Toshiba Personal Computer

PORTEGE A100

Maintenance Manual

TOSHIBA CORPORATION

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Toshiba PORTEGE A100 Maintenance Manual

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer PORTEGE A100.

The procedures described in this manual are intended to help service technicians isolate faulty Field Replaceable Units (FRUs) and replace them in the field.

SAFETY PRECAUTIONS

Four types of messages are used in this manual to bring important information to your attention. Each of these messages will be italicized and identified as shown below.

Danger: *"Danger" indicates the existence of a hazard that could result in death or serious bodily injury, if the safety instruction is not observed.*

Warning: *"Warning" indicates the existence of a hazard that could result in bodily injury, if the safety instruction is not observed.*

Caution: *"Caution" indicates the existence of a hazard that could result in property damage, if the safety instruction is not observed.*

Note: *"Note" contains general information that relates to your safe maintenance service.*

Improper repair of the computer may result in safety hazards. Toshiba requires service technicians and authorized dealers or service providers to ensure the following safety precautions are adhered to strictly.

❑ Be sure to fasten screws securely with the right screwdriver. Be sure to use the PH Point size "0" and "1" screwdrivers complying with the ISO/DIS 8764-1:1996. If a screw is not fully fastened, it could come loose, creating a danger of a short circuit, which could cause overheating, smoke or fire.

❑ If you replace the battery pack or RTC battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

The manual is divided into the following parts:

Chapter 1   Hardware Overview describes the PORTEGE A100 system unit and each FRU.

Chapter 2   Troubleshooting Procedures explains how to diagnose and resolve FRU problems.

Chapter 3   Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.

Chapter 4   Replacement Procedures describes the removal and replacement of the FRUs.

Appendices   The appendices describe the following:

❑ Handling the LCD module
❑ Board layout
❑ Pin assignment
❑ Display codes
❑ Key layout
❑ BIOS/KBC/EC Update
❑ Reliability
❑ Key FD

Conventions

This manual uses the following formats to describe, identify, and highlight terms and operating procedures.

Acronyms

On the first appearance and whenever necessary for clarification acronyms are enclosed in parentheses following their definition. For example:

Read Only Memory (ROM)

Keys

Keys are used in the text to describe many operations. The key top symbol as it appears on the keyboard is printed in **boldface** type.

Key operation

Some operations require you to simultaneously use two or more keys. We identify such operations by the key top symbols separated by a plus (+) sign. For example, **Ctrl + Pause (Break)** means you must hold down **Ctrl** and at the same time press **Pause (Break)**. If three keys are used, hold down the first two and at the same time press the third.

User input

Text that you are instructed to type in is shown in the boldface type below:

DISKCOPY A: B:

The display

Text generated by the PORTEGE A100 that appears on its display is presented in the type face below:

```
Format complete
System transferred
```

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Chapter 1

Hardware Overview

Chapter 1   Contents

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1.1　Features

The PORTEGE A100 is an ultra thin and lightweight PC realizing cable-less environment on a table by wireless function with a Mobile Intel Pentium M processor realizing high performance.

- θ　Microprocessor

    Mobile Intel Pentium Processor-M

    A 1.40GHz Mobile Intel Pentium M with a 1.40GHz internal clock, 400MHz bus and 1.484V core operation.

- θ　Cache memory

    The Mobile Intel Pentium M processor has 32KB primary cache and 1MB secondary cache (in CPU).

- θ　Memory

    Two memory slots are equipped.
    Memory module can be installed up to 1GB (1,024MB). Memory modules of 256MB and 512MB sizes are available.

- θ　VRAM

    16MB VRAM UMA.
    The VRAM can be extended by DVMT (Dynamic Video Memory Technology).

- θ　HDD

    Built-in 2.5-inch x 9.5mm height, 40GB or 60GB HDD

- θ　USB FDD (Optional)

    An external two-mode 3.5-inch FDD, which connects with a USB port, supports 720KB and 1.44MB formats and enables booting from system FD.

- θ　Display

    LCD and CRT can be displayed at the same time.

    LCD

    Built-in 12.1 inch, 262,144 colors, XGA (1,024×768 dots), thin type low temperature poly-silicon TFT color display. A Video controller is included in North Bridge chip.

CRT

  Supported via a RGB connector.

TV-out (depending on the model).

  Has a TV output terminal.

θ Optical device (BTO)

Built-in a CD-RW/DVD-ROM drive, CD-ROM drive or DVD-multi drive.

θ Keyboard

An-easy-to-use 85-key keyboard provides a numeric keypad overlay for fast numeric data entry or for cursor and page control. The keyboard also includes two keys that have special functions in Microsoft Windows XP. It supports software that uses a 101- or 102-key enhanced keyboard.

θ Touch pad

Touch pad is installed as a pointing device.

θ Battery

The RTC battery is mounted inside the computer.
The main battery is a detachable lithium ion main battery (10.8V-4000mAh) and the RTC battery is a lithium ion battery (2.4V-17mAh).

θ Slot for expansion memory

One SO-DIMM slots are available for expansion memory of 256 or 512MB memory modules. One module must be installed in slot A as standard memory.

θ USB (Universal Serial Bus)

The computer comes with four USB ports that comply with the USB 2.0 standard. The USB 2.0 enables daisy-chain connection of up to 127 USB-equipped devices and 480Mbps serial data transfer. It is designed for easy configuration by a Plug-and-Play operating system and provides hot insertion/ejection capability.

θ PC card slot

A Type II PC card is acceptable. Supports ToPIC-100 (3.3V/CardBus).

θ   SD card slot

The computer is equipped with a SD Card slot that can accommodate Secure Digital flash memory cards with capacities of 8MB, 16MB, 32MB, 64MB, 256MB and 512MB. SD cards let the user easily transfer data from devices, such as digital cameras and Personal Digital Assistants, that use SD Card flash-memory. The cards have a high-level of security and copy protection features.

θ   Sound system

This computer includes sound controllers that support AC'97 I/F (AC-Link) Revision 2.2. The sound system is equipped with the following:

- Stereo Speaker
- Built-in Microphone
- Volume control knob
- Headphone jack
- External microphone jack

θ   One touch button

An Internet button, mail button and cyber support button are installed.

θ   Built-in Modem

The computer contains a MDC, enabling data and fax communication. It supports ITU-TV.90. The transfer rates are 56 Kbps for data reception, 33.6 Kbps for data transmission, and 14,400 bps for fax transmission. However, the actual speed depends on the line quality. The RJ11 modem jack is used to accommodate a telephone line.

θ   Internal LAN

The computer is equipped with LAN circuits that support Ethernet LAN (10 megabits per second, 10BASE-T) and Fast Ethernet LAN (100 mega bits per second, 100 BASE-TX). It also supports Wakeup on LAN (WOL) and Magic Packet.

θ   Wireless LAN (mini PCI Card slot (1 slot, BTO))

The wireless LAN supports 802.11b (11ch/13ch), 802.11a/b or 802.11 b/g. This function ca be switched on and off by a switch on the computer.

θ   IEEE1394

One port of IEEE1394 connector is mounted. I/O devices (digital video camera, etc) supporting IEEE1394 can be connected.

θ   Bluetooth (BTO)

Depending on the model, the computer is equipped with a dedicated Bluetooth module. This enables a communication to devices that support Bluetooth Version 1.1. It can be switched on or off with a switch on the computer.

Figure 1-1 shows the front of the computer and Figure 1-2 shows the system units configuration.
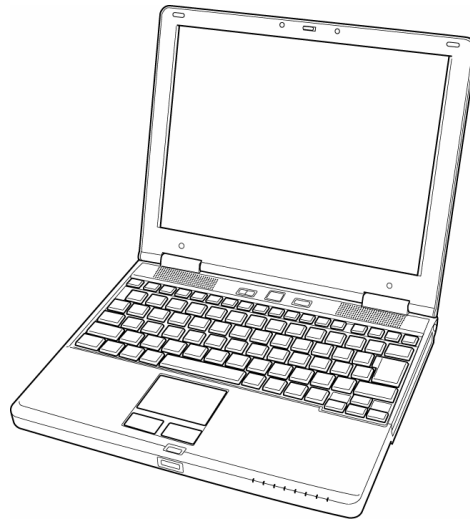
Figure 1-1 Front of the computer
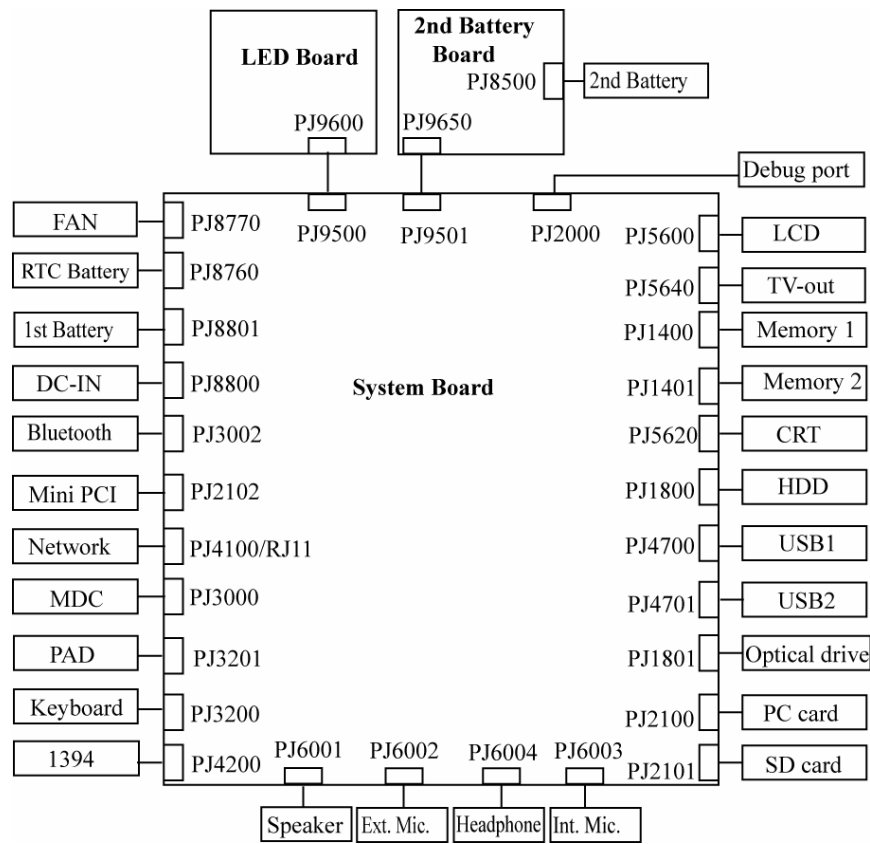
Figure 1-2 System units configuration

Figure 1-3 shows the system block diagram.
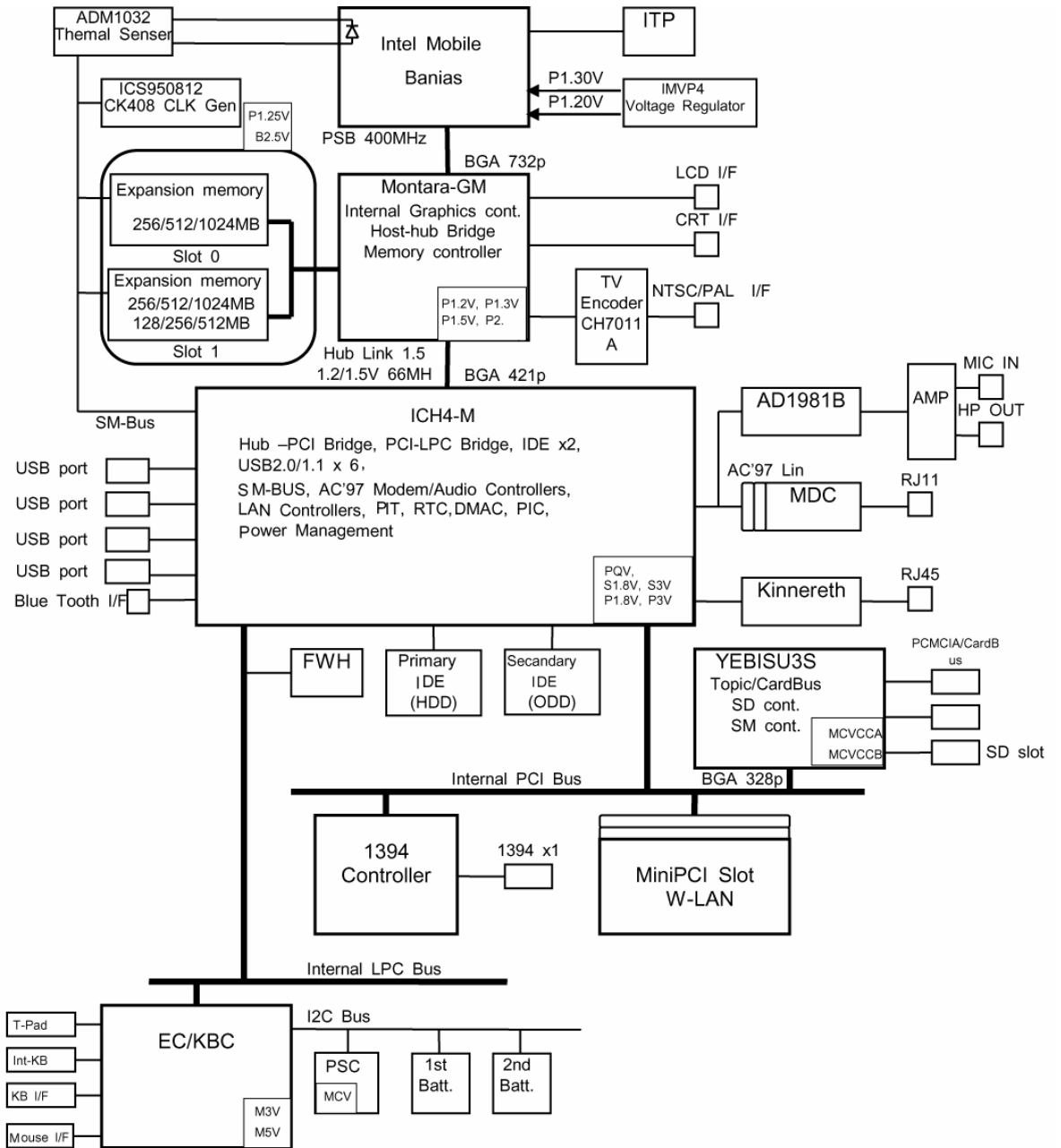
Figure 1-3 System Block Diagram

The PC contains the following components.

θ   CPU

   Mobile Intel Pentium M Processor-M

- A 1.40GHz Pentium M processor with a 1.40GHz internal clock, 400MHz bus and 1.484V core operation voltage
- Internal cache memory: 32KB
- Secondary cache memory: 1MB
  Internal cache memory: 32KB
- Integrated NDP

θ   Memory

   Two memory slots (DDR266). Memory modules in 256MB and 512MB can be installed to a maximum of 1GB (1,024MB).

- 3.3V operation
- 140-pin exclusive memory board
- Access time 6ns
- Memory Supporting PC-2100

θ   BIOS ROM (FWH)

- 8Mbit (512K×16-bit chip)
    - 32KB used for logo and icon
    - 64KB used for setup and checksum
    - 128KB used for system BIOS
    - 64KB used for VGA-BIOS
    - 32KB used for ACPI
    - 64kB used for Sound logo
    - 16KB used for Parameter block
    - 16KB used for MBI
    - 32KB used for Option logo
    - 448KB reserved

θ PCI chipset

This gate array incorporates the following elements and functions

- North Bridge (Intel Montara GM)
    - CPU interface and control
    - DRAM control
    - AGP master slave interface (Complies with AGP V2.0)
    - PCI interface (Complies with PCI Rev 2.2)
    - Built-in graphic (Trident XP)
    - 555-ball 35x35mm BGA package

- South Bridge (Intel ICH4-M)
    - PCI 3.3V/5V tolerance interface
    - Steerable PCI interrupts for PCI device Plug-and-Play
    - Enhanced DMA controller
    - Interrupt controller
    - Counter/timers
    - Distributed DMA supported
    - PC/PCI DMA supported
    - Serial IRQ supported
    - Low Pin Count (LPC) host controller
    - Plug-and-Play supported
    - Built-in KB controller
    - ACPI supporting features
    - Built-in PCI IDE controller
    - USB interface
    - SMBus interface
    - Super I/O interface
    - Audio system
    - SW modem interface
    - 352-ball (27mm x 27mm) BGA package

θ VGA controller

Included in North Bridge.

θ   PC card controller (YEBISU3S)

- PCI interface (PCI Revision2)
- Chipset interface
- Intel serial interrupt
- CardBus/PC Card controller (Yenta Version2.2) :2 slots
- Parallel power supply control (Toshiba style) and serial power supply control (Texas Instruments style)
- SD memory card controller (SDHC Ver.1.2)
- SDIO card controller (Ver.1.0)
- SmartMedia controller (SMHC Ver.01/SMIL 1.0)
- SmartCard interface
- SIO controller
- Docking station interface
  Q switch control, reset control
- External device interface
  FDD/IDE hot plugging and removal control

θ   Modem controller

Supported by MDC. Using the secondary AC97 Line.

θ   LAN controller (Intel–made ED82562 (Kinnereth))

Controls LAN and supports 100Base-TX and 10Base-T.

θ   Other main system chips

- EC/KBC (Hitachi-made HD64F2169BVTE10 x 1)
- PSC (Toshiba made TMP87PM48U x 1)
- CPU temperature sensor (AND-made ADM1032 AR-REEL7 x 1)
- Temperature switch (Maxim-made MAX6501UKP)
- Clock Generator (ICS-made ICS950812)
- TV Encoder (CH7011A)
- SOUND CODEC (AND-made AD1981B)
- 1394 Controller (TI-made TSB43AB22PDT)
- E^2PROM (BR93LC46F-Q (used for LAN MAC address))

1.2 2.5-inch Hard Disk Drive

A compact, high-capacity HDD with a height of 9.5mm. Contains a 2.5-inch magnetic disk and magnetic heads.

Figure 1-4 shows a view of the 2.5-inch HDD and Tables 1-1 and 1-2 list the specifications.
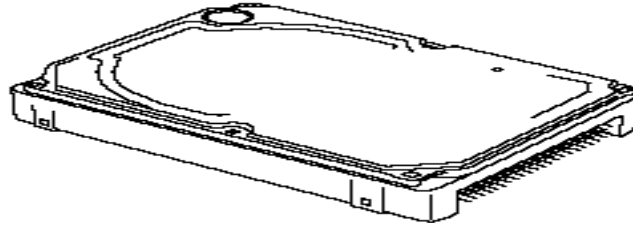
Figure 1-4 2.5-inch HDD

Table 1-1 2.5-inch HDD dimensions

Parameter		Standard value		
		TOSHIBA HDD2182B	**TOSHIBA HDD2190B**	**HITACHI GBC0000F410**
Outline dimensions	Width (mm)	69.85	69.85	70.1 max.
	Height (mm)	9.5	9.5	9.5
	Depth (mm)	100.0	100	100
	Weight (g)	99 max.	95 max.	95

Parameter		Standard value	
		TOSHIBA HDD2183B	**HITACHI G8BC0000F610**
Outline dimensions	Width (mm)	69.85	70.1 max.
	Height (mm)	9.5	9.5
	Depth (mm)	100.0	100.0
	Weight (g)	99 max	95

Table 1-2 2.5-inch HDD Specifications

Parameter	Specification		
	TOSHIBA HDD2182B	**TOSHIBA HDD2190B**	**HITACHI GBC0000F410**
Storage size (formatted)	40GB	40GB	40GB
Speed (RPM)	4,200		
Data transfer speed	154.3-298.0 (Mb/s)	175.0-341.7 (Mbits/s)	19.4-37.1 (MB/s)
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	78.9	88.1	70.0
Average seek time (Read) (ms)	12	-	13 typ.
Start time (sec)	4 typ.	4 typ.	3 typ (Stand by)

Parameter	Specification	
	TOSHIBA HDD2183B	**HITACHI G8BC0000F610**
Storage size (formatted)	60GB	60GB
Speed (RPM)	4,200	
Data transfer speed	154.3-298.0 (Mb/s)	22.1-42.8 (MB/s)
Interface transfer rate (MB/s)	100 (Ultra DMA mode)	
Track density (Ktpi)	78.9	70.0
Average seek time (Read) (ms)	12	13 typ.
Start time (sec)	4	3 (Stand by)

1.3　Keyboard

The keyboard is mounted 85 keys that consist of character key and control key, and in conformity with JIS. The keyboard is connected to membrane connector on the system board and controlled by the keyboard controller on the system board.

Figure1-5 is a view of the keyboard.

See Appendix E about a layout of the keyboard.
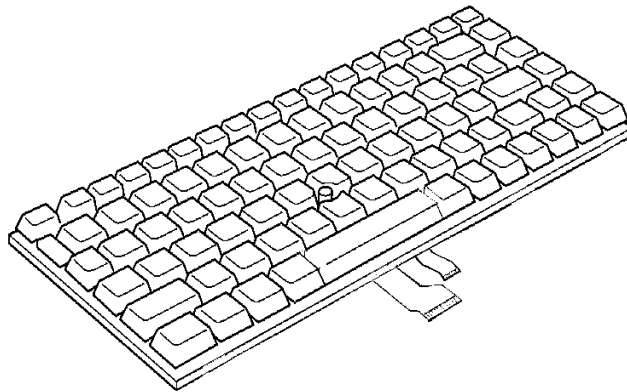
Figure 1-5　Keyboard

1.4 **CD-RW/DVD-ROM Drive**

This drive corresponds CD/CD-ROM (12cm and 8cm), CD-R, CD-RW, DVD-ROM, DVD-R and DVD-RW drive and supports format of CD-DA, CD-ROM, Photo CD, CD-I, Video CD, Enhanced CD, CD-TEXT, DVD-ROM, DVD-R and DVD-Video.

Table 1-3 CD-RW/DVD-ROM drive dimensions

Parameter		Standard value
Outline dimensions	Width (mm)	128(Excluding projections)
	Height (mm)	12.7(Excluding projections)
	Depth (mm)	129(Excluding projections)

Table 1-4 CD-RW/DVD-ROM drive specifications

Item	Specifications
Speed (MAX)	
CD ROM data (Read)	24x CAV
CD R data (Write)	24x max. (ZCLV)
CD-RW data (Write)	4x (CLV)
DVD-ROM data (Read)	8x max. CAV
Date transfer speed	
CD-ROM mode 1	Max. 3,600KB/s
DVD-ROM	Max. 10,816KB/s
PIO MODE 4 (Mode 0 ~ Mode 4)	16.6MB/s max.
Multiword DMA transfer (mode 2)	16.6MB/s max.
Ultra DMA	33.3MB/s max.

1.5 CD-ROM Drive

This drive corresponds to CD/CD-ROM (12cm and 8cm) disk and supports format of CD-DA, CD-ROM, Photo CD and Enhanced CD. This drive reads CD-ROM at maximum 24-speed.

Table 1-5 CD-ROM drive dimensions

Parameter		Standard value
Outline dimensions	Width (mm)	128(Excluding a front bezel)
	Height (mm)	12.7(Excluding a front bezel)
	Depth (mm)	129.4(Excluding an eject button)

Table 1-6 CD-ROM drive specifications

Item	Specifications
Speed (MAX)	
CD ROM data (Read)	24x (5,136rpm)
Date transfer speed	
CD-ROM mode 1	1,545~3,600KB/s
PIO MODE 4 (Mode 0 ~ Mode 4)	16.7MB/s max.
Multiword DMA transfer (mode 0~mode 2)	16.7MB/s max.
Ultra DMA	33.3MB/s max.

1.6 DVD-Multi (CD-R/RW+DVD-RAM/R/RW) Drive

This drive is a combination of CD-R/RW, DVD-R/RW and DVD-RAM Drive. It is full-size and runs either 12cm (4.72-inch) or 8cm (3.15-inch) DVD/CDs without an adaptor. This drive reads CD-ROM at maximum 24-speed, reads DVD-ROM at maximum 8-speed writes CD-R at maximum 16-speed, writes CD-RW at maximum 4-speed, writes DVD-R at maximum 2-speed, writes DVD-RW at maximum 1-speed,and writes DVD-RAM at maximum 2-speed.

The specifications for the DVD multi drive are described in table 1-7.

Table 1-7 DVD-ROM drive specifications

Item	Specifications
ATAPI Burst (MB/sec)	33.3 (Ultra DMA mode 2) 16.6 (PIO Mode 0 to 4, Multi word DMA mode 0 to 2)
Average access time (ms)	CD-ROM 150 DVD-ROM 180
Data buffer (MB)	2
Speed (Read)r	CD-ROM 24x CAV DVD-ROM 8x CAV
Speed (Write)	CD-R 16x max. (ZCLV) CD-RW 4x (CLV) DVD-R 1x, 2x DVD-RW 1x (CLV) DVD-RAM 2x (ZCLV)

Supported Format	CD: CD-DA
	        CD-ROM, CD-ROMXA
	        CD-R/W
	        CD-R
	        CD-I Ready
	        Photo-CD
	        Video CD
	        Cd-Extra(CD+)
	        CD-TEXT
	 DVD :DVD-ROM
	        DVD-R (3.9GB, 4.7GB)
	        DVD-Video
	        DVD-RW (Ver. 1.1)
	        DVD-RAM(4.7G, 2.6G, 9,4GB))

1.7   TFT Color Display

The TFT color display consists of a LCD module and FL inverter board.

1.7.1   LCD Module

The LCD module used for the TFT color display uses a backlight as the light source and can display images and characters of 262,144 colors with 1024×768 resolution. The video controller is incorporated into the North Bridge (M1644T) chip and can control both internal and external XGA-support displays simultaneously.

Table 1-8 and 1-9 show lists of the specifications.

Table 1-8 LCD module specifications (TMD-maid 12.1 TFT)

Item	Specifications
	G33C0000J110
Number of Dots	1024×768
Dot spacing (mm)	0.24(H) x 0.24(V)
Display range (mm)	245.76(H) x 184.32(V)
Outline dimensions	261.0(w) x 199.0(H) x 5.0Max(D)

Table 1-9 LCD module specifications (LG Phillp-maid 12.1 TFT)

Item	Specifications
	G33C0000H110
Number of Dots	1024×768
Dot spacing (mm)	0.24(H) x 0.24(V)
Display range (mm)	245.76(H) x 184.32(V)
Outline dimensions	261.0(w) x 198.0(H) x 5.0Max(D)

1.7.2   FL Inverter Board

The FL inverter board supplies a high frequency current to illuminate the LCD module FL.

Table 1-10 lists the FL inverter board specifications.

Table 1-10 FL inverter board specifications

Item	Specifications	
	G71C00011211	
Input	Voltage (V)	DC 5
Output	Voltage MAX (V)	750(MAX)
	Current MAX (mA)	6.0(MAX)

1.8　Power Supply

The power supply supplies 12 different voltages to the system board.

The power supply micro controller has the following functions.

1. Judges that the DC power supply (AC adapter) is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the battery icon, and DC IN icon.
4. Turns the battery charging system on and off and detects a fully charged battery.
5. Turns the power supply on and off.
6. Provides more accurate detection of a low battery.
7. Calculates the remaining battery capacity.
8. Controls the transmission of the status signal of the main battery.

Table 1-11 lists the power supply output specifications.

Table 1-11　Power supply output specifications(1/2)

Name	Voltage [V]	Use
PPV	0.748 - 1.468	CPU
1R2-P1V	1.2	GMCH-M
PTV	1.05	CPU,GMCH,ICH4-M
2R5-B2V	2.5	GMCH-M, DDR MEM
1R25-P1V	1.25	GMCH,DDR MEM
LAN-E3V	3.3	ICH4-M,82562ET
B3V	3.3	PC Card Cont (YEBISU3S),PC Card
P3V	3.3	CPU Temperature Sensor (ADM1032), Clock Generator (CK408), ICH4-M, TV Encoder, LCD, 1394, FWH, Mini PCI, Sound Codec (AD1981), SD Card, Modem
E5V	5	USB Port
B5V	5	PC Card
P5V	5	Touch PAD, FL Inverter, ODD, KB LED, Other LEDs, HDD, Mini PCI, Bluetooth, Cooling Fan
SND-P5V	5	AD1981, Sound Amplifier
15-EBV	10 - 15	Pull-up
1R8-C1V	1.8	1R5-C1V Power Circuit
1R8-P1V	1.8	CPU, GMCH, ICH4-M

Table 1-11 Power supply output specifications(2/2)

Name	Voltage [V]	Use
1R5-C1V	1.5	1R5-S1V Power circuit
1R5-S1V	1.5	ICH4-M
LAN1R5-E1V	1.5	ICH4-M, 82562ET
1R5-P1V	1.5	GMCH-M, ICH4-M
MCV	5	PSC
M5V	5	PS LEDs, Battery E2PROM
S5V	5	Pull-up
M3V	3.3	EC/KBC
S3V	3.3	ICH4-M
R3V	2.8-3.3	ICH4-M (RTC)

1.9　Batteries

The PC has the following two batteries.

- θ　Main battery
- θ　Real time clock (RTC) battery

Table 1-12 lists the specifications for these two batteries.

Table 1-12 Battery specifications

Battery Name		Battery Element	Output Voltage	Capacity
Main battery	G71C0000K410	Lithium ion	10.8 V	4,000 mAh
Real time clock (RTC) battery	GDM710000012	Lithium ion	3 V	17 mAh

1.9.1　Main Battery

The main battery is the primary power supply for the computer when the AC adapter is not connected. In resume (instant recovery) mode, the main battery maintains the current status of the computer.

1.9.2　Battery Charging Control

Battery charging is controlled by a power supply microprocessor. The power supply microprocessor controls power supply and detects a full charge when the AC adapter and battery are connected to the computer. The system charges the battery using quick charge or trickle charge.

θ   Quick Battery Charge

When the AC adapter is connected, normal charging is used while the system is turned on and quick charge is used while the system is turned off or in suspend mode. Table 1-13 shows the time required for charging battery.

Table 1-13   Time required for charges of battery

	Main battery Charging Time	**Second battery Charging Time**
Normal charge	About 3~12 hours	About 2.5~9 hours
Quick charge	About 2.5 hours	About 2.5 hours

Quick battery charge is stopped in the following cases.

     1. The main battery is fully charged.

     2. The main battery is removed.

     3. Main battery or AC adapter voltage is abnormal.

     4. Charging current is abnormal.

θ   Trickle charge

When the main battery is fully charged and the AC adapter is plugged in, the power supply microcontroller automatically switches from quick charge to trickle charge.

1.9.3   RTC Battery

The RTC battery provides the power supply to maintain the date, time, and other system information in memory. Table 1-14 lists the battery charging time and data preservation times.

Table 1-14   RTC battery charging time and data preservation time

Item		**Time**
Charging time	AC adapter or main battery in use (Power ON)	8 hours
Data preservation time (when fully charged)		About 30 days
Data preservation time (when stand by)		About 4 days

1.10 AC Adapter

The AC adapter is also used to charge the battery.

Table 1-15 lists the AC adapter specifications.

Table 1-15 AC adapter specifications

Parameter	Specification
	G71C0002S310
Input voltage	AC 90 to 264V
Input frequency	50Hz/60Hz
Input current	Less than 71W or 183VA
Output voltage	DC 15V
Output current	4.0A

Chapter 2

Troubleshooting Procedures

Chapter 2 Contents

Figures

Tables

2.1   Troubleshooting

Chapter 2 describes how to determine which Field Replaceable Unit (FRU) in the computer is causing the computer to malfunction. (The "FRU" means the replaceable unit in the field.) The FRUs covered are:

1. Power supply	9. Modem
2. System Board	10. LAN
3. 3.5"USB FDD	11. Sound
4. 2.5" HDD	12. SC card slot
5. Keyboard	13. Wireless LAN
6. Display	14. Bluetooth
7. Optical Drive	
8. Touch pad	

The Detailed replacement procedures are given in Chapter 4. Test Program operations are described in Chapter 3.

The following tools are necessary for implementing the Diagnostics procedures:
1. Diagnostics Disk (Test program for maintenance)
2. Phillips screwdrivers

Note: Be sure to use the PH point size "0" screwdriver complying with the ISO/DIS 8764-1:1996. Use, however, the PH point size "1" screwdriver for screws fixing the expansion memory slot cover and the keyboard.

3. Toshiba MS-DOS system FD
4. Work disk (for FDD testing)
5. Cleaning disk kit (for FDD head cleaning)
6. A set of tools for debug port test (test cable, test board, RS-232C cross cable, display, D port FD)
7. PC with a serial port (for displaying debug port test result)
8. Wraparound connector for PC card
9. Tester
10. External CRT
11. External USB Keyboard
12. External USB mouse
13. Headphone
14. Microphone
15. TOSHJIBA CD-ROM test disk (ZA1217P01/P000204190)
16. Toshiba-EMI DVD-ROM TEST DISK TSD-1
17. Music CD
18. CD-RW media (Recommended media: RICHO, MITHUBISHI x 4 type)
19. DVD-ROM (in the market)
20. RJ-11 connector checker LED (Recommended media:
21. LAN wraparound connector

2.2 Troubleshooting Flowchart

Use the flowchart in Figure 2-1 as a guide for determining which FRU malfunctions. Before going through the flowchart steps, check the following:

❑ Make sure that Toshiba Windows® XP is installed on the hard disk. Non-Toshiba operating systems can cause the computer malfunction.

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

❑ Make sure the USB FDD is empty.
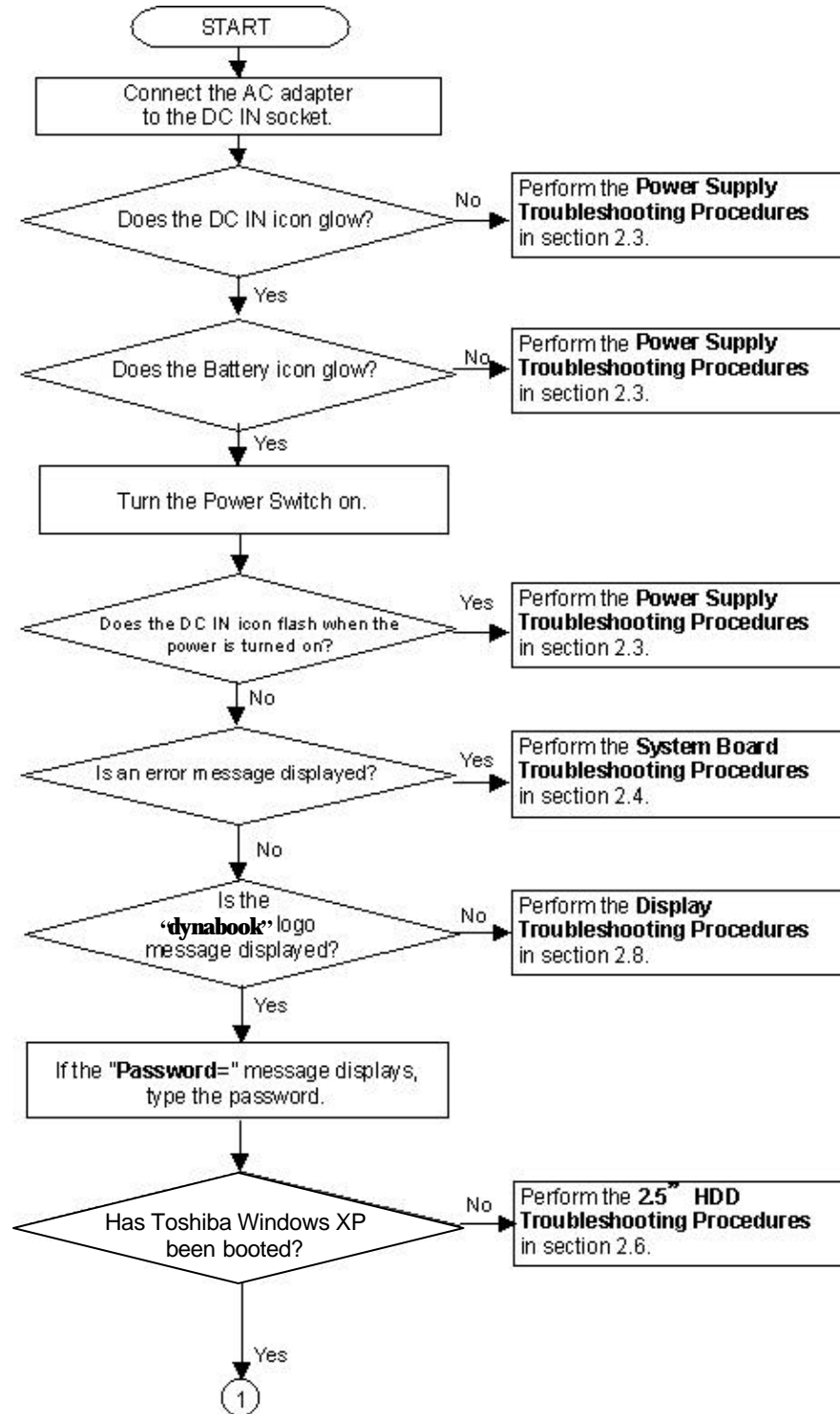
Figure 2-1 Troubleshooting flowchart (1/2)
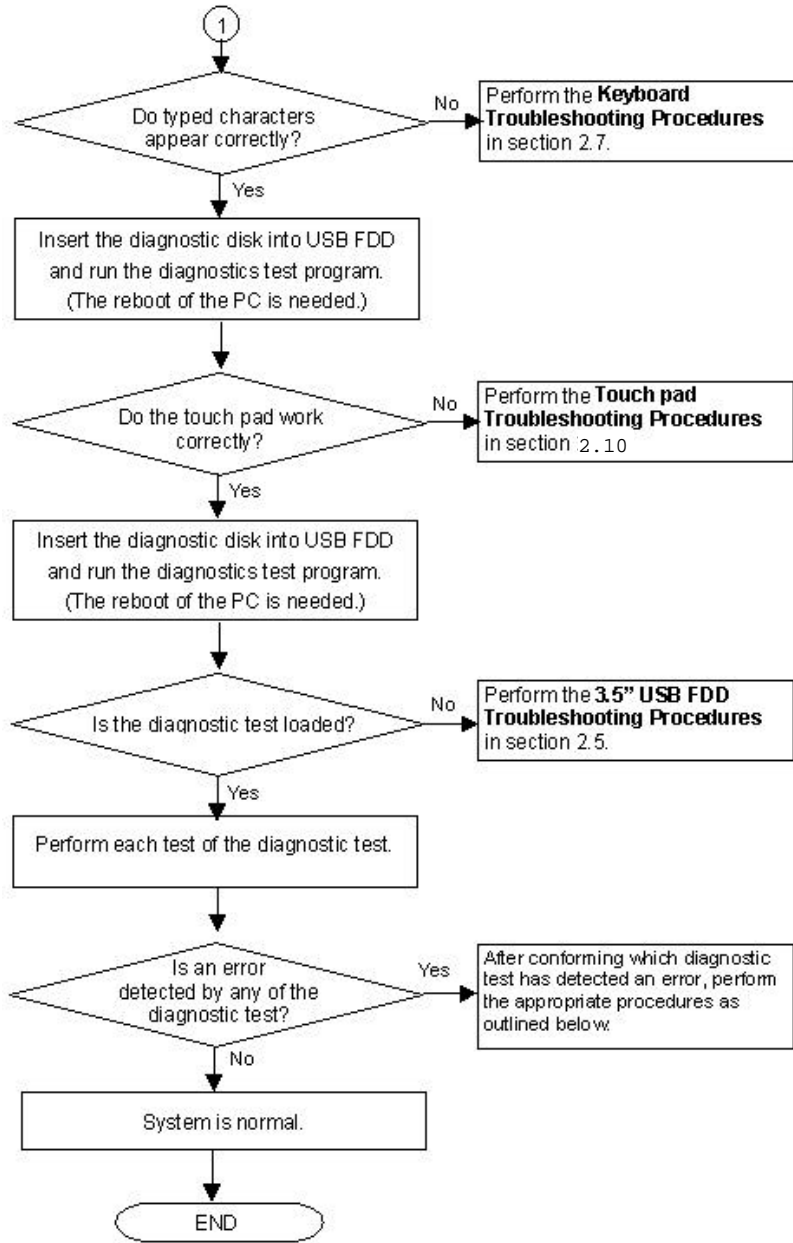
Figure 2-1 Troubleshooting flowchart (2/2)

If the diagnostics program cannot detect an error, the problem may be intermittent. The 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, ASYNC test, Real timer test, NDP test or expansion test, perform the System Board Troubleshooting Procedures in Section 2.4.

2. If an error is detected on the Floppy Disk test, perform the USB FDD Troubleshooting Procedures in Section 2.5.

3. If an error is detected on the Hard disk test, perform the HDD 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 Optical drive test, perform the Optical drive Troubleshooting Procedures in Section 2.9.

7. If an error is detected on the Touch pad test, perform the Touch pad Troubleshooting Procedures in Section 2.10.

8. If an error is detected on the Modem test, perform the Modem Troubleshooting Procedures in Section 2.11.

9. If an error is detected on the LAN test, perform the LAN Troubleshooting Procedures in Section 2.12.

10. If an error is detected on the Sound test, perform the Sound Troubleshooting Procedures in Section 2.13.

11. If an error is detected on the SD Card Slot test, perform the SD card Slot Troubleshooting Procedures in Section 2.14.

12. If an error is detected on the Wireless LAN test, perform the Wireless LAN Troubleshooting Procedures in Section 2.15.

13. If an error is detected on the Bluetooth test, perform the Bluetooth Troubleshooting Procedures in Section 2.16.

2.3 Power Supply Troubleshooting

The power supply controller 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 Supply Icon Check

Procedure 2:   Error Code Check

Procedure 3:   Connection Check

Procedure 4:   Quick Charge Check

Procedure 5:   Replacement Check

Procedure 1   Power Supply Icon Check

The following two icons indicate the power supply status:

❑ Battery icon

❑ DC IN icon

The power supply controller uses the power supply status with the Battery icon and the DC IN icon as listed in the tables below.

Table 2-1 Battery icon

Battery icon	Power supply status
Lights orange	Battery is charged and the external DC is input. It has no relation with ON/OFF of the system power.
Lights green	Battery is fully charged and the external DC is input. It has no relation with ON/OFF of the system power.
Blinks orange (even intervals)	The battery level is low while the system power is ON.
Flashes orange	The battery level is low and the power switch is pressed on in the battery driving.
Doesn't light	Any condition other than those above.

Table 2-2 DC IN icon

DC IN icon	Power supply status
Lights green	DC power is being supplied from the AC adapter.
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 orange. It shows an error code.

When icons are blinking, perform the following procedure.

1. Remove the battery pack and the AC adapter and cut off the power supply to the computer by force.

2. Re-attach the battery pack and the AC adapter.

If icons are still blinking after the operation above, check the followings:

    Check 1   If the DC IN icon blinks 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.

Caution: *Use a recommended AC adapter (G71C0001V410).*

Procedure 2   Error Code Check

If the power supply 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   On for half second

The error code begins with LSB (Least Significant bit)
Example: Error code 11h (Error codes are given in hexadecimal format.)
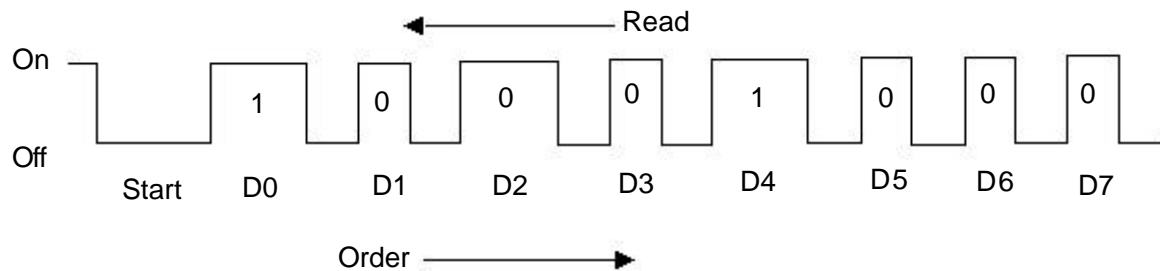
Check 1   Convert the DC IN icon blink pattern into the hexadecimal error code and
           compare it to the tables below. Then go to Check 2.

❑ DC power supply (AC adapter)

Error code	Meaning
10h	AC Adapter output voltage is over 16.5V.
11h	Commondock output voltage is over 16.5V.
12h	Current from the DC power supply is over 6.05A.
13h	Current from the DC power supply is over 0.5A when there is no load.
14h	Abnormal current has been sensed 0[A].

❑ Main Battery

Error code	Meaning
20h	Overvoltage is detected.
21h	Main battery charge current is over 6.05A.
22h	Main battery discharge current is over 0.5A when there is no load.
23h	Main battery charge current is over 3.1A when AC adapter is not connected.
24h	Abnormal current has been sensed 0[A].
25h	Main battery charge current is over 0.3A.

❑ Second Battery

Error code	Meaning
30h	Overvoltage is detected.
31h	Second battery charge current is over 6.05A.
32h	Second battery discharge current is over 0.5A when there is no load.
33h	Second battery charge current is over 3.1A when AC adapter is not connected.
34h	Abnormal current has been sensed 0[A].
35h	Second battery charge current is over 0.3A.

❑ S3V output

Error code	Meaning
40h	S3V voltage is 3.14V or less when the computer is powered on/off.
45h	S3V voltage is 3.14V or less when the computer is booting up. (CV support)

❑ 1R5-C1 output

Error code	Meaning
50h	1R5-C1 voltage is over 1.8V when the computer is powered on/off.
51h	1R5-C1 voltage is 1.275V or less when the computer is powered on.
52h	1R5-C1 voltage is 1.275V or less when the computer is booting up.
53h	1R5-C1 voltage is 1.275V or less while the computer is suspended.
54h	1R5-C1 voltage is abnormal during shutdown. (CV support)
55h	1R5-C1 voltage is 1.275V or less when the computer is booting up. (CV support)

❑ 1R8-C1 output

Error code	Meaning
60h	1R8-C1 voltage is over 2.16V when the computer is powered on/off.
61h	1R8-C1 voltage is 1.53V or less when the computer is powered on.
62h	1R8-C1 voltage is 1.53V or less when the computer is booting up.
63h	1R8-C1 voltage is 1.53V or less while the computer is suspended.
64h	1R8-C1 voltage is abnormal during shutdown. (CV support)
65h	1R8-C1 voltage is 1.53V or less at power-on. (CV support)

❑ PPV output

Error code	Meaning
70h	PPV voltage is over 1.80V when the computer is powered on/off.
71h	PPV voltage is 0.56V or less when the computer is powered on.
72h	PPV voltage is 0.56V or less when the computer is booting up.
73h	PPV voltage is 0.56V or more when the computer is powered off.

❑ PTV output (CH0)

Error code	Meaning
80h	PTV voltage is over 1.26V when the computer is powered on/off.
81h	PTV voltage is 0.89V or less when the computer is powered on.
82h	PTV voltage is 0.89V or less when the computer is booting up.
83h	PTV voltage is 0.89V or more when the computer is powered off.
84h	PTV voltage is 0.89V or less when the computer is suspended.

❑ E5V output (CH0)

Error code	Meaning
90h	E5V voltage is over 6.00V when the computer is powered on/off.
91h	E5V voltage is 4.50V or less when the computer is powered on.
92h	E5V voltage is 4.50V or less when the computer is booting up.
93h	E5V voltage is 4.50V or more when the computer is powered off.
94h	E5V voltage is 4.50V or less while the computer is suspended.

❑ E3V output (CH0)

Error code	Meaning
A0h	E3V voltage is over 3.96V when the computer is powered on/off.
A1h	E3V voltage is 2.81V or less when the computer is powered on.
A2h	E3V voltage is 2.81V or less when the computer is booting up.
A3h	E3V voltage is over 2.81V when the computer is powered off.
A4h	E3V voltage is 2.81V or less while the computer is suspended.

❑ 1R2-P1V output (CH1)

Error code	Meaning
B0h	1R2-P1V voltage is over 1.44V when the computer is powered on/off.
B1h	1R2-P1V voltage is 1.02V or less when the computer is powered on.
B2h	1R2-P1V voltage is 1.02V or less when the computer is booting up.
B3h	1R2-P1V voltage is 1.02V or more when the computer is powered off.
B4h	1R2-P1V voltage is 1.02V or less while the computer is suspended.

❑ PTV output (CH1)

Error code	Meaning
C0h	PTV voltage is over 1.26V when the computer is powered on/off.
C1h	PTV voltage is 0.89V or less when the computer is powered on.
C2h	PTV voltage is 0.89V or less when the computer is booting up.
C3h	PTV voltage is 0.89V or more when the computer is powered off.
C4h	PTV voltage is 0.89V or less while the computer is suspended.

❑ 1R25-P1V output (CH1)

Error code	Meaning
D0h	1R25-P1V voltage is over 1.50V when the computer is powered on/off.
D1h	1R25-P1V voltage is 1.063V or less when the computer is powered on.
D2h	1R25-P1V voltage is 1.063V or less when the computer is booting up.
D3h	1R25-P1V voltage is 1.063V or more when the computer is powered off.
D4h	1R25-P1V voltage is 1.063V or less while the computer is suspended.

Check 2   In the case of error code 10h or 12h:

     ❑ Make sure the AC adapter and AC power cord are firmly plugged into the DC IN 15 V socket and wall outlet. If the cables are connected correctly, go to the following step:

     ❑ Connect a new AC adapter and AC power cord. If the error still exists, go to Procedure 5.

Check 3   In the case of error code 21h:

     ❑ Go to Procedure 3.

Check 4   For any other errors, go to Procedure 5.

Procedure 3   Connection Check

The wiring diagram related to the power supply is shown below:
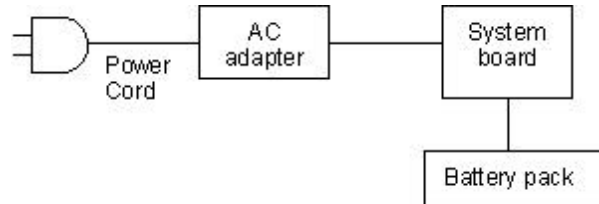
Any of the connectors may be disconnected. Perform starting from Check 1.

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

Check 2   Replace the AC adapter and the AC power cord with new ones.

   •   If the DC IN icon does not light, go to Procedure 5.
   •   If the battery icon does not light, 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 light, go to Procedure 4.

Procedure 4   Quick Charge Check

Check if the power supply controller charges the battery pack properly. Perform the following
procedures:

Check 1   Make sure the AC adapter is firmly plugged into the DC IN socket.

Check 2   Make sure the battery pack is properly installed. If the battery is properly installed,
              go to Check 3.

Check 3   The battery pack may be completely discharged. Wait a few minutes to charge the
              battery pack while connecting the battery pack and the AC adapter. If the battery
              pack is still not charged, go to Check 4.

Check 4   The battery's temperature is too high or low. Return the temperature to normal
              operating condition. If the battery pack is still not charged, go to Check 5.

Check 5   Replace the battery pack with a new one. If the battery pack is still not charged, go
              to Procedure 5.

Procedure 5   Replacement Check

The power is supplied to the system board by the AC adapter. If either the AC adapter or the system board was damaged, perform the following Checks.

To disassemble the computer, follow the steps described in Chapter 4.

Check 1   Replace the AC adapter with a new one. If the AC adapter is still not functioning properly, perform Check 2.

Check 2   Replace the system board with a new one.

2.4   System Board Troubleshooting

This section describes how to determine if the system board is defective. Start with Procedure 1 and continue with the other procedures as instructed. The procedures described in this section are:

        Procedure 1:   Message Check

        Procedure 2:   Debug port (D port) Check on Boot Mode

        Procedure 3:   Diagnostic Test Program Execution Check

        Procedure 4:   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 MS-DOS or Windows XP is properly loaded, go to Procedure 4.

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

If you press the **F1** key as the message instructs, the SETUP screen appears to set the system configuration. If any other error message is displayed, perform Check 2.

```
(a)*** Bad HDD type ***
   Check system.  Then press [F1] key ......
(b)*** Bad configuration ***
   Check system.  Then press [F1] key ......
(c)*** Bad memory size ***
   Check system.  Then press [F1] key ......
(d)*** Bad time function ***
   Check system.  Then press [F1] key ......
(e)*** Bad check sum (CMOS) ***
   Check system.  Then press [F1] key ......
(f)*** Bad check sum (ROM) ***
   Check system.  Then press [F1] key ......
(g)RTC battery is low or CMOS checksum is inconsistent
   Press [F1] key to set Date/Time
```

Check 2   If the following error message is displayed on the screen press any key as the message instructs.
The following error message appears when data stored in RAM under the resume function is lost because the battery has become discharged or the system board is damaged. Go to Procedure 3.

```
WARNING:  RESUME FAILURE.
PRESS ANY KEY TO CONTINUE.
```

If any other error message is displayed, perform Check 3.

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

           If one of the following error messages (1) through (17), (24) or (25) is displayed,
           go to Procedure 5.

           If error message (18) is displayed, go to the Keyboard Troubleshooting Procedures
           in Section 2.7.

           If error message (19), (20) or (21) is displayed, go to the 2.5" HDD
           Troubleshooting Procedures in Section 2.6.

           If error message (22) or (23) is displayed, go to the 3.5" USB 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   Debug Port (D port) Check on Boot Mode

Check the D port status by a debug port test. The tool for debug port test is shown below.
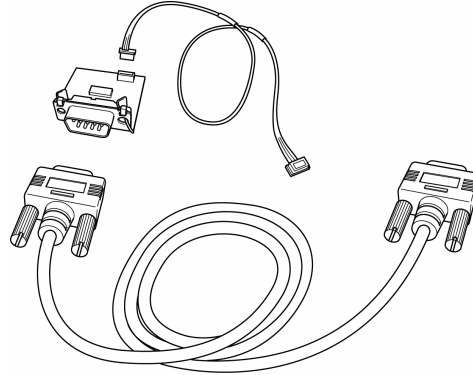
Figure 2-2 A set of tool for debug port test

The test procedures are follows:

1. Connect the debug test cable to the connector PJ325 of the system board. For disassembling to connect the test cable, refer to Chapter 4.
2. Connect the debug port test cable and RS-232C cross-cable to the test board.
3. Connect the RS-232C cross-cable to the PC that displays the results.
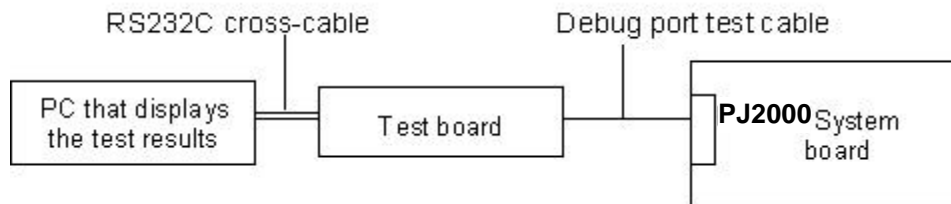
4. Boot the computer in MS-DOS mode.
5. Execute GETDPORT.COM in the text menu in CPU REAL mode. (Insert the FD for starting D port into FDD and input "FD starting drive:>dport".)
   The D port status is displayed in the following form:

6. When the D port status is FFFFh (normal status), go to Procedure 3.
7. When the D port status falls into any status in Table 2-3, execute Check 1.

Table 2-3 D port status (1/7)

D port status	Inspection items	Details
F000h	Start	Clearing a software reset bit
		Enabling address line A20
		Initializing Ali Initializing Intel North Bridge Setting LPC port Disabling AC'97 Modem/Audio Corresponding KBC Serial IRQ Setting of enabling PM timer
		Dummy-reading 3rd Bus date
		Initializing debug port
		Initializing the CH0 of a PIT
		Initializing flags determining whether BIOS is rewritten
		CHECK SUM CHECK Switching to protected mode Examining the checksum of BootBlock (skips when S3 returns), HLT at checksum error Examining the checksum of other data in a flash memory (skips when S3 returns)
F001h	Checking if EC/KBC firmware is to be rewritten	Checking if EC/KBC firmware is to be rewritten When is to be rewritten, goes to Rewriting BIOS routine. When S3 returns, moves the process to the System BIOS IRT side. Initializing a KBC Enabling KB
F002h	Checking whether BIOS rewrite is requested	Checking if BIOS is to be rewritten When rewriting by checksum error other than of BootBlock or a user is requested, goes to BIOS rewriting process.
F003h		Changing the process to the System BIOS IRT side
		Initializing specific for the system
		Selecting USB controller clock
		Initializing HW specific for model
		Initializing PIT channel 1 (Refresh interval→30μs)
		Initializing PIT, DMAC, PIC
		Enabling L1 Cache
		Clearing memory
		Moving to real mode and copying BIOS to RAM

Table 2-3 D port status (2/7)

D port status	Inspection items	Details
F005h		Saving scan code
		Setting TASK_1ms_TSC
F006h		Controlling fan
		Initializing sound items (for BEEP) Enabling system speaker Releasing mute Making the volume max.
		Key input Disabling USB once Beeping Waiting for key-input

		Reading CHGBIOSA.EXE/CHGFIRMA.EXE
		 Resetting FDC
		 Setting parameters for 2HD(1.44MB) and transporting rate
		 Setting parameters for 2DD(720KB) and transporting rate
		 Searching CHGBIOSA.EXE in the root directory
		  Calculating the start head and sector in the directory
		  Read one sector
		  Searching the entry "CHGBIOSA.EXE" / "CHGFIRMA.EXE"
		  Reading the EXE header of and "CHGBIOSA.EXE" / "CHGFIRMA.EXE" and execute them
		  When an error detected, goes to Key input.

(F003H)		Disabling cache
		Initializing H/W(before recognizing DRAM) Initializing chipset Initializing FLUTE
F100H		Initializing PIT channel 1(Refresh interval→30μs)
F101H	Checking the type and size of DRAM	Checking the type and size of DRAM (in Cold Boot) When DRAM size = 0, HLT.
	Testing of SM-RAM stack area	Testing of SM-RAM stack area When it can not be used for a stack , HLT.

Table 2-3 D port status (3/7)

D port status	Inspection items	Details
F102h	Checking and initializing CMOS	Configuring cache memory
		Enabling L1/L2 cache memory
		Testing CMOS for access (only in Cold Boot) When a error is detected, HLT.
		Checking the voltage of a CMOS backup battery
		Examining the checksum of CMOS
		Initializing data in CMOS (1)
		Setting up IRT status
		Storing the size of DRAM

F103h	Checking of resume error	Branch of resuming(only in Cold Boot)
		  When a CMOS error is detected, it does not branch.
		  When a resume status code is not set, it does not branch.
		  Checking of resume error
		    S3 return error
		    Resume error F17AH
		    Check sum check of SM-RAM Resume error F173H
		    Checking change of memory configuration
		      Resume error F173H
		    Check sum check of RAM area of System
		      BIOS Resume error F179H
		    Check sum check of PnP RAM Resume error F177H
		    Goes to resuming process.
		
		Resuming error process
		  Returning the CPU clock to Low
		  Disabling all SMI
		  Clearing resuming status
		  Returning to ROM
		  Assigning the area, C000h to EFFFh, to PCI (Disabling DRAM)
		  Setting a request for a resuming error
		
		Copying system BIOS from ROM to RAM

F104h	Checking the factor of WakeUp	Initializing SMRAM
		Checking the factor of WakeUp
		Changing SMRAM base and storing CPU state map for BIOS
		Enabling SMI only by ASMI

Table 2-3 D port status (4/7)

D port status	Inspection items	Details
F105h		Initializing and testing(only in Cold Boot) a PIT Setting a test pattern to the channel 0 of a PIT#0
		Checking whether the test pattern can be read.
		Initializing PIT channel 0 (Timer interrupt interval → 55ms)
		Initializing PIT channel 2 (Frequency for sound generator →664Hz)
		Testing the channel 1 of a PIT(checking whether the refresh signal is generated correctly in refreshing cycle of 30 μs) When a time-out, HLT.
		Testing the channel 2 of a PIT (checking whether the speaker gate operate correctly)
		Measuring CPU clock
		Enabling SMI other than of auto-off function
		Controlling battery discharging current (1CmA)
		Control of over current than rated current of AC adapter
		Processing of dividing for measuring time of IRT

		Initializing CPU
		  Updating micro-code
		  Checking of supporting Geyserville
		  Set the CPU clock to High
		  Setting Graphics Aperture Size

F106h	Checking the default settings of CMOS	Storing the memory configuration
		Reading EC version
		Updating the type of flash ROM
		Judging the country of destination
		Checking the default settings of CMOS Bad Battery, Bad CheckSum →default setting
		Initializing ACPI table
		Setting devices before initializing PCI bus AC'97 control
		Initializing information of thermal control
		Initializing a KBC
		Turning VGA display off and controlling reset
		Initializing sound function
		Getting the computer multiple box status
		Initializing HC and recognizing/initializing USB device connection

Table 2-3 D port status (5/7)

D port status	Inspection items	Details
F106h		Initializing a PCI
		Testing a PIC
		Checking whether to execute self-test (only in cold boot) (checking the space key and a printer wraparound connector)
		Initializing password
F107h		Initializing PCI bus
		Initializing information of LAN
		Checking the factor of WakeUp
F108h		Running a task waiting for the end of INIT_PCI
		Initializing the data in CMOS
		Initializing PnP
		Setting up the setup parameters
		Waiting for the end of multiple box states check
		Setting up the hardware parameters based on resources
F109h		Running a task waiting for the completion of generating PnP resource
		Serial interrupt control
		Initializing PnP-related H/W
		Initializing PC Card Slots
		PCI auto configuration
		Creating a work area for auto configuration
		Getting PCI IRQ
		Storing the results of VGA configuration
F10Ah		Running a task waiting for completion of PCI_CONFIGURATION
		Initializing H/W required after PCI configuration
		Starting an HDD initialization sequence
		Enabling power off
		Generating output codes

Table 2-3 D port status (6/7)

D port status	Inspection items	Details
F10Bh	Checking the first 64KB of memory	Checking the first 64KB of memory
F10Ch		Initializing interrupt vectors
F10Dh		Initializing a NDP
F10Eh		Setting up system Storing CMOS error information in SMRAM Initializing timer Initializing a buffer for power saving Initializing an EC, and reading battery information
		Updating system BIOS (model name, and EDID of the LCD)
F10Fh		INIT_DISPLAY (Waiting for the completion of VGA initializing ,Initializing VGA BIOS)
F110h		DISP_LOGO (Displaying a logo on the screen
F111h	Checking system memory	SYS_MEM_CHECK (Checking system memory)
F112h	Checking an expansion memory	EXT_MEM_CHECK (Checking an exceptional in a protect mode)
F113h		INIT_SYS_MEM (Initializing conventional memory)
F114h		Error in check of EXT_MEM_CHECK
F115h	Checking DMA pages	CHK_DMA_ PAGE (Checking DMA pages)
F116h	Checking a DMAC	CHECK_DMAC (Checking a DMAC)
F117h		INIT_DMAC (Initializing DMAC)
F118h	Checking password	BOOT_PASSWORD (Checking password) Waiting for the end of the HDD initialization Checking key-in pressed during the IRT Prioritizing ATA Loading BM Initializing BM Checking key-in pressed during the IRT Entering password Canceling BM

Table 2-3 D port status (7/7)

D port status	Inspection items	Details
F11Bh	Checking optional I/O ROM	EX_IO_ROM_CHECK (Checking optional I/O ROM)

F11Ch	Final setting up prior to boot-up	PRE_BOOT SETUP
		  Storing the value of 40:00h (for saving/restoring SIO)
		  Setting up the address of font data for resuming password
		  Setting up the parameters for character repeat on a USB keyboard
		  Getting keys finally pressed during the IRT
		  Storing shadow RAM size
		  Updating system resources information prior to boot-up
		  Renewing memory mapping data for INT15h E820h function
		  Updating a table for DMI
		  Waiting for the completion of initializing AC-Link
		  Copying an ACPI table to the top of an expansion memory
		  Waiting for the end of writing PSC version on BIOS
		  Waiting for the end of setting clock generator
		    When an error is detected, halts in F11DH.
		  Waiting for the end of serial port initialization
		  Canceling NMI mask
		  Examining the checksum of TIT
		  Clearing IRT running flag for runtime
		  Update checksum for runtime
		  Branching to hibernation
		  Initializing Bluetooth
		  Checking for targeted maintenance card
		  Disabling a PC Card that is not being used
		  Setting WAKEUP status data for ACPI
		  Initializing HW right before booting and waiting for the completion
		    Reporting the DVI connection conditions to VGA BIOS
		    Setting up battery safe mode
		    Setting up date
		    Waiting for the end of Bluetooth initialization
		    Updating DMI Wakeup factor and SM-BIOS structure table
		    Waiting for the end of AC-Link initialization
		    Cache control
		    Updating parameter block A
		    Setting up the clock speed of the CPU to the appointed value by the Setup
		    Waiting for the motor off of a disabled HDD
		    Concluding FDD information
		    Clearing power button status
		    Enabling the power button
		    Countermeasure against chipset failure

Check 1   If the D port status error code F11Ah is displayed, go to the 3.5" USB FDD
            Troubleshooting Procedures in Section 2.5 or the 2.5" HDD Troubleshooting
            Procedures in Section 2.6.

Check 2   If any other D port status error code is displayed, perform Procedure 3.

D port error statuses are following:

Error code	Contents
F160h	Timer CH2 error
F161h	PIT error
F162h	PIC #1 error
F163h	PIC #2 error
F11Eh	Clock generator setting error

Procedure 3   Diagnostic Test Program Execution Check

Execute the following tests from the Diagnostic Test Menu. These tests check the system board and I/O unit. Refer to Chapter 3, *Tests and Diagnostic,* for more information on how to perform these tests.

1. System test
2. Memory test
3. Keyboard test
4. Display test
5. USB Floppy Disk test
6. Hard Disk test
7. Real Timer test
8. NDP test
9. Expansion test
10. CD-ROM/DVD-ROM
11. Wireless LAN test
12. Sound/LAN/Modem test
13. IEEE 1394
14. Bluetooth test

If an error is detected during these tests, go to Procedure 4.

Procedure 4   Replacement Check

I/O units or the system board may be damaged. Replace the I/O units or disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.5   USB 3.5" FDD Troubleshooting

This section describes how to determine if the USB 3.5" FDD is functioning properly. Perform the steps below starting with Procedure 1 and continuing 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.

Insert the Diagnostics Disk in the floppy disk drive of the computer, turn on the computer and run the test. And then clean the FDD heads using the cleaning kit. If the FDD still does not function properly after cleaning, go to Procedure 2.

Detailed operation is given in Chapter 3, *Tests and Diagnostics*.

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 FDD of the computer, turn on the computer and run the test. Refer to Chapter 3, *Tests and Diagnostics,* for more information about the diagnostics test procedures.

Make sure the floppy disk is formatted correctly and that the write protect tab is disabled. Floppy disk drive test error codes and their status names are listed in Table 2-4. If any other errors occur while executing the FDD diagnostics test, go to Check 1.

Table 2-4 FDD error code and status

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

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

```
Write protected
```

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

Procedure 3   Connector Check and Replacement Check

The USB FDD connector may be disconnected from the system board. Check visually that the connector is connected firmly.

Check 1   Make sure the USB FDD cable is firmly connected to the PJ4700 or PJ4701 of the system board.

```
                                      ┌──────────────────────┐
                                      │    System board      │
         ┌─────────────┐              │ ┌                    │
         │   USB FDD   │──────────────│ │ PJ4700 or PJ4701   │
         │             │              │ └                    │
         └─────────────┘              └──────────────────────┘
```
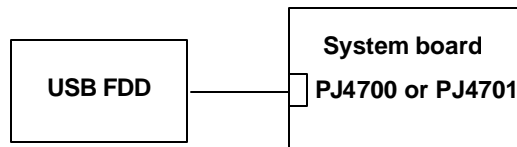
If any of the connections are loose, reconnect firmly and repeat Procedure 2. If there is still an error, go to Check 2.

Check 2   The USB FDD may be defective or damaged. Replace it with a new one. If the FDD is still not functioning properly, perform Check 3.

Check 3   Replace the system board with a new one following the steps in Chapter 4, *Replacement Procedures*.

2.6   2.5" HDD Troubleshooting

This section describes how to determine if the 2.5" HDD is functioning properly. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

        Procedure 1:   Partition Check

        Procedure 2:   Message Check

        Procedure 3:   Format Check

        Procedure 4:   Diagnostic Test Program Execution Check

        Procedure 5:   Connector Check and Replacement Check

Caution: *The contents of the 2.5" hard disk will be erased when the 2.5" HDD troubleshooting procedures are executed. Transfer the contents of the hard disk to floppy disks or other storage drive(s). For the backup, refer to the User's Manual.*

Procedure 1   Partition Check

Insert the Toshiba MS-DOS system disk and start the computer. 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 in the Display Partition Information, go to Check 3. If drive C is not listed, return to the FDISK menu and choose the option to create a DOS partition or a logical DOS drive on drive C. 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 go to Procedure 2.

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

Procedure 2   Message Check

When the power is turned on, the system performs the Initial Reliability Test (IRT) installed in the BIOS ROM. When the test detects an error, an error message is displayed on the screen.

Make sure of no floppy disk in the FDD. Turn on the computer and check the message on the screen. When an OS starts from the 2.5" HDD, go to Procedure 3. Otherwise, start with Check 1 below and perform the other checks as instructed.

Check 1   If any of the following messages appear, go to Procedure 3. If the following messages do not appear, perform Check 2.

> HDC ERROR
>
>   or
>
> HDD #X ERROR (After 5 seconds this message will disappear.)

Check 2   If either of the following messages appears, go to 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 when ready
```

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

Check 4   Using the SYS command of the MS-DOS, transfer the system to the 2.5" HDD. If the system is not transferred, go to Procedure 3. Refer to the MS-DOS Manual for detailed operation.

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

> System Transferred

If an error message appears on the display, perform Check 5.

Check 5   The 2.5" HDD and the connector of the system board may be disconnected (Refer to the steps described in Chapter 4, *Replacement Procedures* for disassembling.). Insert the connectors firmly. If they are firmly connected, go to Procedure 3.

Procedure 3   Format Check

The computer's 2.5" HDD is formatted using the MS-DOS FORMAT program or the physical format program of the test program. To format the 2.5" HDD, start with Check 1 below and perform the other steps as required.

Refer to the MS-DOS Manual for the operation of MS-DOS. For the format by the test program, refer to the Chapter 3.

Check 1   Format the 2.5" HDD using MS-DOS FORMAT command. Type as **FORMAT C:/S/U**.

        If the 2.5" HDD can not be formatted, perform Check 2.

Check 2   Using the MS-DOS FDISK command, set the 2.5" HDD partition. If the partition is not set, go to Check 3. If it is set, format the 2.5" HDD using MS-DOS FORMAT command.

Check 3   Using the Diagnostic Disk, format the 2.5" HDD with a format option (physical format). If the 2.5" HDD is formatted, set the 2.5" HDD partition using MS-DOS FDISK command.

        If you cannot format the 2.5" 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. The error codes and statuses are described in Table 2-5. If an error code is not displayed but the problem still exists, go to Procedure 5.

Table 2-5 2.5" HDD error code and status

Code	Status
01h	Bad command
02h	Address mark not found
04h	Record not found
05h	HDC not reset
07h	Drive not initialized
08h	HDC overrun error (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
DAh	No HDD

Procedure 5   Connector Check and Replacement Check

The HDD is connected to the connector PJ1800 of the system board. The connecting portion may be disconnected. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures* and perform the following checks to check the connecting portion:

Check 1   Make sure the HDD is firmly connected to the system board.

```
                          ┌──────────────────────┐
                          │    System Board       │
   ┌───────────┐          │   PJ1800              │
   │   HDD     │──────────│                       │
   └───────────┘          │                       │
                          └──────────────────────┘
```
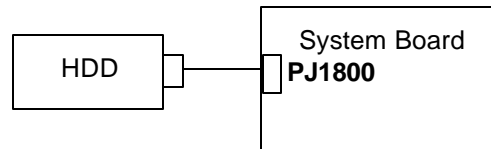
If connection is loose, reconnect firmly and repeat Procedure 4. If there is still an error, go to Check 2.

Check 2   The 2.5" HDD may be damaged. Replace it with a new one and check the operation. If the problem still exists, perform Check 3.

Check 3   The system board may be damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedures*.

2.7 Keyboard Troubleshooting

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

> Procedure 1: Diagnostic Test Program Execution Check
>
> Procedure 2: Connector Check 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 Check and Replacement Check

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

Check 1   Make sure the keyboard cable is firmly connected to the system board.
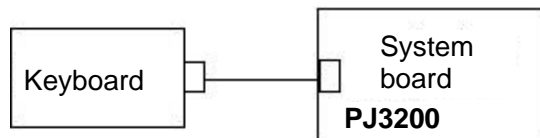
> If the connection is loose, reconnect firmly and repeat Procedure 1. If there is still an error, go to Check 2.

Check 2   The keyboard may be damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedures*. If the problem still exists, perform Check 3.

Check 3   The system board may be damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedures*.

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: Diagnostic Test Program Execution Check

Procedure 2: Connector and Cable Check

Procedure 3: Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

The Display Test program is stored on the Diagnostics disk. 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.

This program checks the display controller on the system board. If an error is detected, go to Procedure 3.

Procedure 2   Connector and Cable Check

The LCD Module is connected to the system board by an LCD/FL cable. The FL inverter board is also connected to the system board by an LCD/FL cable. The connectors may be disconnected from the system board or may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*.

If the connection is loose, reconnect firmly and restart the computer. If there is still an error, go to Procedure 3.
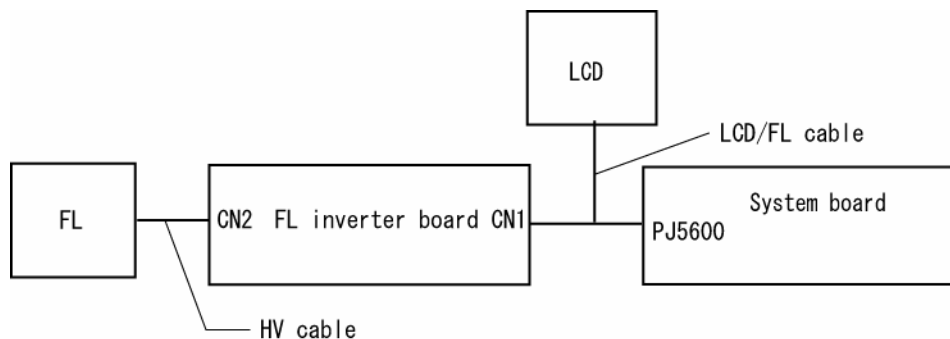
Procedure 3   Replacement Check

The display unit has a FL inverter board, Display module, System board, LCD harness and Display ON/OFF sensor. Any of the components may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures,* then perform the following checks:

(1) If characters or graphics are not displayed on the internal display, perform Check 1.

(2) If characters are displayed on the internal display but the display is not normal, perform Check 2.

(3) If characters are displayed on the internal display but the display is dark (the back-light does not light), perform Check 5.

Check 1   Open and close the display cover to check the display ON/OFF sensor. If it does not work, the display ON/OFF sensor may be damaged. Remove the display ON/OFF sensor and repeat Procedure 4. If there is still an error, go to Check 2.

Check 2   The LCD harness may be damaged. Replace the damaged harness with a new one and repeat Procedure 4. If there is still an error, go to Check 3.

Check 3   The display module may be damaged. Replace it with a new one and repeat Procedure 4. If there is still an error, go to Check 4.

Check 4   The FL inverter board may be damaged. Replace it with a new one and repeat Procedure 4. If there is still an error, go to Check 5.

Check 5   The FL may be damaged. Replace it with a new one and repeat Procedure 4. If there is still an error, go to Check 6.

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

2.9   Optical drive Troubleshooting

To check if the optical drive is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

      Procedure 1:   Diagnostic Test Program Execution Check

      Procedure 2:   Connector Check and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

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

Prepare the tools before the test. (Refer to tools for implementing the Diagnostics procedures on page 2-1.)

If any error is detected by the test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The optical drive is connected to the system board by the connector. The connector may be disconnected from the system board or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   Make sure the following connector has been firmly connected to the optical drive and the system board.

```
+-------------------+         +---------------------------+
|                   |         |  System board             |
|  Optical drive    |---------|  PJ1801                    |
|                   |         |                           |
+-------------------+         +---------------------------+
```
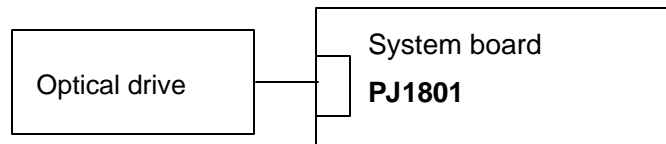
      If the connection is loose, reconnect it firmly and return to Procedure 2. If there is still an error, perform Check 2.

Check 2   The optical drive may be faulty. Replace the optical drive with a new one following the steps in Chapter 4. If the optical drive is still not functioning properly, perform Check 3.

Check 3   The system board may be faulty. Replace it with new one following the instructions in Chapter 4.

2.10 Touch Pad Troubleshooting

To determine whether the Touch Pad is faulty or not, perform the following procedures:

         Procedure 1:   Diagnostic Test Program Execution Check

         Procedure 2:   Connector Check and Replacement Check

         Procedure 3:   Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

Execute the keyboard test program, or maintenance test program, because the pointing device test program is a component of the keyboard test program. For the operating procedure, see Chapter 3.

If any error is detected, perform Procedure 2. The pointing device is operating normally if no error is detected.

Procedure 2   Connector Check and Replacement Check

The touch pad is connected to the system board with a flexible cable. This cable may have come off the connector or the connector may have come off the system board. Disassemble the computer and check the cable connections. See Chapter 4 for the disassembly procedure. If the connector has come off, connect firmly and make sure the operation. If there is still an error, go to Procedure 3.

```
                                              ┌─────────────────────────┐
                                              │     System Board        │
           ┌──────────────────────┐          ┌┤                         │
           │      Touch Pad        ├──────────┤│  PJ3201                 │
           │                       │          └┤                         │
           └──────────────────────┘           │                         │
                                              └─────────────────────────┘
```
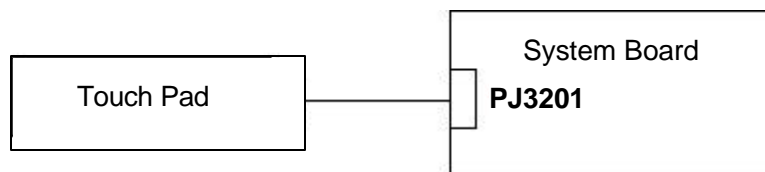
Procedure 3   Replacement Check

The touch pad may be damaged. Replace the touch pad.

2.11 Modem Troubleshooting

To check if the modem is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

> Procedure 1: Diagnostic Test Program Execution Check
>
> Procedure 2: Connector Check and Replacement Check

### Procedure 1   Diagnostic Test Program Execution Check

Execute the Modem test program available as part of the maintenance test program. This program checks the modem. See Chapter 3 for information on how to perform the test.

If any error is detected by the test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The Modem jack is connected to the MDC board and MDC board is connected to the system board. If the modem malfunctions, these connections may be bad or the MDC or system board might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   Make sure the MDC is firmly connected to the PJ3000 on System board.
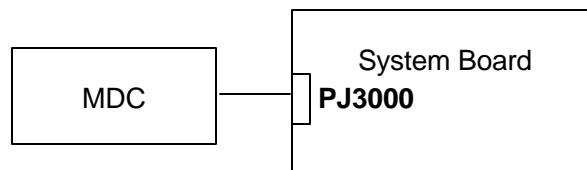
> If any connector is disconnected, connect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2   The MDC harness may be faulty. Replace it with a new one. If the modem is not still working properly, perform Check 3.

Check 3   The MDC may be faulty. Replace it with a new one following the steps in Chapter 4. If the modem is not still working properly, perform Check 4.

Check 4   The system board may be faulty. Replace it with a new one following the instructions in Chapter 4.

2.12 LAN Troubleshooting

To check if the computer's LAN is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

> Procedure 1:   Diagnostic Test Program Execution Check
>
> Procedure 2:   Connector Check and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

To check the LAN function, execute the LAN test program subtest 03 (LAN loop-back test). See Chapter 3 for information on how to perform the test.

If any error is detected by the test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The LAN function is installed on the system board. The modem jack is connected to the system board by the cable. If the LAN malfunctions, the connection between the modem and the system board is bad or the system board might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1   Check if the LAN jack cable is connected firmly to the connector PJ4100 of the system board.
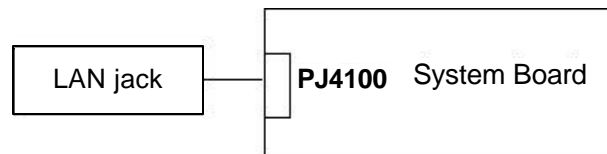
> If the LAN jack is loose or disconnected, connect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2   The modem jack may be defective. Replace the modem jack with a new one. If there is still an error, perform Check 3.

Check 3   The system board may be faulty. Replace the System board following the steps described in Chapter 4.

2.13 Sound Troubleshooting

To check if the sound function is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

        Procedure 1:   Diagnostic Test Program Execution Check

        Procedure 2:   Connector Check

        Procedure 3:   Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

Execute the Sound test program available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.

If any error is detected by the test, go to Procedure 2

Procedure 2   Connector Check

The speaker, external microphone, internal microphone and headphone are connected to the connector board shown in the following figure.
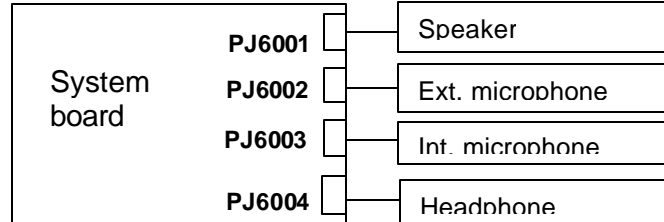
These connectors may have come off. Disassemble the computer and check the connections.

Execute Check 1 if the speaker or the internal microphone is not working properly.

Go to Check 2 if the external microphone and the headphone is not working properly.

Check 1   If the speaker or internal microphone is not working properly, each cable may be disconnected. Make sure the speaker cable is connected to the PJ6001 or the internal microphone cable to the PJ 6003 on the system board. If there is still an error, perform Procedure 3.

Check 2   If the external microphone or the headphone is not working properly, each cable may be disconnected. Make sure the external microphone cable is connected the PJ6002 or the headphone to the PJ 6004 on the system board. If there is still an error, perform Procedure 3.

Procedure 3   Replacement Check

Check 1   If the speaker or internal microphone is not working properly, it may be faulty.
Replace it with a new one following the step in Chapter 4. If they are still not
working properly, go to Check 3.

Check 2   If the external microphone or the headphone is not working properly, the system
board may be faulty. Replace it with a new one following the step in Chapter 4.

2.14 SD Card Slot Troubleshooting

To check if the SD card/Smart Media slot is good or no good, follow the troubleshooting procedures below as instructed.

Procedure 1: Check on Windows XP

Procedure 2: Connector/Replacement Check

Procedure 1   Check on Windows XP

Insert the SD card into the slot. Check if the installed Windows recognizes automatically the SD card and the data in the SD card can be read.

If the card is not recognized or data are not read, go to Procedure 2.

Procedure 2   Connector/Replacement Check

The SD card is connected to the connector PJ2101 of the connector board.

```
                              ┌─────────────────────┐
                              │   System board      │
┌──────────────┐             ┌┤  PJ2101             │
│   SD card     │────────────┘│                     │
└──────────────┘              │                     │
                              └─────────────────────┘
```
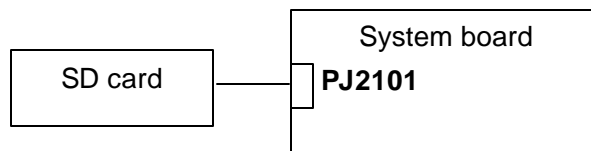
Check 1   The SD card and the system board may be disconnected. Make sure the SD card is firmly inserted to the PJ2101 of the system board. If the SD card is still not functioning properly, perform Check 2.

Check 2   The SD card may be faulty. Replace it with a new one following the step in Chapter 4. If the problem continues, perform Check 3.

Check 3   The system board may be faulty. Replace it with a new one following the step in Chapter 4.

2.15 Wireless LAN Troubleshooting

To check if the Wireless LAN is good or no good, follow the troubleshooting procedures below as instructed.

> Procedure 1:   Transmitting-Receiving Check
>
> Procedure 2:   Antenna Connection Check
>
> Procedure 3:   Antenna Capability Check
>
> Procedure 4:   Replacement Check

Procedure 1   Transmitting-Receiving Check

Make sure the wireless communication switch on the computer is turned ON. If it is not, turn ON.

Check 1   Execute test program for the wireless LAN function to check the transmitting-receiving function of the wireless LAN. You will need a second computer that can communicate by the wireless LAN.

If the computer passes the test, the function is correctly working.

If the computer does not pass the test, perform Procedure 2.

Procedure 2   Antenna Connection Check

The wireless LAN function wiring diagram is shown below:
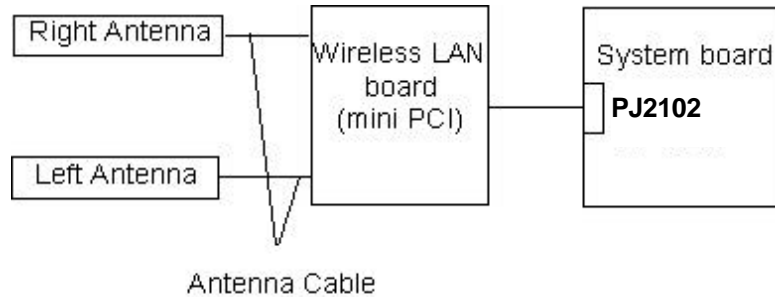
Any of the connections may be disconnected. Disassemble the computer following the steps described in Chapter 4, perform the following checks:

Check 1   The wireless LAN board and the system board may be disconnected. Make sure the wireless LAN board is firmly connected to the PJ2101 of the system board.

   If the connector is disconnected, connect firmly and return to Procedure 1. If there is still an error, go to Check 2.

Check 2   Make sure the wireless LAN antennas (black and white) are firmly connected to the Wireless board. If the antennas are disconnected, connect firmly then return to Procedure 1. If there is still an error, perform Procedure 3.

Procedure 3   Antenna Capability Check

Use an antenna test cable to check the antennas' connection. Follow the steps below.

Any of the connections may be disconnected. Disassemble the computer following the steps described in Chapter 4, perform the following checks:

1. Disassemble the computer and disconnect the wireless LAN antennas (white and black) from the wireless LAN board. Refer to Chapter 4, *Replacement Procedures*, for detailed steps of disassembling.

2. Connect the tester set up for impedance measurement to the antenna jig. Measure the white antenna's resistance.

3. Determine the resistance. The antenna passes the test when the resistance is less than 5Ω. If it is more than 5Ω, the antenna is faulty.

4. Measure the black antenna's resistance. Check if there is faulty.
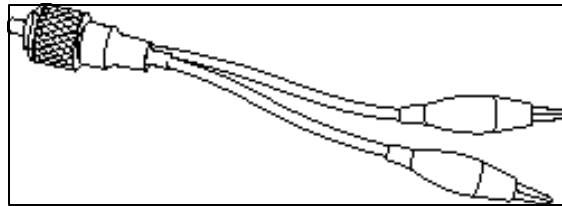
Figure 2-3 Antenna Test jig

Measurement Value	Pass/fail	Comment
Less than 5Ω	Pass	Include cable loss
More than 5Ω	Fail	The digital tester shows 0L ,etc. if there is a broken wire.

> *Note:* 1. *The resistances determined with the steps above may not be st able according to the length of the antenna. The impedance of the antenna itself is about 0.5 to 0.8 ohm.*
> 2. *The above steps cannot accurately determine the impedance of the antenna. Use an LC meter for a precise measure of impedance.*

If each wireless antenna passes the above test, return the Wireless LAN module back, then perform Procedure 1.

If the wireless LAN has still an error, go to Procedure 4.

Procedure 4   Replacement Check

Check if the wireless LAN board, the connector board and the system board are connected properly. Any of these components may be damaged. Disassemble the computer following the steps described in Chapter 4 and replace the board with a new one.

Check 1   The wireless LAN board may be defective or damaged. Disassemble the computer following the steps described in Chapter 4 and replace the board with a new one. If there is still an error go to Check 2.

Check 2   The connector board may be defective or damaged. Disassemble the computer following the steps described in Chapter 4 and replace the board with a new one. If there is still an error go to Check 3.

Check 3   The system board may be defective or damaged. Disassemble the computer following the steps described in Chapter 4 and replace the board with a new one.

2.16 Bluetooth Troubleshooting

This section describes how to determine if the computer's Bluetooth is functioning properly. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1:   Transmitting-Receiving Check

Procedure 2:   Antennas' Connection Check

Procedure 3:   Antenna Check

Procedure 4:   Replacement Check

Procedure 1   Transmitting-Receiving Check

Make sure the wireless switch on the left side of the computer is turned ON. If it is not, slide the switch toward the back of the computer to turn it on.

Check 1   Execute test program IMCSPC73.EXE to check the BD_ADDR of the Bluetooth. Perform the test following the instructions described in Chapter 3, Bluetooth Test Program (IMCSPC73.EXE).
If the computer passes the test, the function is correctly working. If the computer does not pass the test, the Bluetooth board may be disconnected or damaged. Make sure the connector on the Bluetooth board is firmly connected to PJ3002 on the system board. Moreover, perform the test program IMCSPC73.EXE again. If the computer still does not pass the test, go to check 2.

Check 2   Execute test program IMCSPC53.EXE to check the transmitting-receiving function of the Bluetooth. You will need a second computer that can communicate by the Bluetooth. Perform the test following the instructions described in Chapter 3, Bluetooth Test Program (IMCSPC53.EXE).
If the computer passes the test, the function is correctly working.
If the computer does not pass the test, go to check 3.

Check 3   The Bluetooth board may be defective or damaged. Replace it with a new one. Then perform the test program again.
If the computer still does not pass the test, go to Procedure 2.

Procedure 2   Antennas' Connection Check

The Bluetooth function wiring diagram is shown below:
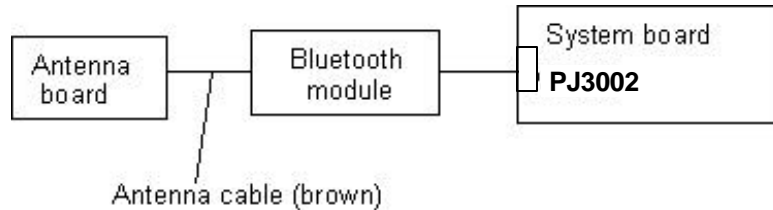
Any of the connections may be disconnected. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks:

Check 1   Make sure the wireless communication switch is "On".

If the switch is "Off", turn it "On". If the Bluetooth module is still not functioning properly, perform Check 2.

Check 2   Make sure the Bluetooth module is firmly connected to PJ3002 on the system board.

If the connector is disconnected, connect it firmly and perform Procedure 1. If the Bluetooth module is still not functioning properly, perform Check 3.

Check 3   Make sure the Bluetooth antenna cable (brown) is firmly connected to the Bluetooth module.

If the Bluetooth antenna cable is disconnected, connect it firmly and perform Procedure 1. If the Bluetooth function is still not functioning properly, go to Procedure 3.

Procedure 3   Antenna Check

Check 1   Use an antenna test cable to check the antennas' connection. Follow the steps
           below:

   1. Disassemble the computer and disconnect the Bluetooth antenna cable
      connected to the Bluetooth module. Refer to Chapter 4, *Replacement
      Procedures*, for detailed steps of disassembling.

   2. Connect the end of the antenna test cable to the multimeter.

   3. Connect the Bluetooth antenna cable to the antenna test cable. One clip is
      connected to the end of the Bluetooth antenna cable. The other is connected to
      the opposite side of the Bluetooth antenna cable.

   4. Determine the resistance. The cable passes the test when the resistance is less
      than 5Ω. If it is more than 5Ω, the Bluetooth antenna cable fails the test.
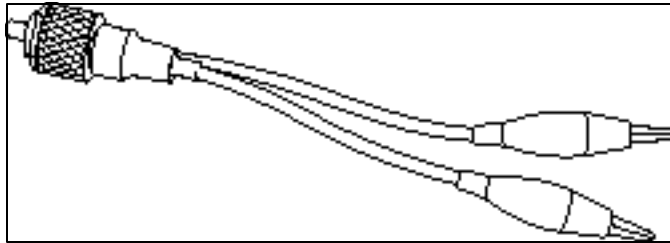
Figure 2-4 Antenna Test jig

*Note: 1. The resistances determined with the steps above may not be stable according to
         the length of the antenna. The impedance of the antenna itself is about 0.5 to 0.8
         ohm.
      2. The above steps cannot accurately determine the impedance of the antenna. Use
         a LC meter for a precise measure of impedance.*

           If the Bluetooth antenna cable pass the test, connect it to the Bluetooth module
           and cover the slot, then perform Procedure 1.

           If the Bluetooth antenna cable does not pass the test, go to Procedure 4.

Procedure 4   Replacement Check

Check 1   The Bluetooth module may be defective or damaged. Replace the Bluetooth
           module with a new one following the steps in Chapter 4, Replacement Procedures.
           If the Bluetooth is still not functioning properly, perform Check 2.

Check 2   The system board may be defective or damaged. Replace the system board with a
           new one following the steps in Chapter 4, Replacement Procedures.

Chapter 3

Tests and Diagnostics

Chapter 3   Contents

Tables

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. They are grouped into the Service Program Modules and the Test Program Modules. The Diagnostic Test consists of 10 programs. Wireless LAN test, Sound/LAN/modem test, Bluetooth test and IEEE1394 test are also supported.

> *Note:* *To start the diagnostics, follow these steps:*
>   *1. Check all cables for loose connections.*
>   *2. Exit any application and close Windows.*

The DIAGNOSTIC MENU consists of the following 7 test programs.

- ❑ DIAGNOSTIC TEST
- ❑ HEAD CLEANING
- ❑ LOG UTILITIES
- ❑ RUNNING TEST
- ❑ FDD UTILITIES
- ❑ SYSTEM CONFIGURATION
- ❑ SETUP

The DIAGNOSTIC TEST MENU contains the following 10 functional tests:

- ❑ SYSTEM TEST
- ❑ MEMORY TEST
- ❑ KEYBOARD TEST
- ❑ DISPLAY TEST
- ❑ FLOPPY DISK TEST
- ❑ HARD DISK TEST
- ❑ REAL TIMER TEST
- ❑ NDP TEST
- ❑ EXPANSION TEST
- ❑ CD-ROM/DVD-ROM

Other test programs are as follows.
- ❑ WIRELESS LAN TEST
- ❑ SOUND/LAN/MODEM TEST
- ❑ IEEE1394 TEST
- ❑ BLUETOOTH TEST

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

- ❑ The Diagnostics Disk (all tests, 5 disks (T&D, Sound/LAN/modem, Wireless LAN, Bluetooth and IEEE1394))
- ❑ A formatted working disk (Floppy disk test)
- ❑ A cleaning kit to clean the floppy disk drive heads (FDD Head Cleaning)
- ❑ A RS-232C wraparound connector (ASYNC test)
- ❑ A PC card wraparound connector (Expansion test)
- ❑ An external CRT monitor (Expansion test)
- ❑ CD test media (A-BEX TEST CD-ROM TCDR-702) (for CD-ROM/DVD-ROM test)
- ❑ Music CD (for CD-ROM/DVD-ROM test)
- ❑ A USB test module (Keyboard test)
- ❑ A USB cable (Keyboard test)
- ❑ Headphone (Sound/LAN/modem test)
- ❑ A microphone (Sound/LAN/modem test)
- ❑ FAT-MODE inspection device (Sound/Modem /LAN test)
- ❑ A PC for communication test

The following sections detail the tests of the DIAGNOSTIC TEST MENU. Refer to Sections 3.19 through 3.26 for detailed information on the remaining Service Program Module functions.

3.2 Executing the Diagnostic Test

To start the DIAGNOSTIC PROGRAM, follow these steps:

1. Insert the test program disk (No.1) in the floppy disk drive.

2. Release the lock of the power switch and turn on the computer by pressing the **F12**. Select the FDD in the display for selecting booting unit. Then press **ENTER** and the following menu appears:

```
TOSHIBA personal Computer XXXX DIAGNOSTICS
version XXX (c) Copyright TOSHIBA Corp. 20XX

DIAGNOSTICS MENU :

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


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

---

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

---

3. Set the highlight bar to **1** and press **Enter**. The following TEST MENU will appear:

```
TOSHIBA Personal Computer XXXX DIAGNOSTICS
Version XXX (c) Copyright TOSHIBA Corp. 20XX

DIAGNOSTIC TEST MENU :

 1 - SYSTEM TEST
 2 - MEMORY TEST
 3 - KEYBOARD TEST
 4 - DISPLAY TEST
 5 - FLOPPY DISK TEST
 6 -
 7 -
 8 - HARD DISK TEST
 9 - REAL TIMER TEST
10 - NDP TEST
11 - EXPANSION TEST
12 -
13 - CD-ROM/DVD-ROM TEST
88 - ERROR RETRY COUNT SET [FDD & HDD]
99 - EXIT TO DIAGNOSTICS MENU


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

Functions 1 through 13 are the Diagnostic Tests. Function 88 sets the floppy disk drive and hard disk drive error retry count (0-255).

To return to the Diagnostics Menu, set the highlight bar to Function 99 and press **Enter**.

4. Select the option you want to execute on the test menu and press **Enter**. When you select
   1- SYSTEM TEST, the following message will appear:

```
SYSTEM TEST      XXXXXXX    ┌──────────────────────────────────┐
                            │ XXXX DIAGNOSTIC TEST VXXX         │
                            │ [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 - SET UUID
03 -
04 - Fan ON/OFF
05 -
06 - Quick charge
07 - DMI read
08 - DMI write
09 -
10 - Temperature surveillance test
11 - BT/W-LAN switch test
12 - Battery F/W test
13 - Option battery F/W test
99 - Exit to DIAGNOSTIC TEST MENU



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

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

---

5. Select the subtest number to execute from the subtest menu and press **Enter**. The following
   message will appear:

```
    TEST LOOP  : YES (or NO)
    ERROR STOP : YES (or NO)
```

Use the right and left arrow keys to move the cursor to the desired option.

Selecting **YES** in TEST LOOP increases the pass counter by one each time the test cycle
ends, and restarts the test cycle.

Selecting **NO** in TEST LOOP terminates the test and returns to the subtest menu after one test cycle is complete.

Use the up and down arrow keys to move the cursor to "**ERROR STOP**".
Use the right and left arrow keys to move the cursor to the option to execute and press
Enter.

Selecting **YES** in ERROR STOP stops the test program when an error is occurred and
displays the error status. The operation guide will appear on the right side of the display as
shown below:

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

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

Press [1]   Terminates the test program and returns to the subtest menu.
Press [2]   Executes the next test.
Press [3]   Restarts the test from the error.

Selecting **NO** in ERROR STOP displays the error status and increases error counter by
one if an error is occurred, and executes the next step.

6. Table 3-1 in section 3.3 describes the function of each test on the subtest menu. Table 3-4
    in section 3.17 describes the error codes and error status for each error.

3.3   Subtest

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 Name
1	SYSTEM	01	ROM checksum
		02	SET UUID
		04	Fan ON/OFF
		06	Quick charge
		07	DMI read
		08	DMI write
		10	Temperature surveillance test
		11	BT/W-LAN switch test
		12	Battery F/W test
		13	Option battery F/W test
2	MEMORY	01	Conventional memory
		02	Protected mode
		04	Cache memory
		05	L2 Cache memory
		06	Stress
3	KEYBOARD	01	Pressed key display
		02	Pressed Key code display
		05	USB Port 1,2 test
		06	Touch pad test
		07	Internet button test
		08	Mail button test
		09	Cyber Support button test
		10	USB Port3,4 test
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
		07	LCD Brightness
		08	CRT shadow

Table 3-1 Subtest names (2/2)

No.	Test Name	Subtest No.	Subtest Name
5	FLOPPY DISK	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address
8	HARD DISK	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		06	Write specified address
		07	Read specified address
		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
		03	RGB monitor ID
12	CD-ROM/DVD-ROM	01	Sequential read
		02	Read specified address
		03	Random address/data
		07	RW 1 point W/R/C
-	Wireless LAN	-	Communication test
			MAC address check
-	BLUETOOTH	1	BD_ADDR CHECK
		3	Communication test
		T	Communication test
-	Sound/LAN /Modem	01	Microphoned recording & play
		02	Sign wave
		03	LAN
		04	Modem
-	IEEE1394	01	Transmit & Receive test
		02	Responder Tool
		03	1394 GUID check

3.4   System Test

To execute the System Test, select 1-SYSTEM TEST from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions on the screen. The System test consists of five subtests. 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 (range: F0000h to FFFFFh, 64KB) on the System Board.

Subtest 02   SET UUID

This subtest writes the UUID into the area of DMI information. When "CreateDMIINFO.TXT (Y/N) ?" is displayed in Subtest 8, press **Y** and then **Enter**. The Text data for writing UUID is out put.

To write the DMI information to File, press **Y**, and then **Enter**.

Subtest 04   Fan On/Off

This subtest turns on/off the fan motor with Fan ON/OFF commands.

The following message will appear. Make sure the rotation of the fan stops and press **Enter**.

```
*** Fan OFF ***

Press [Enter] key
```

The following message will appear. Make sure the rotation of the fan starts and press **Enter**.

```
*** Fan ON ***

Press [Enter] key
```

Subtest 06   Quick charge

This subtest checks the status for the quick charge.

Subtest 07   DMI read

This subtest displays the information in the Flash-ROM in the following format.

```
Model Name       : XXXXXXXXXXX
Version Number   : XXXXXXXXXXXX
Serial Number    : XXXXXXXX
Model Number     : XXXXXX-XXXXX
PCN/BND Number   : XXXXXXXXXXXX/XXXXXXXXXXX
UUID Number      : XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

Press [Enter] to EXIT
```

To exit this subtest and return to the SYSTEM test menu, press **Enter**.

Subtest 08   DMI write

The following messages appear in order. Input each information. (If you do not replace the PCB, the DMI information should not be changed.)

1. "Enter Model Name ?" is displayed.

   Input the computer's model name and press **Enter**. (e.g. DynaBook)

2. "Enter Version Number ?" is displayed.

   Input the computer's version number and press **Enter**. (e.g. PC18070C313S)

3. "Enter Serial Number ?" is displayed.

   Input the computer's serial number and press **Enter**. (e.g. 12345678)

4. "Enter Model Number ?" is displayed.

   Input the computer's sales model number and press **Enter**. (e.g. PP200-AAAAA)

5. "Enter Bundle Number ?" is displayed.

   Input the computer's PCN/Bundle number and press **Enter**. (e.g. PMSREQ3Q34H/S0123456789)

6. "Write data OK (Y/N) ?" is displayed.

   To write the DMI information to the Flash ROM, press **Y**, and then **Enter**.

7. "CreateDMIINFO.TXT (Y/N) ?" is displayed.

   To write the DMI information to File, press **Y**, and then **Enter**.

Subtest 10   Temperature surveillance test

This subtest measures the CPU temperature to see if the cooling functions of the
computer are effectively working.

When the subtest starts, the following message appears on the display:

```
CPU TEMP =  XX deg C   Throttling level = XXXXh
```

The number of the CPU TEMP indicates the CPU temperature at the moment in
decimal notation. For example, if the number is 37, the CPU temperature is 37
degrees.

The number of "Throttling level" indicates how much the CPU has slowed. This
number takes one of the following three values:

    0000h : The CPU is running full speed.
    4000h : The CPU has slowed to 75% of its maximum speed.
    8000h : The CPU has slowed to 50% of its maximum speed.

The subtest displays the message five times at intervals of one minute; therefore, it
takes five minutes to complete the test. The computer passes the test if the CPU
temperature is less than 70 degrees at the end of the test. If the temperature is more
than or equal to 70 degrees, the computer fails the test, and an error message
appears on the display.

Subtest 11   BT/W-LAN Switch test

Check if ON/OFF of the BT/W-LAN switch is correct.

Subtest 12   Battery F/W test

The subtest displays the following message and read the date written in the battery
and check if the battery is correct

```
* Get ! Battery date *
Battery type = XXXXXXXXXX
```

NG: Compare error
OK: Returns.

This subtest is for G71C0000H310 and G71C0000H410.

Subtest 13   Optional battery F/W test

This subtest checks option batteries in the same way as Subtest 12.
This subtest is for optional batteries (G71C0002J110 and G71C0002J210).

3.5   Memory Test

To execute the Memory Test, select 2-MOMORY TEST from the DIAGNOSTIC TEST menu, press **Enter** and follow the directions on the screen. The Memory test consists of five subtests. Set the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Conventional Memory

This subtest writes test data to conventional memory (0 to 640 KB), and reads and compares the result with the original data. The test address is displayed per 4 KB.

Subtest 02   Protected Mode

> *Note*: *The CONFIG.SYS file must be configured without extended 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 (from 1MB to maximum MB), and reads the new data and compares the result with the original data.

Subtest 04   Cache Memory

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

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

Subtest 05   L2 Cache Memory

To test the L2 cache memory, a pass-through write-read comparison of '5A' data is run repeatedly to the test area ('7000':'Program' size to '7000':'7FFF' (32 KB)) to check the hit-miss ratio (on/off status) for L2 cache memory.

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

Subtest 06   Stress

This test prepares the write/read buffer (size:1b30h) and produce write date in the write buffer. The write data is written in the area larger than 1 MB and read into the read buffer then repeated to compare until maximum size.

Test data:

> ffh, ffh, ffh, ffh, ffh
> 00h, 00h, 00h, 00h, 00h
> ffh, ffh, ffh, 00h, ffh
> 00h, 00h, 00h, ffh, 00h
> 00h, ffh, ffh, ffh, ffh
> 00h, 00h, 00h, 00h, aah

These data are generated repeatedly by 1b30h size.

3.6 Keyboard Test

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

Subtest 01   Pressed key display

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 key character that was pressed. Holding a key down enables the auto-repeat function that causes the key's display character to blink.

Press **Del + Enter** to end the test.

```
<<<<<<<   Press  Key  Display   >>>>>>>
```
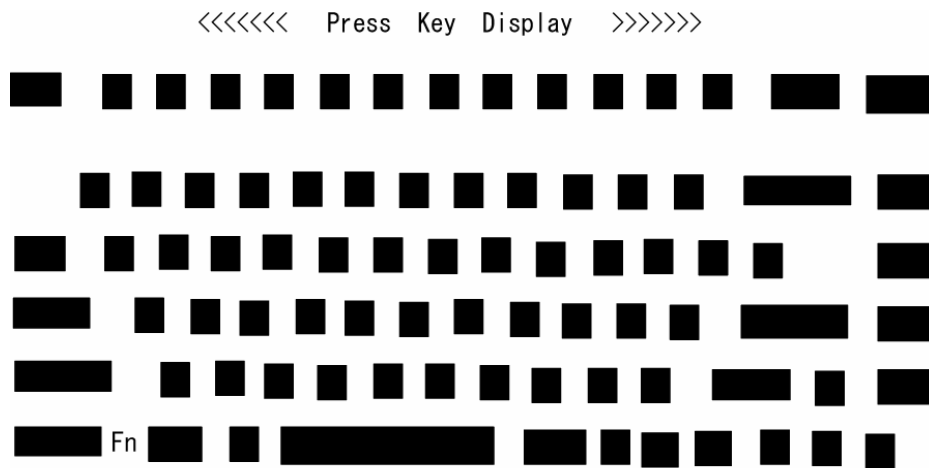


```
IF TEST OK, Press [Dell] [Enter] Key
```

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 Lock**, **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   XXXXXXX

        Scan code       =
        Character code  =
        Keytop          =

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

```
PRESS [Enter] KEY
```

Subtest 05   USB Port 1,2 test

This subtest checks USB. The USB TEST Module (ZD0003P01) and USB Cable
(ZD0003P02) must be connected to the computer.

The following message will appear. Select a port to be tested and press **Enter**.

```
Test port number select (1:Port1, 2:Port1, 0:Port1&2) ?
```

If the test ends successfully, OK is displayed. If nothing is displayed, there may be
a problem with the USB port. Check the wraparound connection and repeat the
test.

Subtest 06   Touch Pad test

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

A) Direction of touch pad.
B) Touch pad switch function check.

This test reports the response of touch pad, and touch pad switch. When you touch the touch pad and slide your finger towards the upper left, the <DIRECTION> display changes according to the following illustration. When a touch pad switch is pressed, the <LAT> displays appear on the right side one by one. The color of the <BUTTONS> being pressed changes.

The parameters appear on the center of the display. Sliding on the touch pad to x or y direction, "OK" is displayed in the X-RATE or Y-RATE. If the IPS switches are pressed at the same time, the subtest menu displays.

```
***** IPS TEST PROGRAM (Vx.xx) *****

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


                               <BUTTONS>
                                (1)      (2)



      <<Press BUTTON1 + BUTTON2 THEN END>>

***** IPS TEST PROGRAM (Vx.xx) *****

  < DIRECTION >      < PARAMETER > STATUS
                       STATUS:0018   BtnUP

                       X-RATE:00F     St  OW

                       Y-RATE:0001   Btn  T

                               <BUTTONS>

                                (1)      (2)



     <<Press BUTTON1 + BUTTON2 THEN END>>
```
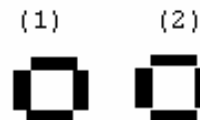
Subtest 07   Internet button test

This subtest checks moving of the Internet button.

Press the Internet button after the following message appears.

```
Press [Internet button] button
```

If the test ends successfully, the display returns to the KEYBOARD TEST menu.

Subtest 08   Mail button test

This subtest checks moving of the Mail button.

Press the Mail button after the following message appears.

```
Press [ Mail ] button
```

If the test ends successfully, the display returns to the KEYBOARD TEST menu.

Subtest 09   Cyber-support button test

This subtest checks moving of the Cyber-support button.

Press the Cyber-support button after the following message appears.

```
Press [ Cyber-support ] button
```

If the test ends successfully, the display returns to the KEYBOARD TEST menu.

Subtest 10   USB Port 3,4 test

This subtest checks USB. The USB TEST Module (ZD0003P01) and USB Cable (ZD0003P02) must be connected to the computer.

The following message will appear. Select a port to be tested and press **Enter**.

```
Test port number select (1:Port3, 2:Port4, 0:Port3&4) ?
```

If the test ends successfully, OK is displayed. If nothing is displayed, there may be a problem with the USB port. Check the wraparound connection and repeat the test.

3.7   Display Test

To execute the Display Test, select 4-DISPLAY TEST from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. The Display test contains eight 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 the constant data (AAh and 55h) and the address data to the video RAM (16MB). The data is read 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.
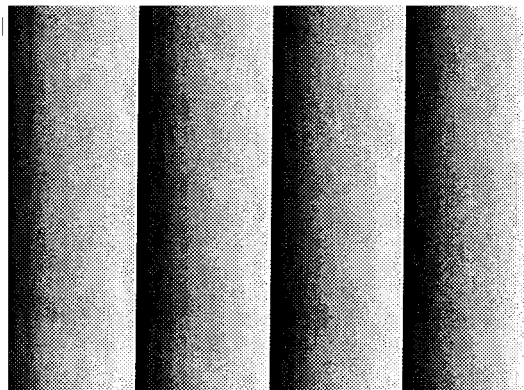
To exit this subtest and return to the DISPLAY TEST menu, press **Enter**.

Subtest 03   Gradation for LCD

This subtest displays bands of gradations for mixed colors, then for red, green, and blue. Next, it displays eight solid colors full screen: red, semi-red, green, semi-green, blue, semi-blue, white, and semi-white. Each color displays for three seconds.

Subtest 04   Gradation & Mode test for VGA

This subtest displays gradations for following modes. To change the mode, press
Enter.

```
[Mode 12]
[Mode 13]
[Mode 3]
[Mode 111  640*480 64K]
[Mode 112  640*480 16M]
[Mode 114  800*600 64K]
[Mode 115  800*600 16M]
[Mode 117  1024*768 64K]
[Mode 118  1024×768 16M]
```

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

(Display example: Mode 12)

To exit this subtest and return to the DISPLAY TEST menu, press **Enter**.

Subtest 05   All Dot On /Off for LCD

This subtest displays an all-white screen then an all-black screen. The display
changes automatically every three seconds.

Subtest 06   "H" Pattern Display

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

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

To exit this subtest and return to the DISPLAY TEST menu, press **Enter**.

---

*Note: The last row may not be completely filled. This condition does not indicate an
error.*

Subtest 07   LCD Brightness

The LCD brightness changes in the following order:

Super-Bright $\rightarrow$ Bright $\rightarrow$ Semi-Bright$\rightarrow$ Bright $\rightarrow$ Super-Bright

Subtest 08   CRT shadow

Make sure to display the left half the screen "O" and the right half screen no
afterimage.

To exit this subtest and return to the DISPLAY TEST menu, press **Enter**.

3.8 USB Floppy Disk Test

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

To execute the Floppy Disk Test, select 5-FLOPPY DISK TEST from the DIAGNOSTIC TEST MENU, press **Enter**.

1. The following message will appear. Select the kind of drive, the kind of media, the media mode and the start track of the floppy disk drive to be tested, press **Enter**.

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

2. The Floppy Disk test contains five subtests that test the FDD.
   The floppy disk test menu will appear after you select FDD test parameters.

```
SUB-TEST MENU:

01-Sequential read
02-Sequential read/write
03-Random address/data
04-Write specified address
05-Read specified address
99-Exit to DIAGNOSTIC TEST MENU
```

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

```
Floppy Disk    XXXXXXX         xxx DIAGNOSTIC TEST VX.XX
                               [Ctrl]+[Break]  ;test end
SUB-TEST                       [Ctrl]+[C]      ;key stop
PASS COUNT:XXXXX      ERROR
COUNT:XXXXX
WRITE DATA:XXXXX      READ
DATA :XX
ADDRESS   :XXXXXX  STATUS    :XXX
```

Subtest 01   Sequential read

This subtest performs a Cyclic Redundancy Check (CRC) that continuously reads all the tracks (track: 0 to 39/0 to 79) on a floppy disk.

The start track is specified at the start of the FDD test.

Subtest 02   Sequential read/write

This subtest continuously writes data pattern B5ADADh to all the tracks (track: 0 to 39/0 to 79) on a floppy disk. 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 (track: 0 to 39/0 to 79) on a floppy disk. The data is then read and compared to the original data.

Subtest 04   Write specified address

This subtest writes the data specified by an operator to a specified track, head and address.

Subtest 05   Read specified address

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

3.9   Hard Disk Test

To execute the Hard Disk Test, select 8-HARD DISK TEST from the DIAGNOSTIC TEST MENU, press **Enter**, and follow the directions on the screen. The hard disk test contains eight subtests that test the hard disk drive functions.

> *Caution*:   *The contents of the hard disk will be erased when subtest 02, 03, 04, 06, 09or 10 is executed. Before running the test, the customer should transfer the contents of the hard disk to another one by executing BACKUP.EXE or others.*

The following messages will appear after selecting the hard disk test from the DIAGNOSTIC TEST MENU.

1.   This message is used to select the error dump operation when a data compare error is detected. Select **yes** or **no**.

```
Data compare error dump  1:No
                         2:Yes
```

2.   This message is used to select whether or not the HDC status is displayed on the screen. The HDC status is described in section 3.18. Select yes or no.

```
Detail status display    1:No
                         2:Yes
```

3.   After setting is completed, select the number of the subtest and press Enter. The following message will appear.

```
HDD DISK TEST IN PROGRESS      xxx DIAGNOSTIC TEST VX.XX
XXXXXXX                        [Ctrl]+[Break]   ; test end
                               [Ctrl]+[C]       ; key stop
SUB-TEST   :XX
PASS COUNT:XXXXX      ERROR COUNT:XXXXX
WRITE DATA:XXXXX        READ DATA  :XX
ADDRESS   :XXXXXX  STATUS      :XXX
```

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

The first digit of the STATUS number indicates the drive number 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 to maximum track. 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:

```
1.Forward sequential
2.Reverse sequential
3.Random
```

Subtest 03   Random address/data

This subtest writes random data in a random length to random addresses. 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 (listed below) to a cylinder, then reads the data while moving from cylinder to cylinder (to check the data interference in the neighbor track) to compare. After the third pass, it tests the motor-off function. (HDD motor is turned off, stops for 20 minutes and is turned on.)

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 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 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.

3.10 Real Timer Test

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

Subtest 01   Real time

This subtest displays and changes the current date and time stored in the real time clock. To execute the real time subtest follow these steps:

Step 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
```

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

```
Enter new time :
```

Step 3: If the current time is not correct, input the correct time in 24-hour format. The time is updated and the following message appears.

The date and time switches by pressing **Enter**. To exit this subtest, press **Enter** during "Enter new time : " display.

The date and the time are displayed alternately by pressing **Enter**. To exit, press **Ctrl + Break**.

Subtest 02   Backup memory

This subtest checks the following backup memories:

Writes 1-bit of "on" data (01h through 80h) to address 0Eh through 7Fh

Writes 1-bit of "off" data (FEh through 7Fh) to address 0Eh through 7Fh

Writes the data pattern AAh and 55h to the address 0Eh to 7Fh

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

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. Make sure the date and time are displayed in the following format and they move forward correctly.

```
Current date  :  12-31-1999
Current time  :  23:59:58

PRESS [Enter] KEY TO EXIT TEST
```

Press **Enter** to exit.

3.11 NDP Test

To execute the NDP test, select 10-NDP TEST from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen. The NDP test contains one subtest.

Subtest 01   NDP

This test checks the following functions of NDP. This test can be executed when NDP is installed. NDP is installed when the bit 1 of configuration byte is "1".

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

Press **Ctrl + Break** to exit.

3.12 Expansion Test

To execute the expansion test, select 11-EXPANSION TEST from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen. The expansion test contains three subtests.

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

Subtest 01   PCMCIA Wraparound

This test checks the following signal line 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: When selecting the subtest number 01, the following message will appear. Specify the slot you want to use.

```
Test slot number select (1:slot0, 2:slot1, 0:slot0&1)?
```

Subtest 03   RGB monitor ID test

                   Connect a CRT monitor for this subtest. This subtest is conducted with VESA commands.

3.13 CD-ROM/DVD-ROM Test

To execute the CD-ROM/DVD-ROM Test, select **13** from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen. The CD-ROM/DVD-ROM Test contains five subtests that test the modem functions.

> *Note: For the subtest 01, 02 and 03, use the dedicated test media: TOSHIBA CD-ROM TEST DISK for CD-ROM and DVD-ROM TESTDISC TSD-1 for DVD-ROM.*

Subtest 01   Sequential read

This subtest reads one-block (2K-byte) data from logical address 0 to the last address in order and compare them.

Subtest 02   Read specified address

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

Subtest 03   Random address/data

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

Subtest 07   RW 1point W/R/C

This subtest writes, reads and compares data at one point on a CD-RW.

3.14 Wireless LAN (Calexico) Test

This section describes how to perform the wireless LAN transmitting-receiving test with the test program.

> *Note:*   *Use another computer (with Calexico wireless LAN card) that can communicate by the wireless LAN as a reference machine to perform this test. An access point is also required.*

In this test, the following items are tested.

(1) Communication test (Main antenna, Aux. antenna)

(2) MAC address Check

To start the Wireless LAN test program, follow the steps below:

> *Note:*   *Before starting the wireless LAN test, make sure the Wireless Communication Switch on the left side of the computer is turned on. (The Wireless Communication LED lights orange.) Release the write-protection of the floppy disk for the test.*

Setting the responder machine

Connect the responder machine to the access point with a cross cable and turn on the access point.

Insert the floppy disk containing the wireless LAN test program into the USB FDD of the responder machine and turn on the responder machine. Then wait until the following message appears.

Setting the target machine

Insert the floppy disk containing the wireless LAN test program into the USB FDD of the target machine and turn on the target machine. Then the test starts automatically.
When the machine has passed the test, "OK !" message will appear on the target machine.

Press any key to exit the test.

When an error is detected during the test, "NG !" massage will appear. Press any key to display the NG item (Main antenna, Aux. antenna or MAC address check). The following message appears.

```
        **********************************************************
      *                                                          *
      *              Main Antenna Test:  NG !!                    *
      *                                                          *
        **********************************************************
```

3.15 Wireless LAN (Atheros 11b/g or 11a/b/g) Test

This section describes how to perform the wireless LAN transmitting-receiving test with the test program.

> *Note: Use another computer (with Atheros 11b/g or 11a/b/g wireless LAN card) that can communicate by the wireless LAN as a responder machine to perform this test. When conducting this test, make sure that any wireless network device using 2.4GHz band other than IEEE 802.11b, such as Bluetooth, is not used nearby.*

In this test, the following items are tested:

   * Test PC side
        (1) SKU (destination code) check
        (2) Mac Address check
        (3) Communication test (11a mode) (only for 11a/b/g card)
        (4) Communication test (11g mode)
        (5) Communication test (11b mode)

This program conducts the above test items continuously and displays results for each item during the test. However, only the last result for the whole test shall be checked. (The message "OK" or "NG" is displayed.)

When an "NG" item is detected during the test, the message "NG" is displayed on the screen and the test stops.

To start the Wireless LAN test program, follow the steps below:

> ***Note:***   *Before starting the wireless LAN test, make sure the Wireless Communication Switch on the left side of the computer is turned on. (The Wireless Communication LED lights orange.)*

Setting the responder machine

> *Note:* *Release the write-protection of the floppy disk for the test.*

Insert a floppy disk containing the test program into the floppy disk drive of the responder machine and turn on the responder machine. The Wireless LAN test menu will appear.

```
##################################################################
####      Atheros WLAN sub system repair test   VX.XX      ####
##################################################################
*                                                                *
*      1 .....Test PC [Initiator]                                *
*                                                                *
*      0 .....[Responder]                                        *
*                                                                *
******************************************************************

....Press test number [1,0] ?
```

Press **0** and **Enter** in the responder machine. After a while, the following messages will appear. The latter message is updated ever 3 seconds.

```
Waiting for transmitter to ring the bell in 11a mode.

Input or output error (EIO) : rxDatBegin : nothing receive within
3000millisecs(waitTime)
```

The responder machine is ready for the test.

Setting the tester machine

> *Note:* *Release the write-protection of the floppy disk for the test.*

Insert a floppy disk containing the test program into the floppy disk drive of the tester machine and turn on the tester machine. The Wireless LAN test menu will appear.

```
##################################################################
####      Atheros WLAN sub system repair test   VX.XX      ####
##################################################################
*                                                                *
*      1 .....Test PC [Initiator]                                *
*                                                                *
*      0 .....[Responder]                                        *
*                                                                *
******************************************************************

....Press test number [1,0] ?
```

Press **1** and **Enter** in the tester machine. After a while, the following message will appear:

```
--------------------------------------------
-                                          -
-      mac address check OK !!             -
-                                          -
-      ...Press any key !!                 -
-                                          -
```

To proceed the test, press any key.

When the tester machine has passed the test, "OK" message will appear in the tester machine.
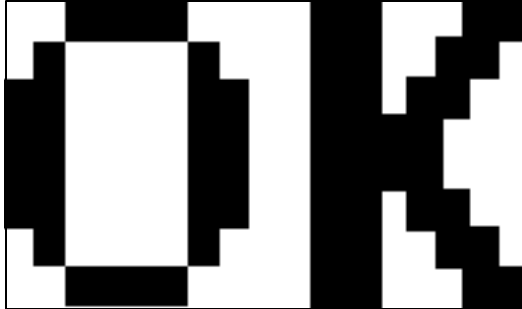
Press **Enter** to return to the main menu.

When the tester machine has not passed the test, "NG" message will appear in the tester machine.
Pressing **Enter** on the screen shows the following message.

```
*************************************************************
*                                                           *
*      8.02 11a Tx Test AUX Antenna NG                       *
*                                                           *
*************************************************************
```

Then the test returns to the main menu automatically.

3.16 Bluetooth Test

This section describes how to perform the Bluetooth test program to check if the Bluetooth functions of computer are working properly. To start the Bluetooth test program, follow the steps below:

> *Note:* Use another computer that can communicate by the Bluetooth as a reference machine to perform this test.

Insert a floppy disk containing the test program into the target machine and turn on the target machine. The following Bluetooth test menu will appear:

```
######################################################################
####          Bluetooth sub system test program VX.XX          ####
######################################################################
*                                                                    *
*              1....BD_ADDR check                                    *
*                                                                    *
*              3... Communication test (DUT mode)                    *
*                                                                    *
*              T....communication test (TEST mode)                   *
*                                                                    *
**********************************************************************
....Press test number [1, 3, T] ? _
```

Press 1 or 3 key to perform the corresponding subtest. To quit the Bluetooth test program, eject the floppy disk and turn the computer off while the menu above is displayed.

Subtest 01   BD_ADDR check

This subtest checks the BD_ADDR functions. When the Bluetooth test menu is displayed, press **1**
to select the test and press **Enter**. The following message will appear:

```
-------------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(BD_ADDR) VerX.XX Copyright (C) by TOSHIBA
Co.
-------------------------------------------------------------------------------
-




       
       
       
       
       
       
       
       
   Initializing …

```

When the machine has passed the test, it displays **BD_ADDR**. If **BD_ADDR** has no problem, the
following message is displayed.

```
-------------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(BD_ADDR) VerX.XX Copyright (C) by TOSHIBA
Co.
-------------------------------------------------------------------------------
-


                         My BD_ADDR = XXXXXXXXXXXX [h]


                         PPPPPP    A     SSSSS    SSSSS
                         P     P  A A   S    S S     S
                         P     P  A  A  S         S
                         PPPPPP  A    A SSSSS    SSSSS
                         P       AAAAAAA      S       S
                         P       A    A S    S S     S
                         P       A    A SSSSS    SSSSS

```

If the target machine has any problem, it displays **Error CODE**. The following message is displayed.

```
------------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(BD_ADDR) VerX.XX Copyright (C) by TOSHIBA
Co.
------------------------------------------------------------------------------
-

                      My BD_ADDR = XXXXXXXXXXXX [h]



                 FFFFFF    A      III   L
                 F         A A     I    L
                 F        A   A    I    L
                 FFFFFF  A     A   I    L
                 F       AAAAAAA   I    L
                 F       A     A   I    L
                 F       A     A  III   LLLLLLL


```

If the machine detects a malfunction, it indicates the error code as shown below.

The error code begins with the least significant digit.

Error code

Table 3-2 Error code for Bluetooth test (BD_ADDR) (1/2)

Error code	Meaning
0x01	Unknown HCI Command.
0x02	No Connection.
0x03	Hardware Failure.
0x04	Page Timeout.
0x05	Authentication Failure.
0x06	Key Missing.
0x07	Memory Full.
0x08	Connection Timeout.
0x09	Max Number Of Connections.
0x0a	Max Number Of SCO Connections To A Device.
0x0b	ACL Connection already exists.
0x0c	Command Disallowed.
0x0d	Host Rejected due to limited resources.
0x0e	Host Rejected due to security reasons.
0x0f	Host Rejected due to remote device is only a personal device.
0x10	Host Timeout.
0x11	Unsupported Feature or Parameter Value.
0x12	Invalid HCI Command Parameters.
0x13	Other End Terminated Connection: Used Ended Connection.
0x14	Other End Terminated Connection: Low Resources.
0x15	Other End Terminated Connection: About to Power Off.
0x16	Connection Terminated by Local Host.
0x17	Repeated Attempts.
0x18	Paring Not Allowed.
0x19	Unknown LMP PDU.
0x1a	Unsupported Remote Feature.
0x1b	SCO Offset Rejected.
0x1c	SCO Interval Rejected.
0x1d	SCO Air Mode Rejected.
0x1e	Invalid LMP Parameters.
0x1f	Unspecified Error.

** See the Specification of the Bluetooth System for details.

Table 3-2 Error code for Bluetooth test (BD_ADDR) (2/2)

Error code	Meaning
0x20	Unsupported LMP Parameter Value.
0x21	Role Change Not Allowed.
0x22	LMP Response Timeout.
0x23	LMP Error Transaction Collision.
0x24	LMP PDU Not Allowed.
0x25	Not Exist
0x26	Not Exist
0x27	Not Exist
0x28	Not Exist
0x29	Not Exist
0x2a	Not Exist
0x2b	Not Exist
0x2c	Not Exist
0x2d	Not Exist
0x2e	Not Exist
0x2f	Not Exist

** See the Specification of the Bluetooth System in detail.

Subtest 02   Communication test (DUT mode)

This subtest checks the Bluetooth communication functions. Preparing the tester machine for the Bluetooth test program. Insert a floppy disk containing the test program into the tester machine and turn on the tester machine. The Bluetooth test menu will appear:

Press **3** to select the test and press **Enter** in the target machine. The following message will appear:

When the test begins, the machine displays **BD_ADDR of the DUT**. The progress bar stops when the test is completed. The following message is displayed.

```
-------------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(CS-Air) VerX.XX  Copyright (C) by TOSHIBA
Co.
-------------------------------------------------------------------------------
-
+---------------------+
|        DUT          |   BD_ADDR of the DUT = XXXXXXXXXXXXX [h]
+---------------------+



    Ready>>>>>>>>>>>>>>>>>>>>>>>         <- *Progress Bar*



                            [ESC] : Stop
```

When the Bluetooth test menu is displayed, press **T** to select the test and press **Enter** in the test machine. The following message will appear:

```
----------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(CS-Air) VerX.XX  Copyright (C) by TOSHIBA
Co.
----------------------------------------------------------------------------
-
+-----------------+
|                 |
|      Tester     |
|                 |
+-----------------+




                              [ESC]:Finish Tester  [SPACE]:Start
                              Is DUT ready?
```

Then press **Space** to start the Bluetooth communication test.

When the machine has passed the test, it displays **BD_ADDR of the DUT**. If the connection with the tester is completed, the progress bar stops. The following message is shown.

```
----------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(CS-Air) VerX.XX  Copyright (C) by TOSHIBA
Co.
----------------------------------------------------------------------------
-
+---------------------+
|         DUT         |   BD_ADDR of the DUT = XXXXXXXXXXXXX [h]
+---------------------+

   CCCC    OOO   M     M PPPPP  L       EEEEEE TTTTTTT EEEEEEE DDDDD
  C    C  O   O  MM   MM P    P L       E         T    E       D    D
 C       O     O M M M M P    P L       E         T    E       D     D
 C       O     O M   M M PPPPP  L       EEEEE     T    EEEEEEE D     D
 C       O     O M     M P      L       E         T    E       D     D
  C    C  O   O  M     M P      L       E         T    E       D    D
   CCCC    OOO   M     M P      LLLLLLL EEEEE     T    EEEEEEE DDDDD
```

```
                             Testing is finished


A>_
```

If the target machine has any problem, the following message "INCOMPLETE" is displayed with the **Error CODE**.

```
----------------------------------------------------------------------------
-
Bluetooth Subsystem T&D for PCSE(CS-Air) VerX.XX  Copyright (C) by TOSHIBA
Co.
----------------------------------------------------------------------------
-


+--------------------+
|        DUT         |   BD_ADDR of the DUT = XXXXXXXXXXXXX [h]
+--------------------+


III  N     N   CCCC     OOO    M      M PPPPP  L        EEEEEE TTTTTTT EEEEEEE
 I   NN    N  C    C  O     O  MM    MM P     P L        E         T    E
 I   N N   N C        O     O M M  M M P     P L        E         T    E
 I   N  N  N C        O     O M  M  M PPPPP  L        EEEEEE    T    EEEEEEE
 I   N   N N C        O     O M     M P       L        E         T    E
 I   N    NN  C    C  O     O M     M P       L        E         T    E
III  N     N   CCCC     OOO    M     M P       LLLLLLL EEEEEE    T    EEEEEEE



                             Testing is finished



_Press any key to continue. . .
```

If the machine detects a malfunction, it indicates the error code as shown below.

The error code begins with the least significant digit.

Error code

Table 3-3 Error code for Bluetooth test (BD_ADDR of the DUT) (1/2)

Error code	Meaning
0x01	Unknown HCI Command.
0x02	No Connection.
0x03	Hardware Failure.
0x04	Page Timeout.
0x05	Authentication Failure.
0x06	Key Missing.
0x07	Memory Full.
0x08	Connection Timeout.
0x09	Max Number Of Connections.
0x0a	Max Number Of SCO Connections To A Device.
0x0b	ACL Connection already exists.
0x0c	Command Disallowed.
0x0d	Host Rejected due to limited resources.
0x0e	Host Rejected due to security reasons.
0x0f	Host Rejected due to remote device is only a personal device.
0x10	Host Timeout.
0x11	Unsupported Feature or Parameter Value.
0x12	Invalid HCI Command Parameters.
0x13	Other End Terminated Connection: Used Ended Connection.
0x14	Other End Terminated Connection: Low Resources.
0x15	Other End Terminated Connection: About to Power Off.
0x16	Connection Terminated by Local Host.
0x17	Repeated Attempts.
0x18	Paring Not Allowed.
0x19	Unknown LMP PDU.
0x1a	Unsupported Remote Feature.
0x1b	SCO Offset Rejected.
0x1c	SCO Interval Rejected.
0x1d	SCO Air Mode Rejected.
0x1e	Invalid LMP Parameters.
0x1f	Unspecified Error.

Table 3-3 Error code for Bluetooth test (BD_ADDR of the DUT) (2/2)

Error code	Meaning
0x20	Unsupported LMP Parameter Value.
0x21	Role Change Not Allowed.
0x22	LMP Response Timeout.
0x23	LMP Error Transaction Collision.
0x24	LMP PDU Not Allowed.
0x25	Not Exist
0x26	Not Exist
0x27	Not Exist
0x28	Not Exist
0x29	Not Exist
0x2a	Not Exist
0x2b	Not Exist
0x2c	Not Exist
0x2d	Not Exist
0x2e	Not Exist
0x2f	Not Exist

** See the Specification of the Bluetooth System in detail.

3.17 Sound/LAN/Modem Test

To execute the Sound/LAN/Modem Test, use the Test Diagnostics disk (No.3). Finish the tests of
the Diagnostics disk (No.1) by selecting 99 - EXIT TO DIAGNOSTICS MENU in the
DIAGNOSTIC TEST MENU. Then in the DIAGNOSTICS MENU, select 9 - EXIT TO MS-
DOS.

Insert the Test program disk (No.2) in the floppy disk drive and turn on the power. The following
message will appear:

```
###################################################################
#######   XXXX DIAGNOSTICS PROGRAM (SOUND/LAN/MODEM TEST)   #######
###################################################################
*                                                                 *
*   1 ...........   (Microphoned recording&play)                  *
*   2 ...........   (DOREMI)                                      *
*   3 ...........   (LAN)                                         *
*   4 ...........   (MODEM)                                       *
*******************************************************************
.... Press test number[1-4] ?
```

Press the number you want to test and press **Enter.**

Note: *To execute Subtest 01, the external microphone is required. 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   Microphoned recording & play

Executed by the load format of Playwave/recwave.

The sound is recorded automatically from microphone when the following message
appears.

```
Recording ......(Press "S" to stop)
```

The sound is played automatically when the following message appears.

```
Playing ......(Press "S" to stop)
```

Subtest 02   Sign wave

This subtest is executed by loading Playwave. In this subtest, the control of the sound volume can be also tested.

Connect headphones and make sure the sound (musical scale: do, re, mi, fa, so, la, si, do) is come out from the right and left headphones.

Subtest 03   LAN

This subtest checks the operation of mini-PCI I/F by the loopback in the chip.

The large "OK" is displayed if no error occurred.

Subtest 04   MODEM

For this subtest, connect the modem PCB and RJ11 connector with a harness. This subtest contains the following tests. They are tested with the dedicated "FAT-MODE inspection device (Product Code QE2000P01 made by Nittou Denki Seisakusyo).

- Scorpio Modem Initialize
- Digital Loopback Test
- Modem Sound Test
- External Loopback test
- RJ11 Connector Test (LED)

To finish the Sound/LAN/Modem Test the computer power should be off.

3.18 IEEE 1394 Test

To execute the IEEE 1394Test, use the Test Diagnostics disk (No.4). Finish the tests of the Diagnostics disk (No.1) by selecting 99 - EXIT TO DIAGNOSTICS MENU in the DIAGNOSTIC TEST MENU. Then in the DIAGNOSTICS MENU, select 9 - EXIT TO MS-DOS.

Insert the Test program disk (No.3) in the floppy disk drive and turn on the power. The following message will appear:

```
*********************************************************************
*     ---------------------------------------------------------     *
*                    EEE1394 test menu (For repair)                 *
*     ---------------------------------------------------------     *
*                                                                   *
*     ============   Select test NO. and [Enter] ============       *
*                                                                   *
*         1 ....Transmit & Receive test                             *
*         2 ....Responder tool                                      *
*         3 ....1394 GUID Display                                   *
*                                                                   *
*********************************************************************
                    .... Press test number [1-3] ?
```

Press the number you want to test and press **Enter.**

Subtest 01   Transmit & Receive test

               Specifies the data size and transfer speed between the responder connected with a responding cable, and sends and receives data. A dedicated cable for I-link is necessary.

Subtest 02   Responder tool

               Setting Menu only for receiving in a responding test.

Subtest 03   1394 GUID Display

               GUID can be displayed.

3.19 Error Status Code

Table 3-4 lists the error status codes for the Diagnostic Test.

Table 3-4 Error status codes names (1/2)

Device name	Error code	Error status name
(Common)	FF	Data Compare Error
System	01 02 03	ROM Checksum Error Location ID Error Serial ID Writer Error
Memory	01 02 14 DD DE DF	Parity error Protected mode not change Memory write/read error Cache memory error 2nd Cache error TAG-RAM error
Keyboard	01 02 03 04 05 06	Mouse interface error IPS interface error Interface error Retransmit error Mouse handler not support PS/2 mouse & IPS not
FDD	01 02 03 04 06 08 09 10 20 40 60 80 EE	Bad Command Error Address Mark Not Found Write Protected Record Not Found Media Removed DMA Overrun Error DMA Boundary Error CRC Error FDC Error Seek Error Not Drive Error Time Out Error Write Buffer Error

Table 3-4 Error status codes names (2/2)

Device name	Error code	Error status name
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 error
	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
	DA	No HDD
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
	CB	ZV Port ERROR
	CD	NO PCMCIA
NDP	01	No Co-Processor
	02	Control Word Error
	03	Status Word Error
	04	Bus Error
	05	Addition Error
	06	Multiplay Error

3.20 HDC Status

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

```
HDC status = XXXX
```

The hard disk test error status is displayed on the screen by a four-digit number.

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

The contents of the HDC error status register and error register are listed in Tables 3-5 and 3-6.

Table 3-5 Hard disk controller status register contents

Bit	Name	Description
7	BSY (Busy)	"0" … HDC is ready. "1" … HDC is busy.
6	DRDY (Drive ready)	"0" … Hard disk drive is not ready to accept any command. "1" … Hard disk drive is ready.
5	DWF (Drive write fault)	"0" … DWF error is not detected. "1" … 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" … Drive is not ready for data transfer. "1" … Drive is ready for data transfer.
2	CORR (Corrected data)	"0" … Not used "1" … Correctable data error is corrected.
1	IDX (Index)	"0" … Not used "1" … Index is sensed.
0	ERR (Error)	"0" … Not used "1" … The previous command was terminated with an error.

Table 3-6 Error register contents

Bit	Name	Description
7	BBK (Bad block mark)	"0" … Not used "1" … A bad block mark is detected.
6	UNC (Uncorrectable)	"0" … There is no uncorrectable data error. "1" … Uncorrectable data error has been detected.
5	——	Not used
4	IDN (Identification)	"0" … Not used "1" … There was no ID field.
3	——	Not used
2	ABT (Abort)	"0" … Not used "1" … Illegal command error or a command abort error.
1	TK0 (Track zero)	"0" … The hard disk detected track 0. "1" … The hard disk could not detect track 0.
0	——	Not used.

3.21 FDD Cleaning

3.21.1 Function Description

This function cleans the heads in the 3.5-inch FDD by executing a series of head load/seek and read operations. A cleaning disk is necessary to perform this program.

3.21.2 Operations

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

   ```
   DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : V6.00

   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 following message appears, the FDD head cleaning has begun.

   ```
   Cleaning start
   ```

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

3.22 Log Utilities

3.22.1 Function Description

This function logs error information generated while a test is in progress and stores the results in RAM. This function can also store data on a floppy disk or output the data to a display or a printer.

If the power switch is turned off, the error information will be lost. The error information is displayed in the following order:

1. Error count (CNT)
2. Test name, Subtest number (TS-No)
3. Pass count (PASS)
4. Error status code (STS)
5. FDD/HDD or memory address (ADDR)
6. Write data (WD)
7. Read data (RD)
8. HDC status code (HSTS)
9. Error status name (ERROR STATUS NAME)

3.22.2 Operations

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

```
0003 ERRORS
CNT   TS-No PASS STS ADDR   WD RD HSTS [ERROR STATUS NAME]
001 FDD 01 0000 110 24015 00 00         FDD-CRC ERROR
002 FDD 01 0001 110  30108 00 00         FDD-CRC ERROR
003 FDD 03 0003 110  23106 00 00         FDD-CRC ERROR
```



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

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

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

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

3.23 Running Test

3.23.1 Function Description

This function automatically executes the following tests in sequence:

1. System test (subtest 01)
2. Memory test (subtests 01,02, 04, 06)
3. Display test (subtest 01)
4. FDD test (subtest 02)
5. HDD test (subtests 01)
6. Real timer test (subtest 02)

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

3.23.2 Operations

> *Caution: Do not forget to remove the diagnostics disk and load a formatted 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 formatted work disk.

2. Select 6-RUNNING TEST from the DIAGNOSTIC MENU and press **Enter**. The following message is displayed.

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

    Select **Y (yes)** to execute the Printer wraparound test or **N (NO)** not to execute, then press **Enter**. A printer wraparound connector must be connected to the parallel port of the computer to execute properly this test.

3. When the selecting of the Printer wraparound test is completed, the following message is displayed.

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

    Select **Y (yes)** to execute the Serial #A test or **N (NO)** not to execute, then press **Enter**. A RS-232C wraparound connector must be connected to the serial port of the computer to execute properly this test.

4. After specifying of the Serial #A test, the following message will appear:

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

5. This program is executed in the above mentioned ways. To exit the program, press **Ctrl +
    Break.**

3.24 Floppy Disk Drive Utilities

3.24.1 Function Description

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

1. FORMAT

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

This program formats the floppy disk in the following formats.

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

(b) 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.

4. HDD-ID

This program reads the hard disk ID and displays the hard disk ID, serial number and other hard disk information.

3.24.2   Operations

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

    ```
    [ FDD UTILITIES ]

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

2. FORMAT program

    (a) When FORMAT program is loaded, the following message is displayed:

    ```
    DIAGNOSTICS - FLOPPY DISK FORMAT : V6.00
    Drive number select (1:A, 2:B) ?
    ```

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

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

    (c) Select a media/drive type number and press **Enter**. The following message will be
    displayed:

    ```
    Warning : Disk data will be destroyed.
    Insert work disk into drive A:
    Press any key when ready.
    ```

    (d) Remove the Test program Disk from the FDD, insert the work disk and press any
    key. The following message will be displayed and 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 FORMAT program is loaded, the following message is displayed:

```
FLOPPY DISK FORMAT & COPY : V6.00
Type select (0:2DD,3:2HD) ?
```

   (b) Selecting a media/drive type number will display a message 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 appears and copying of the disk starts.

```
[ 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 following message will appear and start copying to the target disk.

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

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

   (e) 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) ?
```

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

4. DUMP program

   (a) When DUMP program is loaded, the following message appears:

```
DIAGNOSTICS-HARD DISK & FLOPPY DISK DUMP : V7.00
Drive type select (1:FDD, 2:HDD) ?
```

   (b) Select a format type number. If 2:HDD is selected, the display will go to step (h).
        If 1:FDD is selected, the following message appears:

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

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

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

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

```
2HD media mode (1:1.20MB,2:1.44MB,3:1.23MB) ?
```
   (e) Select a media mode and the following message will appear:

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

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

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

 Track number ????
```

   (g) Select the track number, the head number and the sector number you want to
        dump. The system will access the disk and dump a list. Then the message shown in
        (k) will appear.

   (h) The following message will appear.

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

   (i) Select a drive number and the following message will be displayed.

```
—— Max. address ——
[LBA ] = XXXXXXXXX

 LBA number ??
```

(j) Set the LBA number you want to dump. The system will access the disk and dump
a list.

(k) The following message will appear. To finish the dump, select 3.

```
Press number key (1:up, 2:down, 3:end) ?
```

(l) The following message will appear. Selecting 2 returns to the FDD UTILITIES
MENU.

```
Another dump (1:Yes, 2:No) ?
```

5. HDD-ID READ program

   Loading HDD ID READ program displays the following HDD ID configuration:

```
[HDD ID Read (V5.10)] [Drive #X]
   ID code (h)            =  XXXX
   No. of Cylinders        =  XXXXXXXX
   Removable Cylinders    =  XXXXXXXX
   No. of Heads           =  XXXXXXXX
   Unformat Bytes/Track   =  XXXXXXXX
   Unformat Bytes/Sector  =  XXXXXXXX
   Sectors/Track          =  XXXXXXXX
   Gap Length             =  XXXXXXXX
   Sync. Bytes            =  XXXXXXXX
   Reserved (h)           =  XXXX
   Serial No.             =  YYY...
   Controller Type (h)    =  XXXX
   Sector Buffers         =  XXXXXXXX
   ECC Bytes              =  XXXXXXXX
   Firmware Rev.          =  YYYYYY..
   Model No.              =  YYYY...
   Reserved (h)           =  XXXX
   Double Word Capability =  XXXXXXXX

   Press [Enter] key
```

   Press **Enter** to return to the FDD UTILITIES MENU.

3.25   System Configuration

3.25.1   Function Description

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

1. Processor Type
2. VGA Controller
3. MS-DOS Version
4. BIOS ROM version (1st ID, 2nd ID)
5. BOOT ROM version
6. KBC version
7. PS Micon Version
8. Total Memory Size
9. Battery Code
10. Sound System
11. The number of Co-processor
12. The number of PCMCIA Slots
13. Modem Type
14. LAN Type
15. The number of HDD
16. Date/Time

3.25.2   Operations

1. Selecting 7-SYSTEM CONFIGURATION from the DIAGNOSTIC MENU and pressing
   Enter displays the following system configuration:

```
System Configuration Display : Ver X.XX [Machine Name : XXXX  ]

** -  Processor Type   =  XX-XXXXX
** -  VGA Controller   =  XXXX
*  -  MS-DOS Version   =  VXXXX
*  -  BIOS-ROM Version =  VXXXX 1st ID = XXH, 2nd ID = XXH
*  -  BOOT-ROM Version =  VXXXX
*  -  KBC Version      =  VXXXX
*  -  PS Micom Version =  VXXXX (EC Version = VX.XX)
*  -  Total Memory Size=  XXXXMB(Conventional Memory = 00639KB)
*  -  Battery Code     =
** -  Sound System     =  M1535
*  -
*  -
*  -
*  -  1 Math Co-Processor
*  -  1 PCMCIA Slot
*  -    Modem / LAN   = None
*  -
*  -  1 Hard Disk Drive(s)  #1 Sectors   = XXXXXXXXXX (XXXXXMB)
                            #2 Sectors   =           (    MB)
*  -
Press [Enter] Key         [Date = YYYY-MM-DD, HH:MM:SS]
```

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

3.26 SETUP

3.26.1 Function Description

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

1. Memory
    - (a) Total

2. System Date/Time
    - (a) System Date
    - (b) System Time

3. Battery

4. Password

5. Boot Priority
    - (a) Boot Priority
    - (b) HDD Priority
    - (c) Network Boot Protocol

6. Display
    - (a) Power On Display
    - (b) LCD Display Stretch
    - (c) TV Type

7. Others
    - (a) Power-up Mode
    - (b) CPU Cache
    - (c) Level 2 Cache
    - (d) Dynamic CPU Frequency Mode
    - (e) Auto Power On
    - (f) Sound Logo
    - (g) Power Button On/Off
    - (h) Panel Power On/Off

8. Configuration

9. Drives I/O
    - (a) Built-in HDD
    - (b) CD-ROM
    - (c) PC Card

10. PCI Bus

11. PC Card

12. Peripheral
    - (a) Internal Pointing Device
    - (b) Hard Disk Mode

13. LEGACY Emulation
    - (a) USB KB/Mouse Legacy Emulation
    - (b) USB-FDD Legacy Emulation

14. PCI LAN

3.26.2 Accessing the SETUP Program

Selecting 0-SETUP from the DIAGNOSTICS MENU and pressing **Enter** displays the followings:

```
                    SYSTEM SETUP (1/2)          ACPI BIOS version = X.XX

    ┌──── MEMORY ─────────────┐     ┌──── BOOT PRIORITY ──────────┐
    │ Total         = XXXXX KB │     │ Boot Priority =HDD→FDD→CD-ROM→LAN │
    └──────────────────────────┘     │ HDD Priority  = Built-in HDD→PC Card │
                                      │ Network Boot Protocol = PXE  │
    ┌──── SYSTEM DATE/TIME ────┐      └──────────────────────────────┘
    │ Date(MM-DD-YY)  = XX-XX-XXXX │
    │ Time(HH:MM:SS)  = XX:XX:XX   │  ┌──── DISPLAY ─────────────────┐
    └──────────────────────────┘     │ Power On Display   = Auto-Selected │
                                      │ LCD Display Stretch  = Enabled │
    ┌──── BATTERY ─────────────┐      │ TV Type            = NTSC(Japan) │
    │ Battery Save Mode = Full Power │ └──────────────────────────────┘
    └──────────────────────────┘
                                      ┌──── Others ──────────────────┐
    ┌──── PASSWORD ────────────┐      │ Power-up mode        = Boot  │
    │ Not Registered           │      │ CPU Cache            = Enabled │
    └──────────────────────────┘      │ Level 2 Cache        = Enabled │
                                       │ Dynamic CPU Frequency Mode   │
                                       │           = Dynamically Switchable │
                                       │ Auto Power On        = Disabled │
                                       │ Sound Logo           = Enabled │
                                       │ Power Button Lamp    = Mode 1 │
                                       └──────────────────────────────┘

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



                    SYSTEM SETUP (2/2)          ACPI BIOS version = X.XX
    ┌──── CONFIGURATION ──────────┐   ┌──── PC CARD ─────────────────┐
    │ Device Config.   = Setup by OS │ │ Controller Mode = Auto-Selected │
    └──────────────────────────────┘  └──────────────────────────────┘

    ┌──── DRIVES I/O ─────────────┐   ┌──── PERIPHERAL ──────────────┐
    │ Built-in HDD                │   │ Internal Pointing Device  = Enabled │
    │          = Primary IDE(1F0H/IRQ14) │ Hard Disk Mode  = Enhanced IDE(Normal) │
    │ CD-ROM   = Secondary IDE(170H/IRQ) │ └──────────────────────────────┘
    └──────────────────────────────┘
                                       ┌──── LEGACY EMULATION ────────┐
    ┌──── PCI BUS ────────────────┐    │ USB KB/Mouse Legacy Emulation │
    │ PCI BUS        = IRQ10,IRQ11 │    │                   = Enabled  │
    └──────────────────────────────┘   │ USB-FDD Legacy Emulation  = Enabled │
                                        └──────────────────────────────┘

                                        ┌──── PCI LAN ─────────────────┐
                                        │ Built-in LAN        = Enabled │
                                        └──────────────────────────────┘

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

Moving Within the SETUP Menu and Changing Values

1. Press ← and → to move between the columns horizontally. Press - and ˉ to move between items in a column. Press **Fn**+- **(PgUp)** and **Fn** + ˉ **(PgDn)** to move between the two pages.

2. Press either the **Space bar** or **Back Space** to change the value.

Accepting Changes and Exiting the SETUP Window

1. Press **Fn**+→**(END)** to accept the changes you made.

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

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

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

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

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

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

---

*Note: You can press **Esc** to quit at any time without saving changes. SETUP asks you to confirm that you do not want to save your changes. When SETUP is displayed at the next time, the current configuration appears.*

The Factory Preset Configuration

When you access SETUP, the current configuration is displayed.

1. To display the factory preset configuration, press **Fn**+←**(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:
   (1) HDD mode
   (2) Password
   (3) Write Policy

SETUP Options

The SETUP screen is divided into 14 functionally related groups. This section describes each group and its option.

1. Memory

    This group of options displays the computer's memory.

    Total
      This field displays the total amount of memory installed and is automatically
      calculated by the computer. You cannot change this value.

2. System Date/Time

    Sets the date and time with **Space** and **Backspace** key. Change of Hour to Minute (and vice versa), and of Month to Day (and vice versa) with ⁻ and ⁻.

    (a) System Date/Time

         Use this option to set the date (month-day-year).

    (b) System Date/Time

         Use this option to set the time (hour : minute).

3. Battery

    This option is used to select Full Power, Low Power or User Setting of the battery save mode. When you select the battery save mode, the followings will appear.

    Full Power   The following shows full power settings.

    ```
     ┌ BATTERY SAVE OPTIONS ┐
    ┌─────────────────────────────────────────────┐
    │ Processing Speed      = High                 │
    │ CPU Sleep Mode        = Enabled              │
    │ Display Auto off      = 30Min.               │
    │ HDD Auto off          = 30Min.               │
    │ System Auto off       = Disabled (*1)        │
    │ LCD Brightness        = Bright (*2)          │
    │                         Super-Bright (*3)    │
    │ Cooling Method        = Maximum Performance  │
    └─────────────────────────────────────────────┘
    ```

Low Power   The following shows low power settings.

```
  BATTERY SAVE OPTIONS
┌─────────────────────────────────────────────────────┐
│ Processing Speed       = Low                          │
│ CPU Sleep Mode         = Enabled                      │
│ Display Auto off       = 03Min.                       │
│ HDD Auto off           = 03Min.                       │
│ System Auto off        = 30Min. (*1)                  │
│ LCD Brightness         = Semi-Bright (*2)             │
│                          Bright (*3)                  │
│ Cooling Method         = Battery Optimized            │
└─────────────────────────────────────────────────────┘
```

Note: In boot mode, the System Auto Off (*1) item does not appear.
       Display of the LCD Brightness will be changed in the condition below:
       (*2) Operating the battery
       (*3) Using the AC adapter

User Setting   Use this option to set the battery save parameters on the sub-window, **BATTERY SAVE OPTIONS**. For details, see *Battery Save Options* below.

Battery Save Options

  (a) Processing Speed

      This feature changes the CPU processing speed.

      High   Makes the CPU processing speed high.
      (Default in Full Power Mode)

      Disabled   Disables sleep mode.
      (Default in Low Power Mode)

  (b) CPU Sleep Mode

      Use this option to enable or disable the CPU sleep function. When this mode is set to **Enabled**, the processing speed may be low in some applications. In that case, set the mode to **Disabled**.

      Enabled   Enables sleep mode. (Default)

      Disabled   Disables sleep mode.

  (c) 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 (including no operation of a mouse or touch pad) for the set period of time.

      Disabled   Disables display automatic power off.

      xx Min.   Automatically turns off the power to the LCD panel's illumination if the panel is not used for the duration set. The duration xx can be set to from 0.1 to 30 minutes.

(d) HDD Auto Off

Use this option to set the duration of the HDD automatic power off function. This option stops the rotation of the HDD if you do not read or write to the HDD more than the duration set. To protect the HDD, **Disabled** can not be set to.

xx Min.   Automatically turns off the power to the hard disk drive if it is not used for the duration set. The duration xx can be set to from 0.1 to 30 minutes or Disabled.

(e) System Auto Off

Use this option to disable or set the duration of the system automatic off function in Resume mode. This option turns off the power to the system at the time set if the computer is not used. In Boot mode, this is disabled.

Disabled   Disables system automatic power off.

xx Min.   Automatically turns off the power to the system if it is not used for the duration set. The duration xx can be set to from 10 to 60 minutes.

(f) LCD Brightness

Use this option to set the level of LCD brightness.

Super-Bright   Full brightness for maximum visibility.

Bright   Full brightness for high visibility.

Semi-Bright   Less than full brightness for saving power.

(g) Cooling Method

Maximum Performance If the CPU becomes too hot, the fan turns on automatically in a high speed to cool down the CPU.

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

Battery optimized   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.

Note: Too hot condition may cause defect on the CPU. When the hot condition continues, the power is automatically turned off in resume mode.

4. Password

    This option sets or resets the user password for power on and instant security (**Fn+F1**).

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

    For details on setting the user password, refer to the User's Manual.

5. Boot Priority

    (a) Boot Priority

    Use this option to set the priority for booting of the computer and the priority for the HDD for booting.

FDD® HDD® CD-ROM® LAN:	The computer looks for bootable files in the following order: FDD, HDD, CD-ROM and LAN
HDD® CD-ROM® LAN® FDD	The computer looks for bootable files in the following order: HDD, CD-ROM, LAN and FDD.
FDD® CD-ROM® LAN® HDD	The computer looks for bootable files in the following order: FDD, CD-ROM, LAN and HDD.
CD-ROM® LAN® HDD® FDD	The computer looks for bootable files in the following order: CD-ROM, LAN, HDD and FDD.
CD-ROM® LAN® FDD® HDD	The computer looks for bootable files in the following order: CD-ROM, LAN, FDD and HDD.
HDD® FDD® CD-ROM® LAN	The computer looks for bootable files in the following order: HDD, FDD, CD-ROM and LAN. (Default)

    (b) HDD Priority

    When using more than one HDDs, specifies the priority to boot the system.

Built-in HDD® PC Card	Boots in the priority of Built-in HDD and PC Card.
PC Card® Built-in HDD	Boots in the priority of PC Card and Built-in HDD.

(c) Network Boot Protocol

Use this option to set the starting method via a network.

PXE   Sets to PXE protocol. (Default)

RPL   Sets to RPL protocol.

6. Display

This group of options configures the computer's display.

(a) Power On Display

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

Auto-Selected   Selects an external monitor if one is connected.
                           Otherwise it selects the internal LCD. (Default)

LCD + Analog RGB   Selects both the internal LCD and the external CRT for
                           simultaneous display.

*Note: When LCD + Analog RGB is selected while connecting the external display not
corresponding to SVGA mode, no image appears on the display.*

(b) LCD Display Stretch

LCD Display Stretch enables or disables a larger display area of the screen.

Enabled   Enables the LCD display stretch feature when the . (Default)

Disabled   Disables the LCD display stretch feature.

(c) TV type

Selects TV type.

NTSC (JAPAN)   for Japan

NTSC (US)   for US

PAL   for Europe

7. 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 Mode

Use this option to choose between resume and boot mode.

Boot   Turns on boot mode. (Default)

Resume   Turns on resume mode.

(b) CPU Cache

Use this option to enable or disable the CPU cache.

Enabled   Enables the CPU cache. (Default)

Disabled   Disables the CPU cache.

(c) Level 2 Cache

Use this option to enable or disable the level 2 cache. When "CPU Cache" is set to "Disabled", this option cannot be changed.

Enabled   Enables the level 2 cache. (Default)

Disabled   Disables the level 2 cache.

(d) Dynamic CPU Frequency mode

Use this option to choose a setting from the followings.
This is displayed only when the CPU is a Mobile Intel® Pentium® M.

Dynamically Switchable

Enables Intel SpeedStep technology. When the computer is in use, CPU power consumption and clock speed are automatically switched when necessary. (Default)

Always High   Disables Intel SpeedStep technology and always runs the processor at its fastest speed.

Always Low   Disables Intel SpeedStep technology and always runs the processor at low power consumption and low speed.

(e) Auto Power On

This option displays setting for Wake-up on LAN. When Windows XP is operating, this function is disabled.

Enabled   Indicates auto power on and Wake-up on LAN is set.

Disabled   Indicates auto power on and Wake-up on LAN is not set.

When "Enabled" is set, the following subwindow appears.

Auto power on and Wake-up on LAN is set in the options subwindow. To set alarm time, use **Space** and **BackSpace**. To switch between time and minute, month and date, use **‑** and **¯.**

```
  ──────  OPTIONS  ──────
│                              │
│  Alarm Time         = 00:00:00  │
│  Alarm Date Option  = Disabled  │
│  Ring Indicator     = Disabled  │
│  Wake-up on LAN     = Disabled  │
└──────────────────────────────┘
```

Alarm Time sets a time and date for automatic power on. Second cannot be set. When this option is set to "Disabled", the time for automatic power on is not set.

Alarm Date Option sets a month and date in order for automatic power on. When Alarm Time is set to "Disabled", month and date for automatic power on is not set.

Ring Indicator turns on the power automatically when receiving a call from the line. This item is displayed only in resume mode. A PC card type modem is required for this option. When your computer has no modem, this option is not displayed.

Wake-up on LAN automatically turn on the computer when accessed by the administrator of LAN. When Built-in LAN is "Enabled", this option can be set to "Enabled". AC adapter is required for this option.

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 the resume function will be lost. You must also reset this option.*
2. This option is enabled only once, the setting is reset after booting up

(f) Sound Logo

This option specifies whether to sound at booting.

Enabled   Sounds.

Disabled   Does Not sound.

(g) Power Button Lamp

This option specifies a lamp pattern of power button.

Table 3-7 Lamp pattern of power button

Status	Power ON	Standby	Power off/halt
Mode 1(default)	Lights blue.	Lights yellow.	Lights orange.
Mode 2	Lights blue.	Lights green and orange alternately.	Lights green and blue alternately.
Mode 3	Blinks in order of green, orange and blue	Lights yellow.	Lights orange.
Off	Does not light.		

When the AC adapter and battery pack are removed, once the setting returns to Mode1 (default). After turning on the power of the computer again, the setting returns to the one before the AC adapter and battery pack are removed.

(h) Panel Power On/Off

This option is displayed in the resume mode.

Enabled   Enables the Panel Power On/Off.

Disabled   Disables the Panel Power On/Off. (Default)

8. Configuration

This option lets you set the device configuration.

Setup by OS   Operating system sets devices that it can control. (Default)

All Devices   BIOS sets all devices.

Note: When using installed OS, selecting "Set by OS" is recommended. But, when setting "PC CARD-Controller Mode" to other than " Auto-Selected", select " All Devices".

9. DRIVES I/O

This option set the HDD, CD-ROM and PC card.

(a) Build-in HDD

Displays an address and interrupt level for the hard disk drive.

(b) CD-ROM

Displays an address and interrupt level for the CD-ROM drive.

(c) PC Card

Displays an address and interrupt level for a PC card type of hard disk drive that can boot the computer, when the computer is booted by the drive.

10. PCI Bus

This option displays the interrupt level for the PCI Bus in the computer. It is for information only and cannot be changed.

```
PCI BUS    = IRQ11
```

11. PC Card

This option displays the PC Card Controller mode. When "Device Config." is set to "All Devices", it can be changed.

Auto-Selected	Use this setting when OS supports Plug&Play. (Default)
Card Bus/16 bit	Use this setting when Cared Bus does not work properly in "Auto-Selected.
PCIC Compatible	Use this setting when Cared Bus does not work properly in "Auto-Selected" or PC card supports 16-bit.

12. Peripheral

This option set the HDD and other devices.

(a) Internal Pointing Device

Enabled	Enables touch pad. (Default)
Disabled	Disables touch pad.

*Note: If **Disabled** is select, the touch pad can not be on or off on Windows..*

(b) Hard Disk Mode

Use this item to select the hard disk mode.

`Enhanced IDE (Normal) :`

Select this mode when the HDD is used for Windows XP Tablet PC Edition.
(Default)

`Standard IDE :`

Select this mode when using an OS which does not support the Enhanced IDE.
When this mode is selected, up to 528MB is logically available and the rest of the
capacity is not usable.

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

---

13. LEGACY EMULATION

(a) USB KB/Mouse Legacy Emulation

This option sets the Legacy support condition of the USB keyboard and the USB
mouse.

Enabled   Enables LEGACY support. (Default)
                     USB keyboard/USB mouse are available without the driver.

Disabled   Disables LEGACY support.

(b) USB-FDD Legacy Emulation

This option sets the Legacy support condition of the USB floppy disk drive.

Enabled   Enables LEGACY support. (Default)
                     USB floppy disk is available without the driver.

To start the computer by FD, set this option to "Enabled".

Disabled   Disables LEGACY support.

14. PCI LAN

This option sets the Enable / Disable of the built-in LAN functions.

Enabled   Enables built-in LAN functions. (Default)

Disabled   Disables built-in LAN functions.

Chapter 4

Replacement Procedures

Chapter 4　　Contents

Figures

4.1 Overview

This chapter describes the procedure for removing and replacing the field replaceable units (FRUs) in the PC. It may not be necessary to remove all the FRUs in order to replace one. The chart below provides a guide as to which other FRUs must be removed before a particular FRU can be removed. The numbers in the chart indicate the relevant section numbers in this manual.

In all cases when removing an FRU, the battery pack must also be removed. When repairing an FRU that is the potential cause of a computer fault, use the chart to determine the order in which FRUs need to be removed.

4.2 Battery Pack	
4.3 PC card 4.4 SD card 4.5 Connector panel	4.22 LCD unit / FL inverter
4.6 Keyboard holder / Keyboard	
4.7 Optical drive 4.8 Palmrest / Touchpad 4.9 Memory module	4.25 Flourecent lamp
4.10 HDD 4.11 Wireless LAN Module 4.12 MDC 4.13 RTC battery 4.14 Built-in microphone / Cover latch 4.15 Bluetooth module	
4.16 Cover assembly	
4.17 LED board 4.18 System board 4.20 CPU fan 4.21 Speaker 4.23 LCD cable / Wireless LAN antenna / Bluetooth antenna	
4.19 Second Battery CPU/Heatsink 4.24 Hinge assembly	

■Chart Notation
This chart shows which unit(s) you need to remove in advance when you replace one unit.

Example:
When you wan to replace HDD, you need to remove units in the hatched boxes above the boxes in which the HDD is.
You do not remove the LCD unit and Fluorescent lamp.

| 4.10 HDD   4.11 Wireless LAN Module   4.12 MDC   4.13 RTC battery
4.14 Internal microphone / Cover latch   4.15 Bluetooth module |
| 4.16 Cover assembly |
| 4.17 LED board   4.18 System board   4.20 CPU fan   4.21 Speaker   4.23 LCD cable / Wireless LAN antenna / Bluetooth antenna |
| 4.19 Second Battery CPU/Heatsink   4.24 Hinge assembly |

Safety Precautions

Please read the following safety instructions before disassembling the computer and always follow the instructions while working on the computer.

Danger: 1. *In the case of the battery, always use authentic parts or equivalent parts approved by Toshiba. Other batteries may have different specifications that are incompatible with the computer and may result in fire or explosion. Due to the risk of alkali fluid leaks, never attempt to heat or disassemble the battery. Similarly, due to the risk of explosion, never expose the battery to flame.*

          2. *Some parts including the power supply and FL inverter generate high voltages. If you need to turn on the power while disassembling the computer, do not touch any connectors or other components due to the risk of electric shock. Also, do not disassemble individual parts when performing routine maintenance.*

Warning: 1. *To prevent electric shock, turn off the power and unplug the AC adapter from the power source.*

          2. *As the battery installed to the computer is typically already charged, the risk of electric shock remains even when the AC adapter is unplugged from the socket. To prevent electric shock, always take off any metal jewelry or accessories such as necklaces, bracelets or rings before working on the computer. Never work with wet or moist hands.*

          3. *Take care not to injury yourself on any edges or corners.*

Caution: 1. *Confirm that replacement parts have compatible specifications before replacing on the computer. Never use incorrect parts as these may cause faults on the computer.*

          2. *To prevent internal damage such as short circuits or burning, do not allow any screws, paper clips, or other metal objects to fall into the computer. When removing screws, always replace with the same size screw. Ensure that all screws are fully tightened. Loose screws may result in short circuits leading to overheating, smoke or flame.*

          3. *To prevent electric shock, check that you have disconnected all cable from a part before removing the part.*

          4. *When connecting to the AC power supply, use only an AC adapter and cable approved by Toshiba.*

          5. *To prevent electric shock, ensure that all replacement parts are compatible with the computer and that all cables and connectors are securely connected.*

Before You Begin

Take note of the following points before starting work. Always remove the AC adapter and battery pack before commencing any of the procedures. The procedure for removing the battery pack is described in section "4.2.1 Battery Pack".

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

2. Use the designated tools.

3. Ensure that the environment for working on and storing parts does not contain any of the following.

    - θ   Dust or dirt
    - θ   Static electricity
    - θ   Extremely hot, cold, or humid conditions

4. Perform the diagnostic tests described in Chapter 2 to determine which FRU is the cause of the fault.

5. Do not perform any unnecessary work. Always work in accordance with the disassembly and re-assembly procedures in this manual.

6. Keep parts removed from the computer in a safe place away from the computer where they will not be damaged or interfere with your work.

7. Disassembling requires the removal of a large number of screws. Keep removed screws in a safe place such that you can determine which screws belong to which part.

8. When reassembling, ensure that you use the correct screws and fit parts in the correct position. Screw sizes are noted in the text and figures.

9. As all parts have sharp edges and corners, take care not to cut yourself.

10. After replacing an FRU, check that the computer and replaced part operate correctly.

Disassembly Procedures

Three main types of cable connector are used.

- θ   Pressure plate connector
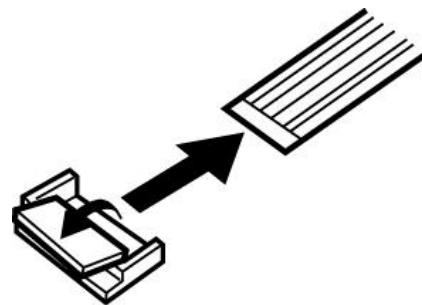- θ   Spring connector
- θ   Normal pin connector

When disconnecting a pressure plate connector, draw the tab on one side of the plastic pressure plate on the connector and pull the cable out from the connector. When reconnecting a cable to a pressure plate connector, draw enough the pressure plate and insert the cable into the connector. Press both sides of the pressure plate such that both sides of the plate and connector are at the same height and that the cable is fixed in the correct position. Pull the cable to ensure that it is securely connected. If the cable is disconnected from the connector, reconnect it making sure that you draw enough the pressure plate to insert fully the cable.

For spring connectors, lifting up the stopper frees the cable and allows it to be pulled out. To reconnect, hold the stopper in the up position and insert the cable, then lower the stopper to secure the cable.

Normal pin connectors are used for all other cables. Simply pull out or push in these connectors to disconnect or reconnect.
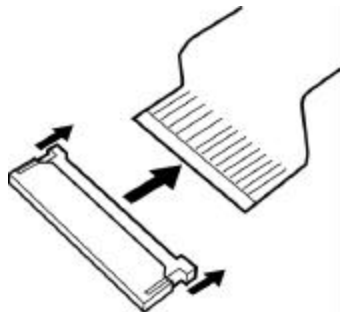
Pressure plate connector   Spring connector

Assembly Procedures

After the computer has been disassembled and the part that caused the fault has been repaired or replaced, the computer must be reassembled.

Take note of the following general points when assembling the computer.

- θ   Take your time and follow the instructions carefully. Hurrying the assembly work will only introduce new problems.

- θ   Check that all cables and connectors are securely connected.

- θ   Before fastening FRUs or other parts in place, ensure that no cables are caught on screws or the FRU.

- θ   Check that all latches are securely closed.

- θ   Ensure that you have installed all FRUs correctly and do not have any screws left over. Using an incorrect screw may damage the thread or screw head and result in the FRU not being securely fastened in place.

After installing FRUs, check that the computer operates correctly.

Tools and Equipment

For your safety and the safety of the people around you, it is important that you use Electrostatic Discharge (ESD) equipment. Correctly utilizing of the equipment increases the percentage of successful repairs and saves on the cost of damaged or destroyed parts. The following equipment is required for disassembly and assembly.

- θ   One Philips screwdriver with type 0 bit (for FLAT BIND screws)

- θ   One Philips screwdriver with type 1 bit (for screws other than above)

- θ   Tweezers (for lifting screws)

- θ   ESD mats (lay on work table or floor)

- θ   An ESD wrist strap and heel grounder

- θ   Anti-static carpet or flooring

- θ   A pair of needle-nose pliers

Screw Tightening Torque

Use the following torque when tightening screws.

> ***Caution****: Overtightening may damage screws or parts. Undertightening may allow screws to loosen (and possibly fall out) causing a short circuit or other damage.*

> ***Note****: To tighten screws quickly and accurately, an electric screwdriver is recommended.*

- θ M2 (2mm)   0.167 N•m (1.7 kgf •cm)

- θ M2.5 (2.5mm) 0.294 N•m(3.0 kgf•cm)

> ***Note:*** *To prevent damage to THIN HEAD screws, use type 0 pit Philips screwdriver. Use, however, the PH point size "1" screwdriver for screws fixing the expansion memory slot cover and the keyboard. Press along the axis of the screwdriver while turning the screw. This is because the contact area between the screw and driver is less than for a pan head screw (standard pan-shaped screw head).*
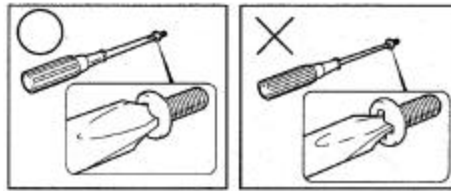
Grip Color

Some screws have a colored grip area to help you determine the length of the screw.

- θ   Even numbered length screws: Brown

- θ   Odd numbered length screws: White

- θ   Special length screw: Blue

"Special length screw" means screws whose length is indicated in an integral number to the first decimal places such as 2.5 mm, 2.6 mm and so on.

Grip area

Screw Notation

To make maintenance of the computer easier, markings of the kinds of the screws including the types and lengths of the screws are indicated on the computer body.

Format:

> Screw shape + Screw length (mm)

Screw shape

> B: Bind screw
> F: Flat bind screw
> S: Super thin head screw
> T: Tapping screw
> U: Other screws (Unique screws: pan head, stud, etc.)

Example: B6 ... 6mm BIND screw

4.2 Battery pack

Removing the battery pack

The following describes the procedure for removing the battery pack. (See Figure 4-1.)

Caution: *Take care not to short circuit the terminals when removing the battery pack.*
Similarly, do not drop, knock, scratch, disassemble, twist, or bend the battery
pack.

---

1. Turn off the power of the computer.

2. Disconnect the AC adapter and all other external devices from the computer.

3. Turn the computer upside down.

4. Slide the battery latch in the direction indicated by the arrow to loosen the lock. Pull
   out the battery to remove.

Battery pack   Battery latch
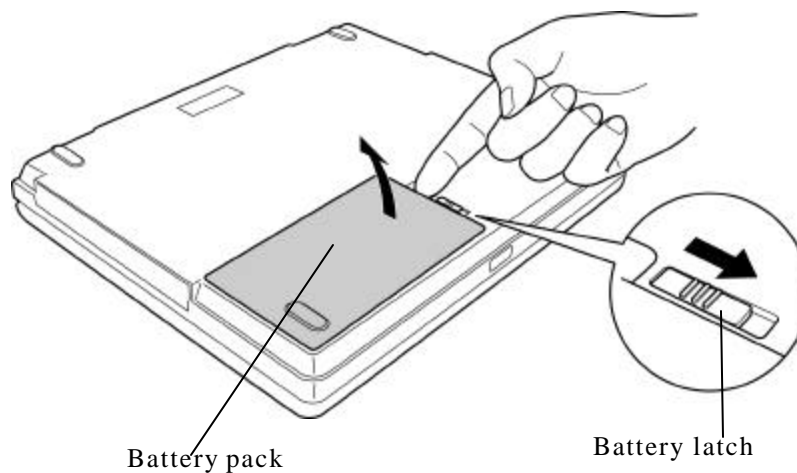
Figure 4-1 Removing the battery pack

Note: *Dispose of the used battery pack in accordance with the laws and ordinances of*
your local authority.

---

5. Remove the battery from the battery cover.

Installing a battery pack

The following describes the procedure for installing a battery pack. (See Figure 4-2.)

Caution: There is a danger that the lithium ion battery pack may explode if not fitted, operated, handled, or disposed correctly. Dispose always the used batteries pack in accordance with the laws and ordinances of your local authority. Use only the batteries approved by Toshiba.

Note: Check visually the battery terminals and clean off any dirt with a dry cloth.

1. Turn off the power of the computer.

2. Connect the AC adapter and all other external devices to the computer.

3. Turn the computer upside down.

4. Se the battery to the battery cover.

5. Inset the connector of the battery to the connector of the computer. Press the battery pack until the battery is locked.
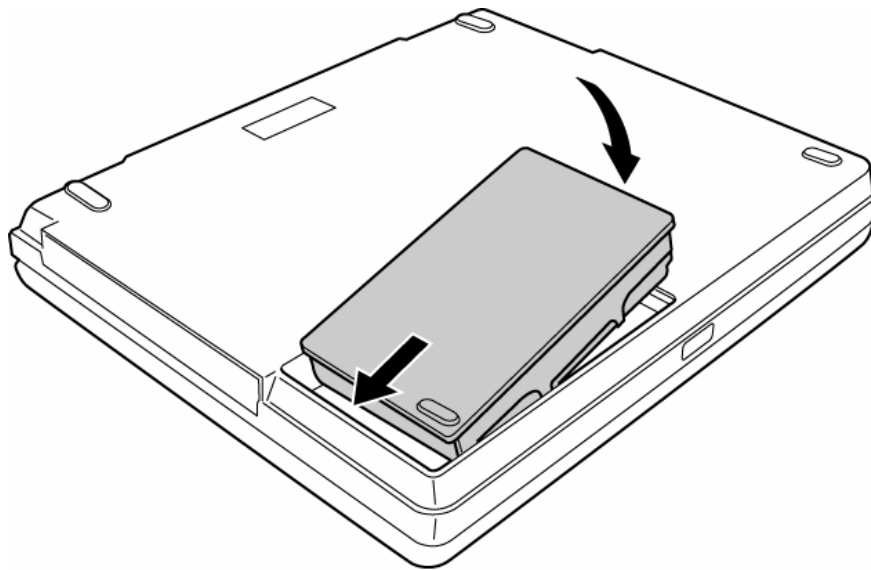
Figure 4-2 Installing a battery pack

4.3 PC card

Removing the PC card

The following describes the procedure for removing the PC card. (See Figure 4-3.)

> *Caution:*   *Insert or remove the PC card in accordance with any instructions in the PC card manual or the manuals of the computer system you are using.*

1. Push the eject button. It will pop out when you release it. Press it once more to eject the PC card.
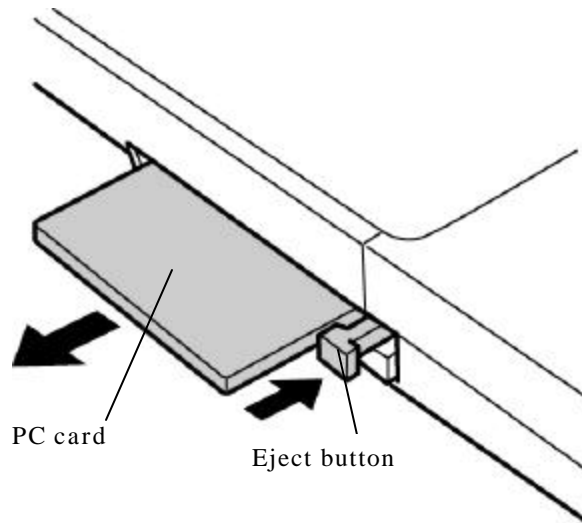
2. Pull out the PC card and remove it.

PC card

Eject button

Figure 4-3 Removing the PC card

Installing a PC card

The following describes the procedure for installing the PC card. (See Figure 4-3)

1. Make sure the eject button does not stick out.

2. Insert the PC card and press it until it is securely connected.

4.4   SD memory card

Removing the SD memory card

The following describes the procedure for removing the SD memory card. (See Figure 4-4.)

> *Caution:*   *Insert or remove the SD memory card in accordance with any instructions in the SD memory card manual or the manuals of the computer system you are using.*

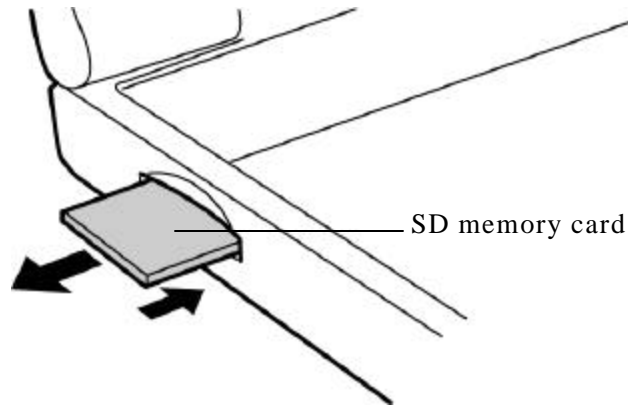1. Push the SD memory card. It will pop out partly when you release, so pull out the card.

Figure 4-4 Removing the SD memory card

Installing a SD memory card

The following procedure describes the procedure for installing a SD memory card. (See Figure 4-4.)

1. Insert the SD memory card and press it until it securely connected.

4.5 Connector panel

Removing the connector panel

The following describes the procedure for removing the connector panel. (See Figure 4-5.)

1. Open the connector panel.

2. Push the center of the connector panel to bend it and remove the connector panel.
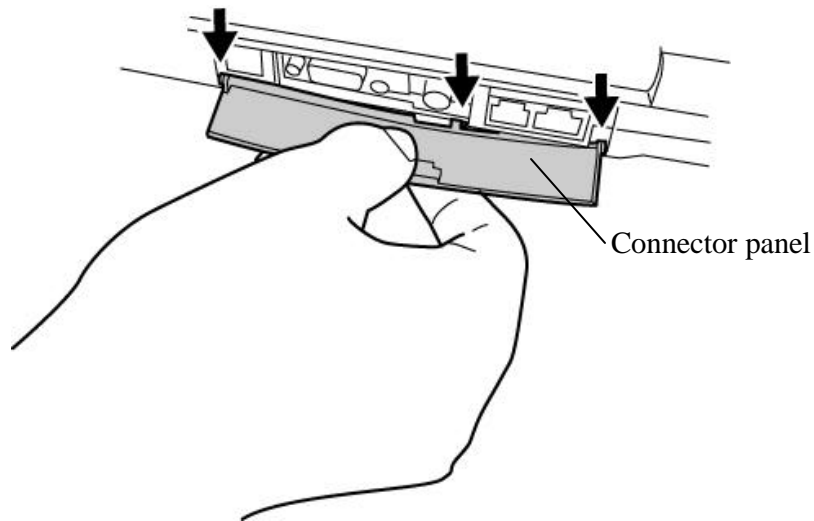

Figure 4-5 Removing the connector panel

Installing a connector panel

The following procedure describes the procedure for installing a connector panel. (See Figure 4-5.)

1. Bend slightly the connector panel at the center. Insert the ends of connector panel to the installing holes of base.
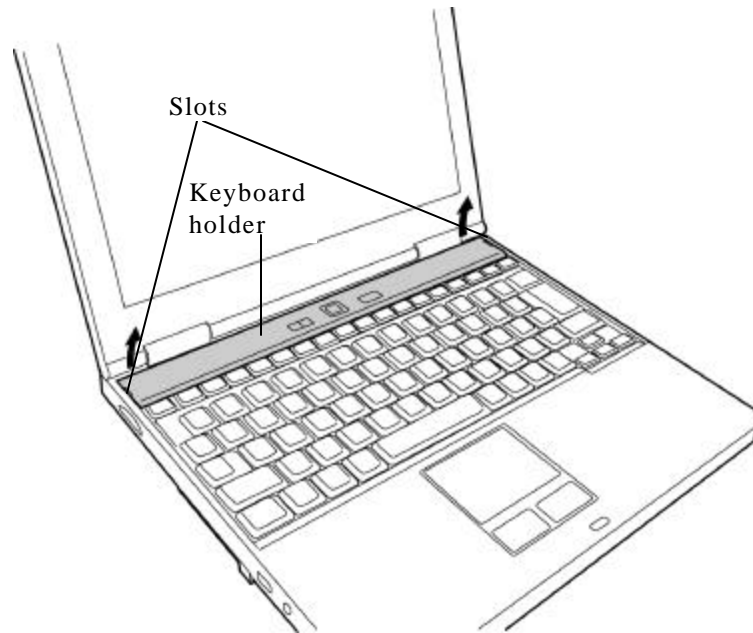
2. Close the connector panel.

4.6   Keyboard holder/Keyboard

4.6.1   Keyboard holder

Removing the keyboard holder

The following describes the procedure for removing the keyboard holder. (See Figure 4-6.)

1. Open the display.

2. Insert your fingers to the slots at the both sides and lift up the keyboard holder.

Figure 4-6 Removing the keyboard holder

Installing a keyboard holder

The following describes the procedure for installing a keyboard holder. (See Figure 4-6.)

1. Hook the latches at the bottom of the keyboard holder first.

2. Push down the upper side of the keyboard holder.

4.6.2 Keyboard

Removing the keyboard

The following describes the procedure for removing the keyboard. (See Figure 4-7, 4-8.)

1. Remove the following screws fixing the keyboard.
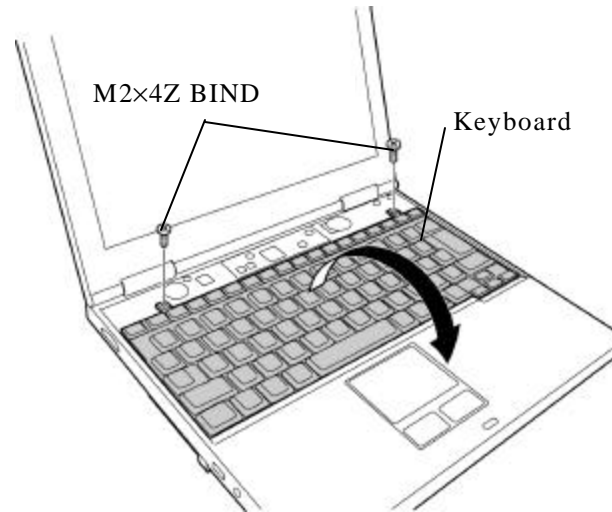
    - M2×4Z   BIND screw   x2

Figure 4-7 Removing the keyboard

2. Lift the upper side of the keyboard and pull down to the front.

3. Remove the keyboard cable from the connector PJ3200 on the system board.
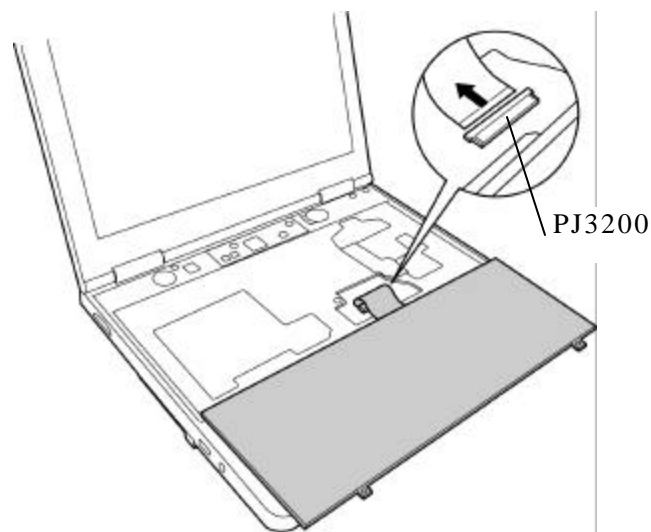

Figure 4-8 Removing the connector

   4. Remove the keyboard.

Installing a keyboard

The following describes the procedure for installing a keyboard. (See Figure 4-7, 4-8.)

   1. Set the keyboard on the palm rest with the back up and connect the keyboard cable to
       the connector PJ3200 on the system board.

   2. Turn down the keyboard on the palm-rest and insert the latches under the palm rest.

   3. Fix the keyboard with the following screws.

       - M2×4Z   BIND screw   x2

4.7   Optical drive

Removing the optical drive

The following describes the procedure for removing the optical drive. (See Figure 4-9,4-23.)
The optical drive can be removed and installed with the battery pack (4.2) and keyboard (4.6)
removed.

1. Remove the following screw (figure 4-23, ③) fixing the optical drive.

    - M2.5×12B   FLAT BIND screw   x1

2. Insert a screwdriver into the hole from the space for a battery pack to push the rear of
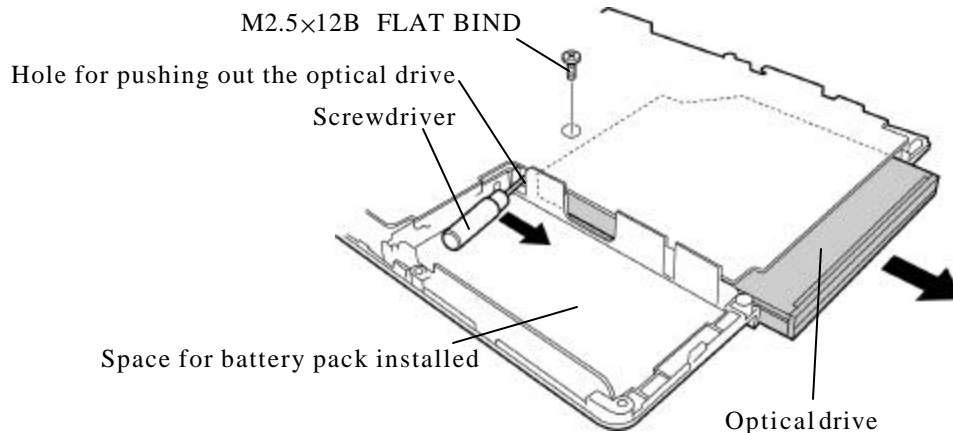   the optical drive.

Figure 4-9 Removing the optical drive

Installing an optical drive

The following procedure describes the procedure for installing an optical drive. (See Figure
4-9,4-23.)

1. Insert the optical drive into the slot and push it slowly until it is surely connected to
    the system board.

2. Fix the optical drive with the following screw.

    - M2.5×12B   FLAT BIND screw   x1

4.8 Palm rest/Touch pad

4.8.1 Palm rest

Removing the palm rest

The following describes the procedure for removing the palm rest. (See Figure 4-10, 4-11.)

> ***Caution:*** *The touch pad is stuck to the palm rest with adhesives, so it can not be removed. When a touch pad is broken, replace a palm rest with a touch pad.*

1. Turn over the computer and remove the following screw fixing the palm rest.
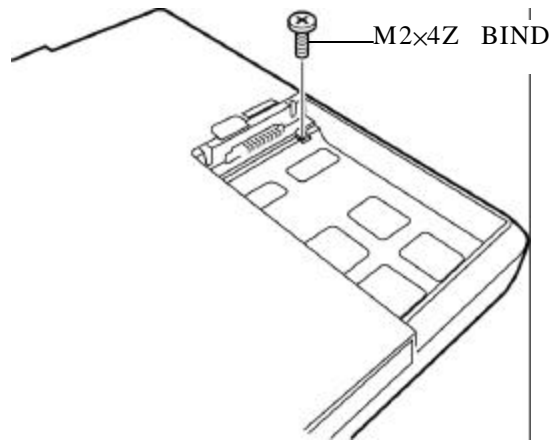
- M2×4Z BIND screw x1

Figure 4-10 Removing the screw

2. Turn over the computer and remove the cable from the connector PJ3201 on the system board.

3. Remove the following screws fixing the palm rest.

 - M2×3C   S-THIN screw   x2
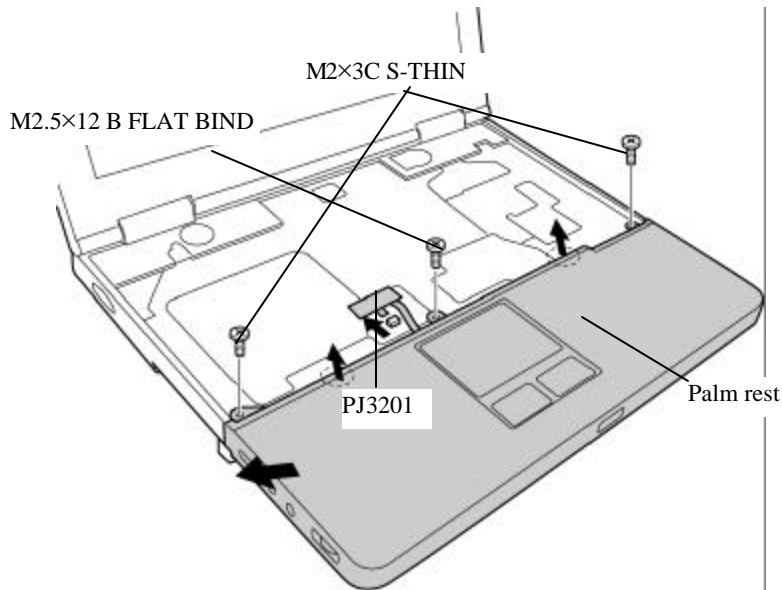
 - M2.5×12B   FLAT BIND screw   x1

Figure 4-11 Removing the palm rest

4. Remove the two latches on the upper side of palm rest and remove the palm rest toward the left upper.

Installing a palm rest

The following describes the procedure for installing a palm rest. (See Figure 4-10, 4-11.)

1. Set the palm rest from the left side while fitting the two holes of palm rest to the audio jacks on the system board.

Caution: *When setting the palm rest, fit the position of wireless LAN switch on the system board and the position of slider on the palm rest.*

2. Fix the palm rest with the following screws.

 - M2×3C   S-THIN screw   x2

 - M2.5×12B   FLAT BIND screw   x1

3. Connect the cable to the connector PJ 3201 on the system board.

4. Turn over the computer and fix the palm rest with the following screw.

- M2×4Z   BIND screw   x1

4.8.2   Touch pad

Removing the touch pad board

The following describes the procedure for removing the touch pad board. (See Figure 4-12.)

Caution:	*The touch pad board can be replaced, but the touch pad is stuck to the palm rest with adhesives, so it can not be removed. When a touch pad is broken, replace with a palm rest and a touch pad. A service part of a touch pad is not stuck to a palm rest, so before installing, a touch pad should be stuck to the palm rest.*

1. Remove the flat cables connected to the system board and touch pad.

2. Remove the following screws fixing the touch pad board.

- M2×3C   S-THIN screw   x2
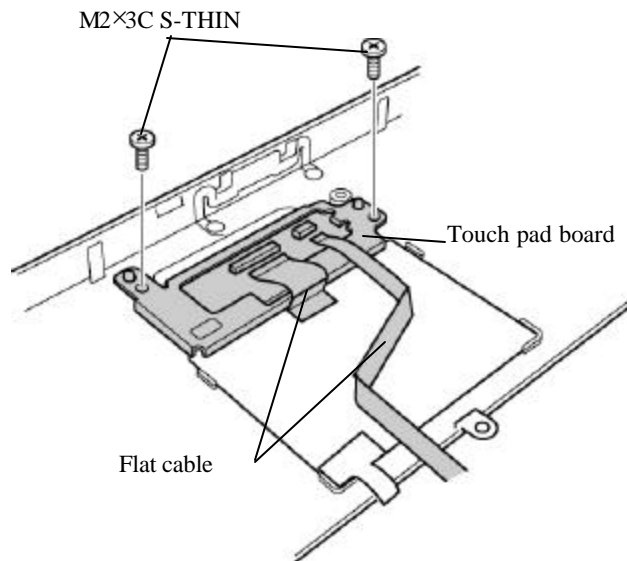
3. Remove the touch pad board.

Figure 4-12 Removing the touch pad board

Installing a touch pad board

The following describes the procedure for installing a touch pad board. (See Figure 4-12.)

1. Hook the hole of the metal of the touch pad board to the latch of the touch pad and set the touch pad board.

2. Fix the touch pad board with the following screws.

   - M2×3C   S-THIN screw   x2

3. Connect the two flat cables.

4.9 Memory module

> ***Caution:***   *The power must be turned off when you remove the memory module.*
> *Removing a memory module with the power on risks damaging the module or*
> *the computer itself.*
>
> *Do not touch the memory module terminals. Any dirt on the terminals may*
> *cause memory access problems.*
>
> *Never press hard or bend the memory module.*

Removing the memory module

To remove the memory module(s), confirm that the computer is in boot mode. Then perform
the following procedure. (See Figure 4-13.)

1. Turn up the insulator and open the latches fixing the memory module.
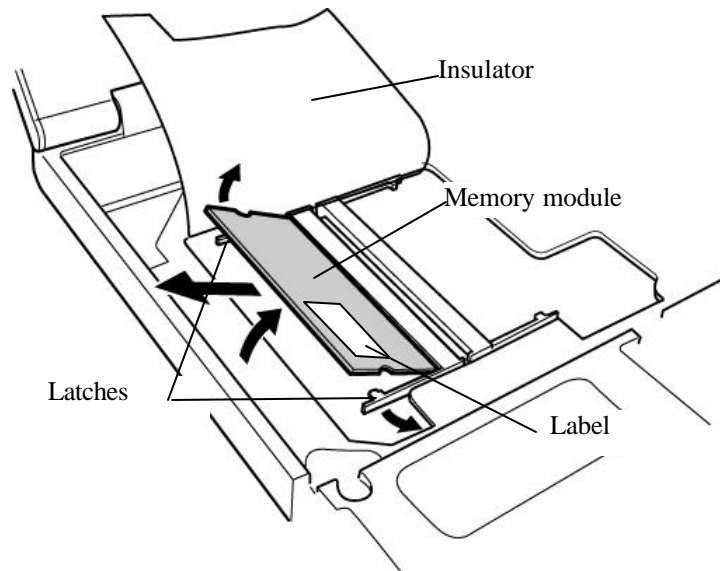
2. Remove the memory module.

Figure 4-13 Removing the memory module

Installing a memory module

To install a memory module(s), confirm that the computer is in boot mode. Then perform the
following procedure. (See Figure 4-13.)

1. Turn up the insulator and insert the memory module into the connector of the
   computer slantwise with the label up and press it to connect firmly.

2. Push down the memory module until it is latched firmly

Caution: *The power must be turned off when you insert the memory module. Inserting a memory module with the power on risks damaging the module or the computer itself.*

                  Never press hard or bend the memory module.

4.10 HDD

Removing the HDD

The following describes the procedure for removing the HDD. (See Figure 4-14, 4-15.)

> *Caution:*   *Take care not to press on the top or bottom of the HDD. Pressure may cause data loss or damage to the device.*

1. Remove the following screw fixing the HDD slot cover and remove the cover.

   - M2.5×12B   FLAT BIND screw   x1

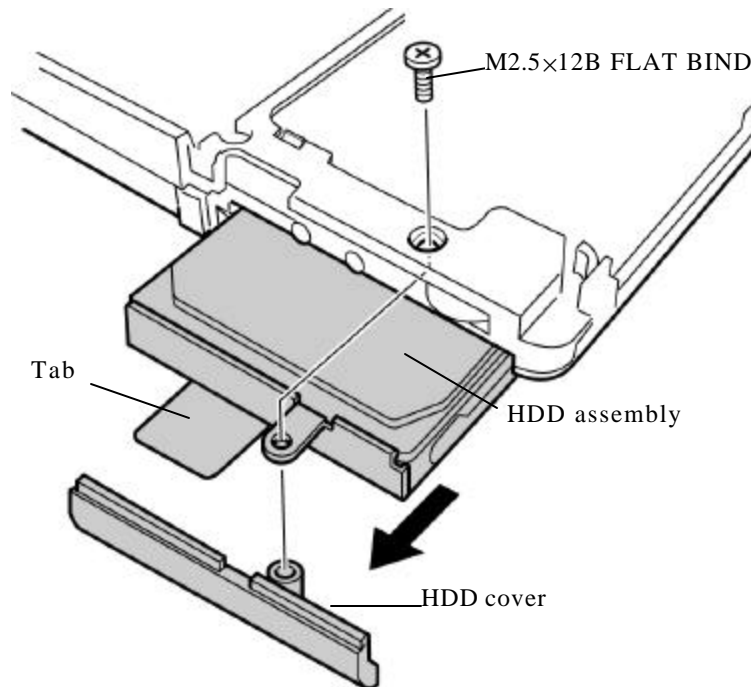2. Hold the HDD tab and pull out the HDD assembly.

Figure 4-14 Removing the HDD assembly

3. Remove the following screws fixing the HDD bracket.

   - M3×4S   FLAT BIND screw   x4

4. Detach the HDD bracket from the HDD.
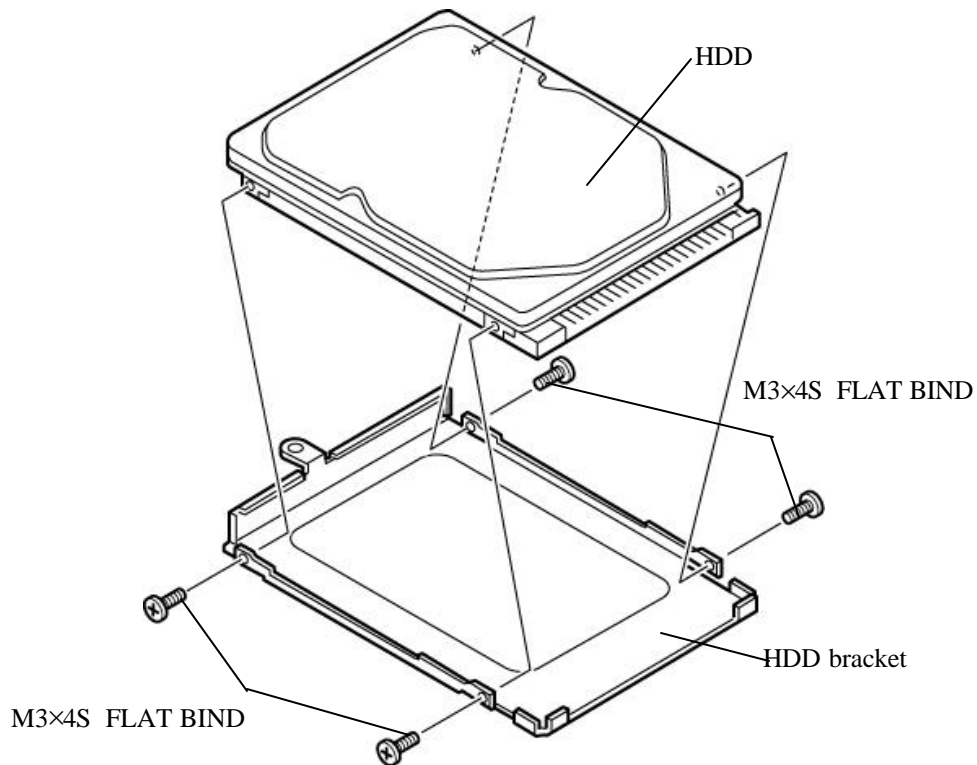
Figure 4-15 Removing the HDD

Installing a HDD

The following describes the procedure for installing a HDD. (See Figure 4-14, 4-15.)

1. Fix the HDD bracket to the HDD with the following screws.

   • M3×4S   FLAT BIND screw   x4

2. Insert the HDD assembly into the HDD slot. Insert the tab into the gap between the chassis of the computer and the HDD assembly.

3. Install the HDD cover from the bottom of the computer and secure it with the following screw.

   • M2.5×12B   FLAT BIND screw   x1

4.11 Wireless LAN module

Removing the wireless LAN module

To remove the wireless LAN module, perform the following procedure. (See Figure 4-16.)

1. Peel off the glass tape on the wireless LAN antenna cables.

2. Remove the white and black antenna cables from the wireless LAN module.

3. Open the latches fixing the wireless LAN module and remove the wireless LAN module.

Figure 4-16 Removing the wireless LAN module
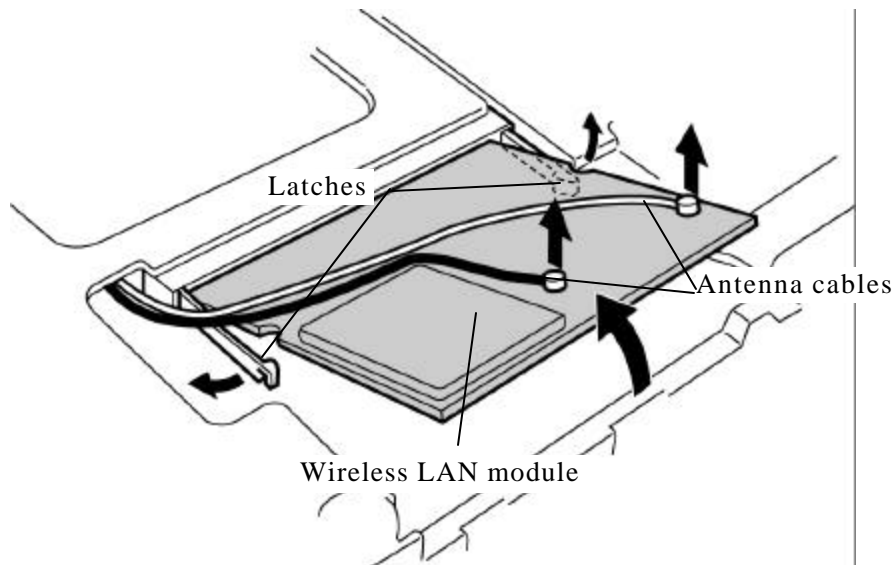
Installing a wireless LAN module

To install a wireless LAN module, perform the following procedure. (See Figure 4-16.)

1. Insert a wireless LAN module into the connector of the computer slantwise and press it to connect firmly.

2. Push down the wireless LAN module until it is latched firmly.

3. Connect the white and black antenna cables and fix them with glass tape.

4.12 MDC module

Removing the MDC module

To remove the MDC module, perform the following procedure. (See Figure 4-17.)

1. Remove the following screws fixing the MDC module.

    • M2×3C   S-THIN screw   x2

2. Remove the MDC cable from the MDC module.
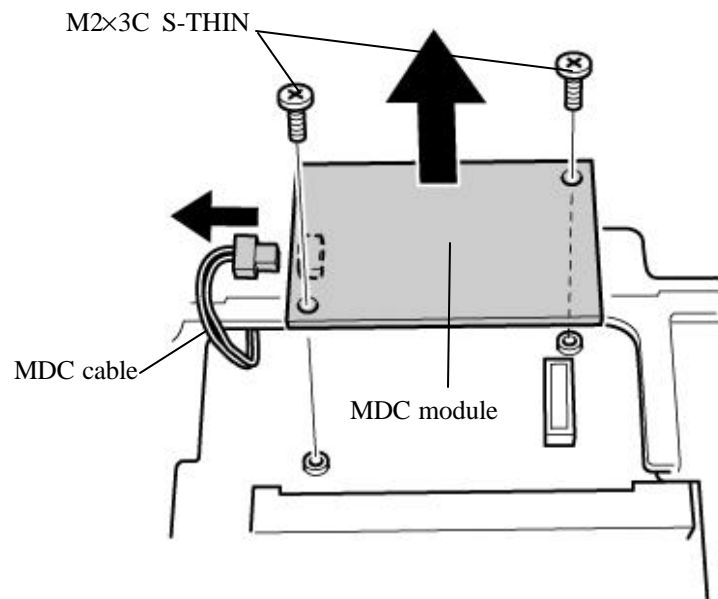
Figure 4-17 Removing the MDC module

Installing a MDC module

To install a MDC module, perform the following procedure. (See Figure 4-17.)

1. Fix the MDC module with the following screws.

    • M2×3C   S-THIN screw   x2

2. Connect the MDC cable to the MDC module.

4.13 RTC battery

Removing the RTC battery

To remove the RTC battery, perform the following procedure. (See Figure 4-18.)

1. Remove the RTC battery cable from the connector PJ8760 on the system board.

2. Turn up the insulator and remove the RTC battery.
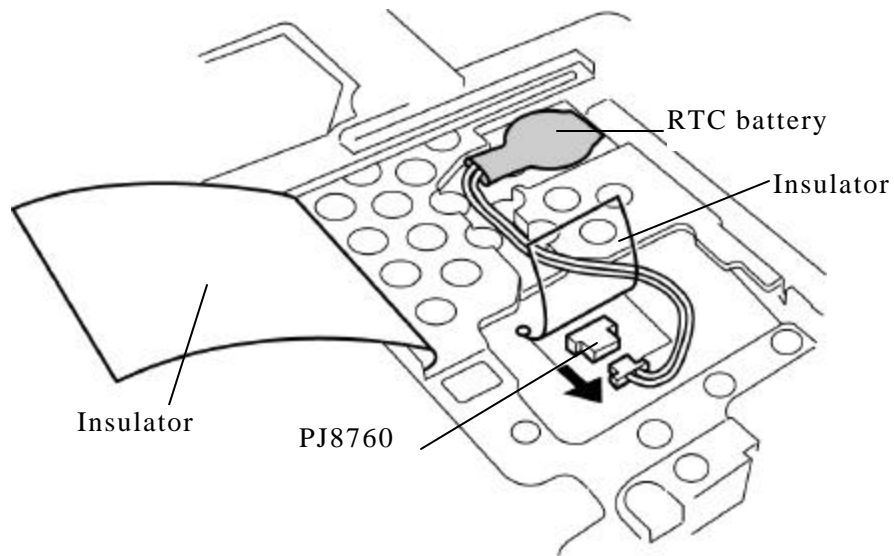
Figure 4-18 Removing the RTC battery

Installing a RTC battery

To remove a RTC battery, perform the following procedure. (See Figure 4-18.)

1. Connect the RTC battery cable to the connector PJ8760 on the system board.

2. Turn up the insulator and set the RTC battery in the slot.

4.14 Internal microphone/Cover latch

4.14.1 Internal microphone

Removing the internal microphone

To remove the internal microphone, perform the following procedure. (See Figure 4-19.)

1. Remove the internal microphone cable from the connector PJ6003 on the system board.

2. Remove the internal microphone from the slot.
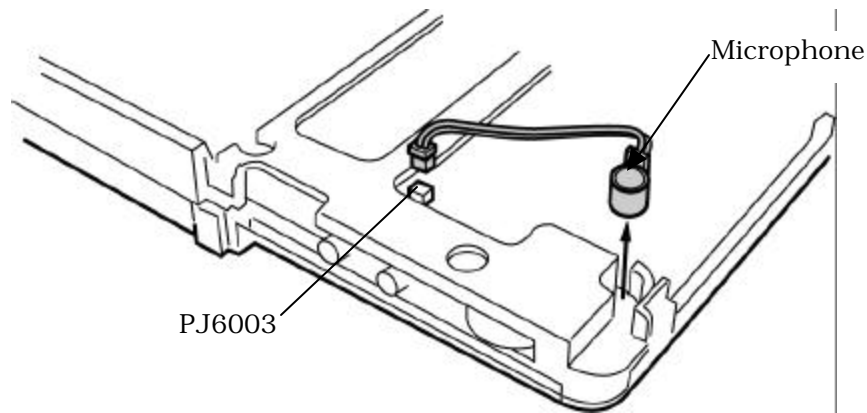
Figure 4-19 Removing the internal microphone

Installing an internal microphone

To installing an internal microphone, perform the following procedure. (See Figure 4-19.)

1. Insert the internal microphone into the slot.

2. Connect the internal microphone cable to the connector PJ6003 on the system board.

4.14.2 Cover latch

Removing the cover latch

To remove the cover latch, perform the following procedure. (See Figure 4-20.)

1. Remove the following screws fixing the cover latch.

    - M2.5×4Z   BIND screw   x2

2. Remove the cover latch.

M2.5×4Z BIND
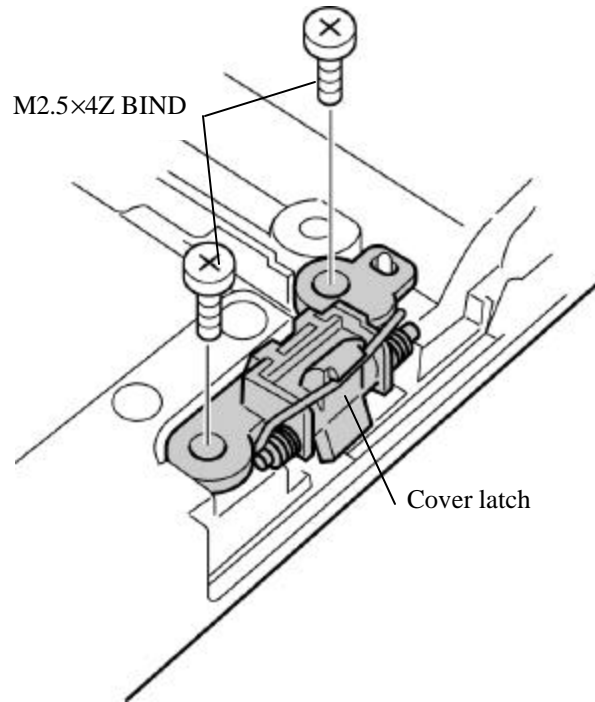
Cover latch

Figure 4-20 Removing the cover latch

Installing a cover latch

To install a cover latch, perform the following procedure. (See Figure 4-20.)

1. Set the cover latch.

2. Fix the cover latch with the following screws.

    - M2.5×4Z   BIND screw   x2

4.15 Bluetooth module

Removing the Bluetooth module

To remove the Bluetooth module, perform the following procedure. (See Figure 4-21.)

1. Remove the flat cable from the connector of the Bluetooth module.

2. Remove the following screw and Bluetooth module.

    - M2×3C   S-THIN screw   x1

3. Disconnect the bluetooth antenna cable from the Bluetooth module.
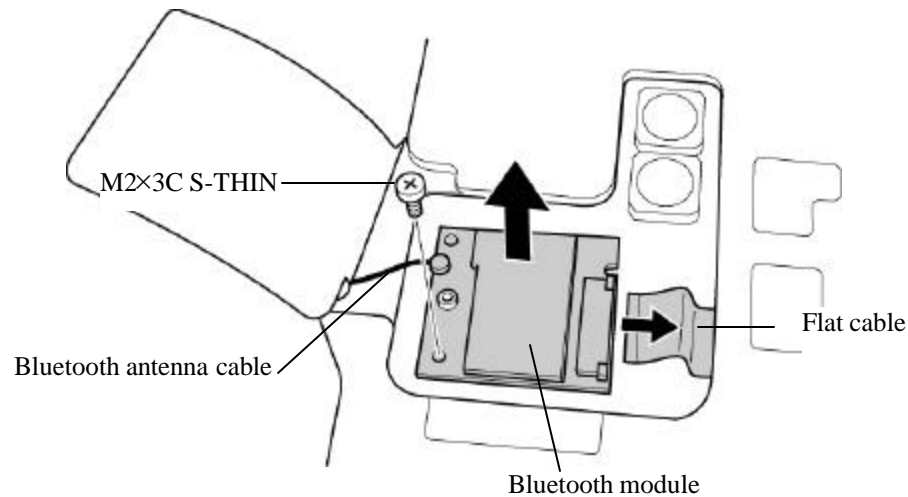
Figure 4-21 Removing the Bluetooth module

Installing a Bluetooth module

To install a Bluetooth module, perform the following procedure. (See Figure 4-21.)

1. Connect the bluetooth antenna cable to the Bluetooth module.

2. Fix a Bluetooth module with the following screw.

    - M2×3C   S-THIN screw   x1

3. Connect the flat cable to the Bluetooth module.

4.16 Cover assembly

Removing the cover assembly

To remove the cover assembly, perform the following procedure. (See Figure 4-22, 4-23, 4-24.)

1. Remove the LCD cable and LED board cable from the connectors PJ5600 and PJ9500 on the system board.

PJ5600 (LCD cable)

PJ9500 (LED board cable)
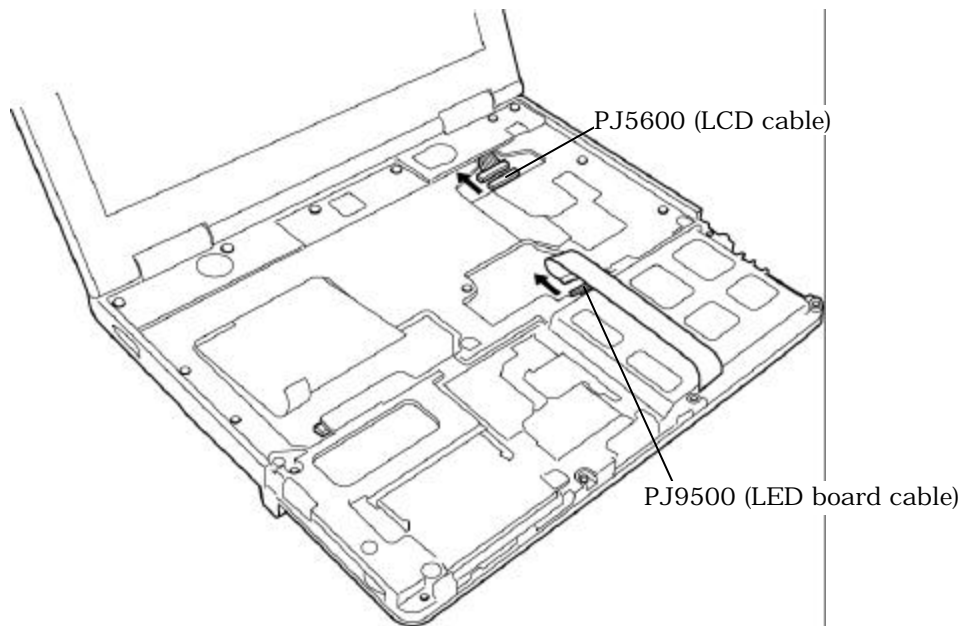
Figure 4-22 Removing the cables

2. Remove the following screws.

- M2.5×8B   BIND screw   x13   (①)

- M2.5×4B   FLAT BIND screw   x3   (②)

- M2.5×12B   FLAT BIND screw   x1   (③)
  (When the optical drive is not removed.)
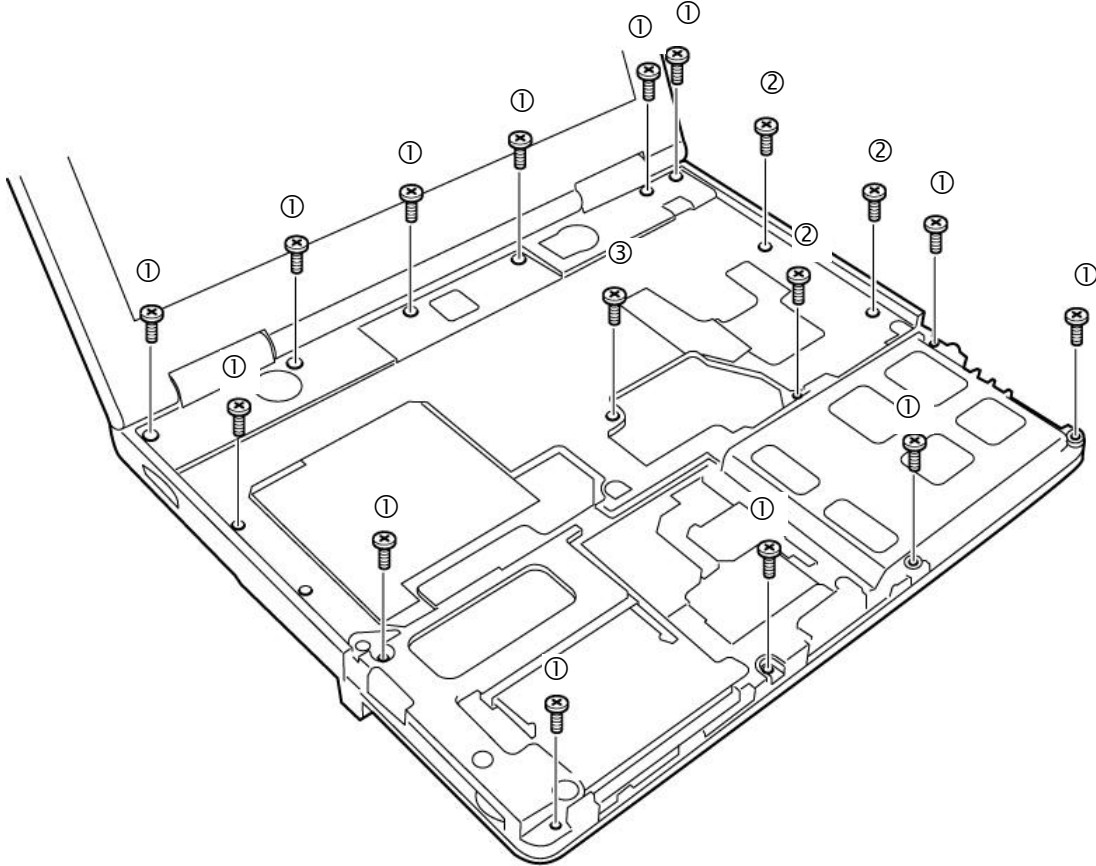
Figure 4-23 Removing the screws

3. Release the latches at left lower of the cover assembly and remove the cover assembly.
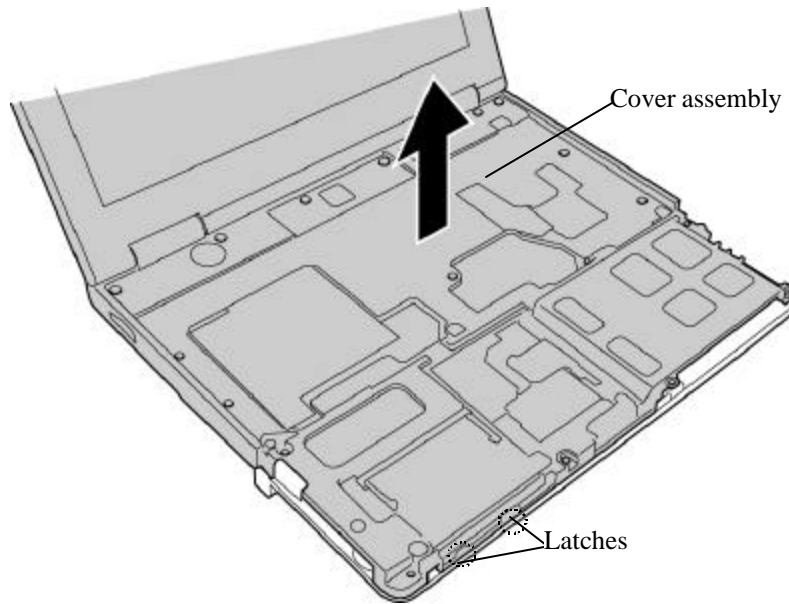
Figure 4-24 Removing the cover assembly

Installing a cover assembly

To install a cover assembly, perform the following procedure. (See Figure 4-22, 4-23, 4-24.)

1. Mount the cover assembly on the base assembly.

2. Fix the cover assembly with the following screws.

> - M2.5×8B   BIND screw   x13   (①)
>
> - M2.5×4B   FLAT BIND screw   x3   (②)
>
> - M2.5×12B   FLAT BIND screw   x1   (③)
>   (when the optical drive is not removed.)

3. Connect the LCD cable and LED board cable to the connectors PJ5600 and PJ9500 on the system board.

4.17 LED board

Removing the LED board

To remove the LED board, perform the following procedure. (See Figure 4-25.)

1. Remove the flat cable from the LED board.

2. Remove the LED board from the slot.
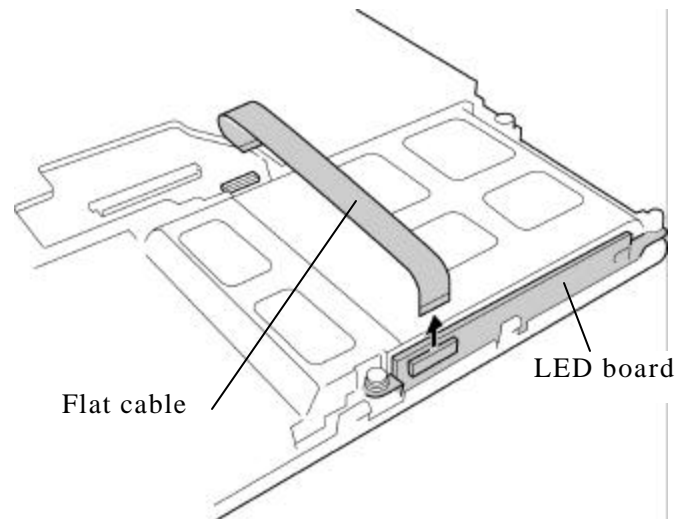
Figure 4-25 Removing the LED board

Installing a LED board

To install a LED board, perform the following procedure. (See Figure 4-25.)

1. Connect the flat cable to the connector on the LED board.

2. Insert the LED board into the slot.

4.18 System board

Removing the system board

To remove the system board, perform the following procedure. (See Figure 4-26.)

1. Open the insulator covering the connector PJ8770 on the system board.

2. Remove the CPU FAN cable from the connector PJ8770.

3. Remove the following screws fixing the system board.

   - M2.5×12B   FLAT BIND screw   x1

   - M2.5×4B   FLAT BIND screw   x1
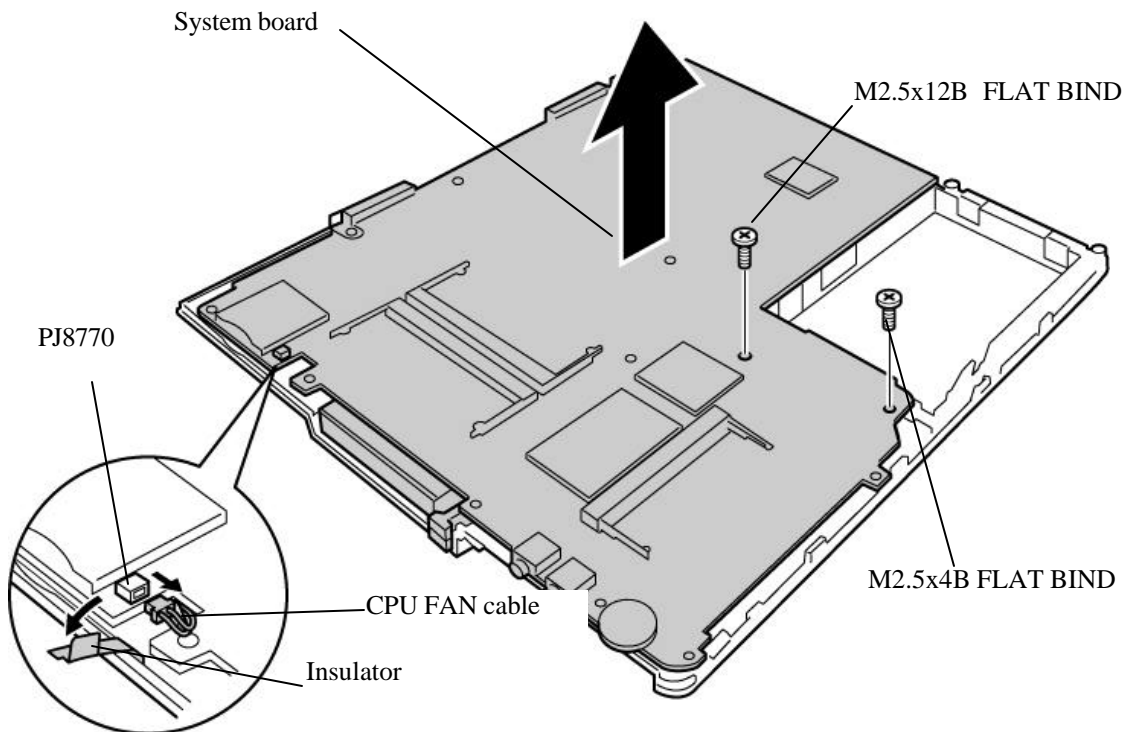
Figure 4-26 Removing the system board

Installing a system board

To install a system board, perform the following procedure. (See Figure 4-26.)

1. Set the system board on the base cover in place and fix it with the following screws.

    - M2.5×12B   FLAT BIND screw   x1

    - M2.5×4B   FLAT BIND screw   x1

2. Connect the CPU FAN cable to the connector PJ8770 on the system board.

3. Cover the connector PJ8770 with the insulator.

4.19 2nd Battery board/Heat sink/CPU

4.19.1 2nd Battery board

Removing the 2nd battery board

To remove the 2nd battery board, perform the following procedure. (See Figure 4-27.)

1. Remove the following screws fixing the 2nd battery board and remove the connector of the 2nd battery board from the connector PJ9501 on the system board then remove the 2nd battery board.

    •   M2.5×4B   FLAT BIND screw   x2
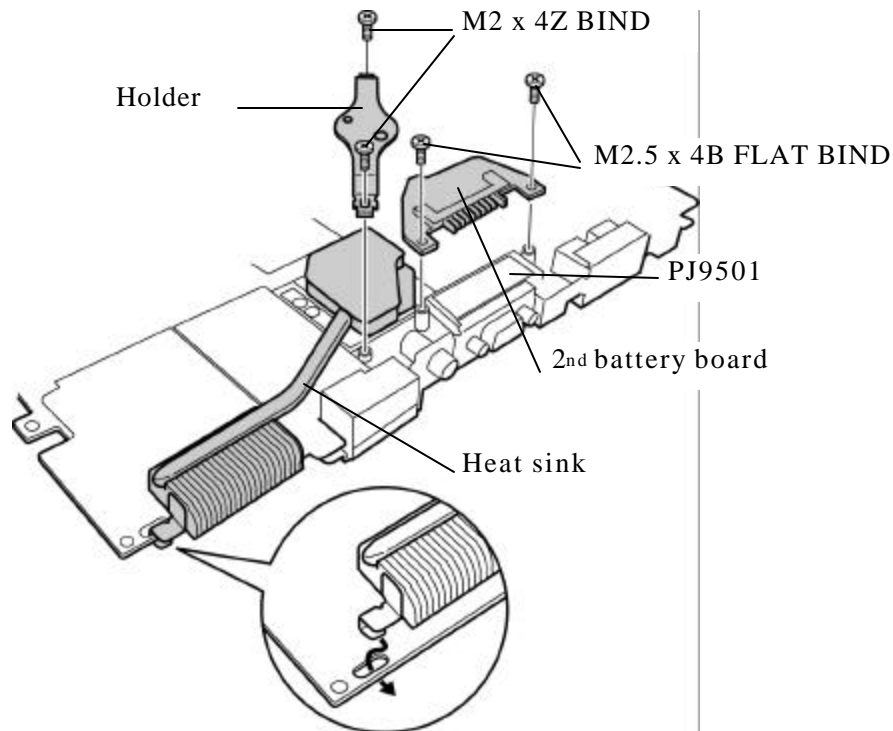
Figure 4-27   Removing the 2nd battery board/heat sink

Installing a 2nd battery board

To install a 2nd battery board, perform the following procedure. (See Figure 4-27.)

1. Insert the connector of the 2nd battery board into the connector PJ9501 on the system board and fix the 2nd battery board with the following screws.

    •   M2.5×4B   FLAT BIND screw   x2

4.19.2   Heat sink

Removing the heat sink

To remove the heat sink, perform the following procedure. (See Figure 4-27, 4-28.)

1. Remove the following screws fixing the heat sink and holder and remove the heat sink.

    - M2×4Z   BIND screw   x2

Installing a heat sink

To install a heat sink, perform the following procedure. (See Figure 4-27, 4-28.)

1. When silicon grease has already been applied to the fin of heat sink and face of CPU, remove them cleanly with a soft cloth. Apply silicon grease to the fin of heat sink and face of CPU by a dedicated injector. The face of CPU chip shall be covered completely with silicon grease.

Caution: *When using a dedicated injector, completely cover the face of CPU chip with silicon grease.*
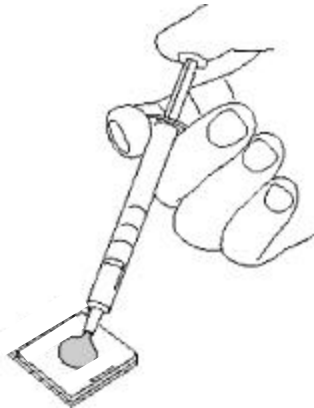
Figure 4-28 Applying silicon grease

2. Hook the latch of heat sink to the hole of the system board and set the heat sink on the CPU. Fix the holder with the following screws.

    - M2×4Z   BIND screw   x2

4.19.3 CPU

Removing the CPU

Caution: *The temperature of CPU may become high. Be sure to work after it has become low.*

To remove the CPU perform the following procedure. (See Figure 4-29.)

1. Turn the cam counterclockwise 90 degrees with a minus screwdriver to release the lock.

2. Remove the CPU.
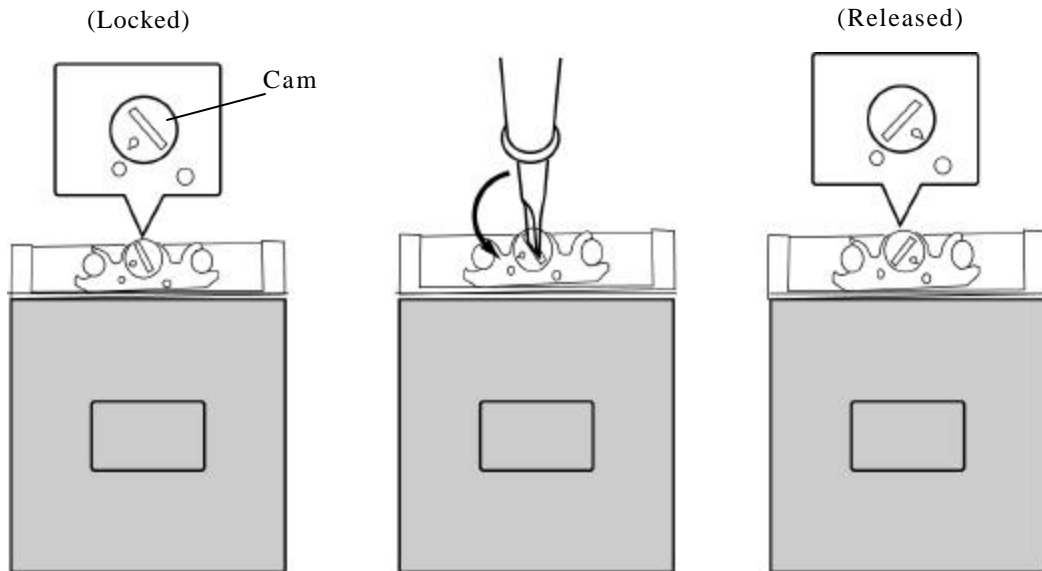
Figure 4-29 Removing the CPU

Installing a CPU

To remove a CPU perform the following procedure. (See Figure 4-30.)

1. Make sure the mark of cam is in the position of "Releasing".

2. Set the CPU in place on the CPU socket.

Triangle mark socket

CPU socket

CPU
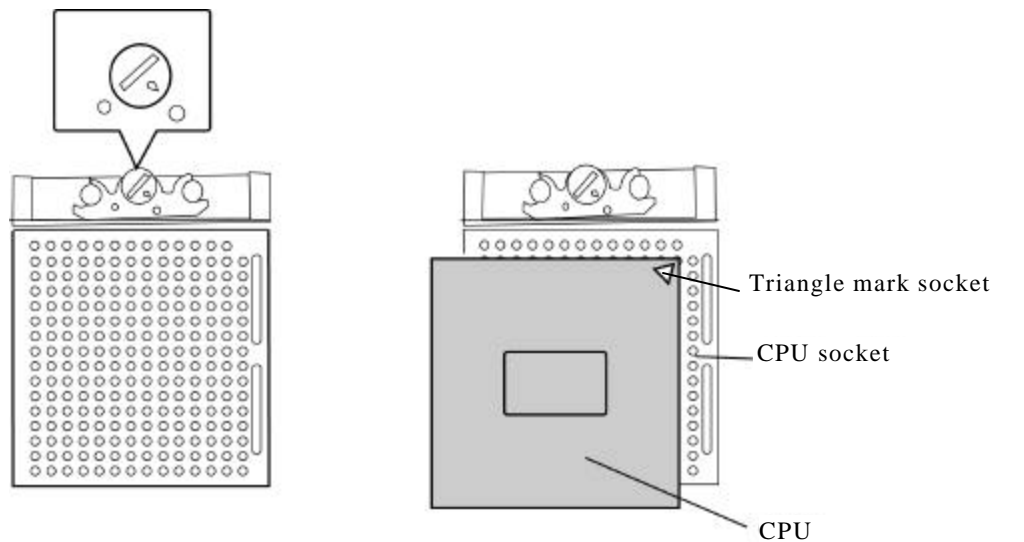
Figure 4-30 Installing a CPU

Caution: *When setting the CPU on the socket, make sure that the triangle mark on the CPU come to the right position. (Refer to the above figure.)*

---

3. Turn the cam clockwise 90 degrees with a minus screwdriver to fix the CPU.

4.20 CPU fan

Removing the CPU fan

To remove the CPU fan, perform the following procedure. (See Figure 4-31.)

1. Remove the following screws fixing the CPU fan.

    - M2.5×4B   FLAT BIND screw   x2

2. Remove the CPU fan from the base assembly.
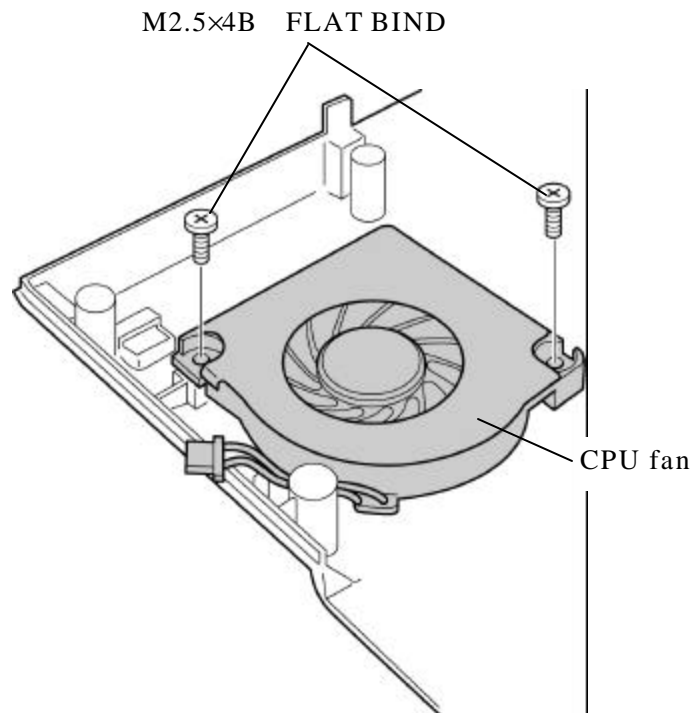
Figure 4-31 Removing the CPU fan

Installing a CPU fan

To install a CPU fan, perform the following procedure. (See Figure 4-31.)

1. Install the CPU fan to the base assembly and fix it with the following screws.

    - M2.5×4B   FLAT BIND screw   x2

4.21 Speaker

Removing the speaker

To remove the speakers, perform the following procedure. (See Figure 4-32.)

1. Peel off two acetate tapes fixing the speaker cable.

2. Remove the following screws fixing the speaker holders.

   - M2×3Z   S-THIN screw   x2 (Left)

   - M2×3Z   S-THIN screw   x1 (Right)
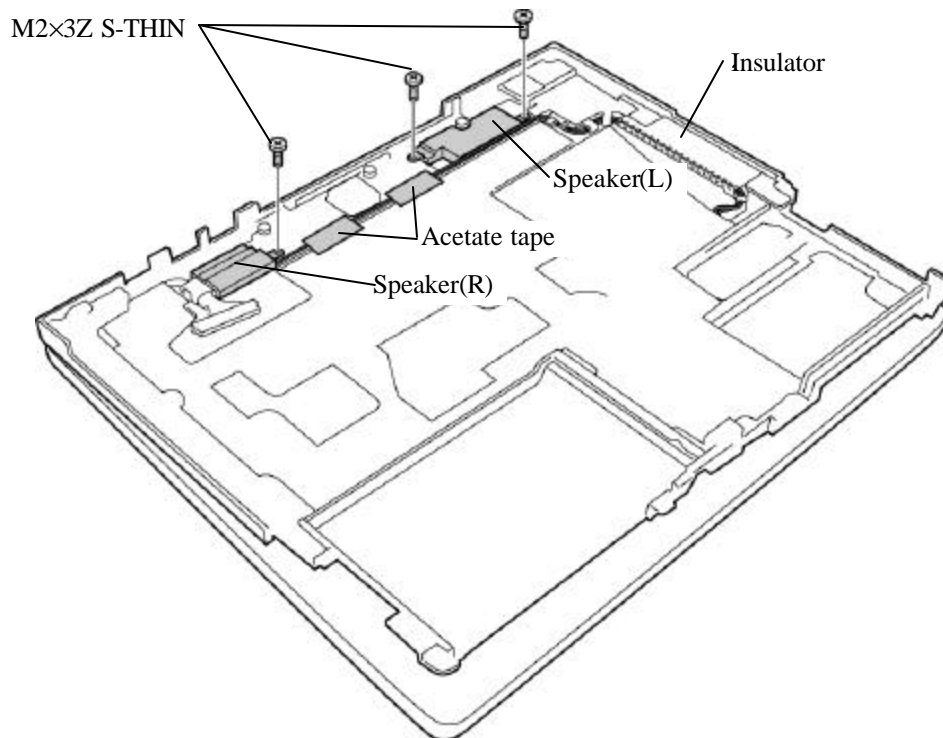
Figure 4-32 Removing the speaker holders

3. Remove the speakers from the speaker holders.

4. Remove the insulator fixing the cables and remove the speakers and speaker cable.

Installing a speaker

To remove a speaker, perform the following procedure. (See Figure 4-32.)

1. Set the speakers in the speaker holders.

2. Fix the speaker holders with the following screws.

    - M2×3Z   S-THIN screw   x2 (Left)

    - M2×3Z   S-THIN screw   x1 (Right)

3. Place the speaker cable and stick the insulator in two places to fix the cables.

4. Stick two acetate tapes to fix the speaker cable.

4.22 LCD unit / FL inverter

Removing the LCD unit / FL inverter

To remove the LCD unit and FL inverter, perform the following procedure. (See Figure 4-33 to 4-37.)

1. Peel off the mask seals and remove the following screws.

   - M2×4Z   BIND screw   x2
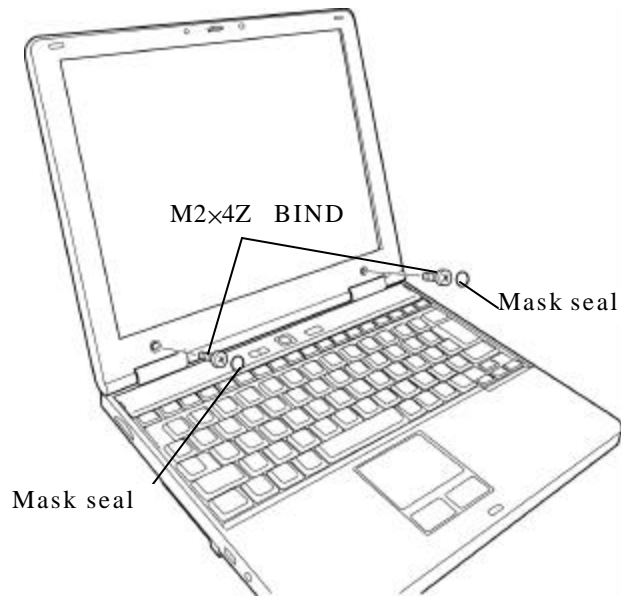
Figure 4-33 Removing the screws and mask seals

2. Release the latches and remove the display mask from the bottom.
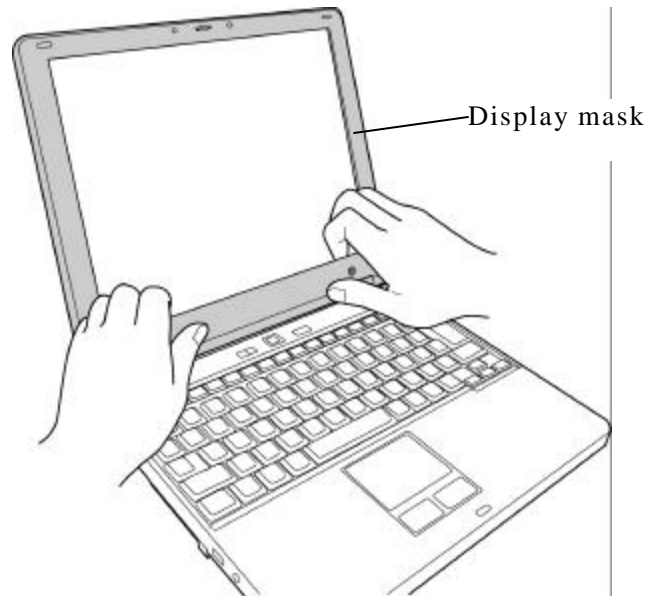
Figure 4-34 Removing the display mask

3. Remove the screws fixing the FL inverter. Remove the connector of the both sides and remove the FL inverter.

- M2×4Z   BIND screw   x1
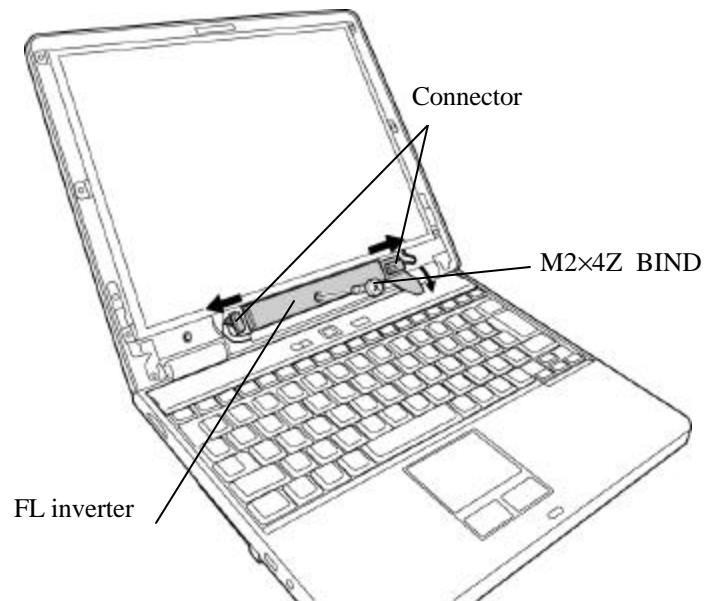
Figure 4-35 Removing the FL inverter

4. Remove the following screws fixing the LCD unit.

- M2×4Z   BIND screw   x4
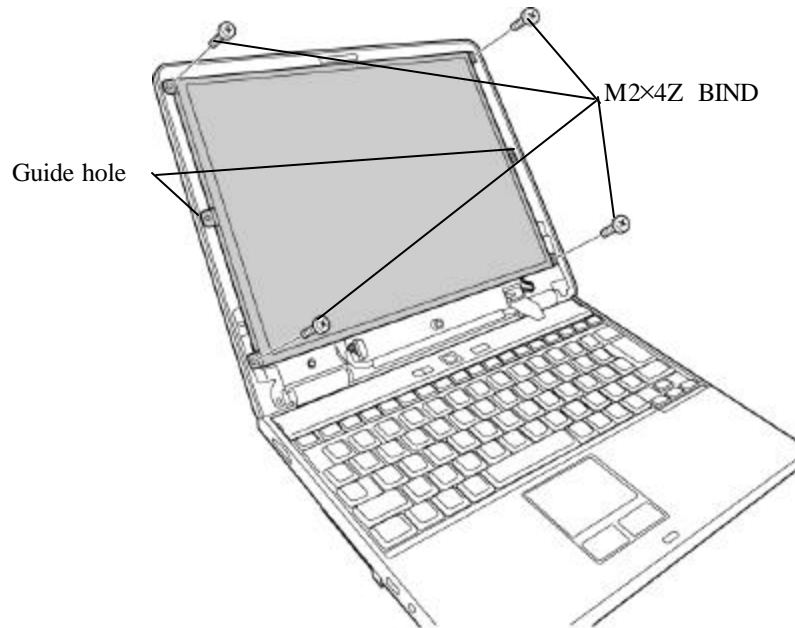
Figure 4-36 Removing the screws

5. Put a soft cloth on the keyboard not to damage the surface of the LCD and pull down the top of the LCD on the soft cloth. Peel off the glass tape on the LCD connector on the back of the LCD unit.

6.   Disconnect the LCD cable and remove the LCD unit.
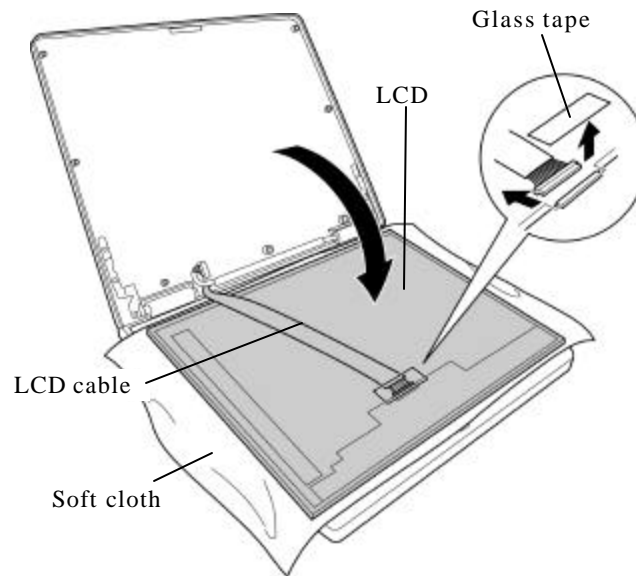
Figure 4-37 Removing the LCD unit

Installing a LCD unit / FL inverter

To install a LCD unit and FL inverter, perform the following procedure. (See Figure 4-33 to 4-37.)

1.   Connect the LCD cable to the connector on the back of the LCD and fix with the glass tape.

2.   Put the LCD unit on the LCD with the guide hole into the guide and fix with the following screws.

   - M2×4Z   BIND screw   x4

3.   Connect the two cables to the connector of the FL inverter.

4.   Set the FL inverter and fix it with the following screw.

   - M2×4Z   BIND screw   x1

5.   Mount the display mask and push to lock all the latches.

6.   Fix the display mask with the following screws and stick the mask seals.

   - M2×4Z   BIND screw   x2

4.23 LCD cable/Wireless LAN antenna / Bluetooth antenna

4.23.1   LCD cable

Removing the LCD cable

To remove the LCD cable, perform the following procedure. (See Figure 4-38.)

1. Remove the right side hinge cover (viewing from the front).

2. Peel off the acetate tape fixing the LCD cable and two acetate tapes fixing the insulator.

3. Take the LCD cable out of the hinge hole.
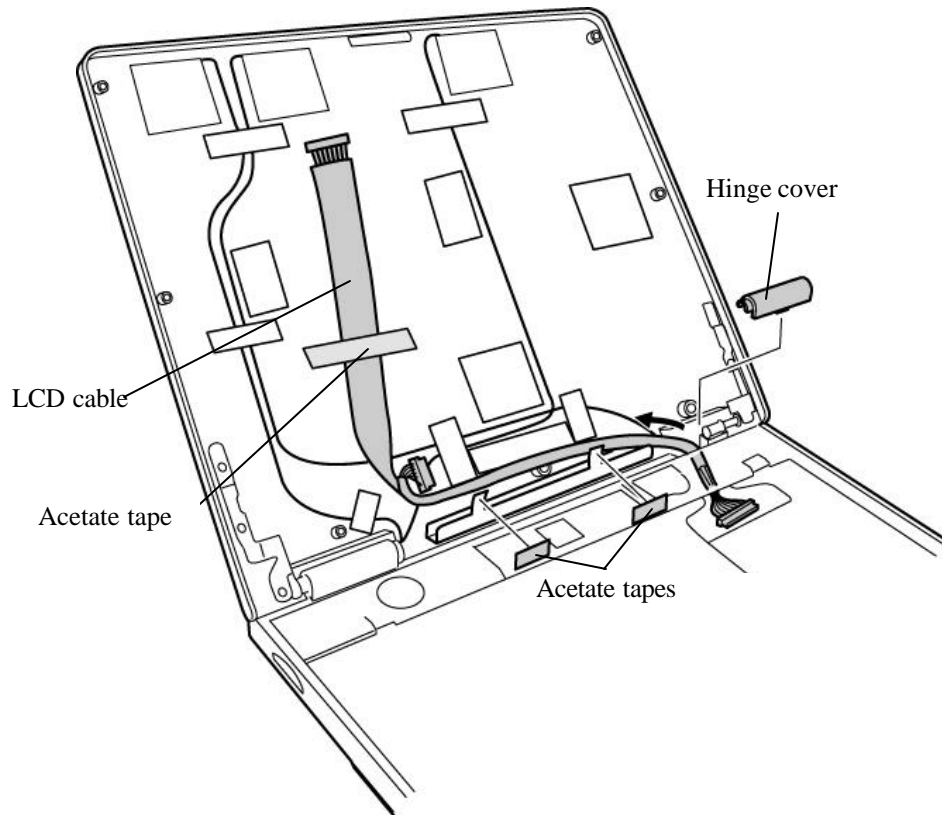
Figure 4-38 Removing the LCD cable

Installing a LCD cable

To install a LCD cable, perform the following procedure. (See Figure 4-38.)

1. Pass the LCD cable through the hinge hole, put the cable (to the connector on the system board) in the slot guiding the cable at the back.

2. Set the hinge cover. When setting, do not make the LCD cable and Bluetooth antenna cables pinched, and do not mistake the direction.

3. Open the insulator wrapping the LCD cable, wrap the LCD cable fixing and apply the acetate tape at two points of the insulator and one point of the LCD cable.

4.23.2   Wireless LAN antenna

Removing the wireless LAN antenna

To remove the wireless LAN antenna, perform the following procedure. (See Figure 4-39, 4-40.)

1. Peel off the five acetate tapes and wireless LAN antenna.

2. Remove the left side hinge cover (viewing from the front).
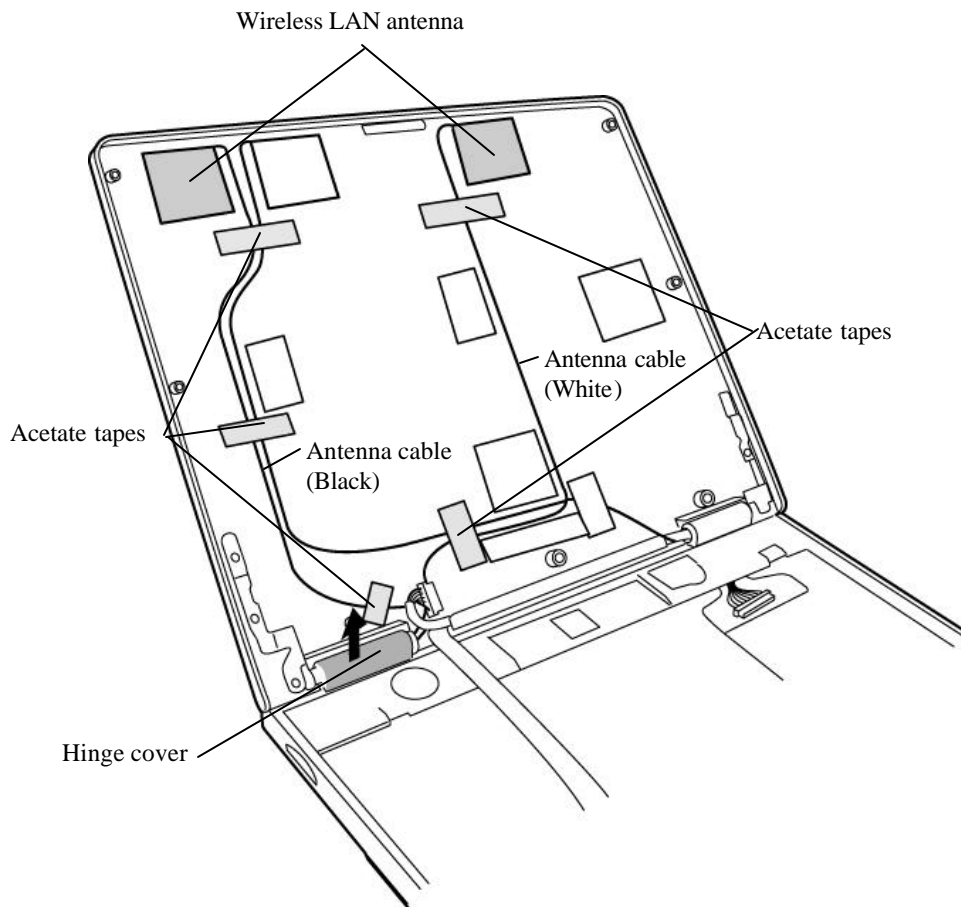
Figure 4-39 Removing the wireless LAN antenna

3. Peel off the insulator and remove the wireless LAN antenna cable from the hinge hole.
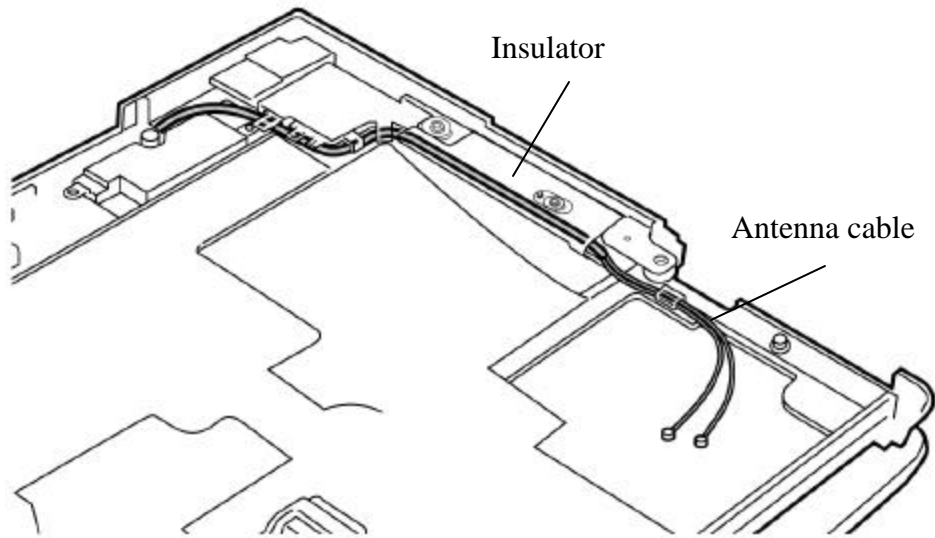
Figure 4-40 Removing the wireless LAN antenna cable

Installing a wireless LAN antenna

To install a wireless LAN antenna cable LCD cable, perform the following procedure. (See Figure 4-39, 4-40.)

1. Pass the wireless LAN antenna cable through the hinge hole, lay down the cable with the speaker cable in place and stick them by the insulator.

2. Set the hinge cover. Do not make the wireless LAN antenna pinched and do not mistake the direction.

3. Stick the wireless LAN antenna on the LCD cover in place and fix the antenna cable with the acetate tape at five points. (fix together with the Bluetooth antenna cable at three points)

4.23.3   Bluetooth antenna

Removing the Bluetooth antenna

To remove the Bluetooth antenna, perform the following procedure. (See Figure 4-41.)

1. Peel off the four acetate tapes and Bluetooth antenna.

2. Remove the right side hinge cover (viewing from the front).

3. Remove the Bluetooth antenna cable from the hinge hole.
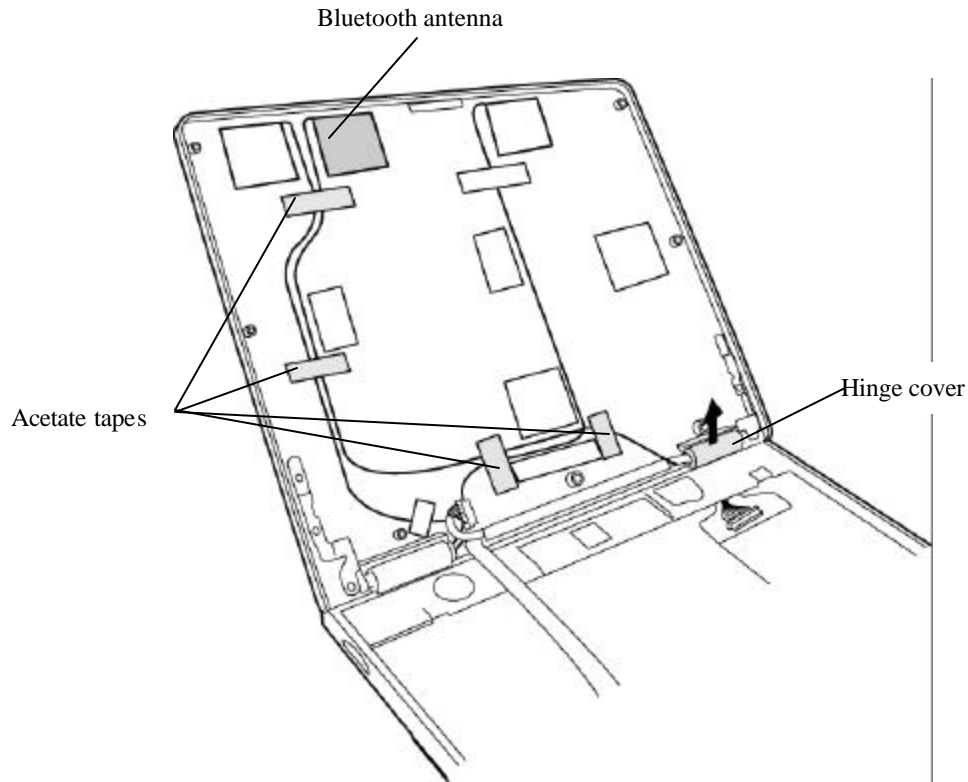
Figure 4-41 Removing the Bluetooth antenna

Installing a Bluetooth antenna

To install a Bluetooth antenna, perform the following procedure. (See Figure 4-41.)

1. Pass the Bluetooth antenna cable with the LCD cable through the hinge hole and lay down them in place. Pass the cable near the MDC module under the insulator.

2. Set the hinge cover. Do not make the wireless LAN antenna pinched and do not mistake the direction.

3. Stick the Bluetooth antenna on the LCD cover in place and fix it with acetate tape at four points (fix together with the wireless LAN antenna cable at three points).

4.24 Hinge assembly

Removing the hinge assembly

To remove the hinge assembly, perform the following procedure. (See Figure 4-42, 4-43)

1. Remove the following screws fixing the hinge assembly on the LCD cover side.

    - M2.5×4B   FLAT BIND screw   x2 (left)

    - M2.5×4B   FLAT BIND screw   x2 (right)
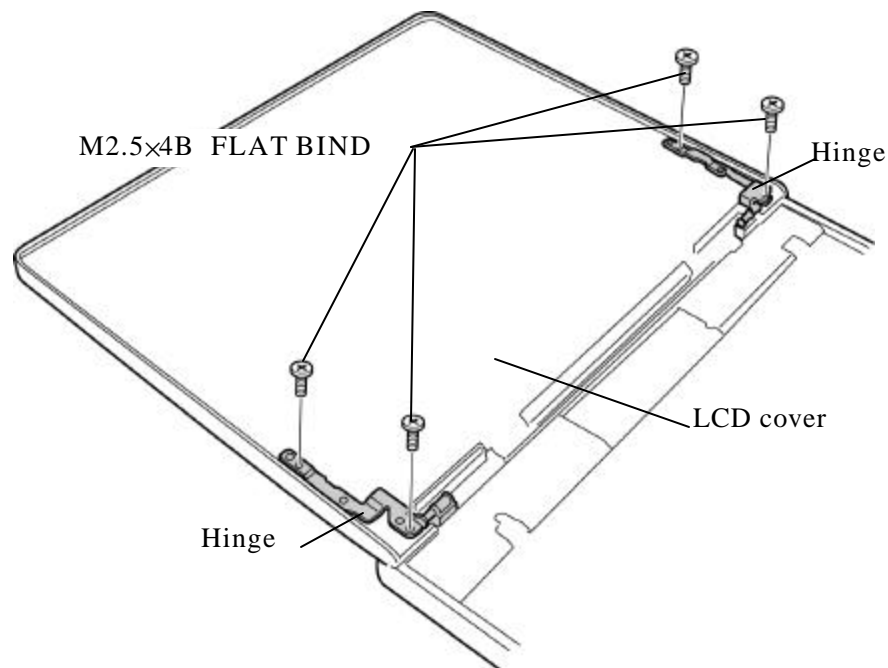
Figure 4-42 Removing the hinge assembly (LCD cover side)

2. Remove the following screws fixing hinge assembly on the base side.

    - M2.5×4B   FLAT BIND screw   x3 (left)

    - M2.5×4B   FLAT BIND screw   x3 (right)

Caution: *Silicon grease is applied to screws on the base side. Drive the screws a little strongly.*

3. Take both the hinges out of the holes.
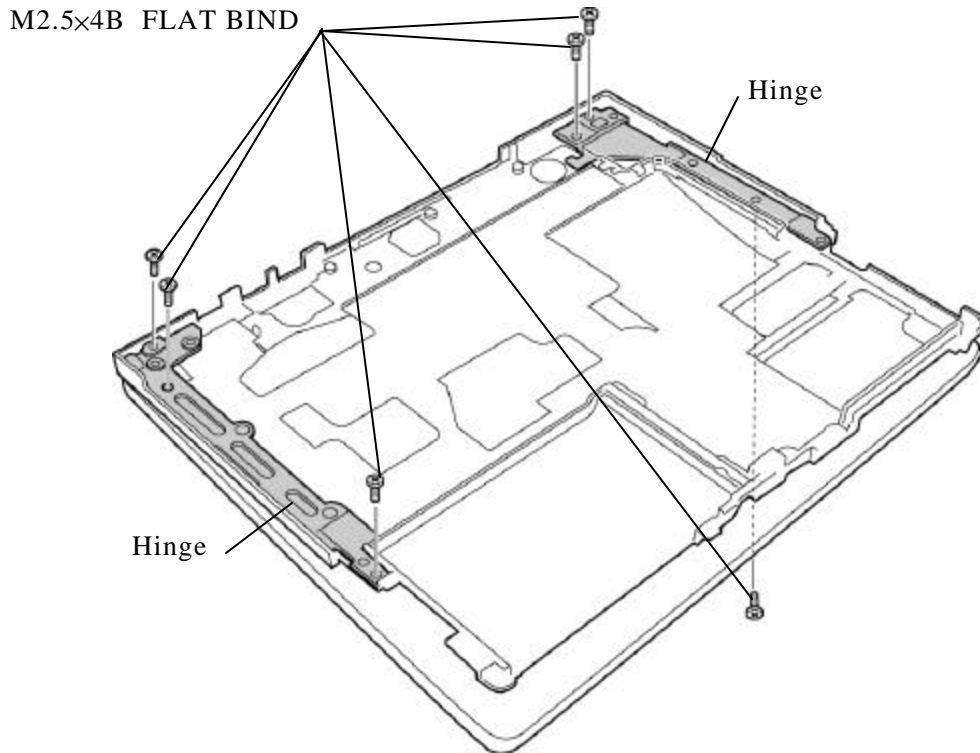
Figure 4-43 Removing the hinge assembly (base side)

Installing a hinge assembly

To install a hinge assembly, perform the following procedure. (See Figure 4-42, 4-43.)

1. Fix the hinges to the LCD cover with the following screws.

    - M2.5×4B   FLAT BIND screw   x2 (left)

    - M2.5×4B   FLAT BIND screw   x2 (right)

2. Fix the hinges to the base with the following screws.

    - M2.5×4B   FLAT BIND screw   x3 (left)

    - M2.5×4B   FLAT BIND screw   x3 (right)

Caution: *When fixing the hinge assembly, use new screws and apply Locktight to them.*

4.25 Fluorescent lamp

This system uses LCD modules from the following suppliers. The procedure for replacing the fluorescent lamp assembly (hereafter refer to fluorescent lamp) is different for each LCD module. Refer to the appropriate procedure.

Type	Part.No	Supplier	Section
12.1 inch	G33C0000J110001	TDM	4.25.1
12.1 inch	G33C0000H110001	LG Phillips	4.25.2

Note: 1. *When working with a LCD module, always use a flat, grounded table.*

2. *Handle the backlight unit in the environment without dust, such as on the clean bench. Keep the worktable free from any screws or other material that may scratch the LCD surface.*

3. *Use an anti-static or protective sheet.*

4. *When replacing the FL unit, cover with a finger protector or similar to prevent dirtying or scratching the LCD panel.*

5. *Take care when handling the lamp. Excessive force may break the lamp.*

6. *Take care not to dirty or deform the lamp reflector.*

7. *Ensure always that the power of the LCD module is turned off before connecting or disconnecting cables and connectors.*

4.25.1   Replacing the 12.1 inch TDM fluorescent lamp

The following describes the procedure for replacing the fluorescent lamp. (See Figure 4-44 to 4-55.)

Disassembling the module

1. Peeing of tape and insulating sheet

<Procedure>

    1) Put quietly the module on a flat plate without foreign objects with the front up. Check for dusts on the desk to protect the module from being scratched. Put a protection sheet (soft cloth) on the surface.

    2) Peel off two tapes fixing FL cable and one bezel tape on the lamp side in order.

Caution: *Be careful not to damage the TAB.*
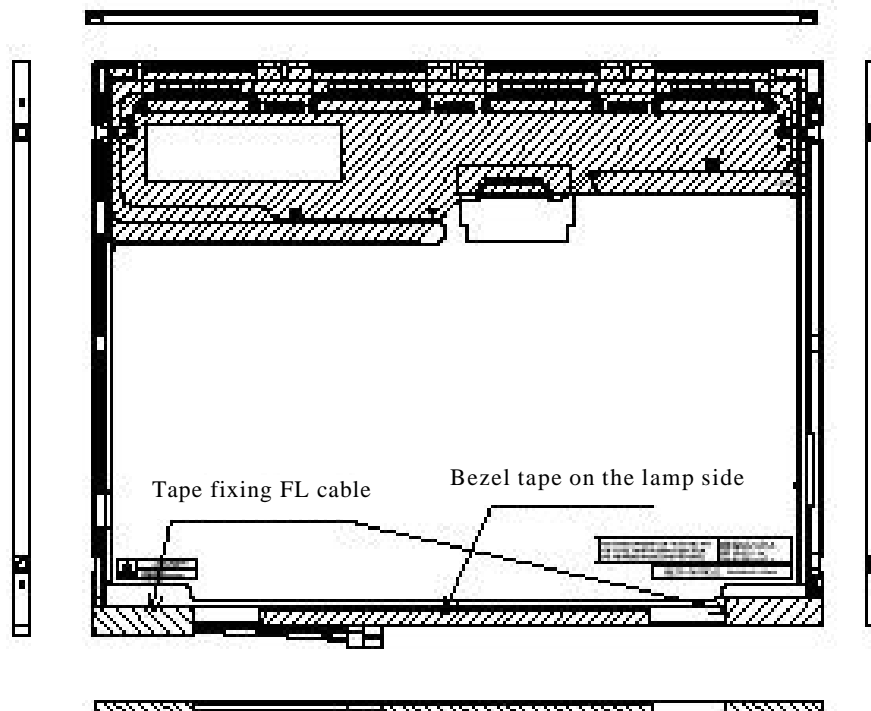
Figure 4-44 Replacing TDM fluorescent lamp(1)

3) Peel off one X-PCB insulating sheet and spread it without it out of the side of bezel.

Caution: *1. Keep the X-PCB insulating sheet being on the bezel.*
               2. Be careful not to damage the TAB.

X-PCB insulating sheet
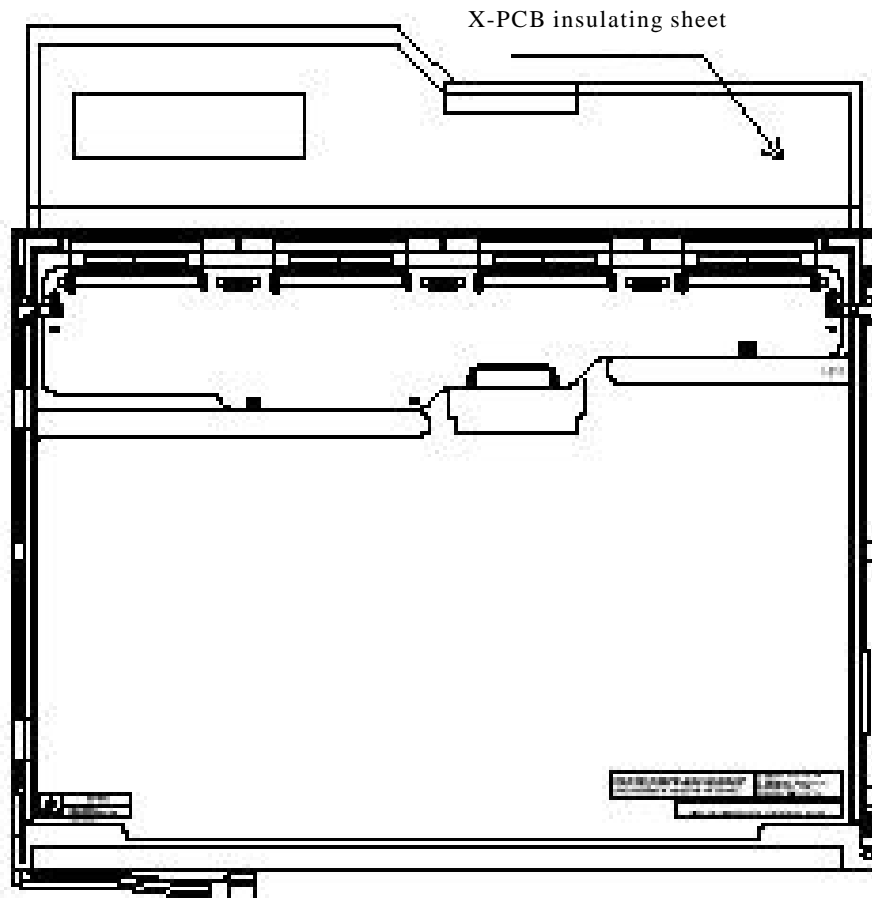
Figure 4-45 Replacing TDM fluorescent lamp (2)

2. Removing screws

<Procedure>

   1) Remove 4 screws on the side of left and the side of right.

Caution: *When removing screws, use a Phillips screwdriver with bit of No.0.*
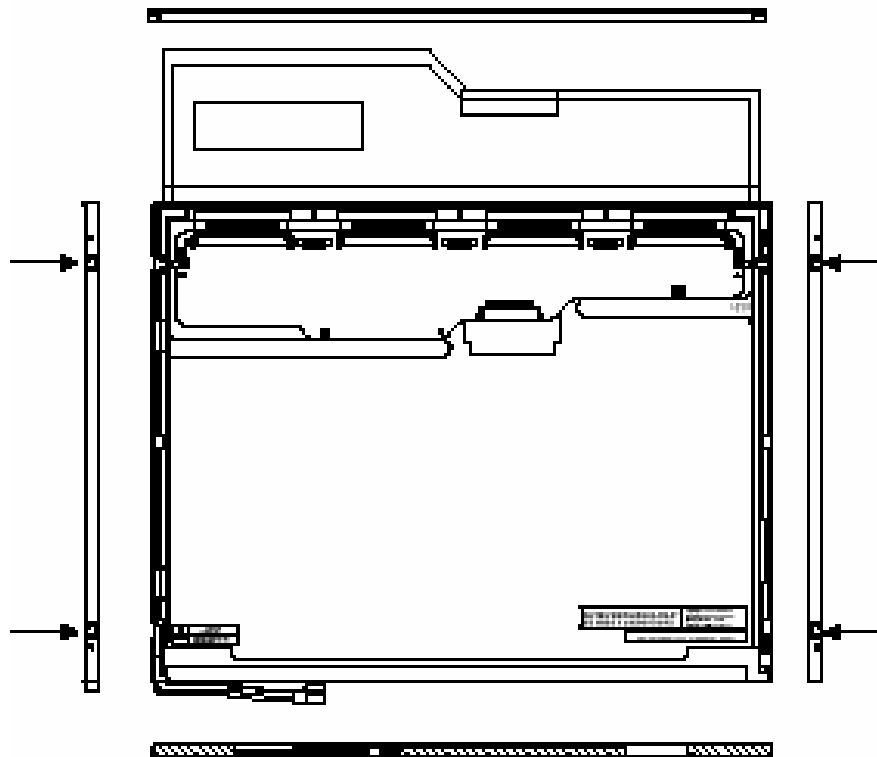
Figure 4-46 Replacing TDM fluorescent lamp(3)

3.   Removing bezel

<Procedure>

      1) Turn over the module with the insulating sheet.

      2) Releases latches of the bezel and frame (3 points).

      3) Lift up slowly the bottom side (Back light side) of bezel and release latches (3
         points)at the upper to remove the bezel. Note that the bezels at the upper and lower
         are fixed with double-sides tape.

Caution: *1. When releasing the upper latches, do not damage the TAB.*
               2. When removing the bezel, do not deform the bezel.
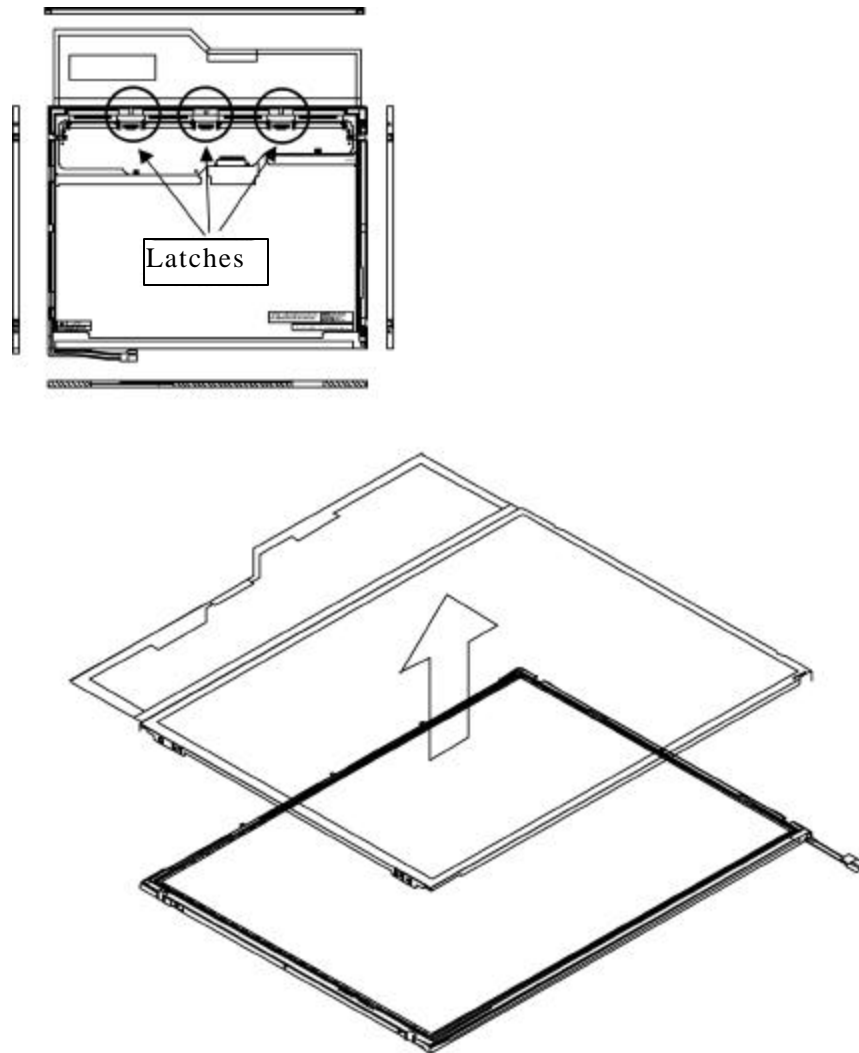
Figure 4-47 Replacing TDM fluorescent lamp(4)

4. Opening PCB

<Procedure>

    1) Open the PCB horizontally.

Caution: *Do not damage the TAB.*

Open the X-PCB from the back
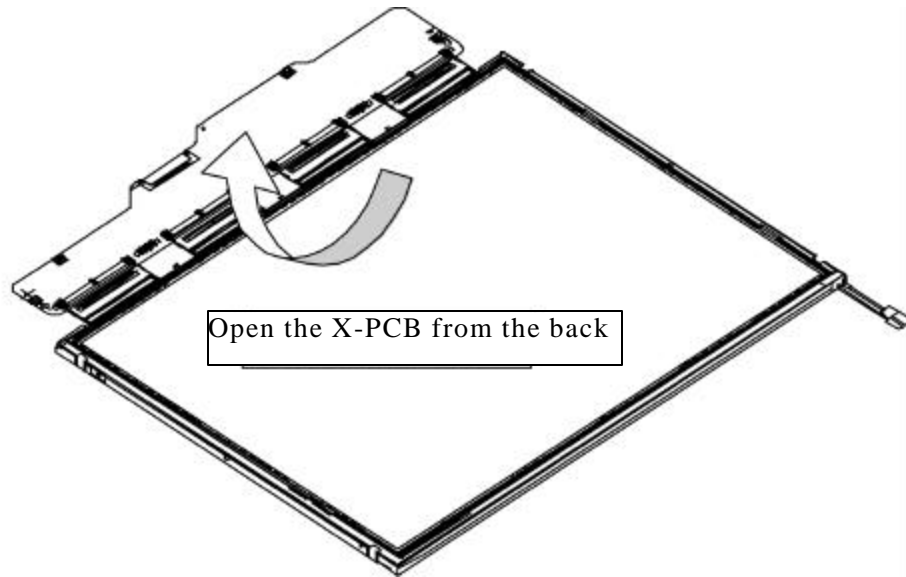
Figure 4-48 Replacing TDM fluorescent lamp(5)

5. Removing PCB-ASSY cell

<Procedure>

    1) Remove the PCB-ASSY cell from the back light unit.

    2) Remove thoroughly remaining double-sided tape on the back of cell.

Caution: *1. One point of the upper of cell is fixed with double sided tape. Peel off slowly so as not to break the cell.*
             2. Be careful not to peel off the light-shield tape at the upper, lower, right and left.

Cell with PCB

Remove the cell while peeling off the double -sided tape (1 point).
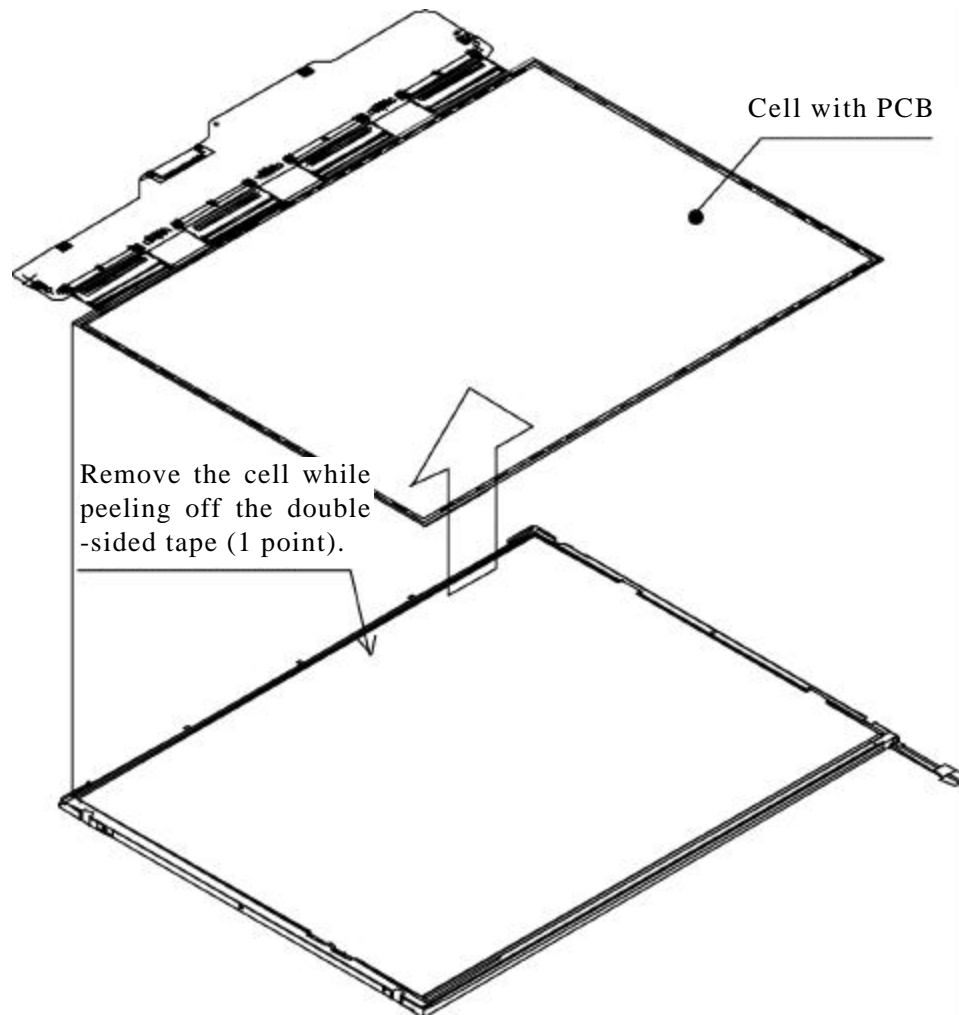
Figure 4-49 Replacing TDM fluorescent lamp(6)

Disassembling the module

1. Check of back light for replacement

      1) Refer to the following figure.

The sheet shall not be out of the frame.
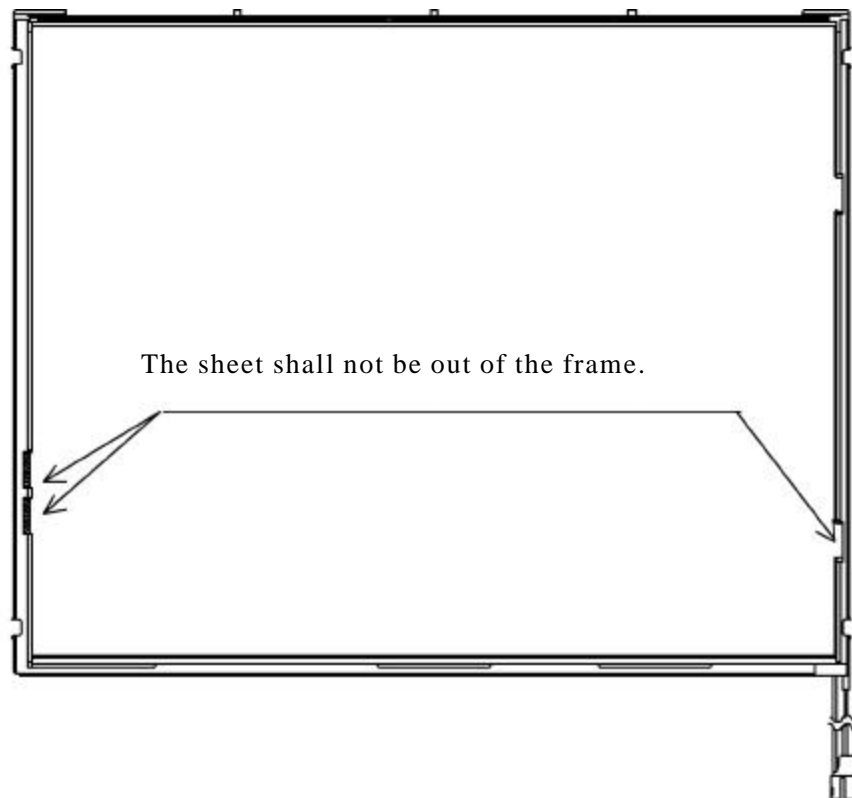
Figure 4-50 Replacing TDM fluorescent lamp(7)

2. Assembling PCB ASSY

<Procedure>

    1) Back light unit for replacement: Remove the peeled-tape on the double-sided tape at the upper of frame.

    2) Light the backlight on.

    3) Make sure that there is no dust, foreign object, scratch and like that on the backlight and the back of cell. Set the PCB-ASSY cell on the back light unit.

Caution: *1. Push it as far as it will go at the left upper.*
                   2. Do not damage the TAB.

Cell with PCB

Push as far as it will go.

Back light unit

Remove the peeled tape on the double-sided tape
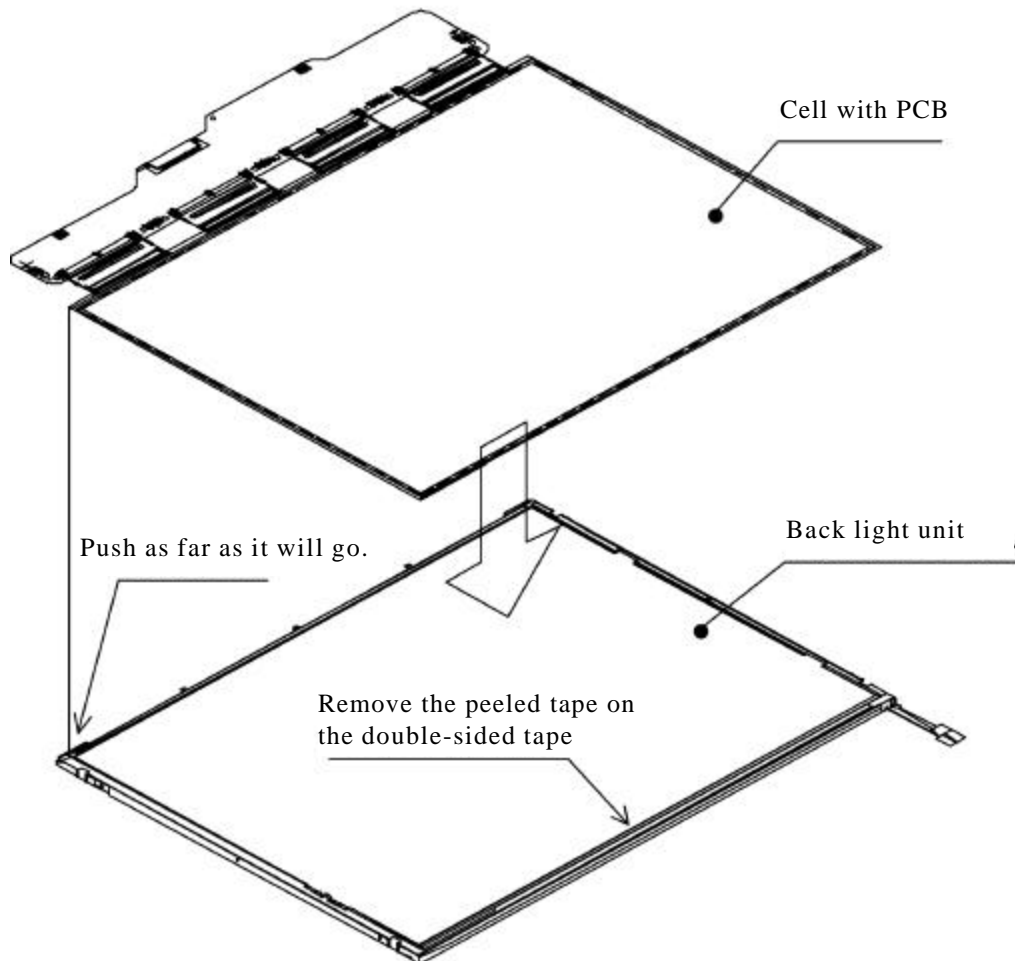
Figure 4-51 Replacing TDM fluorescent lamp(8)

3. Folding TAB/PCB and temporal fixing

<Procedure>

   1) Fold the X-TAB(X-PCB) to the back of back light unit.

Caution: *Do not damage the TAB.*

Fold the X-PCB to the back.
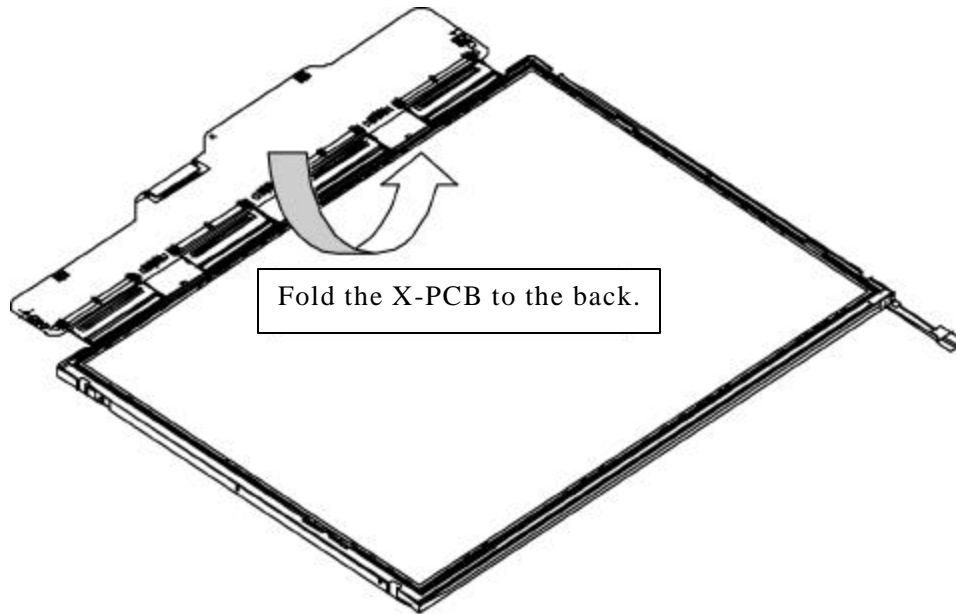
Figure 4-52 Replacing TDM fluorescent lamp(9)

4. Bezel set

<Procedure>

　　1) Hook the upper side (TAB side) of bezel to the three latches of frame. ①

　　2) Latch the side.

　　3) Mate the lamp side. ②

Caution:　1. *Do not damage the TAB.*
　　　　　　2. *Make sure the three latches of bezel are hooked.*
　　　　　　3. *The PCB GND-CU shall be within the bezel.*

PCB GND-CU shall be
within bezel.

Folding of reflector
shall be within bezel.

PCB GND-CU shall
be within the bezel.
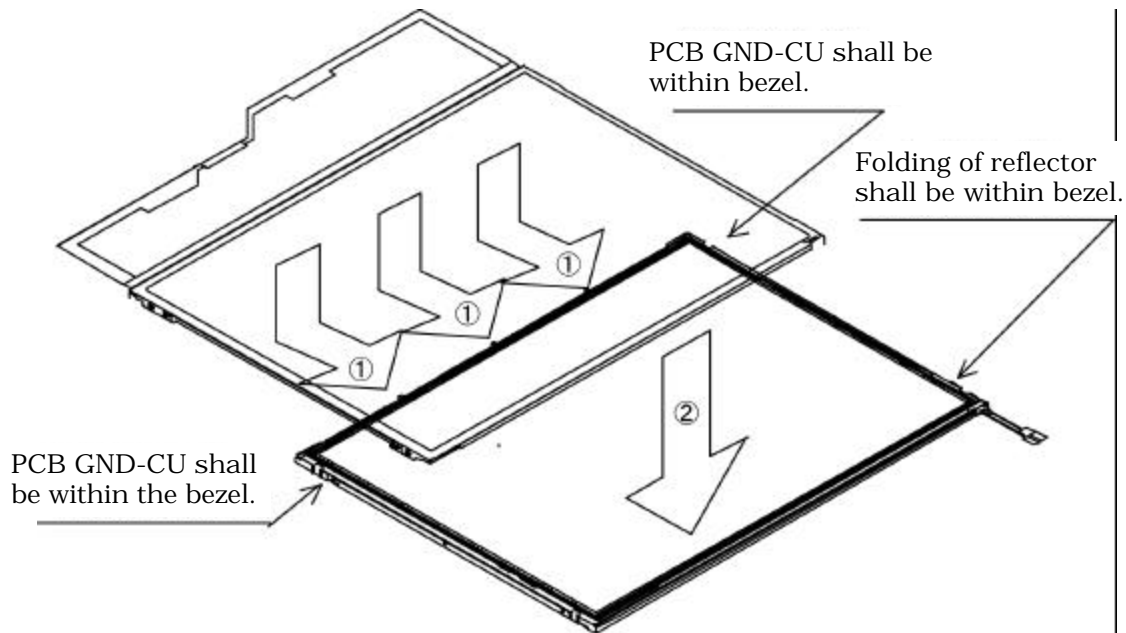
Figure 4-53 Replacing TDM fluorescent lamp(10)

5. Fixing PCB and bezel with screws

<Procedure>

1) Fix the right side (2 points, viewing from the back) with a screw in order of ① and ②.

2) Fix the left side (2 points, viewing from the back) with a screw in order of ③ and ④.

Caution: *1. Keep the order of screwing. No floating shall be.*
2. The torque of screw driving shall be 0.1666N/m (1.7Kgf.cm).
3. Use a Phillips screwdriver with the bit of No.
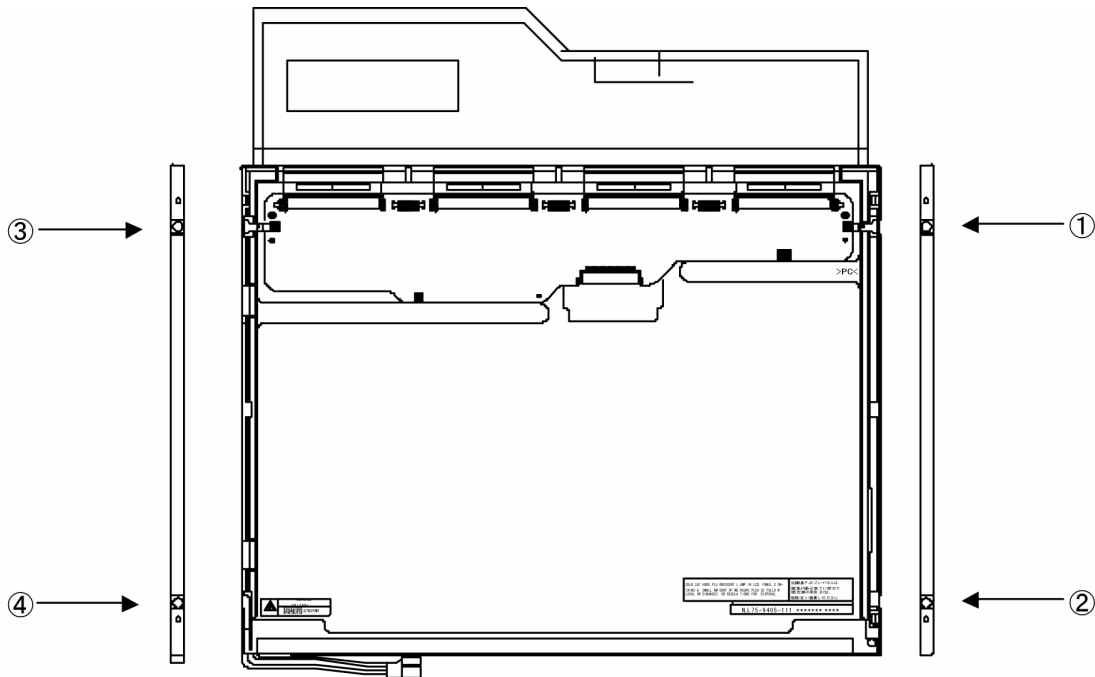
Figure 4-54 Replacing TDM fluorescent lamp(11)

6. Sticking tape and insulating sheet

<Procedure>

      1) Stick the X-PCB insulating sheet. ①

      2) Stick the lower side (lamp side) of bezel tape.②

      3) Stick the FL cable tape.③④

Caution: *1. When sticking the insulating sheet, do no bend it.*
             2. When sticking tape and insulating sheet, do not damage the leading part of
                 lamp cable and let not it out of the display part.
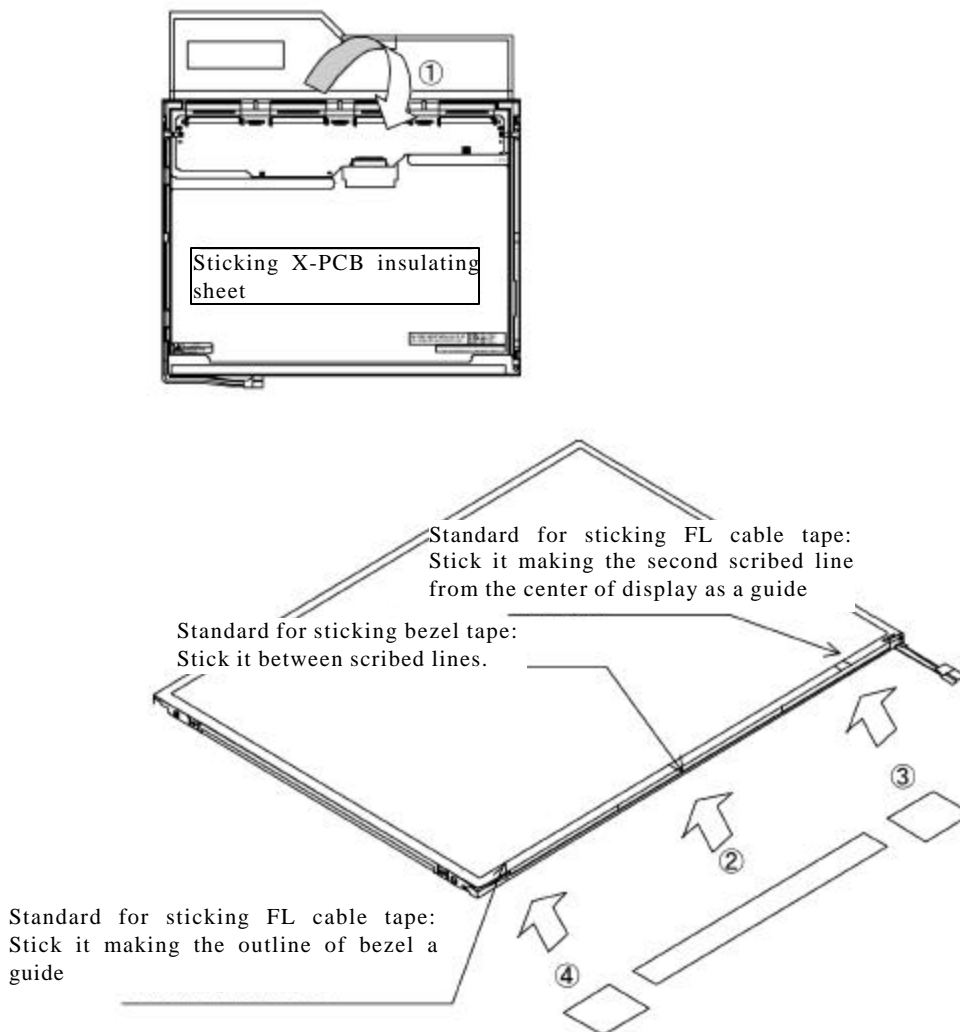
Figure 4-55 Replacing TDM fluorescent lamp(12)

4.25.2   Replacing the 12.1 inch LG Phillips fluorescent lamp

The following describes the procedure for replacing the fluorescent lamp. (See Figure 4-56 to 4-63.)

1. Disassembly of outside tape/ Cover shield

<Procedure>

    1) Disassembly of Tape adhesive used for B/L Wire fixing

Caution: *Pressure or stress should not be given on B/L Wire.*

    2) Disassembly of Cover shield(S)

Caution: *1. Pressure or stress should not be given on Gate TCP.*
                2. Usage of gloves with anti-electric discharge coating is recommended
                   to eliminate possible damage on circuits occurred by ESC.

    3) Disassembly of Cover shield(S)

Caution: *Pressure or stress should not be given on Source PCB.*

    4) Disassembly of Tapes used for Top case fixing

Caution: *Pressure or stress should not be given on Top case during this process.*
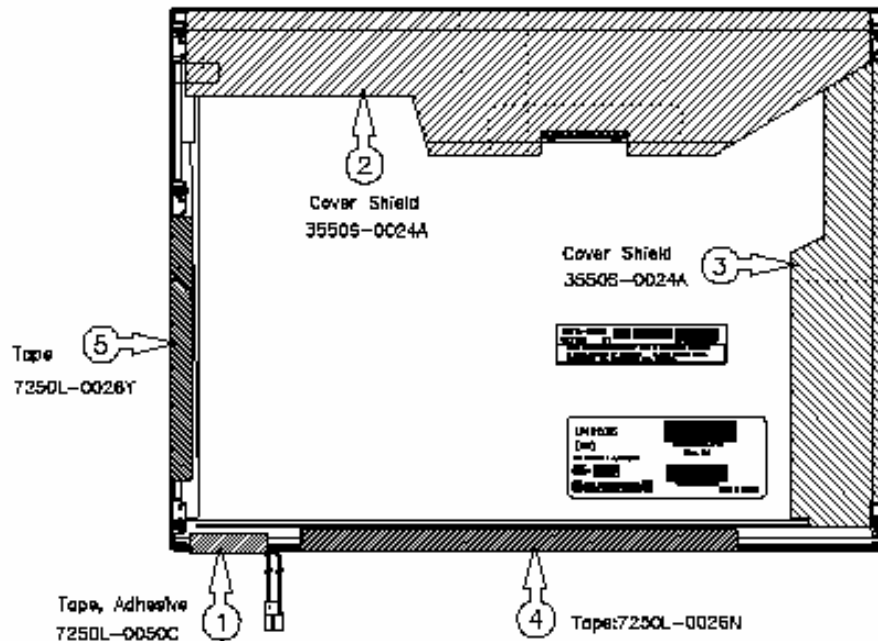
Figure 4-56 Replacing LG Phillip fluorescent lamp (1)

2. Disassembly of Top case

<Procedure>

      1) Disassembly of Top Case

Caution: *Pressure or stress should not be given on Top Case and Gate TCP.*
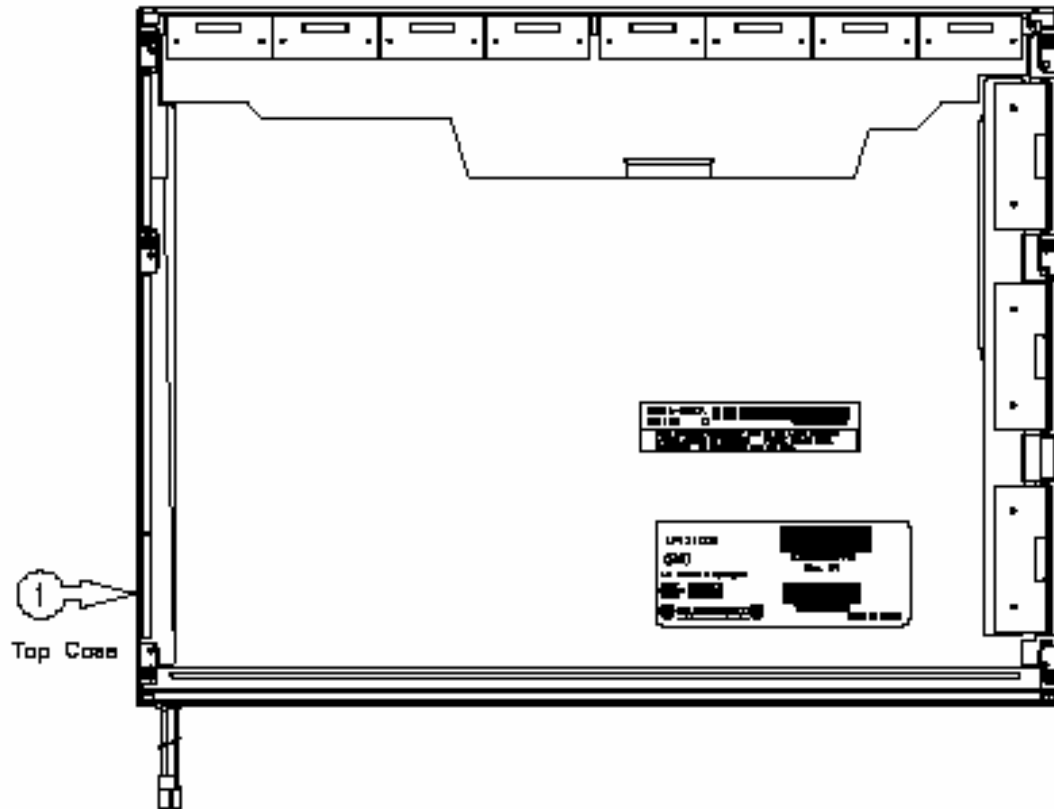
Figure 4-57 Replacing LG Phillip fluorescent lamp (2)

3. Disassembly of Source PCB and Gate PCB

<Procedure>

      1) Disassembly of Gate PCB

Caution:	*Pressure or stress should not be given on PCB and TCP during removing double tape.*

      2) Disassembly of Source PCB

Caution:	*Pressure or stress should not be given on PCB and TCP during removing double tape.*
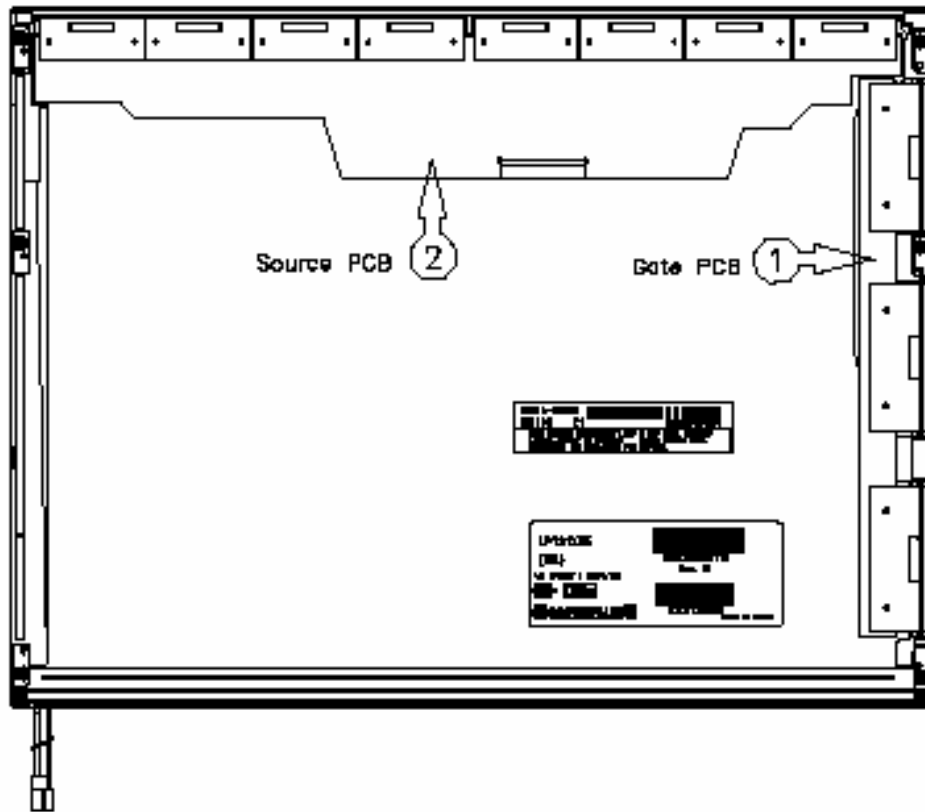
Figure 4-58 Replacing LG Phillip fluorescent lamp (3)

4. Disassembly of Board ASSY, Tape Adhesive, Sheets, Light guide, Plates and Lamp ASSY

<Procedure>

1) Disassembly of Board ASSY.

Caution:	*This process should be made in Clean room with no scratch nor particle on polarizer and B/L ASSY.*

2) Disassembly of Tape Adhesives used for Sheets fixing (5Point).

3) Disassembly of Sheets and Light guide.

Caution:	*No penetration of foreign body is indispensable with no scratch on the surface of each sheet.*

4) Disassembly of Screw and Lamp ASSY.

Caution:	*Maximum value of torque with Screw should be below 2.0kgf.cm.*
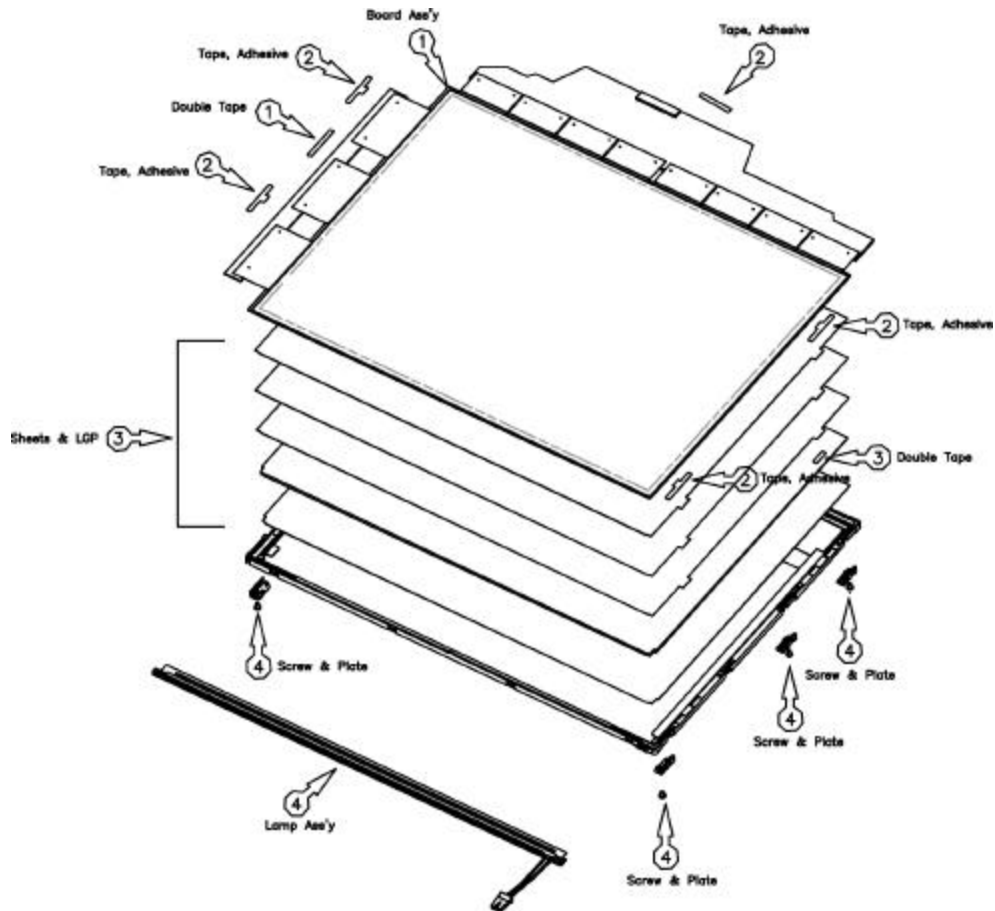
Figure 4-59 Replacing LG Phillip fluorescent lamp (4)

5. Assembly of Lamp ASSY, Plates, Sheets, Light guide, Tape Adhesive and Board ASSY

<Procedure>

      1) Detaching a protect film from Double Tape at the Lamp ASSY

      2) Assembly of Lamp ASSY and Screw

Caution: *The Maximum value of torque with Screw should be below 2.0kgf.cm.*

      3) Assembly of Plates, Light Guide and Sheets.(Diffuser down Sheet fixing with one Double Tape)

Caution: *No penetration of foreign body is indispensable with no scratch on the surface of each Sheet and light guide.*

      4) Assembly of Tape adhesive used for Sheets fixing

5) Assembly of Board ASSY (Gate PCB fixing with Double Tape.)

Caution: *Pressure or stress should not be given on PCB and TCP.*
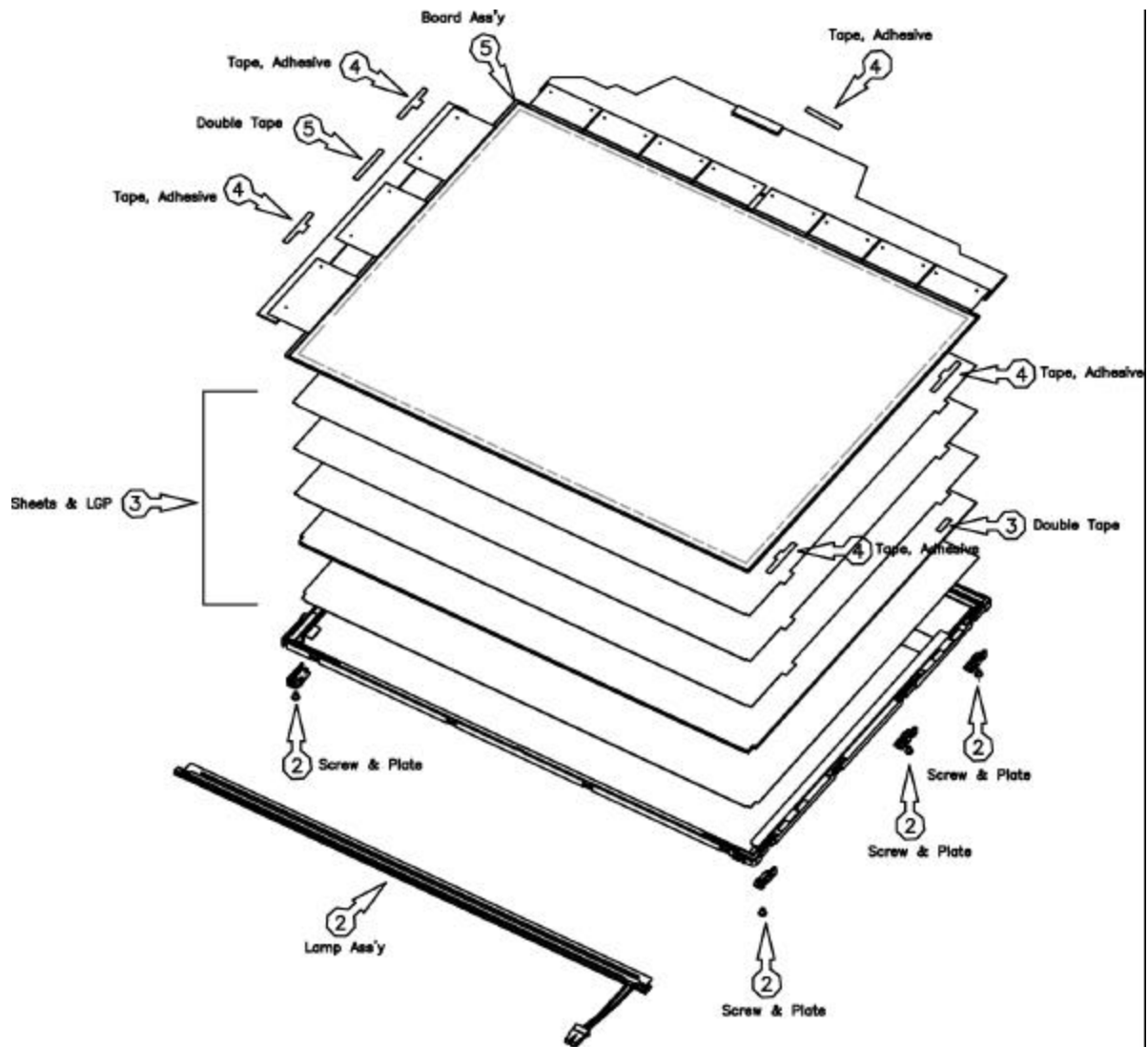
Figure 4-60 Replacing LG Phillip fluorescent lamp (5)

6. Assembly of Source PCB and Gate PCB

<Procedure>

1) Assembly of Source PCB

Caution: *Stress should not be given on TCP.*

2) Assembly of Gate PCB

Caution: *Stress should not be given on TCP.*
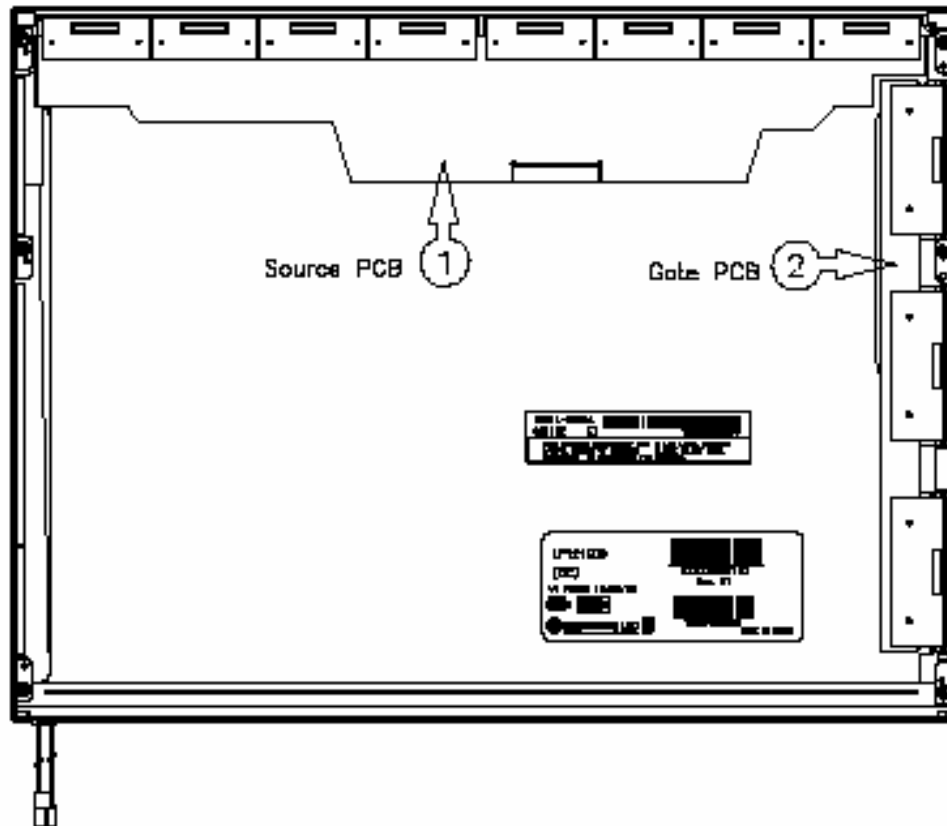
Figure 4-61 Replacing LG Phillip fluorescent lamp (6)

7. Assembly of Top Case

<Procedure>

    1) Assembly of Top Case

Caution: *Pressure should not be given on Gate TCP.*
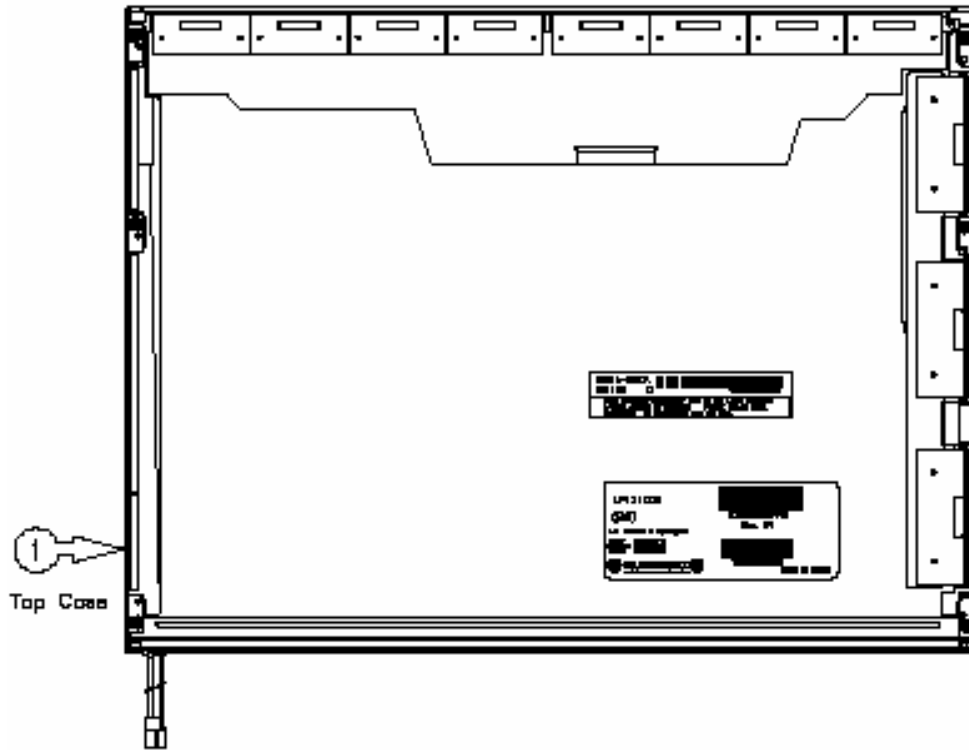
Figure 4-62 Replacing LG Phillip fluorescent lamp (7)

8. Assembly of outside Tape and Cover shield

<Procedure>

1) Assembly of Tape shield and Tape Adhesive used for Top case fixing

Caution:	*Pressure or stress should not be given on Top case during this process.*

2) Assembly of Cover shield(G)

Caution:	*Pressure or stress should not be given on control PCB.*

3) Assembly of Cover shield(S)

Caution:	*1. Pressure or stress should not be given on Gate TCP.*
	2. Usage of gloves with anti-electric discharge coating is recommended, to eliminate possible damage on circuits occurred by ESC.

4) Assembly of Tape adhesive used for B/L Wire fixing

Caution:	*Pressure or stress should not be given on B/L Wire.*
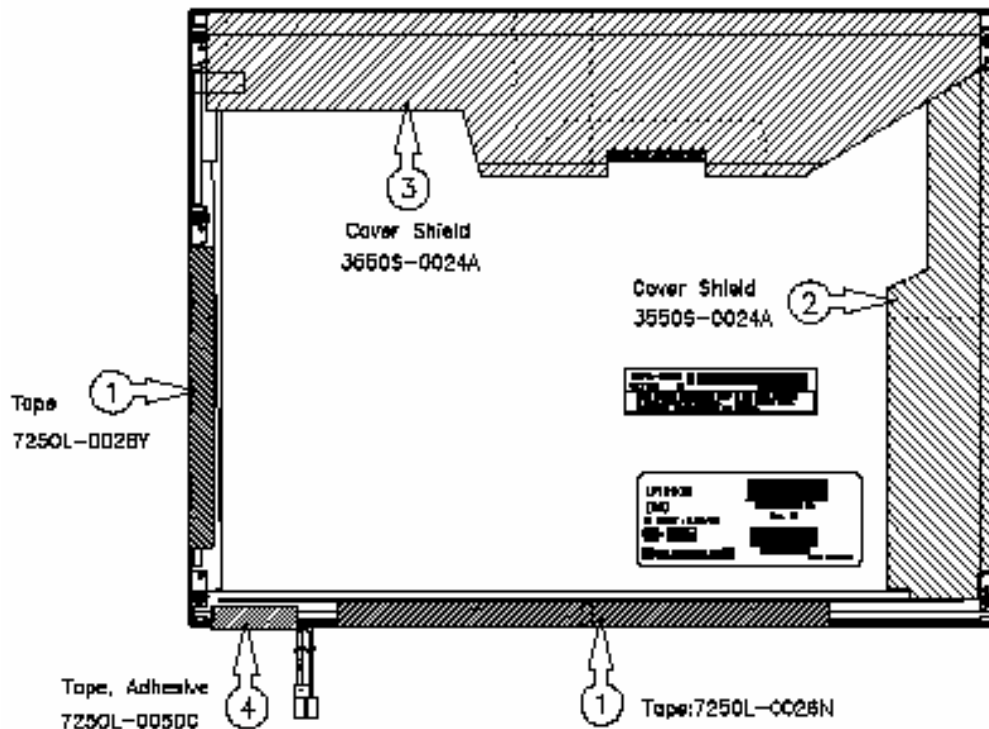
Figure 4-63 Replacing LG Phillip fluorescent lamp (8)

Appendices

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LED Board

2nd Battery Board

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System Board

Appendix A   Handling the LCD Module

Precautions for handling the LCD module

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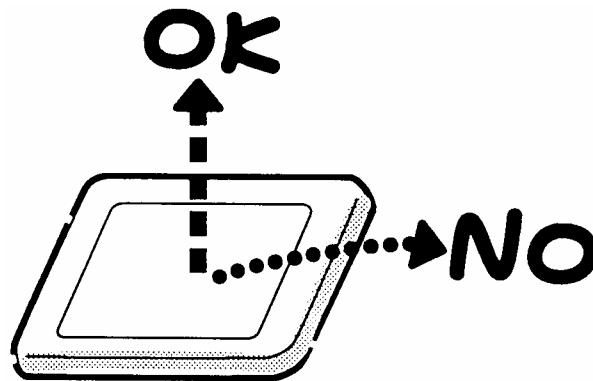
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

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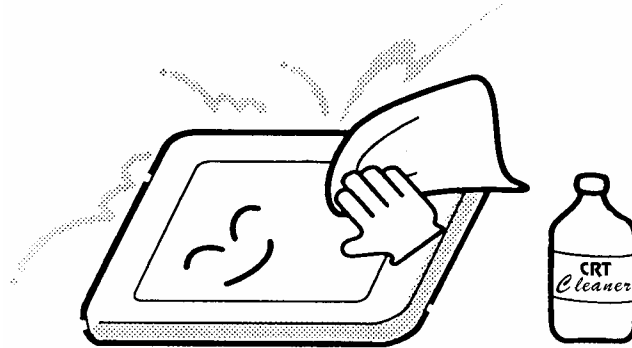
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.

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.
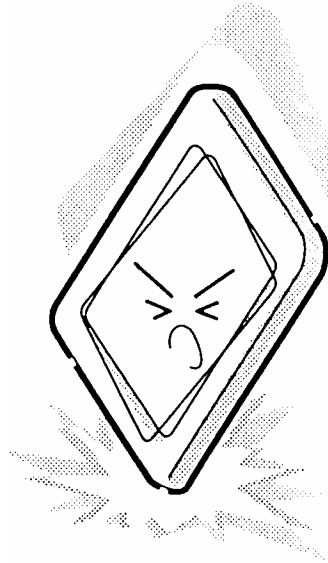
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.
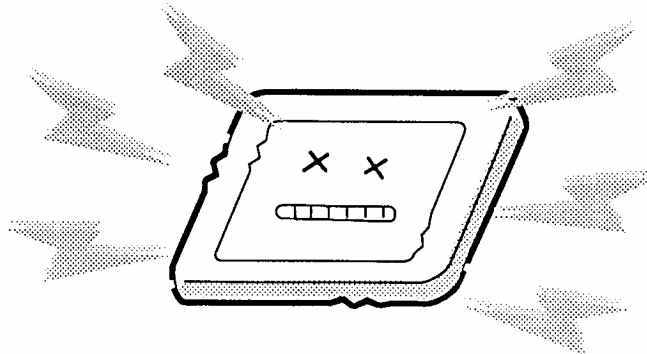
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
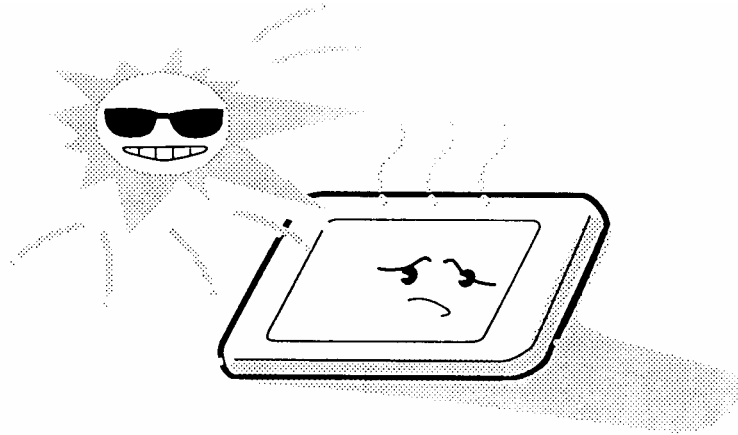
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
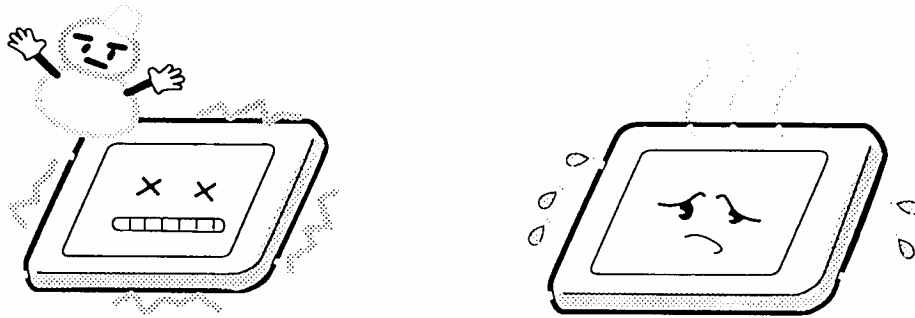
9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
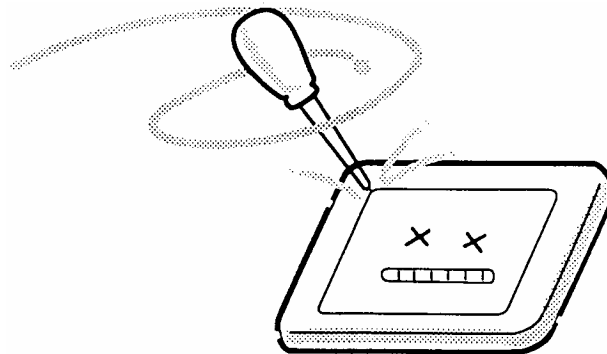
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.

Appendix B   Board Layout

B.1   System Board Front View

Figure B-1 System board layout (front)
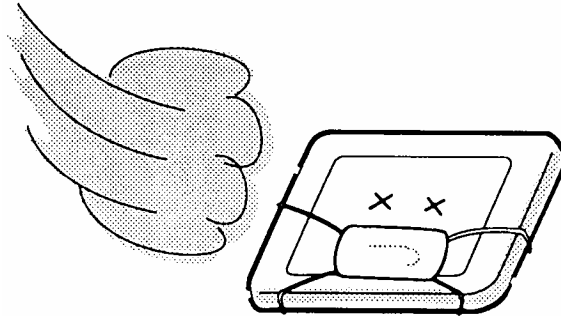
Table B-1 System board (front)

Mark	Number	Part's name
(A)	PJ5600	LCD I/F connector
(B)	PJ2101	SD card I/F connector
(C)	PJ8770	FAN connector
(D)	PJ1400	Memory 1 I/F connector
(E)	PJ1401	Memory2 I/F connector
(F)	PJ6001	Speaker I/F connector
(G)	PJ6002	External microphone I/F connector
(H)	PJ6003	Internal microphone I/F connector
(I)	PJ6004	Headphone I/F connector
(J)	PJ2102	Mini PCI I/F
(K)	PJ3000	MDC I/F connector
(L)	IC1600	ICH4-M
(M)	PJ3201	PAD I/F connector
(N)	PJ2000	Debug port
(O)	PJ8760	RTC Battery connector
(P)	PJ3200	Keyboard I/F connector
(Q)	PJ9500	LED board I/F connector
(R)	PJ3002	Bluetooth I/F connector

B.2 System Board Back View
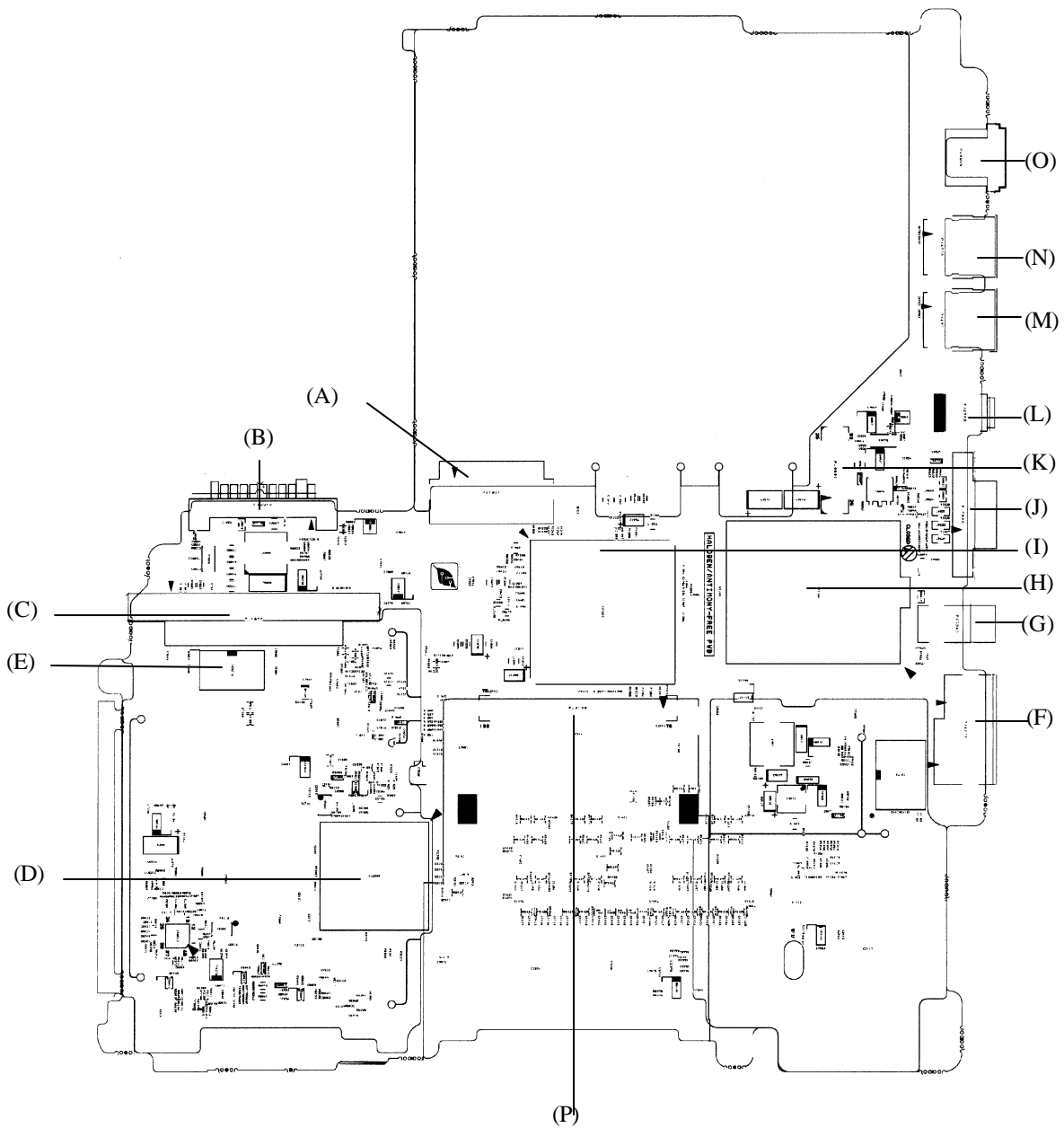
Figure B-2 System board layout (Back)

Table B-2 System board (back)

Mark	Number	Name
(A)	PJ1801	CD-ROM I/F connector
(B)	PJ8801	1st battery I/F connector
(C)	PJ1800	HDD I/F connector
(D)	IC2000	YEBISU3S
(E)	IC3000	FWH
(F)	PJ4100	Network I/F connector
(G)	PJ5640	TV out I/F connector
(H)	IC1005	CPU
(I)	IC1200	Montara-GM
(J)	PJ5600	LCD I/F connector
(K)	PJ9501	2nd battery board I/F connector
(L)	PJ4200	1394 I/F connector
(M)	PJ4701	USB2 I/F connector
(N)	PJ4700	USB1 I/F connector
(O)	PJ8800	DC-IN connector
(P)	PJ2100	PC card I/F connector

B.3   2nd battery Board Front and Back View

(Front)

(Back)

Figure B-3   2nd battery board layout

Table B-3   2nd battery Board

Mark	Number	Name
(A)	PJ9650	System board I/F connector
(B)	PJ8500	2nd battery

B.4 LED Board Front and Back View

(Front)

(B)
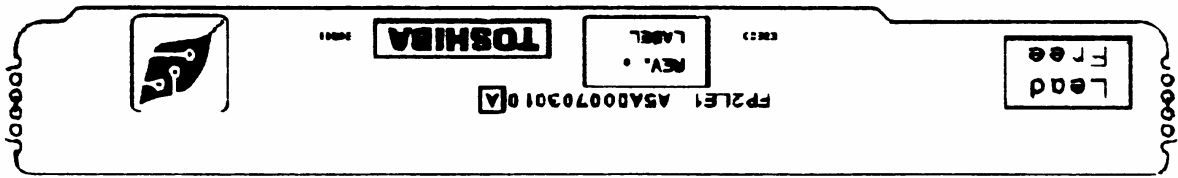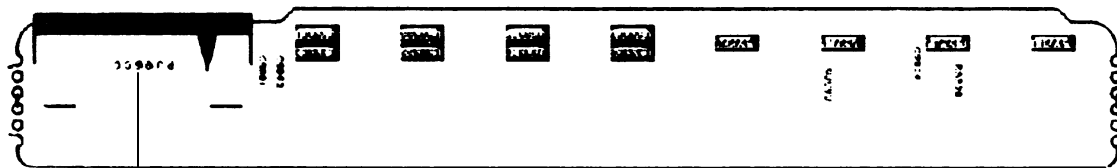
(Back)

Figure B-4 LED board layout

Table B-4 LED Board

Mark	Number	Name
(A)	PJ9600	Main board 1 I/F connector

Appendix C   Pin Assignment

System Board

C.1   PJ1400/PJ1401 Memory 1/2 connector (200pin)

Table C-1 Memory 1/2 connector (200pin)(1/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	VREF	-	2	VREF	-
3	GND	-	4	GND	-
5	SDQ01R-B2P	I/O	6	SDQ05R-B2P	I/O
7	SDQ00R-B2P	I/O	8	SDQ04R-B2P	I/O
9	2R5-B2V	-	10	2R5-B2V	-
11	SDM00R-B2P	I/O	12	SDQS0R-B2P	I/O
13	SDQ02R-B2P	I/O	14	SDQ06R-B2P	I/O
15	GND	-	16	GND	-
17	SDQ03R-B2P	I/O	18	SDQ07R-B2P	I/O
19	SDQ13R-B2P	I/O	20	SDQ09R-B2P	I/O
21	2R5-B2V	-	22	2R5-B2V	-
23	SDQ12R-B2P	I/O	24	SDQ08R-B2P	I/O
25	SDQ51R-B2P	I/O	26	SDM01R-B2P	I/O
27	GND	-	28	GND	-
29	SDQ15R-B2P	I/O	30	SDQ14R-B2P	I/O
31	SDQ11R-B2P	I/O	32	SDQ10R-B2P	I/O
33	2R5-B2V	-	34	2R5-B2V	-
35	SCK0-B2P	I	36	2R5-B2V	-
37	SCK0-B2N	I	38	GND	-
39	GND	-	40	GND	-
41	SDQ16R-B2P	I/O	42	SDQ20R-B2P	I/O
43	SDQ21R-B2P	I/O	44	SDQ17R-B2P	I/O
45	2R5-B2V	-	46	2R5-B2V	-
47	SDQS2R-B2P	I/O	48	SDM02R-B2P	I/O
49	SDQ23R-B2P	I/O	50	SDQ18R-B2P	I/O
51	GND	-	52	GND	-
53	SDQ19R-B2P	I/O	54	SDQ22R-B2P	I/O

Table C-1 Memory1/2 connector (200pin)(2/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
55	SDQ31R-B2P	I/O	56	SDQ25R-B2P	I/O
57	2R5-B2V	-	58	2R5-B2V	-
59	SDQ28R-B2P	I/O	60	SDQ24R-B2P	I/O
61	SDQS3R-B2P	I/O	62	SDM03R-B2P	I/O
63	GND	-	64	GND	-
65	SDQ29R-B2P	I/O	66	SDQ26R-B2P	I/O
67	SDQ27R-B2P	I/O	68	SDQ30R-B2P	I/O
69	2R5-B2V	-	70	2R5-B2V	-
71	SCB5A-B2P	I/O	72	SCB0A-B2P	I/O
73	SCB4A-B2P	I/O	74	SCB1A-B2P	I/O
75	GND	-	76	GND	-
77	SDQS8A-B2P	I/O	78	GND	-
79	SCB2A-B2P	I/O	80	SCB3A-B2P	I/O
81	2R5-B2V	-	82	2R5-B2V	-
83	SCB6A-B2P	I/O	84	SCB7A-B2P	I/O
85	N.C	-	86	N.C	-
87	GND	-	88	GND	-
89	2R5-B2V	-	90	GND	-
91	GND	-	92	2R5-B2V	-
93	2R5-B2V	-	94	2R5-B2V	-
95	SCKE1-B2P	I	96	SCKEO-B2P	I
97	N.C	-	98	N.C	-
99	SMA12R-B2P	I	100	SMA11R-B2P	I
101	SMA09R-B2P	I	102	SMA08R-B2P	I
103	GND	-	104	GND	-
105	SMA07R-B2P	I	106	SMA06R-B2P	I
107	SMA05R-B2P	I	108	SMA04R-B2P	I
109	SMA03R-B2P	I	110	SMA02R-B2P	I
111	SMA01R-B2P	I	112	SMA00R-B2P	I
113	2R5-B2V	-	114	2R5-B2V	-
115	SMA10R-B2P	I	116	SBS1R-B2P	I
117	SBS0R-B2P	I	118	SRASR-B2N	I
119	SWER-B2N	I	120	SCASR-B2N	I
121	SCS0-B2N	I	122	SCS1-B2N	I
123	N.C	-	124	N.C	-

Table C-1 Memory1/2 connector (200pin)(3/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
125	GND	-	126	GND	-
127	SDQ35R-B2P	I/O	128	SDQ37R-B2P	I/O
129	SDQ38R-B2P	I/O	130	SDQ36R-B2P	I/O
131	2R5-B2V	-	132	2R5-B2V	-
133	SDQS4R-B2P	I/O	134	SDM04R-B2P	I/O
135	SDQ39R-B2P	I/O	136	SDQ33R-B2P	I/O
137	GND	-	138	GND	-
139	SDQ34R-B2P	I/O	140	SDQ32R-B2P	-
141	SDQ43R-B2P	I/O	142	SDQ44R-B2P	I
143	2R5-B2V	-	144	2R5-B2V	-
145	SDQ40R-B2P	I/O	146	SDQ45R-B2P	I/O
147	SDQS5R-B2P	I/O	148	SDM05R-B2P	I/O
149	GND	-	150	GND	-
151	SDQ47R-B2P	I/O	152	SDQ41R-B2P	I/O
153	SDQ42R-B2P	I/O	154	SDQ45R-B2P	I/O
155	2R5-B2V	-	156	2R5-B2V	-
157	2R5-B2V	-	158	SCK1-B2N	I
159	GND	-	160	SCK1-B2P	I
161	GND	-	162	GND	-
163	SDQ52R-B2P	I/O	164	SDQ53R-B2P	I/O
165	SDQ49R-B2P	I/O	166	SDQ48R-B2P	I/O
167	2R5-B2V	-	168	2R5-B2V	-
169	SDQS6R-B2P	I/O	170	GND	-
171	SDQ51R-B2P	I/O	172	SDQ50R-B2P	I/O
173	GND	-	174	GND	-
175	SDQ54R-B2P	I/O	176	SDQ55R-B2P	I/O
177	SDQ57R-B2P	I/O	178	SDQ60R-B2P	I/O
179	2R5-B2V	-	180	2R5-B2V	-
181	SDQ61R-B2P	I/O	182	SDQ56R-B2P	I/O
183	SDQS7R-B2P	I/O	184	SDM07R-B2P	I/O
185	GND	-	186	GND	-
187	SDQ58R-B2P	I/O	188	SDQ59R-B2P	I/O
189	SDQ62R-B2P	I/O	190	SDQ63R-B2P	I/O
191	2R5-B2V	-	192	2R5-B2V	-
193	SMBDAT-P3P	I/O	194	GND	-

Table C-1 Memory 1/2 connector (200pin)(4/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
195	SMBCLK-P3P	I/O	196	GND	-
197	P3V	-	198	GND	-
199	N.C	-	200	N.C	-

C.2 PJ5600 LCD connector (41pin)

Table C-2 LCD connector (41pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	PNL-P3V	-	2	PNL-P3V	-
3	NC	-	4	GND	-
5	TXDTAO-PYN	O	6	TXDTAO-PXN	O
7	GND	-	8	TXDTA1-PYN	O
9	TXDTA1-PYP	O	10	GND	-
11	TXDTA2-PYN	O	12	TXDTA2-PYP	O
13	GND	-	14	TXCLKA-PYN	O
15	TXCLKA-PYP	O	16	GND	-
17	BRT2DA-S3P	O	18	BRT1-P5P	O
19	FL-P5V	-	20	FL-P5V	-
21	FL-P5V	-	22	BRT0-P5P	O
23	GND	-	24	GND	-
25	GND	-	26	GND	-
27	GND	-	28	GND	-
29	GND	-	30	GND	-
31	NC	-	32	NC	-
33	NC	-	34	NC	-
35	GND	-	36	NC	-
37	NC	-	38	NC	-
39	NC	-	40	NC	-
41	NC	-			

C.3   PJ5620 CRT I/F connector (15pin)

Table C-3 CRT I/F connector (15pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	RED-PXP	O	2	GREEN-PXP	O
3	BLUE-PXP	O	4	N.C	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	P5V	-	10	GND	-
11	N.C	-	12	(DDCSDA-P3P)	O
13	(HSYNC-B3P)	O	14	(VSYNC-B3P)	O
15	DDCACK-P3P	O			

C.4   PJ5640 TV out I/F connector (3pin)

Table C-4 TV out I/F connector (3pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	CVBS-PYP	O
3	GND	-			

C.5   PJ1800 HDD I/F connector (44pin)

Table C-5 HDD I/F connector (44pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	NC	-	2	GND	-
3	P5V	-	4	P5V	-
5	GND	-	6	HDDLED-P5N	I
7	PDCS3-P3N	O	8	PDCS1-P3N	I
9	PDA2-P3P	O	10	PDAO-P3P	I
11	NC	-	12	PDA1-P3P	I
13	NC	-	14	PDIRQ-P3P	I
15	GND	-	16	PDDACK-P3N	I
17	GND	-	18	PIORDY-P3P	I
19	GND	-	20	PDIOR-P3N	I
21	GND	-	22	PDIOW-P3N	I
23	GND	-	24	PDDREQ-P3P	I
25	NC	-	26	GND	-
27	PDD15-P3P	O	28	PDD00-P3P	I
29	PDD14-P3P	O	30	PDD01-P3P	I
31	PDD13-P3P	O	32	PDD02-P3P	I
33	PDD12-P3P	O	34	PDD03-P3P	I
35	PDD11-P3P	O	36	PDD04-P3P	I
37	PDD10-P3P	O	38	PDD05-P3P	I
39	PDD09-P3P	O	40	PDD06-P3P	I
41	PDD08-P3P	O	42	PDD07-P3P	I
43	GND	-	44	IDRSTA-P5N	I

C.6   PJ1801 CD-ROM I/F connector (50pin)

Table C-6 CD-ROM I/F connector (50pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	CDAUDL-PXP	I	2	CDAUDR-PXP	O
3	CD-GND	I	4	NC	-
5	IDRSTB-P5N	I	6	SDD08-P3P	O
7	SDD07-P3P	I	8	SDD09-P3P	O
9	SDD06-P3P	I	10	SDD10-P3P	O
11	SDD05-P3P	I	12	SDD11-P3P	O
13	SDD04-P3P	I	14	SDD12-P3P	O
15	SDD03-P3P	I	16	SDD13-P3P	O
17	SDD02-P3P	I	18	SDD14-P3P	O
19	SDD01-P3P	I	20	SDD15-P3P	O
21	SDD00-P3P	I	22	SDDREQ-P3P	O
23	GND	-	24	SDIOR-P3N	O
25	SDIOW-P3N	I	26	GND	-
27	SIORDY-P3P	I	28	SDDACK-P3N	O
29	SDIRQ-P3P	I	30	NC	-
31	SDA1-P3P	I	32	NC	-
33	SDA0-P3P	I	34	SDA2-P3P	O
35	SDCS1-P3N	I	36	SDCS3-P3N	O
37	CDRLED-P5N	I	38	P5V	-
39	P5V	-	40	P5V	-
41	P5V	-	42	P5V	-
43	GND	-	44	GND	-
45	GND	-	46	NC	-
47	NC	-	48	GND	-
49	NC	-	50	NC	-

C.7 PJ4700 USB1 connector (8pin)

Table C-7 USB1 connector (8pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	USBPOV-E5V	I	2	USBP0-S3N	I/O
3	USBP0-S3P	I/O	4	GND	-
5	USBPOV-E5V	I	6	USBP1-S3N	I/O
7	USBP1-S3P	I/O	8	GND	-

C.8 PJ4701 USB2 connector (8pin)

Table C-8 USB2 connector (8pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	USBP1V-E5V	I	2	USBP2-S3N	I/O
3	USBP2-S3P	I/O	4	GND	-
5	USBP1V-E5V	I	6	USBP3-S3N	I/O
7	USBP3-S3P	I/O	8	GND	-

C.9 PJ 2000 Debug port connector (4pin)

Table C-9 Debug port connector (4pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	B3V	-	2	DBGRX-B3P	I
3	(DBGTX)	O	4	GND	-

C.10   PJ2100 PC card I/F connector (150pin)

Table C-10 PC card I/F connector (150pin) (1/3)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	GND	-
3	BCCD1-B3N	I	4	BCAD00-BYP	I/O
5	BCAD02-BYP	I/O	6	BCAD01-BYP	I/O
7	BCAD04-BYP		8	BCAD03-BYP	I/O
9	GND	-	10	BCAD05-BYP	I/O
11	BCAD05-BYP	I/O	12	BCD14-BYP	I/O
13	BCAD07-BYP	I/O	14	BCAD08-BYP	I/O
15	BCCBEO-BYN	I/O	16	BCAD10-BYP	I/O
17	GND	-	18	BCAD09-BYP	I/O
19	BCVS1-B3P	I/O	20	BCAD11-BYP	I/O
21	BCAD13-BYP	I/O	22	BCAD12-BYP	I/O
23	BCAD15-BYP	I/O	24	BCAD14-BYP	I/O
25	GND	-	26	BCAD16-BYP	I/O
27	BCCBE1-BYN	I/O	28	BCA18-BYP	I/O
29	BCPAR-BYP	I/O	30	BCLOCK-BYN	I/O
31	BCPERR-BYN	I/O	32	BCSTOP-BYN	I/O
33	GND	-	34	BCGNT-BYN	O
35	BCDEVS-BYN	I/O	36	BCINT-BYN	I
37	MCVCCB	-	38	MCVCCB	-
39	MCVPPB	-	40	BCCLK-BYP	I/O
41	BCTRDY-BYN	I/O	42	BCIRDY-BYN	I/O
43	GND	-	44	BCFRAM-BYN	I/O
45	BCCBE2-BYN	I/O	46	BCAD17-BYP	I/O
47	BCAD18-BYP	I/O	48	BCAD19-BYP	I/O
49	BCAD20-BYP	I/O	50	BCVS2-B3P	I/O
51	GND	-	52	BCAD21-BYP	I/O
53	BCRST-BYN	I/O	54	BCAD22-BYP	I/O
55	BCSERR-BYN	I/O	56	BCAD23-BYP	I/O
57	BCREQ-BYN	I	58	BCAD24-BYP	I/O
59	GND	-	60	BCCBE3-BYN	I/O

Table C-10 PC card I/F connector (150pin)(2/3)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
61	BCAD25-BYP	I/O	62	BCAUDI-BYP	I
63	BCAD26-BYP	I/O	64	BCSTSC-BYP	I
65	BCAD27-BYP	I/O	66	BCAD28-BYP	I/O
67	GND	-	68	BCAD29-BYP	I/O
69	BCAD30-BYP	I/O	70	BCD02-BYP	I/O
71	BCAD31-BYP		72	BCCLKR-BYN	I/O
73	BCCD2-B3N	I	74	GND	-
75	GND	-	76	GND	-
77	GND	-	78	ACCD1-B3N	I/O
79	ACAD00-BYP	I/O	80	ACAD02-BYP	I/O
81	ACAD01-BYP	I/O	82	ACAD04-BYP	I/O
83	ACAD03-BYP	I/O	84	GND	-
85	ACAD06-BYP	I/O	86	ACAD05-BYP	I/O
87	ACD14-BYP	I/O	88	ACAD07-BYP	I/O
89	ACAD08-BYP	I/O	90	ACCBE0-BYN	
91	ACAD10-BYP	I/O	92	GND	-
93	ACAD09-BYP	I/O	94	ACVS1-B3P	I/O
95	ACAD11-BYP	I/O	96	ACAD13-BYP	I/O
97	ACAD12-BYP	I/O	98	ACAD15-BYP	I/O
99	ACAD14-BYP	I/O	100	GND	
101	ACAD16-BYP	I/O	102	ACCBE1-BYN	I/O
103	ACA18-BYP	I/O	104	ACPAR-BYP	I/O
105	ACLOCK-BYN	I/O	106	ACPERR-BYN	I/O
107	ACSTOP-BYN	I/O	108	GND	-
109	ACGNT-BYN	O	110	ACDEVS-BYN	I/O
111	ACINT-BYN	I	112	MCVCCA	-
113	MCVCCA	-	114	MCVPPA	-
115	ACCLK-BYP	I/O	116	ACTRDY-BYN	I/O
117	ACIRDY-BYN	I/O	118	GND	-
119	ACFRAM-BYN	I/O	120	ACCBE2-BYN	I/O

Table C-10 PC card I/F connector (150pin) (3/3)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
121	ACAD17-BYP	I/O	122	ACAD18-BYP	I/O
123	ACAD19-BYP	I/O	124	ACAD20-BYP	I/O
125	ACVS2-B3P	I/O	126	GND	-
127	ACAD21-BYP	I/O	128	ACRST-BYN	I/O
129	ACAD22-BYP	I/O	130	ACSERR-BYN	I/O
131	ACAD23-BYP	I/O	132	ACREQ-BYN	I
133	ACAD24-BYP	I/O	134	GND	-
135	ACCBE3-BYN	I/O	136	ACAD25-BYP	I/O
137	ACAUDI-BYP	I	138	ACAD26-BYP	I/O
139	ACSTSC-BYP	I	140	ACAD27-BYP	I/O
141	ACAD28-BYP	I/O	142	GND	-
143	ACAD29-BYP	I/O	144	ACAD30-BYP	I/O
145	ACD02-BYP	I/O	146	ACAD31-BYP	I/O
147	ACCLKR-BYN	I/O	148	ACCD02-B3N	I/O
149	GND	-	150	GND	-

C.11 PJ3200 Keyboard connector (34pin)

Table C-11 Keyboard connector (34pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	NUMLED-P5N	I	2	ARWLED-P5N	I
3	CAPLED-P5N	I	4	P5V	-
5	KBSC00-S3N	O	6	KBSC01-S3N	O
7	KBSC02-S3N	O	8	KBSC03-S3N	O
9	KBSC04-S3N	O	10	KBSC05-S3N	O
11	KBSC06-S3N	O	12	KBRT00-S3P	I
13	KBSC07-S3N	O	14	KBSC08-S3N	O
15	KBSC09-S3N	O	16	KBRT01-S3P	I
17	KBRT02-S3P	I	18	KBRT03-S3P	I
19	KBSC10-S3N	O	20	KBSC11-S3N	O
21	KBRT04-S3P	I	22	KBRT05-S3P	I
23	KBSC12-S3N	O	24	KBSC13-S3N	O
25	KBRT06-S3P	I	26	KBRT07-S3P	I
27	KBSC14-S3N	O	28	KBSC15-S3N	O
29	NC	-	30	NC	-
31	NC	-	32	NC	-
33	NC	-	34	NC	

C.12 PJ3201 PAD connector (8pin)

Table C-12 PAD connector (8pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	P5V	-	2	P5V	I/O
3	PADDAT-P5P	I/O	4	PADCLK-P5P	I/O
5	N.C.	-	6	GND	-
7	GND	-	8	GND	-

C.13   PJ6002 External microphone connector (6pin)

Table C-13 External microphone connector (6pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	A-GND	-	2	(MICIN-PXP)	I
3	(25VREF-P2V)	-	4	N.C.	-
5	N.C.	-	6	(INTMIC)	I

C.14   PJ6003 Internal microphone connector (2pin)

Table C-14 Internal microphone connector (2pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	INTMIC	I	2	A-GND	-

C.15   PJ4100/RJ11 Network I/F connector

Table C-15 Network I/F connector (12pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
A1	(TDP-E3P)	O	A2	(TDN-E3N)	O
A3	(RDP-E3P)	O	A4	N.C.	-
A5	N.C.	-	A6	(RDN-E3N)	O
A7	N.C.	-	A8	N.C.	-
A9	ACT-E3N	I	A10	LAN-E3V	-
A11	LNK-E3N	I	A12	LAN-E3V	-
B1	MDMTIP-B3P	-	B2	MDMRING-B3P	-

C.16 PJ2102 Mini PCI I/F connector (124pin)

Table C- 16 Mini PCI I/F connector (124pin)(1/2)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	N.C.	-	2	N.C.	-
3	N.C.	-	4	N.C.	-
5	N.C.	-	6	N.C.	-
7	N.C.	-	8	N.C.	-
9	N.C.	-	10	N.C.	-
11	N.C.	-	12	N.C.	-
13	P3V	-	14	N.C.	-
15	GND	-	16	N.C.	-
17	PIRQD-P3N	O	18	P5V	-
19	P3V	-	20	PIRQG-P3N	O
21	N.C.	-	22	N.C.	-
23	GND	-	24	B3V	-
25	X33MPC-P3P	O	26	PCIRST-S3N	I
27	GND	-	28	P3V	-
29	PREQ2-P3N	I	30	PGNT2-P3N	O
31	P3V	-	32	GND	-
33	AD31-P3P	I/O	34	PME-S3N	I/O
35	AD29-P3P	I/O	36	N.C.	-
37	GND	-	38	AD30-P3P	O
39	AD27-P3P	I/O	40	P3V	-
41	AD25-P3P	I/O	42	AD28-P3P	I/O
43	N.C.	-	44	AD26-P3P	I/O
45	CBE3-P3N	I/O	46	AD24-P3P	I/O
47	AD23-P3P	I	48	AD25-P3P	I/O
49	GND	-	50	GND	-
51	AD21-P3P	I/O	52	AD22-P3P	I/O
53	AD19-P3P	I/O	54	AD20-P3P	I/O
55	GND	-	56	PAR-P3P	I/O
57	AD17-P3P	I/O	58	AD18-P3P	I/O
59	CBE2-P3N	I/O	60	AD16-P3P	I/O
61	IRDY-P3N	I/O	62	GND	-

Table C-16 Mini PCI I/F connector (124pin)(2/2)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
63	P3V	-	64	FRAME-P3N	I/O
65	CLKRUN-P3N	I/O	66	TDRY-P3N	I/O
67	SERR-P3N	I/O	68	STOP-P3N	I/O
69	GND	-	70	P3V	-
71	PERR-P3N	I/O	72	DEVSEL-P3N	I/O
73	CBE1-P3N	I/O	74	GND	-
75	AD14-P3P	I/O	76	AD15-P3P	I/O
77	GND	-	78	AD13-P3P	I/O
79	AD12-P3P	I/O	80	AD11-P3P	I/O
81	AD10-P3P	I/O	82	GND	-
83	GND	-	84	AD09-P3P	I/O
85	AD08-P3P	I/O	86	CBE0-P3N	I/O
87	AD07-P3P	I/O	88	P3V	-
89	P3V	-	90	AD06-P3P	I/O
91	AD05-P3P	I/O	92	AD04-P3P	I/O
93	N.C.	-	94	AD02-P3P	I/O
95	AD03-P3P	I/O	96	AD00-P3P	I/O
97	P5V	-	98	N.C.	-
99	AD01-P3P	I/O	100	N.C.	-
101	GND	-	102	GND	-
103	N.C.	-	104	GND	-
105	N.C.	-	106	N.C.	-
107	N.C.	-	108	N.C.	-
109	N.C.	-	110	N.C.	-
111	N.C.	-	112	N.C.	-
113	GND	-	114	GND	-
115	N.C.	-	116	N.C.	-
117	GND	-	118	GND	-
119	GND	-	120	GND	-
121	N.C.	-	122	N.C.	-
123	P5V	-	124	B3V	-

C.17   PJ3002   Bluetooth connector (20pin)

Table C-17 Bluetooth connector (20pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	BT-E3V	-	2	N.C.	-
3	N.C.	-	4	USBP4-S3N	I/O
5	USBP4-S3P	I/O	6	N.C.	-
7	N.C.	-	8	(BTIFOF-S3N)	I
9	N.C.	-	10	GND	-
11	N.C.	-	12	N.C.	-
13	(BTRST-S3P)	I	14	N.C.	-
15	N.C.	-	16	N.C.	-
17	N.C.	-	18	BTMDL-P3N	O
19	N.C.	-	20	GND	-

C.18   PJ4200   1394 I/F connector (4pin)

Table C-18 1394 I/F connector (4pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	(TPBO-P3P)	I/O	2	(TPBO-P3N)	I/O
3	(TPAO-P3N)	I/O	4	(TPAO-P3P)	I/O

C.19   PJ2101 SD card I/F connector (12pin)

Table C-19 SD card I/F connector (12pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	SDAT3-B3P	I/O	2	SDCMD-B3P	I/O
3	GND	-	4	SD-B3V	-
5	SDCLK-B3P	O	6	GND	-
7	SDAT0-B3P	I/O	8	SDAT1-B3P	I/O
9	SDAT2-B3P	I/O	10	SDCD-B3N	I
11	SDWP-B3P	I	12	GND	-

C.20   PJ3000 MDC I/F connector (30pin)

Table C-20 MDC I/F connector (30pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	NC	-	2	GND	-
3	GND	-	4	MDMP-BXP	I/O
5	NC	-	6	NC	-
7	NC	-	8	GND	-
9	NC	-	10	NC	-
11	NC	-	12	NC	-
13	NC	-	14	NC	-
15	GND	-	16	MDC-B3V	-
17	MDC-B3V	-	18	NC	-
19	GND	-	20	GND	-
21	NC	-	22	M97SY2-P3P	I
23	M970T2-P3P	I	24	NC	-
25	M97R52-S3N	I	26	M97IN2-B3P	O
27	GND	-	28	GND	-
29	GND	-	30	X97BC2-B3P	I/O

C.21 PJ8800 DC-IN connector (2pin)

Table C-21 DC-IN connector (2pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	ADPDC	-	2	GND	-

C.22 PJ8810 Main battery connector (10pin)

Table C-22 Main battery connector (10pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	(+)	-	2	BTMP1	O
3	DCHG	-	4	(M5V)	-
5	PSCL-S5P	I	6	PSDA-S5P	I
7	GND	-	8	DBT10V-S5N	O
9	GND	-	10	GND	-

C.23 PJ8760 RTC battery connector (2pin)

Table C-23 RTC battery connector (2pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	(R3V)	-	2	GND	-

C.24 PJ8770 FAN connector (3pin)

Table C-24 FAN connector (3pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	FANVCC	-	2	GND	-
3	FANG-P3P	O			

C.25   PJ6001 Speaker connector (4pin)

Table C-25 Speaker connector (4pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	VO+(VROUTR)	O	2	VO-	O
3	VO+(VROUTL)	O	4	VO-	O

C.26   PJ6004 Headphone connector (6pin)

Table C-26 Headphone connector (6pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	HEADL-PXP	O
3	HEADR-PXP	O	4	GND	-
5	HPIN-P3N	I	6	N.C.	-

LED Board

C.27   PJ9600 System Board1 I/F connector (20pin)

Table C-27 System Board1 I/F connector (20pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	BTLED-S5N	O
3	NC	-	4	SDLED-B5P	O
5	GND	-	6	CDLED1-P5N	O
7	HDDLED1-P5N	O	8	P5V	-
9	BAT2DR	O	10	BAT2OR-S5N	O
11	GND	-	12	BAT1GR-S5N	O
13	BAT1OR-S5N	O	14	S5V	-
15	PWLEGR-S3N	O	16	PWLEOR-S3N	O
17	GND	-	18	DCINGR-S5N	O
19	DCINOR-S5N	O	20	S5V	-

2nd Battery Board

C.28   PJ9650 System Board1 I/F connector (50pin)

Table C-28 System Board1 I/F connector (50pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	GND	-
3	GND	-	4	GND	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	GND	-	10	GND	-
11	GND	-	12	GND	-
13	NC	-	14	PVBAT2	-
15	PVBAT2	-	16	PVBAT2	-
17	PVBAT2	-	18	PVBAT2	-
19	PVBAT2	-	20	PVBAT2	-
21	PVBAT2	-	22	PVBAT2	-
23	PVBAT2	-	24	PVBAT2	-
25	PVBAT2	-	26	GND	-
27	GND	-	28	GND	-
29	GND	-	30	GND	-
31	GND	-	32	GND	-
33	GND	-	34	NC	-
35	DBT20V-S5N	I	36	GND	-
37	PSDA-S5P	I	38	PSCL-S5P	I
39	BT2VD	-	40	CDCHG2-S5P	I
41	BTMP2-SXP	I	42	NC	-
43	PVBAT2	-	44	PVBAT2	-
45	PVBAT2		46	PVBAT2	-
47	PVBAT2	-	48	PVBAT2	-
49	PVBAT2	-	50	PVBAT2	-

C.29   PJ8500 2nd battery Connector (10pin)

Table C-29 2nd battery Connector (10pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	PVBAT2	-	2	BTMP2-SXP	I
3	CDCHG2-S5P	I	4	BT2VD	-
5	PSCL-S5P	I	6	PSDA-S5P	I
7	GND	-	8	DBT20V-S5N	I
9	BT2VD	-	10	GND	-

Appendix D   Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 2) (1/4)

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	*2
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	18	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	

Table D-1 Scan codes (set 1 and set 2) (2/4)

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
29	\ |	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
41	' "	28	A8	52	F0	52	
43	Enter	1C	9C	5A	F0	5A	*3
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	

Table D-1 Scan codes (set 1 and set 2) (3/4)

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	**Break**	**Make**	**Break**		
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	
112	F1	3B	BB	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	*3

Table D-1 Scan codes (set 1 and set 2) (4/4)

Cap No.	Keytop	Code set 1				Code set 2					Note
		Make		**Break**		**Make**		**Break**			
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 the **Fn** key makes different codes.
4. *   **Fn** key does not generate a code by itself.
5. *   This key corresponds to key No. 42 in a 102-key model.
6. *   Refer to Table D-6, No. 124 key scan code.
7. *   Refer to Table D-7, No. 126 key scan code.

Table D-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1								Code set 2								
		Make				Break				Make					Break			
55	/	E0	AA	E0	35	E0	B5	E0	2A	E0	F0	12	E0	4A	E0	F0	4A	E0	12
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	AA	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 listed below:

	With left **Shift**	With right **Shift**
Set 1	E0 AA	E0 B6
	E0 2A	E0 36
Set 2	E0 F0 12	E0 F0 59
	E0 12	E0 59

Table D-3 Scan codes in Numlock mode

Cap No.	Key top	Code set 1								Code set 2								
		Make				Break				Make				Break				
75	INS	E0	2A	E0	52	E0	D2	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	45		C5		77		F0	77	
122	NUMERIC	45		C5		77		F0	77	
123	Scrl	46		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
54	.	(.)	53	D3	71	F0	71
55	/	(/)	E0 35	E0 B5	40 4A	E0 F0 4A	

Table D-6 No.124 key scan code

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 No.126 key scan code

Key top	Shift	Code set 1						Code set 2						
		Make						**Make**						
Pause	Common*	E1	1D	45	E1	9D	C5	E1	14	77	E1	F0	14	F0	77
	Ctrl*	E0	46	E0	C6			E0	7E	E0	F0	7E		

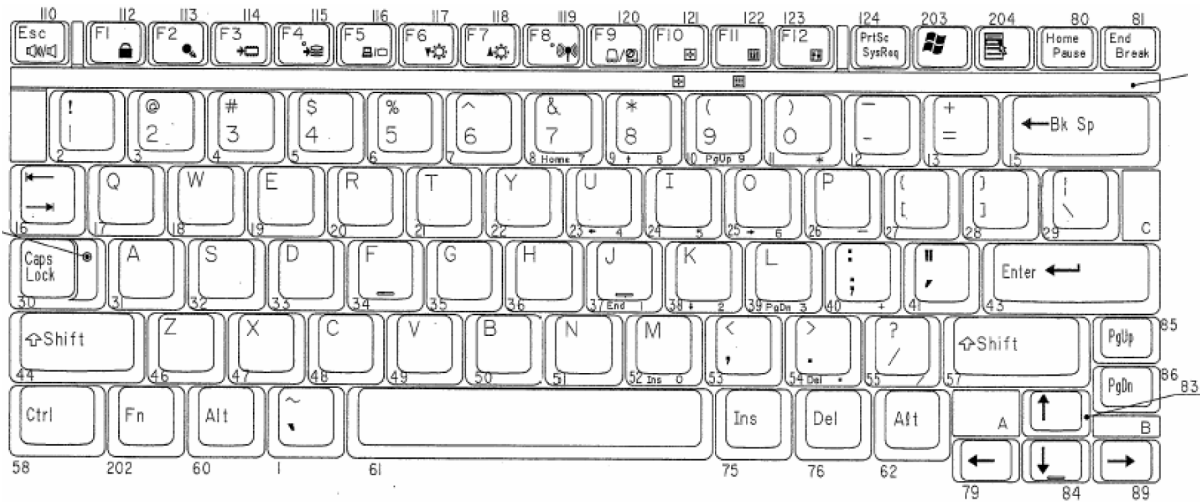*: This key generates only make codes.

Appendix E   Key Layout

Figure E-1 Key layout

Appendix F   BIOS/KBC/EC Update

When updating the BIOS and EC/KBC set floppy diskette including updated program into the floppy drive and turn on the computer while holding down following key.

- In case of updating the BIOS   (Tilde key)

- In case of updating the KBC/EC   **Tab**

The power is automatically turned off as soon as the beep sound is heard and completion message is displayed when updating has been finished. Make sure with T&D whether updating has been done.

Caution: The power must not be turned off during the rewrite. If the write operation fails, the machine may not start up.

Appendix G   Reliability

The following table shows MTBF (Mean Time Between Failures) for the system.

Table G-1 MTBF

Component	Time (hours)
System (hour)	6,444

Appendix H   Key FD

This Appendix explains how to make a key FD.

1. Start the setup program.

2. Set the cursor to Not Registered of PASSWORD and press **Space** or **BackSpace** key. The screen to input the password appears.

    If the password has been set, Registered is displayed PASSWORD item. Then cancel the password first and set a new one.

3. Enter a password.
    The number of words shall be within ten. The character "*" is displayed as you enter a word.

4. Press **Enter** key.
    The first password is recognized and the second one is required.

5. Enter the second password.
    Enter the same password as the first one. . The character "*" is displayed as you enter a word.

6. Press **Enter** key.
    The password is registered. When the second password differs from the first one, the input of the password is required again. Then enter the password same as the first one.

7. When the password is set, press **Fn** + ® keys. Then the following message appears.

    ```
    Are you sure ? (Y/N)
    The changes you made will cause the system to reboot.
    Insert password service disk if necessary.
    ```

8. Insert a FD into the USB FDD and press **Y** key. Then the following message appears.

    ```
    Password Service Disk Type ? (1:2HD,2:2DD)
    ```

    When the set FD is 2HD, press **1** key. For 2DD, press **2** key.

    The data is written to the FD. (If no FD is set, this procedure is finished.)

    When the wiring to the FD is completed, the following message appears.

    ```
    Remove the password service disk, then press any key.
    ```

    Remove the FD and finish the procedure by pressing any key.

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