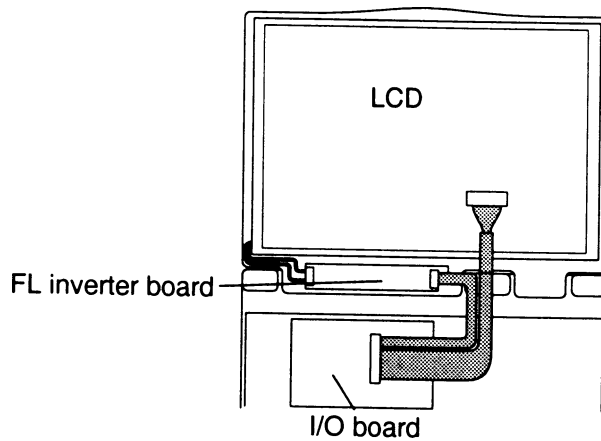


Figure 2-3 Display connection

If any of these cables is not connected, firmly reconnect it and repeat Procedures 1 and 2. If the problem still exists, perform Procedure 4.

Procedure 4 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 5.

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

Check 2 Replace the FL 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 cable with a new one and test the display again. If the problem still exists, perform Check 5.

Check 5 The I/O board may be damaged. Replace the I/O board with a new one. If the problem still exists, perform Check 6.

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

2.9 Internal Modem Troubleshooting

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

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector Check and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

The internal modem Diagnostic Test program is stored on the computer's Diagnostics Disk. This program checks the internal modem. 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.

Check 1 Execute modem test 1. If an error occurs, the I/O board may be malfunctioning. Replace the I/O board. If errors still occur, go to Check 2.

Check 2 Execute modem test 2. If an error occurs, the DAA module may be malfunctioning. Replace the DAA module. If errors still occur, go to Check 3.

Check 3 Execute modem test 3. In an error occurs, the I/O board and DAA module may be malfunctioning. Replace them both.

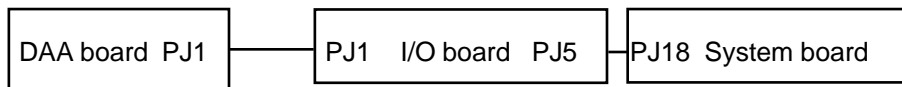
If any other errors occur while executing the internal modem Diagnostics Tests, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The DAA board is connected to the modem I/F board. If the modem malfunctions, there may be a bad connection between the DAA board and the system board, or the DAA module or system board might be damaged.

Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1 Make sure DAA board PJ1 is firmly connected to I/O board PJ1, and that I/O board PJ5 is firmly connected to system board PJ18.



If a connector is disconnected, connect it to the system unit and repeat Procedure 1. If the DAA board is still not functioning properly, perform Check 2.

Check 2 The DAA board may be defective or damaged. Replace the DAA board with a new one following the steps in Chapter 4, *Replacement Procedures*. If the DAA board is still not functioning properly, perform Check 3.

Check 3 Replace the I/O board with a new one following the steps in Chapter 4, *Replacement Procedures*. If the modem is still not functioning properly, perform Check 4.

Check 4 Replace the system board with a new one following the steps in Chapter 4, *Replacement Procedures*.

2.10 Docking Adapter

This section describes how to determine if the Docking Adapter is functioning properly. Perform the steps below starting with Procedure 1 and continue with the other procedure as required.

Procedure 1: Diagnostic Test Program Execution Check

Procedure 2: Connector Check and Replacement Check

Procedure 1 Diagnostic Test Program Execution Check

There is no test specifically for the Docking Adapter, so run the test program for the Enhanced Port Replicator II, or for the Desk Station V Plus. Both programs are stored on the computer's Diagnostics Disk. Insert the Diagnostics Disk in the FDD, turn on the computer, and run the test. If an error is detected, go to Procedure 2. Refer to Chapter 3, *Tests and Diagnostics*, for details.

Procedure 2 Connector Check and Replacement Check

The Docking Adapter connects directly to the system board. If there appears to be a malfunction, the connection might not be secure, or the connector on the computer or Docking Adapter might be damaged. Perform the following checks:

- Check 1 Make sure the connection between the computer and Docking Adapter is secure. If there is still a problem, go to Check 2.
- Check 2 The interface connector board might be damaged. Replace it with a new one. Refer to Chapter 4, *Replacement Procedures*. If there is still a problem, go to Check 3.
- Check 3 The system board might be damaged. Replace it with a new one. Refer to Chapter 4, *Replacement Procedures*. If there is still a problem, go to Check 4.
- Check 4 The I/O board might be damaged. Replace it with a new one. Refer to Chapter 4, *Replacement Procedures*.

3.1 The Diagnostic Test

This chapter explains how to use the Diagnostic Test program to test the functions of the computer's hardware modules. The Diagnostics Program is stored on the Diagnostic Disk and consists of eight programs that are grouped into the Service 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 DIAGNOSTIC 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 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
- MODEM 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)
- External FDD
- Cleaning kit to clean the floppy disk drive heads (Head Cleaning)
- PC card wraparound connector for the I/O card test (Expansion test)
- Parallel port wraparound connector for the printer wraparound test (Printer test)

- External monitor (all test)
- PS/2 or compatible keyboard (all test)
- PS/2 or compatible mouse (Keyboard test)
- Serial port wraparound connector (ASYNC test)
- Multimedia sound system with line-in and line-out ports (Sound test)
- Headphone (Sound test)
- Telephone
- Microphone
- External speaker

The following sections detail the tests within the Diagnostic Test function of the DIAGNOSTIC TEST menu. Refer to Sections 3.19 through 3.25 for detailed information on the remaining Service Program Module functions.

3.2 Executing the Diagnostic Test

Toshiba MS-DOS is required to run the Diagnostic 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. (The Diagnostics disk contains the MS-DOS boot files.)

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*, 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.

- 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 - MODEM 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.

- 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 - Thermistor check
06 - Quick charge
99 - Exit to DIAGNOSTIC TEST MENU
```

```
↑↓→← : Select items
Enter : Specify
Esc   : Exit
```

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

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

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

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 describes the function of each test on the subtest menu. Table 3-2 in Section 3.18 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	Quick charge
2	MEMORY	01	RAM Constant data
		02	RAM Address pattern data
		03	RAM Refresh
		04	Protected mode
		05	Memory module
		06	Cache memory
		07	L2 Cache/TAG memory
3	KEYBOARD	01	Pressed key display
		02	Pressed keycode display
		03	PS/2 Mouse connect check
		04	Pointing stick
4	DISPLAY	01	VRAM read/write for VGA
		02	Gradation for VGA
		03	Gradation for LCD
		04	Gradation & Mode test for VGA
		05	All dot on/off for LCD
		06	"H" pattern display
5	FDD	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address
6	PRINTER	01	Ripple pattern
		02	Function
		03	Wraparound

Table 3-1 Subtest names (2/2)

No.	Test Name	Subtest No.	Subtest Item
7	ASYNC	01	Wraparound (board)
		02	Point to point (send)
		03	Point to point (receive)
		04	Interrupt test
		05	FIR wraparound 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 wraparound
		02	DS bus wraparound
		03	RGB monitor ID
		04	Joystick
		05	Joystick wraparound
12	SOUND	01	CODEC (Recording/Playback)
		02	FM-Synthesizer
		03	SIN-Wave Playback
		04	CODEC (Line In/Out)
13	MODEM	01	Modem test

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

This subtest executes a checksum test of the BIOS ROM on the system board.

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 PJ21 on the system board. When you execute this subtest, the following message is displayed:

```
*** 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. If the data indicates the connector is open or shorted, it displays an error message.

Subtest 06 Quick charge

Checks the battery's quick-charge status. When the test is complete, results are displayed on the screen. Refer to Chapter 2 for an explanation of the displayed results.

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), 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, 32 MB and 64 MB.

After selecting Subtest 05, the following message will appear:

Extended memory size (1:8 MB,2:16 MB,3:32 MB,4:64 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 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

Subtest 07 L2 Cache memory

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

Number of misses < Number of hits → OK
Number of misses ≥ Number of hits → Fail

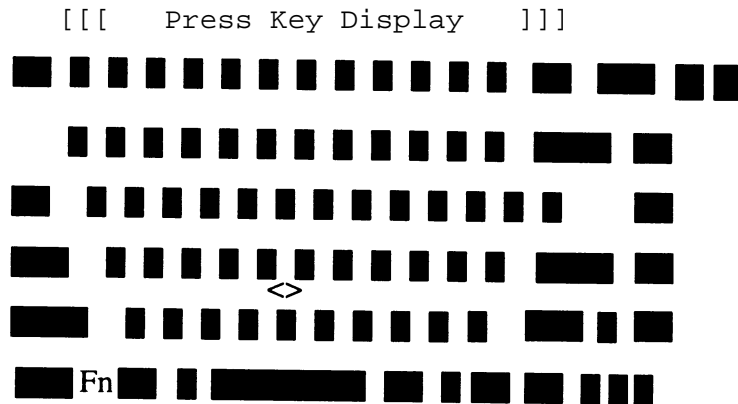
3.6 Keyboard Test

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, PS/2 mouse, and AccuPoint actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Pressed key display

***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 the corresponding character. Holding a key down enables the auto-repeat function which causes the key's display character to blink.



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 shown in Appendix D.

```
KEYBOARD TEST  IN PROGRESS  302000

      Scan code =
      Character code =
      Keytop    =

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

PRESS [Enter] KEY
```

Subtest 03 PS/2 mouse connect check

NOTE: To execute the PS/2 mouse connect check, a PS/2 mouse must be connected to the computer.

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.

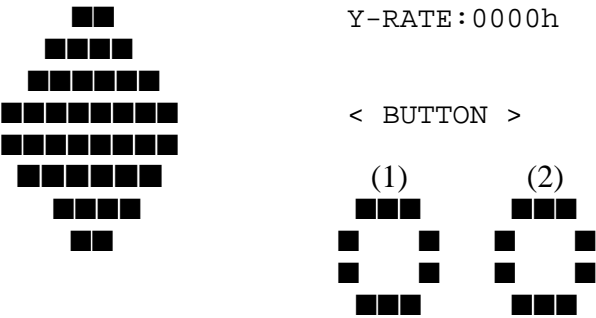
- A) IPS stick pressure sensing direction and parameter.
- B) IPS switch function check.

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

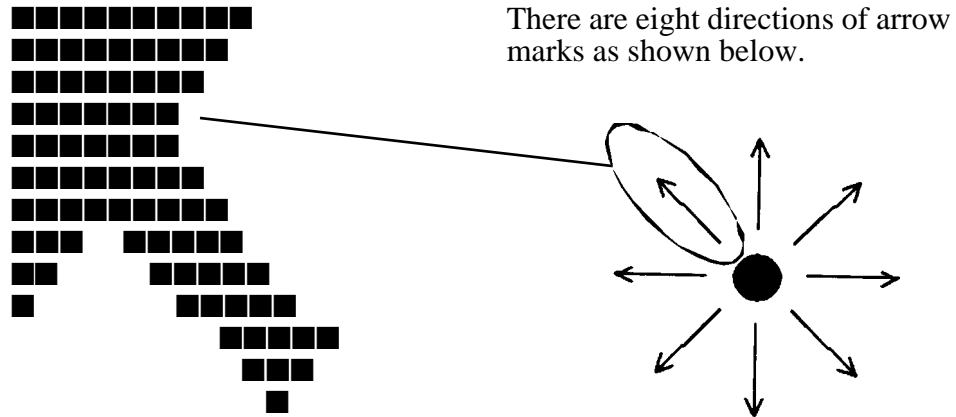
```



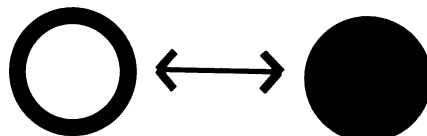
```

<< PRESS BUTTON1 + BUTTON2 THEN END >>

```



When a button is pressed, the display alternates as shown below.



3.7 Display Test

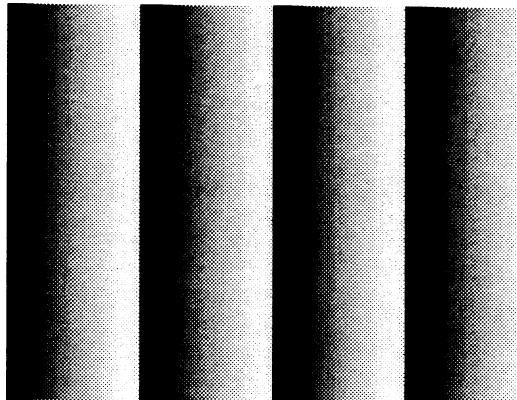
To execute the Display Test, select **4** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions displayed on the screen. The Display test contains six subtests that test the display in various modes. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 VRAM Read/Write for VGA

This subtest writes constant data AAh and 55h and address data to video RAM (2MB: A0000h-AFFFFh). The data is then read from the video RAM and compared to the original data.

Subtest 02 Gradation for VGA

This subtest displays four colors: red, green, blue and white from left to right across the screen from black to maximum brightness. The display below appears on the screen when this subtest is executed.



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

Subtest 03 Gradation for LCD

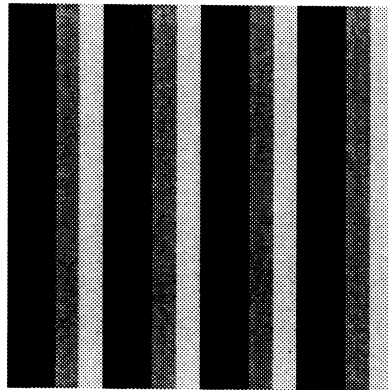
This subtest displays eight colors: red, semi-red, green, semi-green, blue, semi-blue, white, and semi-white. Each color is displayed full screen for three seconds.

Subtest 04 Gradation & Mode test for VGA

This subtest displays gradations for each mode. Execute the test, then press **Enter** to change the mode.

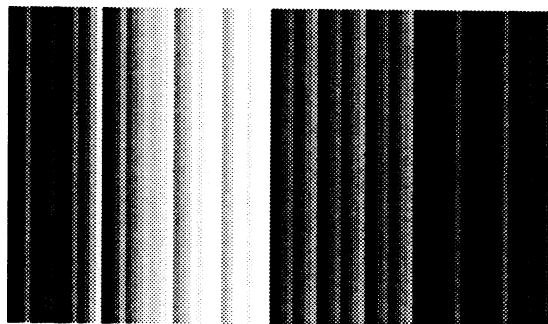
Resolution	Mode
800 x 600	3, 12, 13, 43, 52

The display below appears on the screen when this subtest is executed.



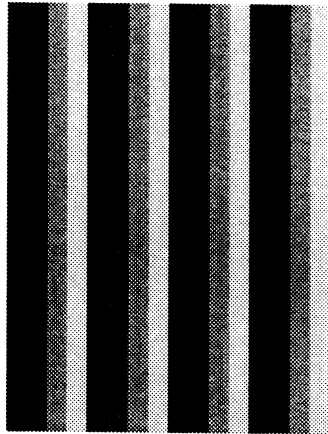
[Mode 12]

Pressing **Enter** changes the size of the displayed image.



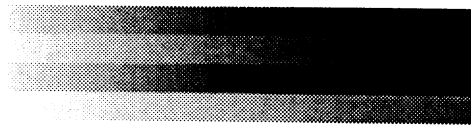
[Mode 13]

Pressing **Enter** changes the size of the displayed image.



[Mode 3]

Pressing **Enter** changes the size of the displayed image.



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

Subtest 05 All dot on /off for LCD

This subtest displays an all-white screen (all dot on) for three seconds then an all-black screen (all dot off) for three seconds. To exit this subtest and return to the DISPLAY TEST menu, press **Ctrl + Break**.

This subtest displays a full screen of "H" patterns.

HH
HH
HH
HH
HH
HH
HH
HH
HH
HH
HH
HH
HH
HH

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

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 FDD.

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

Subtest 02 Function

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

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

This subtest prints the various print types shown below:

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

Subtest 03 Wraparound

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

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

3.10 Async Test

To execute the Async Test, select **7** from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions displayed on the screen. The Async Test contains 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:	9600BPS (Subtests 01 to 04) 38400BPS (Subtests 05 to 07)
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, 05, 06, and 07 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, a serial port wraparound connector (34M741621G01) must be connected to the serial port. The serial port wraparound 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 a serial port direct cable. One machine should be set as "send"(subtest 02) and the other set as "receive" (subtest 03). The wiring diagram for the serial port 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 02 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 FIR Wraparound test

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

NOTE: To execute Subtests 06 and 07, each computer must have access to the other computer's infrared port.

Subtest 06 SIR point to point (Send)

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

Subtest 07 SIR point to point (Receive)

This subtest, used with Subtest 06 described above, receives the data from the send side, then sends the received data 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.

***NOTE:** The contents of the hard disk will be erased when Subtest 02, 03, 04, 05, 06, 08, 09, or 10 is executed. Before running the test, transfer the contents of the hard disk to floppy disk.*

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 Tools (MSCSD.EXE) in the System Tools Folder.

For more information, refer to the appropriate instructions for each operating system.

The following messages will appear after selecting the Hard Disk Test. Answer each of the following 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 3.19.

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 : XXXXXXXX     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 3-2.

Subtest 01 Sequential Read

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

Subtest 02 Address Uniqueness

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

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address/Data

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

Subtest 04 Cross Talk & Peak Shift

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

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

Subtest 05 Write/read/compare (CE)

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

Subtest 06 Write specified address

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

Subtest 07 Read specified address

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

Subtest 08 ECC circuit

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

Subtest 09 Sequential write

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

Subtest 10 W-R-C specified address

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

3.12 Real Timer Test

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

Subtest 01 Real Time

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

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

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

```
Enter new date:
```

```
PRESS [ENTER] KEY TO EXIT TEST
```

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

```
Enter new time :
```

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

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

Subtest 02 Backup Memory

This subtest performs the following backup memory check:

- Writes 1-bit of "on" data to 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 : 12-31-1995
Current time : 23:59:58
```

Pressing **Enter** displays the following:

```
Current date : 01-01-1996
Current time : 00:00:00
```

```
PRESS [Enter] KEY TO EXIT TEST
```

Press **Ctrl + Break** to exit.

3.13 NDP Test

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

Subtest 01 NDP

This test checks the following functions of the coprocessor:

- Control word
- Status word
- Bus
- Addition
- Multiplication

Press **Ctrl + Break** to exit.

3.14 Expansion Test

To execute the expansion test, select **11** from the DIAGNOSTICS TEST menu, press **Enter** and follow the directions on the screen. The expansion test contains one subtest.

NOTE: To execute this subtest, the PC card wraparound connector is required.

Subtest 01 PCMCIA wraparound (Main) (Point to point (Receive))

This test checks the following signal lines of the PC card slot:

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

This subtest is executed in the following order:

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

NOTE: Subtests 02 through 05 are for the Desk Station V Plus and Enhanced Port Replicator II. For procedures on these subtests, refer to the Desk Station V Plus and Enhanced Port Replicator II Maintenance Manuals.

3.15 Sound Test

To execute the sound test, select **12** from the DIAGNOSTICS 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 (AD1848) A/D, D/A converter. At the same time, it tests the microphone terminals and headphone terminals. When you execute this subtest the following message is displayed:

```
[Quick REC & PLAY for AD1848]
Press any key to *** REC ***
```

After pressing any 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 SIN 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 AD1848L.COM. Connect a sound source such as a CD player or stereo to the line-in port.

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

3.16 Modem Test

NOTE: Use the Hardware Setup program to select COM2 (2F8H/IRQ3) for the modem COM port, I/O address and IRQ.

3.16.1 Operation procedures

1. To execute this test, highlight 14-MODEM TEST in the DIAGNOSTIC TEST menu and press **Enter**. Next, highlight 1-MODEM in the SUBTEST menu and press **Enter**. The screen below will display.

```
-----[EXECUTION AREA]-----  
  
[ASYNC MODEM (FAX/DATA) INSPECTION]      :      VX.XX  
  
1  .FLXCY* TEST  
2  .LOOPBACK TEST  
3  .SPEAKER (L) TEST  
4  .SPEAKER (R) TEST  
5  .TERMINAL  
9  .END  
  
PRESS [1] - [9] KEY?  
  
STOP=[crtl]+[break]
```

2. When you select any item from 1 to 5, the following screen will display:

```
[XXXXX-X]          [XXXXXXXXXX]  
  
-----[EXECUTION AREA]-----  
  
Select the COM(1:COM1/3F8h,2:COM2/2F8h)?
```

3. When you set the COM port to the same one selected in the Hardware Setup program, the following screen will display:

```
[XXXXX-X]          [XXXXXXXXXX]  
  
-----[EXECUTION AREA]-----  
  
Select the COM(1:COM1/3F8h,2:COM2/2F8h)?  
Baud rate  
(2:300,4:1200,5:2400,6:9600,7:14400,8:19200,9:38400)?
```

4. Enter the Baud rate and press **Enter**.

3.16.2 Program explanation

Subtest 01 FLXCY*TEST

Initializes the modem and sends an ATZ command.

Subtest 02 LOOPBACKTEST

A loopback signal is sent from board FLXCY* to FLXDA.

Subtest 03 SPEAKER (L) TEST

A dial tone sound is generated in the left speaker.

NOTE: *The computer is equipped with a monaural speaker, so you get the same result when you execute Subtests 03 and 04.*

Subtest 04 SPEAKER (L/R) TEST

A dial tone sound is generated in the right speaker.

Subtest 05 TERMINAL

When you have connected the DAA module to a telephone, test the connection by calling the line from another phone.

NOTE: *Before you conduct Subtest 05, connect the DAA module to a telephone.*

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 (1/2)

Device Name	Error Code	Error Status Name
(Common)	FF	Data Compare Error
System	01	ROM Checksum Error
Memory	01	Parity Error
	02	Protected Mode Not Changed
	14	Memory Read/Write Error
	DD	Cache Memory Error
	DE	2nd Cache Error
	DF	TAGRAM Error
FDD	01	Bad Command
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Removed
	08	DMA Overrun Error
	09	DMA Boundary Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	60	FDD Not Drive Error
	80	Time Out Error
	EE	Write Buffer Error
Printer	01	Time Out
	08	Fault
	10	Select Line
	20	Out Of Paper
	40	Power Off
	80	Busy Line
Async	01	DSR On Time Out
	02	CTS On Time Out
	04	RX-READY Time Out

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

Device Name	Error Code	Error Status Name
Async (cont.)	08	TX-BUFFER Full Time Out
	10	Parity Error
	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

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 form and the second byte displays the HDC error register.

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

Table 3-3 Hard disk controller status register contents

Bit	Name	Description
7	BSY (Busy)	"0" --- The HDC is ready. "1" --- The HDC is busy.
6	DRDY (Drive ready)	"0" --- The hard disk drive is not ready to accept any command. "1" --- The hard disk drive is ready.
5	DWF (Drive write fault)	"0" --- A DWF error is 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" --- Not used. "1" --- A correctable data error was corrected.
1	IDX (Index)	"0" --- Not used. "1" --- The index is sensed.
0	ERR (Error)	"0" --- Normal. "1" --- The previous command was terminated with some error.

Table 3-4 Error register contents

Bit	Name	Description
7	BBK1 (Bad block mark)	"0" --- Not used "1" --- A bad block mark was detected.
6	UNC (Uncorrectable)	"0" --- There is no uncorrectable data error. "1" --- Uncorrectable data error was detected.
5	—	Not used
4	IDNF (Identification)	"0" --- Not used "1" --- There was no ID field in the requested sector.
3	—	Not used
2	ABRT (Abort)	"0" --- Not used "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 floppy disks.*

If MS-DOS 6.22 and Windows for Workgroups was selected, use the Master Diskette Creator (MDC) utility in the Toshiba Utility folder to back up the preinstalled software.

If Windows 95 was selected, use the Microsoft Create System Disks Tools (MSCSD.EXE) in the System Tools Folder.

For more information, refer to the appropriate instructions for each operating system.

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	(MK1301MAV)
Storage capacity Formatted (Byte)	1,356,070,912
Cylinders	3,650
Heads	6
Sectors	121
Bytes per sector	512
Rotation speed (rpm)	4,200
Recording method	8-9 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.

(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 automatically formatted as a bad track.

2. Good track FORMAT

If a good track has been erroneously formatted as a bad track, you can use this subtest to reformat the track as a good track. To format a track as a good track, enter the number for 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 if 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 Diagnostic Menu.
 - The **4** key erases all error log information in RAM.
 - The **5** key outputs the error log information to a printer.
 - The **6** key reads the log information from a floppy disk.
 - The **7** key writes the log information to a floppy disk.

3. 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 06)
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 be displayed:

Printer wrap around test (Y/N) ?

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

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

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

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

4. Select **Yes** or **No** and press **Enter**. The following message will be 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. When the amount of data is too large to be copied in one operation, the message from step (b) is displayed again. After the floppy disk has been copied, the following message will appear:

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

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

4. DUMP program

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

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

- (b) Select a 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 displays:

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


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

(f) The following message displays:

```
— 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 Microprocessor 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
* - XXXMB + XXXXKB TOTAL MEMORY
* - 1 MATH CO-PROCESSOR
```

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
3. Password
 - (a) User Password
 - (b) Eject Password
4. Hard Disk
5. Battery
6. Others
 - (a) Power-up Mode
 - (b) CPU Cache
 - (c) Level 2 Cache
 - (d) Auto Power On
 - (e) Alarm Volume
 - (f) System Beep
 - (g) Panel Power On/Off
 - (h) Ext. Keyboard "Fn"
 - (i) Boot Priority
 - (j) Pointing Devices
 - (k) PC Card Controller Mode
7. Display
8. I/O Ports
 - (a) Serial Port
 - (b) Infrared Port
 - (c) Built-in Modem Port
 - (d) Parallel Port
 - (e) Sound System
9. PCI Bus
10. Drives I/O
11. Floppy Disk I/O

3.25.2 Accessing the SETUP Program

Selecting **0** from the DIAGNOSTICS MENU and pressing **Enter** displays the TSETUP screen. The TSETUP screen is divided into two pages: SYSTEM SETUP (1/2) and SYSTEM SETUP (2/2).

SYSTEM SETUP (1/2)		BIOS version = x.xx
MEMORY	Total = 16384 KB	BATTERY Battery Save Mode = Full Power
DISPLAY	Display Adapter = VGA Compatible LCD Display Colors = 16M Colors Power On Display = Internal/External Text Mode Stretch = Disabled	OTHERS Power-up Mode = Resume CPU Cache = Enabled Level 2 Cache = Enabled Auto Power On = Disabled Alarm Volume = High System Beep = Enabled Panel Power On/Off = Disabled Ext Keyboard "Fn" = Disabled Boot Priority = FDD→HDD Pointing Devices = Auto-selected PC Card Controller Mode = PCIC Compatible
PASSWORD	Not Registered	
HARD DISK	Internal HDD Mode = Enhanced IDE (Normal)	

SYSTEM SETUP (2/2)		BIOS version = x.xx
DISPLAY	VGA Segment Address= E400H-EFFFH	DRIVES I/O Internal HDD = Primary IDE(1F0H/IRQ14)
I/O PORTS	Serial = COM1(3F8H/IRQ4) Built-in Modem = COM2(2F8H/IRQ3) Parallel = LPT1(378H/IRQ7/CH3) Sound = Enabled	FLOPPY DISK I/O Floppy disk = Others(3F2H/IRQ6/CH2)
PCI BUS	PCI BUS = IRQ Not Used	

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

NOTE: The Panel Power On/Off item appears only when the computer is in Resume mode.

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.

***NOTE:** On either page, you can go directly to a specific group by pressing the first letter (highlighted) of the group's name. For example, press **B** to go to the **Battery** group.*

*To change pages, press the **PgUp** (page up) or **PgDn** (page down) key.*

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 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*
- 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 Adaptor

Allows you to enable or disable the internal controller for the VGA internal display.

VGA Compatible Enables the internal VGA controller. (Default)

Not Used Disables the internal VGA controller.

(b) LCD Display Colors

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

16M colors Displays up to 16,777,216 colors simultaneously.
(This value cannot be changed.)

(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. (Default)

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.

Disabled Disables the text mode stretch feature. (Default)

3. Password

(a) User Password

Sets or reset the user password for power on and instant security.

Registered The user password has been registered.

Not registered The user password has not been registered.

(b) Eject Password

Prevents an unauthorized user from removing the computer from an optional Desk Station V Plus.

Enabled The eject password has been registered.

Disabled The eject password has not been registered.
(Default)

For details on setting the user and eject password, refer to your computer's User's Guide.

4. Hard Disk

Selects the internal 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 is 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. Battery

This option lists the **BATTERY SAVE OPTIONS**. Selections include **Full Power**, **Low Power**, or **User Setting**.

Full Power The following shows full power settings.

BATTERY SAVE OPTIONS		
Processing Speed	=	High
CPU Sleep Mode	=	Enabled
Display Auto Off	=	30 Min.
HDD Auto Off	=	30 Min.
System Auto Off	=	Disabled
LCD Brightness	=	Bright
Cooling Method	=	Performance

Low Power The following shows low power settings.

BATTERY SAVE OPTIONS		
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 sub-window, **BATTERY SAVE OPTIONS**. When you select this option, the automatic setting feature (*Full Power* or *Low Power*) is disabled and the user-preferred parameters become effective. The default setting in the 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 submenu of the **User Setting**, which is one of the **Battery Save Mode** options.

(1) Processing Speed

This feature changes the CPU processing speed.

High CPU operates at high speed. (Default)

Low 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 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 set the duration of the HDD automatic power off function.

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.

Disabled Disables system automatic power off.

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

(6) LCD Brightness

Use this option to set the level of LCD brightness.

Bright Full brightness for maximum visibility.

Semi-Bright Less than full brightness for saving power.

(7) Cooling method

Performance If the CPU becomes too hot, the fan turns on automatically. When the CPU temperature falls to a normal range, the fan is turned off.

Quiet 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.

6. Others

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

(a) Power-up Modes

This option lets you choose between AutoResume and boot mode. You can also set this option using 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* for CPU cache.

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) Level 2 Cache

Use this feature to enable or disable the level 2 cache.

Enabled Enables the CPU cache. (Default)

Disabled Disables the CPU cache.

(d) 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 Indicator* is displayed only when the computer is in Resume mode and *Alarm Date Option* is displayed when *Alarm Time* is enabled.

OPTIONS	
Alarm Time	= xx:xx:00
Alarm Date Option	= xx-xx
Ring Indicator	= Enabled

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.

NOTE: 1. 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.

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.

(e) 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.

(f) System Beep

Use this feature to enable or disable the system beep.

Enabled Enables the feature. (Default)

Disabled Disables the feature.

(g) 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.

(h) 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

Ext. Keyboard "Fn" key equivalent

- = Right Ctrl + Right Alt
- = Left Alt + Left Shift
- = Right Alt + Right Shift
- = Left Alt + Caps Lock
- = Left Ctrl + Left Alt

(1) 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.

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

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

* If these selections are made, you cannot warm boot the system by pressing **Ctrl + Alt + Del.**

(i) Boot Priority

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

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

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

(j) Pointing Devices

This option enables or disables the AccuPoint.

Auto selected 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)

Simultaneous Enables both the AccuPoint and PS/2 mouse.

(k) PC Card Controller Mode

Use this option to set the PC card controller mode.

PCIC Compatible For the PCMCIA R2.01 and ZV port cards. (Default)

CardBus/16bit For the PC card 16 multi-function card, CardBus card and ZV port card.

7. Display

Use this option to set the VGA segment address:

(a) VGA Segment Address

E000h-EFFFh
E400h-EFFFh (Default)
C000h-CBFFh
E000h-EBFFh

8. I/O ports

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

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

(a) Serial Port

This option allows you to set the COM level for the serial port. The serial port interrupt request level (IRQ) and I/O port base address for each COM level are shown below:

COM level	Interrupt level	I/O address
COM1	4	3F8H (Serial port default)
COM2	3	2F8H
COM3	4	3E8H
COM3	5	3E8H
COM3	7	3E8H
COM4	3	2E8H
COM4	5	2E8H
COM4	7	2E8H
Not used		(Disables port)
Others		(Other settings are made automatically by the Plug-and-Play operating system.)

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

(b) Built-in Modem

This option allows you to set the COM level for the Modem port. The Modem port interrupt request level (IRQ) and I/O port base address for each COM level are shown below:

NOTE: If an internal modem (optional in some markets) is not installed, this selection does not appear.

COM level	Interrupt level	I/O address
COM1	4	3F8H
COM2	3	2F8H (Modem port default)
COM3	4	3E8H
COM3	5	3E8H
COM3	7	3E8H
COM4	3	2E8H
COM4	5	2E8H
COM4	7	2E8H
Not used		(Disables port)
Others		(Other settings are made automatically by the Plug-and-Play operating system.)

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

(c) Parallel Port

This option sets the address for the parallel port. When the Printer Port Type is set to *Std. Bi-direct.*, the options are:

LPT setting	Interrupt level	I/O address
LPT 1	7	378H
LPT 2	5	278H
LPT 3	7	3BCH
Not Used		(Parallel port default)
Others		(Other settings are made automatically by the Plug-and-Play operating system.)

When the Printer Port Type is set to *ECP*, the DMA channel can also be set to 1, 2 or 3. The default is 3.

LPT setting	Interrupt level	I/O address	DMA Channel
LPT1	7	378H	3(Default)
LPT2	5	278H	3
LPT3	7	3BCH	3
Not Used		(Parallel port default)	
Others		(Other settings are made automatically by the Plug-and-Play operating system.)	

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-Direct*.

OPTIONS		
Mode	=	ECP
DMA	=	Channel 3

For most printers, the port should be set to *ECP*. With some other parallel devices, the setting should be *Std. Bi-Direct*.

(d) Sound system

This item allows you to enable or disable the sound system.

Enabled Enables the sound system. (Default).

Disabled Disables the sound system.

When *Enabled* is selected, a subwindow similar to the one below appears to let you set the *WSS I/O address*, *SBPro I/O address*, *Synthesizer I/O address*, *WSS & SBPro IRQ Level*, *WSS & SBPro DMA*, *Control I/O address*, *MPU401 IRQ Level*, and *Joystick I/O address* for the sound system.

SOUND SYSTEM		
WSS I/O Address	=	534H
SBPro I/O Address	=	220H
Synthesizer I/O Address	=	388H
WSS & SBPro IRQ Level	=	IRQ5
WSS & SBPro DMA		
Playback	=	Channel 1
Record	=	Channel 0
Control I/O Address	=	120H
MPU401 (MIDI I/F) IRQ Level	=	Not Used
Joystick I/O Address	=	200H

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

534h (default), 608h, E84h, F44h

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

220h (default), 240h

*Synthesizer I/O
address*

You cannot change this value.

*WSS & SBPro IRQ
level*

This option sets the WSS & SBPro IRQ level for the sound system. The available settings are:

*IRQ5 (default), IRQ7, IRQ9,
IRQ11, IRQ15*

*WSS & SBPro
DMA*

This option sets the WSS & SBPro DMA for the sound system. The available settings are:

Playback Channel 0, Channel 1
 (default), Channel 3

Record Channel 0 (default),
 Channel 1, Channel 3

NOTE: When you set the ***Playback*** and ***Record*** option to the same channel, the ***Record*** option will display ***Same as Playback***.

*MPU401 (MIDI I/F)
IRQ level*

This option sets the MPU401 IRQ level for the sound system. The available settings are:

*Not Used (default), 330H/IRQ5, 330H/
IRQ7, 330H/IRQ9, 330H/IRQ11, 330H/
IRQ15*

Joystick I/O address You cannot change this value.

9. PCI Bus

This option displays the interrupt level for the CardBus in the computer and the PCI bus in the Desk Station V Plus. It is for information only and cannot be changed.

Under the following conditions:

- No PCI card is installed in the Desk Station V Plus.
- The system cannot assign an interrupt level to the PCI bus.
- The PC Card Controller Mode is not set to CardBus/16Bit in TSETUP.

the display will read:

PCI bus = IRQ Not Used.

NOTE: In this case, the system will sound a warning beep when you connect the Desk Station V Plus and turn on the computer. Also, the following items on the Desk Station V Plus cannot be used: PCI bus slots, ISA bus slots, PC card slots, and SCSI port.

10. Drives I/O

This item displays the installed hard disk drives and/or CD-ROM drives: internal standard, Selectable Bay, Desk Station V Plus, or no drive. It displays only in TESTUP.

(a) Setting for hard disk drive

<i>Primary IDE (1F0H/IRQ14)</i>	The computer's HDD is ready for use.
<i>Not used</i>	Disables the computer's HDD.
<i>No drive</i>	The computer's HDD is not installed.

Other settings are made automatically by plug-and-play operating systems.

(b) Setting for CD-ROM (DS Selectable Bay)

<i>Secondary IDE (170H/IRQ15)</i>	Desk Station V Plus Selectable Bay CD-ROM.
<i>Not used</i>	Disable selected CD-ROM.
<i>Others</i>	Setting is made automatically by plug-and-play operating systems.

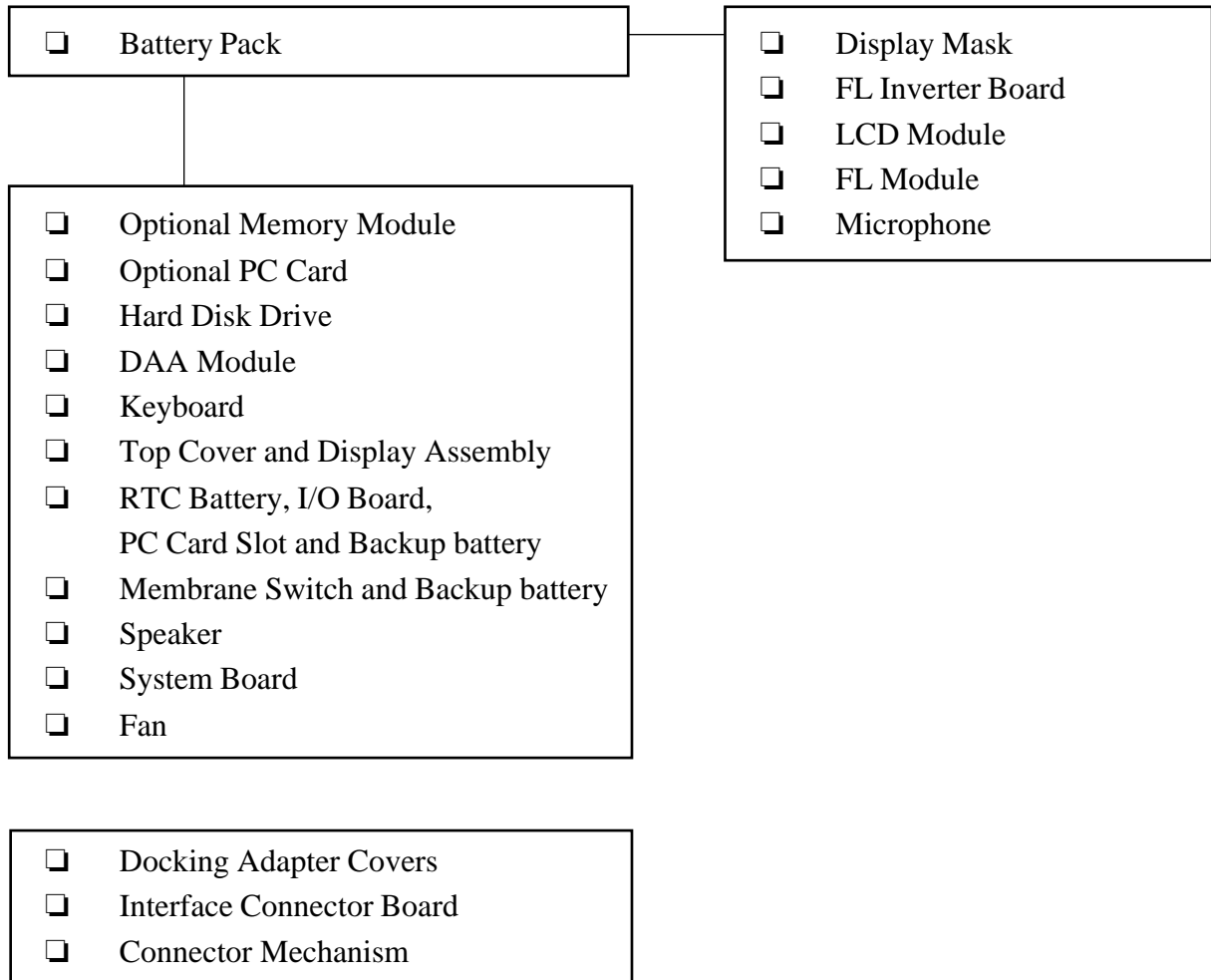
11. Floppy disk I/O

Displays the address, internal level and channel settings for the diskette drive. It appears only in TSETUP.

<i>(3F2H/IRQ6/CH2)</i>	The computer's FDD is ready for use.
------------------------	--------------------------------------

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 next 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 the lithium ion battery pack or back-up battery that are 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. If you need to turn on the power of a partially disassembled computer to check its operation, be very careful not to touch connectors or components, in order to avoid the risk of electric shock. Also, do not disassemble individual components in first-level maintenance.*

WARNING:

To avoid the risk of electric shock or other injury:

1. *Always turn the power off and disconnect the AC adapter 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.*
3. *Before removing an FRU or other component, make sure all cables to the component have been disconnected.*
4. *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 the corresponding figures.
9. The computer contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU, make sure the computer is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The computer has 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 the cable is secure. If you pull out the connector, connect it again making sure the connector's pressure plate is fully lifted when you insert the cable.

Standard pin connectors and flexible cable connections can be connected and disconnected by simply pulling them apart or pushing them together.

Assembly Procedures

After you have disassembled the computer and fixed or repaired the problem that was causing the computer to operate abnormally, you will need to reassemble the computer. 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.
- A hexagonal screwdriver.
- A jeweler's screwdriver to remove screw masks.
- Tweezers to lift out screws that you cannot grasp with your fingers.
- ESD mats for the floor and the table you are working on.
- An ESD wrist strap or heel grounder.
- 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. Overtightening 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 Figures 4-1 and 4-2.

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 upside down.
3. Push the battery cover release to the right to free the cover's latch and slide the cover off.

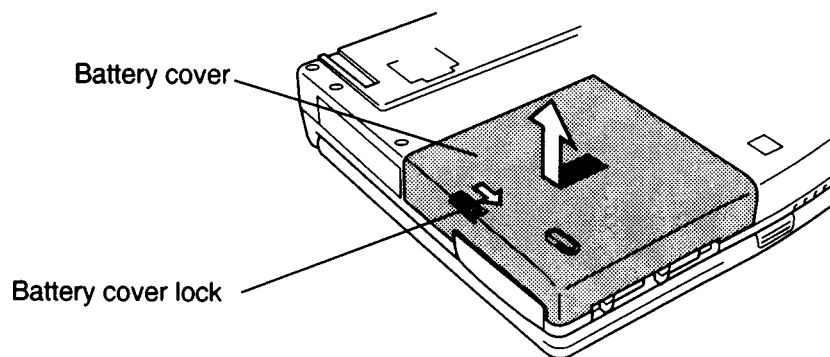


Figure 4-1 Releasing the battery cover

4. Another latch secures the battery pack. Slide this latch until the battery pops up.
5. Lift up the end of the battery pack facing you and pull it toward you to remove it.

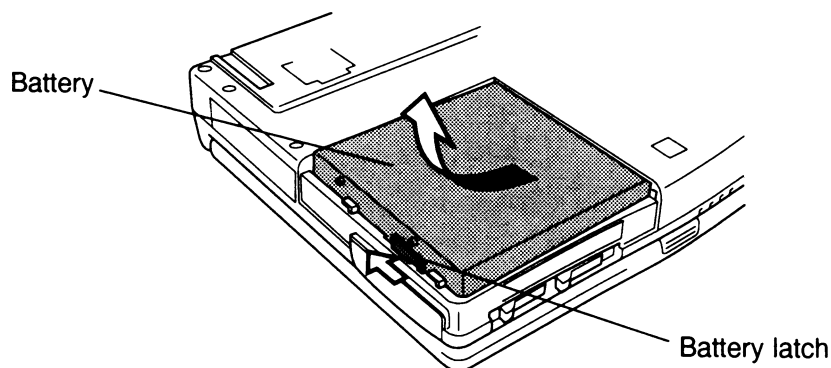


Figure 4-2 Removing the battery pack

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

Installing the Battery Pack

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

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

NOTE: *Check the battery's terminals visually. If they are dirty, wipe them clean with a dry cloth.*

1. Align the connectors and partially insert the connector end of the battery.
2. Match the connectors and push down gently until it snaps into place.
3. Place the battery cover in position. The back edge should be about one-half to three-quarters of an inch from the closed position.

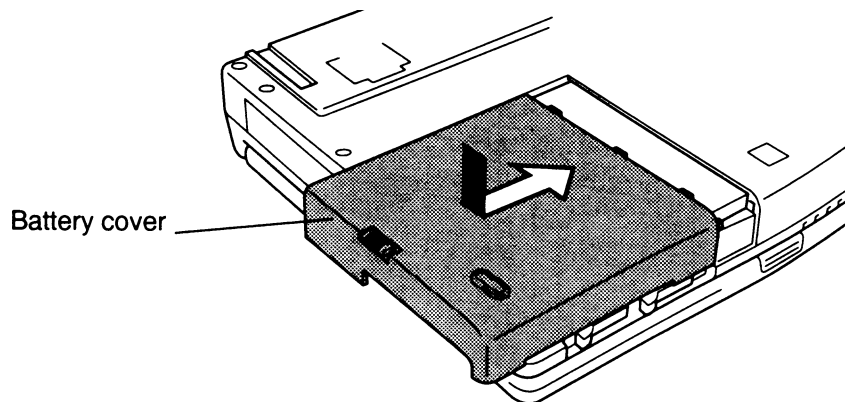


Figure 4-3 Securing the battery cover and lock

4. Gently push the cover back until you hear the latch click.

4.3 Optional Memory Module

Removing the 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 4-4 and 4-5.

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 the **M2x4 silver screw** securing the optional memory module **socket cover**.
4. Slide your fingernail or a thin object under the cover and remove it.

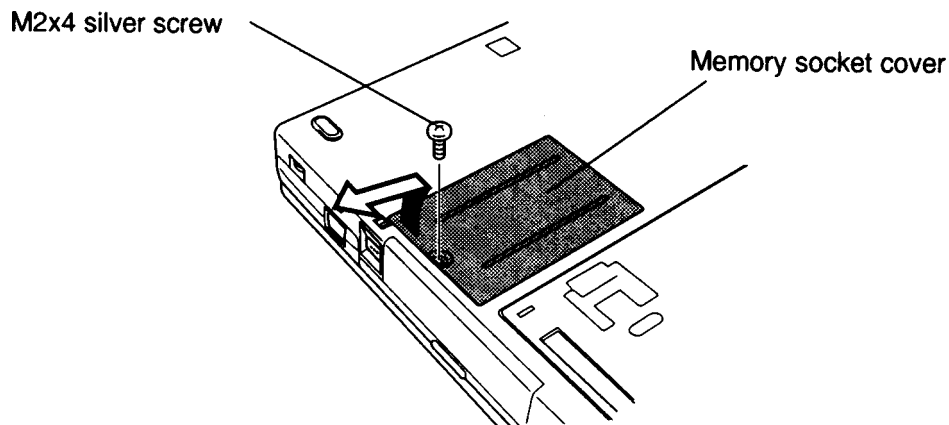


Figure 4-4 Removing the optional memory module socket cover

5. Press the two **latches** to the outside to release the module. A spring will force one end of the **optional memory module** up.

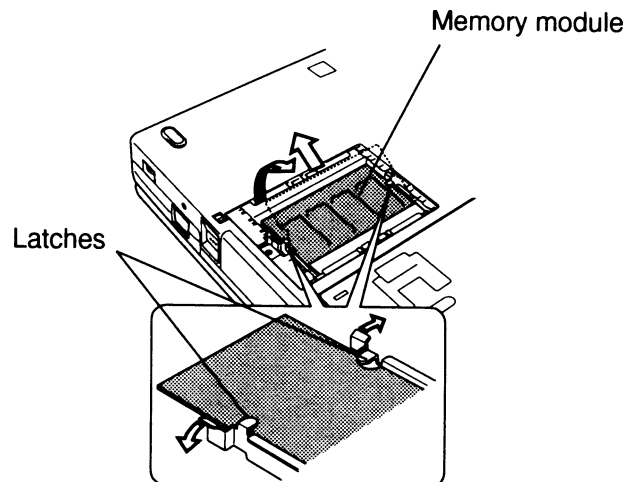


Figure 4-5 Removing the optional memory module

6. Grasp the sides of the optional memory module and pull it out.

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

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 Figure 4-6.

1. Insert the **optional memory module's** connectors into the computer's connectors, carefully press the module back down to ensure a firm connection.

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

2. As you press the optional memory module down, two **latches** will clamp against notches on the sides of the module to secure it.

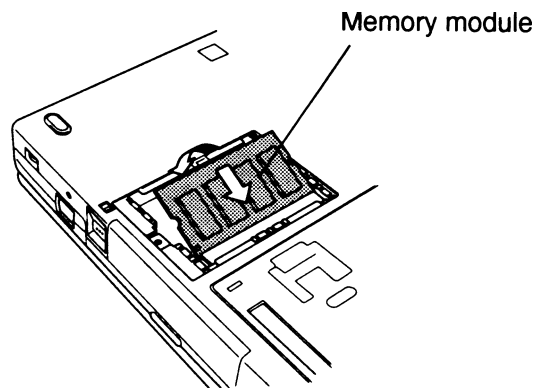


Figure 4-6 Seating the optional memory module

3. Seat the **socket cover** and secure it with the **M2x4 silver screw**.
4. Install the battery pack as described in Section 4.2.

4.4 Optional PC Card

Removing the Optional PC Card

To remove the optional PC card, make sure the computer is in boot mode, then follow the steps below and refer to Figure 4-7.

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 **PC card slot cover**.
4. Slide the **eject button** to partially eject the card.
5. Grasp the **optional PC card** and remove it.

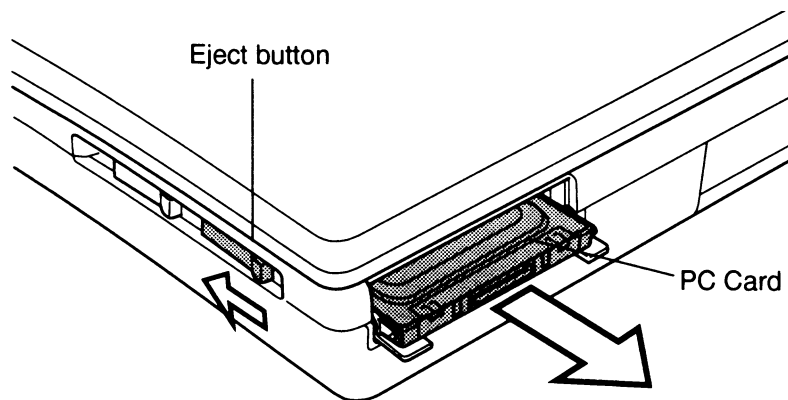


Figure 4-7 Removing the optional PC card

Installing the Optional PC Card

To install the optional PC card, make sure the computer is in boot mode, then follow the steps below and refer to Figures 4-8.

1. Insert the **optional PC card**. You will feel slight resistance when the card is nearly fully seated. Press gently to ensure a firm connection.
2. The **eject button** will return to the lock position.

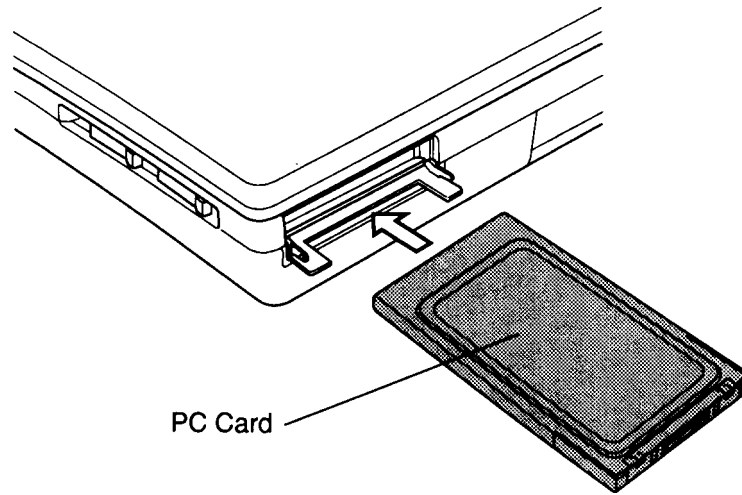


Figure 4-8 Installing the optional PC card

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

4.5 Hard Disk Drive (HDD)

Removing the HDD

To remove the HDD, follow the steps below and refer to Figures 4-9 to 4-12.

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 PC card as described in Sections 4.2 through 4.4.
3. Turn the computer upside down and remove **two M2x6 silver screws** securing the **HDD**.

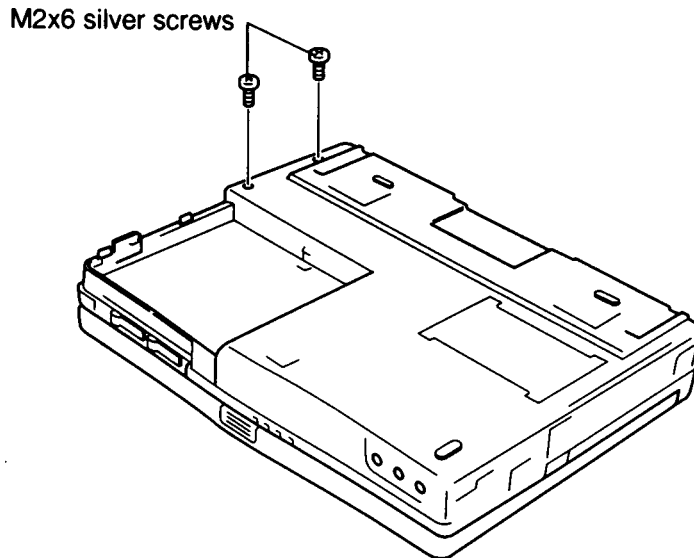


Figure 4-9 Removing the HDD screws

4. Turn the computer right side up and slide your fingernail or a thin object under the cover to remove the **HDD cover**.

CAUTION: *The cover is connected by two insulator strands. Be careful not to damage these strands when you remove the cover.*

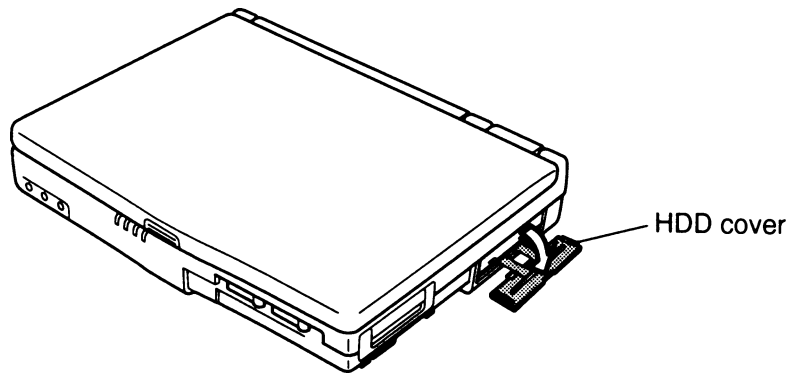


Figure 4-10 Removing the HDD cover

5. Grasp the **metal tab** on the **HDD bracket** and pull out the HDD.

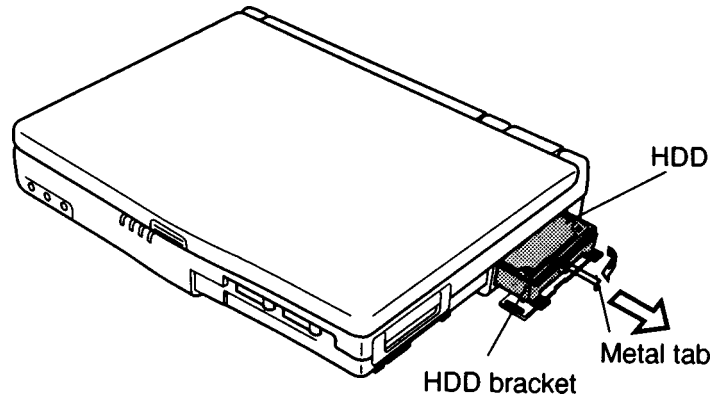


Figure 4-11 Removing the HDD

6. Remove **four M2.5x4 flat-head screws** securing the **HDD bracket** to the HDD and remove the bracket.

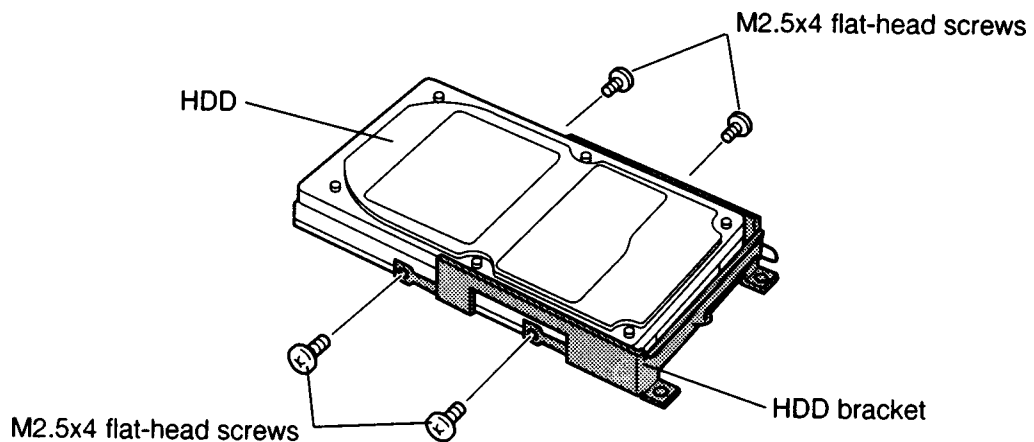


Figure 4-12 Removing the HDD bracket

Installing the HDD

To install the HDD, follow the steps below and refer to Figures 4-12 back through 4-9.

1. Seat the **HDD** in the **bracket** and secure it with the **four M2.5x4 flat-head screws**.
2. Make sure the HDD's connectors are properly aligned and insert the HDD into the computer. Press gently to assure a firm connection.
3. Close the HDD cover.
4. Turn the computer upside down and secure the HDD with **two M2x6 silver screws**.
5. Install the optional PC card, optional memory module, and battery pack as described in Sections 4.4 back through 4.2.

4.6 DAA Module

Removing the DAA Module

To remove the DAA module, follow the steps below and refer to Figures 4-13 to 4-16.

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. Use your fingernail or a thin object to remove the **DAA module cover**.

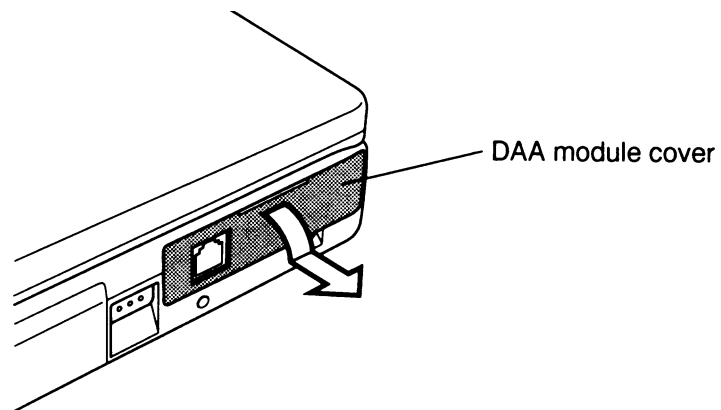


Figure 4-13 Removing the DAA module cover

4. Remove **two M2x6 screws** securing the **DAA module**.
5. Use a small thin, flat screwdriver to pry the DAA module loose from its connection.

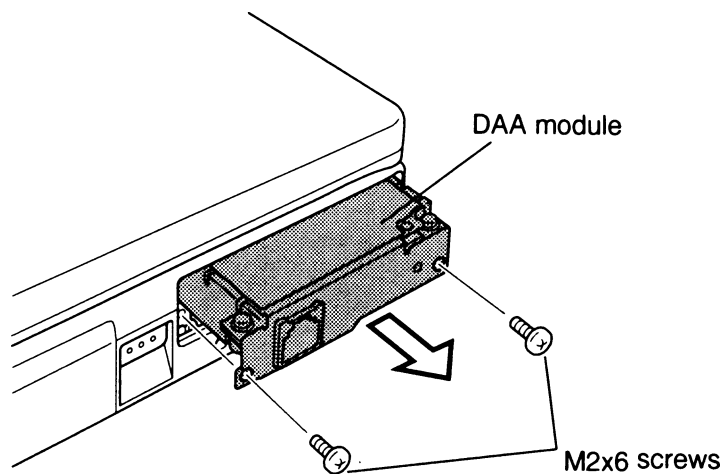


Figure 4-14 Removing the DAA module

6. With the DAA module partially out of the computer, grasp and remove it.
7. Remove **two M2.5x4 screws** securing the **metal plate** to the DAA module.
8. Release the pressure on the lower cover, then remove the metal plate over the guide pin.
9. Free the **latches** securing the **upper cover** to the DAA module and remove the cover.

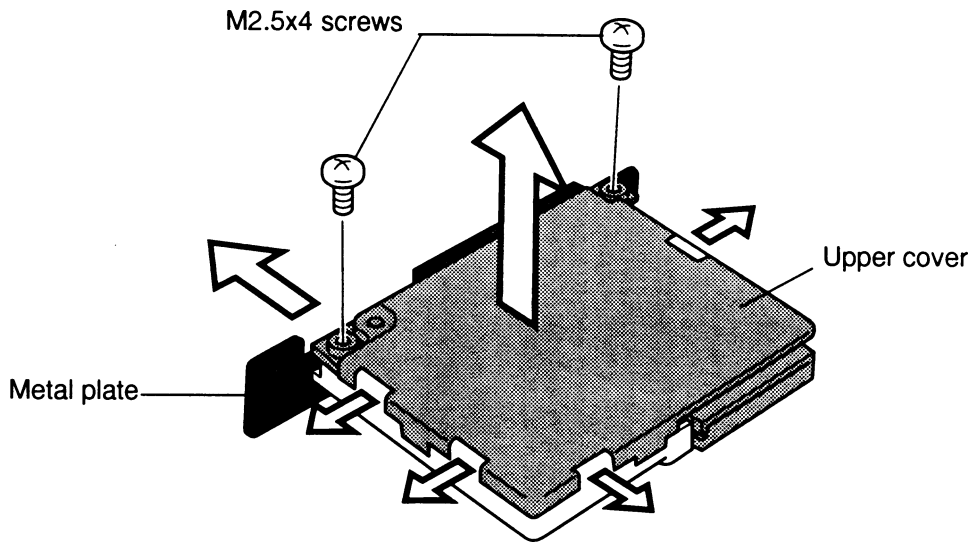


Figure 4-15 Removing the DAA board's upper cover

10. Free the **latches** securing the **lower cover** to the DAA board and remove the DAA board.

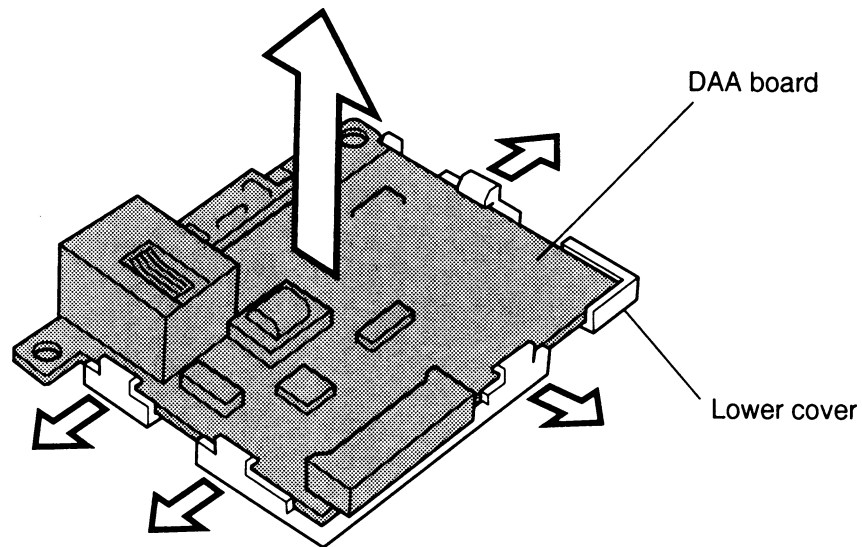


Figure 4-16 Removing the DAA board's top cover

Installing the DAA Module

To install the DAA module, follow the steps below and refer to Figures 4-16 back through 4-13.

1. Seat the **DAA board** into the **bottom cover** and secure the **latches**.
2. Seat the **upper cover** and secure the **latches**.
3. Seat the **metal plate** and secure it with **two M2.5x4 screws**. Pull the bottom cover up to place the metal plate over the guide pin.
4. Insert the DAA module into the computer and press gently to secure the connection.
5. Secure the DAA module with **two M2x6 screws**.
6. Replace the cover starting with the bottom right.
7. Install the battery pack as described in Section 4.2.

4.7 Keyboard

Removing the Keyboard

To remove the keyboard, follow the steps below and refer to Figures 4-17 and 4-18.

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. Open the display.
4. Using your fingernail or the Toshiba Case Separating Tool, release the **six latches** along the front securing the **keyboard brace** and remove the brace, beginning at the front side.

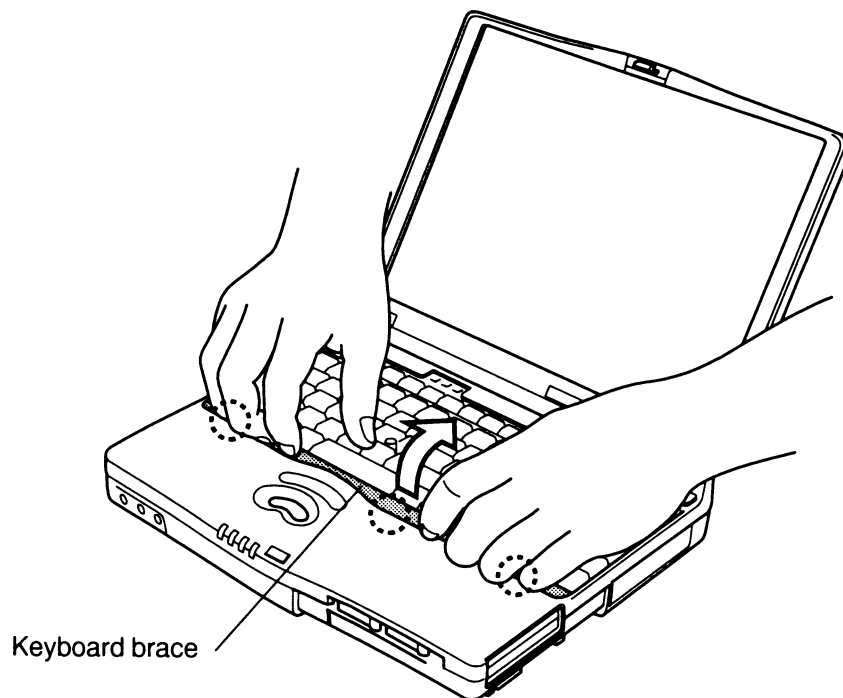


Figure 4-17 Removing the keyboard brace

5. Lift out the **keyboard** and lay it on the wrist rest.
6. Disconnect the **keyboard pressure connectors** from **PJ14** (the closest connector to the screen at the back of the computer) and **PJ15** on the system board.

CAUTION: The keyboard pressure connectors are very delicate. Release them very carefully.

7. Remove the keyboard.

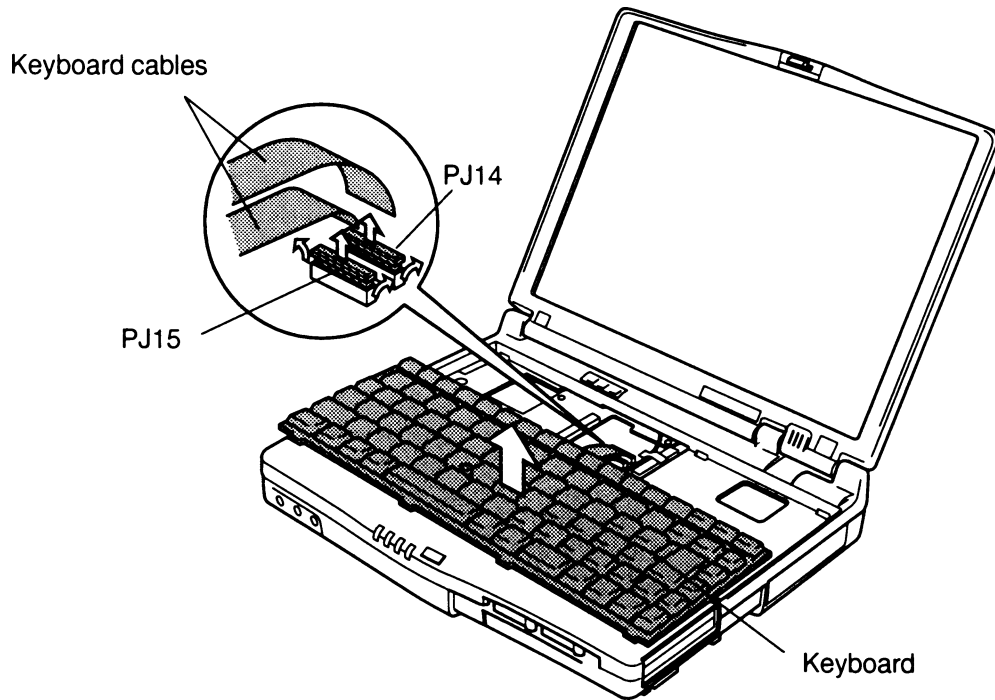


Figure 4-18 Removing the keyboard

Installing the Keyboard

To install the keyboard, follow the steps below and refer to Figures 4-18 and 4-17.

1. Lay the **keyboard** on the wrist rest and carefully connect the keyboard cables to **PJ15** and **PJ14** on the system board. Make sure the pressure connectors are in the up position before attempting to connect them.
2. Seat the keyboard.
3. Seat the **keyboard brace** and secure the **six latches**.
4. Install the battery pack as described in Section 4.2.

4.8 Top Cover with Display Assembly

Removing the Top Cover with Display Assembly

To remove the top cover with display assembly, follow the steps below and refer to Figures 4-19 through 4-23.

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 PC card, HDD, DAA and keyboard as described in Sections 4.2 through 4.7.
3. Open the **covers** to ports and slots. If any cover is damaged replace it.

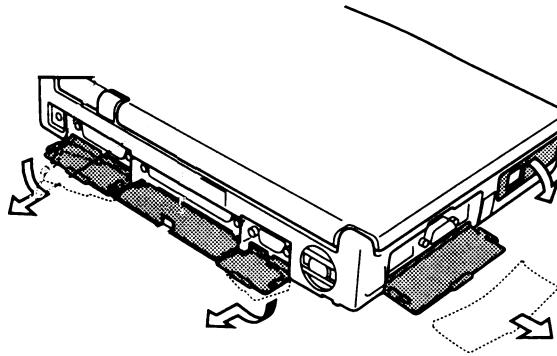


Figure 4-19 Removing the covers to ports and slots

4. Disconnect the **display cable** from **PJ7**, then release the **membrane pressure connector** from **PJ6** on the I/O board.
5. Remove the tape securing the cables. Disconnect the **microphone cable** from **PJ502** and the **backup battery cable** from **PJ803** on the system board. Be careful not to break the cable when removing it. You may need a pair of tweezers in order to grasp the cable.

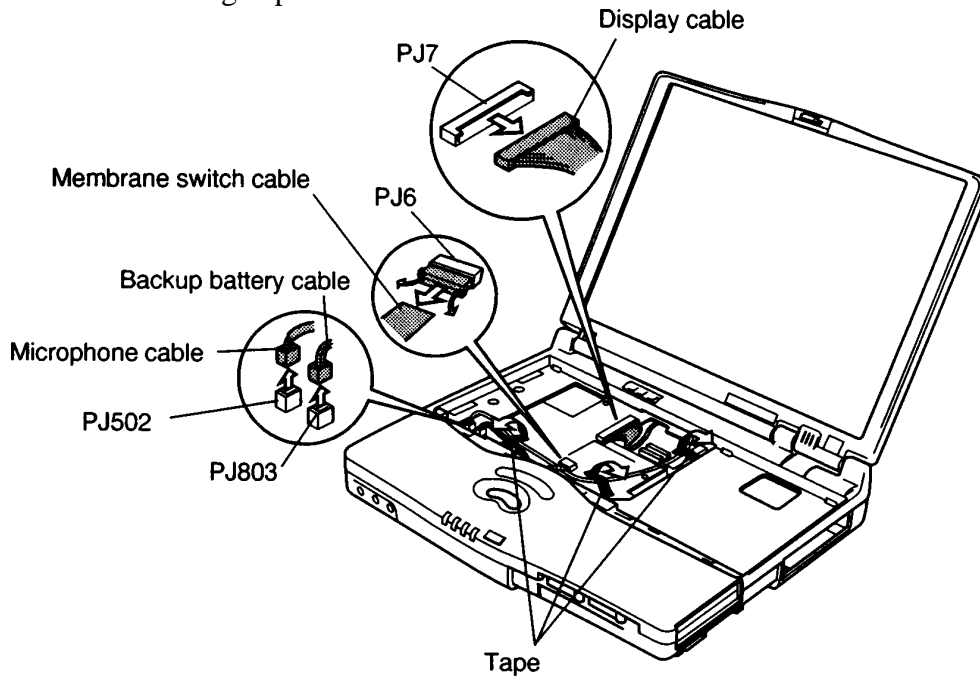


Figure 4-20 Disconnecting the cables

6. Remove **one M2x6 screw** securing the ground cable.

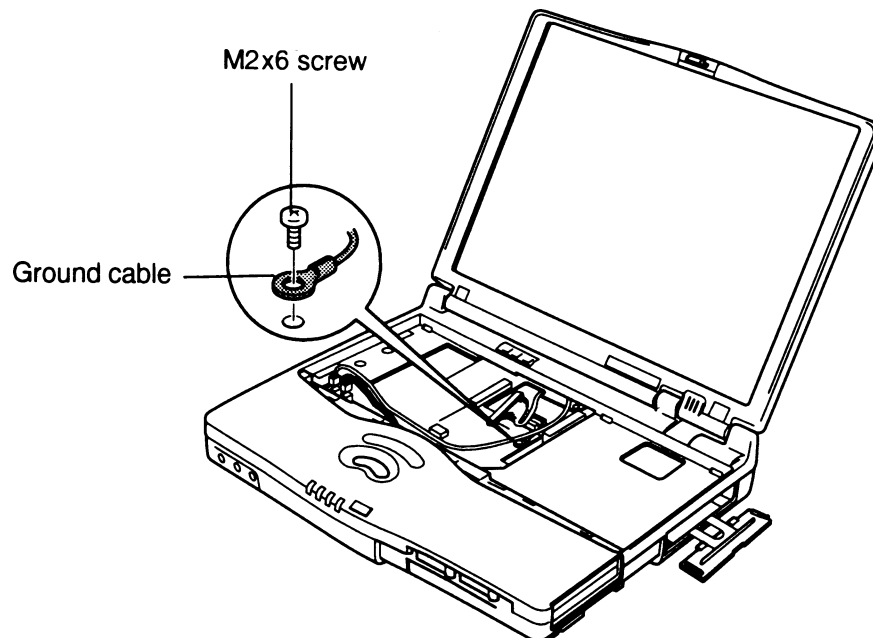


Figure 4-21 Removing the ground cable screw

7. Remove **one M2x6 screw**.
8. Turn the computer over and remove **one M2x4 silver screw** and **five M2x6 silver screws**.

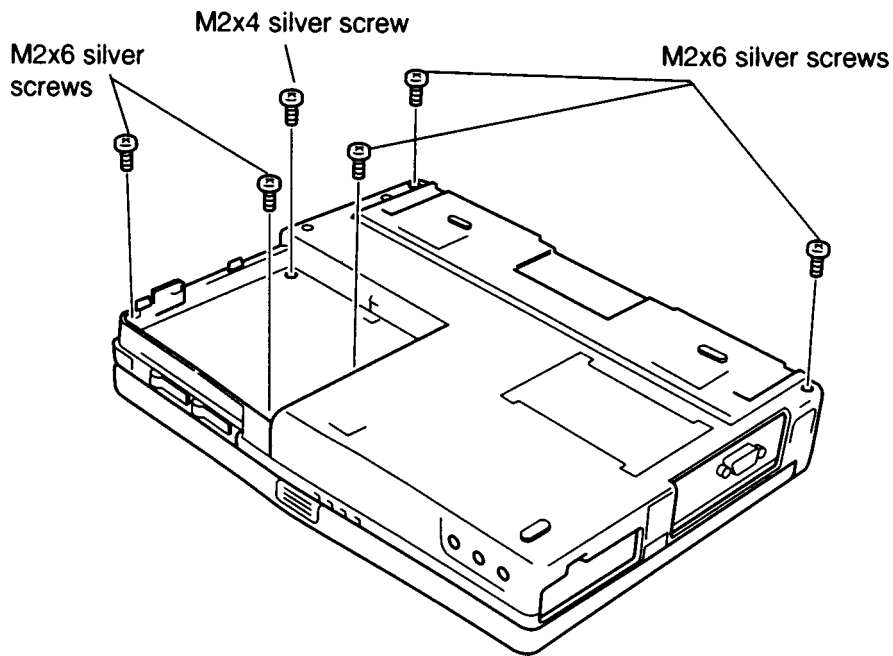


Figure 4-22 Removing the top cover screws

9. Turn the computer back over and release the **latches** at the back of the **top cover**, continue with the latches at the front, then lift off the top cover with **display assembly**.

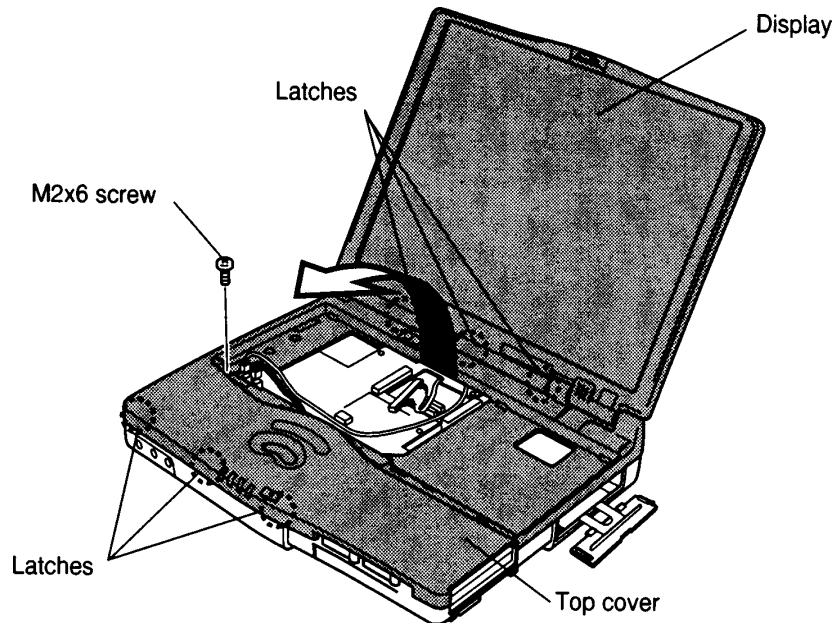


Figure 4-23 Removing the top cover with display assembly

Installing the Top Cover and Display Assembly

To install the top cover and display assembly, follow the steps below and refer to Figures 4-23 back through 4-19.

1. Seat the **top cover** with **display assembly** and secure the **five latches** going from front to back.
2. Secure the **one M2x6 screw**.
3. Secure the **one ground cable** with **one M2x6 screw**.
4. Connect the **microphone cable** (three contacts) to **PJ502** and the **backup battery cable** (two contacts) to **PJ803** on the system board, and replace the tape securing the cables. Be sure to route the microphone cable under the tape securing it to the HDD base.
5. Use a multimeter at TP801 to check the voltage of the backup battery. If the voltage is out of range (6.0 to 9.6 volts), replace the backup battery.
6. Connect the **display cable** to **PJ7** and the **membrane switch** to **PJ6** on the **I/O board**. Make sure the connections are secure.
7. Close the display and turn the computer over.
8. Secure **one M2x4 silver screw** and **five M2x6 silver screws** on the bottom of the computer.
9. Turn the computer back over and replace the covers on the ports and slots.
10. Install the keyboard, DAA, HDD, optional PC card, optional memory module, and battery pack as described in Sections 4.7 through 4.2.

4.9 Membrane Switch and Backup Battery

WARNING: If you replace the backup battery, be sure to use only batteries recommended by Toshiba. Installation of the wrong battery can cause the battery to explode or cause serious damage.

Removing the Membrane Switch and Backup Battery

To remove the membrane switch and backup battery, follow the steps below and refer to Figure 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 PC card, HDD, DAA module, keyboard and top cover with display assembly as described in Sections 4.2 through 4.8.
3. Remove the **two M2x4 screws** securing the **membrane switch metal cover**, and lift out the **membrane cover** and switch.
4. Remove the tape securing the backup battery and lift out the backup battery.

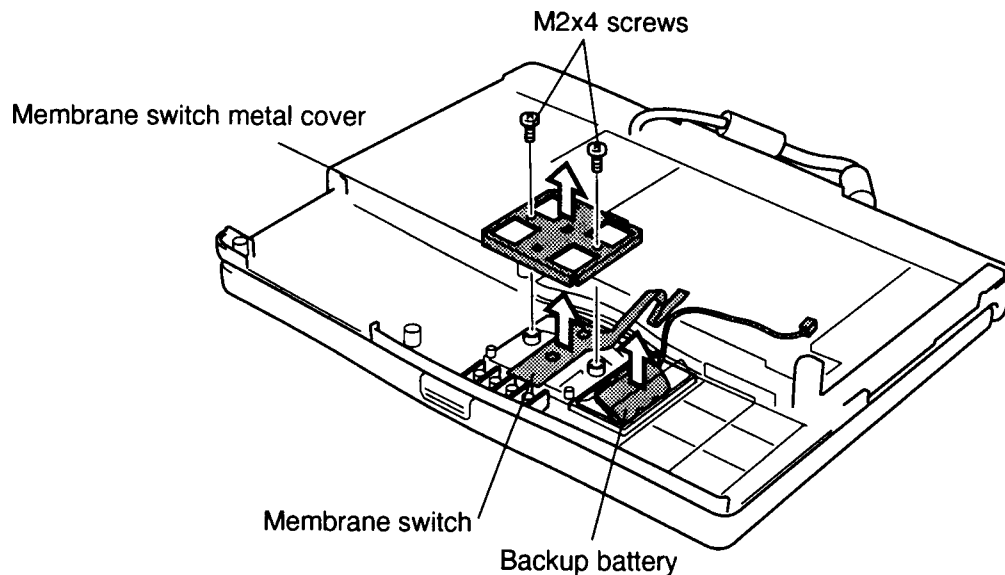


Figure 4-24 Removing the membrane switch and backup battery

Installing the Membrane Switch and Backup Battery

To install the membrane switch and backup battery, follow the steps below and refer to Figure 4-24.

1. Seat the **backup battery** and replace the tape securing the battery.
2. Use a multimeter at TP to check the voltage of the backup battery. If the voltage is out of range (6.0 to 9.6 volts), replace the backup battery.

CAUTION: *Be careful not to pinch the cable between the top cover and the DAA module when you install the top cover with display assembly.*

3. Seat the **membrane switch** and its **metal cover**, and secure the cover with **two M2x4 screws**.
4. Install the top cover with display assembly, keyboard, DAA module, HDD, optional PC card, optional memory module and battery pack as described in sections 4.8 back through 4.2.

4.10 RTC Battery, I/O Board and PC Card Slot

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 cause serious damage.

Removing the RTC Battery, I/O Board and PC Card Slot

To remove the RTC battery, I/O board and PC card slot, follow the steps below and refer to figures 4-25 and 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 PC card, HDD, DAA, keyboard, top cover with display assembly, and membrane switch and backup battery as described in Sections 4.2 through 4.9.
3. Disconnect the **RTC battery cable** from **PJ7** on the system board. If you enter from the hard drive cavity, use a small flat head screwdriver to disconnect the cable.
4. Remove the tape and lift out the **RTC battery**.
5. Remove **seven M2x6 screws** securing the **I/O board** and **four M2x6 screws** securing the **PC card slot**.

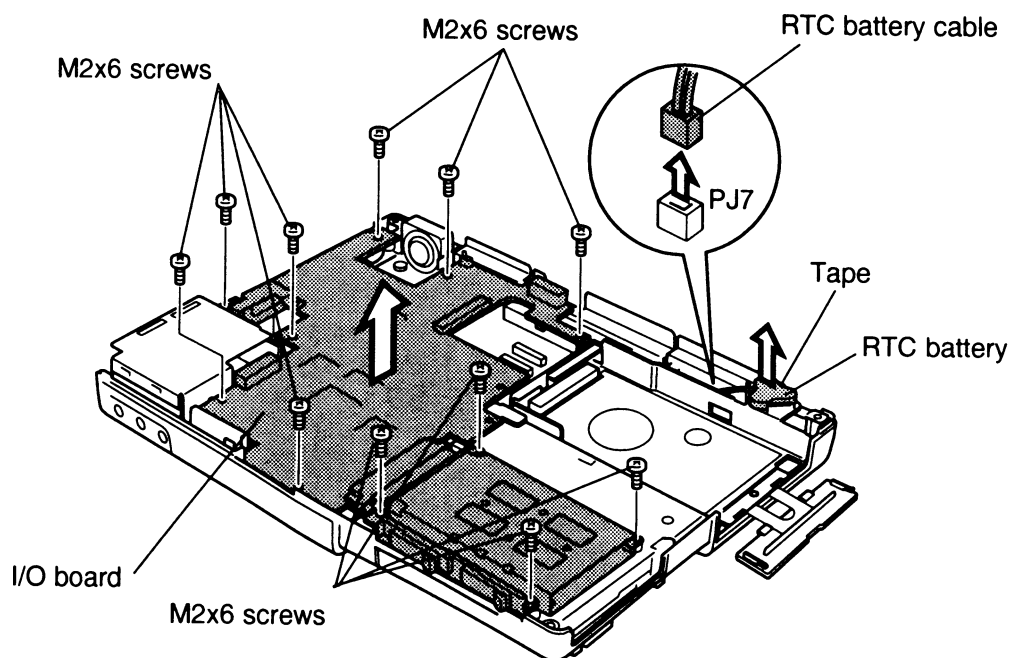


Figure 4-25 Removing the RCT battery and screws

6. Lift out the I/O board with PC card slot.
7. Grasp the PC card at the connector end and rock it loose, then pull the PC card slot evenly to disconnect it from **PJ2** on the I/O board.

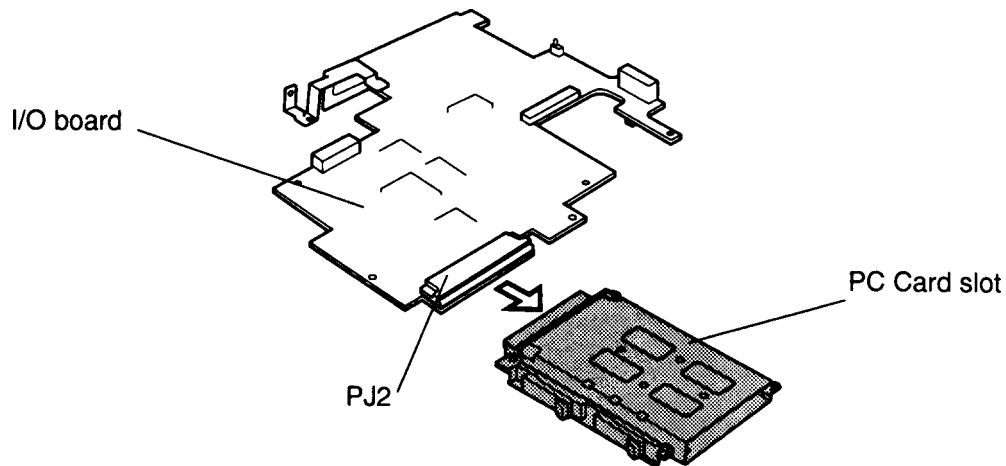


Figure 4-26 Removing the PC card slot

Installing the RTC Battery, I/O Board and PC Card Slot

To install the RTC battery, I/O board and PC card slot, follow the steps below and refer to Figures 4-25 and 4-26.

1. Connect the **PC card slot** to **PJ2** on the **I/O board** by holding the PC Card assembly near the cable and rocking it into place.
2. Seat the I/O board with PC card slot and gently press the board to connect it.
3. Secure **seven M2x6 screws** on the I/O board and **four M2x6 screws** on the PC card slot. Before securing the PC card slot, be sure to insert the PC card ejector and align the holes with the ejector tabs.
4. Connect the **RTC battery cable** to **PJ7** on the system board.
5. Seat the **RTC battery** and use the tape to secure it.
6. Use a multimeter at TP1 to check the voltage of the RTC battery. If the voltage is out of range (3.0 to 4.8 volts), replace the RTC battery.
7. Install the membrane switch and backup battery, top cover and display assembly, keyboard, DAA module, HDD, optional PC card, optional memory module and battery pack as described in Sections 4.9 back through 4.2.

4.11 Speaker

Removing the Speaker

To remove the speaker, follow the steps below and refer to Figures 4-27 through 4-30.

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 PC card, HDD, DAA module, keyboard, top cover with display assembly, membrane switch and backup battery, and RTC battery and I/O board and PC card slot as described in Sections 4.2 through 4.10.
3. Remove **one M2x6 screw** securing the **DAA module cover** and **I/O board base** and lift them out.

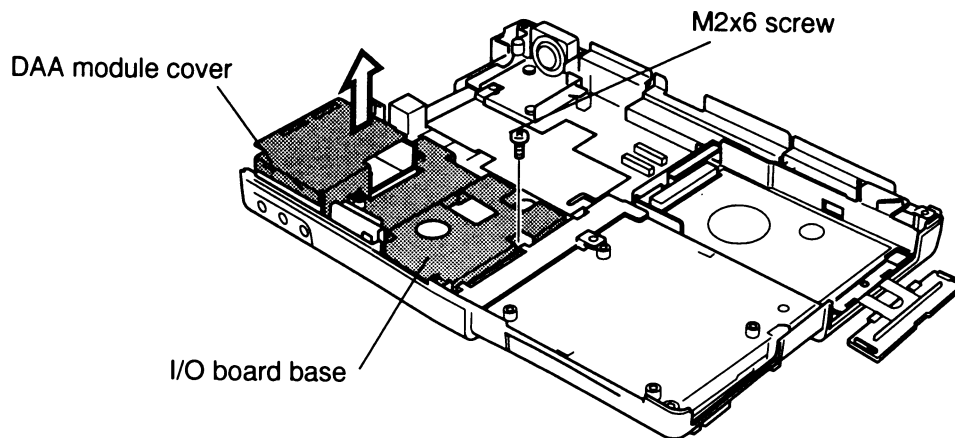


Figure 4-27 Removing the I/O board base

4. Remove **one M2x6 screw** securing the **modem base** and lift out the base.

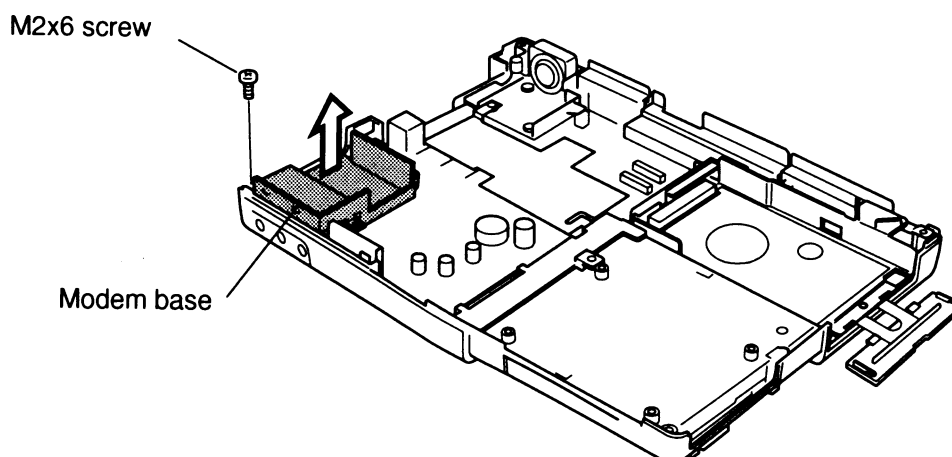


Figure 4-28 Removing the modem base

5. Remove **two M2x6 screws** securing the **speaker module** (the left screw secures the ground cable).
6. Lift out the speaker module and disconnect the **speaker cable** from **PJ504** on the system board.

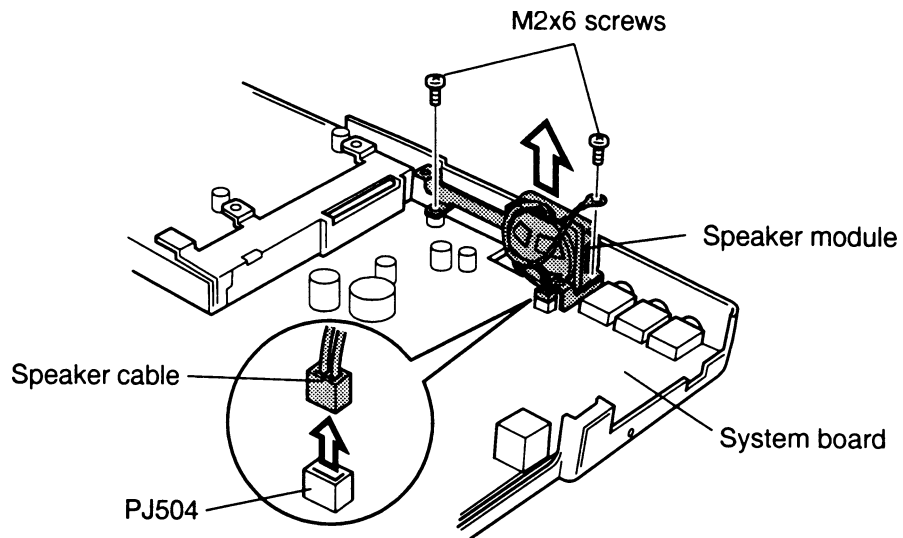


Figure 4-29 Disconnecting the speaker cable

7. Push the guide pins to release the speaker from the speaker case and remove the speaker.

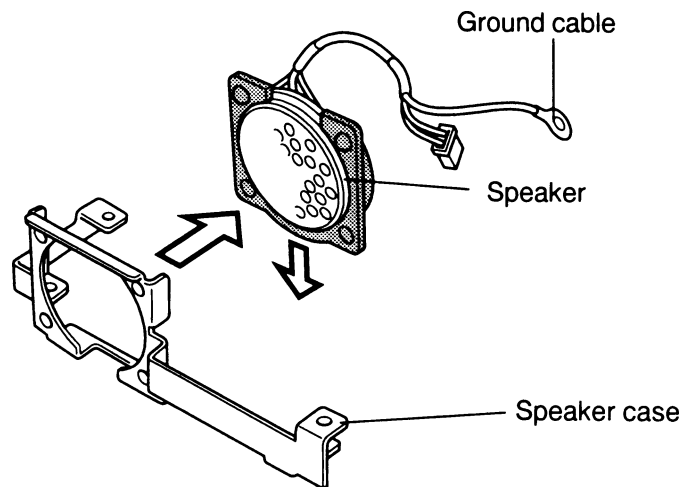


Figure 4-30 Removing the speaker from the case

Installing the Speaker

To install the speaker, follow the steps below and refer to Figures 4-30 back through 4-27.

1. Connect the **speaker cable** to **PJ504** on the system board.
2. Seat the speaker in the speaker case, then seat the assembly in the speaker module.
3. Seat the speaker module in the computer.
4. Secure the speaker module with **two M2x6 screws** (the left screw secures the ground cable).
5. Seat the **modem base** and secure it with **one M2x6 screw**.
6. Seat the **I/O board base** and secure it with **one M2x6 screw**.
7. Install the RTC battery and I/O board and PC card slot, membrane switch and backup battery, top cover with display assembly, keyboard, DAA module, HDD, optional PC card, optional memory module and battery pack as described in Sections 4.10 back through 4.2.

4.12 System Board

Removing the System Board

To remove the system board, follow the steps below and refer to Figures 4-31 and 4-32.

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 PC card, HDD, DAA module, keyboard, top cover with display assembly, membrane switch and backup battery, RTC battery and I/O board and PC card slot, and speaker as described in Sections 4.2 through 4.11.
3. Remove **one M2x6 screw** securing the **battery pack contact cover** and lift out the cover.
4. Remove **one M2x6 screw** and **one M2x8 screw** securing the **heat sink plate** and lift out the plate. The **M2x8 right screw** secures the **HDD holder**.
5. Remove the remaining **two M2x6 screws** securing the HDD holder and lift out the holder.

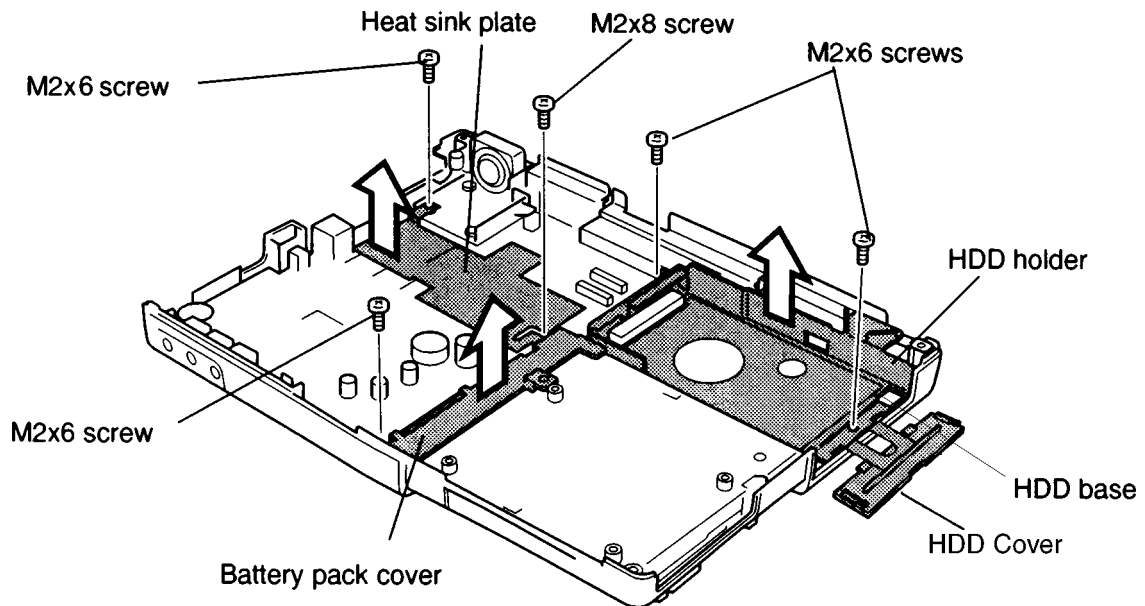


Figure 4-31 Removing the cover to the battery pack and HDD

6. Remove **two M2x6 screws** securing the **system board** and lift out the board. First lift the edge on the side opposite the audio jacks, then pull the board out to clear the jacks.

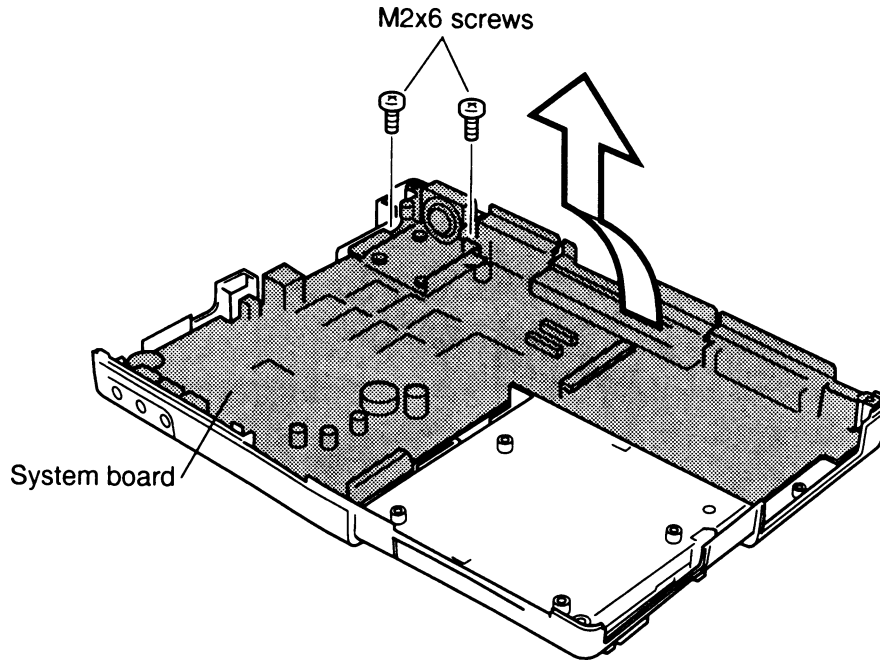


Figure 4-32 Removing the system board

Installing the System Board

To install the system board, follow the steps below and refer to Figures 4-32 and 4-31.

1. Seat the **system board** and secure it with **two M2x6 screws**. Set the edge with the audio jacks in place first so the jacks go through corresponding holes on the bottom cover, then lay the board in place.
2. Seat the **HDD holder** and secure **two M2x6 screws**.
3. Seat the **heat sink plate** and secure it with **one M2x8 screw** and **one M2x6 screw**. The **M2x8 right screw** secures the HDD holder. Be sure to carefully install the two insulator strands before securing the HDD base.
4. Seat the **battery pack connector cover** and secure it with **one M2x6 screw**.
5. Install the speaker RTC battery and I/O board and PC card slot, membrane switch and backup battery, top cover and display assembly, keyboard, DAA module, HDD, optional PC card, optional memory module and battery pack as described in sections 4.11 back through 4.2.

4.13 Fan

Removing the Fan

To remove the fan, follow the steps below and refer to Figure 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 PC card, HDD, DAA module, keyboard, top cover with display assembly, membrane switch and backup battery, RTC battery and I/O board and PC card slot, and speaker and system board as described in sections 4.2 through 4.12.
3. Disconnect the **fan cable** from **PJ21** on the system board.
4. Turn it over and remove **two M2.5x4 screws** securing the fan to the system board and lift out the **fan**. Take note of how the fan cable is routed on the system board.

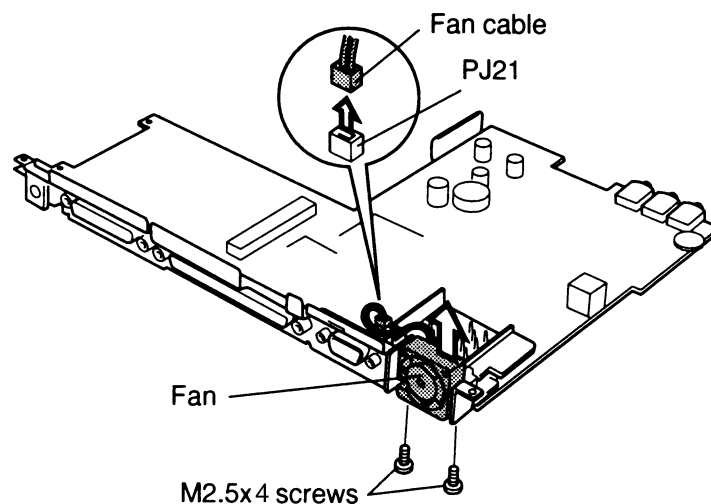


Figure 4-33 Removing the fan

Installing the Fan

To install the fan, follow the steps below and refer to Figure 4-33.

1. Carefully route the fan cable, seat the **fan** in the system board, and secure it with **two M2.5x4 screws**.
2. Connect the **fan cable** to **PJ21** on the system board.
3. Install the system board, speaker, RTC battery and I/O board and PC card slot, membrane switch and backup battery, top cover and display assembly, keyboard, DAA module, HDD, optional PC card, optional memory module and battery pack as described in Sections 4.12 back through 4.2.

4.14 Display Mask

Removing the Display Mask

To remove the display mask, 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 as described in Section 4.2.
3. Carefully remove **two screw masks** at the bottom corners of the display assembly.

NOTE: Support the display with your hand, a book, or a support block when you remove the masks.

4. Remove **two M2.5x6 screws** that were covered by the screw masks.

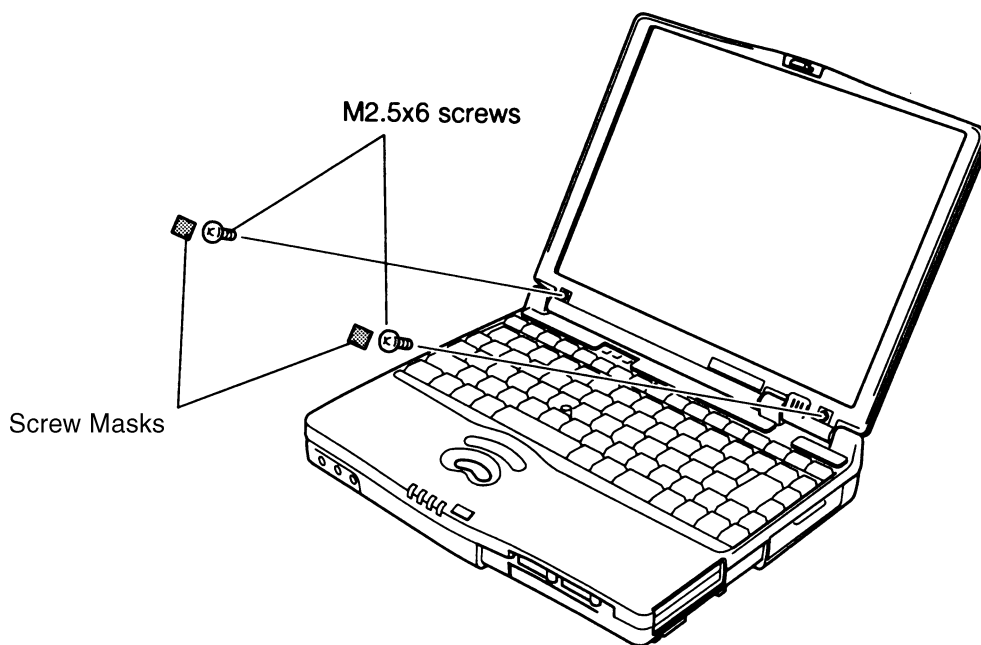


Figure 4-34 Removing the screw masks

5. If desired, use the Toshiba Case Separator tool to release the 17 latches along the edges of the **display mask**. Begin at the top (four latches), continue along the sides (four latches on each side), and then the bottom (five latches).

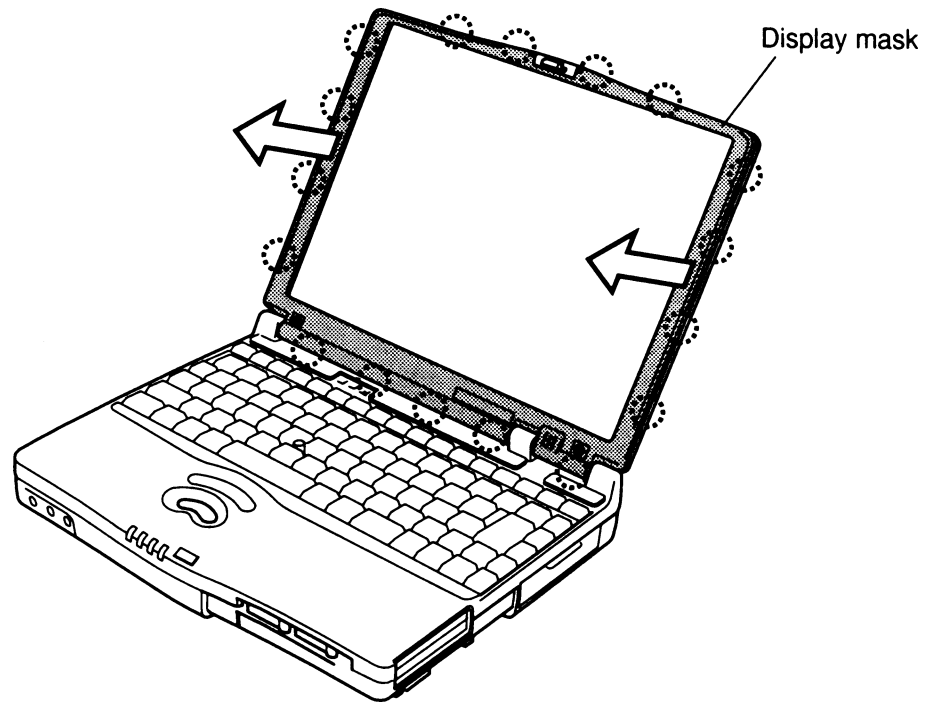


Figure 4-35 Releasing the latches

Installing the Display Mask

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

1. Set the **display mask** in place and connect the 17 latches. Begin at the bottom (five latches, continue along the sides (four latches on each side), and then the top (four latches).
2. Secure the display mask with **two M2.5x6 screws**.

NOTE: Support the display with your hand, a book, or support block when you insert the screws.

3. Replace **two screw masks** covering the screws.
4. Install the battery pack as described in Section 4.2.

4.15 FL Inverter Board

Removing the FL Inverter Board

To remove the FL inverter board, 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 PC card and display mask as described in sections 4.2, 4.3, 4.4 and 4.14.
3. Remove **two M2x6 screws** securing the **FL inverter board**.

NOTE: Support the display with your hand, book or support block when you remove the screws.

4. Carefully rotate the FL inverter board towards the display to access the **FL inverter cable** and **FL cable**.
5. Disconnect the FL inverter cable from **CN2** and the FL cable from **CN1** and lift out the FL inverter board.

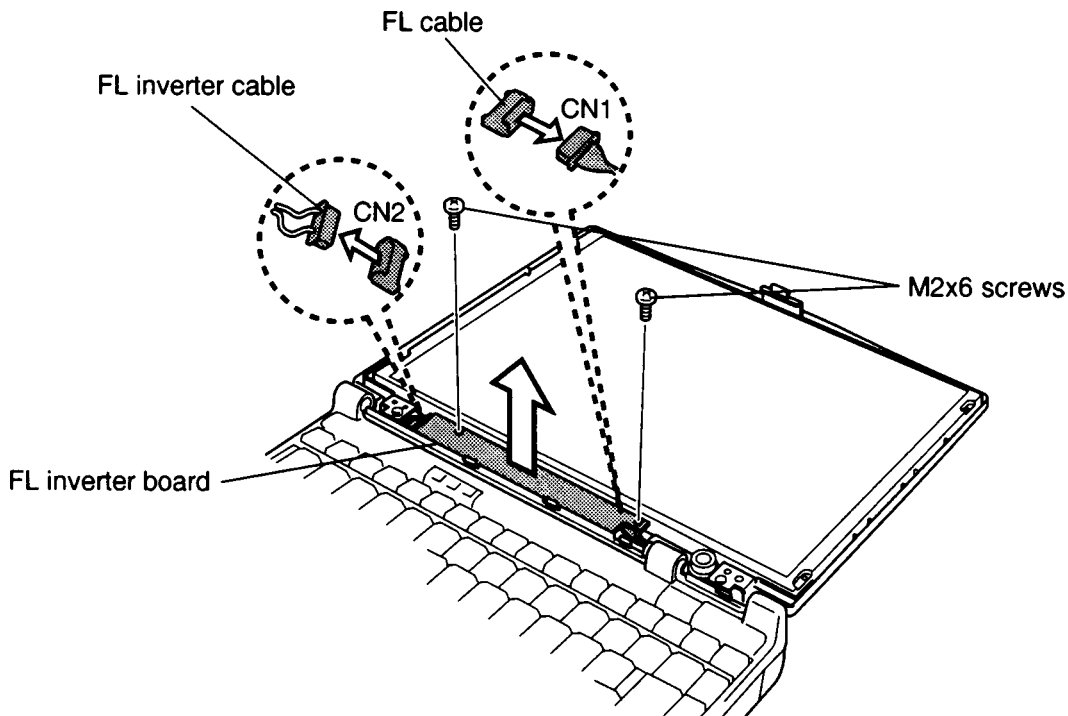


Figure 4-36 Removing the FL inverter board

Installing the FL Inverter Board

To install the FL inverter board, follow the steps below and refer to Figure 4-36.

1. Connect the **FL inverter cable** to **CN2** and the **FL cable** to **CN1** and lay the FL inverter board in place.
2. Secure the **FL inverter board** with **two M2x6 screws**.

***NOTE:** Support the display with your hand, book, or support block when you insert the screws.*

3. Install the display mask, optional PC card, optional memory module, and battery pack as described in Sections 4.14, 4.4, 4.3, and 4.2.

4.16 LCD Module

Removing the LCD Module

To remove the LCD module, follow the steps below and refer to Figure 4-37.

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 PC card, display mask and FL inverter board as described in sections 4.2, 4.3, 4.4, 4.14 and 4.15.
3. Remove **four M2x6 screws** securing the **LCD module** to the display assembly.

NOTE: Lay the display on a support block when you remove the screws.

4. Carefully lift out the LCD module enough to access the **display cable**. Remove the tape securing the display cable, then disconnect the cable.

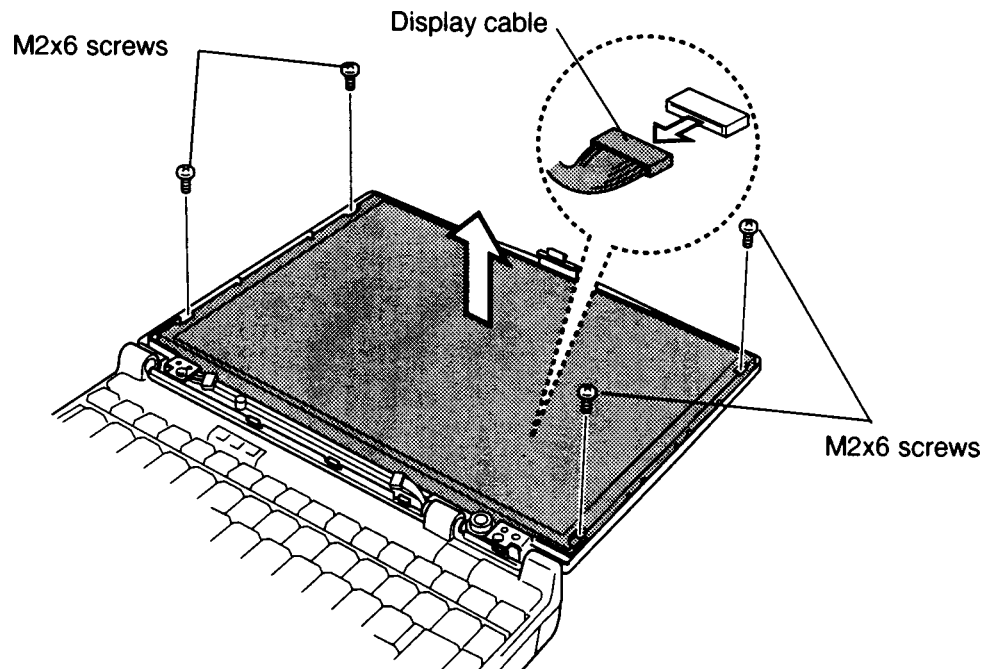


Figure 4-37 Removing the LCD module

Installing the LCD Module

To install the LCD module, follow the steps below and refer to Figure 4-37.

1. Connect the **display cable** to the **LCD module** and secure it with the cable tape.
2. Seat the LCD module and secure it with **four M2x6 screws**.
3. Install the FL inverter board, display mask, optional PC card, optional memory module, and battery pack as described in sections 4.15, 4.14, 4.4, 4.3, and 4.2.

4.17 Fluorescent Lamp (FL)

Removing the 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.

To remove the FL, follow the steps below and refer to Figures 4-38 through 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, display mask, FL inverter and LCD module as described in sections 4.2, 4.3, 4.4, 4.14, 4.15 and 4.16.
3. Release **four latches**.

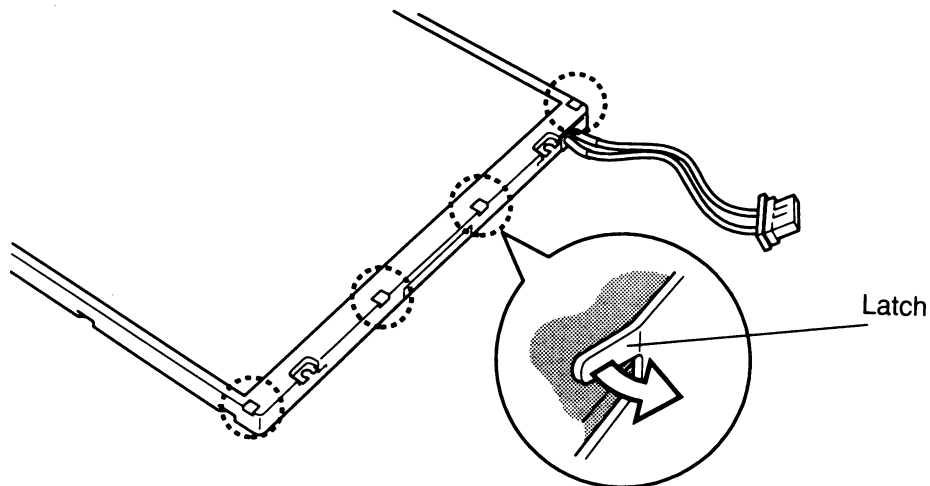


Figure 4-38 Releasing the FL inverter latches

4. Turn the panel over and remove the **tape** securing the **FL cable**.
5. Remove **one small black M2x2 screw** in the center of the insulator, then remove the insulator covering.

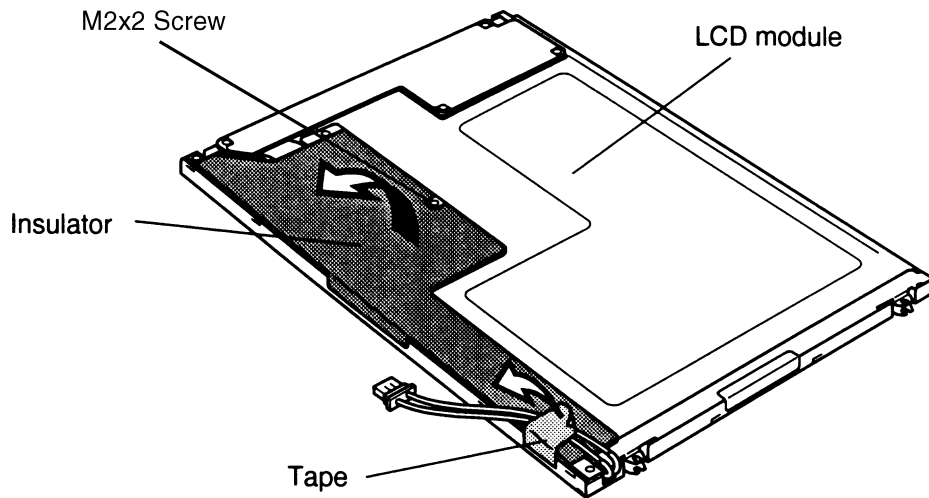


Figure 4-39 Removing the insulator screw and covering

6. Remove **four M2x2 screws** (two black and two silver) securing the control board, flip up the pressure connector to release the flexible cable and rotate the board up (90° maximum).

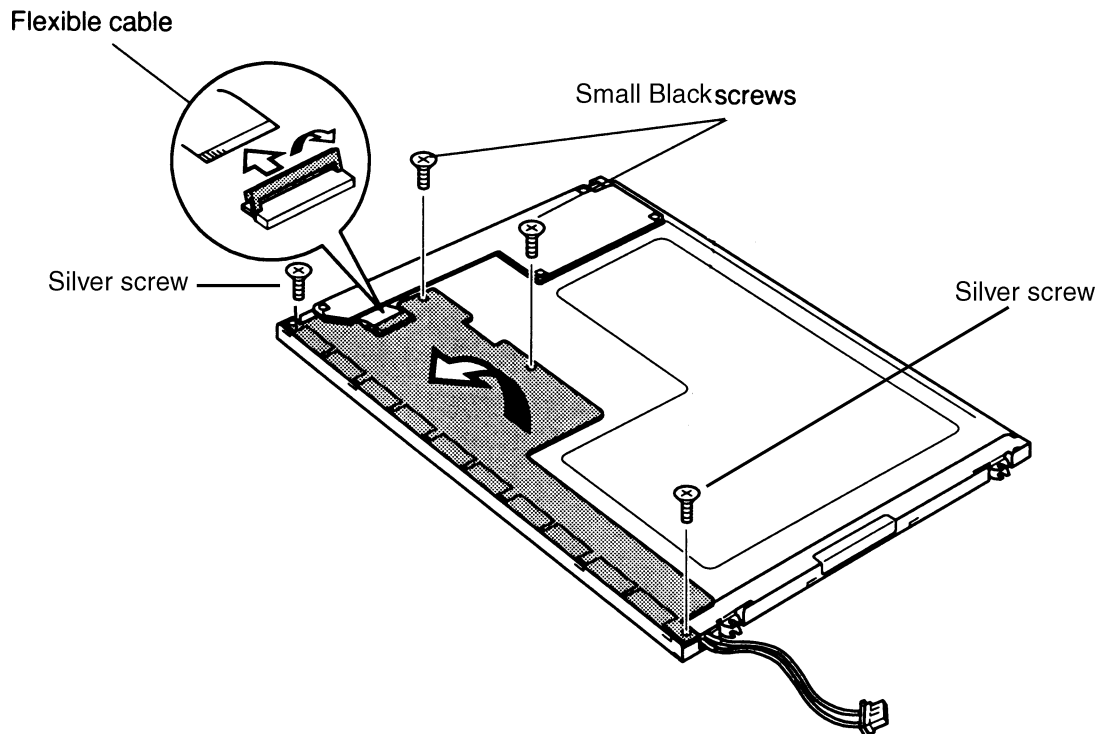


Figure 4-40 Removing the control board screws

7. Remove the **silver tape** securing the **FL cover** and remove the cover.

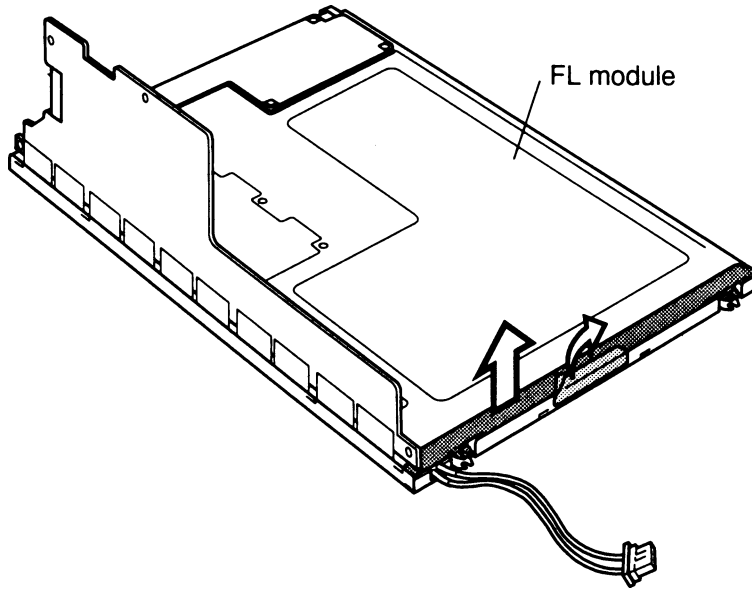


Figure 4-41 Removing the FL cover

8. Carefully lift out the **FL**.

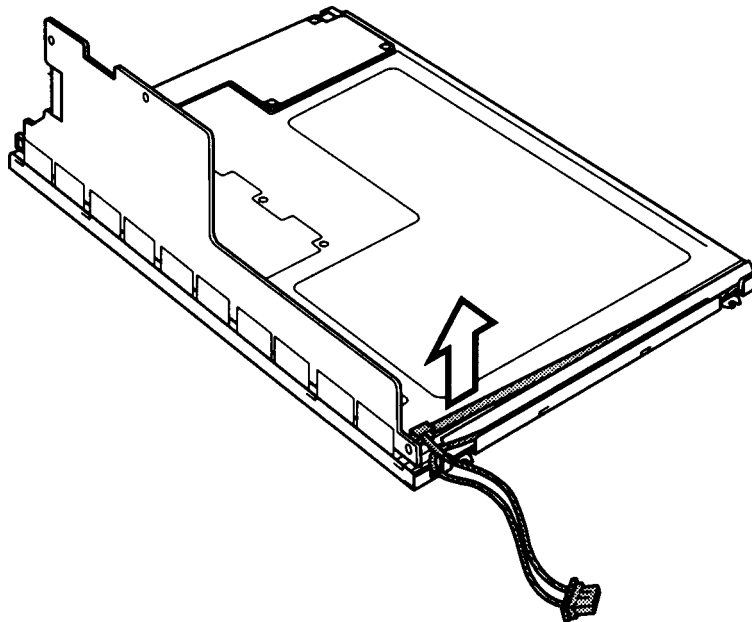


Figure 4-42 Removing the FL

Installing the FL

To install the FL, follow the steps below and refer to Figures 4-42 back through 4-38.

1. Carefully seat the **FL**.
2. Seat the **FL cover** and secure it with the **silver tape**.
3. Lay the **control board** in place and connect the **flexible cable**. Make sure the flip up connector is in the up position before connecting the cable.
4. Secure the control board with **two M2x2 silver screws** and **two M2x2 black screws**.
5. Secure the **FL cable** with **tape**.
6. Turn the **display panel** over and secure the **four latches**.
7. Install the LCD module, FL inverter board, display mask and battery pack as described in Sections 4.16, 4.15, 4.14 and 4.2.

4.18 Microphone

Removing the Microphone

To remove the microphone, follow the steps below and refer to Figures 4-43 and 4-44.

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, HDD, DAA, keyboard, top cover and display assembly, display mask, FL inverter board, and LCD module as described in sections 4.2, 4.5, 4.6, 4.7, 4.8, 4.14, 1.15 and 4.16.
3. Remove the **one M2.5x6 screw** securing the **ground cable**.
4. Release **two latches** securing the **microphone cable cover** and remove the cover.
5. Lift the **microphone** out of its socket.

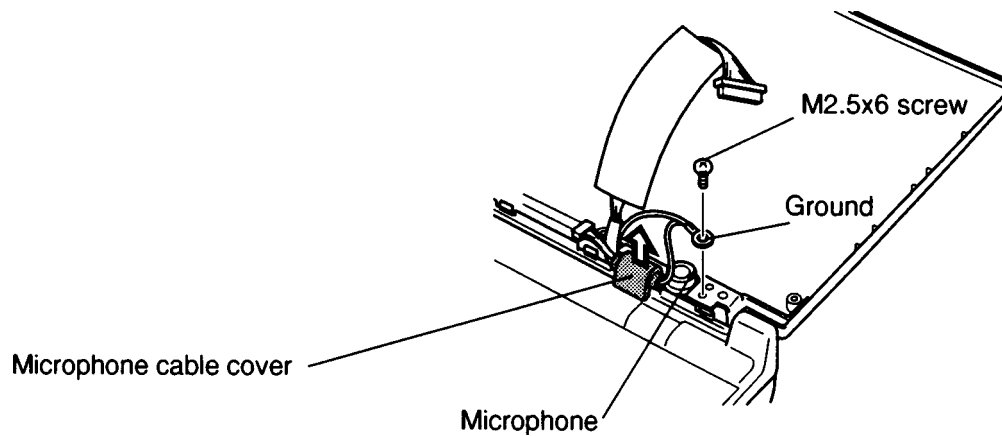


Figure 4-43 Removing the microphone

6. Remove the microphone's **rubber cover**.

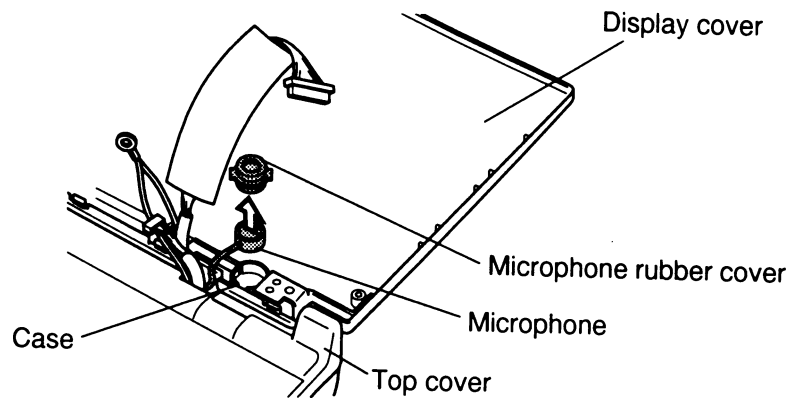


Figure 4-44 Removing the microphone's rubber cover

7. Peel back the tape securing the microphone cable so you can remove the cable.
8. Pull the microphone cable out from the gap between the display cover and top cover, then remove the microphone.

Installing the Microphone

To install the microphone, follow the steps below and refer to Figures 4-44 and 4-43.

1. Thread the **microphone cable** between the display cover and top cover.
2. Secure the microphone cable with tape and position the core so that one end is aligned with a notch in the top cover. There should be a little slack in the cables.
3. Replace the microphone's **rubber cover**.
4. Seat the **microphone** in its **case**. The microphone cable should fit into a slot on the case.
5. Secure the microphone **case cover**. Be sure the latches lock into place.
6. Secure the **ground cable** with **one 2.5x6 screw**.
7. Install the LCD module, FL inverter board, display mask, top cover and display assembly, keyboard, DAA, HDD, and battery pack as described in Sections 4.16, 4.15, 4.14, 4.8, 4.7, 4.6, 4.5, and 4.2.

4.19 Docking Adapter Covers

Removing the Docking Adapter Covers

To remove the Docking Adapter covers, follow the steps below and refer to Figures 4-45 to 4-47.

1. Turn the Docking Adapter upside down and remove **five M2.5x6 silver screws** and **two M2.5x8 silver screws**.

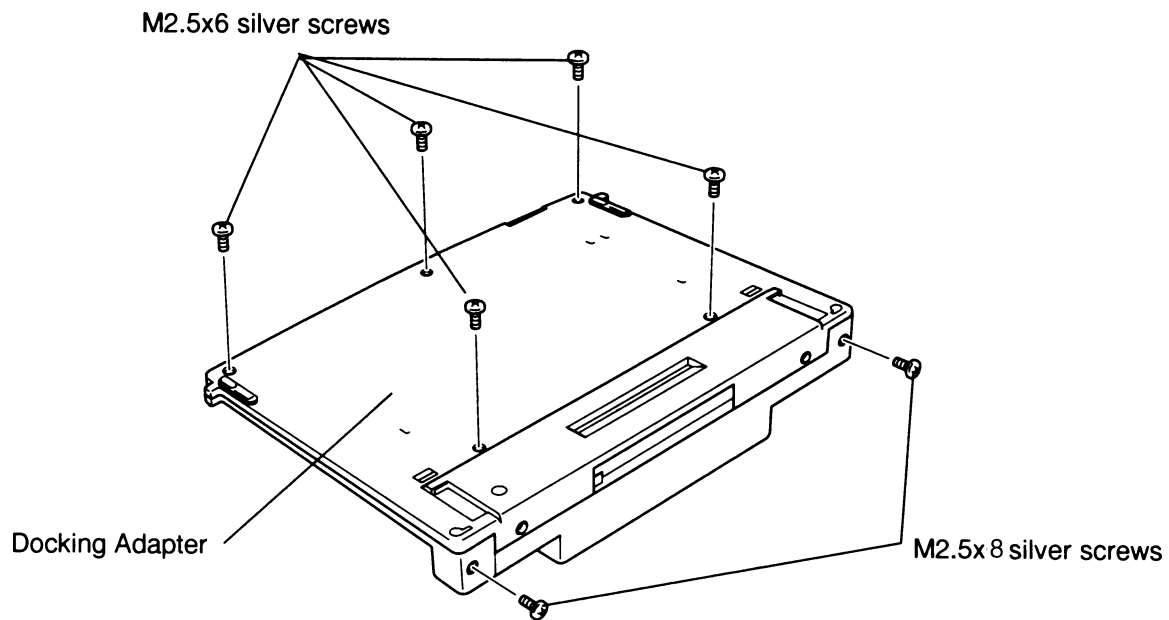


Figure 4-45 Removing the docking adapter cover screws

2. Turn the **Docking Adapter** over and remove **two M2.5x8 silver screws** securing the **rails** and the **upper cover**, free the four side latches and lift off the **rails**, then remove the **upper cover**. Use the Toshiba Case Separator to release the latches securing the upper cover.

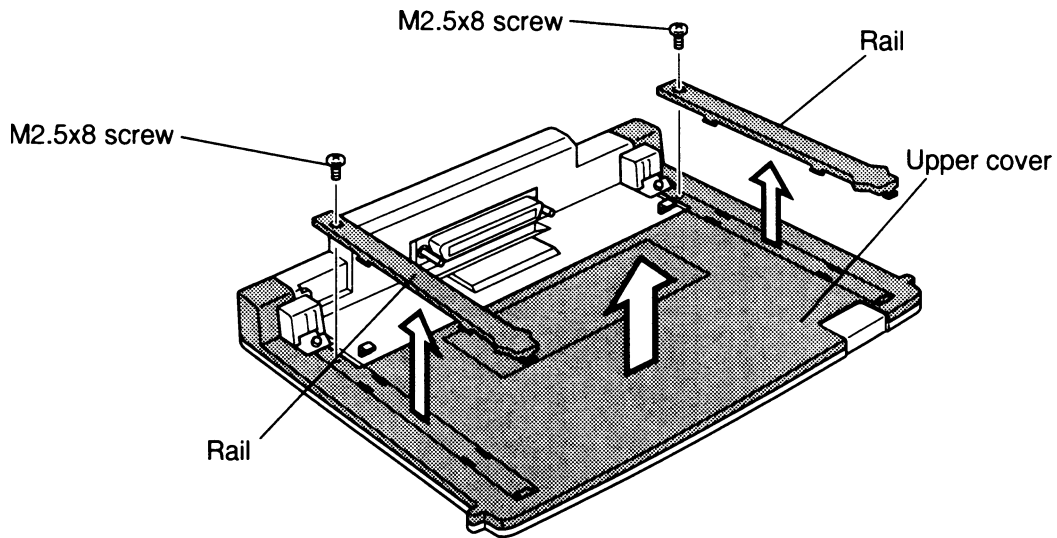


Figure 4-46 Removing the upper cover

3. Remove **two M2.5x6 screws** and **two M2.5x8 silver screws** securing the **interface connector cover**, free the two latches, and lift off the cover.

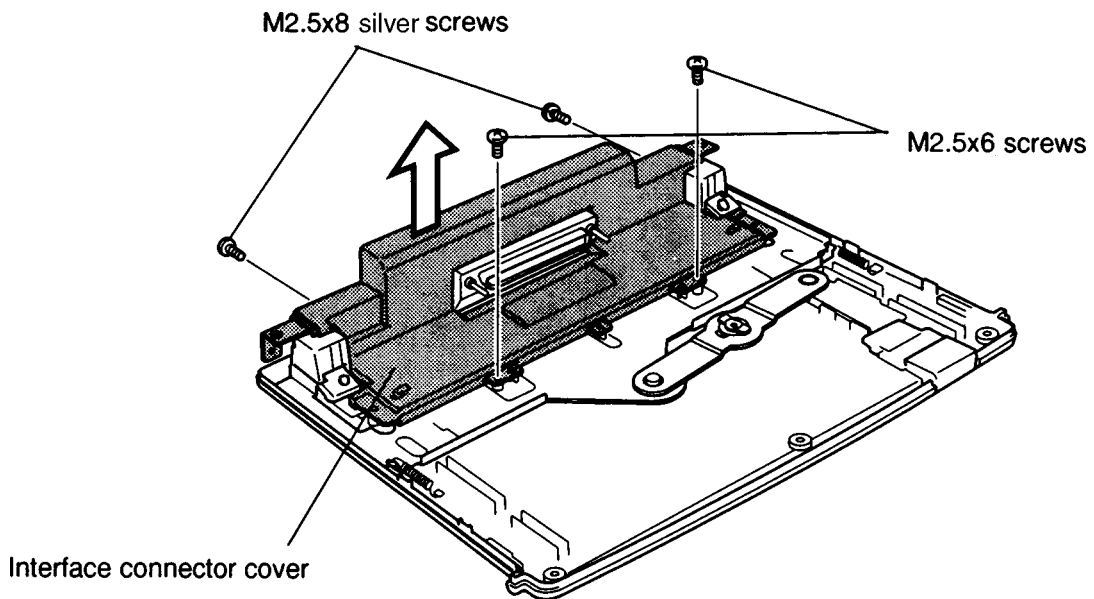


Figure 4-47 Removing the interface connector cover

Installing the Docking Adapter Covers

To install the Docking Adapter covers, follow the steps below and refer to Figures 4-47 back through 4-45.

1. Seat the **interface connector cover** and secure it with **two M2.5x8 silver screws** and **two M2.5x6 screws**.
2. Seat the **upper cover**, secure the latches and the **rails**, then secure them with **two M2.5x8 silver screws**.
3. Turn the **Docking Adapter** upside down and secure the **five M2.5x6 silver screws**.

4.20 Interface Connector Board

Removing the Interface Connector Board

To remove the interface connector board, follow the steps below and refer to Figures 4-48 to 4-50.

1. Remove the Docking Adapter covers as described in Section 4.19.
2. Remove **four M2.5x6 screws** securing the **interface connector assembly** and lift off the assembly.

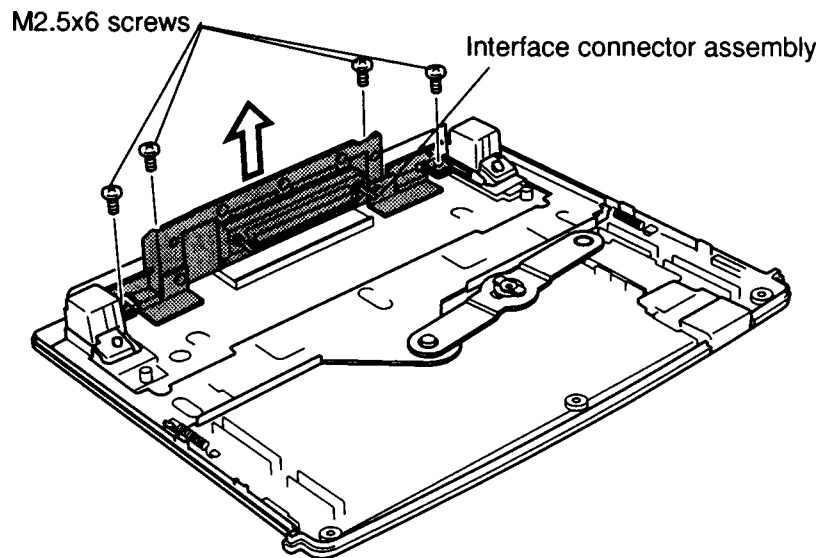


Figure 4-48 Removing the interface connector assembly

3. Remove **three M2.5x4 screws**, **two M2.5x6 screws** and **two bolt screws** securing the interface connector board to a metal plate.

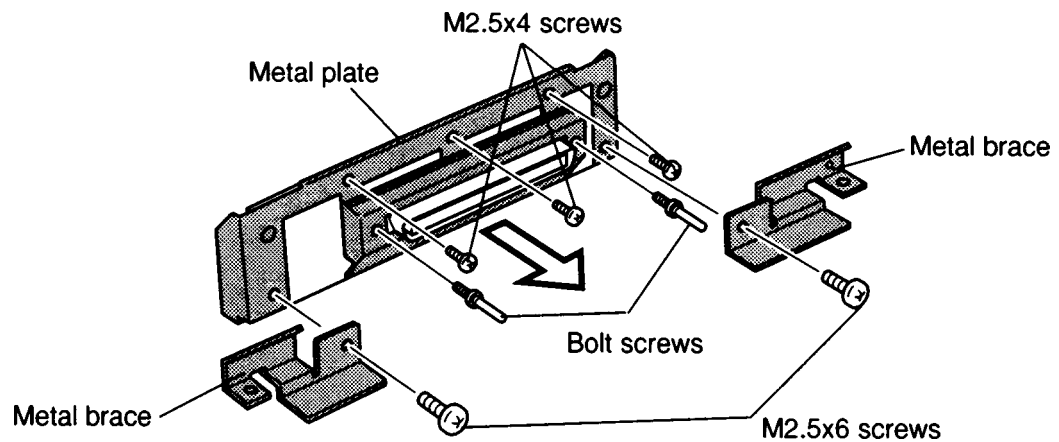


Figure 4-49 Removing the interface connector board and cover

4. Remove **two hexagonal-head screws** securing the **connector cover** to the **interface connector board**.

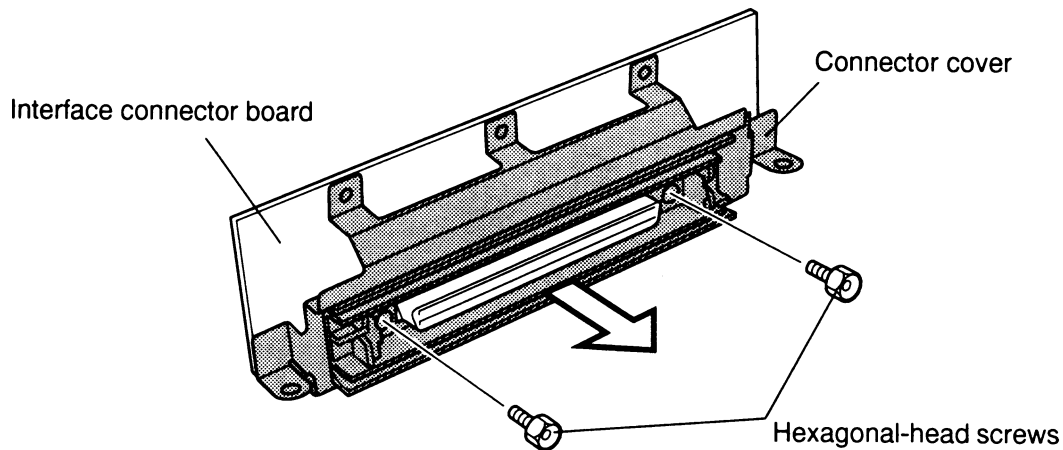


Figure 4-50 Removing the connector cover

Installing the Interface Connector Board

To install the interface connector board, follow the steps below and refer to Figure 4-50 back through 4-48.

1. Secure the **connector cover** to the **interface connector board** with **two hexagonal screws**.
2. Secure the **metal plate** to the interface connector board with **three M2.5x4 screws**, **two M2.5x6 screws**, and **two bolt screws**.
3. Secure the **interface connector assembly** to the **Docking Adapter** with **four M2.5x6 screws**.
4. Install the Docking Adapter covers as described in Section 4.19.

4.21 Connector Mechanism

Removing the Connector Mechanism

To remove the connector mechanism, follow the steps below and refer to Figures 4-51 to 4-53.

1. Remove the Docking Adapter covers as described in Section 4.19.
2. Remove **two springs** on each side of the Docking Adapter.

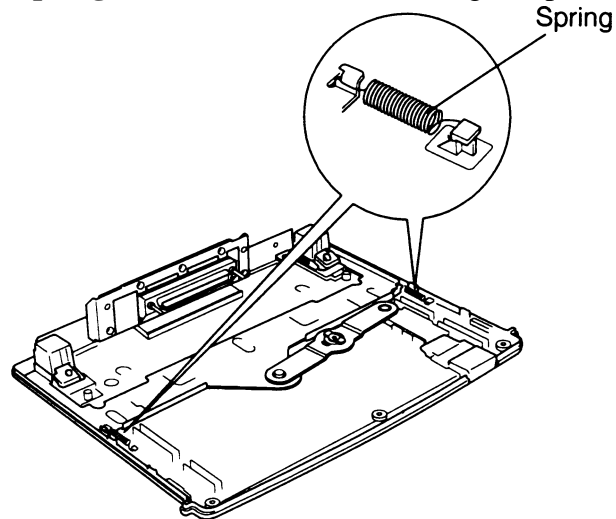


Figure 4-51 Removing the Docking Adapter springs

3. Remove **one M3x4 screw** from the **metal lever**, then remove the lever and **connecting mechanism**.

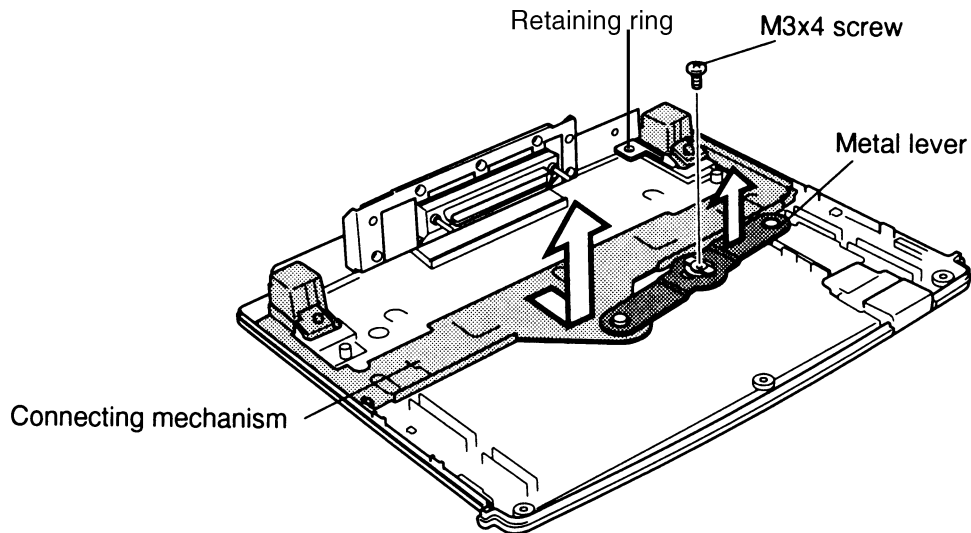


Figure 4-52 Removing the metal lever

4. Remove the two retaining rings on each side of the connecting mechanism, then remove the washers (note their position), and then the connector mechanism locking pins.
5. Turn the connecting mechanism over and remove **two M2.5x4 screws** from each side.
6. Separate the connecting mechanism, **eject devices** and **covers**.

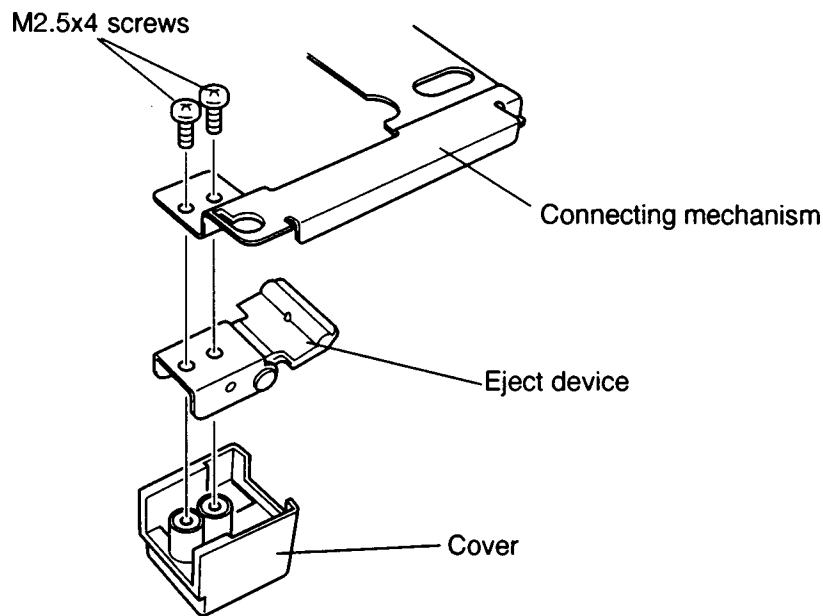


Figure 4-53 Removing the screws, eject devices and covers

Installing the Connector Mechanism

To install the connector mechanism, follow the steps below and refer to figures 4-51 to 4-53.

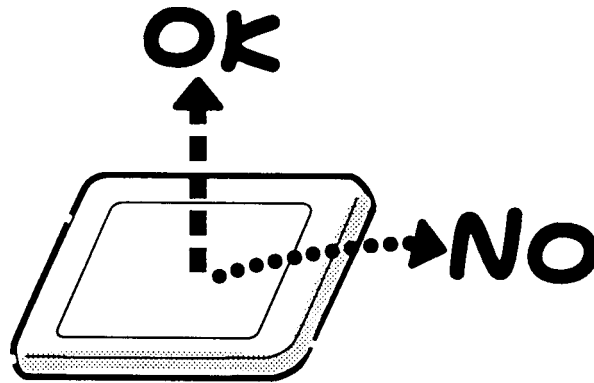
1. Assemble the **covers, eject devices** and connecting mechanism.
2. Turn the connecting mechanism upside down and secure **two M2.5x4 screws**, one on each side.
3. Install the two retaining rings, washers and locking pins on each side of the connecting mechanism.
4. Seat the connecting mechanism and **lever** and secure the lever with **one M3x4 screw**.
5. Replace the **springs** on both sides of the Docking Adapter and position the guide rails (right and left).
6. Replace the covers as described in Section 4.19.

Appendix A Handling the LCD Module

Precautions for handling the LCD module

The computer's LCD module can be easily damaged during assembly or disassembly. Therefore, please observe the following precautions when handling the LCD module:

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.



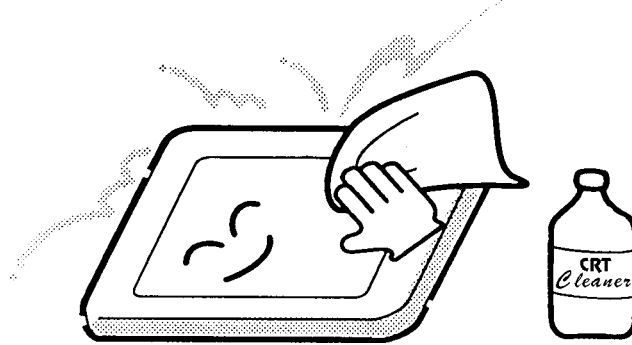
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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

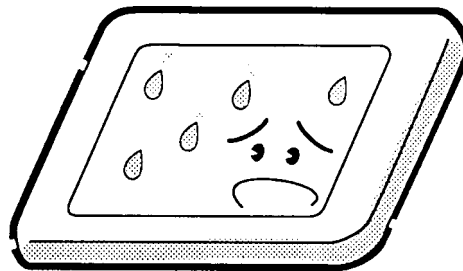


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

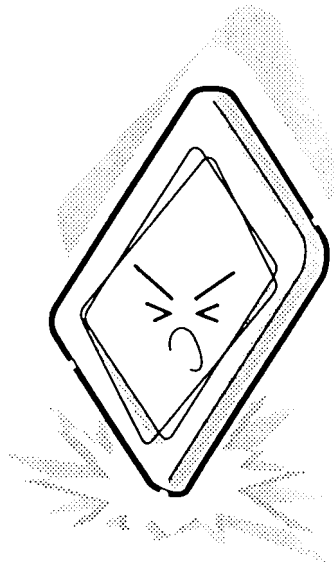
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



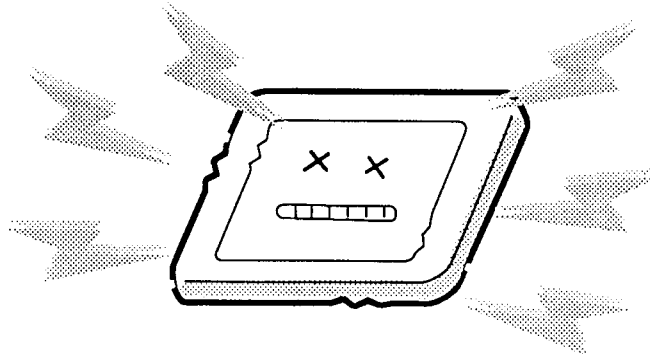
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



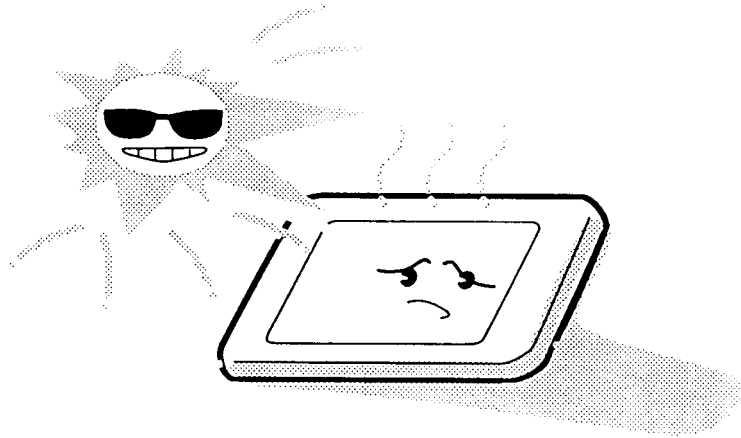
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



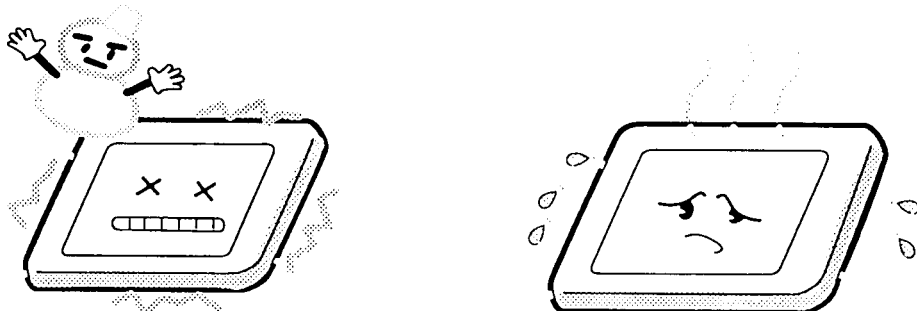
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



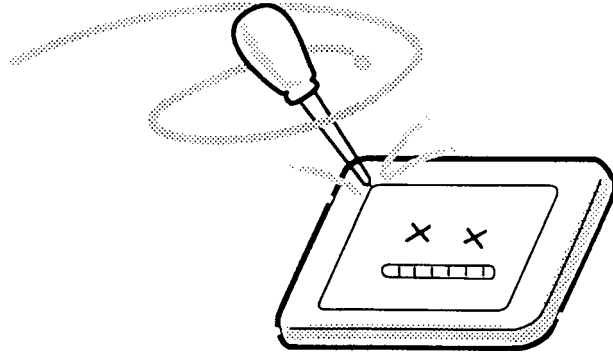
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



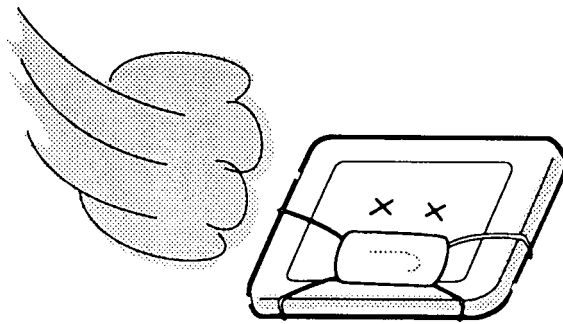
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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

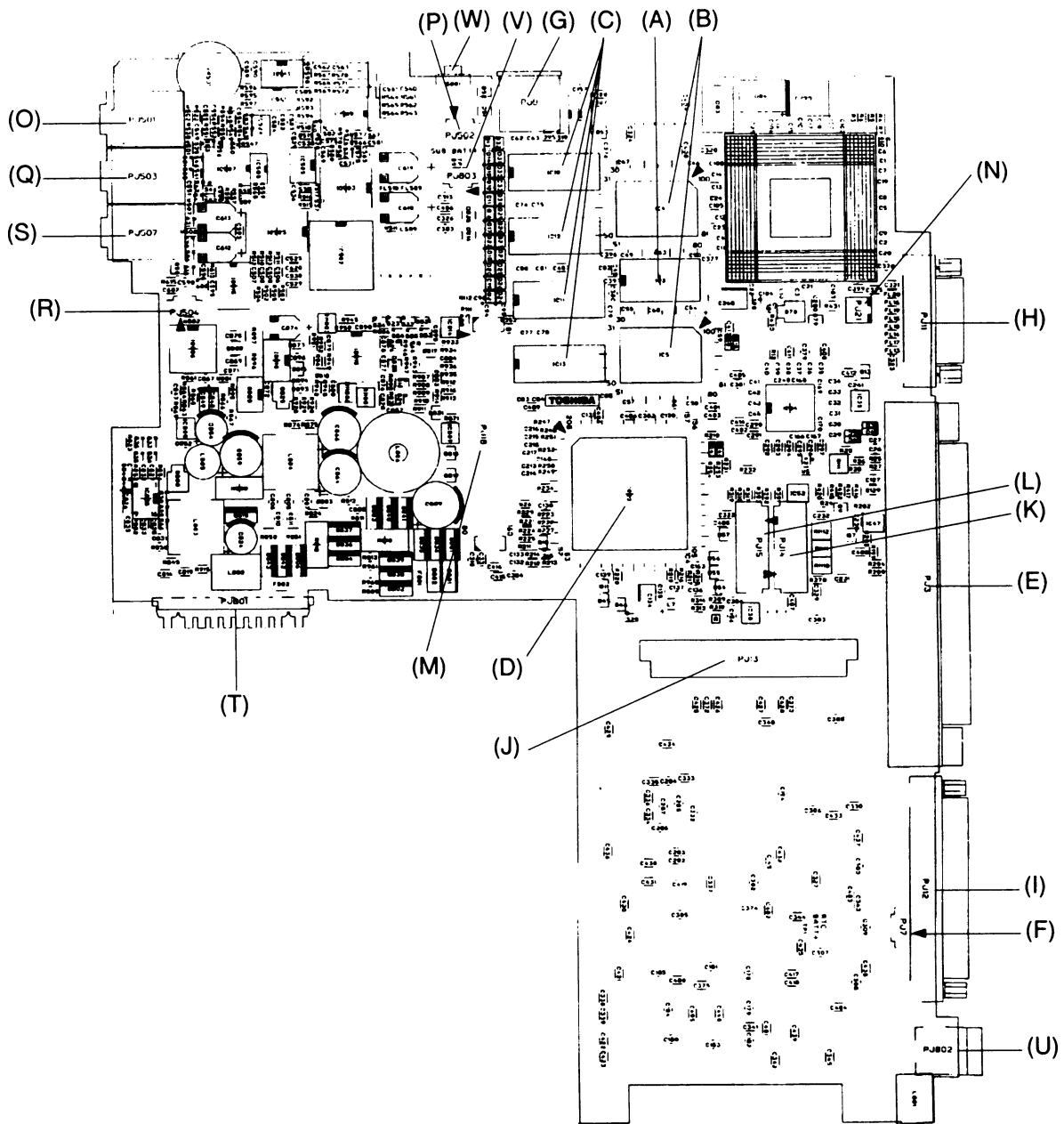


Figure B-1 System board layout (front)

B.2 System Board Back View

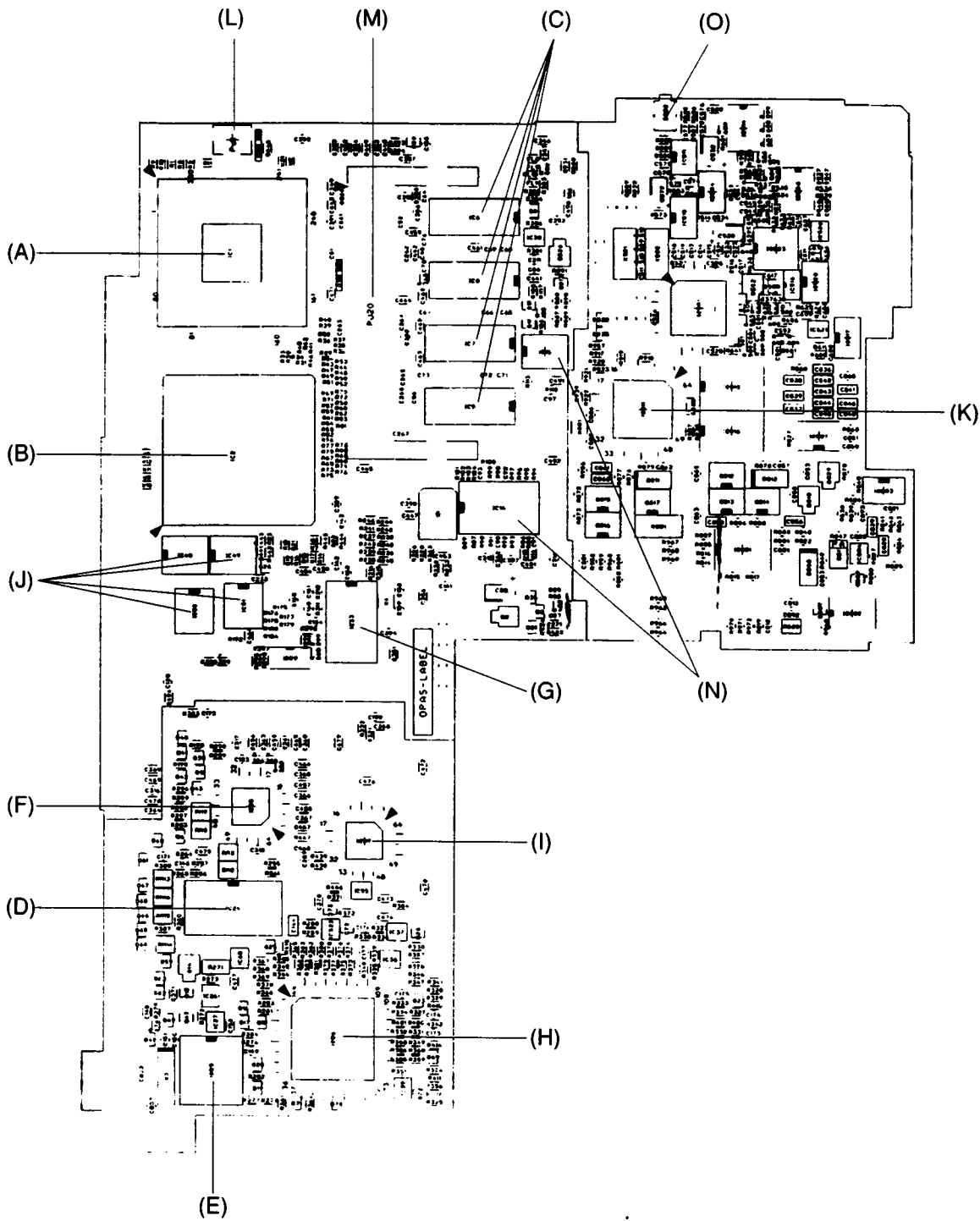


Figure B-2 System board layout (back)

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

Mark	Number	Name
(A)	IC3	L2 cache TAG RAM
(B)	IC4 and IC5	L2 cache data RAM
(C)	IC10 to IC13	System memory
(D)	IC23	I/O controller GA
(E)	PJ3	Docking Adapter connector
(F)	PJ7	RTC battery connector
(G)	PJ8	PS/2 mouse/keyboard connector
(H)	PJ11	Serial port connector
(I)	PJ12	Parallel port connector
(J)	PJ13	HDD connector
(K), (L)	PJ14, PJ15	Internal keyboard connector
(M)	PJ18	FMXIO* board connector
(N)	PJ21	Cooling fan connector
(O)	PJ501	Audio line-in connector
(P)	PJ502	Internal microphone connector
(Q)	PJ503	External microphone jack connector
(R)	PJ504	Internal speaker connector
(S)	PJ507	Headphone connector
(T)	PJ801	Main battery connector
(U)	PJ802	DC-IN jack connector
(V)	PJ803	Backup battery connector
(W)	S801	Power switch

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

Mark	Number	Name
(A)	IC1	CPU
(B)	IC2	System controller GA
(C)	IC6 to IC9	System memory
(D)	IC24	BIOS ROM
(E)	IC25	RTC
(F)	IC28	KBC
(G)	IC33	IPS controller
(H)	IC36	Miscellaneous GA
(I)	IC57	FIR controller
(J)	IC48 to IC51	Docking interface Q-SW
(K)	IC811	Power supply microprocessor
(L)	PJ1	Thermistor connector
(M)	PJ20	Expansion memory connector
(N)	IC14 and 15	Clock generator
(O)	S802	Reset switch

B.3 I/O Board Front View

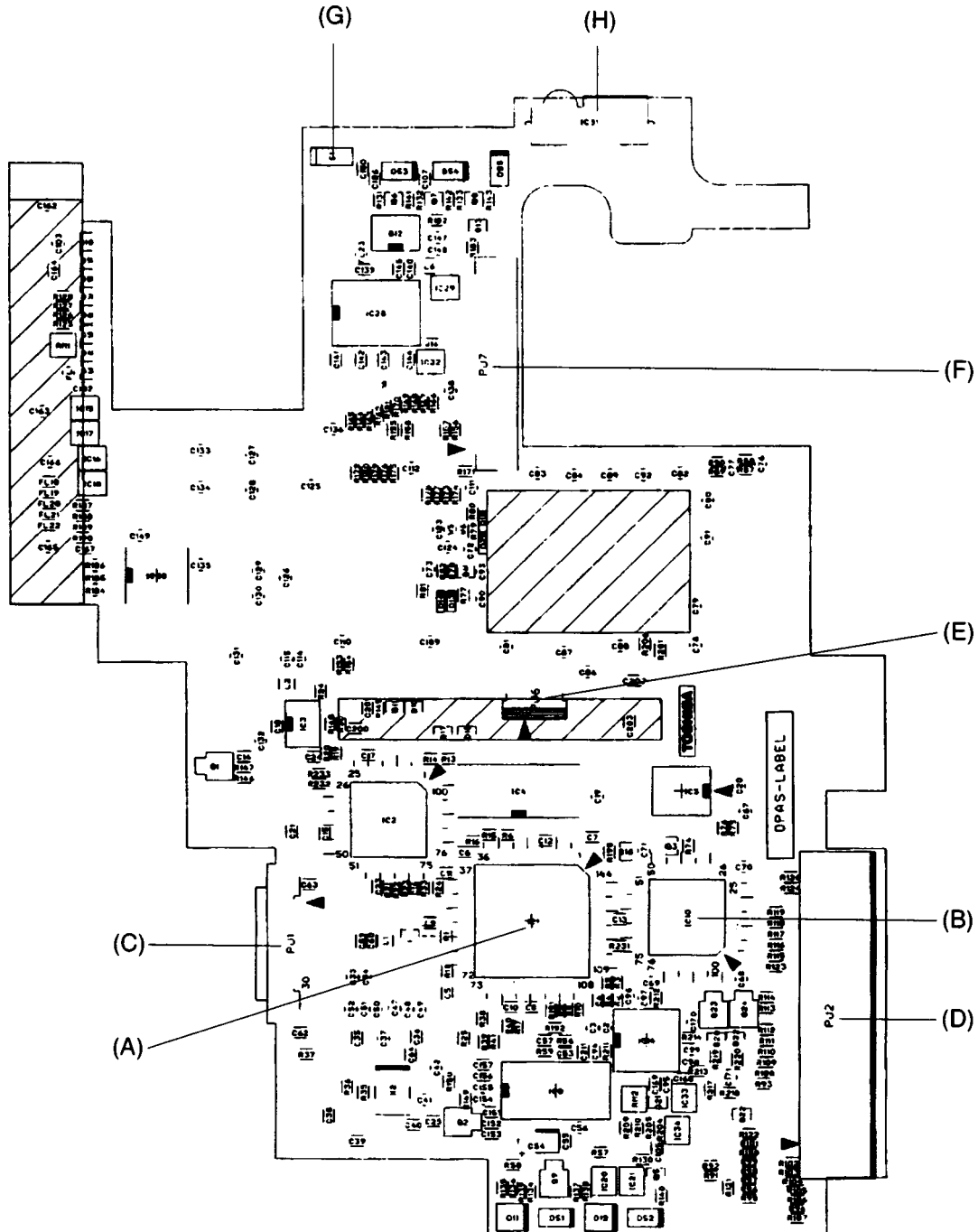


Figure B-3 I/O board layout (front)

B.4 I/O Board Back View

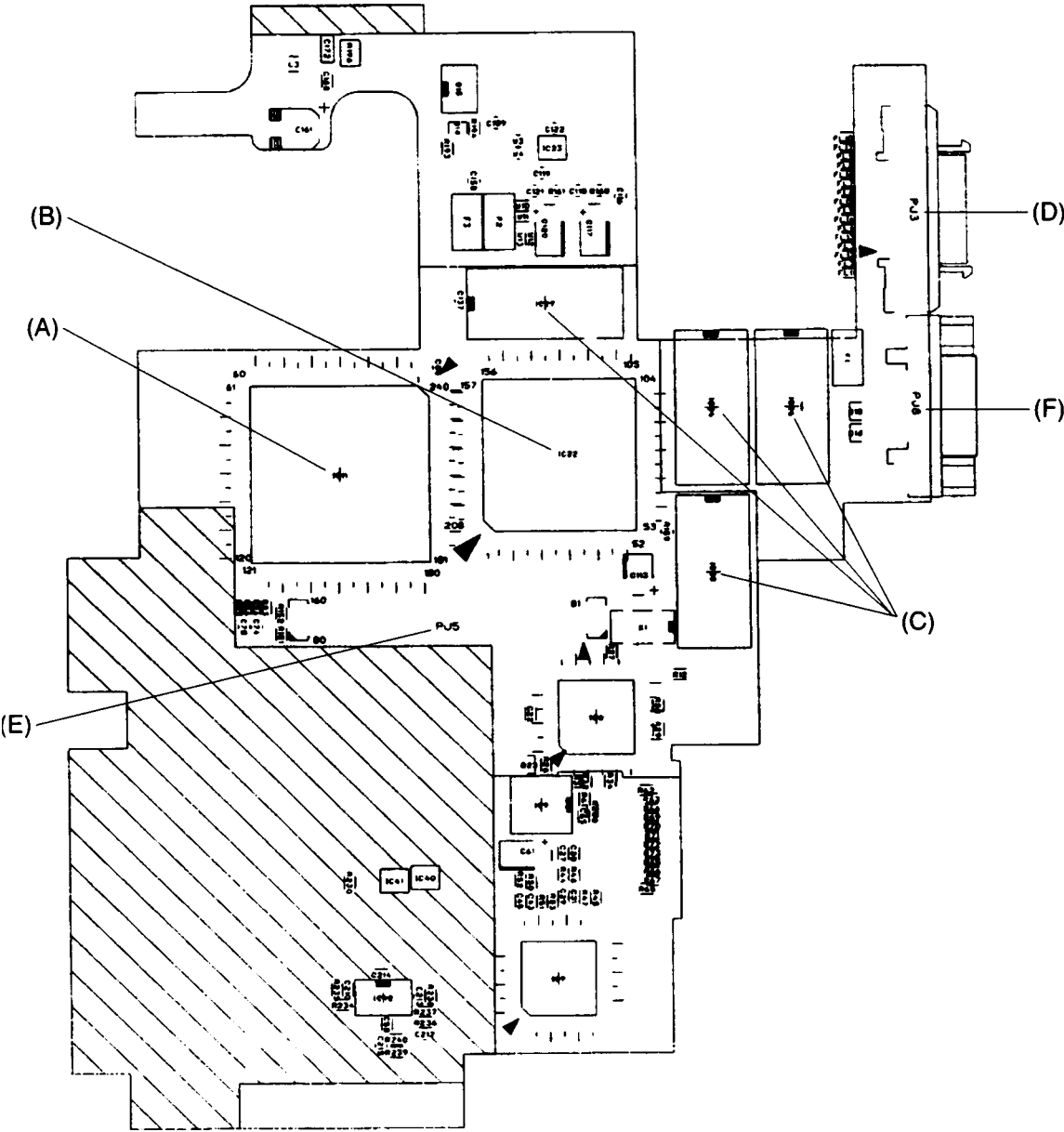


Figure B-4 I/O board layout (back)

Table B-3 I/O board ICs and connectors (front)

Mark	Number	Name
(A)	IC1	Modem interface GA
(B)	IC10	Multiplex GA
(C)	PJ1	DAA module connector
(D)	PJ2	PC card connector
(E)	PJ6	IPS membrane switch connector
(F)	PJ7	LCD connector
(G)	S1	LCD panel sensor
(H)	IC31	Fast Infrared Transceiver

Table B-4 I/O board ICs and connectors (back)

Mark	Number	Name
(A)	IC11	PC card controller GA
(B)	IC22	Video controller
(C)	IC24 to IC27	Video RAM
(D)	PJ3	External FDD connector
(E)	PJ5	FMXSY* board connector
(F)	PJ8	External monitor connector

Appendix C Pin Assignments

C.1 PJ3 Docking Connector (240-pin)

Table C-1 Docking Connector (240-pin) (1/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	GND	-	002	GND	-
003	DOCDT1;000	O	004	DSKDC	I
005	DSKDC	I	006	DSKDC	I
007	DSKDC	I	008	GND	-
009	PINT;000	I	010	PD1;100	I/O
011	PD0;100	I/O	012	AUTFD;000	I
013	DAD8;100	I/O	014	DAD6;100	I/O
015	GND	-	016	DAD4;100	I/O
017	DAD2;100	I/O	018	DAD0;100	I/O
019	GND	-	020	DREFRS;000	O
021	DHFRAM;000	I/O	022	DBUSY;000	O
023	GND	-	024	DSTOP;000	I/O
025	DTRDY;000	I/O	026	DCBE2;000	I/O
027	GND	-	028	DCBE0;000	I/O
029	DIOCHK;000	O	030	P.U (B3V,47K)	-
031	GND	-	032	DINTC;000	I
033	GND	-	034	DINTB;000	I
035	GND	-	036	DINTA;000	I
037	DPREQ;000	I	038	DPGNT;000	O
039	MIDIN;100	I	040	MIDOT;100	I
041	IFVCC	O	042	IFVCC	O
043	IFVCC	O	044	IFVCC	O
045	SNDMUT;010	O	046	SPKDIS;100	I
047	MICDIS;100	I	048	LINEIR;100	I
049	LINEIR;000	I	050	CDR;000	I
051	CDR;100	I	052	CDL;100	I
053	MICR;000	I	054	MICR;100	I
055	MICL;000	I	056	LINEOR;100	O
057	LINEOL;000	O	058	LINEOR;000	O
059	LINEOL;100	O	060	MICL;100	I

Table C-1 Docking Connector (240-pin) (2/4)

Pin No.	Signal Name	I/O	Pin No.	Signal name	I/O
061	GND	-	062	GND	-
063	GND	-	064	DSKDC	I
065	DSKDC	I	066	DSKDC	I
067	PD3;100	I/O	068	GND	-
069	PD4;100	I/O	070	ERROR;000	I
071	ACK;000	I	072	STROB;000	O
073	DAD7;100	I/O	074	DAD5;100	I/O
075	GND	-	076	DAD3;100	I/O
077	DAD1;100	I/O	078	RCLR;001	O
079	GND	-	080	DDEVSL;000	I/O
081	DPAR;100	I/O	082	P.U (B3V,47K)	
083	GND	-	084	DIRDY;000	I/O
085	DCBE3;000	I/O	086	DCBE1;000	I/O
087	GND	-	088	DIRQCK;100	O
089	DIRODT;000	I/O	090	DINTD;000	I
091	GND	-	092	GND	-
093	GND	-	094	DGNT;000	O
095	GND	-	096	GND	-
097	DFRAME;000	I/O	098	N.C.	-
099	IFLD2A;002	O	100	EXKBCK;100	I/O
101	N.C.	-	102	EXKBDT;100	I/O
103	GND	-	104	MOUSCK;100	I/O
105	QSWON;102	O	106	MOUSDT;100	I/O
107	PCM2SP;100	I	108	LINEIL;000	I
109	GND	-	110	LINEIL;100	I
111	DOCSMI;100	I	112	CDL;000	I
113	EJCTRQ;100	I	114	JOYDT0;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	N.C.	-	124	GND	-
125	N.C.	-	126	DSKDC	I
127	PD5;100	I/O	128	SLIN;000	O
129	PD6;100	I/O	130	GND	-
131	MCV	O	132	PE;100	I
133	DAD31;100	I/O	134	DAD17;100	I/O

Table C-1 Docking Connector (240-pin) (3/4)

Pin No.	Signal Name	I/O	Pin No.	Signal name	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
145	DAD22;100	I/O	146	DAD11;100	I/O
147	GND	-	148	DAD10;100	I/O
149	DAD19;100	I/O	150	DAD9;100	I/O
151	GND	-	152	GND	-
153	GND	-	154	DREQ;000	I
155	GND	-	156	GND	-
157	N.C.	-	158	N.C.	-
159	DCD1;100	I	160	SCL;100	I/O
161	RXD1;000	I	162	SDA;100	I/O
163	GND	-	164	DCRIOT;100	I
165	CTS1;100	I	166	DSCREQ;000	I
167	GND	-	168	DSCGNT;000	O
169	DTR1;110	O	170	DCPCLR;002	O
171	MONID0;100	I/O	172	GND	-
173	MONID1;100	I/O	174	DSKCHG;000	I
175	MONID2;100	I/O	176	JOYDT1;100	I
177	MONID3;100	I/O	178	JOYDT4;100	I
179	N.C.	-	180	JOYDT6;100	I
181	GND	-	182	SELCT;100	I
183	GND	-	184	BUSY;100	I
185	GND	-	186	PD7;100	I/O
187	GND	-	188	PD2;100	I/O
189	GND	-	190	CPCNF;100	I
191	GND	-	192	DCPWON;100	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

Table C-1 Docking Connector (240-pin) (4/4)

Pin No.	Signal Name	I/O	Pin No.	Signal name	I/O
209	GND	-	210	DAD18;100	I/O
211	GND	-	212	GND	-
213	GND	-	214	DSCLK;100	O
215	GND	-	216	GND	-
217	GND	-	218	BI1;100	I
219	GND	-	220	DSR1;100	I
221	GND	-	222	RTS1;110	O
223	GND	-	224	TXD1;010	O
225	GND	-	226	SIRRX;100	I
227	GND	-	228	FIRTXB;101	O
229	GND	-	230	CHSYNC;100	O
231	GND	-	232	CVSYNC;100	O
233	GND	-	234	CRED;100	O
235	GND	-	236	CGREEN;100	O
237	GND	-	238	CBLUE;100	O
239	GND	-	240	DOCDT2;000	I

C.2 PJ8 PS/2 Mouse/Keyboard Connector (6-pin)

Table C-2 PS/2 Mouse/Keyboard Connector (6-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal name	I/O
001	PS2DT;100	I	002	EXKBDT;100	I
003	GND	-	004	IFVCC	-
005	PS2CK;100	O	006	EXKBCK;100	O

C.3 PJ11 Asynchronous Connector (9-pin)

Table C-3 Asynchronous Connector (9-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal name	I/O
001	DCD1;101	I	002	RXD1;001	I
003	TXD1;011	O	004	DTR1;111	O
005	GND	-	006	DSR1;101	I
007	RTS1;101	O	008	CTS1;101	I
009	RI1;101	I			

C.4 PJ12 Parallel Connector (25-pin)

Table C-4 Parallel Connector (25-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal name	I/O
001	STROB;010	O	002	PD0;100	I/O
003	PD1;100	I/O	004	PD2;100	I/O
005	PD3;100	I/O	006	PD4;100	I/O
007	PD5;100	I/O	008	PD6;100	I/O
009	PD7;100	I/O	010	ACK;000	I
011	BUSY;100	I	012	PE;100	I
013	SELCT;100	I	014	AUTFD;000	O
015	ERROR;000	I	016	PINT;000	O
017	SLIN;000	O	018	GND	-
019	GND	-	020	GND	-
021	GND	-	022	GND	-
023	GND	-	024	GND	-
025	GND	-			

C.5 PJ13 HDD Connector (44-pin)

Table C-5 HDD Connector (44-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	IORST;000	O	002	GND	-
003	SD7;100	I/O	004	SA8;100	I/O
005	SD6;100	I/O	006	SA9;100	I/O
007	SD5;100	I/O	008	SA10;100	I/O
009	SD4;100	I/O	010	SA11;100	I/O
011	SD3;100	I/O	012	SA12;100	I/O
013	SD2;100	I/O	014	SA13;100	I/O
015	SD1;100	I/O	016	SA14;100	I/O
017	SD0;100	I/O	018	SA15;100	I/O
019	GND	-	020	N.C.	-
021	N.C.	-	022	GND	-
023	FIOW;000	O	024	GND	-
025	FIOR;000	O	026	GND	-
027	IOCRDY;100	I	028	N.C.	-
029	N.C.	-	030	GND	-
031	HDDIRQ;100	I	032	IOCS16;000	I
033	SA1;100	O	034	N.C.	-
035	SA0;100	O	036	SA2;100	O
037	SA4;100	O	038	SA5;100	O
039	HDDLED;000	I	040	GND	-
041	VCC	-	042	VCC	-
043	GND	-	044	Pull Up (47K)	-

C.6 PJ14 KB Connector (1) (14-pin)

Table C-6 KB Connector (1) (14-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	KBSTS;000	I	002	GND	-
003	KBOT11;001	O	004	KBOT02;001	O
005	KBOT09;001	O	006	KBOT10;001	O
007	KBOT03;001	O	008	KBOT04;001	O
009	KBOT05;001	O	010	KBOT06;001	O
011	KBOT07;001	O	012	KBOT08;001	O
013	KBOT01;001	O	014	KBOT00;001	O

C.7 PJ15 KB Connector (2) (14-pin)

Table C-7 KB Connector (2) (14-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	KBRT6;100	I	002	KBRT2;100	-
003	KBRT5;100	I	004	KBRT0;100	I
005	KBRT1;100	I	006	KBTR3;100	I
007	KBRT7;100	I	008	KBRT4;100	I
009	IPSY;100	I	010	VCC (IPSVCC)	-
011	IPSX;100	I	012	IPSY;100	I
013	GND(IPSGND)	-	014	IPSX;100	I

C.8 PJ18 Stacking Connector (160-pin)

Table C-8 Stacking Connector (160-pin) (1/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	B12V	-	002	B12V	-
003	PNLOFF;000	I	004	DEVSEL;000	I/O
005	TRDY;000	I/O	006	GND	-
007	STOP;000	I/O	008	REQC;000	I
009	REQF;000	I	010	INTA;000	I
011	INTB;000	I	012	INTC;000	I
013	AD0;100	I/O	014	AD1;100	I/O
015	AD2;100	I/O	016	GND	-
017	AD3;100	I/O	018	AD4;100	I/O
019	AD5;100	I/O	020	AD6;100	I/O
021	AD7;100	I/O	022	AD8;100	I/O
023	AD9;100	I/O	024	AD10;100	I/O
025	AD11;100	I/O	026	GND	-
027	AD12;100	I/O	028	AD13;100	I/O
029	AD14;100	I/O	030	AD15;100	I/O
031	AD16;100	I/O	032	AD17;100	I/O
033	AD18;100	I/O	034	AD19;100	I/O
035	AD20;100	I/P	036	GND	-
037	AD21;100	I/O	038	AD22;100	I/O
039	AD23;100	I/O	040	AD24;100	I/O
041	AD25;100	I/O	042	AD26;100	I/O
043	AD27;100	I/O	044	AD28;100	I/O

Table C-8 Stacking Connector (160-pin) (2/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
045	GND	-	046	AD29;100	I/O
047	AD30;100	I/O	048	AD31;100	I/O
049	GND	-	050	GND	-
051	CBE0;000	I/O	052	CBE1;000	I/O
053	CBE2;000	I/O	054	CBE3;000	I/O
055	GND	-	056	PGNTC;000	O
057	PGNTF;000	O	058	PCMSPK;100	I
059	PCMSMI;100	I	060	HDDLED;000	O
061	ARWLED;100	O	062	CAPLED;100	O
063	NUMLED;100	O	064	LEDEN;100	O
065	GND	-	066	DCINO;110	O
067	DCING;110	O	068	BATO;110	O
069	BATG;110	O	070	IRQCLK;100	O
071	IRQDT;000	I/O	072	PAR;100	I/O
073	IRDY;000	I/O	074	FRAME;000	I/O
075	GND	-	076	VCC	-
077	VCC	-	078	VCC	-
079	VCC	-	080	VCC	-
081	B5V	-	082	B5V	-
083	B5V	-	084	PBCLK2;100	O
085	PBCLK3;100	O	086	GND	-
087	CBCLK;100	O	088	C32P8K;100	O
089	CAUDIO;100	I	090	RING;000	I
091	S0SEL;100	I	092	S1SEL;100	I
093	C14P3M;102	O	094	PCLR;011	O
095	PBCLK1;100	O	096	GND	-
097	RSTVGA;000	O	098	PDNVGA;000	O
099	CRTEN;000	O	100	FLTEN;000	O
101	MONID0;100	I/O	102	MONID1;100	I/O
103	FLTEN;001	O	104	MONID2;100	I/O
105	MONID3;100	I/O	106	GND	-
107	BRIGHT;100	O	108	FLSEL0;100	O
109	FLSEL1;100	O	110	CBLUE;100	I
111	CGREEN;100	I	112	CRED;100	I
113	CHSYNC;100	I	114	CVSYNC;100	I
115	DSKCHG;000	I	116	GND	-
117	IFRADY;000	I	118	IFHMED;000	I

Table C-8 Stacking Connector (160-pin) (3/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
119	IFINDX;000	I	120	IFTRK0;000	I
121	IFWPRO;000	I	122	IFRDAT;000	I
123	IFDASL;000	O	124	IFAMON;000	O
125	GND	-	126	IFL0D1;000	O
127	IFLD2A;000	O	128	IFSSEL;000	O
129	FLON;000	I/O	130	IFDIRC;000	O
131	IFSTEP;000	O	132	IFWEN;000	I/O
133	IFWDAT;000	O	134	FDALED;100	O
135	GND	-	136	FIRRXB;100	I
137	FIRTXB;100	O	138	PCLR;010	O
139	GND	-	140	IPSSWL	I
141	IPSSWR	I	142	RCLR;100	O
143	ENVCC;000	O	144	MDMSLI;100	I
145	GND	-	146	MDSLO1;100	I
147	MDSLO0;100	I	148	MDMSD0;100	I
149	MIC	O	150	AGND	-
151	ZVLRCK;100	O	152	ZVSDAT;100	O
153	B3V	-	154	ZVMCLK;100	O
155	GND	-	156	B3V	-
157	B3V	-	158	B3V	-
159	B3V	-	160	B3V	-

C.9 PJ20 Expansion Memory Connector (144-pin)

Table C-9 Expansion Memory Connector (144-pin) (1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	GND	-	002	MD0;100	I/O
003	MD1;100	I	004	MD2;100	I/O
005	MD3;100	I/O	006	B3V	-
007	MD4;100	I/O	008	MD5;100	I/O
009	MD6;100	I/O	010	MD7;100	I/O
011	GND	-	012	CAS0;011	O
013	CAS1;011	O	014	B3V	-
015	MA0B;110	O	016	MA1B;110	O
017	MA2;111	I/O	018	GND	-
019	MD8;100	I/O	020	MD9;100	I/O
021	MD10;100	I/O	022	MD11;100	I/O
023	B3V	-	024	MD12;100	I/O
025	MD13;100	I/O	026	MD14;100	I/O
027	MD15;100	I/O	028	GND	-
029	N.C. (Reserved)	-	030	N.C. (Reserved)	-
031	N.C. (RFU)	-	032	B3V	-
033	N.C. (RFU)	-	034	WEC;010	O
035	RAS2;010	O	036	RAS3;010	O
037	N.C. (/OE)	-	038	GND	-
039	N.C. (Reserved)	-	040	N.C. (Reserved)	-
041	B3V	-	042	MD16;100	I/O
043	MD17;100	I/O	044	MD18;100	I/O
045	MD19;100	I/O	046	GND	-
047	MD20;100	I/O	048	MD21;100	I/O
049	MD22;100	I/O	050	MD23;100	I/O
051	B3V	-	052	MA6;111	O
053	MA8;111	O	054	GND	-
055	MA9;111	O	056	MA10;111	O
057	B3V	-	058	CAS2;011	O
059	CAS3;011	O	060	GND	-
061	MD24;100	I/O	062	MD25;100	I/O
063	MD26;100	I/O	064	MD27;100	I/O
065	B3V	-	066	MD28;100	I/O
067	MD29;100	I/O	068	MD30;100	I/O
069	MD31;100	I/O	070	GND	-
071	N.C. (SDA)	-	072	B3V	-

Table C-9 Expansion Memory Connector (144-pin) (2/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
073	GND	-	074	MD32;100	I/O
075	MD33;100	I/O	076	MD34;100	I/O
077	MD35;100	I/O	078	B3V	-
079	MD36;100	I/O	080	MD37;100	I/O
081	MD38;100	I/O	082	MD39;100	I/O
083	GND	-	084	CAS4;011	O
085	CAS5;011	O	086	B3V	-
087	MA3;111	O	088	MA4;111	O
089	MA5;111	O	090	GND	-
091	MD40;100	I/O	092	MD41;100	I/O
093	MD42;100	I/O	094	MD43;100	I/O
095	B3V	-	096	MD44;100	I/O
097	MD45;100	I/O	098	MD46;100	I/O
099	MD47;100	I/O	100	GND	-
101	N.C. (Reserved)	-	102	N.C. (Reserved)	-
103	N.C. (RFU)	-	104	B3V	-
105	WED;010	O	106	RAS4;010	O
107	RAS5;010	O	108	RAS6;010	O
109	RAS7;010	O	110	GND	-
111	N.C. (Reserved)	-	112	N.C. (Reserved)	-
113	B3V	-	114	MD48;100	I/O
115	MD49;100	I/O	116	MD50;100	I/O
117	MD51;100	I/O	118	GND	-
119	MD52;100	I/O	120	MD53;100	I/O
121	MD54;100	I/O	122	MD55;100	I/O
123	B3V	-	124	MA7;111	I/O
125	MA11;111	O	126	GND	-
127	MA0C;110	O	128	MA1C;110	O
129	B3V	-	130	CAS6;011	O
131	CAS7;011	O	132	GND	-
133	MD56;100	I/O	134	MD57;100	I/O
135	MD58;100	I/O	136	MD59;100	I/O
137	B3V	-	138	MD60;100	I/O
139	MD61;100	I/O	140	MD62;100	I/O
141	MD63;100	I/O	142	GND	-
143	N.C. (SCL)	-	144	B3V	-

C.10 PJ21 Fan Connector (2-pin)

Table C-10 Fan Connector (2-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	FANVCC	O	002	GND	-

C.11 PJ501 Line-in Connector (6-pin)

Table C-11 Line-in Connector (6-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	AGND	-	002	LINEINL	I
003	LINEINR	I	004	AGND	-
005	AGND	-	006	AGND	-

C.12 PJ502 Internal Microphone Connector (3-pin)

Table C-12 Internal Microphone Connector (3-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	INTMIC	I	002	AGND	-
003	N.C.	-			

C.13 PJ503 External Microphone Connector (6-pin)

Table C-13 External Microphone Connector (6-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	AGND	-	002	EXTMIC	I
003	N.C.	-	004	INTMIC	I
005	MIC;000	I	006	EXTMIC	I

C.14 PJ504 Speaker Connector (2-pin)

Table C-14 Speaker Connector (2-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	SPKP	O	002	SPKM	O

C.15 PJ507 Headphone Connector (6-pin)

Table C-15 Headphone Connector (6-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	AGND	-	002	PHONEL	O
003	PHONER	O	004	N.C.	-
005	HPON	O	006	AGND	-

C.16 PJ801 Battery Connector (10-pin)

Table C-16 Battery Connector (10-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	(+)	I	002	THRM+	I
003	DCHG	O	004	VDD	-
005	MBCLK	O	006	MBDAT	I/O
007	VSS	-	008	0V	O
009	IST#/2ND	O	010	(-)	I

C.17 PJ802 DC IN Connector (3-pin)

Table C-17 DC IN Connector (3-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	DCIN	I	002	GND	-
003	GND	-			

C.18 PJ803 Backup Battery Connector (2-pin)

Table C-18 Backup Battery Connector (2-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	SUBBATT	O	002	GND	-

C.19 PJ1 DAA Connector (30-pin)

Table C-19 DAA Connector (30-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	AGND	-	002	AVCC	-
003	DI1;100	O	004	DCM1;100	O
005	AUX;100	O	006	CID;100	O
007	C_SDI;100	O	008	C_SDO;100	O
009	C_CLK;100	O	010	N.C.	-
011	OAON;000	O	012	OAOP;100	O
013	N.C.	-	014	IAIN;000	I
015	IAIP;100	I	016	DI2;100	O
017	DCM2;100	O	018	C_INT;100	I
019	C_CTRL;100	O	020	AGND	-
021	AGND	-	022	AGND	-
023	OH;000	O	024	MUTE;100	O
025	RIDET;000	O	026	CELDET;000	O
027	OPTDET;100	O	028	AVCC	-
029	AGND	-	030	AGND	-

C.20 PJ2 PC Card Slot Connector (160-pin)

Table C-20 PC Card Slot Connector (160-pin) (1/3)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
A01	GND	-	A02	BCAD0;100	I/O
A03	BCAD1;100	I/O	A04	BCAD3;100	I/O
A05	BCAD5;100	I/O	A06	BCAD7;100	I/O
A07	BCCBE0;000	I/O	A08	BCAD9;100	I/O
A09	BCAD11;100	I/O	A10	BCAD12;100	I/O
A11	BCAD14;100	I/O	A12	BCCBE1;000	I/O
A13	BCPAR;100	I/O	A14	BCPERR;000	I/O
A15	BCGNT;000	I/O	A16	BCINT;000	I
A17	CVCCB	-	A18	CVPPB	-
A19	BCCLK;100	I/O	A20	BCIRDY;000	I/O
A21	BCCBE2;000	I/O	A22	BCAD18;100	I/O
A23	BCAD20;100	I/O	A24	BCAD21;100	I/O
A25	BCAD22;100	I/O	A26	BCAD23;100	I/O

Table C-20 PC Card Slot Connector (160-pin) (2/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A27	BCAD24;100	I/O	A28	BCAD25;100	I/O
A29	BCAD26;100	I/O	A30	BCAD27;100	I/O
A31	BCAD29;100	I/O	A32	BCD2;100	I/O
A33	BCCLKR;100	I/O	A34	GND	-
A35	GND	-	A36	BCCD1;000	I
A37	BCAD2;100	I/O	A38	BCAD4;100	I/O
A39	BCAD6;100	I/O	A40	BCD14;100	I/O
A41	BCAD8;100	I/O	A42	BCAD10;100	I/O
A43	BCVS1;100	I/O	A44	BCAD13;100	I/O
A45	BCAD15;100	I/O	A46	BCAD16;100	I/O
A47	BCA18;100	I/O	A48	BCLOCK;000	I/O
A49	BCSTOP;000	I/O	A50	BCDEVS;000	I/O
A51	VVCCB	-	A52	CVPPB	-
A53	BCTRDY;000	I/O	A54	BCFRAM;000	I/O
A55	BCAD17;100	I/O	A56	BCAD19;100	I/O
A57	BCVS2;100	I/O	A58	BCRST;000	I/O
A59	BCSERR;000	I/O	A60	BCREQ;000	I
A61	BCCBE3;000	I/O	A62	BCAUDI;100	I
A63	BCSTSC;100	I	A64	BCAD28;100	I/O
A65	BCAD30;100	I/O	A66	BCAD31;100	I/O
A67	BCCD2;000	I	A68	GND	-
A69	GND	-	A70	GND	-
A71	GND	-	A72	GND	-
A73	GND	-	A74	GND	-
A75	GND	-	A76	GND	-
B01	GND	-	B02	ACAD0;100	I/O
B03	ACAD1;100	I/O	B04	ACAD3;100	I/O
B05	ACAD5;100	I/O	B06	ACAD7;100	I/O
B07	ACCBEO;000	I/O	B08	ACAD9;100	I/O
B09	ACAD11;100	I/O	B10	ACAD12;100	I/O
B11	ACAD14;100	I/O	B12	ACCBE1;000	I/O
B13	ACPAR;100	I/O	B14	ACPERR;000	I/O
B15	ACGNT;000	I/O	B16	ACINT;000	I
B17	CVCCA	-	B18	CVPPA	-
B19	ACCLK;100	I/O	B20	ACIRDY;000	I/O
B21	ACCBE2;000	I/O	B22	ACAD18;100	I/O
B23	ACAD20;100	I/O	B24	ACAD21;100	I/O

Table C-20 PC Card Slot Connector (160-pin) (3/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
B25	ACAD22;100	I/O	B26	ACAD23;100	I/O
B27	ACAD24;100	I/O	B28	ACAD25;100	I/O
B29	ACAD26;100	I/O	B30	ACAD27;100	I/O
B31	ACAD29;100	I/O	B32	ACD2;100	I/O
B33	ACCLKR;100	I/O	B34	GND	-
B35	GND	-	B36	ACCD1;000	I
B37	ACAD2;100	I/O	B38	ACAD4;100	I/O
B39	ACAD6;100	I/O	B40	ACD14;100	I/O
B41	ACAD8;100	I/O	B42	ACAD10;100	I/O
B43	ACVS1;100	I/O	B44	ACAD13;100	I/O
B45	ACAD15;100	I/O	B46	ACAD16;100	I/O
B47	ACA1B;100	I/O	B48	ACLOCK;000	I/O
B49	ACSTOP;000	I/O	B50	ACDEVS;000	I/O
B51	CVCCA	-	B52	CVPPA	-
B53	ACTRDY;000	I/O	B54	ACFRAM;000	I/O
B55	ACAD17;100	I/O	B56	ACAD19;100	I/O
B57	ACVS2;100	I/O	B58	ACRST;000	I/O
B59	ACSERR;000	I/O	B60	ACREQ;000	I
B61	ACCBE3;000	I/O	B62	ACAUDI;100	I
B63	ACSTSC;100	I	B64	ACAD28;100	I/O
B65	ACAD30;100	I/O	B66	ACAD31;100	I/O
B67	ACCD2;000	I	B68	GND	-
B69	GND	-	B70	GND	-
B71	GND	-	B72	GND	-
B73	GND	-	B74	GND	-
B75	GND	-	B76	GND	-

C.21 PJ3 External FDD Connector (26-pin)

Table C-21 External FDD Connector (26-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	VCC	-	002	IFINDX;000	I
003	VCC	-	004	IFDASL;000	O
005	VCC	-	006	DSKCHG;000	I
007	VCC	-	008	IFRADY;000	I
009	IFHMED;000	I	010	IFAMON;000	O
011	IFLOD;000	O	012	IFDIRC;000	O
013	SLFDLD;100	I	014	IFSTEP;000	O
015	GND	-	016	IFWDAT;000	
017	GND	-	018	IFWEN;000	O
019	GND	-	020	IFTRKO;000	I
021	GND	-	022	IFWPRO;000	I
023	GND	-	024	IFRDAT;000	I
025	GND	-	026	IFSSEL;000	O

C.22 PJ5 Stacking Connector (160-pin)

Table C-22 Stacking Connector (160-pin) (1/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	B12V	-	002	B12V	-
003	PNLOFF;000	O	004	DEVSEL;000	I/O
005	TRDY	I/O	006	GND	-
007	STOP;000	I/O	008	REQC;000	O
009	REQF;000	O	010	INTA;000	O
011	INTB;000	O	012	INTC;000	O
013	AD0;100	I/O	014	AD1;100	I/O
015	AD2;100	I/O	016	GND	-
017	AD3;100	I/O	018	AD4;100	I/O
019	AD5;100	I/O	020	AD6;100	I/O
021	AD7;100	I/O	022	AD8;100	I/O
023	AD9;100	I/O	024	AD10;100	I/O
025	AD11;100	I/O	026	GND	-
027	AD12;100	I/O	028	AD13;100	I/O
029	AD14;100	I/O	030	AD15;100	I/O
031	AD16;100	I/O	032	AD17;100	I/O

Table C-22 Stacking Connector (160-pin) (2/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
033	AD18;100	I/O	034	AD19;100	I/O
035	AD20;100	I/O	036	GND	-
037	AD21;100	I/O	038	AD22;100	I/O
039	AD23;100	I/O	040	AD24;100	I/O
041	AD25;100	I/O	042	AD26;100	I/O
043	AD27;100	I/O	044	AD28;100	I/O
045	GND	-	046	AD29;100	I/O
047	AD30;100	I/O	048	AD31;100	I/O
049	GND	-	050	GND	-
051	CBE0;000	QI/O	052	CBE1;000	I/O
053	CBE2;000	I/O	054	CBE3;000	I/O
055	GND	-	056	PGNTC;000	I
057	PGNTF;000	I	058	PCMSPK;100	O
059	PCMSMI;100	I	060	HDDLLED;000	I
061	ARWLED;100	I	062	CAPLED;100	I
063	NUMLED;100	I	064	LEDEN;100	I
065	GND	-	066	DCIN0;100	I
067	DCING;110	I	068	BAT0;110	I
069	BATG;110	I	070	IRQCLK;100	I
071	IRQDT;000	I/O	072	PAR;100	I/O
073	IRDY;000	I/O	074	FRAME;000	I/O
075	GND	-	076	VCC	-
077	VCC	-	078	VCC	-
079	VCC	-	080	VCC	-
081	B5V	-	082	B5V	-
083	B5V	-	084	PBCLK2;100	I
085	PBCLK3;100	I	086	GND	-
087	CBCLK;100	I	088	C32P8K;100	I
089	CAUDIO;100	O	090	RING;000	O
091	S0SEL;100	O	092	S1SEL;100	O
093	C14P3M;102	I	094	PCLR;011	I
095	PBCLK1;100	I	096	GND	-
097	RSTVGA;000	I	098	PDNVGA;000	I
099	CRTEN;000	I	100	FLTEN;000	I
101	MONID0;100	I/O	102	MONID1;100	I/O
103	FLTEN;001	I	104	MONID2;100	I/O
105	MONID3;100	I/O	106	GND	-

Table C-22 Stacking Connector (160-pin) (3/3)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
107	BRIGHT;100	I	108	FLSEL0;100	I
109	FLSEL1;100	I	110	CBLUE;100	O
111	CGREEN;100	O	112	CRED;100	O
113	CHSYNC;100	O	114	CVSYNC;100	O
115	DSKCHG;000	O	116	GND	-
117	IFRADY;000	O	118	IFHMED;000	O
119	IFINDX;000	O	120	IFTRK0;000	O
121	IFWPRO;000	O	122	IFRDAT;000	O
123	IFDASL;000	I	124	IFAMON;000	I
125	GND	-	126	IFL0D1;000	I
127	IFLD2A;000	I	128	IFSSEL;000	I
129	FLON;000	I/O	130	IFDIRC;000	I
131	IFSTEP;000	I	132	IFWEN;000	I/O
133	IFWDAT;000	I	134	FDALED;100	I
135	GND	-	136	FIRRXB;100	O
137	FIRTXB;100	I	138	PCLR;010	I
139	GND	-	140	IPSSWL	O
141	IPSSWR	O	142	RCLR;100	I
143	ENVCC;000	I	144	MDMSLI;100	O
145	GND	-	146	MDSLD1;100	O
147	MDSLD0;100	O	148	MDSDD0;100	O
149	MIC	I	150	AGND	-
151	ZVLRCK;100	I	152	ZVSDAT;100	I
153	B3V	-	154	ZVMCLK;100	I
155	GND	-	156	B3V	-
157	B3V	-	158	B3V	-
159	B3V	-	160	B3V	-

C.23 PJ6 Membrane Switch Connector (4-pin)

Table C-23 Membrane Switch Connector (4-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	GND	-	002	IPSSWL	O
003	GND	-	004	IPSSWR	O

C.24 PJ7 LCD Connector (25-pin)

Table C-24 LCD Connector (25-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	N.C.	-	002	N.C.	-
003	N.C.	-	004	LCDV	-
005	LCDV	-	006	GND	-
007	GND	-	008	GND	-
009	GND	-	010	TODD0;000	O
011	TODD0;100	O	012	TODD1;000	O
013	TODD1;100	O	014	TODD2;000	O
015	TODD2;100	O	016	TCLK;000	O
017	TCLK;100	O	018	BRIGHT;100	O
019	FLSEL0;100	O	020	FLSEL1;100	O
021	FLV	-	022	FLV	-
023	GND	-	024	GND	-
025	N.C.	-			

C.25 PJ8 External Monitor Connector (15-pin)

Table C-25 External Monitor Connector (15-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
001	CRED;100	O	002	CGREEN;100	O
003	CBLUE;100	O	004	MONID2;100	I/O
005	GND	-	006	GND	-
007	GND	-	008	GND	-
009	N.C.	-	010	GND	-
011	MONID0;100	I/O	012	MONID1;100	I/O
013	CHSYNC;100	O	014	CVSYNC;100	O
015	MONID3;100	I/O			

Appendix D Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 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 (set 1 and set 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 (set 1 and set 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
203	Win	E0 5B	E0 DB	E0 1F	E0 F0 1F	
204	App	E0 5D	E0 DD	E0 2F	E0 F0 2F	

Notes:

- 1* Scan codes differ by mode.
- 2* Scan codes differ by overlay function.
- 3* Combination with **Fn** key makes different codes.
- 4* **Fn** key does not generate a code by itself.
- 5* This key corresponds to key No. 42 in 102-key model.
- 6* Refer to table D-6, scan codes with **Ctrl** key.
- 7* Refer to table D-7, scan codes with **Alt** key.

Table D-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1		Code set 2	
		Make	Break	Make	Break
75	INS	E0 AA E0 52	E0 D2 E0 2A	E0 F0 12 E0 70	E0 F0 70 E0 12
76	DEL	E0 AA E0 53	E0 D3 E0 2A	E0 F0 12 E0 71	E0 F0 71 E0 12
79	←	E0 AA E0 4B	E0 CB E0 2A	E0 F0 12 E0 6B	E0 F0 6B E0 12
80	Home	E0 A E0 47	E0 C7 E0 2A	E0 F0 12 E0 6C	E0 F0 6C E0 12
81	End	E0 AA E0 4F	E0 CF E0 2A	E0 F0 12 E0 69	E0 F0 69 E0 12
83	↑	E0 AA E0 48	E0 C8 E0 2A	E0 F0 12 E0 75	E0 F0 75 E0 12
84	↓	E0 AA E0 50	E0 D0 E0 2A	E0 F0 12 E0 72	E0 F0 72 E0 12
85	PgUp	E0 AA E0 49	E0 C9 E0 2A	E0 F0 12 E0 7D	E0 F0 7D E0 12
86	PgDn	E0 AA E0 51	E0 D1 E0 2A	E0 F0 12 E0 7A	E0 F0 7A E0 12
89	→	E0 AA E0 4D	E0 CD E0 2A	E0 F0 12 E0 74	E0 F0 74 E0 12
203	Win	E0 AA E0 5B	E0 DB E0 2A	E0 F0 12 E0 1F	E0 F0 1F E0 12
204	App	E0 AA E0 5D	E0 DD E0 2A	E0 F0 12 E0 2F	E0 F0 2F E0 12

*Note: The table above shows scan codes with the left **Shift** key. In combination with the right **Shift** key, scan codes are changed as below:*

	With left Shift	With right Shift
Set 1	E0 AA E0 2A	E0 B6 E0 36
Set 2	E0 F0 12 E0 12	E0 F0 59 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
203	Win	E0 2A E0 5B	E0 DB E0 AA	E0 12 E0 1F	E0 F0 1F E0 F0 12
204	App	E0 2A E0 5D	E0 DD E0 AA	E0 12 E0 2F	E0 F0 2F E0 F0 12

Table D-4 Scan codes with 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 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 Alt key

Key top	Shift	Code set 1						Code set 2							
		Make						Make							
Pause	Common	E1	ID	45	E1	SD	C5	E1	14	77	E1	F0	14	F0	77
	Ctrl*	E0	46	E0	C6	E0	7E	E0	F0	7E					

*: This key generates only make codes.

Appendix E Key Layout

E.1 United States (US) Keyboard

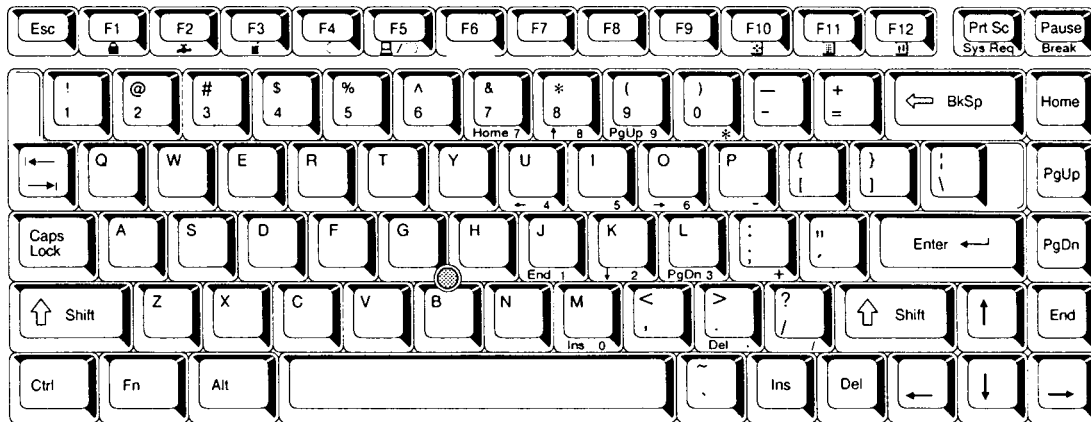


Figure E-1 US keyboard

E.2 United Kingdom (UK) Keyboard

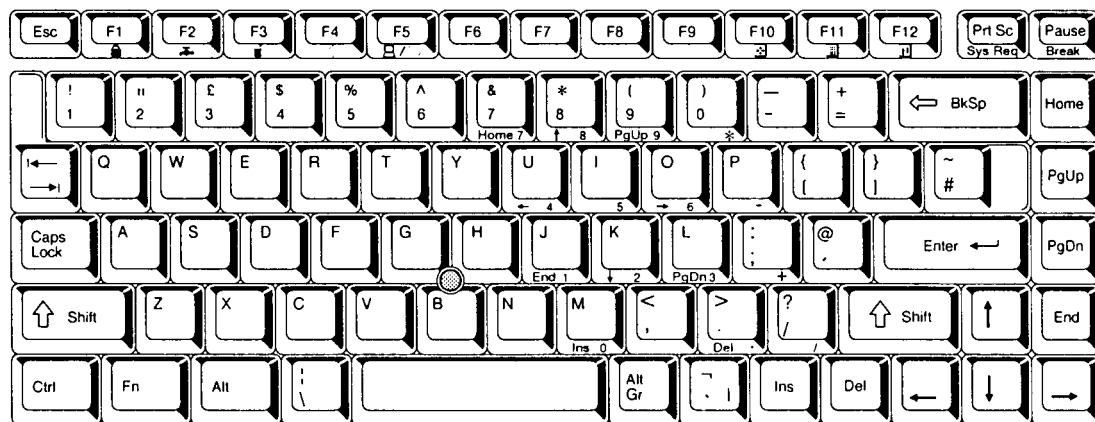


Figure E-2 UK keyboard

E.3 German (GR) Keyboard

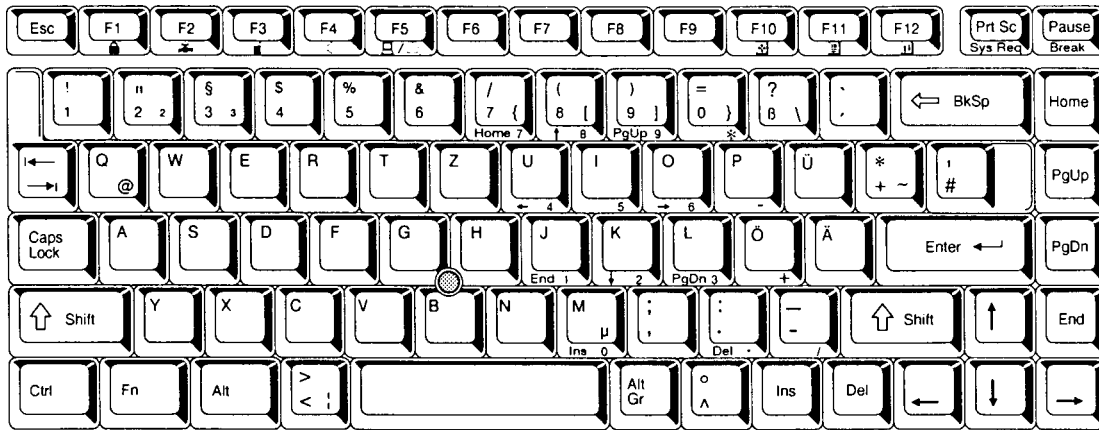


Figure E-3 GR keyboard

E.4 French (FR) Keyboard

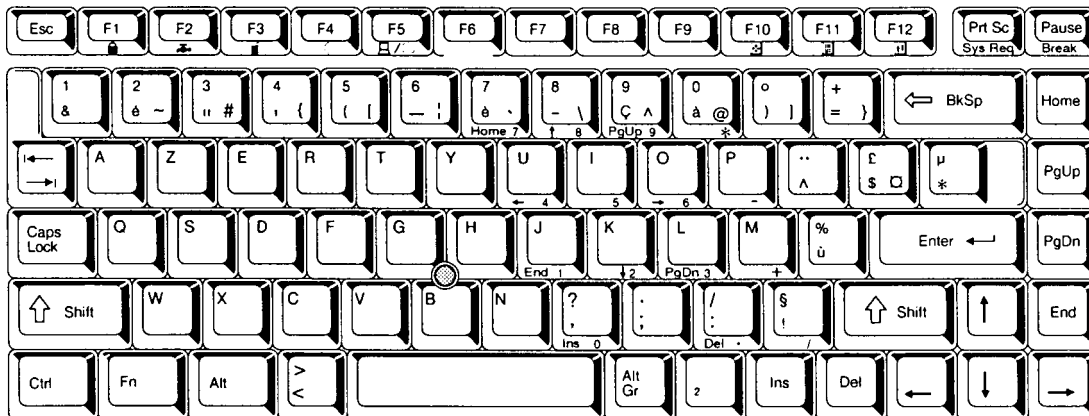


Figure E-4 FR keyboard

E.5 Spanish (SP) Keyboard

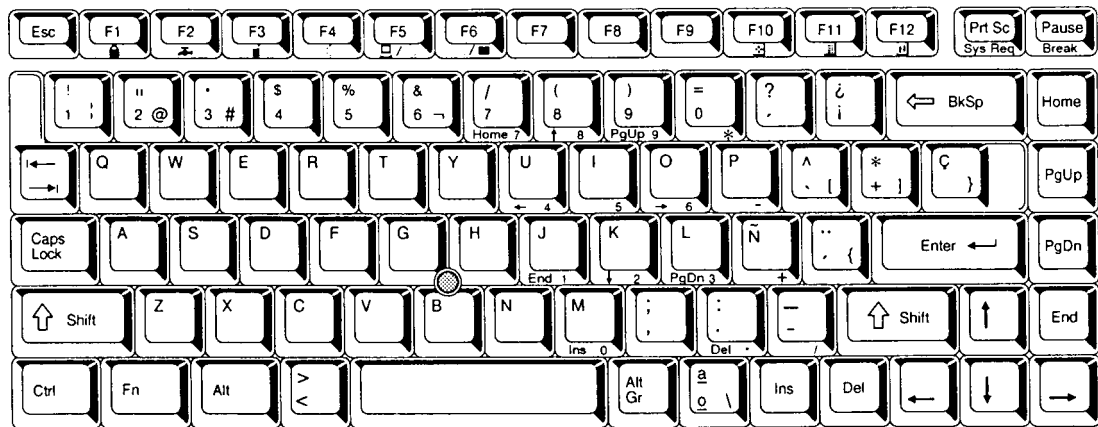


Figure E-5 SP keyboard

E.6 Italian (IT) Keyboard

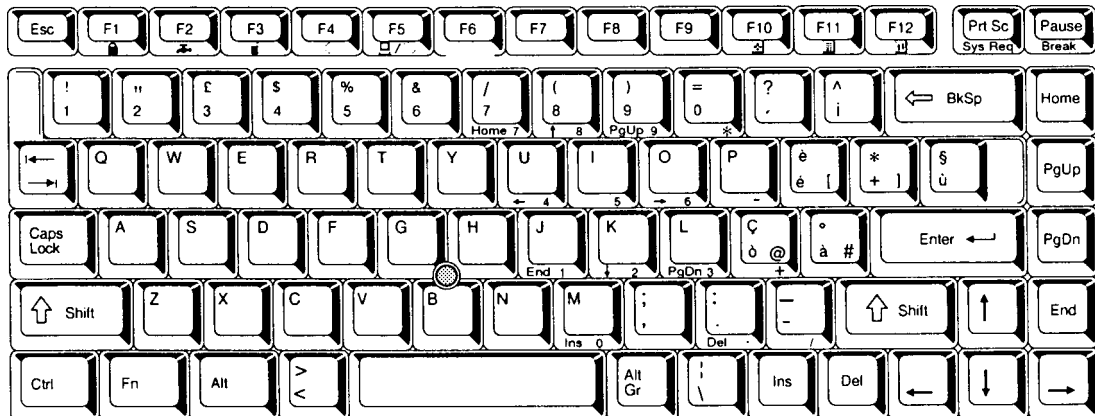


Figure E-6 IT keyboard

E.7 Scandinavian (SC) Keyboard

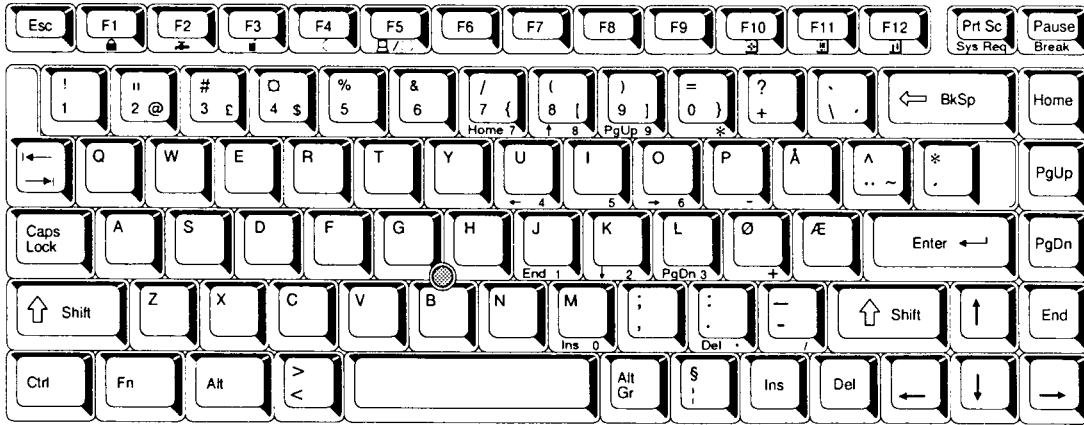


Figure E-7 SC keyboard

E.8 Swiss-German (SL) Keyboard

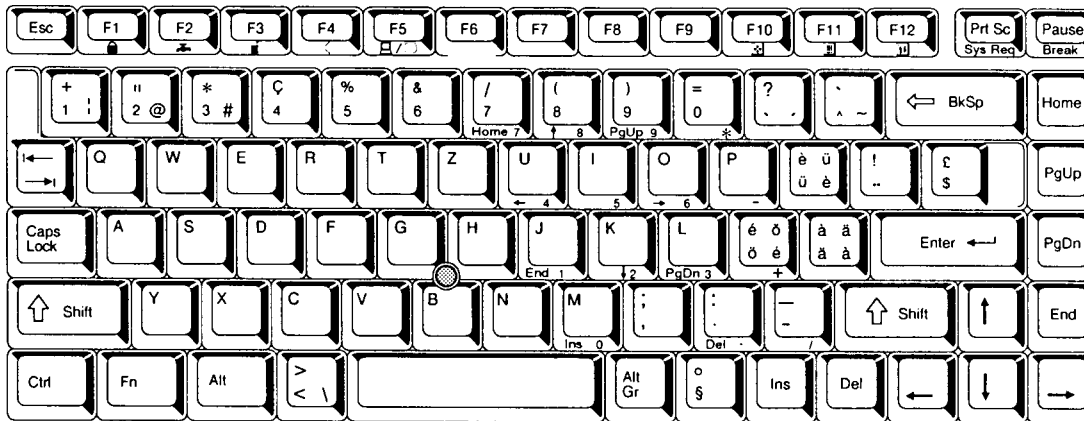


Figure E-8 SL keyboard

Appendix F Wiring Diagrams

F.1 Parallel Port Wraparound Connector

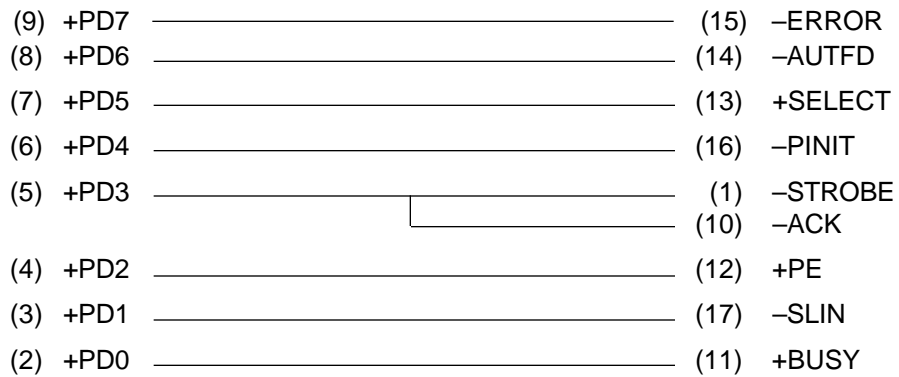


Figure F-1 Parallel port wraparound connector

F.2 Serial Port Wraparound Connector

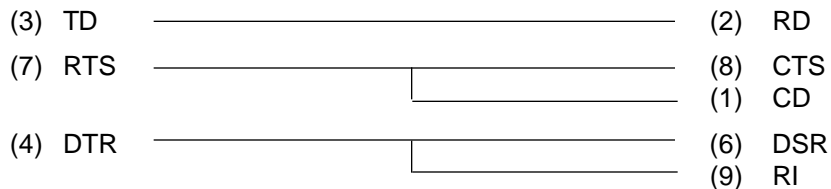


Figure F-2 Serial port wraparound connector

F.3 Serial Port Direct Cable (9-Pin to 9-Pin)

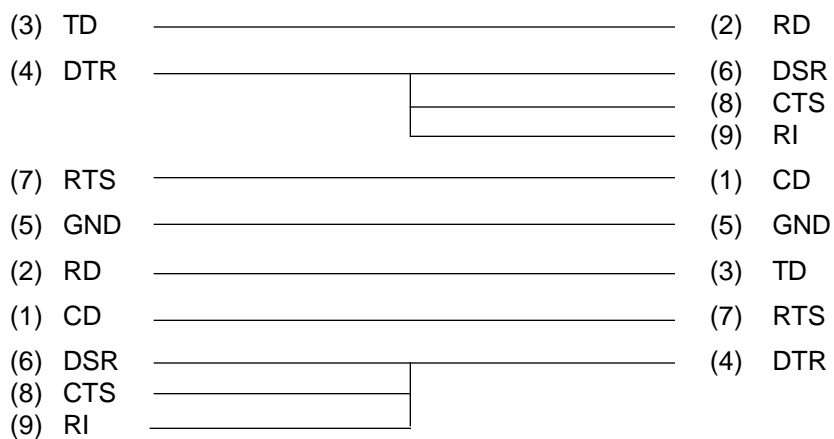


Figure F-3 Serial port direct cable (9-pin to 9-pin)

F.4 Serial Port Direct Cable (9-Pin to 25-Pin)

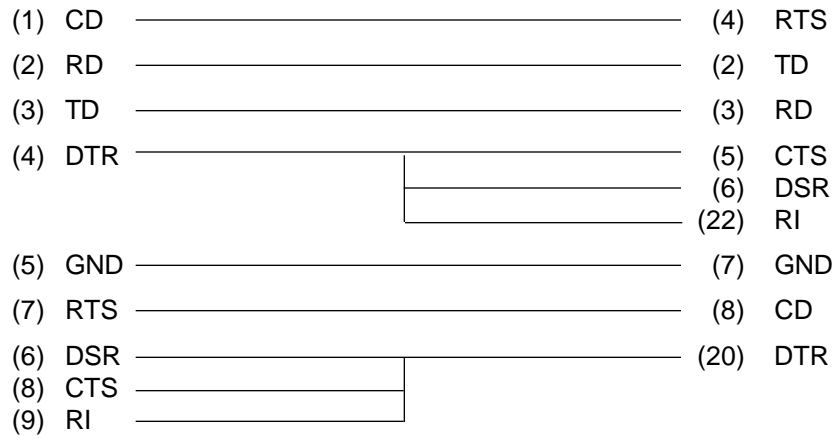


Figure F-4 Serial port direct cable (9-pin to 25-pin)

Appendix G BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when you update the system BIOS.

Tools

To rewrite the BIOS, you need the following tool:

- Diagnostics disk for the computer

Rewriting the BIOS

1. Set the system to boot mode.
2. Turn off the power to the computer.
3. Remove the external cable and PC card.
4. Turn on the power while holding down the **F12** key. (Keep holding down the key until the system speaker sounds a beep.)
5. When the message is displayed, insert the diagnostics disk into the FDD. Press **Enter** to start the BIOS rewrite.
6. When the BIOS rewrite is finished, eject the diagnostics disk and press the reset switch to restart the system.

