Toshiba Personal Computer

Satellite A40 Series

Maintenance Manual

TOSHIBA CORPORATION

File Number 960-458

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Toshiba Personal Computer Satellite A40 Series Maintenance Manual

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite A40 Series.

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. 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 Satellite A40 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 assignments
❑ Keyboard scan/character codes
❑ Key layout
❑ Wiring diagrams
❑ BIOS Rewrite Procedures
❑ Reliability

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 computer that appears on its display is presented in the typeface below:

```
Format complete
System transferred
```

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Chapter 1

Hardware Overview

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1.1   Features

The Toshiba Satellite A40 Personal Computer is a high performance all-in-one PC running a Pentium 4 or Celeron processor.

❑ Microprocessor

Intel Mobile Pentium 4 Processor (Northwood)

A 2.40GHz, 2.66GHz, 2.80GHz, 3.06GHz or 3.20GHz Pentium 4 processor (Northwood) with a 2.40GHz, 2.66GHz, 2.80GHz, 3.06GHz or 3.20GHz internal clock, 533MHz bus and 1.525/1.20V core operation

Intel Mobile Pentium 4 Processor (Prescott)

A 2.66GHz, 2.80GHz, 3.06GHz, 3.20GHz or 3.46GHz Pentium 4 processor (Prescott) with a 2.66GHz, 2.80GHz, 3.06GHz, 3.20GHz or 3.46GHz internal clock, 533MHz bus and 1.35/1.15V core operation

Intel Mobile Celeron

A 2.40GHz, 2.50GHz, 2.60GHz, 2.70GHz or 2.80GHz Celeron processor with a 2.40GHz, 2.50GHz, 2.60GHz, 2.70GHz or 2.80GHz internal clock, 400MHz bus and 1.525V core operation

❑ Chipset

The Satellite A40 is equipped with Intel Montara-GT, Intel ICH4-M and YEBISU-SS.

❑ Cache Memory

Intel Mobile Pentium 4 Processor (Northwood)

12KB primary cache (in CPU) and 512KB secondary cache (in CPU)

Intel Mobile Pentium 4 Processor (Prescott)

12KB primary cache (in CPU) and 1024KB secondary cache (in CPU)

Intel Mobile Celeron

12KB primary cache (in CPU) and 128KB secondary cache (in CPU)

❑ GPU

GPU is mounted in the Montara-GT. The internal VRAM is 64M UMA (max).

❑ Memory

Two DDR SO-DIMM slots are available for installation of PC2700 compatible 256, 512MB and 1GB memory modules. The memory is expandable up to 2GB.

❑ Built-in HDD

The computer has a 30GB, 40GB, 60GB or 80GB internal drive of 2.5 inch x 9.5mm height.

❑ USB FDD

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.

❑ DVD-ROM Drive

This drive accommodates either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD, CD-R/RW and DVD. It is a high-performance drive that reads DVD at maximum 8-speed, and reads CD at maximum 24-speed (3,600 KB per second).

❑ CD-RW/DVD-ROM Drive

This drive is a combination of DVD-ROM and CD-R/RW 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.

❑ DVD-R/-RW Drive

A full-size DVD-R/-RW drive module lets you record data to rewritable CD/DVD as well as run either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVD without using an adaptor. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 1-speed, and reads CD at maximum 24-speed (3,600 KB per second).

❑ DVD±RW Drive

This full size DVD±RW drive module lets you record data to rewritable CD/DVDs as well as run either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVD without using an adaptor. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 2-speed, DVD+R/+RW at 2.4-speed and reads CD at maximum 24-speed (3,600 KB per second).

❑ DVD Multi 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/CD without an adaptor. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 1-speed, and reads CD at maximum 24-speed (3,600 KB per second).

❑ Display

The display comes in the following three types:

- 14.1-inch XGA TFT LCD (1024 × 768 pixels with 16M colors)

- 15.0-inch XGA TFT LCD (1024 × 768 pixels with 16M colors)

- 15.0-inch SXGA+ TFT LCD (1400 × 1050 pixels with 16M colors)

❑ Keyboard

An easy-to-use 85(US)-/86(UK)-key keyboard (101 Key emulation). A Windows key is supported.

❑ Touch pad

A touch pad is installed as a pointing device.

❑ Batteries

A RTC battery is mounted inside the computer.
The main battery is a detachable lithium ion battery (8,400mAh: Li-Ion, 12cell).

❑ USB (Universal Serial Bus)

The computer has four USB ports, which support USB2.0.

❑ IEEE 1394 port

The computer comes with one IEEE 1394 port. It enables high-speed data transfer directly from external devices such as digital video cameras.

❑ Parallel port

The parallel port enables connection of parallel printer or other parallel devices (ECP compatible).

❑ External monitor port

The port enables connection of an external monitor, which is recognized automatically by Video Electronics Standards Association (VESA) Display Data Channel (DDC) 2B compatible functions.

❑ PC card slot

The PC card slot accepts one Type II (5mm thick) card. The slot is equipped with an ejector and supports ToPIC-100 (3.3V/CardBus).

❑ SD Card

The SD Card Slot can accommodate Secure Digital flash memory cards with various capacities. SD cards let you easily transfer data from devices, such as digital cameras and Personal Digital Assistants, which use SD Card flash-memory.

❑ Sound system

The sound system is equipped with the following features:

- AC 97 Link
- Sound CODEC: Analog Devices 1981B
- Stereo speakers
- Volume control knob
- Stereo Headphone jack
- External microphone jack

❑ Video-out jack (in some models, there is no Video-out jack)

The video jack enables to transfer NTSC or PAL data to external devices connected with S-Video cable.

θ LAN (Intel-made)/MODEM (Askey -made)

Connectors for LAN and Modem are separately mounted.

❑ Wireless LAN (Mini PCI slot)

The wireless LAN (802.11b, 802.11a/b/g, or 802.11b/g Combo) is equipped on the mini PCI slot.

The front of the computer is shown in figure 1-1 and the system unit configuration is shown in figure 1-2.
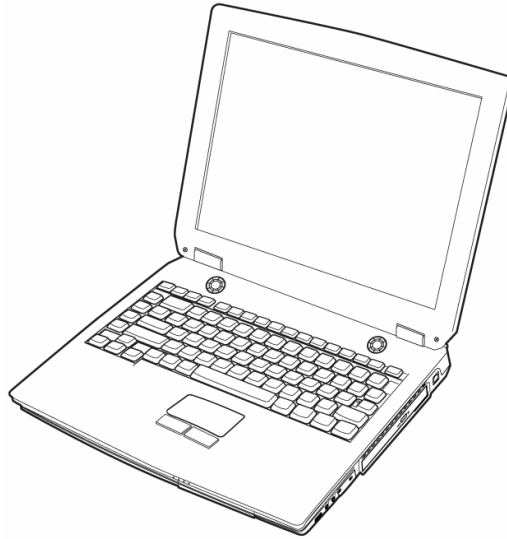
Figure 1-1 Front of the computer
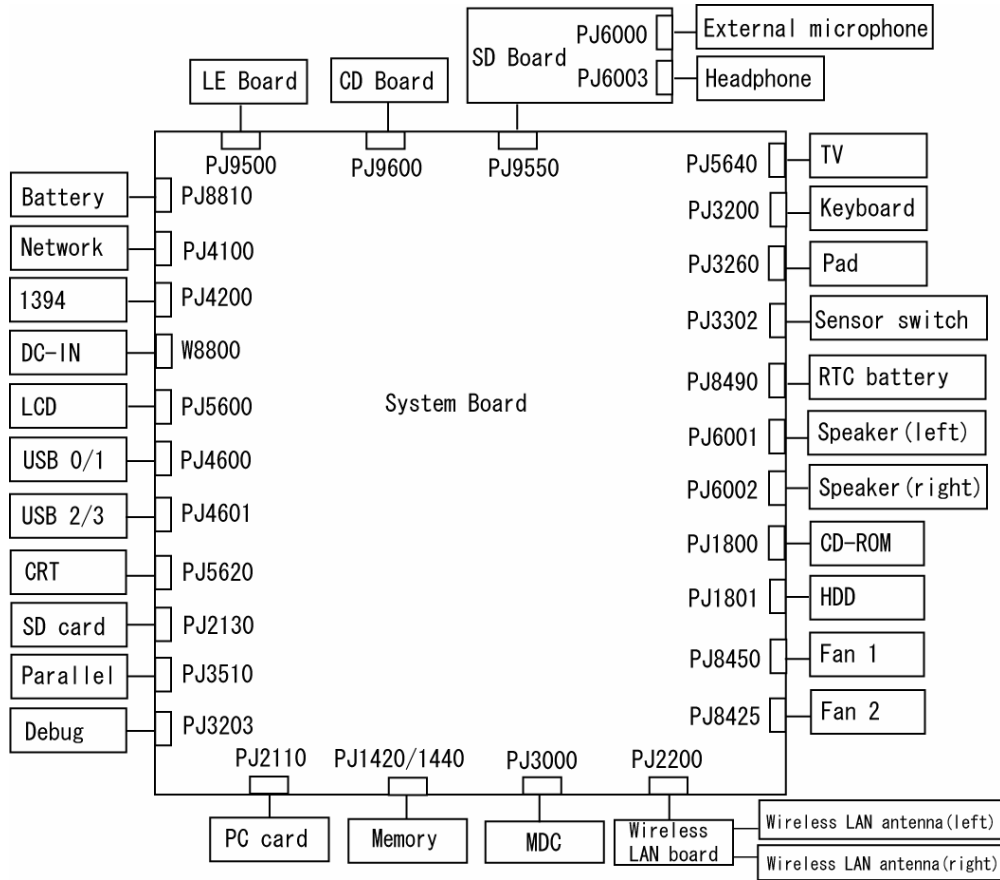
Figure 1-2 System unit configuration

1.2   System Unit Block Diagram

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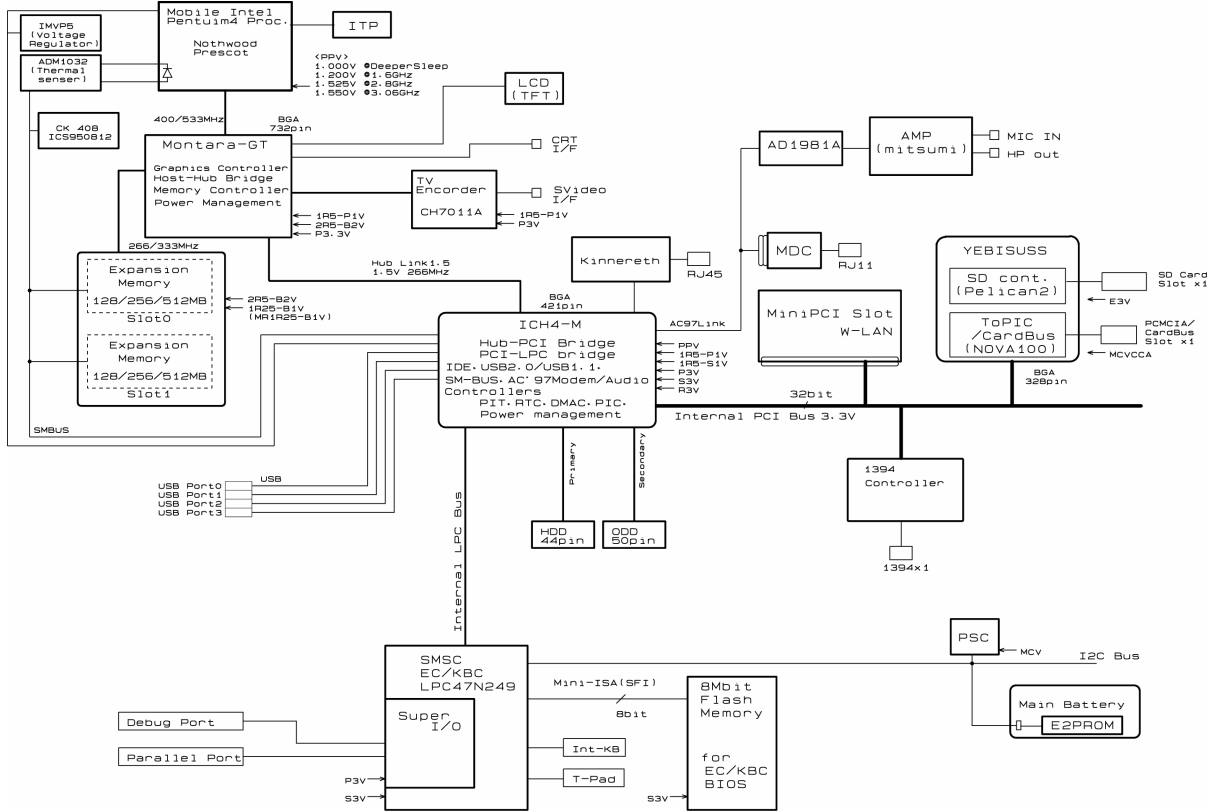
Figure 1-3 System unit block diagram

The system unit is composed of the following major components:

❑ Processor

Intel Mobile Pentium 4 Processor (Northwood)

- 2.40/2.66/2.80/3.06/3.20GHz (Internal clock: 2.40/2.66/2.80/3.06/3.20GHz, Bus: 533MHz, Core voltage: 1.525/1.20V (Battery Optimized Mode at 1.20V), Built-in NDP)
- Internal cache memory: 12KB (in CPU)
- Secondary cache memory: 512KB (in CPU)

Intel Mobile Pentium 4 Processor (Prescott)

- 2.66/2.80/3.06/3.20/3.46GHz (Internal clock: 2.66/2.80/3.06/3.20/3.46GHz, Bus: 533MHz, Core voltage: 1.35/1.15V (Battery Optimized Mode at 1.15V), Built-in NDP)
- Internal cache memory: 12KB (in CPU)
- Secondary cache memory: 1024KB (in CPU)

Intel Mobile Celeron

- 2.40/2.50/2.60/2.70/2.80GHz (Internal clock: 2.40/2.50/2.60/2.70/2.80GHz, Bus: 400MHz, Core voltage: 1.525V, Built-in NDP)
- Internal cache memory: 12KB (in CPU)
- Secondary cache memory: 128KB (in CPU)

❑ Memory

Two memory slots are provided. Expansion up to 2GB is available.

- Supports DDR333
- Supports PC2700
  - 256MB: 256Mbit (16M × 16bit) chips × 8
  - 512MB: 512Mbit (32M × 8bit) chips × 16
  -              512Mbit (32M × 16bit) chips × 8
  - 1GB: 512Mbit (64M × 8 bit) chips × 16
- 200 pin, SO Dual In-line Memory Modules (SO-DIMM)
- 2.5 volt operation

❑ Intel Montara-GT (North Bridge)

- One Intel 82852GME is used.
- Features:
  - Mobile Intel Pentium 4 processor and Intel Celeron processor System Bus Support
  - Supports Enhanced Intel SpeedStep technology
  - DRAM Controller supporting DDR333/DDR266/DDR200, 2GB max
  - Accelerated Graphics Port (AGP) Interface: Supports AGP 2.0 including 1×, 2×, and 4×
  - Up to 64MB of dynamic video memory allocation
  - 732-pin Micro-FCBGA (37.5×37.5 mm)

❑ Intel ICH4-M (South Bridge)

- One Intel 82801DBM is used.
- This gate array has the following features:
  - Hub Link Interface
  - PCI Rev2.2 Interface (6 PCI REQ/GNT Pairs)
  - Enhanced DMA Controller, Interrupt Controller and Timer Functions
  - BusMaster IDE Controller (Ultra ATA 100/66/33)
  - USB 1.1/2.0 Controller 6 Ports (EHCI: Enhanced Host Controller)
  - I/O APIC
  - SMBus2.0 Controller
  - Firmware Hub (FWH) Interface (BIOS)
  - Low Pin Count (LPC) Interface (EC/KBC, Super I/O)
  - Serial Interrupt Controller
  - ACPI Power Management Controller
  - Deeper Sleep Support
  - AC'97 2.3 Interface
  - Internal RTC
  - Internal LAN Controller (WfM2.0)
  - Alert ON LAN (AOL)
  - 421-ball (31×31mm) BGA Package

❑ PC Card Controller Gate Array

  •   One YEBISU-SS gate array is used.
  •   This gate array has the following functions and components.
       –   PCI interface (PCI Revision2.2)
       –   CardBus/PC Card controller (Yenta2 Version2.2)
       –   SD memory card controller (SDHC Ver.1.2)
       –   SD IO card controller (Ver.1.0)
       –   SmartMedia controller (SMHC Ver.01/SMIL1.0)
       –   SIO (UART) controller (MS Debug Port Specification Ver.1.0)
       –   Docking station interface
       –   Q switch control, reset control
       –   External device interface

❑ BIOS ROM

  •   8Mbit (Flash memory)
                –   64KB used for logo
                –   32KB used for setup and checksum
                –   128KB used for system BIOS
                –   64KB used for VGA-BIOS
                –   64KB used for ACPI
                –   8KB used for PnP
                –   8KB used for password security
                –   16KB used for booting
                –   128KB are reserved
  •   5.0V operation
  •   Access time : 120 ns or 90 ns
  •   Data transfer: 8-bit

❑ VGA Controller

Included in the North Bridge

❑ Sound Controller

AC 97' Link (in the South Bridge) is used.

- Amplifier, internal stereo speakers, stereo headphone connector, external microphone connector and volume control knob are mounted.

❑ EC/KBC (Embedded Controller/Keyboard Controller)

One SMSC LPC-47N259 micon chip functions as both EC and KBC.

- EC
    This controller controls the following functions:
    – Power supply sequence
    – Thermal conditions
    – LEDs
    – Beep
    – Device ON/OFF
    – Fan speed
    – Universal I/O port
    – Docker Docking Sequence
    – Battery capacity check
    – Forced reset
    – Flash rewriting
    – EC interface
    – I2C communication
    – EC access
    – Slim Select Bay Control

- KBC
    This controller has the following functions:
    – Scan controller to check status of keyboard matrix
    – Interface controller between the keyboard scan controller and the system
    – Control of switching and simultaneous operation of the accupoint/external PS/2 mouse and of the internal keyboard/external PS/2 keyboard

❑ PSC (Power Supply Controller)

- One Toshiba TMP87PM48U chip is used.
- This controller controls the power sources.

❑ Clock Generator

- One ICS 950812 is used.
- This device generates the system clock.

❑ Modem Controller

- One built-in Askey-made 1456VQL4A(INT) modem card
- This controller has the following functions:
  – Digital line protection support
  – Ring wake up support
  – AC97 interface
  – Supports V.92 56k Modem/Fax.

❑ Internal LAN Controller

- One Kinnereth (ED82562) chip is used.
  – Supports 100Base-TX and 10Base-T.
  – Controls LAN.

❑ Wireless LAN

  – Mini-PCI Type III 1slot
  – Supports Kill SW.
  – Supports Wireless LAN through PCMCIA.
  – 802.11b: Agere-made
  – 802.11a/b/g, 802.11b/g: Atheros-made

❑ Super I/O

- One SMSC LPC 47N259 chip is used.
  – Floppy Disk Controller
  – Serial Port Controller

❑ IEEE1394

- One TSB43AB22 is used.

❑ Sensor

- Thermal Sensor: One ADM1032AR chip is used.
- LCD Sensor: One NRS-701-1015T is used.

1.3 USB 3.5-inch Floppy Disk Drive

The 3.5-inch USB FDD is a thin, high-performance reliable drive that supports 720KB and 1.44MB.

The FDD is shown in figure 1-4. The specifications for the FDD are listed in Table 1-1.
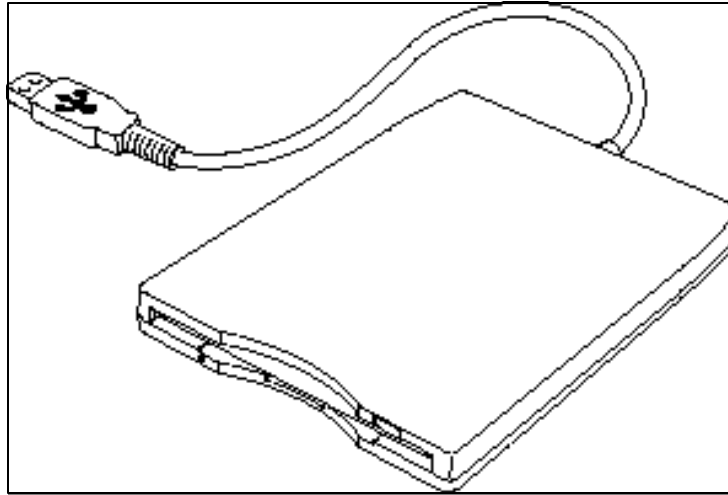
Figure 1-4 3.5-inch FDD (USB External)

Table 1-1 3.5-inch FDD specifications

Items		720KB mode	1.44MB mode
Data transfer rate	FDD part	250K bits/second	500K bits/second
	USB	Full speed mode (12M bits/second)	
Disk rotation speed		300rpm	360rpm
Track density		5.3 track/mm (135TPI)	

1.4   2.5-inch Hard Disk Drive

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

The computer supports a 30GB, 40GB, 60GB and 80GB HDD.

The HDD is shown in figure 1-5. Specifications are listed in Table 1-2 and 1-3.
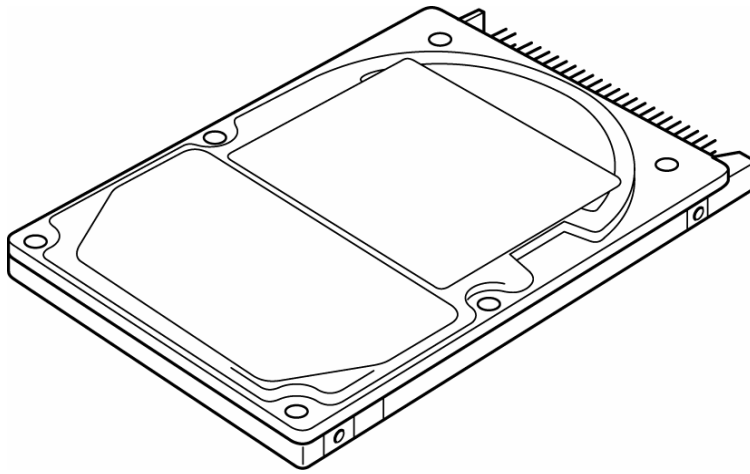
Figure 1-5   2.5-inch HDD

Table 1-2   2.5-inch HDD dimensions (1/2)

Parameter		Specifications		
		TOSHIBA HDD2181B	TOSHIBA HDD2190B	TOSHIBA HDD2183B
Outline dimensions	Width (mm)	69.85		
	Height (mm)	9.5		
	Depth (mm)	100		
	Weight (g)	99 max.	95 max.	99 max.

Parameter		Specifications		
		TOSHIBA HDD2184B	TOSHIBA HDD2194B	TOSHIBA HDD2188B
Outline dimensions	Width (mm)	69.85		
	Height (mm)	9.5		
	Depth (mm)	100		
	Weight (g)	102 max.		99 max.

Table 1-2 2.5-inch HDD dimensions (2/2)

Parameter		Specifications		
		IBM G8BC0000Z310	**IBM G8BC0000Z410**	**IBM G8BC0000Z610**
Outline dimensions	Width (mm)	69.85		
	Height (mm)	9.5		
	Depth (mm)	100.2		
	Weight (g)	95 max.		99 max.

Parameter		Specifications	
		IBM G8BC00014610	**IBM G8BC0000Z810**
Outline dimensions	Width (mm)	69.85	69.85
	Height (mm)	9.5	9.5
	Depth (mm)	100.2	100.2
	Weight (g)	102 max.	99 max.

Parameter		Specifications		
		HITACHI G8BC00017310	**HITACHI G8BC00017410**	**HITACHI G8BC00017610**
Outline dimensions	Width (mm)	69.85		
	Height (mm)	9.5		
	Depth (mm)	100		
	Weight (g)	91		95

Parameter		Specifications		
		HITACHI G8BC00013610	**HITACHI G8BC00017810**	**HITACHI G8BC00014810**
Outline dimensions	Width (mm)	70.1 (MAX)	69.85	
	Height (mm)	9.5		
	Depth (mm)	100		100.2
	Weight (g)	95 max	95 max	102 max.

Table 1-3 2.5-inch HDD specifications (1/3)

Parameter	Specifications		
	TOSHIBA HDD2181B	**TOSHIBA HDD2190B**	**TOSHIBA HDD2183B**
Storage size (formatted)	30GB	40GB	60GB
Speed (RPM)	4200		
Data transfer speed (Mb/sec)	154.3-298.0	175.0–341.7	154.3-298.0
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	78.9	88.1	78.9
Access Time Average seek (sec)	12		
Start time (sec)	4 typ.		

Parameter	Specifications		
	TOSHIBA HDD2184B	**TOSHIBA HDD2194B**	**TOSHIBA HDD2188B**
Storage size (formatted)	60GB		80GB
Speed (RPM)	5400		4200
Data transfer speed (Mb/sec)	202.9–373.3	258–394	175.0-341.78
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	78.9	88.8	88.1
Access Time Average seek (sec)	12		
Start time (sec)	4 typ.		

Table 1-3 2.5-inch HDD specifications (2/3)

Parameter	Specifications		
	IBM G8BC0000Z310	**IBM G8BC0000Z410**	**IBM G8BC0000Z610**
Storage size (formatted)	30GB	40GB	60GB
Speed (RPM)	4200		
Data transfer speed (Mb/sec)	-		
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	63		
Access Time Average seek (Read) Average seek (Write)	12 typ. 14 typ.		
Start time (sec)	5		

Parameter	Specifications	
	IBM G8BC00014610	**IBM G8BC0000Z810**
Storage size (formatted)	60GB	80GB
Speed (RPM)	5400	4200
Data transfer speed (Mb/sec)	450	350
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)	
Track density (Ktpi)	96	96
Access Time (ms) Average seek (Read) Average seek (Write)	12 14	12 14
Start time (sec)	3.5	5

Table 1-3 2.5-inch HDD specifications (3/3)

Parameter	Specifications		
	HITACHI G8BC00017310	**HITACHI G8BC00017410**	**HITACHI G8BC00017610**
Storage size (formatted)	30GB	40GB	60GB
Speed (RPM)	4200		
Data transfer speed (Mb/sec)	183.2-347.2	187.2-351.2	
Interface transfer rate (MB/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	80		
Access Time Average seek (Read) Average seek (Write)	13 typ. -		
Start time (sec)	5 typ (Power on)		

Parameter	Specifications		
	HITACHI G8BC00013610	**HITACHI G8BC00017810**	**HITACHI G8BC00014810**
Storage size (formatted)	60GB	80GB	80GB
Speed (RPM)	5400	4200	5400
Data transfer speed (Mb/s)	263.2-407.2	187.2-351.2	450 max
Interface transfer rate (Mb/s)	100 max. (Ultra DMA mode)		
Track density (Ktpi)	85.5	80	96
Access Time (ms) Average seek (Read) Average seek (Write)	13 typ -		12 typ 14 typ
Start time (sec)	5 (Power on)		3.5 (Power on)

1.5   DVD-ROM Drive

The DVD-ROM drive accommodates either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD, CD-R/RW and DVD. It is a high-performance drive that reads DVD at maximum 8-speed, and reads CD at maximum 24-speed (3,600 KB per second).

The DVD-ROM drive is shown in Figure 1-6. The specifications of the DVD-ROM drive are described in Table 1-4.
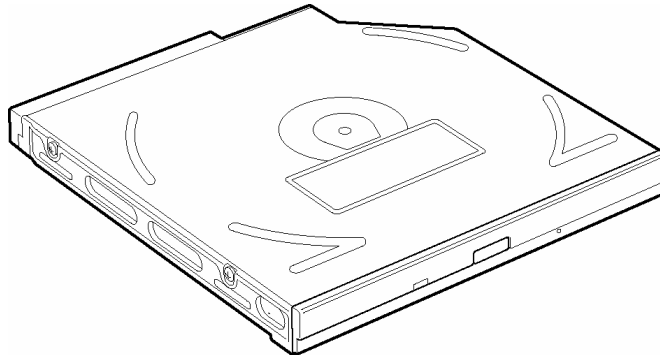
Figure 1-6 DVD-ROM drive

Table 1-4 DVD-ROM drive specifications (1/2)

Item		Specifications Toshiba G8CC0000R810		
		DVD-ROM	**CD-ROM**	**DVD-RAM**
Burst data transfer rate (MB/s)		16.7 (PIO Mode 4) 16.7 (Multi-word DMA Mode 2) 33.3 (Ultra DMA Mode 2)		
Average random access time (ms)		100	95	170
Average random seek time (ms)		95	90	120
Average random full strike access time (ms)		160	160	350
Data buffer capacity (KB)		192		
Supported formats	DVD	DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18) DVD-R (read), DVD-RW (read), DVD-RAM (read, Version 2.1), DVD-RAM (read, Version 1.0)		
	CD	CD-Audio, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, CD-R, CD-RW), CD-R (read), CD-RW (read)		

Table 1-4 DVD-ROM drive specifications (2/2)

Item		Specifications Hitachi G8CC00015810		
		DVD-ROM	**CD-ROM**	**DVD-RAM**
Burst data transfer rate (MB/s)		33.3 (Ultra DMA Mode 2)		
Transfer rate (MB/s)		10.8 (Single/Dual layer)	3.6	2.7 (2.6GB/4.7GB Disc)
Average random access time (ms)		90 (Single) 130 (Dual)	85	250 (4.7 GB Disc)
Data buffer capacity (KB)		256		
Supported formats	DVD	DVD-ROM, DVD-RAM (2.6GB/4.7GB, read only), DVD-R (3.95GB/4.7GB, read only), DVD-RW (4.7GB, read only)		
	CD	CD-ROM Mode 1/Mode 2, CD-ROM XA, CD-I Digital Video, Photo-CD Multisession, CD-Audio disc, Mixed mode CD-ROM, CD-EXTRA, CD-TEXT, CD-R (read only), CD-RW (read only)		

1.6 CD-RW/DVD-ROM Drive

This drive is a combination of DVD-ROM and CD-R/RW 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.

The CD-RW/DVD-ROM drive is shown in figure 1-7. Specifications are listed in Table 1-5.
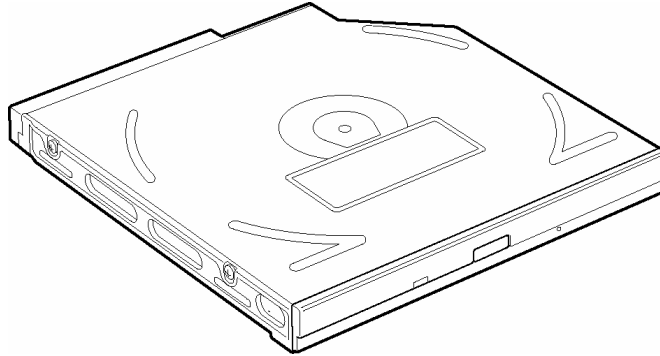
Figure 1-7 CD-RW/DVD-ROM drive

Table 1-5 CD-RW/DVD-ROM drive specifications (1/3)

Item		Specifications
		TEAC G8CC0001D810
Transfer rate	For read (CD-ROM)	1,545 to 3,600KB/sec.
	For read (DVD-ROM)	4,469 to 10,816KB/sec.
Average access time (ms)	CD-ROM	90
	DVD-ROM	110
Data buffer capacity		2MB
Supported formats	CD	CD-DA, CD-ROM Mode 1, CD-ROM XA Mode 2 (Form 1,Form 2), Multi-session Photo CD, CD-I, Video CD,
	DVD	DVD-ROM, DVD-R,(General, Authoring), DVD-Video, DVD-RW, DVD-RAM(4.7GB, 2.6GB)

Table 1-5 CD-RW/DVD-ROM drive specifications (2/3)

Item		Specifications
		HITACHI G8CC0001K810
Transfer rate	For read (CD-ROM)	3,600KB/sec. max
	For read (DVD-ROM)	11.08Mbytes/s max
Average access time (ms)	CD-ROM	110
	DVD-ROM	120
Data buffer capacity		2MB
Supported formats	CD	CD-DA, CD-ROM Mode 1, CD-ROM XA , CD-Audio, Mixed Mode CD-ROM (Audio and Date combined) Photo CD (Single and Multi-session), CD-I, Video CD, CD-Plus/CD-Extra, CD-TEXT
	DVD	DVD-ROM, DVD-R,(General, Authoring), DVD-RW, DVD-RAM, DVD+R, DVD+RW

Item		Specifications
		Panasonic G8CC0001C810
Transfer rate	For read (CD-ROM)	MAX 24× CAV(MAX 3600KB/s)
	For read (DVD-ROM)	MAX 8× CAV(MAX 10800KB/s)
Average access time (ms)	CD-ROM	130
	DVD-ROM	180
Data buffer capacity		2MB
Supported formats	CD	CD-DA, CD-ROM XA, CD-R, CD-Extra(CD+), CD-RW, Photo CD, Video CD, CD-text
	DVD	DVD-Video, DVD-ROM, DVD-R(3.9GB, 4.7GB), DVD-RW, DVD-RAM(4.7GB)

Table 1-5 CD-RW/DVD-ROM drive specifications (3/3)

Item		Specifications
		Toshiba SDR2412OAA
Burst data transfer rate (MB/s)		16.7 (PIO Mode 4) 16.7 (Multi-word DMA Mode 2) 33.3 (Ultra DMA Mode 2)
Average random access time (ms)		CD-ROM: 105, DVD-ROM: 120, DVD-RAM: 130 (Typ.)
Average random seek time (ms)		CD-ROM: 105, DVD-ROM: 120, DVD-RAM: 130 (Typ.)
Average full stroke access time (ms)		CD-ROM: 105, DVD-ROM: 120, DVD-RAM: 130 (Typ.)
Data buffer capacity		2,048KB
Supported formats (for play)	CD	CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, CD-R, CD-RW, Portfolio), CD-R, CD-RW
	DVD	DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R (Ver.1.0, Ver.2.1)

1.7   DVD-R/-RW Drive

A full-size DVD-R/-RW drive module lets you record data to rewritable CD/DVD as well as run either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVDs without using an adaptor. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 1-speed, and reads CD at maximum 24-speed (3,600 KB per second).

The DVD-R/-RW drive is shown in figure 1-8. Specifications are listed in Table 1-6.

Figure 1-8 DVD-R/-RW drive

Table 1-6 DVD-R/-RW drive specifications

Item	Toshiba SD-R6112
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) DVD-ROM CD-ROM DVD-RAM	 115 105 170
Data buffer (MB)	2
Speed (Read) DVD-ROM DVD-RAM CD-ROM	 8x 1x 24x
Speed (Write) CD-R CD-RW DVD-R DVD-RW	 4x, 16x 4x,10x (High Speed) 1x, 2x 1x

Supported format (Read)	CD:
	
	    CD-DA, CD+(E)G, CD-MIDI,
	    CD-TEXT, CD-ROM,
	    CD-ROM XA, CD-I,
	    CD-I Bridge (Photo-CD, Video-CD)
	    Multisession CD (Photo-CD,
	    CD-EXTRA, CD-R, CD-RW,
	    Portfolio),
	    CD-R, CD-RW
	
	DVD :
	    DVD-ROM (DVD-5, DVD-9,
	     DVD-10, DVD-18)
	    DVD-R (Ver.1.0, Ver.2.1)
	    DVD-RW(Ver.1.0, Ver.1.1)
	    DVD-RAM(Ver.2.1)

1.8   DVD±RW (DVD Dual) Drive

This full size DVD±RW drive module lets you record data to rewritable CD/DVDs as well as run either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVD without using an adaptor. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 2-speed, DVD+R/+RW at 2.4-speed and reads CD at maximum 24-speed (3,600 KB per second).

The DVD multi drive is shown in Figure 1-9. Specifications for the DVD multi drive are described in table 1-7.
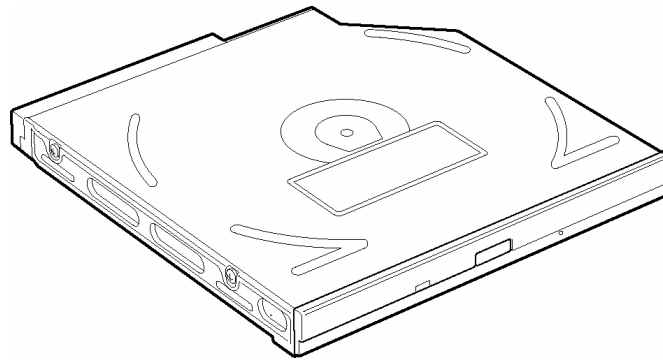
Figure 1-9 DVD±RW drive

Table 1-7 DVD±RW drive specifications

Item	Pioneer G8CC0001L810
ATAPI Burst (MB/sec)	33.3 (Ultra DMA mode 2) 16.6 (PIO Mode 4, Multi word DMA mode 2)
Average access time (ms) DVD-ROM CD-ROM	 150 130
Data buffer (MB)	2
Speed (Read) DVD-ROM CD-ROM	 8x 24x
Speed (Write) CD-R CD-RW DVD-R DVD-RW DVD+R DVD+RW	 4x, 8x, 12x, 16x 4x,10x (High Speed) 1x, 2x (4x) 1x, (2x) 2.4x (4x) 2.4x (4x)

Supported format (Read)	CD:
	    Photo CD (single and multiple session)
	    CD-ROM mode1
	    CD-ROM XA mode2 (form1, form2)
	    Video CD, CD-DA, CD-Extra
	    Mixed-CD, CD-Text,
	    CD-R, CD-RW,
	
	DVD :
	    DVD-ROM (DVD-5, DVD-9,
	    DVD-10, DVD-18)
	    DVD-R (Ver.1.0, Ver.2.0)
	    DVD-RW(Ver.1.0, Ver.1.1)
	    DVD+R, DVD+RW

1.9   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. It is a high-performance drive that reads DVD at maximum 8-speed, writes DVD-R/-RW at 1-speed, and reads CD at maximum 24-speed (3,600 KB per second).

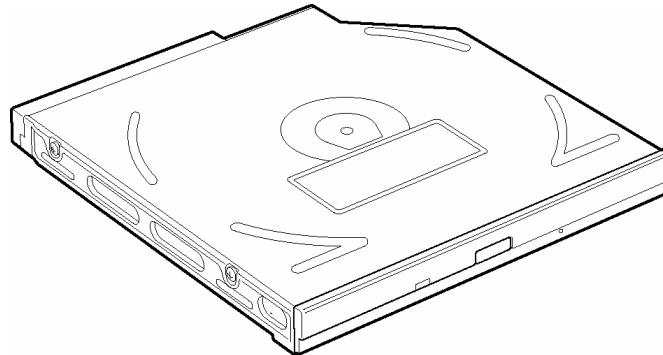The DVD multi drive is shown in Figure 1-10. Specifications for the DVD multi drive are described in table 1-8.
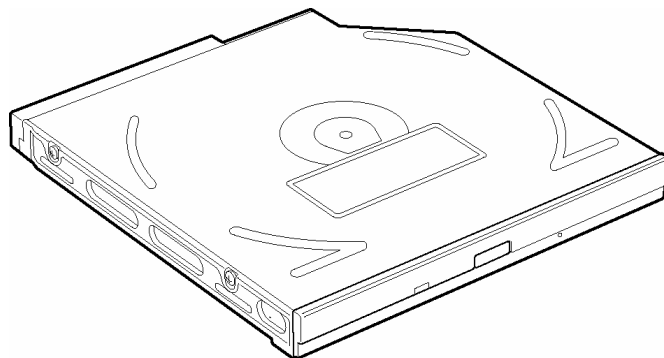
Figure 1-10 DVD-Multi drive

Table 1-8 DVD-Multi drive specifications (1/2)

Item		Specifications		
		Panasonic G8CC00019810		
		DVD-ROM	**CD-ROM**	**DVD-RAM**
Burst data transfer rate (MB/s)		33.3 (Ultra DMA mode 2)		
		16.6 (PIO Mode 4, Multi-word DMA mode 2)		
Access time (ms) 1/3 Stroke Access (typ.)		180	130	-
Data buffer capacity		2MB		
Supported formats	DVD	DVD-VIDEO, DVD-ROM, DVD-R (3.9GB, 4.7GB), DVD-RW (Ver.1.1), DVD-RAM		CD-R, CD-R/W
	CD	CD-DA, CD-ROM, CD-R/W, CD-R, CD-ROM XA (except ADPCM), CD-I Ready, Photo CD (Multi session), Video CD, CD-EXTRA (CD+), CD-TEXT		

Table 1-8 DVD-Multi drive specifications (2/2)

Item		Specifications TEAC G8CC00013810		
		DVD-ROM	CD-ROM	DVD-RAM
Burst data transfer rate (MB/s)		33.3 (Ultra DMA mode 2) 16.7 (PIO Mode 4, Multi-word DMA mode 2)		
Access time (ms) 1/3 Stroke Access (typ.)		130	110	-
Data buffer capacity		2MB		
Supported formats	DVD	DVD-VIDEO, DVD-ROM, DVD-R (General, Authoring), DVD-RW, DVD-RAM(4.7GB, 2.6GB /Read only)		-
	CD	CD-DA, CD-ROM Mode1, CD-ROM XA Mode2 (Form1, Form2), CD-I, Photo CD (Multi session), Video CD, Enhanced CD, CD-TEXT		

1.10 Keyboard

The keyboard mounts 85(US)/86(UK) keys that consist of character key and control key. The keyboard is connected to membrane connector on the system board and controlled by the keyboard controller.

Figure 1-11 is a view of the keyboard.

See Appendix E about a layout of the keyboard.

Figure 1-11 Keyboard

1.11 TFT Color Display

The TFT color display consists of 14.1-inch (XGA) or 15.0-inch (XGA, SXGA+) LCD module and FL inverter board.

1.11.1 LCD Module

The LCD module used for the TFT color display uses a backlight as the light source and can display a maximum of 262,144 colors with 1,024 x 768 or 1,400 x 1,050 resolution. North Bridge can control both internal and external XGA- or SXGA+- support displays simultaneously.

Figure 1-12 shows a view of the LCD module and Table 1-9 lists the specifications.
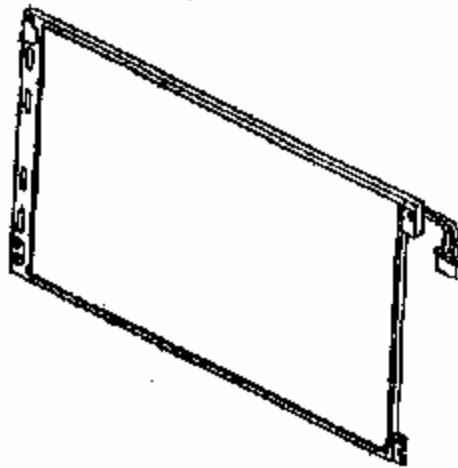
Figure 1-12 LCD module

Table 1-9 LCD module specifications (14.1-inch XGA TFT) (1/3)

Item	Specifications			
	G33C00014110	VF2093P01	VF2058P01	G33C00015110
Number of Dots	1,024(W) x 768(H)			
Dot spacing (mm)	0.279(H) x 0.279(V)			
Display range (mm)	285.696(H) x 214.272(V)			

Table 1-9 LCD module specifications (15.0-inch XGA TFT) (2/3)

Item	Specifications				
	G33C0000M 110	G33C0000K 110	G33C0000L 110	G33C0000Q 110	G33C0000Q 310
Number of Dots	1,024(W) x 768(H)				
Dot spacing (mm)	0.297(H) x 0.297(V)				
Display range (mm)	304.128(H) x 228.096(V)				

Table 1-9 LCD module specifications (15.0-inch SXGA+ TFT) (3/3)

Item	Specifications	
	G33C0000P110	G33C0000R110
Number of Dots	1,400(W) x 1,050(H)	
Dot spacing (mm)	0.2175(H) x 0.2175(V)	
Display range (mm)	304.5(H) x 228.375(V)	

1.11.2   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	
		G71C00011121	G71C00011110
Input	Voltage (V)	DC 5	
	Power (W)	7	
Output	Voltage (V)	750	
	Current (mA)	6.00	
	Power (mA)	5W/7VA	

1.12 Power Supply

The power supply supplies many different voltages to the system board and performs the following functions:

1. Checks power input to determine:
    - Whether the AC adaptor is connected to the computer.
    - Whether the battery pack is installed and supplying power.

2. Checks power supply's internal controls:

    - Battery pack charging: start, stop and voltage supplied to the battery pack.
    - Power supply system: Power supplied from a DC power source (AC adaptor).
    - Faulty power supply: Executes forced shutdown if needed.
    - Logic: Power supply to various circuits
    - Charging current to PWM control IC for battery pack charging

3. Controls the following aspects of the logic system

    - Power supply to gate arrays
    - Power on/off

4. Indicates the following:

    - DC IN (sets LED to orange or blue)
    - Battery icon (sets LED to orange or blue)
    - Faulty power supply by low battery

5. Interface for the following:

    - BIOS via EC/KBC
    - Function mode of power supply

6. Detects the following:

    - Input voltage to logic system
    - Input voltage, overvoltage and input/output to battery pack
    - Battery pack's internal temperature
    - Input voltage to DC power supply (output from AC adaptor)

The power supply output rating is specified in Table 1-11.

Table 1-11 Power supply output rating

Name	Voltage (V)	Use
PPV	1.308-0.844	CPU, GMCH/MCH, ICH4-M
PGV	1.20	GPU (NV34M)
1R25-B1V	1.25	DDR-SDRAM Termination
MR1R25-B1V	1.25	DDR-SDRAM, GMCH
1R5-P1V	1.5	GMCH, ICH4-M, TV, LAN Power
1R5-S1V	1.5	ICH4-M
2R5-P2V	2.5	GPU (NV34M)
2R5-B2V	2.5	GMCH, DDR-SDRAM
P3V	3.3	Clock Generator, Thermal Sensor, GMCH, SDRAM(SPD), TV, LCD, ICH4-M, LAN Power, KINNERETH, AD1981B, Mini-PCI, EC/KBC, FIR
E3V	3.3	YEBISUSS, PC Card Power, mini-PCI, MDC
S3V	3.3	ICH4-M, EC/KBC, Flash Memory, PSC
P5V	5	CRT, ICH4-M, FL inverter, LEDs, HDD, ODD, KB, PAD, Parallel
SND-P5V	5	MM1517A(Amp)
A4R7-P4V	4.7	AD1981B, Amp, Int/Ext Mic, Head Phone
E5V	5	PC Card Power, USB Power
M5V	5	ICH4-M, LM26CIM5, LED
MCV	5	PSC
R3V	2.0-3.5	ICH4-M(RTC)

1.13 Batteries

The computer has two types of batteries as follows:

❑   Main battery pack

❑   RTC battery

The battery specifications are listed in Table 1-12.

Table 1-12 Battery specifications

Battery name		Material	Output voltage	Capacity
Main battery	G71C00023510	Lithium-Ion (12 cell)	10.8 V	8,400mAh
	G71C00023610			
RTC battery	P71035017110	Nickel-metal hydride	3.0 V	17mAh

1.13.1　Main Battery

The removable main battery pack is the computer's main power source when the AC adaptor is not attached. The main battery maintains the state of the computer when the computer enters in resume mode.

1.13.2   Battery Charging Control

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

Quick Battery Charge

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

Table 1-13 Time required for quick charges

Status	Charging time
Quick charge 1 (Power off)	About 3.5 hours
Quick charge 2 (Power on)	About 7.0 to 20.0 or longer

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

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

1. The battery becomes fully charged.

2. The AC adaptor or battery is removed.

3. The battery or output voltage is abnormal.

❑ Detection of full charge

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

1. The current in the battery charging circuit drops under the predetermined limit.

2. The charging time exceeds the fixed limit.

1.13.3   RTC battery

The RTC battery provides power to keep the current date, time and other setup information in memory while the computer is turned off. Table 1-14 lists the charging time and data preservation period of the RTC battery.

Table 1-14 RTC battery charging/data preservation time

Status	Time
Charging Time (power on)	8 hours
Data preservation period (full charge)	1 month

Chapter 2

Troubleshooting Procedures

Chapter 2   Contents

Figures

Tables

2.1 Troubleshooting

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

1. Power supply	5. Keyboard	9. LAN
2. System Board	6. Display	10. Wireless LAN
3. Floppy Disk Drive	7. Optical Drive	11. Sound components
4. Hard Disk Drive	8. Modem	12. SD Card Slot

The Diagnostics Disk operations are described in Chapter 3. Detailed *Replacement Procedures* are given in Chapter 4, *Replacement Procedures*.
The following tools are necessary for implementing the troubleshooting procedures:

1. Diagnostics Disk
2. Phillips screwdriver (2 mm)
3. LH-STIX screwdriver (in some models)
4. Toshiba MS-DOS system disk(s)
   (You must install the following onto the disk: SYS.COM, FORMAT.COM, FDISK.COM and FDISK.EXE)
5. Formatted work disk for floppy disk drive testing
6. Cleaning kit for floppy disk drive troubleshooting
7. Parallel port wraparound connector
8. PC card wraparound connector
9. Multimeter
10. External USB FDD
11. External USB keyboard and Mouse
12. Headphone
13. Microphone
14. USB test module and USB cable
15. TOSHIBA CD-ROM TEST DISK (ZA1217P01/P000204190)
16. CD-RW Media (RICOH-made x4 recommended)
17. DVD-ROM TSD-1 (TOSHIBA-EMI DVD Test Media)
18. Music CD
19. RJ11 connector checker
20. Speaker
21. Personal computer that can communicate by wireless LAN for wireless LAN troubleshooting
22. Antenna test cable

2.2   Troubleshooting Flowchart

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

❑ Ask the user if a password is registered and, if it is, ask him or her to enter the password. If the user has forgotten the system password, perform the following procedure at the appropriate step in the flowchart in Figure 2-1:

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

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

❑ Make sure the External USB floppy disk drive is empty.
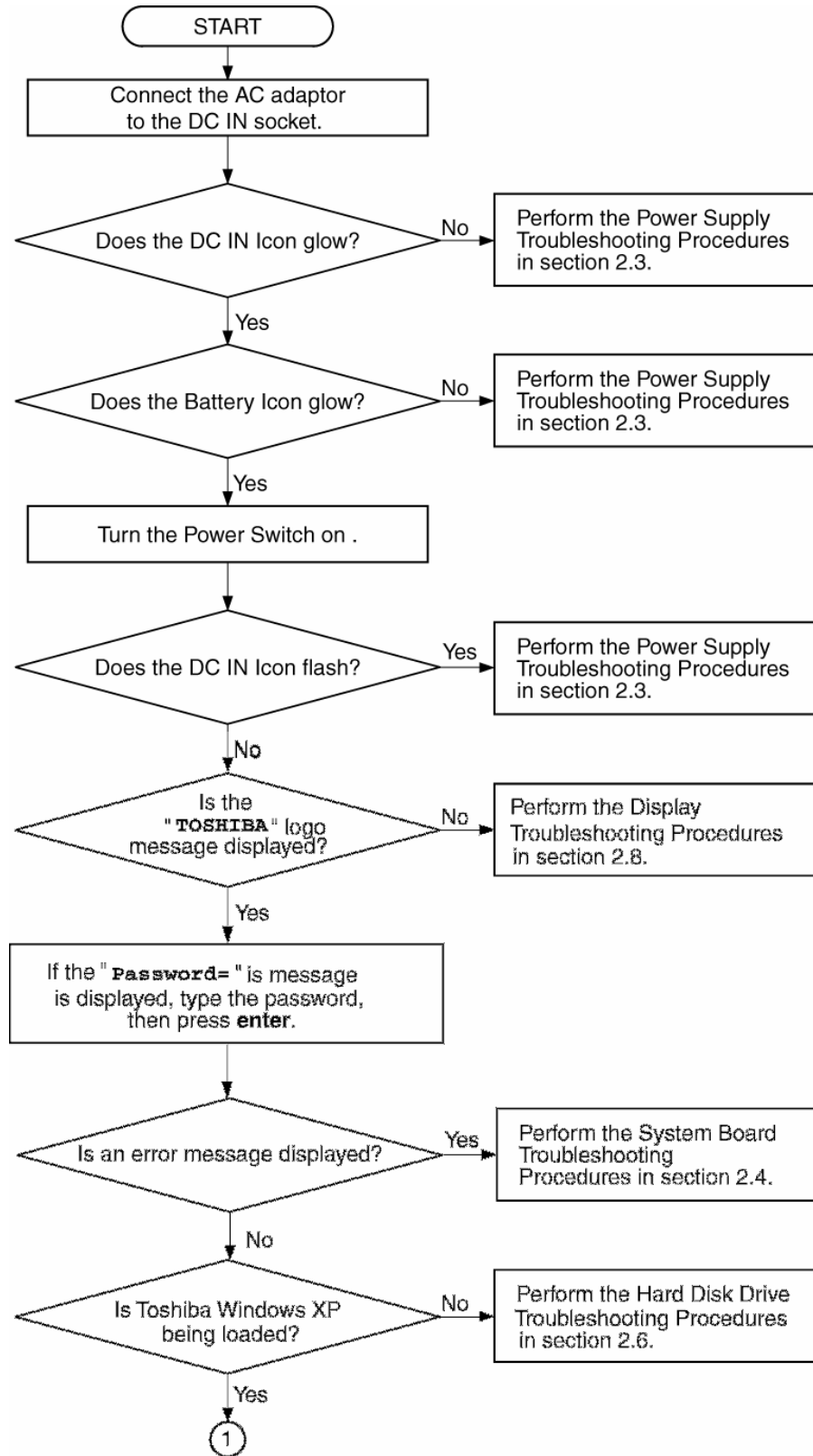
Figure 2-1 Troubleshooting flowchart (1/2)
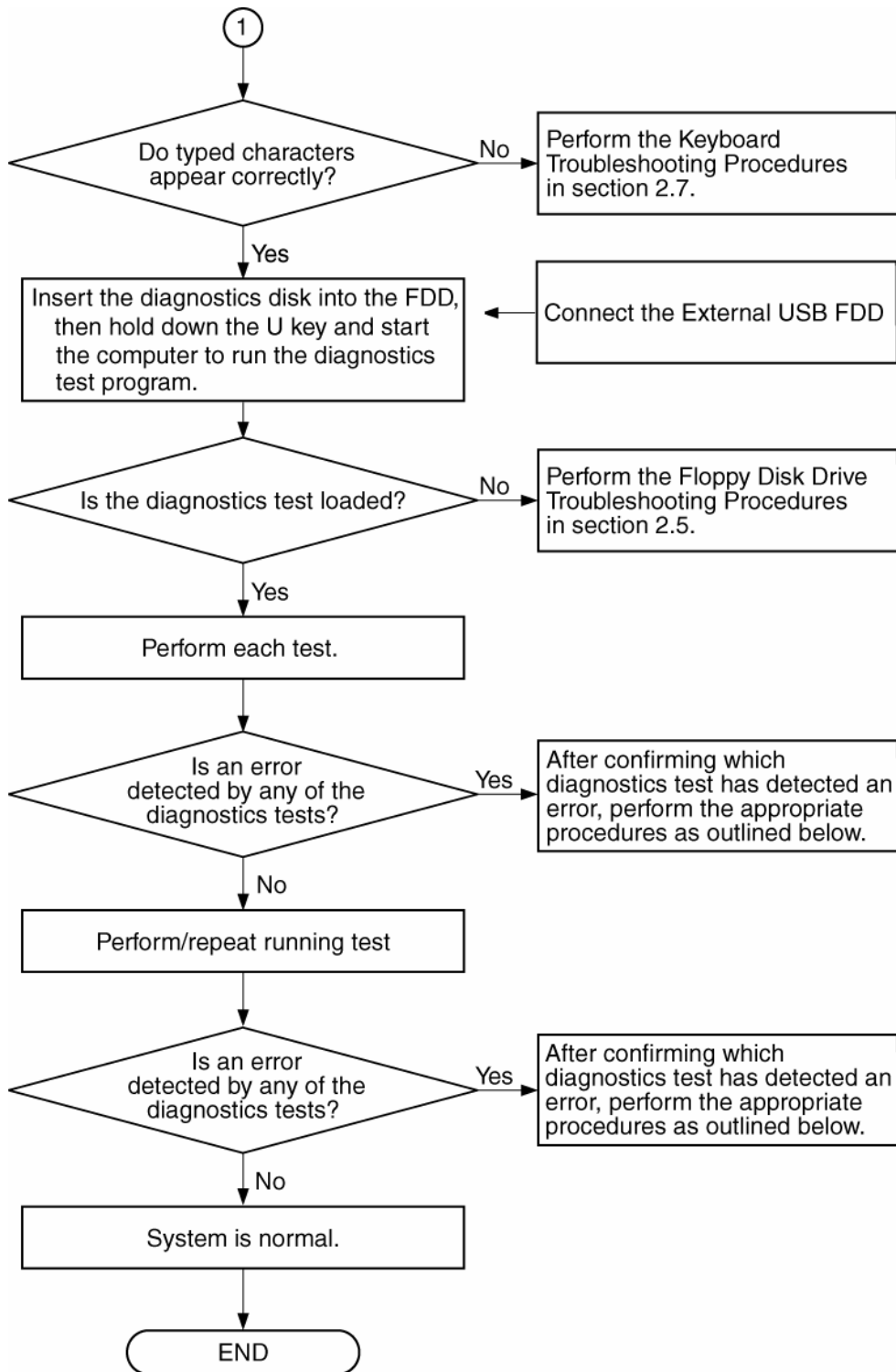
Figure 2-1 Troubleshooting flowchart (2/2)

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

1. If an error is detected on the system test, memory test, real timer test, perform the
    System Board and Processor Module Troubleshooting Procedures in Section 2.4.

2. If an error is detected on the floppy disk test, perform the 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 modem test, perform the Modem Troubleshooting
    Procedures in Section 2.10.

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

9. If an error is detected on the Wireless LAN test, perform the Wireless 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 test, perform the SD card slot Troubleshooting
    Procedures in Section 2.14.

2.3   Power Supply Troubleshooting

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

> Procedure 1:   Icon Check
>
> Procedure 2:   Error Code Check
>
> Procedure 3:   Connection Check
>
> Procedure 4:   Charge Check
>
> Procedure 5:   Replacement Check

Procedure 1   Icon Check

The following Icons indicate the power supply status:

❑ Battery icon

❑ DC IN icon

The power supply controller displays the power supply status through the Battery icon and the DC IN icon as listed in the tables below. To check the power supply status, install a battery pack and connect an AC adapter.

Table 2-1 Battery icon

Battery icon	Power supply status
Lights orange	Quick charge
Lights green	Battery is fully charged and AC adapter is connected.
Blinks orange (even intervals)	The battery level becomes low while operating the computer on battery power.[*1]
Flashes orange	The power switch is pressed on when the battery level is low.[*2]
Doesn't light	Any condition other than those above

> *1 Low Battery Hibernation will be executed soon.
>
> *2 Low Battery Hibernation has already been executed.

Table 2-2 DC IN icon

DC IN icon	Power supply status
Lights green	DC power is being supplied from the AC adapter.
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 LED blinks and an error code is displayed.

If the icon blinks, execute the followings:

1. Remove the battery and AC adapter to cut power supply to the computer.

2. Reinstall the battery and AC adapter.

If the LED still blinks, perform 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 blue, go to Procedure 3.

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

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 a half second

       Interval between data bits   Off for a half second

The error code begins with the least significant digit.

Example: Error code = 12h (Error codes are given in hexadecimal format.)
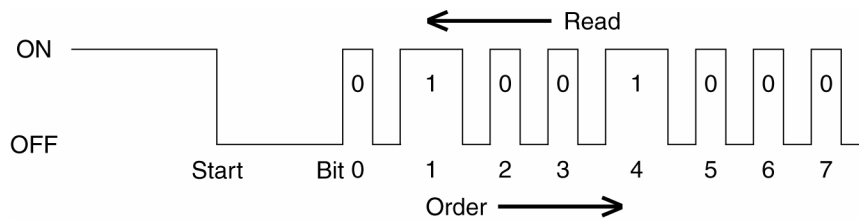
Check 1   Convert the DC IN icon blink pattern into the hexadecimal error code and
            compare it to the tables below.

The error code begins with the least significant digit.

Error code

Table 2-3 Error code

Error code	Where Error occurs
1*h	DC Power (AC Adapter)
2*h	1st battery
3*h	2nd battery
4*h	S3V output (3.3V)
5*h	1R5-C1V output (1.5V)
6*h	1R5-C1V output (1.5V)
7*h	FAN12V-PXP output
8*h	PPV output
9*h	E5V output (5.0V)
A*h	E3V output (3.3V)
B*h	FAN12V-PXP output
C*h	1R25-B1V output (1.25V)
D*h	1R25-B1V output (1.25V)
E*h	2R5-B2V output (2.5V)

Check 1   Compare the patterns in the hexadecimal error code to the tables below.

❑ DC IN

Error code	Meaning
10h	AC Adaptor output voltage is over 16.5 V.
11h	Advanced Port Replicator output voltage is over 16.5 V.
12h	Current from the DC power supply is over the limit (15.4 A).
13h	Current from the DC power supply is over the limit (0.5 A), when there is no load.
14h	Current sensing IC is not normal, when there is no load.

❑ Main Battery

Error code	Meaning
20h	Over voltage has been detected.
21h	Main battery charge current is over 15.4 A.
22h	Main battery discharge current is over 0.5 A, when there is no load.
23h	Main battery charge current is over 4.3 A, when the AC adapter is not directly connected.
24h	Current sensing IC is not normal, when there is no load.
25h	Main battery charge current is over 0.3 A.

❑ 2nd Battery

Error code	Meaning
30h	Over voltage has been detected.
31h	2nd battery charge current is over 15.4 A.
32h	2nd battery discharge current is over 0.5 A, when there is no load.
33h	2nd battery charge current is over 4.3 A, when the AC adapter is not directly connected.
34h	Current sensing IC is not normal, when there is no load.
35h	2nd battery charge current is over 0.3 A.

❑ S3V output

Error code	Meaning
40h	S3V voltage is 3.14 V or under, when the computer is powered on/off.
45h	S3V voltage is 3.14 V or under, when the computer is booting up.

❑ 1R5-C1V output

Error code	Meaning
50h	1R5-C1V voltage is over 1.80 V, when the computer is powered on/off.
51h	1R5-C1V voltage is 1.275V or under, when the computer is powered on.
52h	1R5-C1V voltage is 1.275V or under, when the computer is booting up.
53h	1R5-C1V voltage is 1.275V or under, when the computer is suspended.
54h	1R5-C1V voltage is not normal, when the computer is shutdown.
55h	1R5-C1V voltage is 1.275V or under, when the computer is booting up.

❑ 1R5-C1V output

Error code	Meaning
60h	1R5-C1V voltage is over 1.80 V, when the computer is powered on/off.
61h	1R5-C1V voltage is 1.275V or under, when the computer is powered on.
62h	1R5-C1V voltage is 1.275V or under, when the computer is booting up.
63h	1R5-C1V voltage is 1.275V or under, when the computer is suspended.
64h	1R5-C1V voltage is not normal, when the computer is shutdown.
65h	1R5-C1V voltage is 1.275V or under, when the computer is booting up.

❑ FAN12V-PXP output (CH0)

Error code	Meaning
70h	FAN12V-PXP voltage is over 16.8 V, when the computer is powered on/off.
71h	FAN12V-PXP voltage is 0.00 V or under, when the computer is powered on.
72h	FAN12V-PXP voltage is 0.00 V or under, when the computer is booting up.
73h	FAN12V-PXP voltage is 0.00 V or over, when the computer is powered off.

❑ PPV output

Error code	Meaning
80h	PPV voltage is over 1.92 V, when the computer is powered on/off.
81h	PPV voltage is 0.64 V or under, when the computer is powered on.
82h	PPV voltage is 0.64 V or under, when the computer is booting up.
83h	PPV voltage is 0.64 V or over, when the computer is powered off.
84h	PPV voltage is 0.64 V or under, when the computer is suspended.

❑ E5V output

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

❑ E3V output

Error code	Meaning
A0h	E3V voltage is over 3.96 V, when the computer is powered on/off.
A1h	E3V voltage is 2.81 V or under, when the computer is powered on.
A2h	E3V voltage is 2 .81 V or under, when the computer is booting up.
A3h	E3V voltage is 2.81 V or over, when the computer is powered off.
A4h	E3V voltage is 2.81 V or under when the computer is suspended.

❑ FAN12V-PXP output (CH1)

Error code	Meaning
B0h	FAN12V-PXP voltage is over 16.8 V, when the computer is powered on/off.
B1h	FAN12V-PXP voltage is 0.00 V or under, when the computer is powered on.
B2h	FAN12V-PXP voltage is 0.00 V or under, when the computer is booting up.
B3h	FAN12V-PXP voltage is 0.00 V or over, when the computer is powered off.

❑ 1R25-B1V output

Error code	Meaning
C0h	1R25-B1V voltage is over 1.50 V, when the computer is powered on/off.
C1h	1R25-B1V voltage is 1.063 V or under, when the computer is powered on.
C2h	1R25-B1V voltage is 1.063 V or under, when the computer is booting up.
C3h	1R25-B1V voltage is 1.063 V or over, when the computer is powered off.
C4h	1R25-B1V voltage is 1.063 V or under when the computer is suspended.

❑ 1R25-B1V output

Error code	Meaning
D0h	1R25-B1V voltage is over 1.50 V, when the computer is powered on/off.
D1h	1R25-B1V voltage is 1.063 V or under, when the computer is powered on.
D2h	1R25-B1V voltage is 1.063 V or under, when the computer is booting up.
D3h	1R25-B1V voltage is 1.063 V or over, when the computer is powered off.
D4h	1R25-B1V voltage is 1.063 V or under when the computer is suspended.

❑ 2R5-B2V output

Error code	Meaning
E0h	2R5-B2V voltage is over 3.00 V, when the computer is powered on/off.
E1h	2R5-B2V voltage is 2.125 V or under, when the computer is powered on.
E2h	2R5-B2V voltage is 2.125 V or under, when the computer is booting up.
E3h	2R5-B2V voltage is 2.125 V or over, when the computer is powered off.
E4h	2R5-B2V voltage is 2.125 V or under when the computer is suspended.

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

    ❑ Make sure the AC adaptor cord 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 adaptor and/or AC power cord, if necessary. If the error still exists, go to Procedure 5.

Check 3   In the case of error code 2Xh:

    ❑ Make sure the battery pack is correctly installed in the computer. If the battery pack is correctly installed, go to the following step:

    ❑ Replace the battery pack with a new one. If the error still exists, go to Procedure 5.

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

Procedure 3   Connection Check

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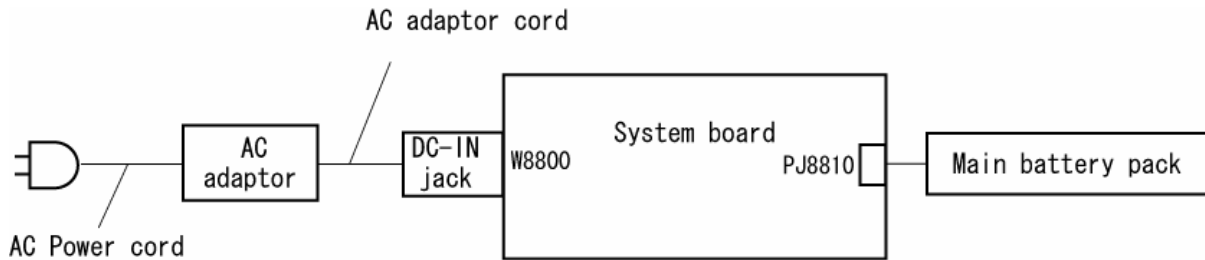
Any of the connectors may be disconnected. Perform Check 1.

Check 1   Disconnect the AC power cord from the wall outlet. Check the power cable for breaks. If the power cord is damaged, replace it with a new one. If there is no damage, go to Check 2.

Check 2   Make sure the AC cord is firmly connected to the AC wall outlet and to the AC adaptor. If the cable is connected correctly, go to Check 3.

Check 3   Make sure the AC adaptor cord is firmly connected to the DC IN jack (W8800) and the DC-IN jack is firmly secured to the system board.
- If the DC IN jack loose, go to Procedure 5.
- If it is not loose, go to Check 4.

Check 4   Use a multimeter to make sure the AC adaptor output voltage is close to 15 V. If the output is several percent lower than 15 V, go to Check 5. If the output is close to 15 V, go to Check 6.

Check 5   Connect a new AC adaptor or AC power cord.
- If the DC IN icon does not light, go to Procedure 5.
- If the battery icon does not light, go to Check 6.

Check 6   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   Charge Check

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

1. Reinstall the battery pack.

2. Attach the AC adaptor and turn on the power. If you cannot turn on the power, go to Procedure 5.

3. Run the Diagnostic test, go to System test and execute subtest 06 (Quick charge) described in Chapter 3.

4. When charge is complete, the diagnostics test displays the result code. Check the result code against the table below and perform any necessary check.

Table 2-4 Diagnostics test result code

Result code	Contents	Check items
0	The battery is charging normally.	Normal
1	The battery is fully charged.	Normal
2	The AC adaptor is not connected.	Check 1
3	The AC adaptor's output voltage is not normal.	Check 1
4	The battery is not installed.	Check 2
5	The battery's output voltage is not normal.	Check 3
6	The battery's temperature is not normal.	Check 4
7	A bad battery is installed.	Check 2
8	Any other problems.	Check 5

Check 1   Make sure the AC adaptor and AC power cord are firmly plugged into the DC IN socket and the wall outlet. If these cables are connected correctly, replace the AC adaptor (and/or AC power cord, if necessary).

Check 2   Make sure the battery 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. If the battery pack is still not charged, go to Check 4.

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

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

Procedure 5   Replacement Check

The system board processor module may be disconnected or damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*. Check the connection between the AC adaptor and system board. After checking the connections, perform the following Check 1:

Check 1   Replace the AC adaptor with a new one. If the AC adaptor still does not function properly, perform Check 2.

Check 2   Replace the system board with a new one following the steps described in Chapter 4, *Replacement Procedures*.

2.4 System Board Troubleshooting

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

        Procedure 1:   Message Check

        Procedure 2:   Printer Port LED Check

        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 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 4.

           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 HDD Troubleshooting
           Procedures in Section 2.6.

           If error message (22) or (23) is displayed, go to the 3.5" FDD Troubleshooting
           Procedures in Section 2.5.

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

Procedure 2   Printer Port LED Check

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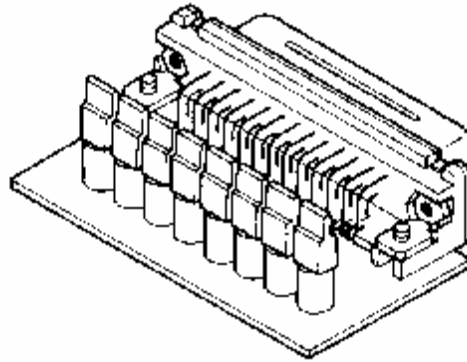
Figure 2-2 Printer port LED

Figure 2-3 shows the function of the printer port LED board.
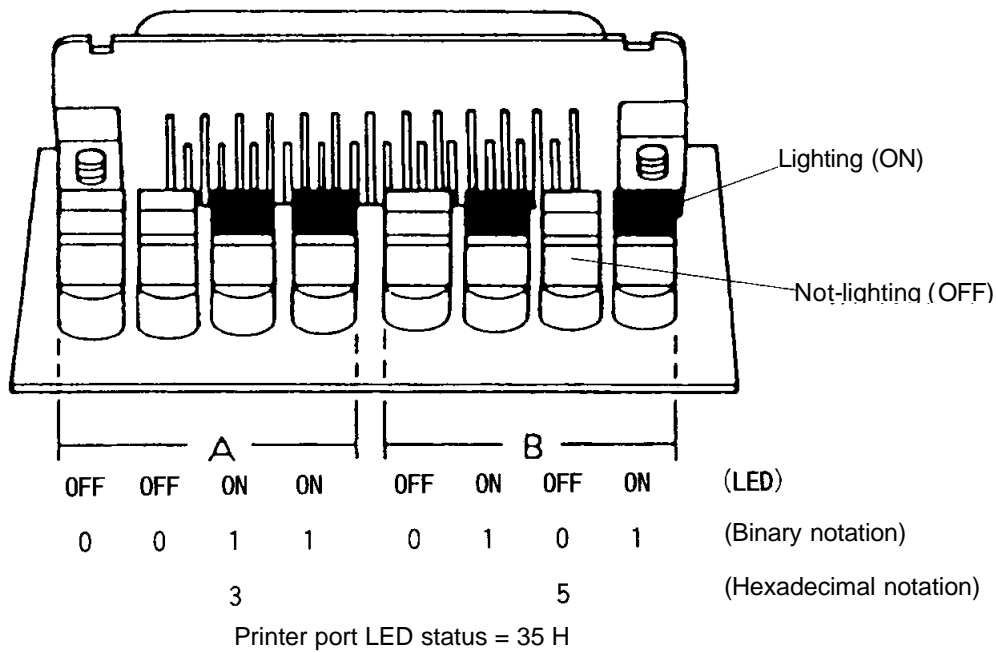
Figure 2-3 Printer port LED board

To use the printer port LED, follow the steps below:

```
┌─────────────────┐       ┌─────────────────────┐
│ Printer Port    │       │        System board │
│ LED             │───────│ PJ3510              │
│                 │       │                     │
└─────────────────┘       └─────────────────────┘
```
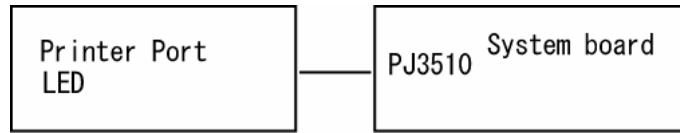
1. Turn on the computer's power and set it to boot mode.

2. Turn off the computer's power.

3. Plug the printer port LED into the parallel port.

4. While holding down the space bar, turn on the computer's power.

5. Read the LED status from left to right.

6. Convert the status from binary to hexadecimal notation.

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

8. If the final LED status matches any of the test status values in Table 2-3, perform Check 1.

NOTE: *If an error condition is detected by the IRT test, the printer port LED displays the status for the last test item which ended correctly. For example, when the printer port LED displays 0Ch and halts, the IRT test has already completed the Vector initialization. In this instance, the IRT indicates an error has been detected during the NDP initialization.*

Table 2-5 Printer port LED status (1/8)

LED Status	Test item	Contents
	Start	Permission of A20 and Clear of software reset bit
		Prohibition of APIC
		Initialization of MCHM
		Initialization of ICHM
		Initialization of Super I/O
		Initialization of debug port
		Dummy read of 3rd Bus data
		Setting of printer port
B0h	Flash ROM check	PIT CH0 initialization (for HOLD_ON)
		BIOS rewrite factor flag initialization
		CHECK SUM CHECK
		Transition to protected mode
		Boot block checksum (skip when returned to S3)
		The program halts when checksum error occurred.
		Checksum other than boot block (skip when returned to S3)
B1h	KBC initialization	EC/KBC rewrite check
		If "rewrite" is requested, go to "BIOS rewrite process".
		Transition of process to System BIOS IRT when returned to S3)
		Key input
		Check of Tilde key (�辛/全 key) and Tab key if a key is pressed
B2h	BIOS rewrite request check	BIOS rewrite request check if Checksum check error occurred on except Boot Block or rewrite is required by user. "BIOS rewrite process".
B3h	BIOS rewrite (1)	Transits to System BIOS IRT.
		Initialization of ICHM. D31
		DRAM configuration
		Permission of cache (L1 cache only)
		Memory clear
		Transition to real mode and copy of BIOS to RAM
B5h		Saving of key scan code
		Initialization of TASK_1ms_TSC setting screen
B6h	BIOS rewrite	FAN control
		Sound initialization (for BEEP sound)
		System speaker enable

Table 2-5 Printer port LED status (2/8)

LED Status	Test item	Contents
(B6h)	(BIOS rewrite)	Cancel of sound mute
		Setting of volume to max.
		Display of messages (EC/KBC UPDATE/DAMAGED, BIOS UPDATE/DAMAGED)
		Key input
		Prohibition of USB
		BEEP
		Waiting for Key input
		Reading of CHGBIOSA.EXE/CHGFIRMA.EXE
		FDC RESET
		Setting of parameters for 2HD (1.44MB)
		Reading of first sector, If it is the data of 1.44MB (2HD), the media type is definite.
		Setting of parameters for 2DD (720KB)
		Retrieval of "CHGBIOSA.EXE" from the root directory.
		Calculates the directory start header and sector.
		Reads one sector of the root directory.
		Retrieval the entry of "CHGBIOSA.EXE" and "CHGFIRMA.EXE" from the sector read.
		Reading of EXE header of "CHGBIOSA.EXE" and "CHGFIRMA.EXE", key input when error occurred.
		Execution of "CHGBIOSA.EXE" and "CHGFIRMA.EXE"
(B3h)	Prohibition of cache	Initialization of special register
00h		Cache control for Hyper Threading
		Prohibition of cache
		Initialization of H/W (before DRAM recognition)
		Initialization of MCHM
		Initialization of ICH4M.D31.Func0
		Initialization of ICH4M.D31.Func1
		Initialization of USB.Func0,1,2,7
		Initialization of ICH4M.D31.Func3
		Initialization of ICH4M.D31.Func5
		Initialization of FLUTE
		Initialization of PIT channel 1 (Setting the refresh interval "30μs")

Table 2-5 Printer port LED status (3/8)

LED Status	Test item	Contents
01h	Memory check	DRAM type and size check (at Cold boot)
		If DRAM size is "0", the program halts
		If the SM-RAM stack area test cannot be used as stack, the program halts
02h	CMOS check and initialization	Cache configuration
		Permission of cache (L1/L2 cache)
		CMOS access test (at Cold boot only)
		If any error occurred, the program halts
		CMOS battery level check
		CMOS checksum check
		CMOS data initialization (1)
		IRT status setting (Setting of "Boot status" and "IRT busy flag" and "0" to the remaining bits)
		Storing of DRAM size
03h	Resume branch check (at Cold boot only)	In the case of CMOS error, no resume occurs.
		If "resume status code" is not set, no resume occurs
		Resume error check
		ICH Power Failure error Resume error 7AH
		SM-RAM checksum check Resume error 73H
		Memory configuration change check Resume error 73H
		Checksum check of system BIOS RAM area Resume error 79H
		Checksum check of PnP RAM Resume error 77H
		To resume process (RESUME_MAIN)
		Resume error process
		Returns the CPU clock to "Low"
		Prohibition of all SMI
		Clears resume status
		Returns to ROM

Table 2-5 Printer port LED status (4/8)

LED Status	Test item	Contents
(03h)		Forwards the area of C0000h to EFFFFh to PCI (prohibition of DRAM)
		Sets resume error request
		Copying ROM/RAM of system BIOS (HLT when error occurred)
04h	SMRAM initialization	SMRAM initialization
		CPU supporting Hyper Threading check
		Microcode update
		WakeUp factor check
		Initialization of APIC
		SMRAM base rewriting and CPU state map saving for BIOS
		Permission of SMI based on ASMI
05h	Initialization of devices which need initialization before PCI bus initialization	PIT test (at Cold boot only) and initialization
		Setting of test pattern to channel 0 of PIT#0
		Check whether the set test pattern can be read
		Initialization of PIT channel 0 (Setting of timer interruption interval to 55ms)
		Initialization of PIT channel 2(Setting of the sound generator frequency to 664Hz)
		Test of PIT channel 1 (Check whether the refresh signal works normally in 30 micro-s refresh interval.) The system halts when the time is out.
		Test of PIT channel 2 (Check whether the speaker gate works normally.)
		CPU clock measurement
		Permission of SMI except auto-off function
		Battery discharge current control (1CmA)
		AC adapter rated over current control
		Dividing procedures for time measuring by IRT
		Setting for clock generator
		Check of parameter block A
		CPU Initialization
		Microcode update
		Geyserville support check
		Setting of CPU clock to "high"
		Graphics Aperture Size setting

Table 2-5 Printer port LED status (5/8)

LED Status	Test item	Contents
06h		Saving memory configuration to buffer
		Reading of EC version
		Update of flash ROM type
		Judging of destination (Japan or except Japan) based on DMI data
		CMOS default setting check (Default set if Bad battery, Bad checksum (ROM, CMOS) is detected)
		ACPI table initialization (for execution of option ROM)
		Initialization of devices which need initialization before PCI bus initialization
		AC'97 control
		Initialization of temperature control information
		KBC initialization
		VGA display off, Reset control
		Sound initialization
		PC multi-box status acquisition
		HC initialization, USB Device recognition and initialization
		Control of built-in LAN permission/prohibition
		PIC initialization
		PIC test
		Check if self test is executed or not (at Cold boot only) (space key and printer loop back connector check)
		Password Initialization
07h		PCI bus initialization (connection of DS Bus)
		Initialization of LAN information
		WakeUp factor check
08h		Task generation for waiting INIT_PCI completion
		CMOS data initialization (2)
		PnP initialization
		Setting of setup items
		Waiting for the completion of Multi-box status check
		H/W setting based on resource

Table 2-5 Printer port LED status (6/8)

LED Status	Test item	Contents
09h	Task generation for waiting PnP resource making completion	Task generation for waiting PnP resource making completion
	Serial interruption control	(before use of interruption)
	PnP H/W initialization	PC card slot initialization
		SIO initialization (for models supporting SIO)
		FIR initialization (for models supporting FIR)
	PCI automatic configuration	Making of work for automatic configuration
		Acquisition of PCI IRQ
		Configuration
		Saving of VGA configuration result
0Ah	Task generation for waiting PCI_CONFIGURATION completion	Task generation for waiting PCI_CONFIGURATION completion
	Initialization of H/W needed after PCI configuration	Printer port setting (for models supporting printer port)
		HDD initialization sequence start
		FDD initialization (built-in support machine only)
	Enabling power off	
	Output code generation	
0Bh	FIRST_64KB_CHECK	Check of first 64KB memory
0Ch	INIT_INT_VECTOR	Initialization of vectors
0Dh	INIT_NDP	Initialization of NDP
0Eh	INIT_SYSTEM (Initialization of system)	Storing of CMOS error status to IRT_ERR_STS_BUF
		Timer initialization start
		Initialization of buffers for power saving
		EC initialization & Reading of battery information
		Update of system BIOS (Update of model name and EDID information for LCD)
0Fh	INIT_DISPLAY	Waiting for VGA chip initialization completion
		VGA BIOS initialization
10h	VGA POST	

Table 2-5 Printer port LED status (7/8)

LED Status	Test item	Contents
12h	DISP_LOGO	
13h	INIT_SYS_MEM	Initialization of conventional memory (Boot)
14h	EXE_MEM_CHECK	Check of exception in the protected mode
15h	INIT_SYS_MEM	Initialization of conventional memory (Reboot)
17h	CHK_DMA_PAGE	Check of DMA Page Register (Boot)
18h	CHECK_DMAC	Check of DMAC (Boot)
19h	INIT_DMAC	Initialization of DMAC (Boot)
1Ah	CHECK_PRT	Check of printer port existence
1Bh	CHECK_SIO	Check of SIO
1Ch	BOOT_PASSWORD	Check of password
	(In the case of "Reboot")	Waiting for HDD initialization completion
		Check of key input during IRT (waiting for KBC initialization completion)
		ATA priority initialization
	(In the case of "Boot")	BM loading process
		Initialization of BM
		Check of key input during IRT (waiting for KBC initialization completion)
		Input of password
		BM open
1Dh	EX_IO_ROM_CHECK	Check of option I/O ROM
1Eh	PRE_BOOT_SETUP	Saving of value in 40:00h (for SIO saving/restoring)
		Setting of font address for resume password
		Setting of repeat parameter for USB KB
		Final check of key input during IRT
		Storing of T_SHADOW_RAM_SIZE
		Update of system resource before boot
		Rewriting of memory map data of INT15h E820h function
		Waiting for AC-Link initialization completion

Table 2-5 Printer port LED status (8/8)

LED Status	Test item	Contents
(1Ch)	(PRE_BOOT_SETUP)	Updating of table for DMI
		Copy of ACPI table to top of expansion memory
		Waiting for completion writing of PSC version to BIOS
		Waiting for clock generator setting completion (The system halts in LED = 1DH when an error is detected.)
		Waiting for serial port initialization completion (for models supporting SIO)
		Waiting for Serial Port initialization completion
		Cancel of NMI Mask
		TIT check sum
		Clearance of the IRT flag of Runtime side
		Update of check sum of Runtime side
		Hibernation branch
		Initialization of Bluetooth
		Check of existence of object maintenance cards
		Prohibition of unused PC cards
		HW initialization before Boot, Waiting for initialization completion
		Notifies the DVI connection status to VGA BIOS
		Setting of battery save mode
		Setting of date
		Waiting for Bluetooth initialization completion
		Update of DMI Wakeup factor, Update of SM-BIOS structure table
		PCI device configuration space close
		Cache control
		Update of parameter block A
		Process for CPU (Make the CPU clock to be set by SETUP)
		Waiting of motor-off completion of disabled HDD
		Final decision of USB FDD drive information
		Post processing of PRE_BOOT_SETUP
		Clearance of PWRBTN_STS Enabling POWER Button
20h		Clearance of IRT status
		Update of check sum of Runtime side

FFh	End	

> ***NOTE:*** *The printer port LED outputs the status of an item in which an error is occurred. If the printer port LED outputs "0Ch" and then halts, it indicates memory check of first 64KB is completed and an error occurred during initialization of vector.*

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

B0h, B1h, B2h, B5h, B6h, B3h, 00h, 01h, 02h, 03h, 04h, 05h, 06h, 07h, 08h, 09h, 0Bh, 0Ch, 0Dh, 0Eh, 0Fh, 10h, 11h, 12h, 13, 14h, 15h, 16h, 17h, 18h, 19h, 1Ah, 1Bh, 1Ch, 1Eh

Check 2 If error code 0Ah is displayed, go to the following Sections:
Section 2.5 3.5" FDD Troubleshooting
Section 2.6 2.5" HDD Troubleshooting

Procedure 3   Diagnostic Test Program Execution Check

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

1. System test
2. Memory test
3. Keyboard test
4. Display test
5. Floppy Disk test
6. Printer test
7. Hard Disk test
8. Real Timer test
9. NDP test
10. Expansion test
11. CD-ROM/DVD-ROM test
12. LAN
13. Wireless LAN test
14. Sound/LAN/Modem test
15. IEEE1394

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

Procedure 4   Replacement Check

The system board connectors may be disconnected. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures* and perform Check 1.

Check 1   Visually check for the following:

      a) Cracked or broken connector housing

      b) Damaged connector pins

         If connectors are in good condition, but there is still a problem, go to Check 2.

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

2.5 FDD Troubleshooting

This section describes how to determine if the 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 operation details are given in Chapter 3, *Tests and Diagnostics*.

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

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

Procedure 2   Diagnostic Test Program Execution Check

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

Floppy disk drive test error codes and their status names are listed in Table 2-6. Make sure the floppy disk is formatted correctly and that the write protect tab is disabled. If any other errors occur while executing the FDD diagnostics test, go to Check 1.

Table 2-6 FDD error code and status

Code	Status
01h	Bad command
02h	Address mark not found
03h	Write protected
04h	Record not found
06h	Media removed
08h	DMA overrun error
09h	DMA boundary error
10h	CRC error
20h	FDC error
40h	Seek error
60h	No FDD
80h	Time out error (Not ready)
EEh	Write buffer error

Check 1   If the following message displays, release the write protect tab on the floppy disk. If any other message appears, perform Check 2.

```
FDD-Write protected
```

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

Procedure 3　　Connector Check and Replacement Check

The 3.5inch FDD is connected to the System Board via USB port.

Check 1　Make sure the USB cable is securely connected to the FDD. Also, make sure the USB cable of the FDD is securely connected to the connector PJ4600 or PJ4601 on the system board.
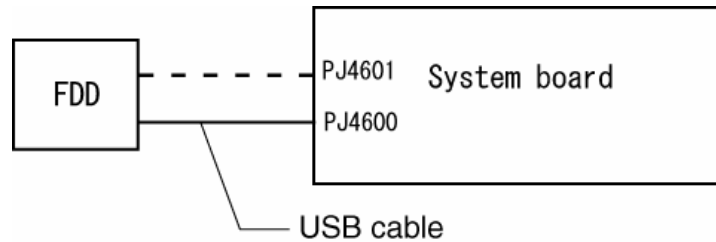
If any of the connections are loose, reconnect firmly and repeat Procedure 2.

If any connector is damaged, replace it with a new one and repeat Procedure 2.

If there is still an error, go to Check 2.

Check 2　The FDD cable 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　HDD Troubleshooting

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

> Procedure 1:　Message Check
>
> Procedure 2:　Partition Check
>
> Procedure 3:　Format Check
>
> Procedure 4:　Diagnostic Test Program Execution Check
>
> Procedure 5:　Connector Check and Replacement Check

CAUTION:　*The contents of the hard disk will be erased when you execute the HDD troubleshooting procedures. Transfer the contents of the hard disk to floppy disks or other storage media.*

Procedure 1　　Message Check

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

Check 1　　If any of the following messages appear, go to Procedure 5. If the following messages do not appear, perform Check 2.

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

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

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

Check 3　　Make sure the Hard Disk option is set to not used. If it is set to not used, choose another setting and restart the computer. If the problem still exists, go to Procedure 2.

Procedure 2   Partition Check

Insert the Toshiba MS-DOS system disk and restart the computer with **U** key holding down. 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 Check 3.

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

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. Restart the computer and then go to Procedure 3.

Check 4   Remove the FD and restart the computer. If the problem still exists, go to Procedure 3.

Procedure 3   Format Check

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

Check 1   Format the HDD and transfer system files using **FORMAT C:/S/U**. If the
following message appears on the display, the HDD is formatted.

            Format complete

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

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

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

            Format complete

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

Procedure 4   Diagnostic Test Program Execution Check

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

If an error is detected during the HDD test, an error code and status will be displayed.
Replace the HDD with a new one following the instructions in Chapter 4, *Replacement
Procedures*. The error codes and statuses are listed in Table 2-7. If an error code is not
generated and the problem still exists, go to Procedure 5.

Table 2-7 Hard disk drive 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 (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 may be disconnected, or the HDD or the system board may be damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures* and perform the following checks:

Check 1   Make sure the HDD is firmly connected to the system board.
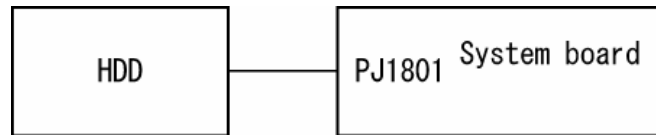
```
 ┌──────────┐         ┌──────────────────────┐
 │          │         │                      │
 │   HDD    │─────────│ PJ1801  System board │
 │          │         │                      │
 └──────────┘         └──────────────────────┘
```

If the connection is loose, reconnect firmly and repeat Procedure 1. If there is still an error, go to Check 2.

Check 2   The HDD 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*.

2.7   Keyboard Troubleshooting

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

    Procedure 1:   Diagnostic Test Program Execution Check

    Procedure 2:   Connector and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

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

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

Procedure 2   Connector and Replacement Check

The keyboard, PAD I/F and PAD Switch may be disconnected or damaged. Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*, and perform the following checks:

1. If the keyboard malfunctions, start with Check 1.

2. If the PAD switch malfunctions, start with Check 3.

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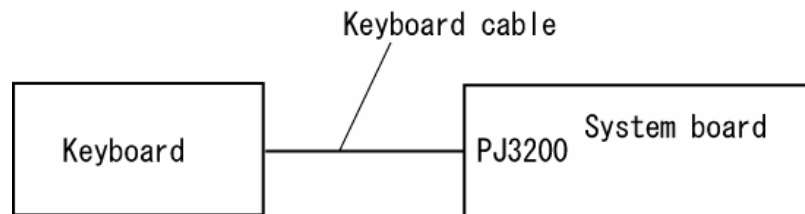
If the connection is loose, reconnect firmly and repeat Procedure 1. If there is still an error, go to Check 2.

Check 2   The keyboard or its cable may be damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedures*. If the problem still exists, perform Check 5.

Check 3   Make sure the PAD cable is firmly connected to the system board.
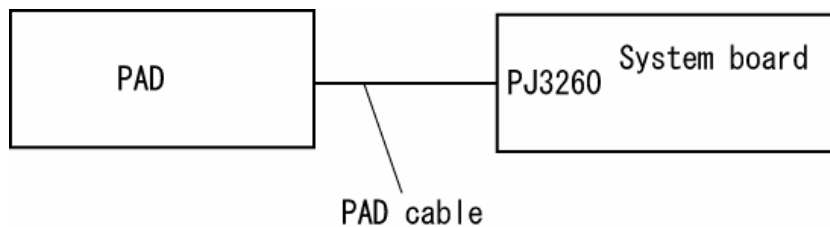
If the connection is loose, reconnect firmly and repeat Procedure 2. If there is still an error, go to Check 4.

Check 4   The PAD switch board or PAD switch cable may be damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedures*. If the problem still exists, perform Check 5.

Check 5   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:   External Monitor Check
>
> Procedure 2:   Diagnostic Test Program Execution Check
>
> Procedure 3:   Connector and Cable Check
>
> Procedure 4:   Replacement Check

Procedure 1   External Monitor Check

Connect an external monitor to the computer's external monitor port, then boot the computer. The computer automatically detects the external monitor.

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

If the external monitor appears to have the same problem as the internal monitor, the system board may be damaged. Go to Procedure 2.

Procedure 2   Diagnostic Test Program Execution Check

The Display Test program is stored on the computer's Diagnostics disk. This program checks the display controller on the system board. Insert the Diagnostics disk in the computer's floppy disk drive, turn on the computer and run the test. Refer to Chapter 3, *Tests and Diagnostics* for details. If an error is detected, go to Procedure 3.

Procedure 3   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. And the FL is connected to the FL inverter board by the HV cable. The connectors may be disconnected from the system board or the FL inverter board, or they 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 4.
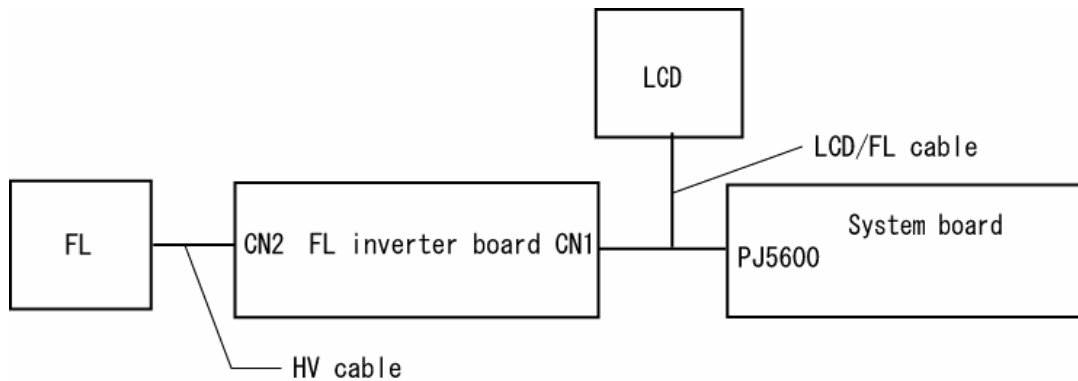
Procedure 4   Replacement Check

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

        If the FL does not light, perform Check 1.

        If characters or graphics are not displayed clearly, perform Check 4.

        If some screen functions do not operate properly, perform Check 4.

        If the FL remains lit when the display is closed, perform Check 5.

Check 1   Replace the FL with a new one following the instructions in Chapter 4, *Replacement Procedures* and test the display again. If the problem still exists, perform Check2.

Check 2   The LCD/FL cable or HV cable may be defective or damaged. Replace the FL/LCD or HV cable with a new one following the instructions in Chapter 4, *Replacement Procedure* and test the display again. If the problem still exists, perform Check3.

Check 3   The FL inverter board may be defective or damaged. Replace the FL inverter board with a new one following the instructions in Chapter 4, *Replacement Procedure* and test the display again. If the problem still exists, perform Check4.

Check 4   The LCD module may be defective or damaged. Replace the LCD module with a new one following the instructions in Chapter 4, *Replacement Procedure* and test the display again. If the problem still exists, perform Check 5.

Check 5   The system board may be defective or damaged. Replace it with a new one following the instructions in Chapter 4, *Replacement Procedure*.

2.9   Optical Drive Troubleshooting

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

Procedure 1:   Diagnostic Test Program Execution Check

Procedure 2:   Connector Check and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

The CD-ROM/DVD-ROM test program is stored in the Diagnostics Disk.

For the test, prepare a test CD-ROM, DVD-ROM, music CD and CD-RW Media.

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

If any errors occur while executing the CD-ROM/DVD-ROM test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The Optical Drive is connected to the system board. 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* and perform the following checks:

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

```
+-------------------+        +-----------------------------+
|                   |        |          System board       |
|   Optical Drive   |--------| PJ1800                      |
|                   |        |                             |
+-------------------+        +-----------------------------+
```

If the connection is loose, reconnect firmly and repeat Procedure 1. If there is still an error, go to Check 2.

Check 2   The Optical Drive may be defective or damaged. Replace the drive with a new one. If there is still an error, go to Check 3.

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

2.10 Modem Troubleshooting

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

       Procedure 1:   Diagnostic Test Program Execution Check

       Procedure 2:   Connector Check and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

The Sound/LAN/Modem test program is stored in the Diagnostics Disk.
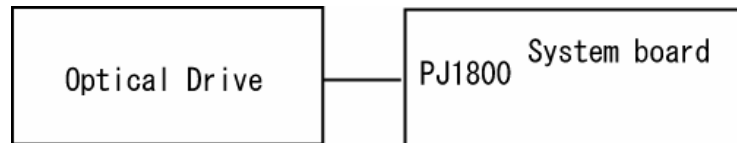
For the test, prepare a test Sound/LAN/Modem.

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

If any errors occur while executing the Sound/LAN/Modem test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The Modem is installed as a modem daughter card (MDC). If the modem malfunctions, there may be a bad connection between the MDC and the System Board. Or the MDC, System Board or their connectors might be damaged.

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

Check 1   Make sure the MDC cable is firmly connected to the MDC and make sure the MDC is firmly connected to PJ3000 on the System Board.
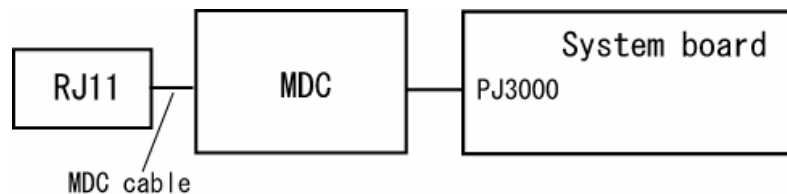
If a connector is disconnected, connect it firmly and repeat Procedure 1. If the Modem is still not functioning properly, perform Check 2.

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

Check 3   The system board may be defective or damaged. Replace the System Board with a new one following the steps in Chapter 4, *Replacement Procedures*.

2.11 LAN Troubleshooting

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

        Procedure 1:   Diagnostic Test Program Execution Check

        Procedure 2:   Connector Check and Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

The Sound/LAN/Modem test program is stored in the Diagnostics Disk.

For the test, prepare a test Sound/LAN/Modem.

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

If any errors occur while executing the Sound/LAN/Modem test, go to Procedure 2.

Procedure 2   Connector Check and Replacement Check

The RJ45 jack with LAN cable is on the System Board. If the LAN malfunctions, the System Board might be damaged.

Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures*.

```
┌─────────────────────────┐        ┌──────────┐
│ System board            │────────│  RJ-45   │
│              PJ4100      │        │  jack    │
└─────────────────────────┘        └──────────┘
```
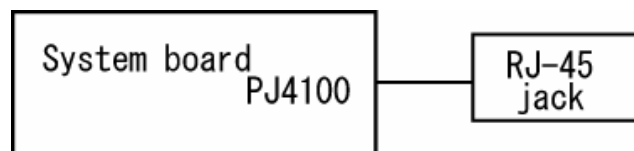
2.12 Wireless LAN Troubleshooting

This section describes how to determine if the computer's Wireless LAN 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 communication switch on the front 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 to check the transmitting-receiving function of the wireless LAN. You will need a second computer that can communicate by the wireless LAN. Perform the test following the instructions described in Chapter 3, *Wireless LAN Test Program.*

         If the computer passes the test, the function is correctly working.
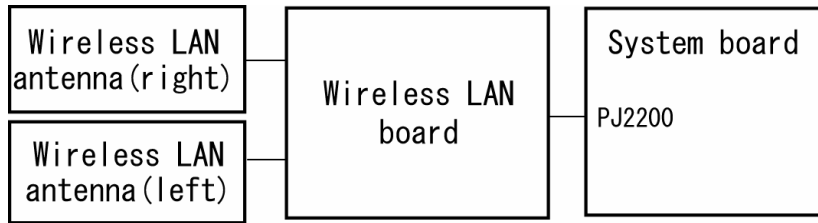
         If the computer does not pass the test, perform Procedure 2.

Procedure 2   Antennas' Connection Check

The wireless LAN wiring diagram is shown below:

```
┌──────────────┐
│Wireless LAN  │       ┌──────────────┐     ┌──────────────────┐
│antenna(right)│       │              │     │  System board    │
├──────────────┤───────│ Wireless LAN │─────│                  │
│Wireless LAN  │       │    board     │     │  PJ2200          │
│antenna(left) │       │              │     │                  │
└──────────────┘       └──────────────┘     └──────────────────┘
```

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 wireless LAN is still not functioning properly, perform Check 2.

Check 2   Make sure the wireless LAN board is firmly connected to PJ2200 on the system board.

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

Check 3   Make sure the wireless LAN antenna cables (black and white) are firmly connected to the wireless LAN board.

            If the wireless LAN antenna cables are disconnected, connect them firmly and perform Procedure 1. If the wireless LAN function is still not functioning properly, perform Check 3.

Procedure 3   Antenna Check

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

1. Remove the wireless LAN slot cover and lift it off. Refer to Chapter 4, *Replacement Procedures*, for detailed steps of disassembling.

2. Disconnect the wireless LAN antenna cables connected to the wireless LAN board.

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

4. Connect the Main antenna cable to the antenna test cable. One clip is connected to the end of the white antenna cable. The other is connected to the opposite side of the antenna cable.

5. Determine the resistance. The cable passes the test when the resistance is 5Ω. Or less. If it is more than 5Ω, the antenna cable fails the test.

6. Change the antenna cable. Perform from step 3 to check the black antenna cable.
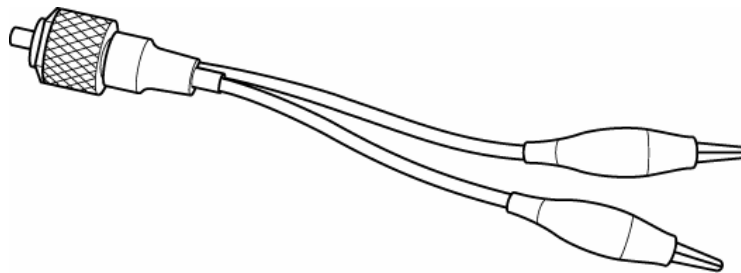
Figure 2-4   Antenna Test cable

> *NOTE:*   *1.*   *The resistances determined with the steps above may not be stable with other machines because of "cable loss," which varies according to the length of the cable. The impedance of the antenna itself is about 0.5-0.8W.*
>
>   *2.*   *The above steps cannot accurately determine the impedance of the antenna. Use an LC meter for a precise measure of impedance.*

If the wireless LAN antenna cables pass the test, connect them to the wireless LAN board and cover the slot, then perform Procedure 1.

If the wireless LAN antenna cables do not pass the test, replace the wireless LAN antenna cables with new ones following the steps in Chapter 4, *Replacement Procedures*. If the wireless LAN is still not functioning properly, go to Procedure 4.

Procedure 4   Replacement Check

The wireless LAN board is connected to the power board and the system board. Any of these components may be damaged. Refer to Chapter 4, *Replacement Procedures,* for instructions on how to disassemble the computer and then perform the following checks:

Check 1   Replace the wireless LAN board with a new one following the instructions in Chapter 4, *Replacement Procedures* and test the display again. If the problem still exists, perform Check2.

Check 2   The power board may be defective or damaged. Replace it with a new one following the steps in Chapter 4, *Replacement Procedures*. If the problem still exists, perform Check3.

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

2.13 Sound Troubleshooting

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

> Procedure 1:   Diagnostic Test Program Execution Check
>
> Procedure 2:   Connector Check
>
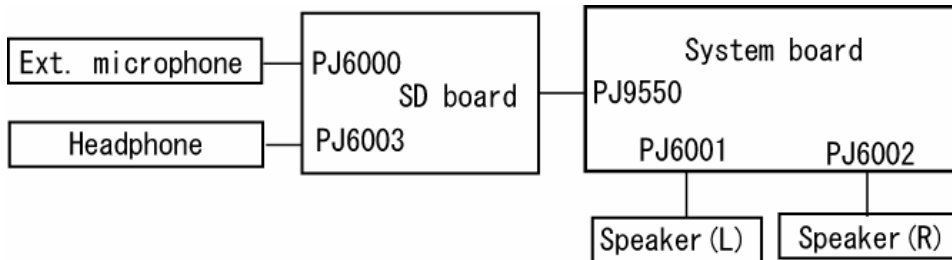> Procedure 3:   Replacement Check

Procedure 1   Diagnostic Test Program Execution Check

The Sound/LAN/Modem test program is stored on the computer's diagnostic 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.

If an error is detected, go to Procedure 2.

Procedure 2   Connector Check

The sound 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:

If the stereo speakers do not work correctly, perform Check 1.

If headphones do not work correctly, perform Check 2.

If sound recording does not work correctly, perform Check 3.

Check 1   If the stereo speakers do not work properly, the speaker cables may be disconnected. Make sure the speaker cables are firmly connected to PJ6001 and PJ6002 on the system board. If the stereo speakers are still not functioning properly, go to Procedure 3.

Check 2   If headphones do not work properly, the SD board may be disconnected or the headphone cable may be disconnected firmly. Make sure the SD board is firmly connected to PJ9550 on the system board and the headphone cable is connected to the headphone jack (PJ6000) on the SD board. If the sound function still does not work properly, replace it with a new one. Go to Procedure 3.

Check 3   If the sound recording function by an external microphone does not work properly, the SD board may be disconnected or the external microphone cable may be disconnected. Make sure the SD board is firmly connected to PJ9550 on the system board and the external microphone cable is firmly connected to microphone jack (PJ6003) on the SD board. If recording is still not functioning properly, go to Procedure 3.

Procedure 3   Replacement Check

Check 1   If the stereo speakers do not sound properly, the stereo speakers may be defective
           or damaged. Replace them with new ones. If the stereo speakers still do not work
           properly, go to Check 4.

Check 2   If headphones does sound properly, the headphone jack may be defective or
           damaged, or the SD board may be defective. Replace the SD board with a new
           one. If the headphone still does not work properly, go to Check 4.

Check 3   If the recording function by the external microphone does not work properly, the
           external microphone jack may be defective or damaged, or the SD board may be
           defective. Replace the SD board with a new one. If the recording function still
           does not work properly, go to Check 4.

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

2.14 SD Card Slot Troubleshooting

To check if the SD card slot is good or not, follow the troubleshooting procedures below as instructed.

> Procedure 1:   Check on Windows
>
> Procedure 2:   Connector/Replacement Check

Procedure 1   Check on Windows

Insert a SD card into the slot. Check if 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 PJ2130 on the system board.

```
┌──────────────┐        ┌─────────────────────────┐
│              │        │          System board   │
│   SD-card    │────────│ PJ2130                  │
│              │        │                         │
└──────────────┘        └─────────────────────────┘
```
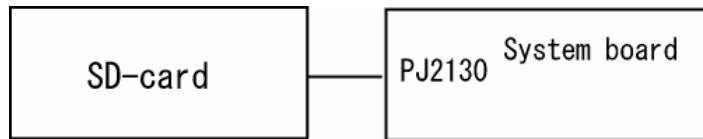
Check 1   The SD card and the system board may be disconnected. Make sure the SD card is firmly inserted to PJ2130 on the system board. If not, insert it firmly. If the SD card is still not functioning properly, perform Check 2.

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.

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. The Diagnostic Test Program is stored on the Diagnostic Disk.

NOTES: To start the diagnostics, follow these steps:

    1. Check all cables for loose connections.
    2. Exit any application you may be using and close Windows.

Test and Diagnostic consists of the following two functions:

- ❑ Repair Main (T&D)
- ❑ Repair initial config set

The DIAGNOSTIC MENU consists of the following eight functions:

- ❑ DIAGNOSTIC TEST
- ❑ HEAD CLEANING
- ❑ LOG UTILITIES
- ❑ RUNNING TEST
- ❑ FDD UTILITIES
- ❑ SYSTEM CONFIGURATION
- ❑ EXIT TO MS-DOS
- ❑ SETUP

The DIAGNOSTIC TEST MENU contains the following twelve functional tests:

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

❑ LAN TEST

There are following four test programs other than the DIAGNOSTIC test program:

❑ Sound/LAN/MODEM TEST

❑ Wireless LAN TEST

❑ IEEE 1394 TEST

❑ Thermal Radiation Control Test

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

❑ The Diagnostics Disk (all tests)

❑ A formatted working disk for the floppy disk drive test

❑ An USB FDD

❑ A cleaning kit to clean the floppy disk drive heads (Head Cleaning)

❑ A PC card wraparound connector for the I/O card test (Expansion test)

❑ A printer wraparound connector for the printer wraparound test (Printer test)

❑ A CD test media (TOSHIBA CD-ROM TEST DISK (ZA1217P01/P000204190) (CD-ROM/DVD-ROM test)

❑ A DVD test media (Toshiba-EMI DVD-ROM TEST DISK TSD-1)

❑ External CRT (Display test)

❑ Headphone (Sound test)

❑ CD-ROM/DVD-ROM drive (CD-ROM test)

❑ A microphone

❑ A modular cable and RJ11 connector checker

❑ A modular cable and RJ11 connector checker (LED)

❑ USB test module and USB cable

❑ LAN wraparound connector (LAN test)

❑ PC for communication test (wireless LAN test)

3.2 **Executing the Diagnostic Test**

Toshiba MS-DOS is required to run the DIAGNOSTICS TEST PROGRAM. To start the
DIAGNOSTIC TEST PROGRAM, follow these steps:

1. Insert the Diagnostics disk in the floppy disk drive and turn on the computer while pressing
   U key.
   (The Diagnostics Disk contains the MS-DOS boot files.)

   The following menu will appear:

   ```
    1.Repair Main (T&D)
    2.Repair initial config set

   Enter a choice = 1
   ```

   To execute Repair Main (T&D), select "1.Repair Main (T&D)" with - or ¯ key and press
   Enter key.

   To execute Repair initial config set, select "2.Repair initial config set" with - or ¯ key and
   press **Enter** key.

   The followings are described on the Repair Main (T&D). The Repair initial config set is
   described in section 3-24.

When "1.Repair Main (T&D)" is selected and **Enter** key is pressed, the following menu will appear.

```
TOSHIBA Personal Computer  xxxxxxx DIAGNOSTICS
Version X.XX (C) Copyright TOSHIBA Corp. XXXX

DIAGNOSTICS MENU :

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




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

Refer to sections 3.18 through 3.23 for detailed descriptions of item 4 through 8 and 0 (Service programs).

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

---

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

```
TOSHIBA Personal Computer XXXXXX DIAGNOSTICS
Version X.XX (C) Copyright TOSHIBA Corp. XXXX

DIAGNOSTIC TEST MENU :

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

                            ? ? ? ?  :  Select items
                            Enter    :  Specify
                            Esc      :  Exit
```

Refer to sections 3.4 through 3.15 for detailed descriptions of each Diagnostic Tests 1
through 14. 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.

3. Select the test you want to execute and press **Enter**. When SYSTEM TEST is selected, the following message will appear:

```
SYSTEM TEST              XXXXXXX   ┌──────────────────────────┐
                                   │ XXX DIAGNOSTIC TEST VX.XX │
                                   │ [Ctrl]+[Break] : test end │
                                   │ [Ctrl]+[C]     : key stop │
                                   └──────────────────────────┘


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


SUB-TEST MENU :

01 - ROM checksum
02 - Geyserville
03 -
04 - Fan ON/OFF
05 -
06 - Quick charge
07 - DMI read
08 - DMI write
09 - Thermister Check
99 - Exit to DIAGNOSTIC TEST MENU
                               ? ? ? ?   :  Select items
                               Enter  :  Specify
                               Esc    :  Exit
```

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

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

```
TEST LOOP : YES/NO
```

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

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

5. The following message will appear:

```
ERROR STOP : YES/NO
```

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

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

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

These three selections have the following functions respectively:

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

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

Use - or ‾ key to move a cursor of the "TEST LOOP" and "ERROR STOP"

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

    Table 3-1 in section 3.3 describes the function of each test on the subtest menu. Table 3-2
    in section 3.16 describes the error codes and error status for each error.

3.3   Subtest Names

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

Table 3-1 Subtest names (1/2)

No.	Test Name	Subtest No.	Subtest Name
1	SYSTEM	01	ROM checksum
		02	Geyserville
		04	Fan ON/OFF
		06	Quick charge
		07	DMI read
		08	DMI write
		09	Thermister check
2	MEMORY	01	Conventional memory
		02	Protected mode
		06	Stress
3	KEYBOARD	01	Pressed key display
		02	Pressed key code display
		04	Touch pad
		05	USB (Port 0, Port 1) test
		06	USB (Port 2, Port 3) test
		07	CD-function key 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
5	FLOPPY DISK	01	Sequential read
		02	Sequential read/write
		03	Random address/data
		04	Write specified address
		05	Read specified address

Table 3-1 Subtest names (2/2)

No.	Test Name	Subtest No.	Subtest Name
6	PRINTER	01	Ripple pattern
		02	Function
		03	Wrap around
8	HARD DISK	01	Sequential read
		02	Address uniqueness
		03	Random address/data
		04	Cross talk & peak shift
		05	Partial read
		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
13	CD-ROM/DVD-ROM	01	Sequential read
		02	Read specified address
		03	Random address/data
		05	RW 1Point W/R/C
14	LAN	01	LAN MAC ADDRESS DISPLAY

3.4   System Test

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

Subtest 01   ROM checksum

This subtest executes a checksum test of the BIOS ROM (range: F0000h to
FFFFFh, 64KB) on the System Board.

Subtest 02   Geyserville

If the CPU supports Gerserville (SpeedStep), this Subtest checks that the CPU
operating clock speed can be changed.

Subtest 04   Fan ON/OFF

This subtest turns on/off the fan motor by force with Fan ON/OFF commands and
displays the max speed of the fan.

The following message will appear. Make sure the fan does not rotate and press
Enter.

```
Test Fan OFF Start
Press [Enter] KEY
```

The following message will appear. Make sure the fan rotates at max speed and
press **Enter.**

```
Test Fan MAX Start
Press [Enter] KEY
```

The following message will appear and display the max speed of the fan.

```
Test Fan MAX Start
*** CPU FAN Speed = XXXX rpm
*** 2nd FAN Speed = XXXX rpm

Press [Shift] + [S] KEY
```

To exit this subtest and return to the SYSTEM test menu, press **Shift + S**.

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.

```
*** DMI Data Display Ver X.XX ***

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. "Create DMIINFO TXT (Y/N) ?" is displayed.

   Press **Y,** then the DMI information (text data) is written to the Floppy disk, etc.

Subtest 09   Thermister check

This subtest reads the status (normal/open/short) of the [Thermister connect check] of the PS micon. When it is not normal, an error message is displayed. When it is normal, the display returns to the main menu.

3.5   Memory Test

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

Subtest 01   Conventional memory

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

Subtest 02   Protected mode

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

This subtest writes constant data (FFh, Aah, 55h, 00h) and address data (FFFFh, FFFEh,….., 0000h) to the area of 1MB to maximum MB and reads the new data and compares the result with the original data.

Subtest 06   Stress

Data (from 1MB to the maximum MB) is written from the 16KB write buffer to the 16KB read buffer and compared the data in the buffers. The read buffer starts from 0001 and the comparison is continued with the following read buffer addresses: 0001, 0003, 0005, 0007, 0009, 000b, 000d and 000f.

3.6   Keyboard Test

To execute the Keyboard Test, select **3** from the DIAGNOSTIC TEST MENU, press **Enter** and
follow the directions on the screen. 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 which causes the key's display character to blink.

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

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



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

Subtest 02   Pressed key code display

When a key is pressed, the scan code, character code, and key top name are
displayed on the screen in the format shown below. The **Ins 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  302000
        Scan code       =
        Character code  =
        Keytop          =
Ins Lock  Caps Lock  Num Lock    Scroll Lock
Alt       Ctrl       Left Shift  Right Shift
```

```
PRESS [Enter] KEY
```

Subtest 04   Touch pad

This subtest checks the functions of the touch pad as shown below.

A) Direction and parameter
B) Switching function check

This test displays the response from the touch pad and touch pad switch. When moving your finger on the touch pad towards the upper left, the `<POINTING>` display changes according to the following illustration. If a touch pad switch is pressed, the `<BUTTONS>` displays appear on the right side one by one. The parameters appear above the `<BUTTONS>` (1) or (2) corresponding to the pressed touch pad switch highlights. If two touch pad switches are pressed at the same time, the subtest menu appears.
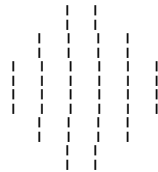
```
       *** IPS (PAD) TEST PROGRAM (Vx.xx) ***

          <POINTING>                 <PARAMETER>
                                    STATUS :0000h
              | |                   X-RATE :0000h
            | | | |                 Y-RATE :0000h
          | | | | | |
          | | | | | |                 <BUTTON>
            | | | |                   (1)     (2)
              | |


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

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

          < POINTING >           < PARAMETER >
                                 STATUS  : 0018h
                                 X-RATE  :  OK
                                 Y-RATE  :  OK
                                 Z-RATE:0000
                                   <BUTTON>
                                   < BUTTONS >
                                   (1)     (2)
                                 [BtUP]      [BtDW]

                                     utton1-ON
                                     Button1-ON

                                   Bt2-ON
                                   Bt2-ON

          << PRESS BUTTON1 + BUTTON2 THEN END >>
```
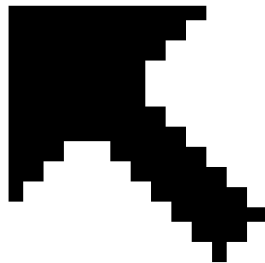
Subtest 05   USB (Port 0, Port1) test

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 test and press **Enter**.

```
Test port number select (1:Port0, 2:Port1, 0:Port0&1) ?
```

If the test ends successfully, OK is displayed. If there is a problem with the USB port, an error message appears. Check the wraparound connection and repeat the test.

Subtest 06   USB (Port 2, Port3) 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 test and press **Enter**.

```
Test port number select (1:Port2, 2:Port3, 0:Port2&3) ?
```

If the test ends successfully, OK is displayed. If there is a problem with the USB port, an error message appears. Check the wraparound connection and repeat the test.

Subtest 07   CD function key test

This subtest checks the [Play/Pause], [Stop], [rewind] and [forward] button.

1. The following message is displayed. Press **Play/Pause** button.

```
Press [play/pause] Button
```

2. The following message is displayed. Press **Stop** button.

```
Press [stop] Button
```

3. The following message is displayed. Press **Rewind** button.

```
Press [rewind] Button
```

4. The following message is displayed. Press **Forward** button.

```
Press [forward] Button
```
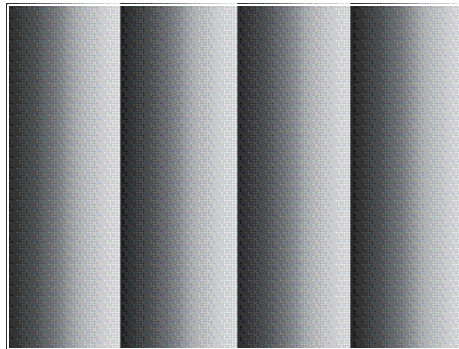
3.7   Display Test

To execute the Display Test, select **4** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. 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) to the video RAM. 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.
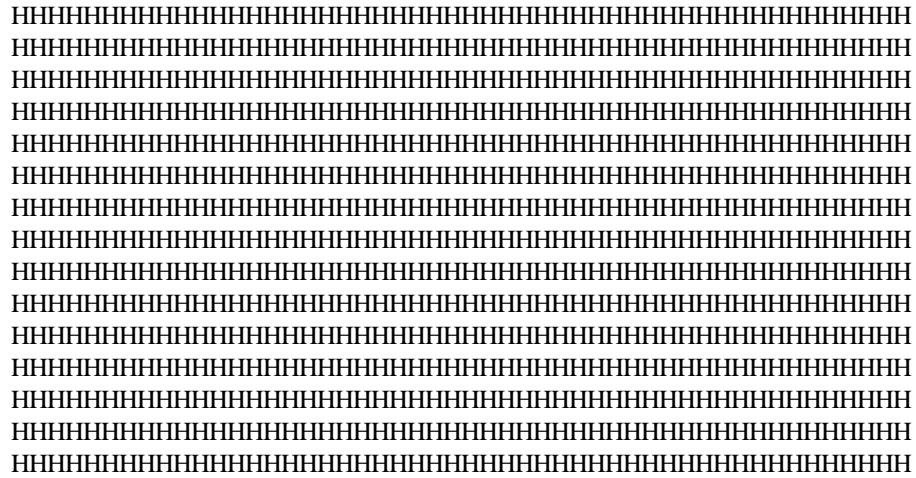

(Display example: Mode 12)

To exit this subtest and return to the DISPLAY TEST menu, press **Enter** after displaying the Mode 118**.**

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, then returns to the DISPLAY TEST menu.

Subtest 06   "H" Pattern Display

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

```
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
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HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH
```

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 on
error.

Subtest 07   LCD brightness

The LCD brightness changes in the following order:

Super-Bright —> Bright —> Semi-Bright —> Bright —> Super-Bright

The display switches automatically every three seconds and returns to the
DISPLAY TEST menu.

3.8   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. The contents of
             the floppy disk will be erased.*

To execute the Floppy Disk Test, select **5** from the DIAGNOSTIC TEST MENU, press **Enter**
and follow the directions displayed on the screen. After selecting the Floppy Disk Test from the
DIAGNOSTIC TEST MENU, messages to execute the test drive number, media type and test
start truck will be displayed successively. Answer each question with an appropriate response to
execute the test.

1. The following message will appear. Select the drive number, media mode and start track to be
    tested, then press **Enter.**

```
Test drive number select  (1:FDD#1, 2:FDD#2, 0:FDD1&2) ?
Media in drive#1/#2 mode  (0:2DD, 1:2D, 2:2D-2HD/2DD, 3:2HD)?
2HD media mode (*1)       (1:1.20MB/2:1.44MB) ?
Test start track          (Enter:0/dd:00-79) ?
```

    (*1) If 2 or 3 is selected in the Media in drive#1/#2 mode)

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.

```
FLOPPY DISK            XXXXXXX  │ XXX DIAGNOSTIC TEST VX.XX
                                │  [Ctrl]+[Break] :   test end
                                │  [Ctrl]+[C]     :   key stop

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

SUB-TEST MENU :

01 - 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 items
                                    Enter  :   Specify
                                    Esc    :   Exit
```

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

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

3. When the subtest 04 or 05 is selected, the following messages will appear on the screen. Select the test data（subtest 04 only), track number and head number you want to test.

```
Test data     ?? (subtest 04 only)
Track No.     ??
Head No.       ?
```

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.

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   Printer Test

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

NOTE: *A Port Replicator and an IBM compatible printer must be connected to the system to execute this test.*

The following message will appear, after selecting the subtest 01 to 03 of the printer test:

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

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

Subtest 01   Ripple pattern

This subtest prints characters for codes 20h through 7Eh line-by-line while shifting one character to the left at the beginning of each new line.

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

Subtest 02   Function

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

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

> This subtest prints the various print types shown below:

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

Subtest 03   Wrap around

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

> This subtest checks the output and bi-directional modes of the data control and status lines through the parallel port wraparound connector (34M741986G01). (Both output and bi-directional modes are tested.)

3.10 Hard Disk Test

To execute the Hard Disk Test, select **8** from the DIAGNOSTIC TEST MENU, press **Enter,** and follow the directions on the screen.

CAUTION: *The contents of the hard disk will be erased when subtest 01, 02, 03, 04, 05, 06, 07,09, or 10 is executed. Before running the test, the customer should transfer the contents of the hard disk to floppy disk or another hard disk. If the customer has not or cannot perform the back-up, create back-up disks as described below.*

Check to see if the Microsoft Create System Disks Tools (MSCSD.EXE) still exists in the System Tools Folder. (This tool can be used only once.) If it exists, use it to back up the pre-installed software, then use the Backup utility in the System Tools folder to back up the entire disk, including the user's files.

Refer to the operating system instructions.

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

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

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

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 HDD status is displayed on the screen. The HDD status is described in section 3.18. Select **yes** or **no**.

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

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

```
HARD DISK TEST XXXXXXX             ┌──────────────────────────────┐
                                   │ XXX DIAGNOSTIC TEST VX.XX     │
                                   │  [Ctrl]+[Break] :  test end   │
                                   │  [Ctrl]+[C]     :  key stop   │
                                   └──────────────────────────────┘
SUB TEST      : XX
PASS COUNT    : XXXXX        ERROR COUNT   : XXXXX
WRITE DATA    : XX           READ DATA     : XX
ADDRESS       : XXXXXX       STATUS        : XXX
```

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

The first digit of the STATUS number indicates the drive being tested and the last two digits
indicate the error status code as explained in table 3-2 of the section 3.16.

Subtest 01   Sequential read

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

Subtest 02   Address uniqueness

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

                  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. (Test the data interference in the neighbor track)

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

Subtest 05   Partial read

This subtest reads 1GB data just before the first, middle and maximum of the HDD filed.
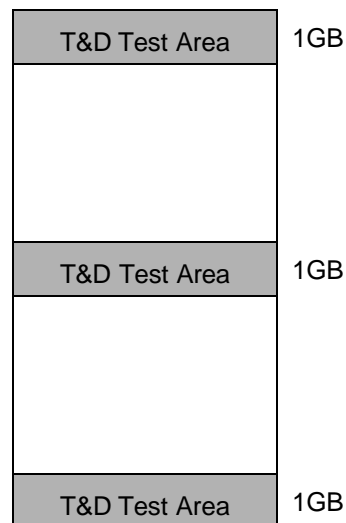
Subtest 06   Write specified address

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.

3.11 Real Timer Test

To execute the Real Timer Test, select **9** from the DIAGNOSTIC TEST MENU, press **Enter** and follow the directions on the screen. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01   Real time

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

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

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

Enter new date:

PRESS [Enter] KEY TO EXIT TEST
```

            2.   If the current date is not correct, input the correct date at the "Enter new date" prompt and press **Enter**.

            3.   The following messages will appear:

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

Enter new time:

PRESS [ENTER] KEY TO EXIT TEST
```

            4.   If the current time is not correct, input the correct time in 24-hour format. To enter "**:**", press **Shift + ;**. The time is updated.

            To exit, press **Enter**.

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, making sure the date and time are displayed in the following format:

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

The real time increments are automatically executed and the following is displayed:

```
Current date  :  01-01-2000
Current time  :  00:00:00

PRESS [Enter] KEY TO EXIT TEST
```

Press **Enter** to exit.

3.12 NDP Test

To execute the NDP Test, select **10** from the DIAGNOSTICS TEST MENU, press **Enter** and
follow the directions on the screen.

Subtest 01   NDP

        This test checks the following functions of NDP:

        ❑ Control word

        ❑ Status word

        ❑ Bus

        ❑ Addition

        ❑ Multiplication

3.13 Expansion Test

To execute the Expansion Test, select **11** from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen.

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

Subtest 01   PCMCIA wraparound

This subtest 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

Subtest 03   RGB monitor ID

Connect a wraparound connector to CRT monitor for the test of ID acquisition. To check whether the ID is acquired or not is judged by the data from the monitor. Therefore, this test will fail when it is performed in simultaneously display mode or panel display mode. Make sure the CRT used for this test is the one with ID and only the CRT is selected for display device before the test.

3.14 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.

NOTE: *To execute the CD-ROM/DVD-ROM test, make sure the CD-ROM and CD-ROM drive or DVD-ROM and DVD-ROM drive is installed in the computer.*

For the subtest 01, 02 and 03, use the TOSHIBA CD-ROM TEST DISK (ZA1217P01/P000204190) for CD-ROM and DVD-ROM TEST DISK TSD-1 for DVD-ROM. For the subtest 05, use a CD-RW on the market.

Subtest 01   Sequential read

This subtest is a sequential reading of one‑block units (2K bytes) of all the logical addresses.

Subtest 02   Read specified address

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

Subtest 03   Random address/data

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

Subtest 05   RW 1Point W/R/C

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

3.15 LAN Test

To execute the LAN Test, select **14** from the DIAGNOSTICS TEST MENU, press **Enter** and follow the directions on the screen. The LAN Test contains one subtest.

Subtest 01   LAN MAC ADDRESS DISPLAY

This subtest reads MAC ADDRESS and displays it.

Press **Enter** to exit.

3.16 Error Code and Error Status Names

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

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

Device name	Error code	Error status name
(Common)	FF	Data Compare Error
System	01	ROM-Checksum Error
	03	ROM-Serial ID Write Error
	04	ROM-Not supported PS System
	05	ROM-Sensing Error For AC-adapter
	06	ROM-Sensing Error For 1st Battery
	07	ROM-Sensing Error For 2nd Battery
	08	ROM-Thormistor Error (1)
	09	ROM-Thormistor Error (2)
	10	ROM-Thormistor Error (3)
Memory	01	RAM-Parity Error
	02	RAM-Protected Mode Not Changed
	0D	RAM-Cache Memory Error
Keyboard	FE	USB-GET Descr. Error (First)
	FD	USB-GET Address Error
	F0	HUB-GET Descr. Error (Top88)
	F1	HUB-GET Descr. Error (Whole)
	F2	HUB-SET Configuration Error
	F3	HUB-GET Descr. Error (Descr)
	F4	HUB-SET Feature Error (P on)
	F5	HUB-GET States Error
	F6	HUB-SET Feature Error (Reset)
	F7	HUB-CLEAR Feature Error
	F8	HUB-CLEAR Feature1 Error
	F9	HUB-SET Feature Error (Enab)
	FA	HUB-CLEAR Feature2 Error
	EF	USB-Over Count Error
	ED	USB-GET-Descr Error (Second)

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

Device name	Error code	Error status name
Display	EE	VRAM Size Not Support
FDD	01	FDD-Bad Command Error
	02	FDD-Address Mark Not Found
	03	FDD-Write Protected
	04	FDD-Record Not Found
	06	FDD-Media Removed
	08	FDD-DMA Overrun Error
	09	FDD-DMA Boundary Error
	10	FDD-CRC Error
	20	FDD-FDC Error
	40	FDD-Seek Error
	60	FDD-Not Drive Error
	80	FDD-Time Out Error
	EE	FDD-Write Buffer Error
Printer	01	PRT-Time Out
	08	PRT-Fault
	10	PRT-Select Line
	20	PRT-Out Of Paper
	40	PRT-Power Off
	80	PRT-Busy Line
HDD	01	HDD-Bad Command Error
	02	HDD-Address Mark Not Found
	04	HDD-Record Not Found Error
	05	HDD-HDC Not Reset Error
	07	HDD-Drive Not Initialized
	08	HDD-Overrun Error (DRQ)
	09	HDD-DMA Boundary Error
	0A	HDD-Bad Sector
	0B	HDD-Bad Track Error
	10	HDD-ECC Error
	11	HDD-ECC Recover Enable
	20	HDD-HDC Error
	40	HDD-Seek Error
	80	HDD-Time Out Error
	AA	HDD-Drive Not Ready
	BB	HDD-Undefined Error
	CC	HDD-Write Fault
	E0	HDD-Status Error
	EE	HDD-Access Time Error
	DA	HDD-No HDD

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

Device name	Error code	Error status name
NDP	01	NDP-No Co-Processor
	02	NDP-Control Word Error
	03	NDP-Status Word Error
	04	NDP-Bus Error
	05	NDP-Addition Error
	06	NDP-Multiply Error
Expansion	C1	Address 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
	CC	No PCMCIA
	CE	Card Type Error
	CF	ZV_Cont\ Error
CD/DVD-ROM	01	Bad Command
	02	Illegal Length
	03	Unit Attention
	04	Media Change Request
	05	Media Detected
	06	Additional Sense
	09	Boundary Error
	11	Corrected Data Error
	20	Drive Not Ready
	40	Seek Error
	80	Time Out
	90	Reset Error
	B0	Address Error

3.17 Hard Disk Test Detail Status

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

```
HDC status = XXXX
```

Detailed information about the hard disk test error 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 status register in hexadecimal form and the second byte displays the HDC error register.

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

Table 3-3 Hard disk controller status register contents

Bit	Name	Description
7	BSY (Busy)	"0" … HDC is ready. "1" … HDC is busy.
6	DRY (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	COR (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" … Normal "1" … The previous command was terminated with an error.

Table 3-4 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 is no ID field in the requested sector.
3	——	Not used
2	ABT (Abort)	"0" … Not used "1" … Illegal command or command abort.
1	TK0 (Track 0)	"0" … The hard disk found track 0 during a recalibrate command. "1" … The hard disk could not find track 0 during a recalibrate command.
0	——	Not used

3.18 Head Cleaning

3.18.1 Function Description

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

3.18.2 Operations

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

   ```
   DIAGNOSTICS - FLOPPY DISK HEAD CLEANING : VX.XX
   Mount cleaning disk(s) on drive(s).
   Press any key when ready.
   ```

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

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

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

3.19   Log Utilities

3.19.1   Function Description

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

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 (STS)

5. FDD, HDD or memory address (ADDR)

6. Write data (WD)

7. Read data (RD)

8. HDC status (HSTS)

9. Error status name (ERROR STATUS NAME)

If the power switch is turned off, the error information will be lost.

3.19.2 Operations

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

```
XXXXX ERRORS
CNT  TS-NO   PASS STS   ADDR    WD RD HSTS [ERROR STATUS NAME]

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

     Error count
```

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

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

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

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

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

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

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

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

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

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

3.20 Running Test

3.20.1 Function Description

This function automatically executes the following tests in sequence:

1. System test (subtest 01)
2. Memory test (subtests 01, 02 and 06)
3. Display test (subtest 01)
4. FDD test (subtest 02)
5. HDD test (subtests 01)
6. Real timer test (subtest 02)
7. Printer test (subtest 03) if selected

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

3.20.2 Operations

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

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

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

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

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

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

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

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

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

    ```
    Mount the work disk(s) on the drive(s),
    then press [Enter] key.

    [Warning : The contents of the disk(s)
    will be destroyed]
    ```

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

3.21   Floppy Disk Drive Utilities

3.21.1   Function Description

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

   1. FORMAT

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

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

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

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

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

   2. COPY

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

   3. DUMP

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

   4. HDD ID READ

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

3.21.2 **Operations**

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

   ```
   [ FDD UTILITIES ]

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

2. FORMAT program

   (a) Selecting FORMAT displays the following message:

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

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

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

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

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

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

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

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

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

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

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

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

3. COPY program

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

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

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

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

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

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

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

   (d) The following message will appear.

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

   (e) Remove the source disk from the FDD, then insert a formatted work disk and press any key. The following message will appear and start copying to the target disk.

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

   (f) 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) ?
```

   (g) 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 is selected, the following message appears:

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

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

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

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

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

   (d) If `3:2HD` is selected, the following message will appear. Select a media mode:

   ```
   2HD media mode (1:1.20MB, 2:1.44MB, 3:1.23MB)?
   ```

   (e) 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) Set the track number, head number and 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 when selecting `2:HDD` in (a):

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

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

   ```
   ---Max. address ---
   [LBA ] = XXXXXXXX

   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

Selecting HDD ID displays the following HDD ID configuration:

```
[HDD ID Read (VX.XX)] [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.             =  YYYY...
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.

3.22 System Configuration

3.22.1 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 (EC Version)
8. Total memory size (Conventional Memory)
9. Battery code
10. Sound System
11. The number of printer ports
12. The number of ASYNC ports
13. The number of math co-processors
14. The number of PCMCIA Slot
15. Modem/LAN Type
16. The number of floppy disk drives
17. The number of hard disk drives
18. Date/Time

3.22.2 Operations

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

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

*   - Processor Type    = XXXXXX
**  - VGA Controller    = XXXXXX
*   - MS-DOS Version    = V7.XX
*   - BIOS ROM Version  = VX.XX 1st ID = XXH, 2nd ID = XXH
*   - BOOT ROM Version  = VX.XX
*   - KBC Version       = VX.XX
*   - PS Micon Version  = V1.XX    ( EC Version = VX.XX )
*   - Total Memory Size = XXXXXXMB ( Conventional Memory = XXXXXKB )
*   - Battery Code      = XXXXX
**  - Sound System      = XXXXX
*   - X Printer Adapter   LPT1 = XXXX  LPT2 = XXXX  LPT3 = XXXX
*   - X ASYNC Adapter     COM1 = XXXX  COM2 = XXXX  COM3 = XXXX
*   - X Math CO-Processor
*   - X PCMCIA Slot
*   -   MODEM            = XXXXX
*   -   LAN              = XXXXX
*   - X Floppy Disk Drive(s) Track = XX  Head = XX, Sector = XX
*   - X Hard Disk Drive(s)  #1 Sectors  = XXXXX, (XX GB)
                            #2 Sectors  = XXXXX, (XX GB)
Press [Enter] Key        [Date = XXXX-YY-ZZ, XX:YY:ZZ]
```

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

3.23 SETUP

3.23.1 Function Description

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

1. Memory

    (a) Total

2. System Date/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) Hyper-Threading Technology
    (f) Auto Power On
    (g) Panel Power On/Off

8. Configuration

9. I/O Ports

    (a) Parallel

10. Drives I/O

    (a) Built-in HDD
    (b) CD-ROM

11. PCI Bus

12. PC Card

13. Peripheral

    (a) Internal Pointing Device

    (b) Parallel Port Mode

    (c) Hard Disk Mode

14. LEGACY Emulation

    (a) USB KB/Mouse Legacy Emulation

    (b) USB-FDD Legacy Emulation

15. PCI LAN

3.23.2   Accessing the SETUP Program

Selecting **0** from the DIAGNOSTICS MENU and pressing **Enter** displays the SETUP screen.
The SETUP screen is divided into two pages.

```
              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                │
    ┌──────── BATTERY ────────┐        │ LCD Display Stretch = Enabled │
    │ Battery Save Mode = Full Power │  └─────────────────────────┘
    └──────────────────────────┘

    ┌──────── PASSWORD ────────┐       ┌──────── Others ────────┐
    │ Not Registered          │       │ Power-up mode         = Boot │
    └──────────────────────────┘       │ CPU Cache             = Enabled │
                                       │    Level 2 Cache          = │
                                       │ Enabled                 │
                                       │ Dynamic CPU Frequency Mode │
                                       │             = Dynamically Switchable │
                                       │ Hyper-Threading Technology = Enabled │
                                       │ Auto Power On          = Disabled │
                                       └─────────────────────────┘
```

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

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

    ┌──────── CONFIGURATION ────────┐   ┌──────── PC CARD ────────┐
    │ Device Config.    = Setup by OS │   │ Controller Mode = Auto-Selected │
    └──────────────────────────────┘     └─────────────────────────┘

    ┌──────── I/O PORTS ────────┐        ┌──────── PERIPHERAL ────────┐
    │ Parallel       =          │        │ Internal Pointing Device   = Enabled │
    └──────────────────────────┘         │ Parallel Port Mode  = ECP  │
                                         │ Hard Disk Mode    = Enhanced IDE(Normal) │
    ┌──────── DRIVERS I/O ────────┐       └──────────────────────────────┘
    │ Built-in HDD             │
    │         = Primary IDE(1F0H/IRQ14) │  ┌──── LEGACY EMULATION ────┐
    │ CD-ROM   = Secondary IDE(170H/IRQ15) │ │ USB KB/Mouse Legacy Emulation │
    └──────────────────────────────┘      │              = Enabled │
                                         │ USB-FDD Legacy Emulation     = │
    ┌──────── PCI BUS ────────┐           └──────────────────────────┘
    │ PCI BUS        = IRQ10, IRQ11 │     ┌──────── 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

---

NOTE*: Panel Power On/Off item appears only when the Power-up Mode is in Resume
mode.*

Moving Within the SETUP Menu and Changing Values

1. Press ← and → to move between the two columns. 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 **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 show the factory preset configuration, press **Home**.

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

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

SETUP Options

The SETUP screen is divided into 15 functionally related groups. This section describes each group and its options.

1. Memory

   This group of option displays the computer's memory.

   (a) 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

   This option is used to set the date and the time of the computer.

   > **Date (MM-DD-YYYY)**   Sets the date.
   >
   > **Time (HH:MM:SS)**   Sets the time.

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.

(a)   Battery Save Options

Processing Speed

This feature changes the CPU processing speed.

High   CPU operates at 2.66/2.80/3.06/3.20GHz (Pentium 4 Northwoood)
2.66/2.80/3.06/3.20/3.46GHz (Pentium 4 Prescott)
2.40/2.60/2.60/2.70GHz (Celeron)
(Default in Full Power Mode)

Low   CPU operates at half processing speed.
(Default in Low Power Mode)

CPU Sleep Mode

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

Enabled   Enables sleep mode. (Default)

Disabled   Disables sleep mode.

Display Auto Off

Use this option to disable or set the duration of the display automatic power off function. This function causes the computer to turn the LCD panel's illumination off if you make no entry (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 **1**, **3**, **5**, **10**, **15**, **20** or **30** minutes.

HDD Auto Off

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

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 **1**, **3**, **5**, **10**, **15**, **20** or **30** minutes.

System Auto Off

Use this option to disable or set the duration of the system automatic off function in
Resume mode. In Boot mode, it is not displayed.

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 **10**, **20**, **30**, **40**, **50** or **60** minutes.

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.

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 (*1) 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)

(*1) CD-ROM refers to a CD-ROM, DVD-ROM, CD-RW/DVD, DVD-R/-RW, DVD±RW or DVD-Multi drive.

(b) HDD Priority

Use this option to set the priority for booting of the computer when a device connected via PC card is connected to the computer.

Built-in HDD® PC Card:	The computer looks for bootable files in the built-in HDD first. (Default)
PC Card® Built-in HDD:	The computer looks for bootable files in the PC card first.

(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)
LED+AnalogRGB	Selects both the internal LCD and the external CRT for simultaneous display.

NOTE : When starting the computer in Resume mode, the last configuration is remembered. If data does not appear on the display you are using after starting in Resume mode, pressing **Fn+F5***.*

Pressing **Fn+F5** *changes the display setting as follows in order: the internal LCD, the external CRT, both the internal LCD and the external CRT and TV display.*

You cannot select TV display in HW Setup. To display on a TV screen, use **Fn+F5***.*

When an external CRT display which does not support SVGA mode is connected and "LED+AnalogRGB" is selected, the external display is not displayed.

(b) TV Type

This option allows you to select the type of TV.

NTSC (Japan)   TV in Japanese system

NTSC (US)   TV in the U.S. system (Default)

PAL   TV in Europe system

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. This potion can also be set by hotkeys.

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 is not displayed.

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. When the CPU of the computer is Celeron, this option is not displayed.

Dynamically Switchable

	Enables Pentium 4 processor featuring Intel SpeedStep technology. (Default)
Always High	Disables Pentium 4 processor featuring Intel SpeedStep technology and always runs the processor at its maximum speed.
Always Low	Disables Pentium 4 processor featuring Intel SpeedStep technology and always runs the processor at its default speed.

(e)   Hyper-Threading Technology

This option sets the Enable/Disable of the Hyper-Threading Technology.

Disabled	Disables the Hyper-Threading Technology function.
Enabled	Enables the Hyper-Threading Technology function. (Default)

(f)   Auto Power On

This option shows the setting for the Auto Power On function.

Disabled	Parameters for the Auto Power On function and Wake-up LAN function are not set. (Default)
Enabled	Parameters for the Auto Power On function and Wake-up LAN function are set.

When the "Enable" is selected, the following menu appears.

```
┌──────────── OPTIONS ────────────┐
│ Alarm Time            = 00:00:00 │
│ Alarm Date Option     = Disabled │
│ Ring Indicator        = Disabled │
└──────────────────────────────────┘
```

Set the parameters for the Auto Power On (automatic power on) function and the Wake-up on LAN in the "OPTIONS" window. To set the time, use **Space** or **BackSpace**. Press ‾ to move the cursor to the right and - to move the cursor to the left when you set the date and time.

For the **Alarm Time**, set the time to turn on the power automatically. The "second" cannot be set. When it is set to "Disabled", the time to turn on automatically is not set.

For the **Alarm Date Option**, set the date to turn on the power automatically. When it is set to "Disabled", the time to turn on automatically is not set.

The **Ring Indicator** is displayed only when the computer is in Resume mode and this function cannot be used for a PC card-type modem. When any modem is not installed, it is not displayed.

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

3. This option is enabled only once, the setting is reset, after booting up.

(g) 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.

All Devices	BIOS sets all devices.
Setup by OS	Operating system sets devices that it can control. (Default)

NOTE: When using installed OS, selecting "Setup by OS" is recommended. But, when setting "PC CARD-Controller Mode" to other than " Auto-Selected", select " All Devices".

---

9. I/O ports

    This option controls settings for the parallel port.

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

This option sets the interrupt request level and I/O port base address for the parallel port. When the parallel port mode is set to **Std. Bi-direct**, the options are as follows:

LPT setting	Interrupt level	I/O address
LPT 1	7	378H
LPT 2	5	278H
LPT 3	7	3BCH
Not Used		Disables port

When the parallel port mode (see settings below) is set to **ECP**, the DMA channel can also be set to **1** or **3**. The default is 3.

LPT setting	Interrupt level	I/O address	DMA channel
LPT 1	7	378H	3 (Default)
LPT 2	5	278H	3
LPT 3	7	3BCH	3
Not Used		Disables port	

When you select one of the above options, except for **Not Used**, a subwindow similar to the one below appears to let you set the DMA. The options for this setting are Channel 1and Channel 3 (Default).

```
             ┌──────── OPTIONS ─────────┐
             │ DMA       = Channel 3 (Default) │
             └─────────────────────────────────┘
```

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

---

10. Drives I/O

This option displays the address and interrupt level for the hard disk drive, CD/DVD-ROM drive and PC card. It is for information only and cannot be changed.

> **Built-in HDD**   The setting for the built-in HDD is displayed.
>
> **CD-ROM**   The setting for the built-in CD-ROM is displayed.
>
> **PC Card**   This is displayed, when a PC card type HDD that can boot system is inserted to PC card slot.

11. PCI Bus

This option displays the interrupt level for the Card Bus in the computer. It is for information only and cannot be changed.

```
PCI BUS    = IRQ10, IRQ11
```

12. PC Card

This option displays the PC Card Controller mode.

> **Auto-Selected**   Use this setting for all PC Card if you are using Windows 98/2000/XP which support Plug&Play. (Default)
>
> **CardBus/16-bit**   If you are using Windows for Workgroups or Windows NT 4 or lower or if the card does not work properly with the Auto-Selected setting, use this setting for Card Bus PC card.
>
> **PCIC Compatible**
>   If you are using Windows for Workgroups or Windows NT 4 or lower or if the card does not work properly with the Auto-Selected and CardBus/16 bit setting.

13. Peripheral

Use this option to select the peripheral's mode.

(a) Internal Pointing Device

This option enables or disables the touch pad

> **Enabled**   Enables the touch pad. (Default)
>
> **Disabled**   Disables the touch pad.

(b) Parallel Port Mode

Use this option to set information of ECP and Standard Bi-directional.

ECP   Sets the port mode to Extended Capabilities Port (ECP). For most printers, the port should be set to ECP. (Default)

Std. Bi-Direct.   Sets the bi-directional setting. This setting should be used with some other parallel devices.

NOTE : When the Windows is used, the setting in "Toshiba HW setup" has the priority. The setting in "Parallel Port Mode" is ignored.

(c) Hard Disk Mode

Use this item to select the hard disk mode.

Enhanced IDE (normal)

Select this mode when the HDD is used for MS-DOS®, Windows 95/98/2000/XP, or OS/2®.   (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.

---

14. 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

15. 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.

3.24 Repair initial config set

The following message will appear:

```
######################################################################
#########    H/W initial information setting tool VerX.XX    #####
######################################################################
*                                                                    *
*   1                    Initial configuration                       *
*   2                    Region write                                *
*   8                    System configuration display                *
*   9                    E2PROM test (MAC/GUIDE/DMI)                  *
*                                                                    *
*********************************************************************
.... Press test number[1,2,8,9] ?
```

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

Subtest 01   Initial configuration

          This subtest executes the following items and displays the result.
- Setting CPU settable
- Setting Micro code
- Setting EHSS
- Inputting DMI information and writing it (Flash-ROM text)
  (Writes the text adding time stamp to DMI information being written)
- Setting HWSC
- Setting UUID

          When any abnormal is detected, it waits for any key input. (If the problem is solved, execute it again)

          To make all the setting effective, turns off the power.

Subtest 02   Region write

          This subtest sets the DVD region code. (Executing or not is selectable.)
          This subtest judges the destination based on the DMI information of the computer and sets the appropriate region code to the DVD drive. If the region code has been already written, this subtest is finished without setting.

Subtest 08   System configuration display

          This subtest displays System configuration.

Subtest 09   E2PROM test (MAC/GUIDE/DMI)

Make sure that the MAC address, IEEE1394 GUIDE and DMI information are written. (This test does not need tools.)
For models without H/W, this test fails. Go to next with any key pressed.

3.25 Wireless LAN Test Program (Agere)

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

NOTE: Use another computer (with Agere wireless LAN card) that can communicate by the wireless LAN as a reference machine to perform this test.

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

NOTE: 1) 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.)

2) Release the write-protection of the floppy disk for the test.

Turn off the computer and connect a USB FDD to the computer. Insert a floppy disk containing the test program into the floppy disk drive of the target machine and turn on the target machine while pressing **U**. The Wireless LAN test menu will appear.

```
############################################################
####      Wireless LAN sub system repair test  VX.XX      ####
############################################################
*                                                          *
*        1   Transmit & Receive test [Responder]           *
*        2   MAC Address test [Mini-PCI Wireless LAN]      *
*        3   Wireless LAN (WEP64/128) test                 *
*                                                          *
*        0   Transmit & Receive test [Initiator]           *
*                                                          *
************************************************************

....Press test number [1-3,0]  ?
```

Press 1, 2 or 3, and the **Enter** to perform the corresponding sub test. To quit the Wireless LAN test program, eject the floppy disk and turn the computer off while the menu above is displayed.

Subtest 01   Transmit & Receive test

       This sub test checks transmit and receive functions.

Transmit test

Press **1** to select the test and press **Enter** in the target machine as a responder. The following message will appear:

```
################################################################
####      Wireless LAN sub system repair test  VX.XX      ####
################################################################
*                                                              *
*        1   Transmit & Receive test [Responder]              *
*        2   MAC Address test [Mini-PCI Wireless LAN]         *
*        3   Wireless LAN (WEP64/128) test                    *
*                                                              *
*        0   Transmit & Receive test [Initiator]             *
*                                                              *
****************************************************************

....Press test number [1-3,0]  ?1

======== RESPONDER SET ========

ORiWL.EXE Rev.03 Copyright (c) Toshiba Corporation,2000, 2001
Initializing...

[[[ Responder Mode ]]]

MAC adress : XXXXXXXXXXXX
Ad-hoc mode
      SS ID : PHN Test
      Channel : 10
      Tx ratio : 2 Mbps
```

To prepare the tester machine for the Wireless LAN test program, 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.

Press **0** to select the test and press **Enter** in the initiator machine. The following message will appear:

```
################################################################
####      Wireless LAN sub system repair test  VX.XX      ####
################################################################
*                                                              *
*        1   Transmit & Receive test [Responder]              *
*        2   MAC Address test [Mini-PCI Wireless LAN]         *
*        3   Wireless LAN (WEP64/128) test                    *
*                                                              *
*        0   Transmit & Receive test [Initiator]             *
*                                                              *
****************************************************************

....Press test number [1-3,0]  ?1

======== RESPONDER SET ========

ORiWL.EXE Rev.03 Copyright (c) Toshiba Corporation,2000, 2001
Initializing...

[[[ Responder Mode ]]]

MAC address : XXXXXXXXXXXX
Ad-hoc mode
      SS ID : PHN Test
      Channel : 10
      Tx ratio : 2 Mbp
      PASS : 134 ERROR : 0
```

When the machine has passed the test, "OK" message will appear in the test machine.
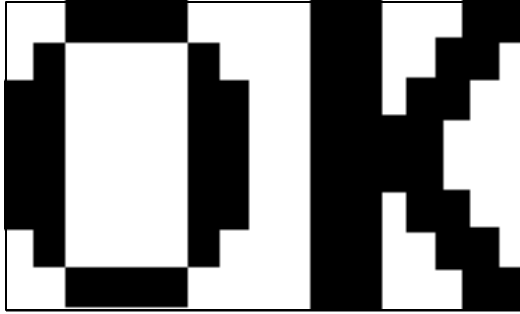
Then press **Enter** in the target machine; the "OK" message will appear also in the target machine.

Press **Enter** to return to the main menu.

Receive test

In receive test reverse the procedures of the transmit test. To prepare the tester machine for the Wireless LAN test program, 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.

Press **1** to select the test and press **Enter**. The following message will appear:

```
####################################################################
####       Wireless LAN sub system repair test  VX.XX         ####
####################################################################
*                                                                  *
*        1   Transmit & Receive test [Responder]                   *
*        2   MAC Address test [Mini-PCI Wireless LAN]              *
*        3   Wireless LAN (WEP64/128) test                        *
*                                                                  *
*        0   Transmit & Receive test [Initiator]                  *
*                                                                  *
****************************************************************

....Press test number [1-3,0]  ?1

======== RESPONDER SET ========

ORiWL.EXE Rev.03 Copyright (c) Toshiba Corporation,2000, 2001
Initializing...

[[[ Responder Mode ]]]

MAC address : XXXXXXXXXXXX
Ad-hoc mode
      SS ID : PHN Test
      Channel : 10
      Tx ratio : 2 Mbps
      PASS : 134 ERROR : 0
```

Press **0** to select the test and press **Enter** in the target machine. The following message will appear:

```
################################################################
####        Wireless LAN sub system repair test   VX.XX       ####
################################################################
*                                                              *
*          1   Transmit & Receive test [Responder]            *
*          2   MAC Address test [Mini-PCI Wireless LAN]        *
*          3   Wireless LAN (WEP64/128) test                  *
*                                                              *
*          0   Transmit & Receive test [Initiator]            *
*                                                              *
****************************************************************

....Press test number [1-2,0]  ?1

======= RESPONDER SET =======

ORiWL.EXE Rev.03 Copyright (c) Toshiba Corporation,2000, 2001
Initializing...

[[[ Responder Mode ]]]

MAC address : XXXXXXXXXXXX
Ad-hoc mode
       SS ID : PHN Test
       Channel : 10
       Tx ratio : 2 Mbps
```

When the machine has passed the test, "OK" message will appear in the target machine.

Then press **Enter** in the test machine; the "OK" message will appear also in the test machine.

Press **Enter** to return to the main menu.

Subtest 02   Mac Address test

This subtest reads Mac Address. If there is no problem, the "OK" message will appear.

Subtest 03   Wireless LAN (WEP64/128) test

This subtest reads the WEP of the wireless LAN card installed in the target machine. A message similar to the following will appear:

```
****** This CARD is WEP ******
Press any key to continue
```

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

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 (802.11a mode main antenna)
        (4) Communication test (802.11a mode sub antenna)
        (5) Communication test (802.11b 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 a "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.

```
################################################################
####   Askey/Atheros Wireless LAN Module Maintenance T&D     ####
################################################################
*                                                              *
*     1 .....DUT mode                                          *
*                                                              *
*     2 .....REF mode (Responder)                              *
*                                                              *
****************************************************************

....Press test number [1,2] ?
```

Press **2** 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  V1.00       ####
################################################################
*                                                              *
*     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.
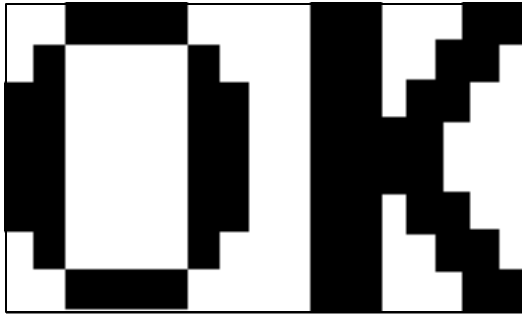
Press **Enter** to return to the main menu.

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.

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

3.27 Sound/LAN/Modem Test Program

This section describes how to perform the Sound/LAN/Modem test with the test program.

Insert the Test program disk in the floppy disk drive and turn on the power. The following message will appear:

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

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

NOTE: 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.

To execute a subtest continuously, select the test number and press **Enter.** To exit the Sound/LAN/Modem test, remove the test program disk from the USB FDD and turn off the power.

Subtest 01   Microphoned recording & play

This subtest checks the function of the CODEC A/D D/A converter. Both the microphone and headphone terminals can be checked at the same time.

Before executing this subtest, connect an external microphone to the computer. If necessary, connect a headphone to the computer to check whether the headphone jack of the computer is working properly.

When the subtest is selected, the following message appears:

```
....Press test number[1-4] ? pause
Press any key to continue...

....Press test number[1-4] ? call micrec
Record from source name is MIC
Requested Sampling Rate is 22025 Hz
Volume requested is 0,000dB
Record to buffer is BUFFER0
Record Time requested is 5.000 seconds
Actual record time will be 5.000
```

When the above message is displayed, the screen is fixed for a while. Then record the sound with the microphone.

When the following message appears, make sure the recorded sound is replayed.

```
Play to destination is LINEOUT
Volume requested is 0,000dB
Play from buffer name is BUFFER0
Requested play time is 5.000 seconds
Actual play time will be 5.000

Completing  SoundMAX/ICH play buffer0 to line out
End time   XXX XXX XX  XX:XX:XX XXXX
System Status 0X0

Test completed at XXX XXX XX XX:XX:XX  XXXX
System completion code was 0X0
```

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

Subtest 02   Sin Wave

This subtest is executed by loading the COM file (ADSIN.COM). The program expands sin wave data table from 16KB to 64KB, and creates the play data. Then it transfers the data between the DMA and the CODEC to play the sine wave. (It sounds like a continuous beep). By using wave measuring devices such as an oscilloscope, the data can be measured as a sine wave.

When the subtest is executed, the following message appears:

```
....Press test number[1-4] ? pause
Press any key to continue...
```

Press any key, and the following message appears. Then sin wave is expanded from 16KB to 64KB data and is beeped.

```
....Press test number[1-4] ? call sin
```

Subtest 03   LAN

This subtest checks the operation of mini-PCI I/F by the loopback in the chip. Select **3** to execute and press **Enter**. The following message will appear:

```
XXXX+XXXXXXX LAN test Rev.XX

                        COMPLETED   Repeat count   = 00000
                                    Error count    = 00000

LOOPBACK TEST

100Mbps Auto-negotiation TxRx Test
 Destination Address      = xxxxxxxxxxxx
 Source Address           = xxxxxxxxxxx

   ** 100Base-TX Full-Duplex **
   < TRANSMIT >
   < RECEIVE >
```
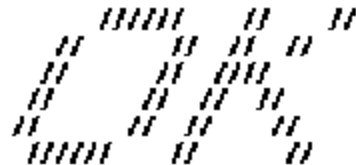
NOTE: *The menu displayed by your computer may be slightly different from the one*
            shown above.

Check that the message "OK" appears.

Subtest 04   Modem

For this subtest, connect the modem PCB-RJ11 connector with a harness. Use the dedicated "FAT-MODE inspection device (product code: QE2000P01 made by Nitto Denki Seisakusyo)" for the tests.

Select **4** to execute and press **Enter**. The following message will appear:

```
....Press test number[1-4] ? ICH_MSCE.EXE
ICHx MDC Test Program with Modem Sound (Line Test)
Version X.X
* Scorpio Modem Initialize     :OK
* Digital Loopback Test          :OK
* RJ11 Connector Check (LED)     :(Operator's Check!)
```

After a few seconds, the following message will appear:

```
...Press Key (Y = OK, N =NG)
```

If you hear the modem sound from the speakers, press **Y**, otherwise, press **N**.

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

After you press **Y** or **N**, the RJ11 Connection Check (LED) (Operator's Check LED) test will be executed, and the following message will appear:

```
...Press Key (Y = OK , N =NG)
```

If the color in the LED of the connection checker is orange, press **Y**. Otherwise, press **N**.

3.28 IEEE1394 test program

This section describes how to perform the IEEE1394 test with the test program.

> *NOTE:*   *Use another computer that can communicate by IEEE1394 (i. Link) cable as a reference machine to perform this test.*

Toshiba MS-DOS is required to run the DIAGNOSTICS TEST PROGRAM. To start the DIAGNOSTIC TEST PROGRAM, follow these steps:

Insert the Diagnostics disk in the floppy disk drive and turn on the computer.
(The Diagnostics Disk contains the MS-DOS boot files.)

The following menu will appear:

```
********************************************************************
*           IEEE1394 [XXXXX] test menu ( For Repair ) V1.00        *
********************************************************************
*                                                                  *
*           1 ....IEEE1394 test                                    *
*                                                                  *
*           2 ....Responder tool                                   *
*                                                                  *
*           3 ....ID Check                                         *
*                                                                  *
********************************************************************
.... Press test number[1-3] ?
```

To execute the TEST, select the test number you want to execute and press **Enter**.

Subtest 01   IEEE1394 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

        This program initializes the machine responder.

Subtest 03   ID Check

        This program displays the GUID.

3.29 Thermal Radiation Control Test

This thermal radiation control test checks the temperature of the CPU and GPU. To execute this test, use the diagnostics disk (thermal radiation control) and follow the procedures below.

1. Turn on the computer and start the Windows.

2. Insert the diagnostic disk for the thermal radiation control test to the USB FDD.

3. Open the [EXPLORE] window and double-click the [THERMAL.bat] file in the diagnostic disk.

4. The input field appears on the screen. Then, input the temperature around the computer and click [OK] button. The thermal radiation control test starts.

5. The test result is displayed 15 minutes later. When the test ends normally, the following message appears in the display.

   ```
   [Status:pass]
   ```

   When an error is found, the following message appears in the display.

   ```
   [Status:CPU:FAIL GPU:FAIL]
   ```

   When the error message appears in the display, there is a possibility of breakage of CPU, GPU or FAN.

   Close the test menu to end the thermal radiation control test.

Chapter 4

Replacement Procedures

Chapter 4   Contents

Figures

4.1   General

This section explains how to disassemble the computer and replace Field Replaceable Units (FRUs). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, next, optional items such as the optional PC card and optional SD card, then follow the line on the chart to determine which FRU you must remove next in order to repair the one you think is causing the computer to operate improperly. Refer to the example at the bottom of the page.

4.2   Battery Pack

4.3   PC card   4.4   SD card

4.23 Display mask /FL inverter /LCD module

4.5   HDD   4.6 Haet sink/CPU   4.7   Optical drive

4.8   Keyboard

4.26 Fluorescent Lamp

4.9   Memory module
4.10 Wireless LAN board/Modem Daughter Card
4.11 CD/DVD (Audio) play button

4.12 Display assembly

4.13 TouchPad   4.14 LED board   4.15 RTC battery
4.16 Sound board

4.17 System board/Bat con cover

4.18 Fan   4.19 Modem cable   4.20 Wireless LAN cover
4.21 Battery lock assembly   4.22 Speaker

4.24 LCD cable/Wireless LAN Antenna/Sensor switch

4.25 Hinge

How to See the Chart

An example of referring to the chart is shown below.

•**Removing the Display assembly**

4.2 Battery Pack to 4.11 CD/DVD (Audio) play button must be removed.

4.12 Display assembly

4.13 TouchPad   4.14 LED board   4.15 RTC battery
4.16 Sound board

4.17 System board/Bat con cover

4.18 Fan   4.19 Modem cable   4.20 Wireless LAN cover
4.21 Battery lock assembly   4.22 Speaker

4.24 LCD cable/Wireless LAN Antenna/Sensor switch

4.25 Hinge

Safety Precautions

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

DANGER: 1) *Always use the genuine battery that is authorized by Toshiba or compatible with the unit. Since other battery packs have different specifications, they may be incompatible with the unit, and may burst or explode.*
Never heat or disassemble the battery pack, as that could cause leakage of alkaline solution. Never throw the battery pack into a fire, as that could cause the battery pack to explode.

2) *The power supply, FL inverter and other components carry high voltages. If you need to turn on the power of a partially disassembled computer to check its operation, be very careful not to touch connectors or components, in order to avoid the risk of electric shock.*
Also, do not disassemble individual components in first-level maintenance.

WARNING: 1) *Turn off the power and disconnect the AC adaptor from the power source, to avoid exposure to electric shock.*

2) *Batteries in the computer retain an electrical charge, so there is danger of electrical shock even when the computer is disconnected from an AC power source. Remove any metal jewelry or accessories such as necklaces, bracelets or rings, in order to reduce the risk of electric shock. Never work with wet or damp hands.*

3) *Be careful of edges and corners as these may cut.*

CAUTION: 1) *When you change a component, be sure the replacement component meets the required specifications. Never use foreign parts, to avoid any risk of damage to the computer.*

2) *To avoid any risk of short-circuit, fire or other internal damage, never allow any metal objects such as screws or paper clips to fall into the unit. Be sure to replace screws with the same size as those removed. Make sure all screws are securely fastened. Loose screws can cause short circuits, resulting in heat, smoke or fire.*

3) *Before lifting out an FRU or other component, make sure all cables to the component have been disconnected, in order to reduce the risk of accidental electric shock.*

4) *If you use AC power, be sure to use the cable that came with the computer or one recommended by Toshiba.*

5) *Make sure that all replacement components meet the specifications for the computer and that all cables and connectors are securely fastened, in order to avoid the risk of electric shock.*

6) *Some parts inside the computer, such as the CPU and cooling module, become very hot during operation. Conduct repair work after they have cooled. Be careful around the CPU and cooling module to avoid burns.*

Before You Begin

Look over the procedures in this section before you begin disassembling the computer. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC adapter and the battery pack as instructed in this section:

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

2. Use only the correct and approved tools.

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

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

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

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

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

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

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

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

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

Disassembly Procedures

The computer has three basic types of cable connectors:

- Pressure Plate Connectors
- Coaxial Cable Connectors
- Normal Pin Connectors

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

Coaxial cables should be disconnected with an antenna coaxial disconnector.

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

Assembly Procedures

After you have disassembled the computer and fixed or repaired the problem that was causing the computer to operate abnormally, you will need to reassemble the computer.

Install all the removed FRUs following the steps described in the corresponding sections in this chapter.

While assembling the computer, remember the following general points:

- Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the computer.

- Make sure all cables and connectors are securely fastened.

- Before securing the FRU or other parts, make sure that screws or the FRU will pinch no cables.

- Check that all latches are closed securely in place.

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

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

Tools and Equipment

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

- One M2 point size 0 Phillips screwdriver to remove and replace screws.

- One M2.5/M3 point size 1 Phillips screwdriver to remove and replace screws.

- One 4 mm flat-blade screwdriver.

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

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

- An ESD wrist strap or heel grounder.

- Anti-static carpeting or flooring.

- Air ionizers in highly static sensitive areas.

- Antenna coaxial cable disconnector

- Brush for applying grease

Screw Tightening Torque

When you fasten screws, be sure to follow the torque list below.

> *CAUTION: Overtightening can damage components and screws; undertightening can result in electrical shorts or other damage if screws or components come loose.*

> *NOTE: Toshiba recommends that you use an electric screwdriver for quick and easy operations.*

- M2   0.17 N·m   (1.7 kgf·cm)
- M2.5   0.30 N·m   (3.0 kgf·cm)
- M3   0.57 N·m   (5.6 kgf·cm)

> *NOTE: The computer contains several flat head screws. These screws have less contact area with the screwdriver, so be careful to press firmly enough to prevent the screwdriver from slipping out and damaging the screw head.*

Color of Screw Shaft

To avoid mistakes on the screw length, screw shafts are colored as follows:

- ❑ Even number length screw: brown

- ❑ Odd number length screw: white

- ❑ Special length screw: blue

Screws whose lengths are indicated to one or more decimal places such as 2.5 mm or 2.8 mm.

Marking of Screws on the Computer Body

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.

	Kind of screws	Symbol
	BIND screw	B
❑	FLAT HEAD screw	F
❑	SUPER FLAT HEAD screw	S
❑	TAPPING screw	T
❑	Other screws (Unique screws, STUD, etc.)	U

Examples:

- ❑ 6 mm BIND screw   B6

- ❑ 12 mm BIND screw   B12

- ❑ 5 mm FLAT HEAD screw   F5

- ❑ (Indicates the screwed length in round number regardless the length of the stud.)

4.2   Battery pack

Removing the Battery pack

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

CAUTION: *When handling battery packs, be careful not to short circuit the terminals. Also do not drop, hit or apply impact; do not scratch, break, twist or bend the battery pack.*

1. Turn off the computer.

2. Disconnect the AC adapter and other external devices from the computer.

3. Turn the computer face down.

4. Release the **battery lock**. Lift up the **battery pack** while sliding the **battery latch**.

NOTE: *For environmental reasons, do not throw away a spent battery pack. Collect the spent battery packs.*
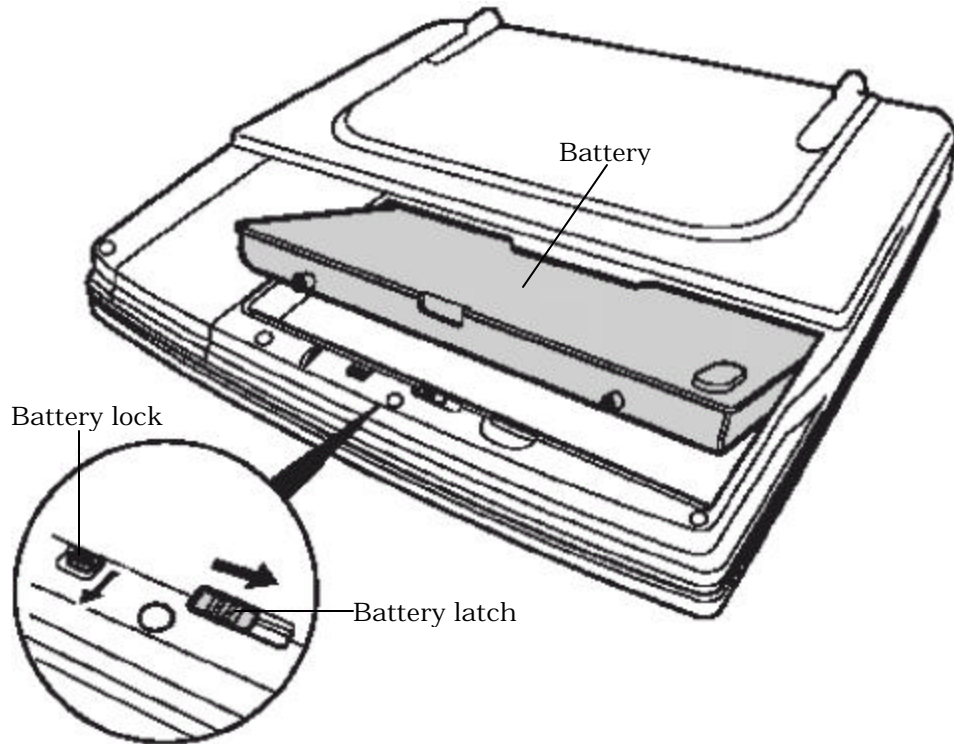
Figure 4-1   Removing the Battery pack

Installing the Battery pack

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

> *CAUTION:* *The battery pack is a lithium ion battery, which can explode if not properly replaced, used, handled or disposed of. For environmental reasons, collect the spent battery packs. Use only batteries recommended by Toshiba as replacements.*

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

1. Install **the battery pack** into the battery slot. Make sure the battery pack is installed securely.

2. Slide the **battery lock** into the lock position.

4.3   PC card

Removing the PC card

To remove the PC card, follow the steps below and refer to figure 4-2.

CAUTION: Before you remove the PC card, refer to the card's documentation and your
operating system documentation for proper procedures and precautions.

1. Turn the computer face up.

2. Push the **eject button**. It will pop out.

3. Press once more the eject button to eject the PC card.

4. Grasp the **PC card** and pull it out.
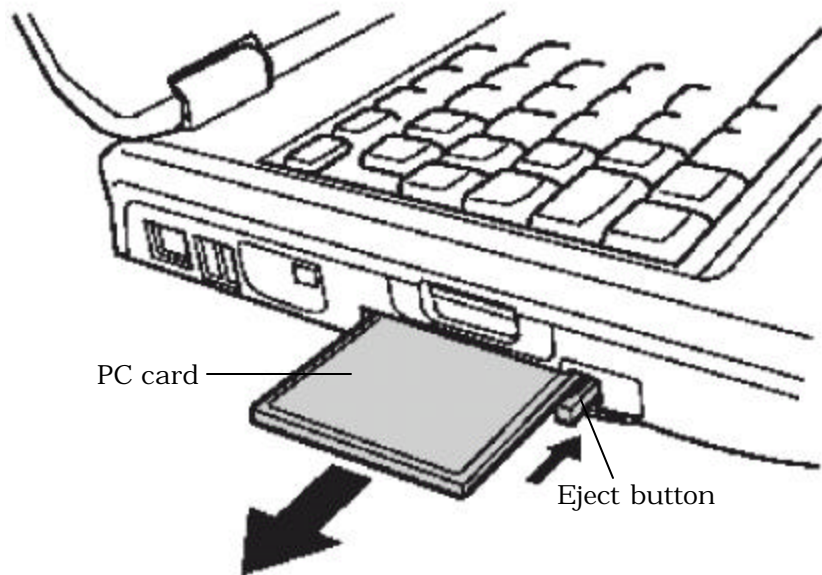
Figure 4-2   Removing the PC card

Installing the PC card

To install the PC card, follow the steps below and refer to figure 4-2.

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 card

Removing the SD card

To remove the SD card, follow the steps below and refer to figure 4-3.

CAUTION: *Before you remove the SD card, refer to the card's documentation and to*
your operating system documentation for proper procedures and
precautions.

---

1. Push the **SD card**. It will pop out partly.

2. Pull out the SD card.
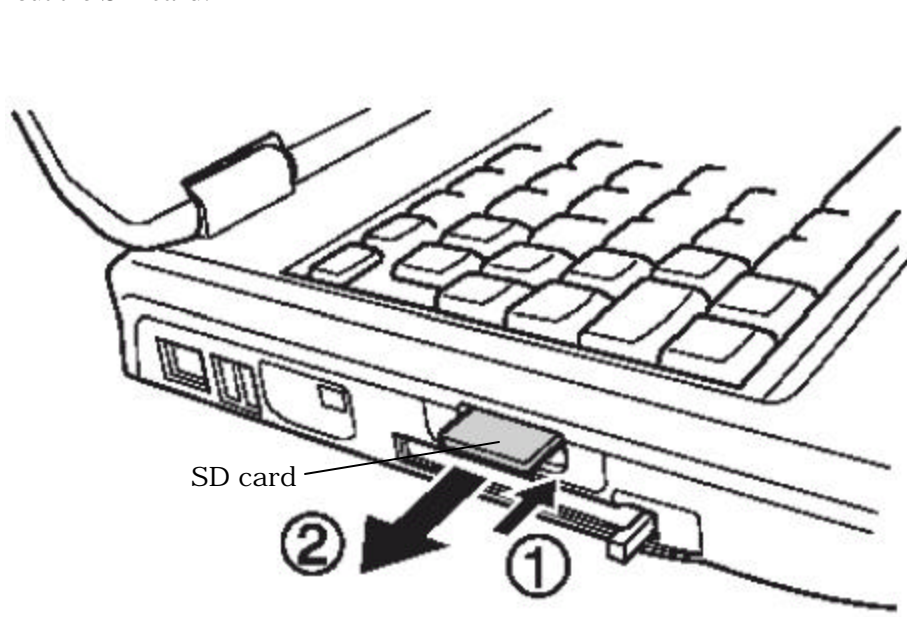
Figure 4-3 Removing the SD card

Installing the SD card

To install the SD card, follow the steps below and refer to figure 4-3.

1. Insert the **SD card** and press it until it is securely connected.

4.5 HDD

CAUTION: When handling the HDD, do not press the top surface as shown by the arrow.
          Hold it by the sides.

HDD
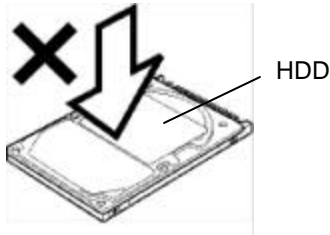
Removing the HDD

To remove the HDD, follow the steps below and refer to figures 4-4 and 4-5.

1. Turn the computer upside down.

2. Remove the following **screw** securing the HDD cover. Remove the **HDD cover** by lifting it up.

    - M2.5×4B   FLAT HEAD screw   ×2

M2.5×4B FLAT HEAD

HDD cover

M2.5×4B FLAT HEAD

HDD pack

Tab
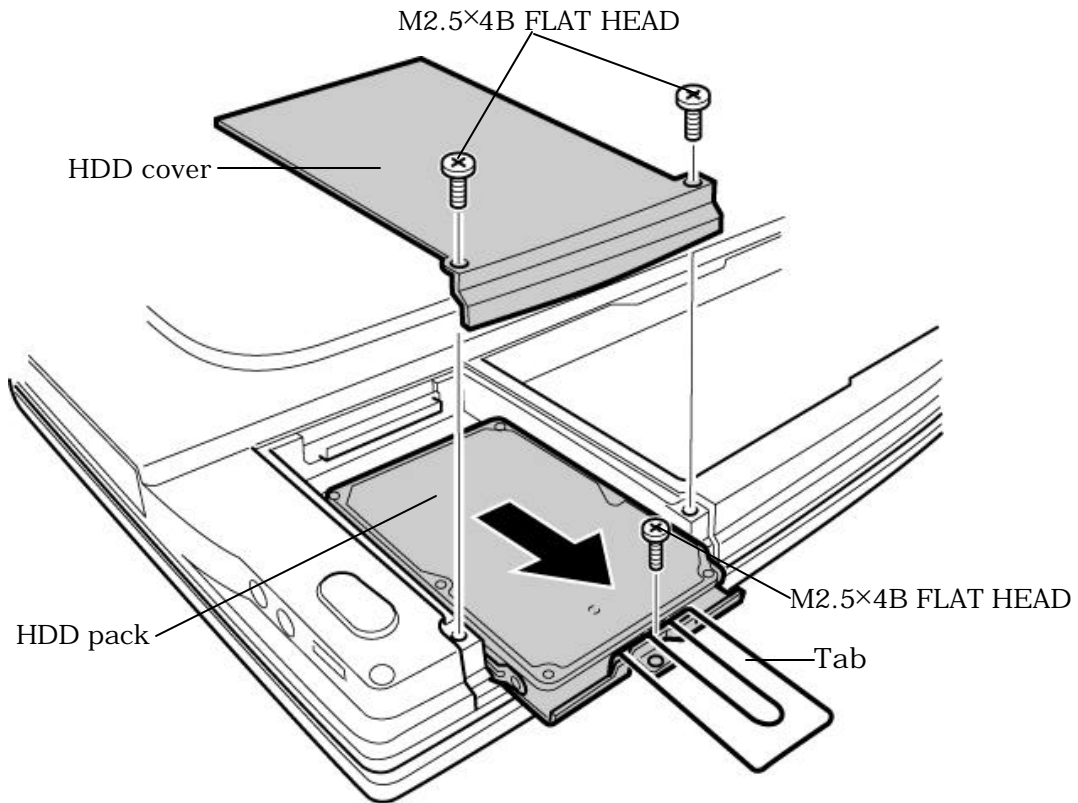
Figure 4-4   Removing the HDD cover

3. Remove the following **screws** and pull the tab of the **HDD pack** to remove it. Be careful not to damage the connector.

   - M2.5×4B   FLAT HEAD screw   ×1

NOTE: The following steps describe how to disassemble the HDD pack; however, do not disassemble if the HDD is working properly.

4. Remove the following **screws**.

   - M3×4S   FLAT HEAD screw   ×4

5. Detach the **HDD** from the **HDD bracket**.

CAUTION: Do not apply pressure to the top and bottom of the HDD.
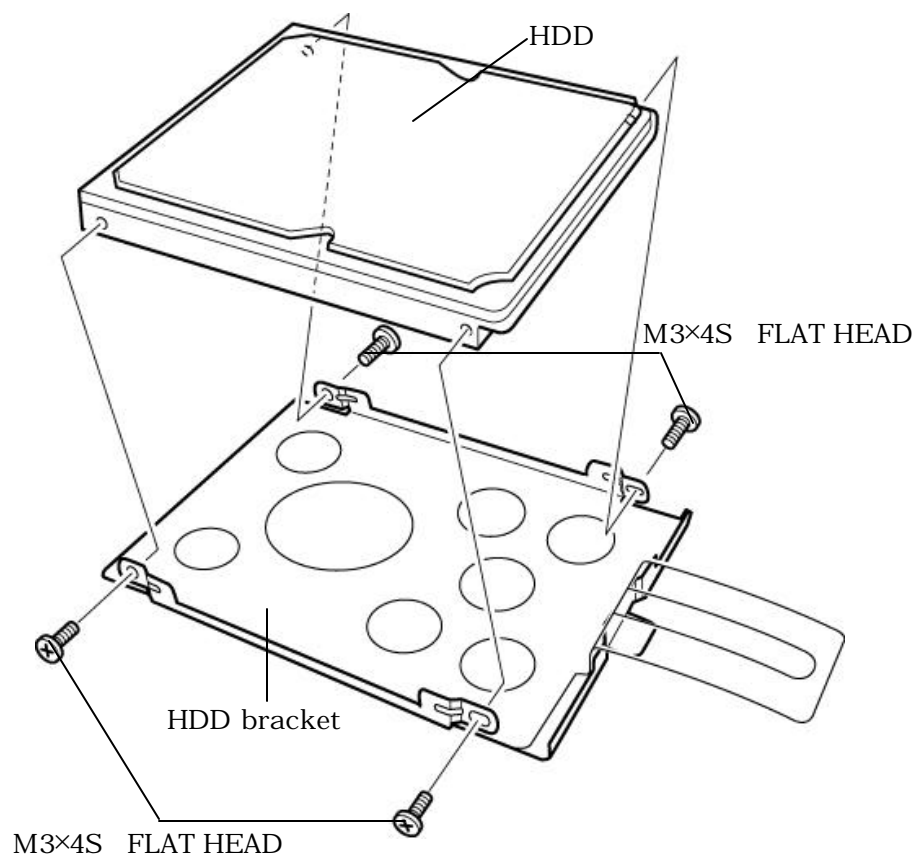
Figure 4-5 Detaching the HDD bracket and HDD

Installing the HDD

To install the HDD, follow the steps below and refer to figures 4-4 and 4-5.

CAUTION: Do not hold the HDD by its top and bottom. It may damage the HDD.

1. Secure the **HDD** to the **HDD bracket** with the following **screws**.

   - M3×4S   FLAT HEAD screw   ×4

CAUTION: Hold the HDD pack by the sides.

2. Insert the **HDD pack** into the slot and secure it with the following **screws**.

   - M2.5×4B   FLAT HEAD screw   ×1

3. Seat the **HDD cover** and secure it with the following **screws**.

   - M2.5×4B   FLAT HEAD screw   ×2

4.6   Heat sink/CPU

Removing the Heat sink/CPU

To remove the heat sink/CPU, follow the steps below and refer to figures 4-6 to 4-9.

> *CAUTION:* *The CPU can become very hot during operation. Be sure to let it cool before starting repair work.*

1. Remove the following **screws** securing the CPU slot cover. Remove the **CPU slot cover** by lifting it up.

   - M2.5×4B   FLAT HEAD screw   ×2

2. Remove the following **screws** securing the heat sink slot cover. Remove the **heat sink slot cover** by lifting it up.

   - M2.5×4B   FLAT HEAD screw   ×2
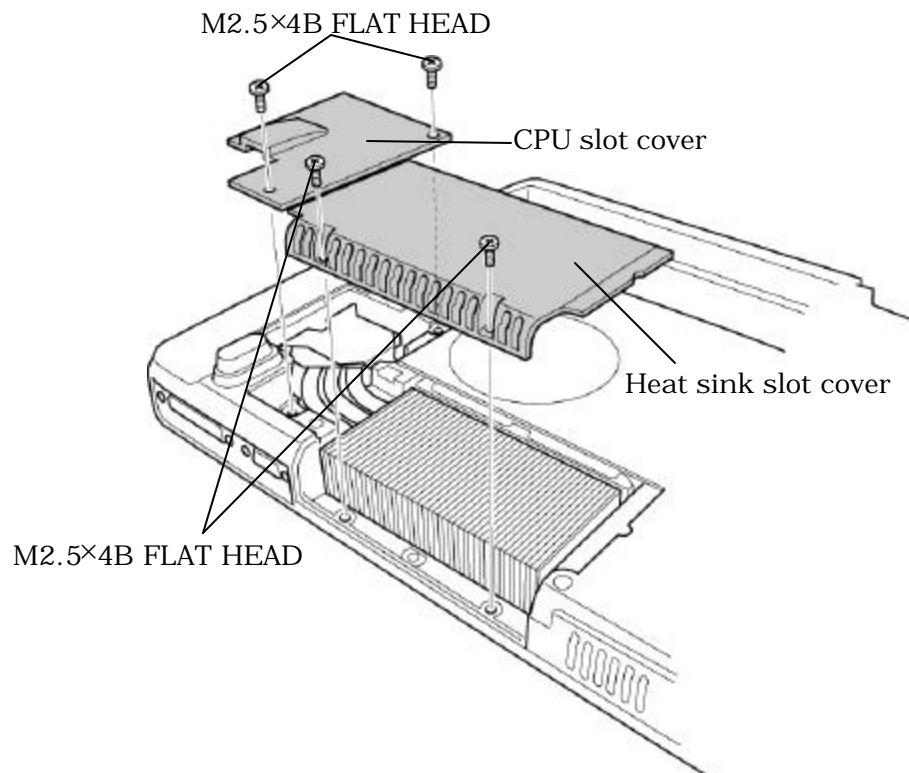
Figure4-6   Removing the CPU slot cover and heat sink slot cover

3. Remove the following **screws** securing the **CPU holder**, in the reverse order of the number marked on the holder.

   - M2.5×6B   FLAT HEAD screw   ×3

4. Remove the **CPU holder**.

5. Release the **lock lever** (lift the lock lever vertically) and lift up the **heat sink.**
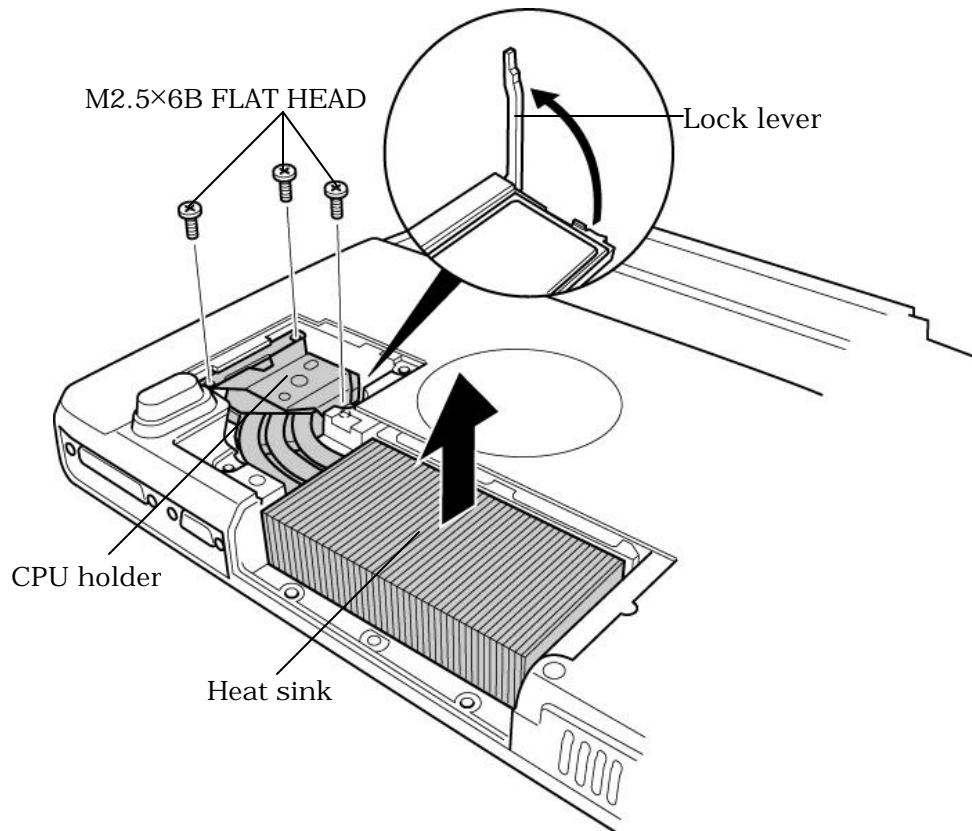
Figure4-7   Removing the CPU holder and heat sink

6. Remove the **CPU** from the heat sink

CAUTION: As silicon grease is applied between the heat sink and CPU, the CPU is removed with the heat sink.
If the CPU has been left on the CPU socket, remove the CPU.

Installing the Heat sink/CPU

To install the heat sink/CPU, follow the steps below and refer to figures 4-6 to 4-9.

---

*CAUTION: Place the CPU in such direction as shown below. (Pay attention to the
              position of the triangle mark on the CPU.)*

Make sure the lock lever is lifted up, before installing the CPU.

---

1. Seat the **CPU** in the **CPU socket** and lock the **lock lever** by pressing it down. Make sure
    the position is exact to avoid damaging pins of the CPU.
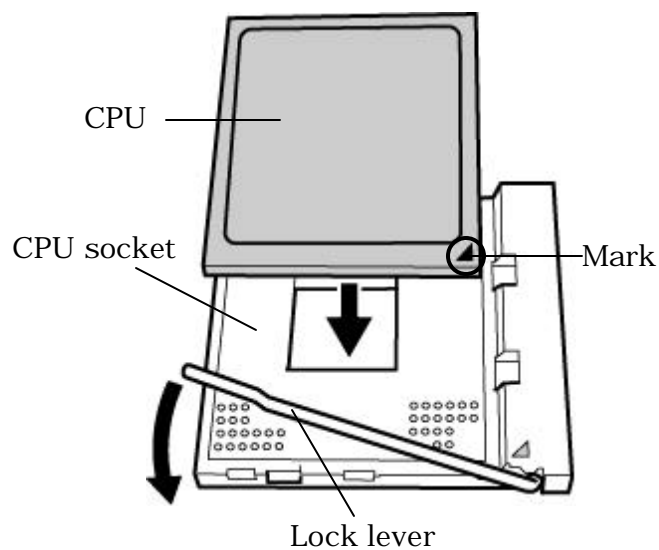
Figure 4-8   Installing the CPU

2. Apply new **grease** on the CPU using a brush as shown in the following figure. Apply
    appropriate quantity (about 0.5 gram minimum) of grease evenly all over the top face of the
    CPU chip. When silicon grease is left on to the CPU chip, wipe it off with a cloth in
    advance.
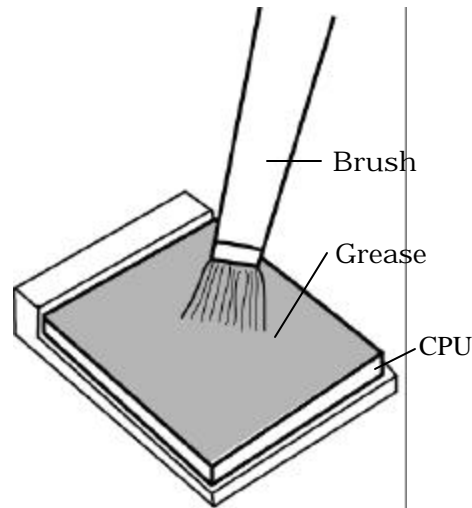
Figure 4-9   Applying new grease

3. Install the **heat sink**.

*CAUTION: When installing the heat sink, make sure the bottom of the heat sink covers
           the top of the CPU.*

4. Place the **CPU holder** and secure it with the following **screws** in the order of the number
    marked on the holder.

    *   M2.5×6B   FLAT HEAD screw   ×3

5. Place **the heat sink slot cover** and secure it with following **screws**.

    *   M2.5×4B   FLAT HEAD screw   ×2

6. Place the **CPU slot cover** and secure it with following **screws**.

    *   M2.5×4B   FLAT HEAD screw   ×2

4.7 Optical drive

Removing the Optical drive

To remove the optical drive, follow the steps below and refer to figures 4-10 and 4-11.

CAUTION: Do not apply excessive force to the top of an optical drive.

---

1. Turn the computer upside down.

2. Remove the following screws securing the **optical drive**.

   - M2.5×4B FLAT HEAD screw   ×2

3. Pull the **optical drive** outward to disconnect it.
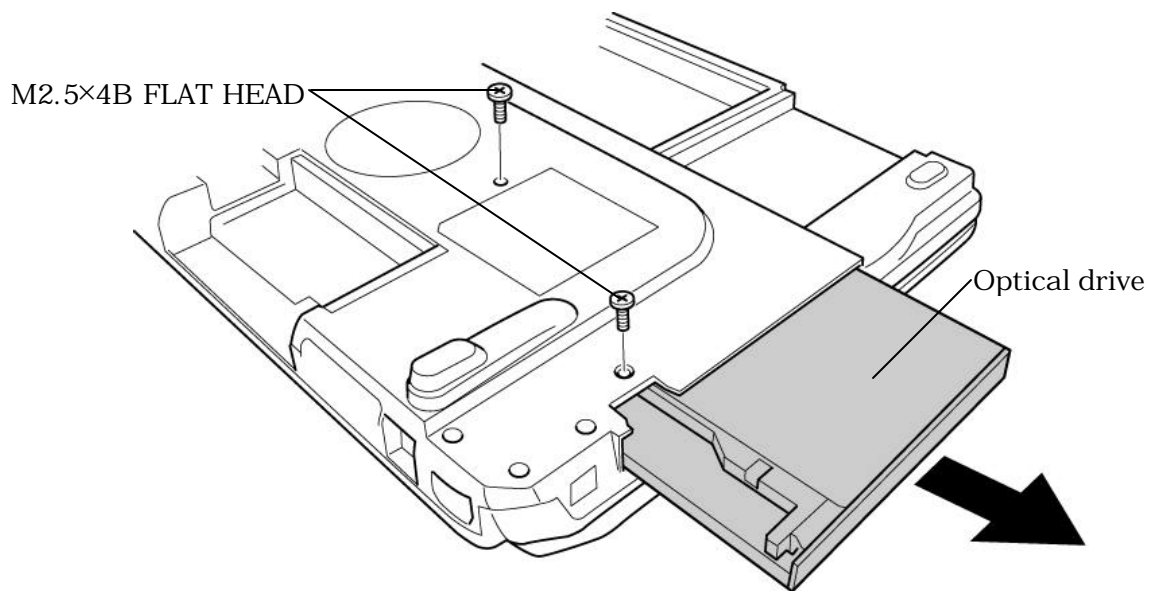
Figure 4-10   Removing the optical drive

4. Remove the following **screws** and detach the **optical drive** from the **plastic frame**.

   - M2×3C   S-FLAT HEAD screw   ×2
   - Stepping screw   ×1
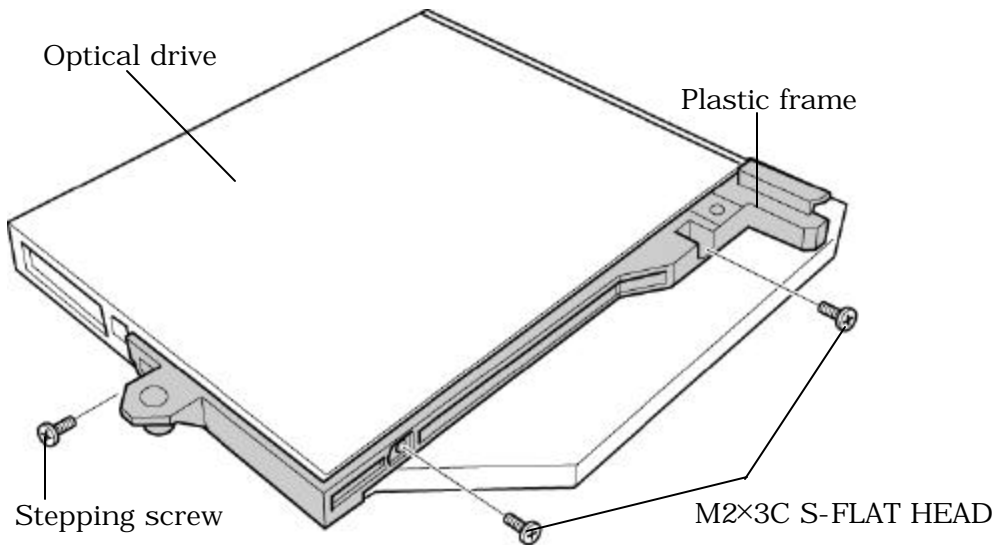
Figure 4-11   Disassembling the optical drivel

Installing the Optical drive

To install the optical drive, follow the steps below and refer to figures 4-10 and 4-11.

1. Seat the **optical drive** on the **plastic frame**, and secure them with the following s**crews**.

    - M2×3C   S-FLAT HEAD screw   ×2
    - Stepping screw   ×1

2. Insert the **optical drive** into the slot to connect it.

3. Secure the optical drive with the following **screws**.

    - M2.5×4B   FLAT HEAD screw   ×2

4.8   Keyboard

CAUTION: When removing/installing the keyboard, do not touch the memory module, boards and speakers under the keyboard. It may cause the damages to them.

Removing the Keyboard

To remove the keyboard, follow the steps below and refer to figures 4-12 and 4-13.

1. Turn the computer face up and open the display.

2. Hold the both ends of the **keyboard holder** and lift it up to remove.

3. Remove the following **screws** securing the keyboard and keyboard hold plate. Then remove the **keyboard hold plate**.

    - M2.5×4B   FLAT HEAD screw   ×3
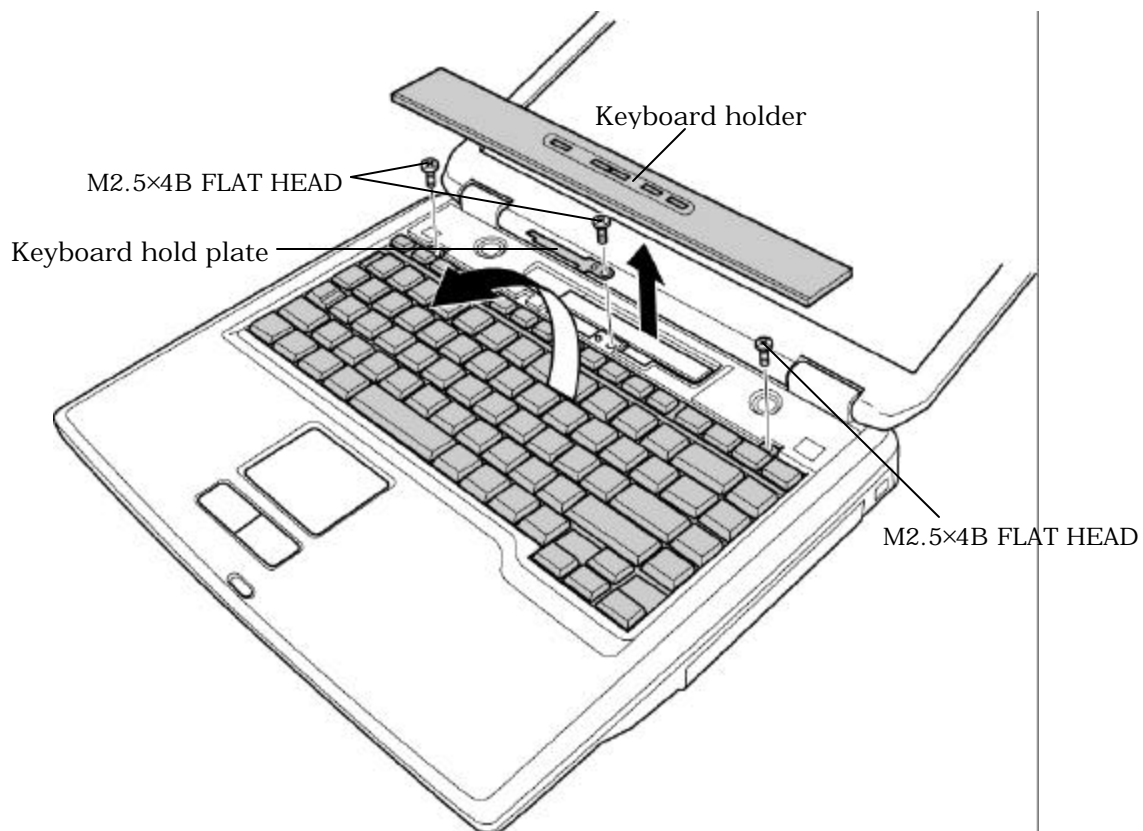
Figure 4-12   Removing the keyboard holder and keyboard hold plate

---

4. Lift the upper side of the **keyboard** up and turn it's face down on the palm rest.

5. Remove the following **screw** and **keyboard support plate.**

    - M2.5×6B   FLAT HEAD screw   ×1

6. Disconnect the **keyboard cable** from the connector **PJ3200** on the system board, and remove the keyboard.
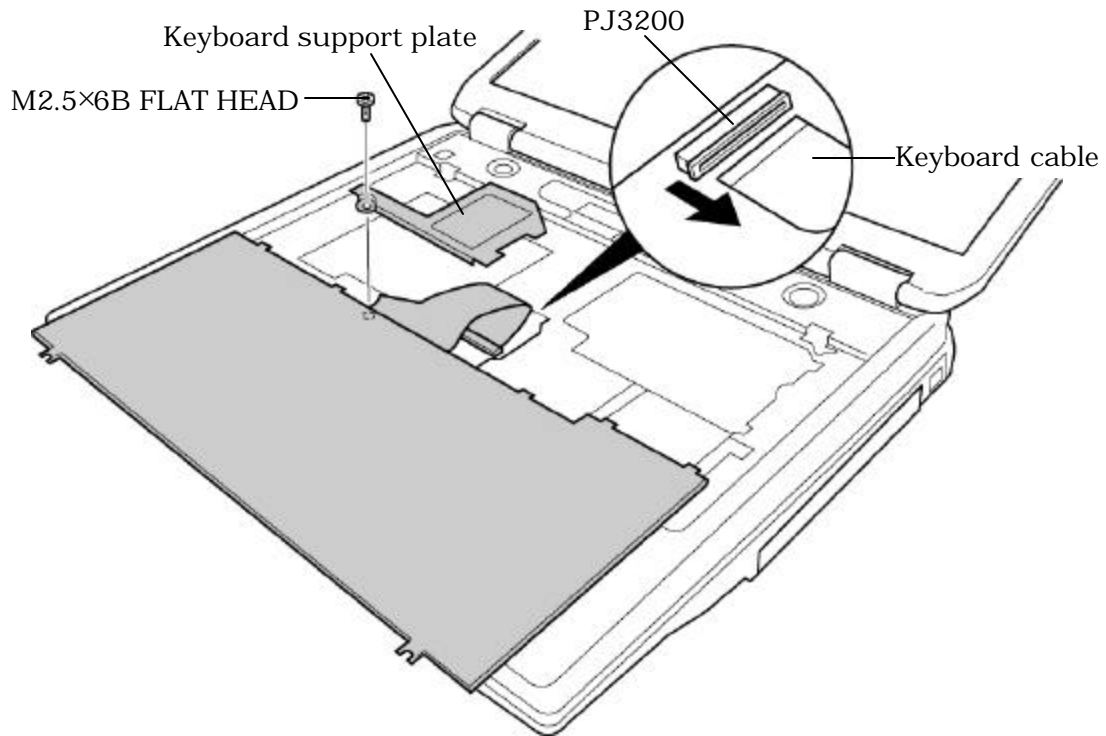
Figure 4-13   Removing the keyboard support plate

Installing the Keyboard

To install the keyboard, follow the steps below and refer to figures 4-12 and 4-13.

1. Place the keyboard face down on the palm rest.

2. Connect the **keyboard cable** to the connector **PJ3200** on the system board.

3. Place the **keyboard support plate** and secure it with the following **screw**.

    *   M2.5×6B   FLAT HEAD screw   ×1

4. Turn the **keyboard** face up and set it. Make sure that there is no gap between the keyboard and the edge of palm rest.

5. Place the **keyboard hold plate**. Then secure the **keyboard hold plates** and the **keyboard** with the following **screws**.

    *   M2.5×4B   FLAT HEAD screw   ×3

6. Install the **keyboard holder** by pressing it from the topside.

4.9   Memory module

> *CAUTION:* *The power of the computer 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, confirm that the computer is in boot mode. Then perform the following procedures (See Figure 4-14).

1. Peel the **insulator**.

2. Open the left and right **latches** and remove the **memory module** from slot A or slot B on the system board.
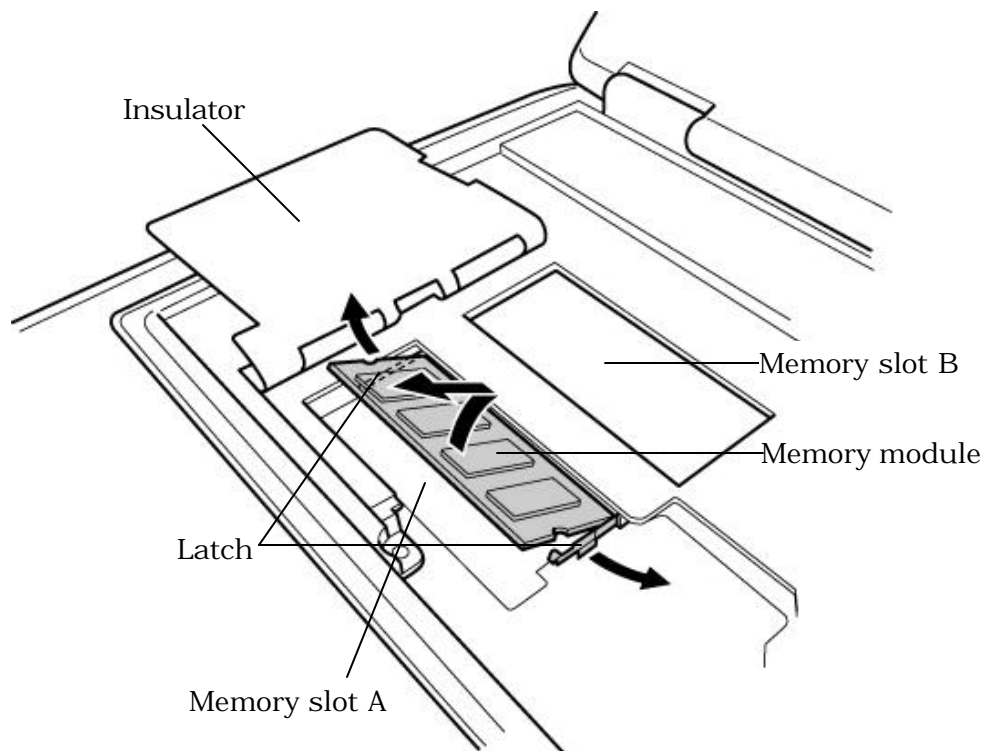
Figure 4-14 Removing the memory module

Installing the memory module

To install the memory module, confirm that the computer is in boot mode. Then follow the steps below and refer to figures 4-14.

1. Insert the **memory module** into the connector of the computer slantwise (terminal side first) and press it to connect firmly.

CAUTION: *The power must be turned off when you insert the memory module. Inserting a memory module with the power on might damage the module or the computer itself.*

      Do not install a memory module in slot B only. Use slot A prior to slot B. Otherwise, the computer or the memory may be damaged.

  Never press hard or bend the memory module.

---

2. When the power of the computer is turned on, the computer checks automatically the memory size. Confirm that the new memory is detected correctly.

3. If the memory is not detected, check that it is connected correctly.

4.10 Wireless LAN board/Modem Daughter Card

4.10.1 Wireless LAN board

CAUTION: *The power must be turned off when you remove the wireless LAN board.*
Removing the wireless LAN board with the power on risks damaging the
board or the computer itself.

Never press hard or bend the wireless LAN board.

Removing the wireless LAN board

To remove the wireless LAN board, follow the steps below and refer to figure 4-15 and 4-16.

1. Remove the **screw** fixing the **wireless LAN board cover**.

   - M2×4Z   BIND screw   ×1
                  or
   - M2×4   LH STICK screw   ×1 (Athelos a/b/g)

2. Slide the **wireless LAN board cover** to the left and lift it up to remove.
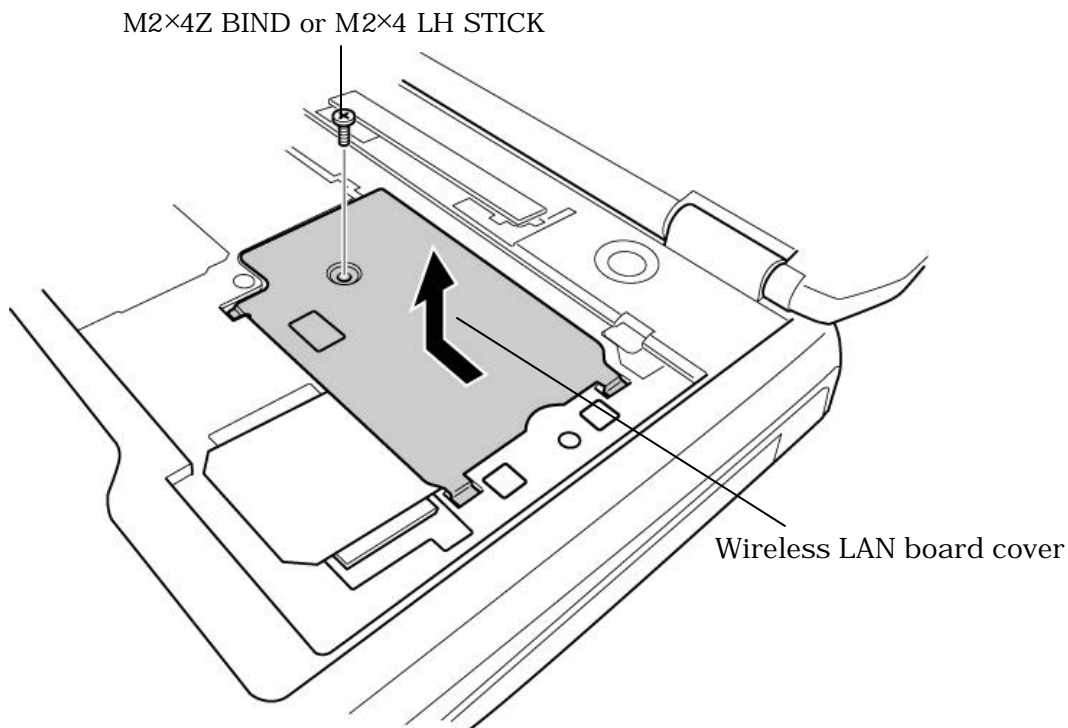
Figure 4-15   Removing the wireless LAN board cover

3. Peel off the **glass tape** and disconnect the two **wireless LAN antenna cables** (black and white) from the wireless LAN board.

4. Open the left and right latches and remove the **wireless LAN board**.
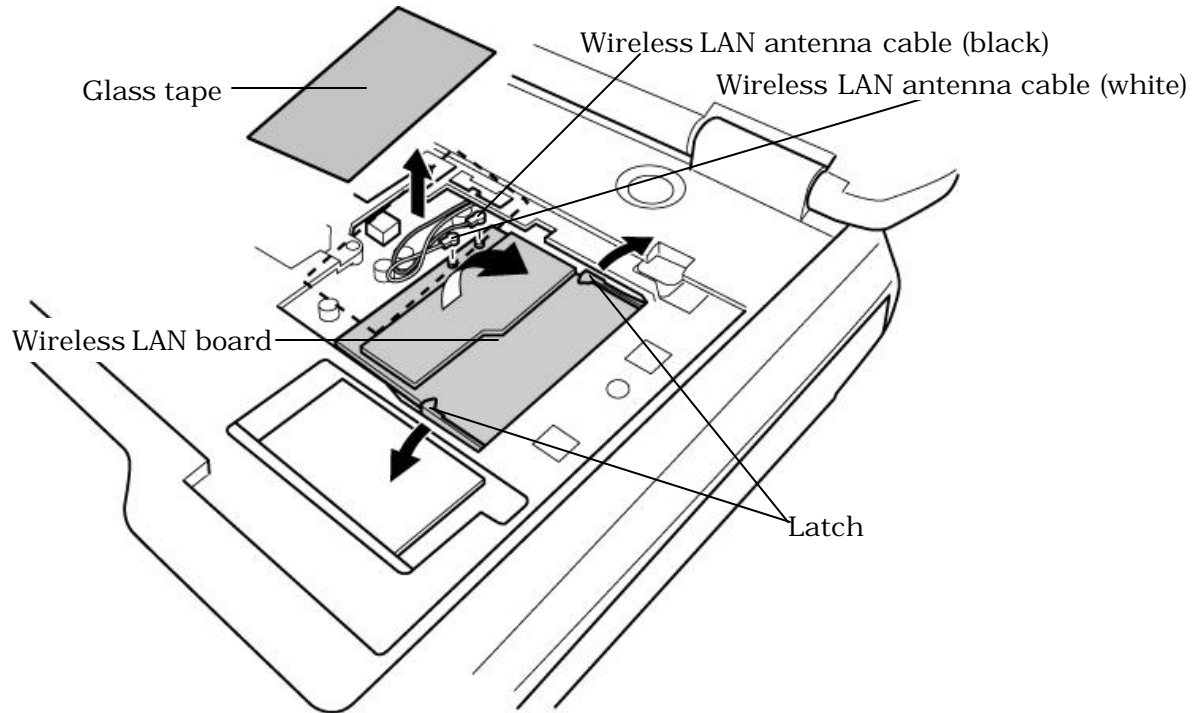
Figure 4-16   Removing the wireless LAN board

Installing the wireless LAN board

To install the wireless LAN board, follow the steps below and refer to figure 4-15 and 4-16.

1. Insert the **wireless LAN board** terminals slantwise into the connector on the computer and press the wireless LAN board until it is securely in place.

2. Connect the **wireless LAN cables** (black and white) to the terminals on the wireless LAN board and fix them with the **glass tape**.

3. Install the **wireless LAN board cover** and secure it with the following **screw**.

   - M2×4Z   BIND screw   ×1

            or

   - M2×4   LH STICK screw   ×1 (Athelos a/b/g)

4.10.2 Modem Daughter Card

CAUTION: *The power must be turned off when you remove the modem daughter card.*
              Removing the modem daughter card with the power on risks damaging the
              card or the computer itself.

Removing the Modem Daughter Card

To remove the modem daughter card, follow the steps below and refer to figure 4-17.

1. Remove the following **screws** securing the modem daughter card.

    - M2×4Z   BIND screw   ×2

2. Lift up gently the **modem daughter card** perpendicularly to disconnect it from the
    connector **PJ3000** on the system board.

CAUTION: *When removing/installing the modem daughter card, be sure to hold the*
              modem daughter card by both the edges right above the connector PJ3000.

---

3. Disconnect the **modem cable** from the connector on the modem daughter card.
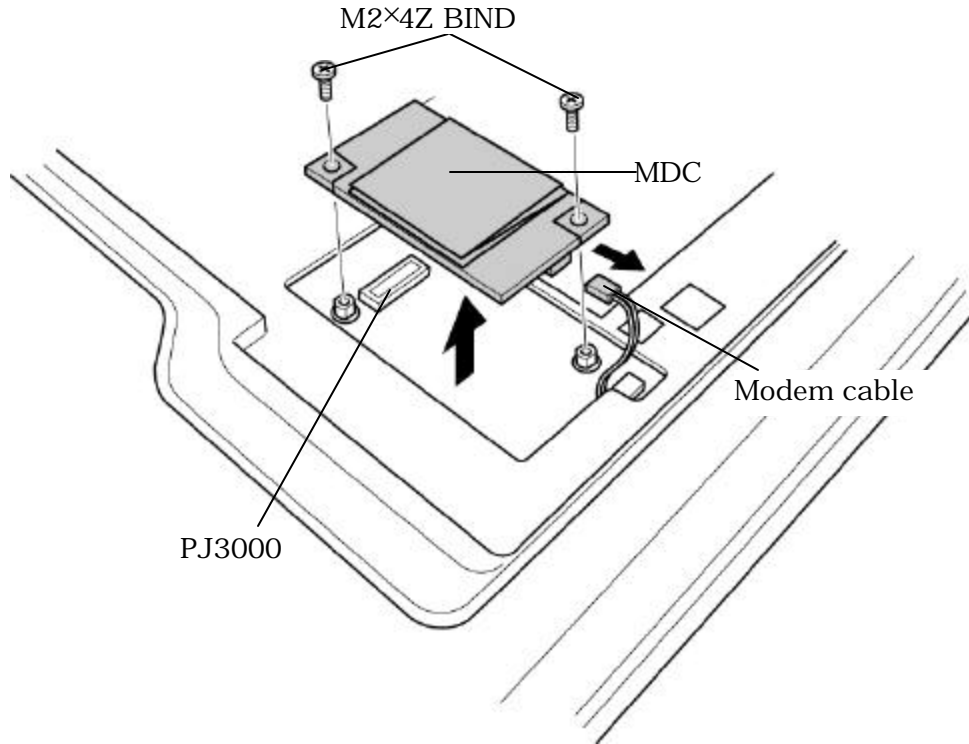
Figure 4-17   Removing the modem daughter card

Installing the Modem Daughter Card

To install the modem daughter card, follow the steps below and refer to figures 4-17.

1. Connect the **modem cable** to the connector on the modem daughter card.

2. Connect the **modem daughter card** to the connector **PJ3000** on the system board.

CAUTION: Be careful not to damage the card and connector.

3. Secure the modem daughter card with the following **screws**.

   - M2×4Z   BIND screw   ×2

4.11 CD/DVD (Audio) play button

CAUTION: *When removing/installing the CD/DVD (audio) play button, do not touch the*
speakers. It may cause any damage.

Removing the CD/DVD (audio) play button

To remove the CD/DVD (audio) play button, follow the steps below and refer to figure 4-18.

  1. Remove the following **screws** fixing the CD/DVD (audio) play button.

    • M2.5×4B FLAT HEAD screw   ×2

  2. Disconnect the **CD/DVD (audio) play button cable** and remove the **CD/DVD (audio)
      play button**.
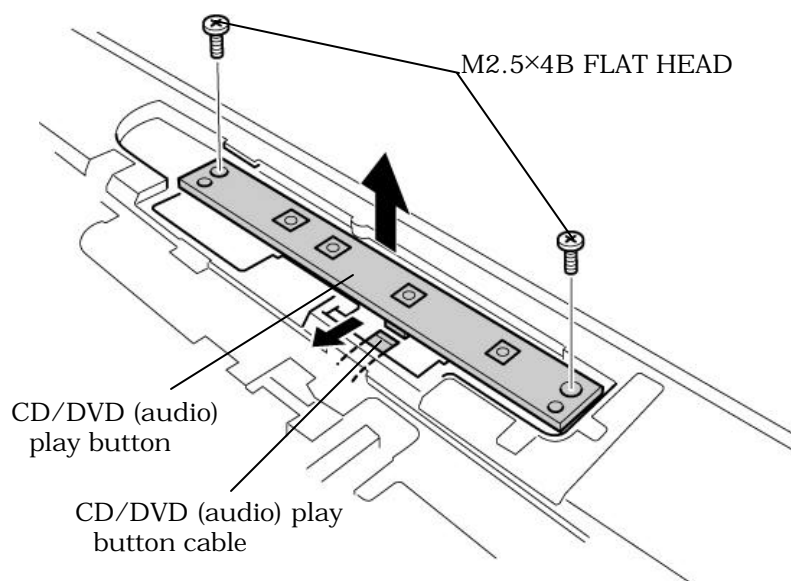
Figure 4-18   Removing the CD/DVD (audio) play button

Installing the CD/DVD (audio) play button

To install the CD/DVD (audio) play button, follow the steps below and refer to figure 4-18.

  1. Connect the **CD/DVD (audio) play button cable** to the **CD/DVD (audio) play button.**

  2. Place the **CD/DVD (audio) play button** into the slot and secure it with the following
      screws.

    • M2.5×4B FLAT HEAD screw   ×2

4.12 Display assembly

Removing the Display assembly

To remove the display assembly, follow the steps below and refer to figures 4-19 to 4-21.

1. Turn the computer upside down.

2. Remove the following **screws**.

    - M2.5×16B   FLAT HEAD screw   ×12 ("16" in the figure below)
    - M2.5×6B   FLAT HEAD screw   ×7 ("6" in the figure below)
    - M2.5×3B   S-FLAT HEAD screw   ×5 ("3" in the figure below)
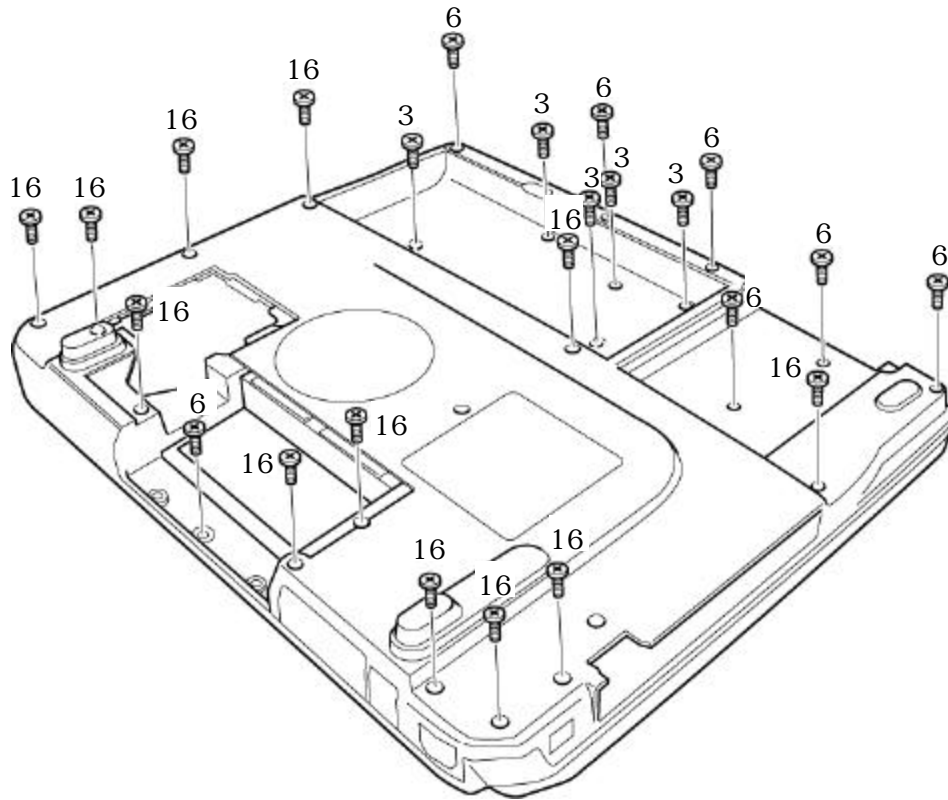
Figure 4-19   Removing the display assembly (1)

3. Turn the computer face up and open the display.

4. Remove the following **screws** securing the display assembly.

    *   M2.5×6B   FLAT HEAD screw   ×2

5. Disconnect the **LCD cable** from the connector **PJ5600** on the system board.

6. Disconnect the **speaker cables** from the connectors **PJ6001** (blue) and **PJ6002** (red) on the system board.

7. Disconnect the **panel sensor cable** from the connector **PJ3302** on the system board.
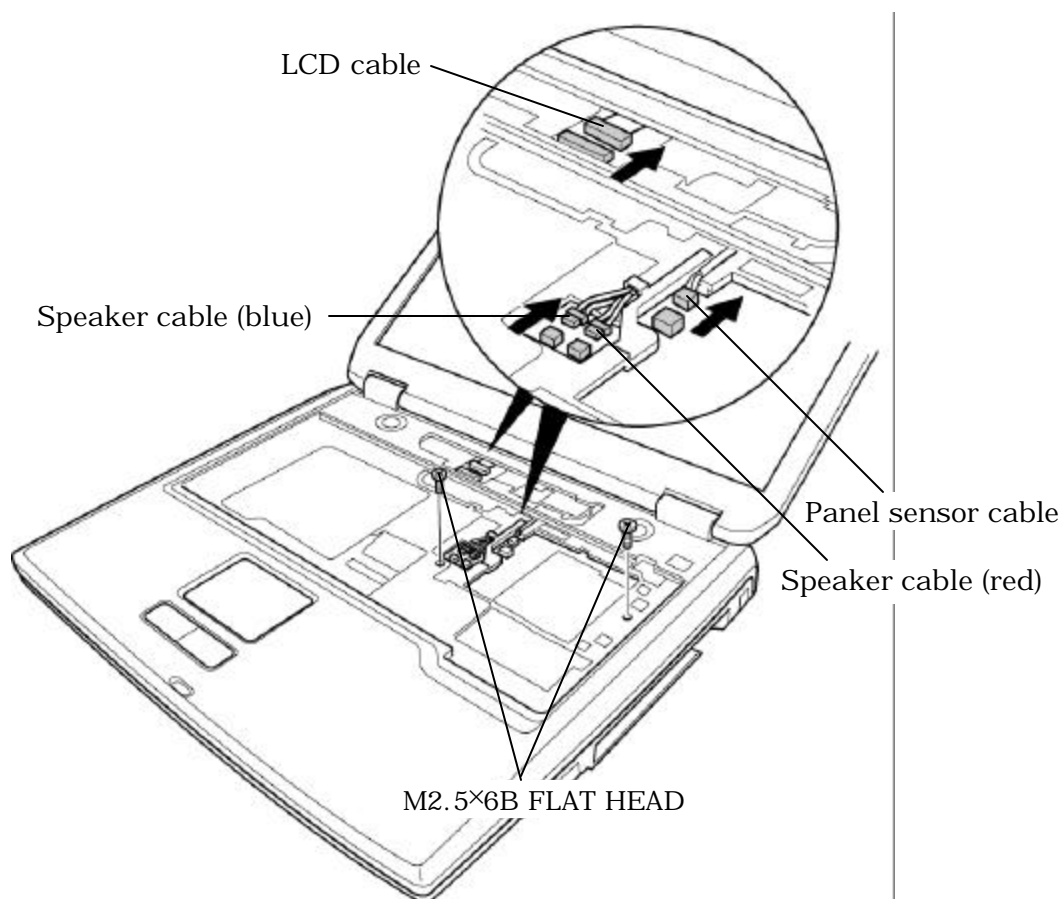
Figure 4-20   Removing the display assembly (2)

8. Remove the **display assembly** from the base assembly while unhooking the latches.
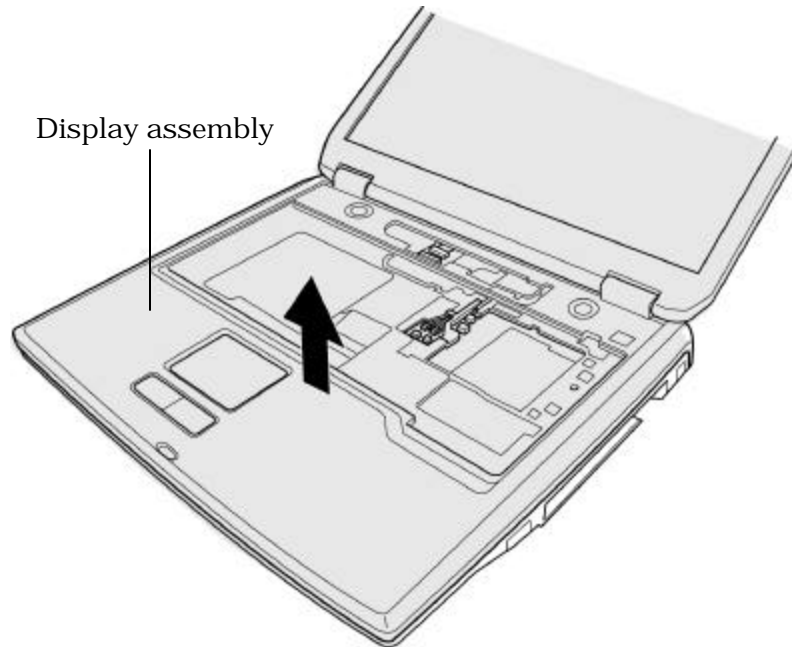
Display assembly

Figure 4-21   Removing the display assembly (3)

NOTE: *When removing the display assembly, be careful not to damage any cables.*

Installing the Display assembly

To install the display assembly, follow the steps below and refer to figures 4-19 to 4-21.

1. Install the **display assembly** on the base assembly.

NOTE: When installing the display assembly, be careful not to pinch or damage any cables.

---

2. Press along the edges of the display assembly to secure the latches.

3. Connect the **panel sensor cable** to the connector **PJ3302** on the system board.

4. Connect the **speaker cables** to the connectors **PJ6001** (blue) and **PJ6002** (red) on the system board.

5. Connect the **LCD cable** to the connector **PJ5600** on the system board.

6. Secure the display assembly with the following **screws**.

    -   M2.5×6B   FLAT HEAD screw   ×2

7. Turn the computer face down and secure the display assembly with the following **screws**.
    -   M2.5×16B   FLAT HEAD screw   ×12 ("16" in the figure below)
    -   M2.5×6B   FLAT HEAD screw   ×7 ("6" in the figure below)
    -   M2.5×3B   S-FLAT HEAD screw   ×5 ("3" in the figure below)

4.13 Touch pad

Removing the Touch pad

To remove the touch pad, follow the steps below and refer to figures 4-22.

1. Disconnect the **touch pad flexible cable** from the connector **PJ3260** on the system board.

2. Remove the following **screws** securing the touch pad.

   - M2.5×3B   S-FLAT HEAD screw   ×2

3. Remove the **touch pad**.
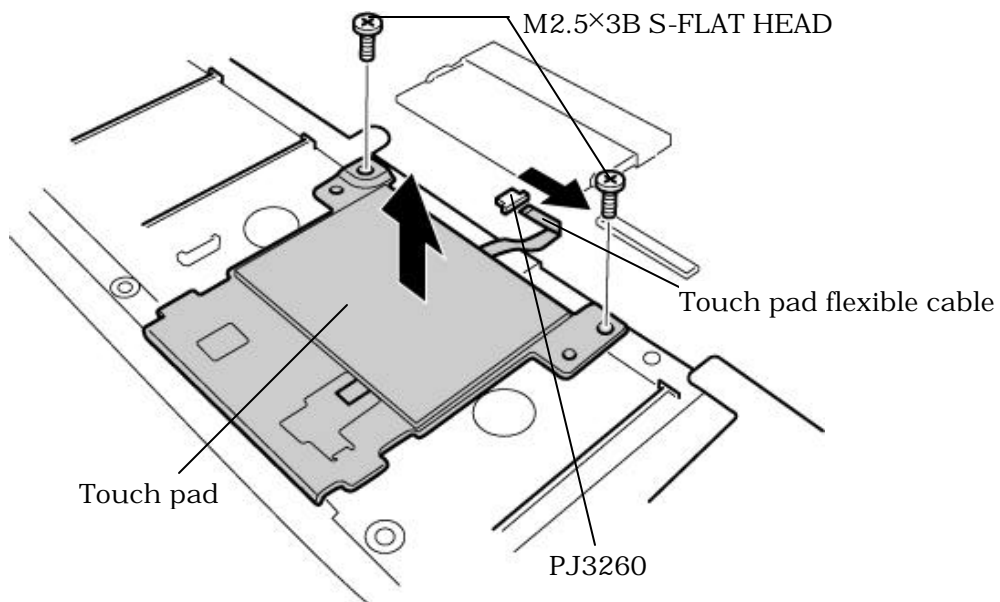
Figure 4-22   Removing the touch pad

4. Disconnect the **touch pad flexible cable** from the connector on the touch pad.

Installing the Touch pad

To install the touch pad, follow the steps below and refer to figures 4-22.

1. Connect the **touch pad flexible cable** to the connector on the touch pad.

2. Install the **touch pad** and secure it with the following **screws**.

    *   M2.5×3B   S-FLAT HEAD screw   ×2

3. Connect the **touch pad flexible cable** to the connector **PJ3260** on the system board.

4.14 LED board

Removing the LED board

The following describes the procedure for removing the LED board (See Figure 4-23).

1. Remove the following **screw** and **LED board** from the system board.

   - M2.5×6B   FLAT HEAD screw   ×1

2. Disconnect the **LED cable** from the connector **PJ9500** on the system board.

3. Disconnect the **LED cable** from the LED board.
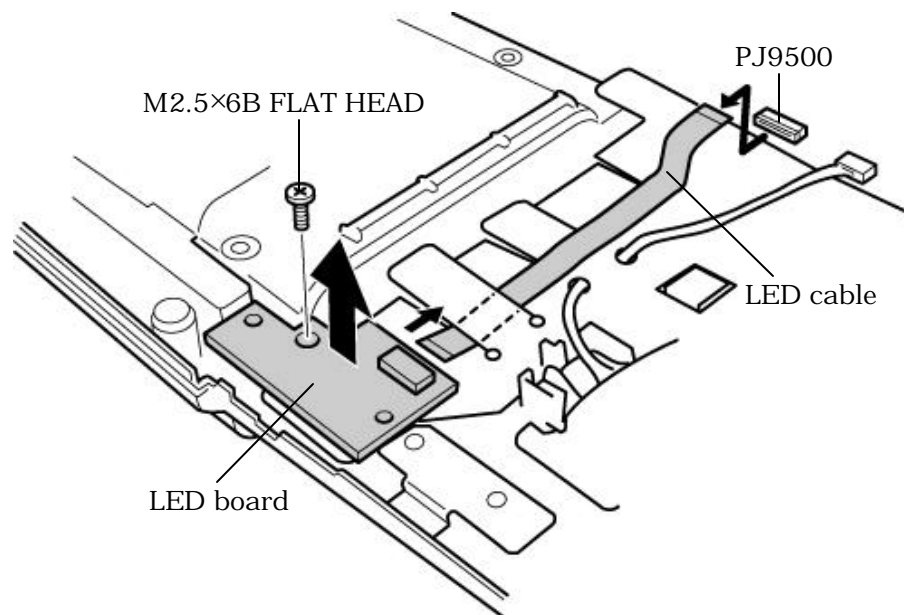
Figure 4-23   Removing the LED board

Installing the LED board

The following describes the procedure for installing the LED board (See Figure 4-23).

1. Connect the **LED cable** to the LED board and to the connector **PJ9500** on the system board.

NOTE : *When connecting the LED cable, the bent portion of the cable must be connected to the connector on the LED board.*

---

2. Fix the **LED board** to the system board with the following **screw**.

   - M2.5×6B   FLAT HEAD screw   ×1

4.15 RTC battery

WARNING: *When replacing the RTC battery, be sure to use genuine batteries or replacement batteries authorized by Toshiba. Installing the wrong battery could cause a battery explosion or other damage.*

If the RTC battery is found abnormal, it must not be installed. Replace it with a new battery, and dispose of the old one according to the local regulations.

Check for any of the following signs of damage:

1) Electrolyte leakage

- *Corrosion (greenish color) on the battery connector or cable*
- *Corrosion on the computer's battery connector*
- *White powder on any part of the battery*
- *White powder in the battery tray*
- *Clear liquid on the battery*
- *Clear liquid in the battery tray*
- *Clear liquid on any board near the battery*

2) Damage to the connection cable

3) Damage to the connector housing

If any powder or liquid is found in or around the battery tray, clean it. Be careful not to let any leaked material contact your eyes or mouth. Do not inhale fumes from leaked material.

If leaked material contacts your skin, eyes or mouth, wash the affected area thoroughly with clean water.

Removing the RTC battery

To remove the RTC battery, follow the steps below and refer to figure 4-24.

1. Disconnect the **RTC battery cable** from the connector **PJ8490** on the system board.

2. Peel the **insulators** and remove the **RTC battery**.
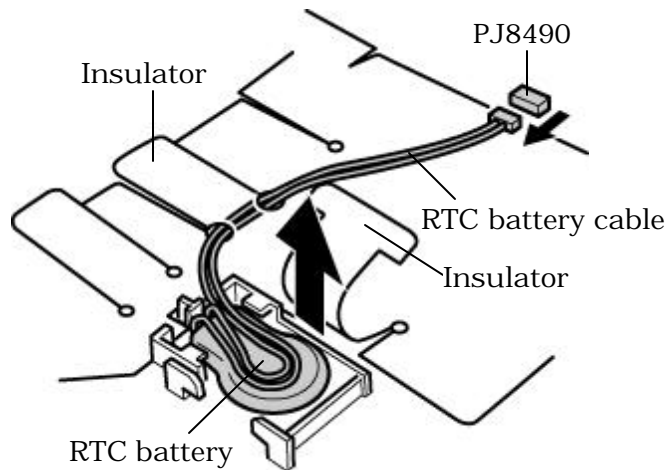
Figure 4-24   Removing the RTC battery

Installing the RTC battery

To install the RTC battery, follow the steps below and refer to figure 4-24.

1. Place the **RTC battery** into the slot.

2. Connect the **RTC battery cable** to the connector **PJ8490** on the system board.

3. Fix the **RTC battery** with the **insulators**.

4.16 Sound board

Removing the Sound board

To remove the sound board, follow the steps below and refer to figure 4-25.

1. Disconnect the **sound board I/F cable** from the connector **PJ9550** on the system board and from the connector on the sound board.

2. Remove the following **screws** securing the sound board.

   - M2.5×6B   FLAT HEAD screw   ×2

3. Remove the **sound board**.
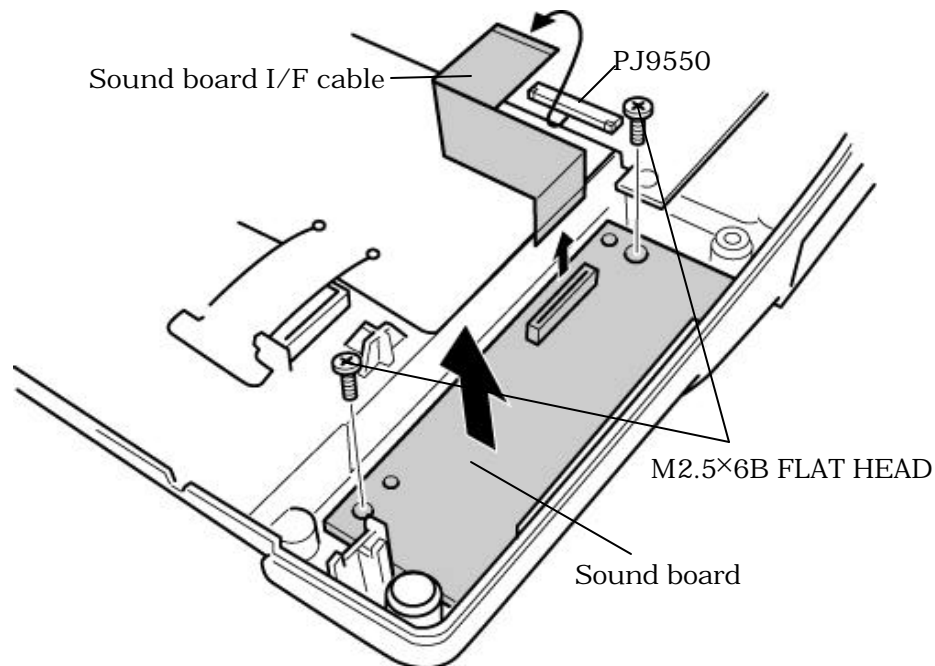
Figure 4-25   Removing the sound board

Installing the Sound board

To install the sound board, follow the steps below and refer to figure 4-25.

1. Connect the **sound board I/F cable** to the connector on the sound board.

2. Install the **sound board** slantwise to fit the guide and secure it with the following **screws**.

   - M2.5×6B   FLAT HEAD screw   ×2

3. Connect the **sound board I/F cable** to the connector **PJ9550** on the system board.

4.17 System board/ Bat con cover

Removing the System board/Bat con cover

To remove the system board/bat con cover, follow the steps below and refer to figures 4-26 and 4-27.

1. Remove the following **screw** and **bat con cover**.

    *   M2.5×6B   FLAT HEAD screw   ×1
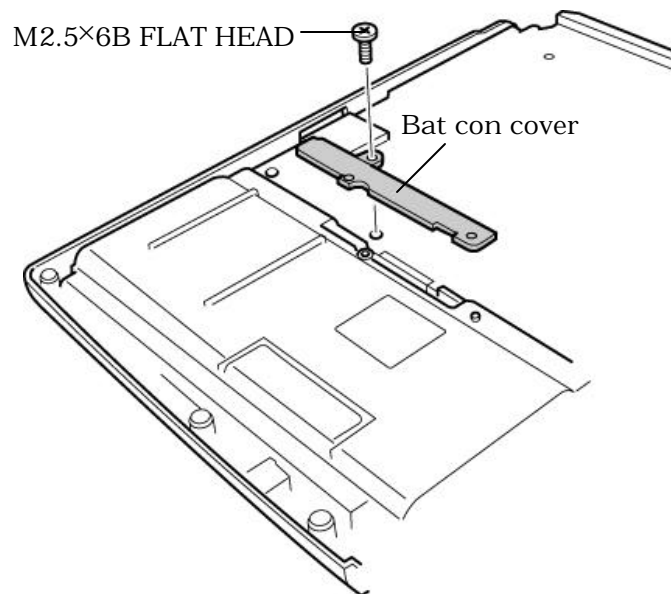
Figure 4-26   Removing the bat con cover

2. Remove the following **screw** securing the system board.

    *   M2.5×6B   FLAT HEAD screw   ×1

3. Peel off the **glass tape** and disconnect the **fan cable 1** from the connector **PJ8450** on the system board.

4. Peel of the **glass tape** and disconnect the **fan cable 2** from the connector **PJ8425** on the system board.

5. Lift up the **system board** to remove.
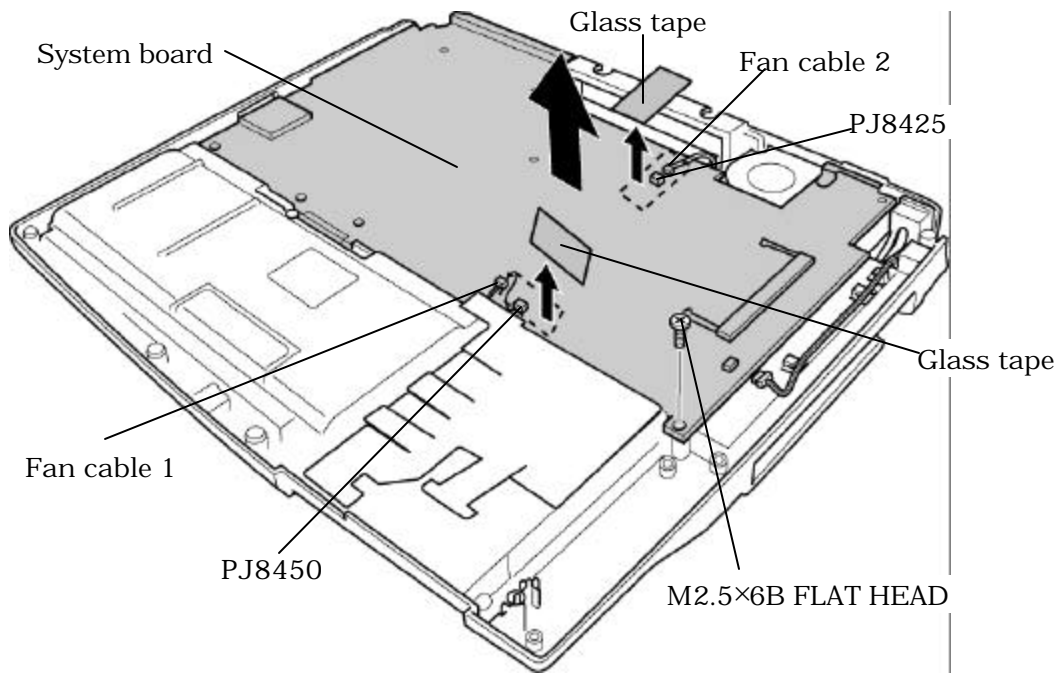
Figure 4-27   Removing the system board

Installing the System board/Bat con cover

To install the system board/bat con cover, follow the steps below and refer to figures 4-26 and 27.

1. Install the **system board**.

NOTE: *When installing the system board, be careful not to pinch or damage the fan cables.*

2. Connect the **fan cable 2** to the connector **PJ8425** on the system board and stick the **glass tape**.

3. Connect the **fan cable 1** to the connector **PJ8450** on the system board and stick the **glass tape**.

4. Secure the **system board** with the following **screw**.

    *   M2.5×6B   FLAT HEAD screw   ×1

5. Install the **bat con cover** and secure it with the following **screw**.

    *   M2.5×6B   FLAT HEAD screw   ×1

4.18 Fan

Removing the Fan

To remove the fan, follow the steps below and refer to figure 4-28.

1. Remove the following **screws** securing the **fan 1**.

   - M2.5×6B   FLAT HEAD screw   ×2

2. Remove the **fan 1**.

3. Remove the following **screws** securing the **fan 2**.

   - M2.5×6B   FLAT HEAD screw   ×2

4. Remove the **fan 2**.
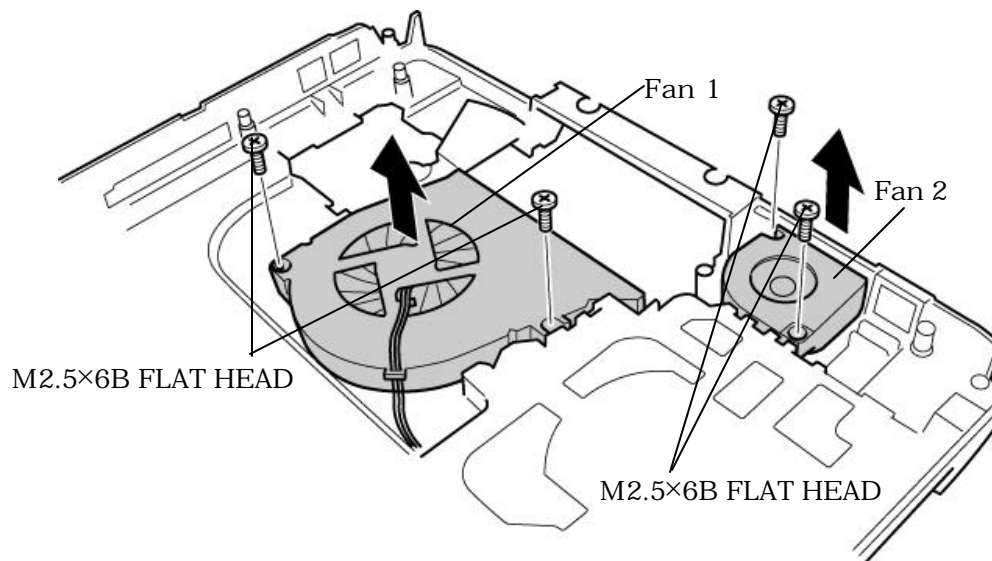
Figure4-28   Removing the fan

Installing the Fan

To install the fan, follow the steps below and refer to figure 4-28.

1. Install the **fan 2** and secure it with the following **screws**.

    -   M2.5×6B   FLAT HEAD screw   ×2

2. Install the **fan 1** and secure it with the following **screws**.

    -   M2.5×6B   FLAT HEAD screw   ×2

4.19 Modem cable

Removing the Modem cable

To remove the modem cable, follow the steps below and refer to figures 4-29.

1. Remove the **RJ11 jack** while unlatching the hooks.

RJ11 jack
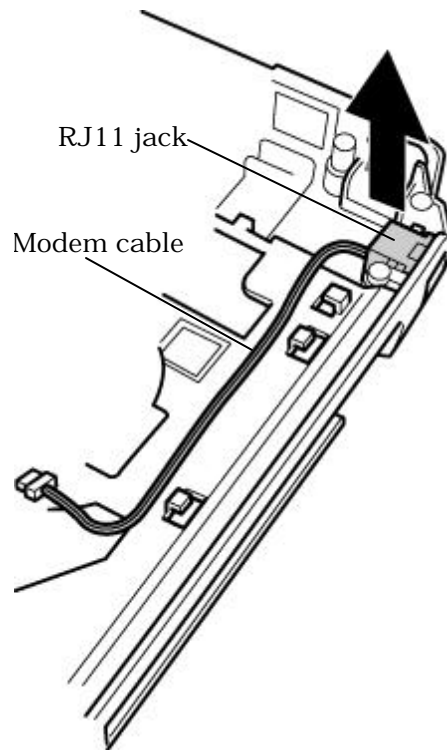
Modem cable

Figure 4-29   Removing the modem cable

Installing the Modem cable

To install the modem cable, follow the steps below and refer to figures 4-29.

1. Install the **RJ11 jack** while latching the hooks.

4.20 Wireless LAN cover

Removing the Wireless LAN cover

To remove the wireless LAN cover, follow the steps below and refer to figure 4-30.

   1.   Remove the **wireless LAN cover** while unlatching.
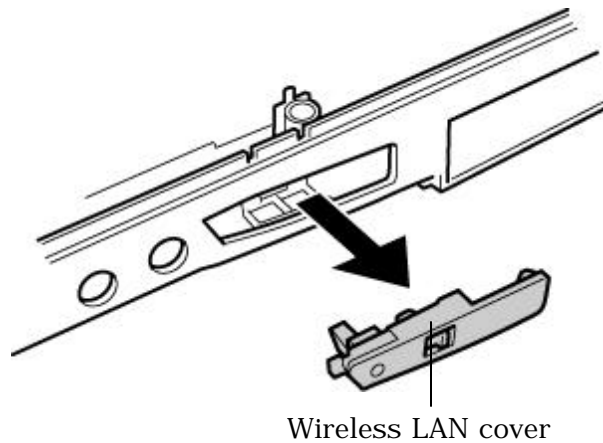
Wireless LAN cover

Figure 4-30   Removing the wireless LAN cover

Installing the Wireless LAN cover

To install the wireless LAN cover, follow the steps below and refer to the figure 4-30.

   1.   Install the **wireless LAN cover** in the slot while latching.

4.21   Battery lock assembly

Removing the Battery lock assembly

To remove the battery lock assembly, follow the steps below and refer to figures 4-31.

1. Remove the following **screws** securing the battery lock assembly.

   - M2.5×6   Tapping screw   ×2
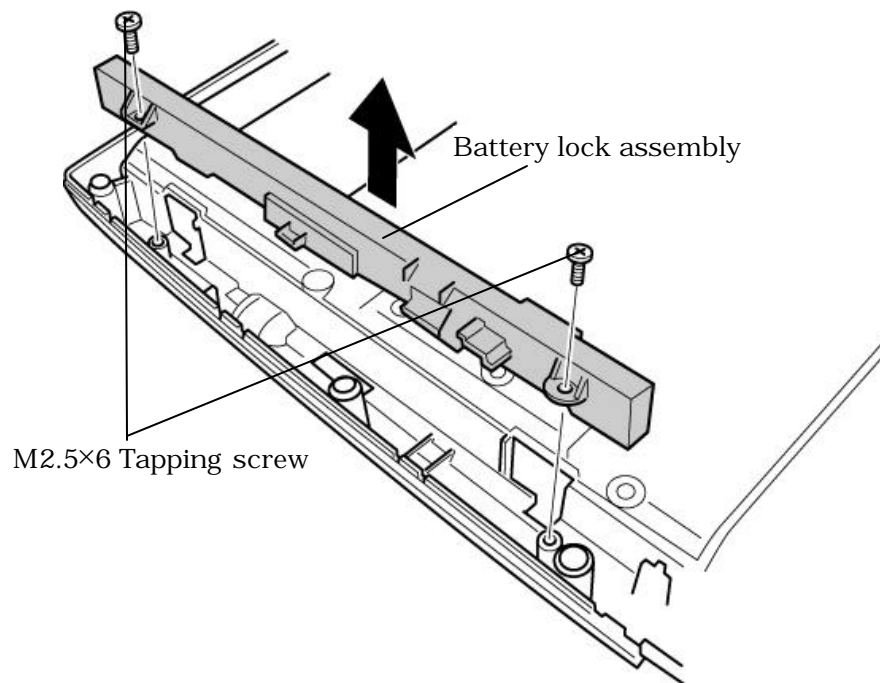
Figure 4-31   Removing the battery lock assembly

2. Remove the **battery lock assembly**.

Installing the Battery lock assembly

To install the Battery lock assembly, follow the steps below and refer to figures 4-31.

1. Install the **battery lock assembly** and secure it with the following **screws**.

   - M2.5×6   Tapping screw   ×2

4.22 Speaker

Removing the Speaker

To remove the speaker, follow the steps below and refer to figures 4-32 and 4-33.

1. Peel off the **insulator.**
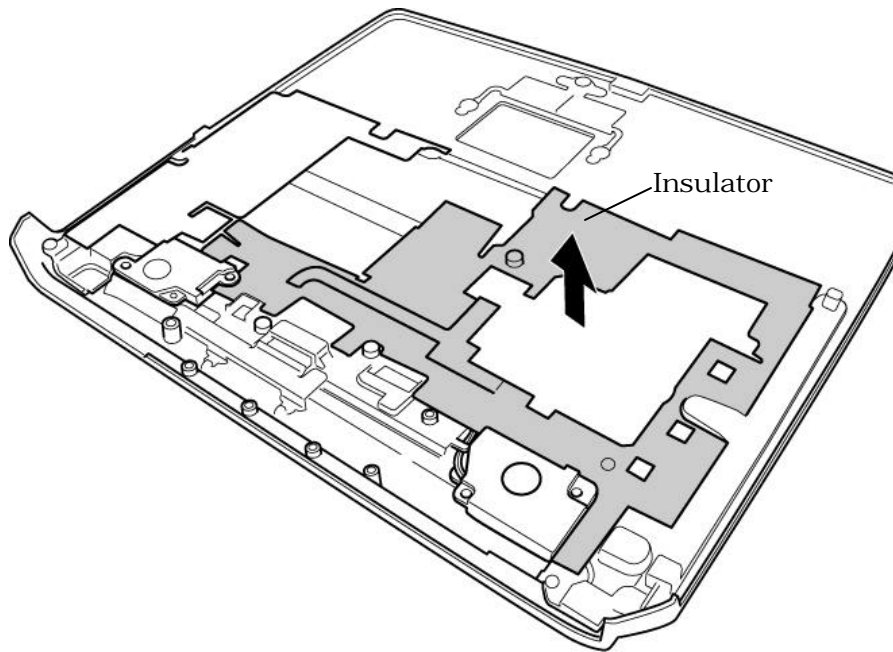
Insulator

Figure 4-32   Removing the insulator

2. Remove the following **screws** fixing the **speakers**.

    •   M2.5×6   Tapping screw   ×4
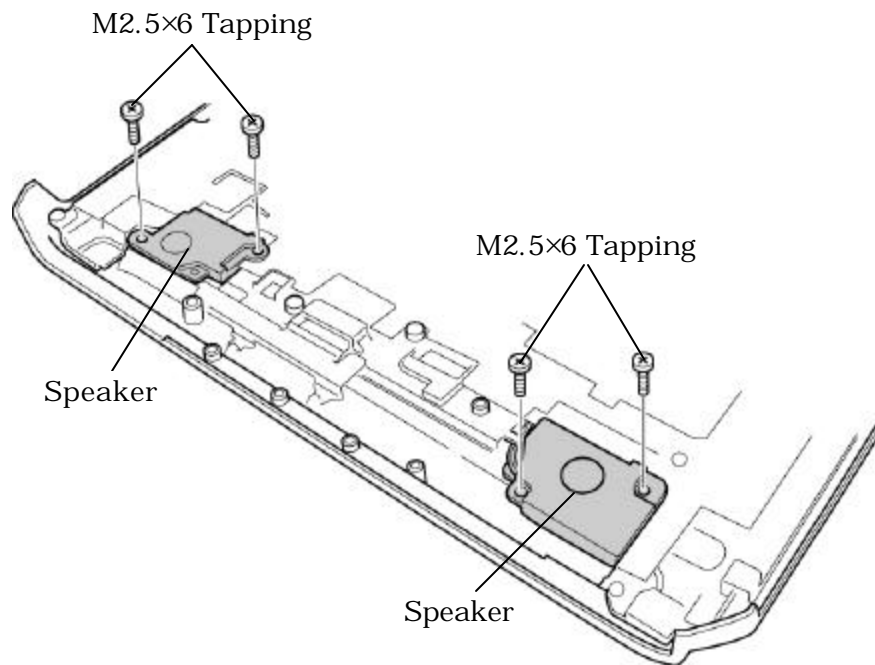
Figure 4-33   Removing the speakers

3. Take out the **speakers** from the slots and the cables from the guides/holes.

Installing the Speaker

To install the speaker, follow the steps below and refer to figures 4-32 to 4-34.

1. Set both the **speakers** in the slot and pass the cables through the hole and guide.
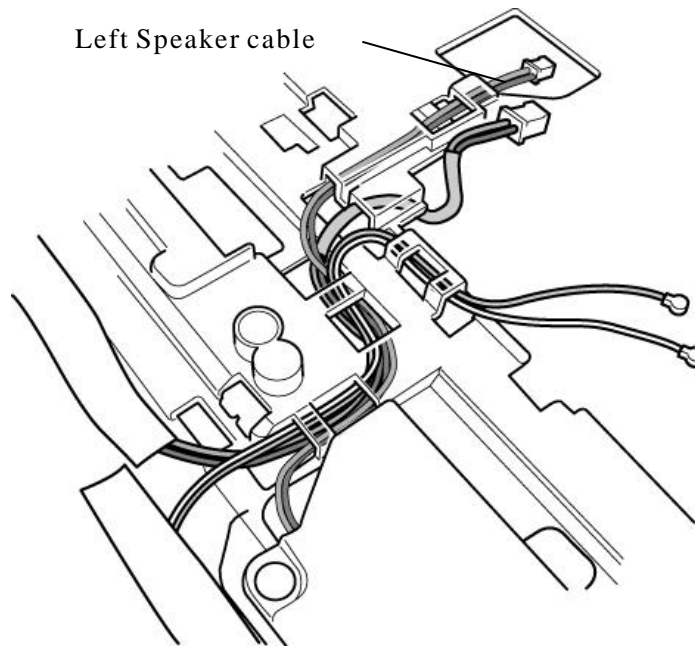
Figure 4-34   Installing the left speaker cable

2. Secure the following **screws** to fix the **speakers**.

    - M2.5×6   Tapping screw   ×4

3. Stick the **insulator** in place**.**

4.23   Display mask/LCD unit/FL inverter

Removing the Display mask/LCD unit/FL inverter

The following describes the procedure for removing the display mask, LCD unit and FL inverter (See Figure 4-35 to 4-37).

1. Peel off two **mask seals** and remove the following **screws**.

    *   M2.5×6B   FLAT HEAD screw   x2

2. Insert your finger between the upper edge of the display mask and the LCD, and remove the **display mask** while unlatching the display mask.
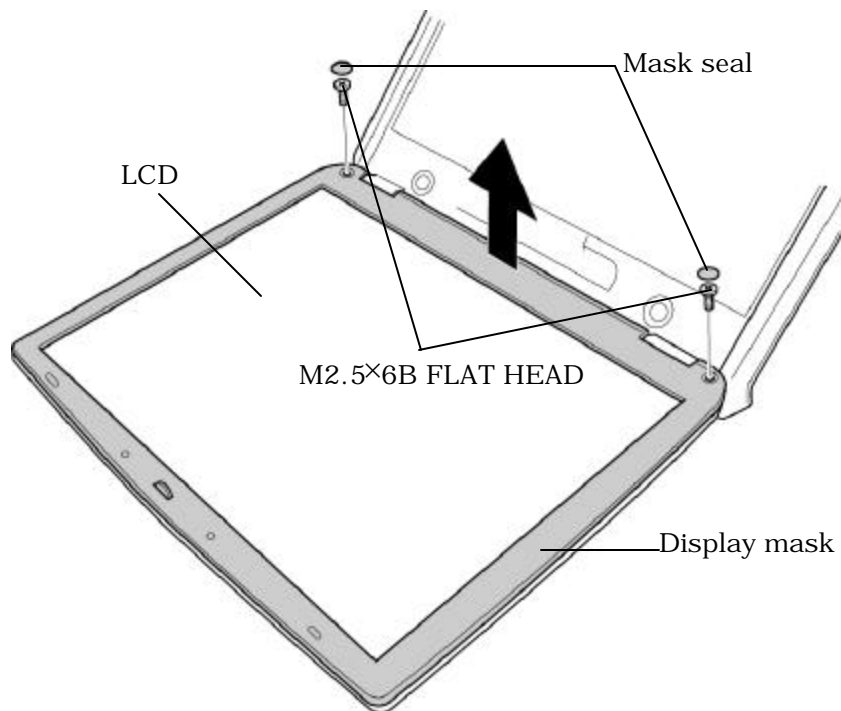
Figure 4-35 Removing the display mask

3. Remove the following **screw** fixing the FL inverter.

    - M2×5C   S-FLAT HEAD screw   x1

4. Peel off the **insulator** adhered to the FL inverter.

5. Disconnect the **FL cable** under the insulator and **HV cable** from the FL inverter.

6. Remove the following **screws** fixing the LCD unit.

    - M2×5C   S-FLAT HEAD screw   x4

7. With the bottom edge of the LCD unit on the display cover, lift the top edge of the LCD unit.

8. After peeling off the **glass tape**, disconnect the **LCD cabl**e from the connector on the back of the LCD. Remove the **LCD unit**.
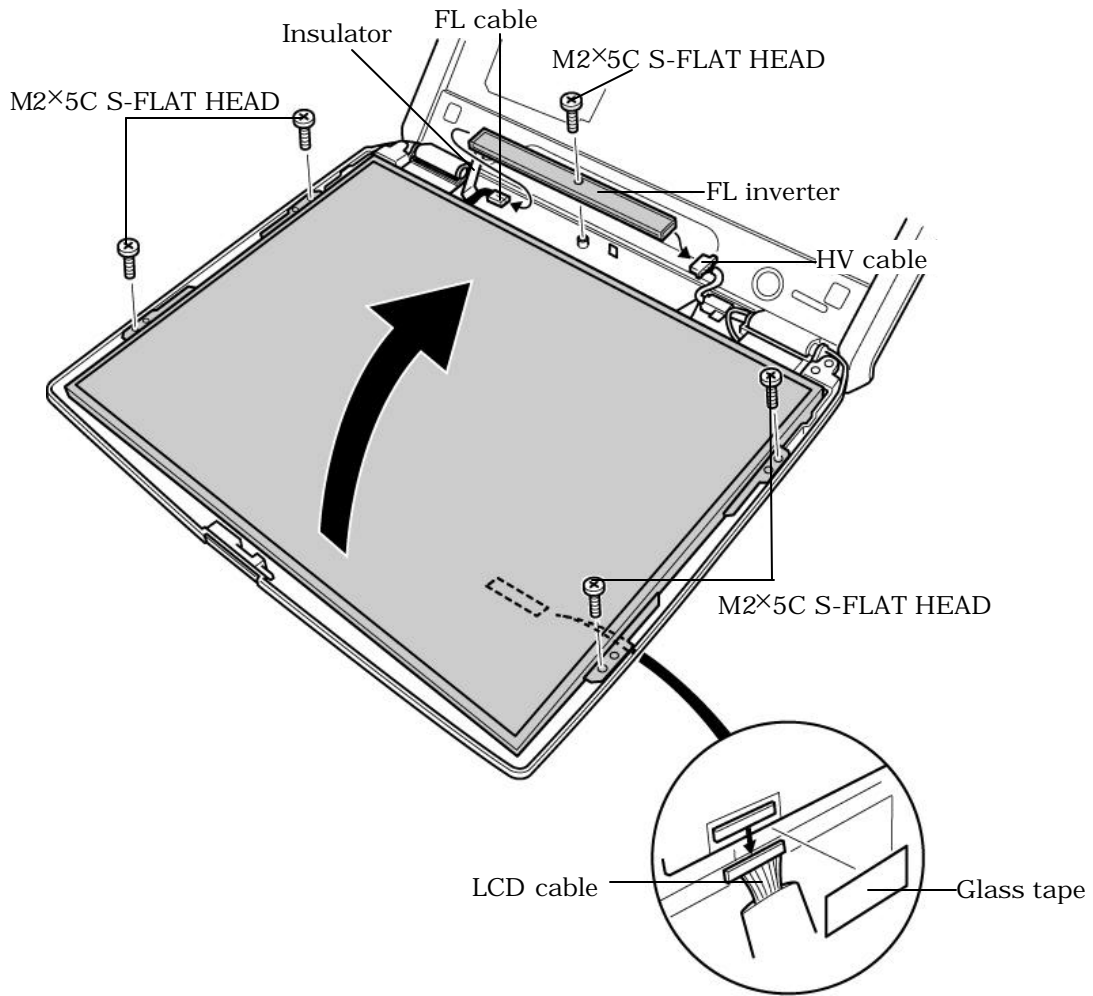
Figure 4-36   Removing the LCD unit and FL inverter

9. Remove the following **screws** and **right and left LCD supports** from the LCD unit.

    •   M2×3C   S-FLAT HEAD screw   x4
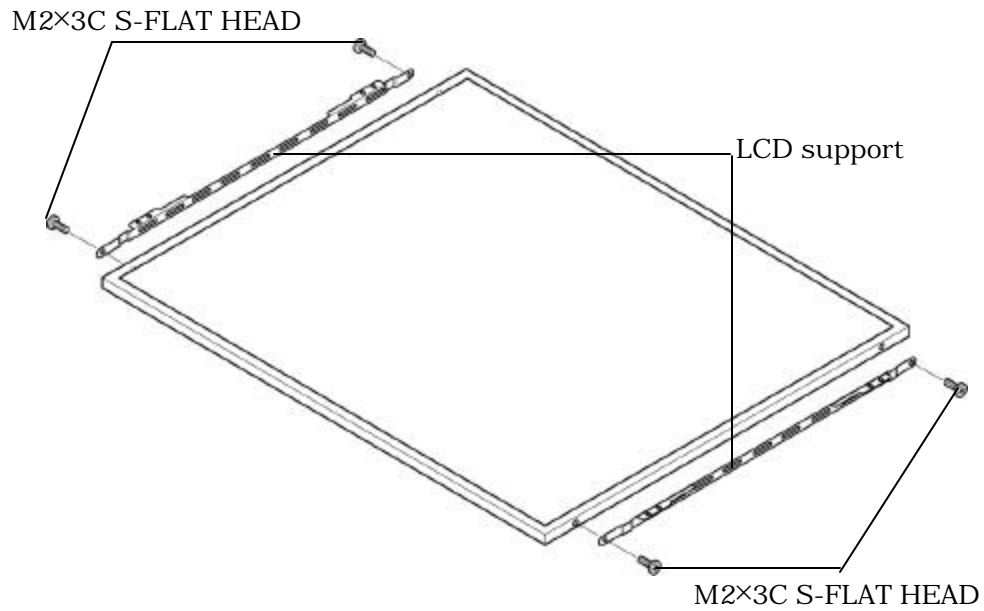
Figure 4-37   Removing the LCD supports

Installing the Display mask/LCD unit/FL Inverter

The following describes the procedure for installing the display mask, LCD unit and FL inverter (See Figure 4-35 to 4-37).

1. Fix the **LCD supports** (left and right) to the LCD unit with the following **screws**.

    - M2×3C   S-FLAT HEAD screw   x4

NOTE: The shape of the right LCD support for 14.1-inch LCD is different from the one of the left. Check "R" (right) or "L" (left) marks on the LCD support.

---

2. Stand the **LCD unit** on the display cover and connect the **LCD cable** to the connector on the back of the LCD. Stick the **glass tape** on the LCD cable.

3. Fix the LCD unit with the following **screws**.

    - M2×5C   S-FLAT HEAD screw   x4

4. Connect the **FL cable** and **HV cable** to the FL inverter.

5. Insert one **insulator** under the LCD unit (over the FL cable) and stick the other one to the FL inverter.

6.   Secure the **FL inverter** with the following **screw**.

    - M2×5C   S-FLAT HEAD screw   x1

7. Install the **display mask** and engage the latches.

NOTE: When installing the display mask, ensure there is no gap between the display mask and the display cover.

---

8. Secure the **display mask** with the following **screws** and stick two **mask tapes** on the front.

    - M2.5×6B   FLAT HEAD screw   x2

4.24 LCD cable/Sensor switch/Wireless LAN antenna

Removing the LCD cable/Sensor switch/Wireless LAN antenna

To remove the LCD cable/sensor switch/wireless LAN antenna, follow the steps below and refer to figures 4-38 to 4-43.

1. Remove the following **screws** and **LCD cable holder** on the back.

    *   M2.5×4   Tapping screw   ×2
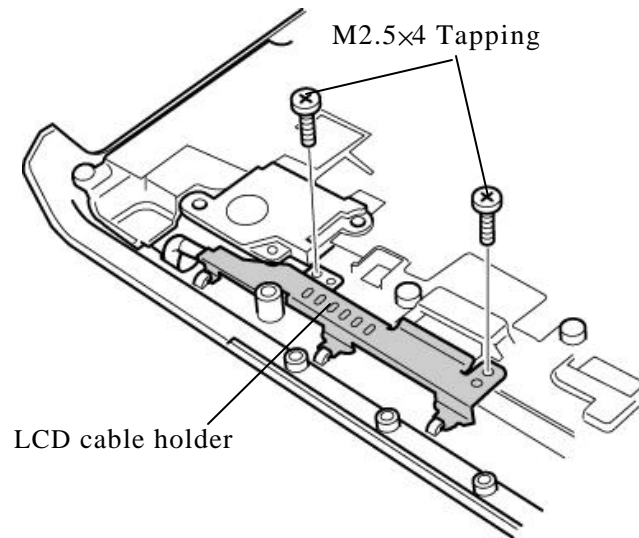
Figure 4-38   Removing the LCD cable holder

2. Remove the following **screw** and **cable holder** on the front.

    *   M2.5×4   Tapping screw   ×1
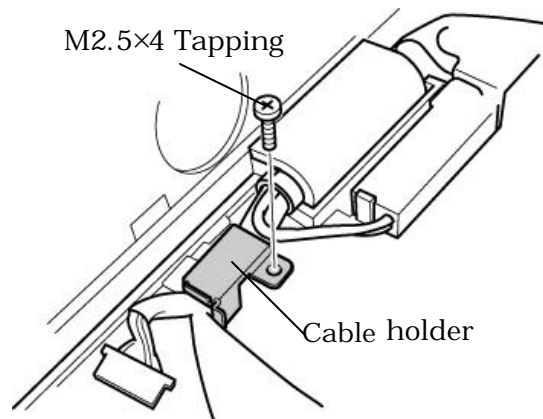
Figure 4-39   Removing the cable holder

3. Remove the **hinge cap** (at the LCD cable side).

4. Pull out the **LCD cable** from the hole.

5. Remove the **sensor switch** while unhooking the latches.

Hinge cap
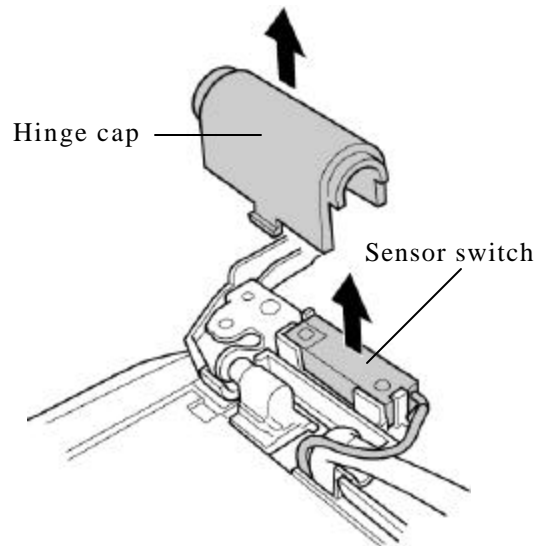
Sensor switch

Figure 4-40   Removing the hinge cap (on the LCD cable side) and sensor switch

6. Peel off the **acetate tape** on the back and take out the **sensor switch cable** from the guide and hole.

Acetate tape

Sensor switch cable

Wireless LAN antenna
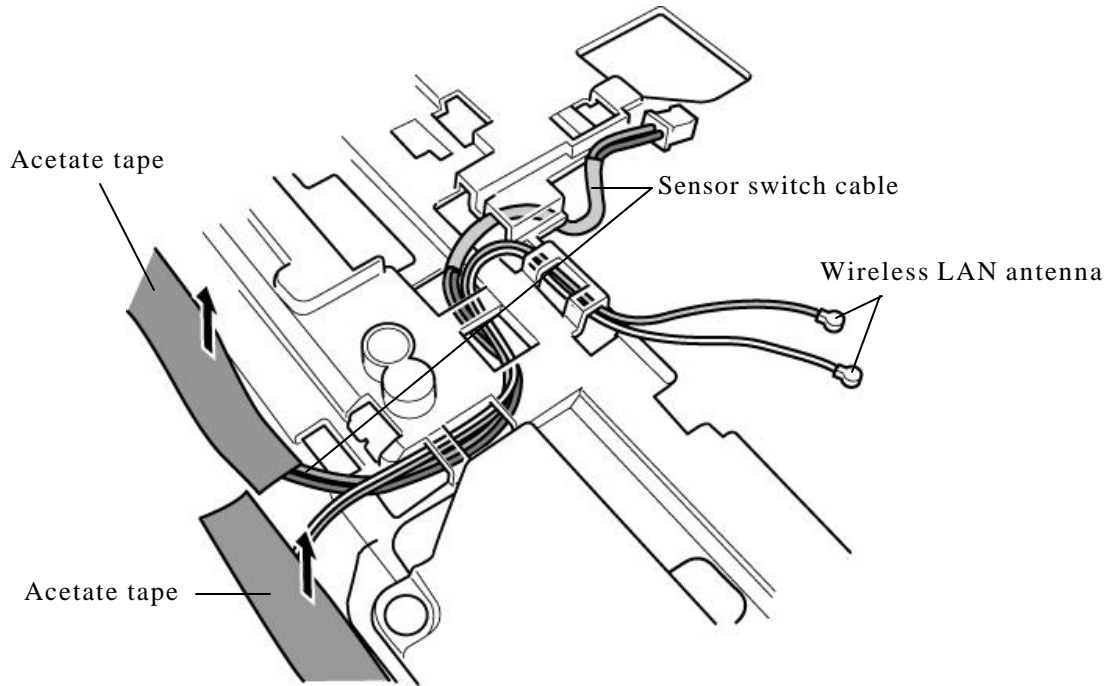
Acetate tape

Figure 4-41   Removing the sensor switch cable

7. Remove the **hinge cap** (on the other side).
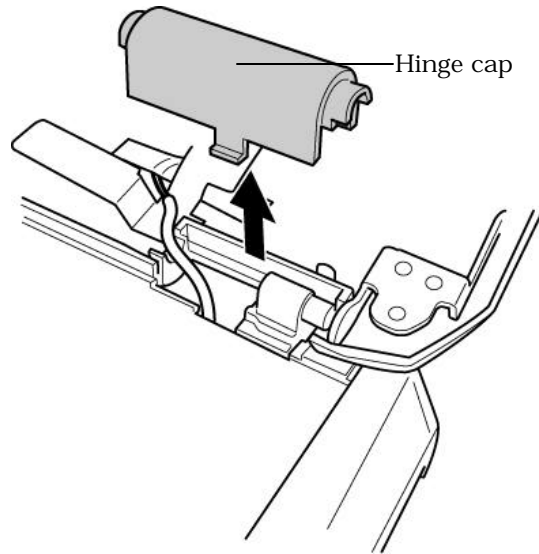
Figure 4-42   Removing the hinge cap (on the other side)

8. Peel off the five **acetate tapes** on the front (figure4-43) and one **acetate tape** (figure4-41) on the back fixing the wireless LAN antenna cable.

9. Peel off both the **wireless LAN antennas** and pull out the cables through the hole under the hinge cap.
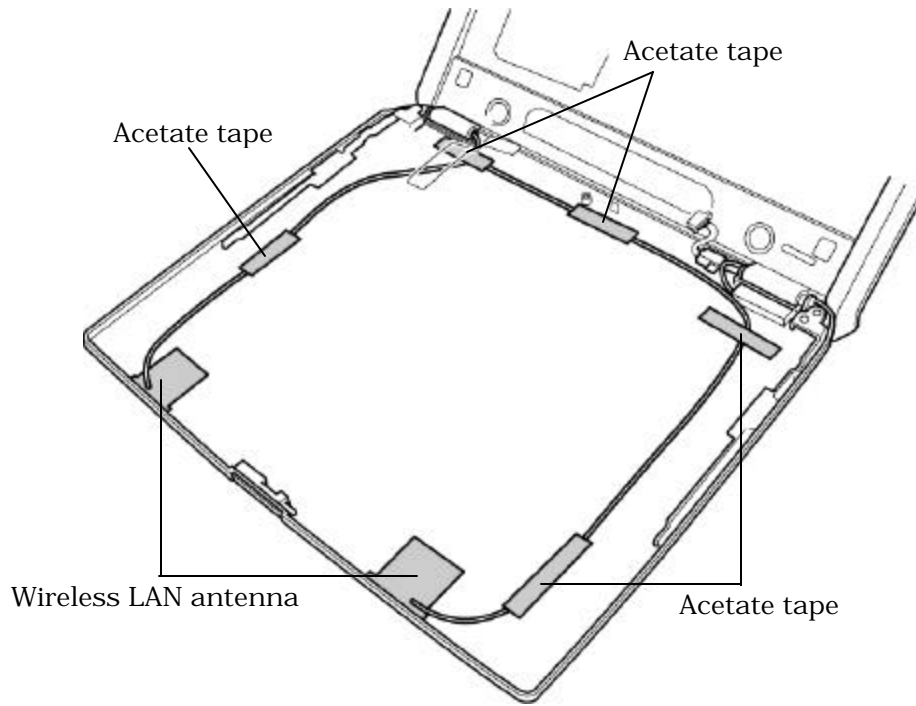
Figure 4-43 Removing the wireless LAN antenna

Installing the LCD cable/Sensor switch/Wireless LAN antenna

To install the LCD cable/sensor switch/wireless LAN antenna, follow the steps below and refer to figures 4-38 to 4-43.

1. Stick the **wireless LAN antennas**.

2. Pass the **wireless LAN antenna cables** through the hole.

3. Secure the **wireless LAN antenna cables** with the six **acetate tapes** (one tape at the back, five tapes at the front).

4. Install the **hinge cap** (on the opposite side of the LCD cable side).

5. Install the **sensor switch** while hooking the latches.

6. Pass the **sensor switch cable** through the holes and guides and stick the **acetate tape**.

7. Pass the **LCD cable** through the holes and guides.

8. Set the **LCD cable holder** and secure it with the following **screw**.

   - M2.5×4   Tapping screw   ×2

9. Set the **cable holder** and secure it with the following **screw**.

   - M2.5×4   Tapping screw   ×1

10. Install the **hinge cap** (at the LCD cable side).

4.25 Hinge

Removing the Hinge

To remove the hinge, follow the steps below and refer to figures 4-44 to 4-47.

1. Remove the following **screws**.

    - M2.5×6   Tapping screw   ×2
    - M2.5×4B   FLAT HEAD screw   ×2
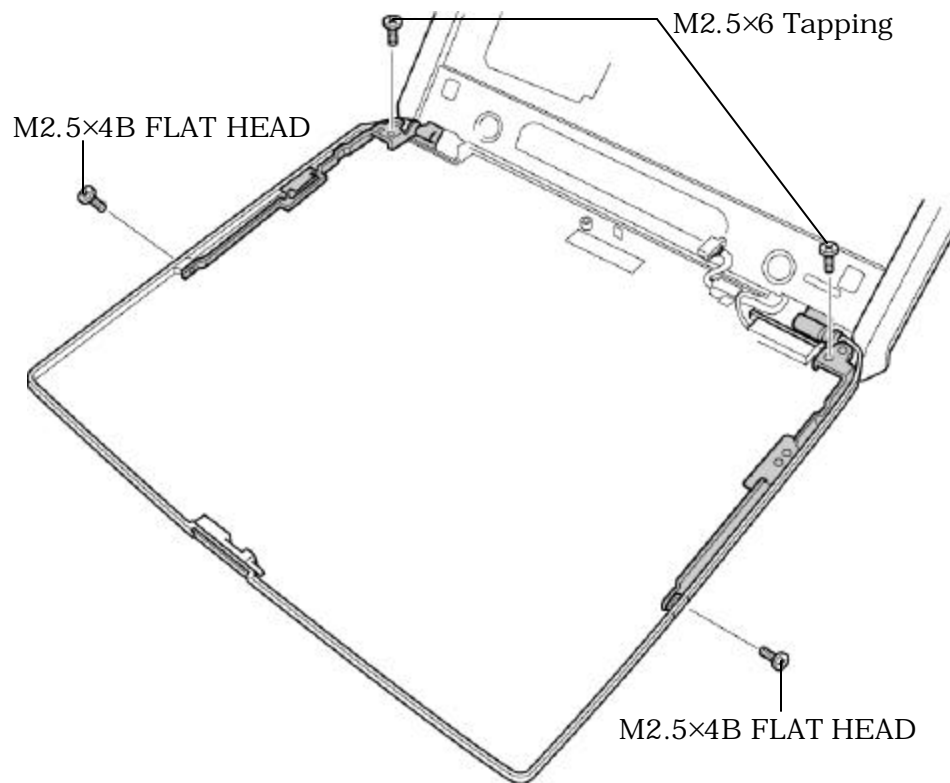
Figure 4-44   Removing the screws

2. Peel off the insulator and remove the following **screws** and **hinge** while turning it.

   - M2.5×6   Tapping screw   ×2
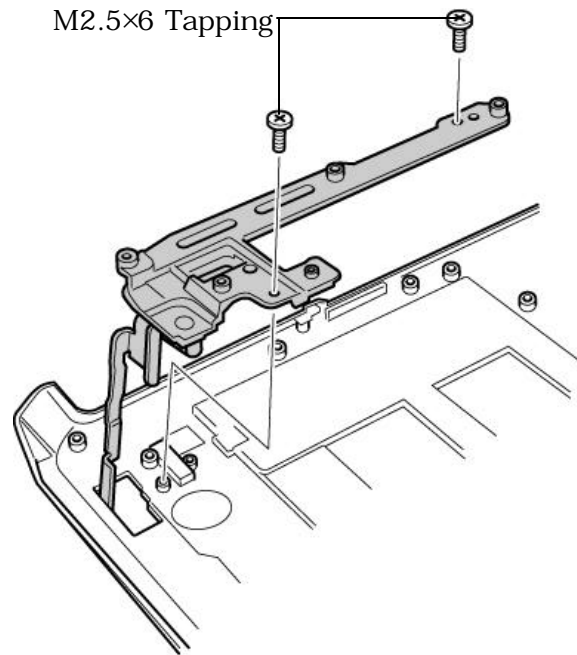
Figure 4-45   Removing the hinge (1)

3. Remove the following **screws** and **hinge** while turning it.

   - M2.5×6   Tapping screw   ×2
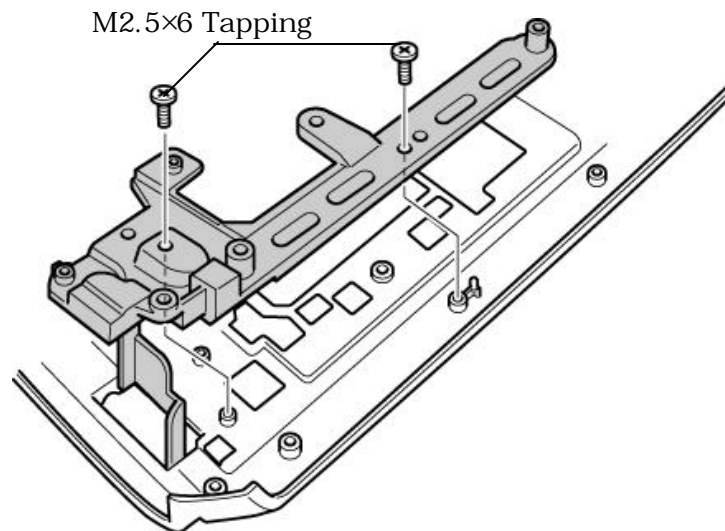
Figure 4-46   Removing the hinge (2)

4.   Pull out the **LCD latch hook**.

5.   Remove the **LCD latch knob**.
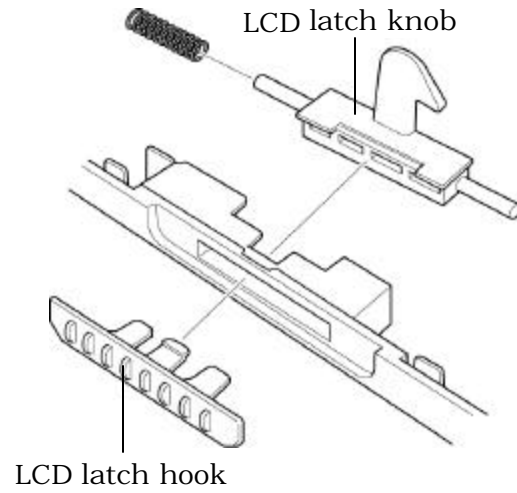
Figure 4-47   Removing the LCD latch hook and LCD latch knob

NOTE: *Be careful not to lose the spring.*

Installing the Hinge

To install the hinge, follow the steps below and refer to figures 4-37 to 4-45.

1. Install the **LCD latch knob** and **LCD latch hook**. Be careful not to lose the spring.

2. Set both the **hinges** on the base side and secure them with the following **screws**.

   - M2.5×6   Tapping screw   ×4

3. Secure the **hinges** on the display cover with the following **screws**.

   - M2.5×4B   FLAT HEAD screw   ×2
   - M2.5×6   Tapping screw   ×2

4.26 Fluorescent lamp

This system uses LCD modules from the following suppliers. The procedure for replacing the fluorescent lamp is different for each LCD module. Refer to the appropriate procedure.

Type	Part No.	Supplier	Section
14.1 inch (XGA)	VF2093P01	Chimei	4.26.1
	VF2058P01	Samsung	4.26.2
	G33C00015110	TMD	4.26.3
15.0 inch (XGA)	G33C0000M110	Chimei	4.26.4
	G33C0000K110	LG.Philips	4.26.5
	G33C0000L110	Samsung	4.26.6
	G33C0000Q110	Sharp	4.26.7
	G33C0000Q310	Sharp	4.26.7
15.0 inch (SXGA+)	G33C0000R110	LG.Philips	4.26.8
	G33C0000P110	Sharp	4.26.9

> *NOTE:*   *- When working with a LCD module, always use a flat, grounded table.*
>
>   *- 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.*
>
>   *- Use an anti-static or protective sheet.*
>
>   *- When replacing the FL unit, cover with a finger protector or similar to prevent soiling or scratching the LCD panel.*
>
>   *- Be careful when handling the lamp. Excessive force may break the lamp.*
>
>   *- Be careful not to soil or deform the lamp reflector.*
>
>   *- Make sure that the power of the LCD module is turned off before connecting or disconnecting cables and connectors.*

4.26.1 Replacing the 14.1 Inch XGA CHIMEI Fluorescent lamp

The following describes the procedure for replacing the fluorescent lamp (See Figure 4-48 to Figure 4-54).

    1. Remove the tapes, labels and films (1 to 8).

①   CU TAPE
②   TRANSPARENT TAPE
③   HIGH Voltage Label
④   Customer Label
⑤   Tape
⑥   UL Label
⑦   Protector Film X
⑧   Protector Film Y
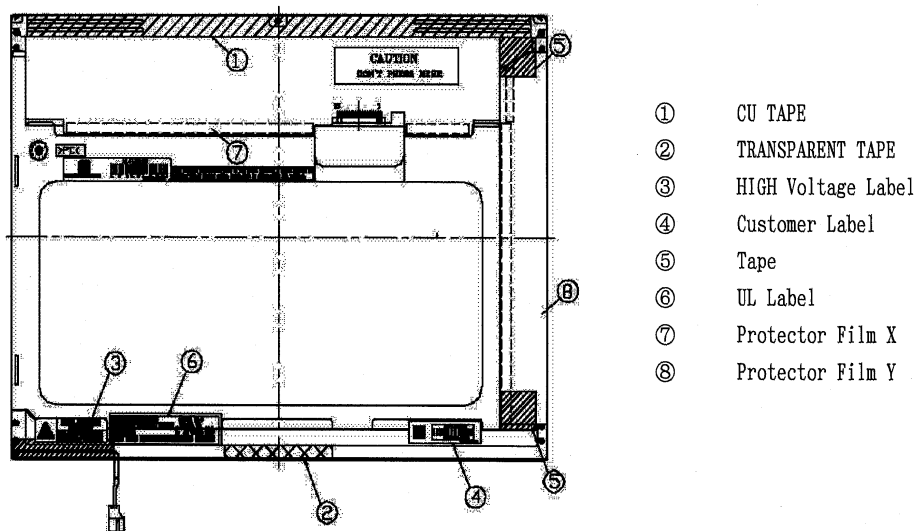
Figure 4-48 Replacing 14.1 Inch CHIMEI fluorescent lamp (1)

    2. Remove the latch.

①   LCM
②   METAL FRAME
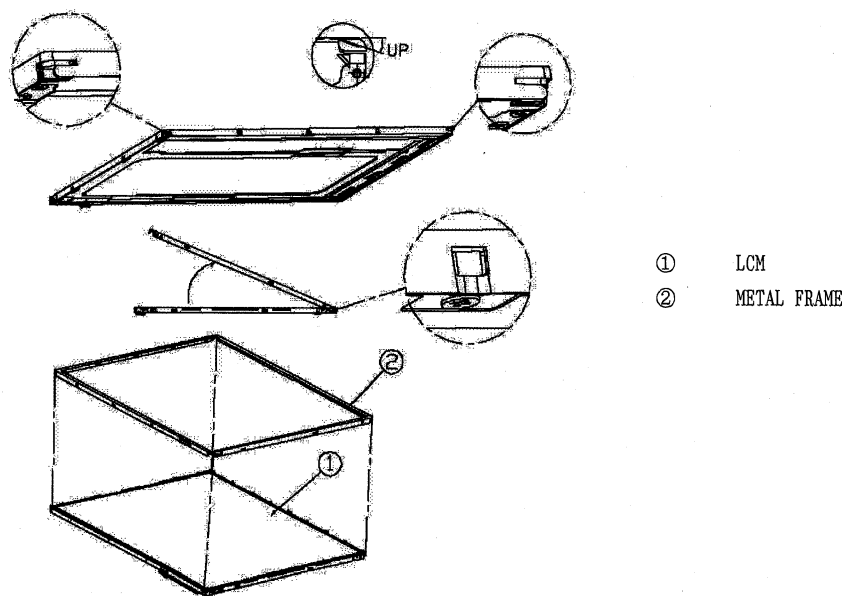
Figure 4-49 Replacing 14.1 Inch CHIMEI fluorescent lamp (2)

3. Remove the screw and PCB cover.

①   SCREW
②   PCB–COVER
③   LCM
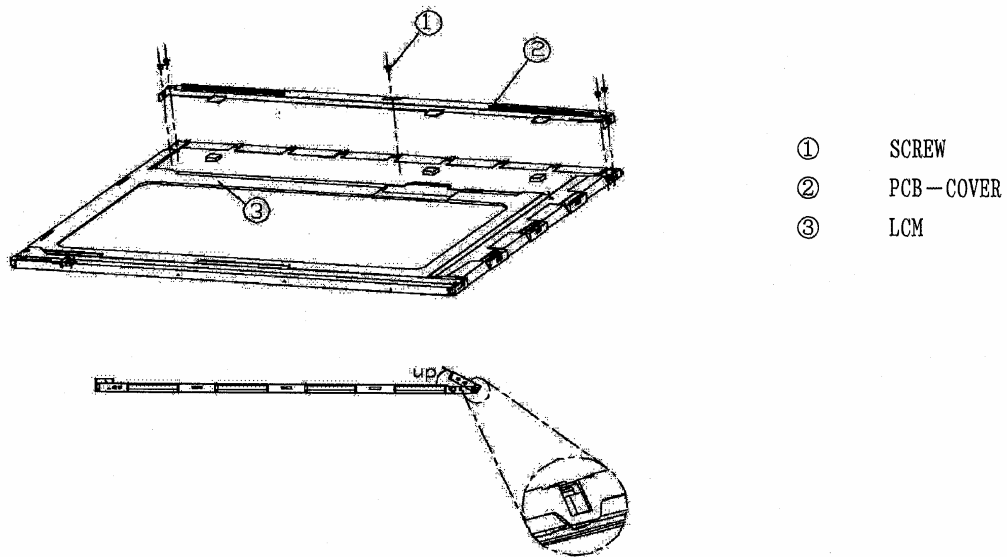
Figure 4-50 Replacing 14.1 Inch CHIMEI fluorescent lamp (3)

4. Loosen the X-PCB connector and disconnect the FPC from the Y-PCB.

5. Remove the X-PCB and Y-PCB.

①   PANEL
②   B/L UNIT
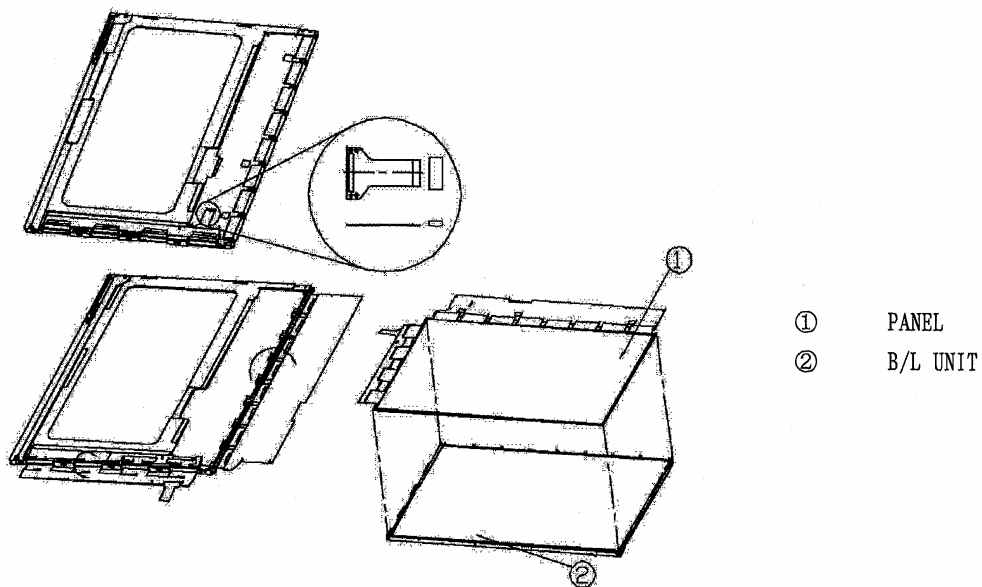
Figure 4-51 Replacing 14.1 Inch CHIMEI fluorescent lamp (4)

6. Remove the spacer from the protector sheet.

7. Remove the sheets (2) to (5).

①	SPACER
②	PROTECTOR SHEET
③	BEF_H SHEET
④	BEF_V SHEET
⑤	DIFFUSER SHEET
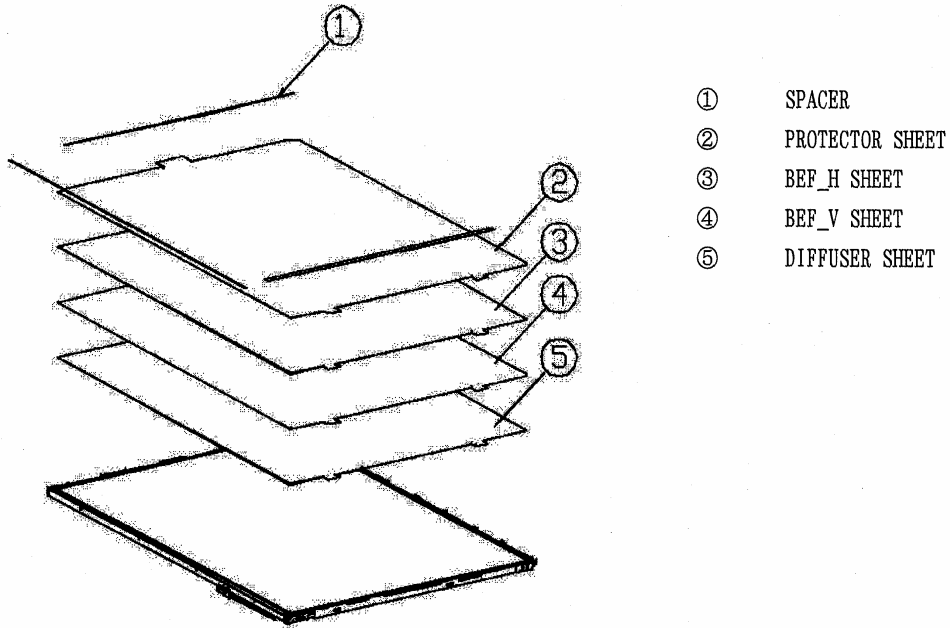
Figure 4-52 Replacing 14.1 Inch CHIMEI fluorescent lamp (5)

8. Remove the LGP and reflection sheet.

①	LGP
②	REFLECTOR SHEET
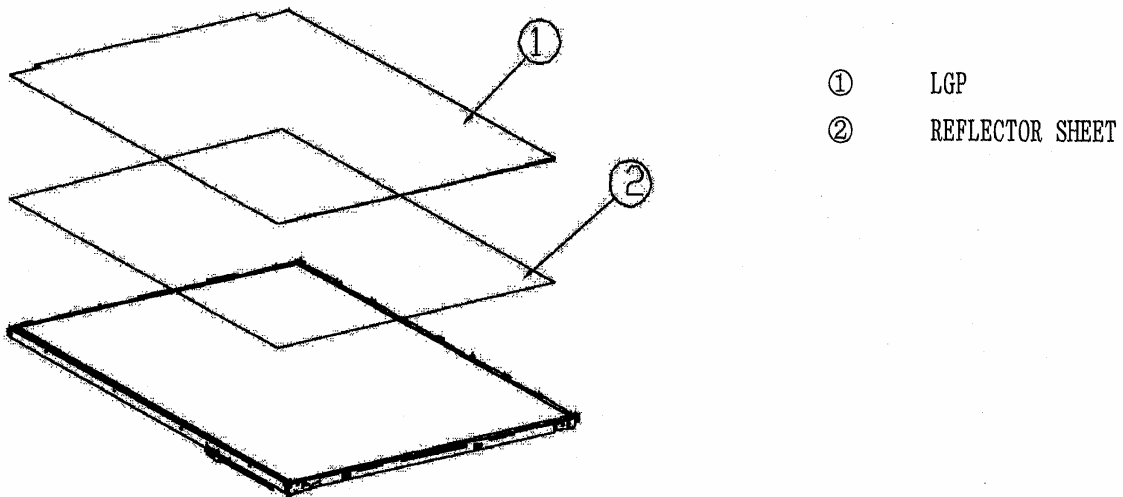
Figure 4-53 Replacing 14.1 Inch CHIMEI fluorescent lamp (6)

9. Remove the screw.
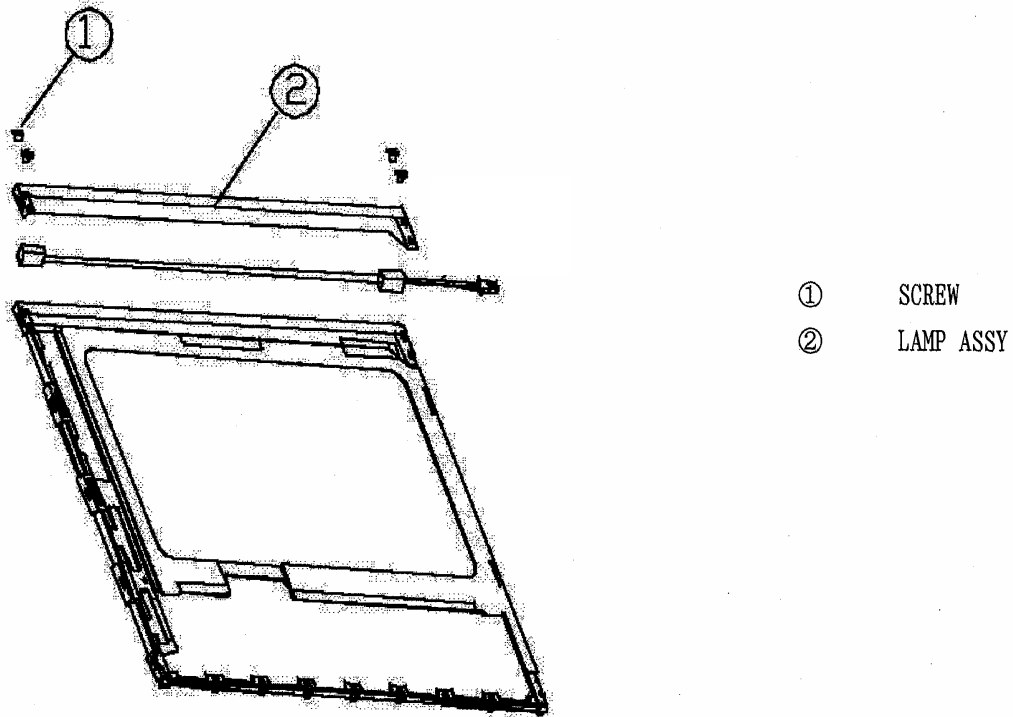
Figure 4-54 Replacing 14.1 Inch CHIMEI fluorescent lamp (7)

10. The assembly procedure is the reverse of the above disassembly procedure.

4.26.2   Replacing the 14.1 Inch XGA Samsung Fluorescent lamp

The following describes the procedure for replacing the fluorescent lamp (See Figure 4-55 to Figure 4-62)

1. Remove the PCB cover and tapes from the LCD module. Be careful not to damage the PCB.
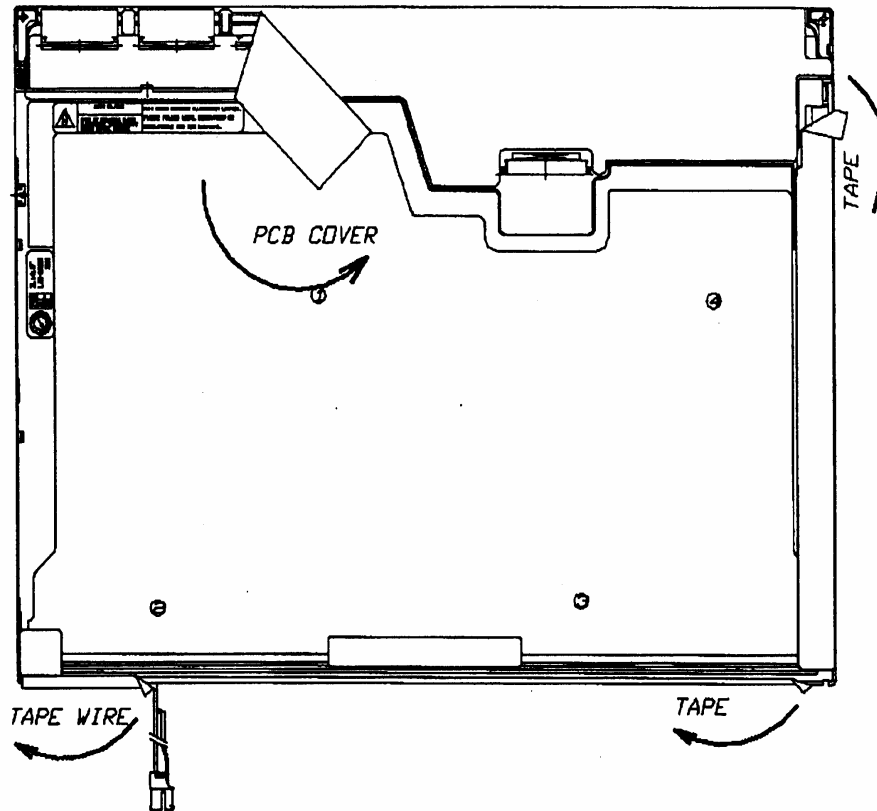
Figure 4-55 Replacing 14.1 Inch Samsung fluorescent lamp (1)

2. Remove two screws fixing the PCB. Be careful not to damage the PCB.
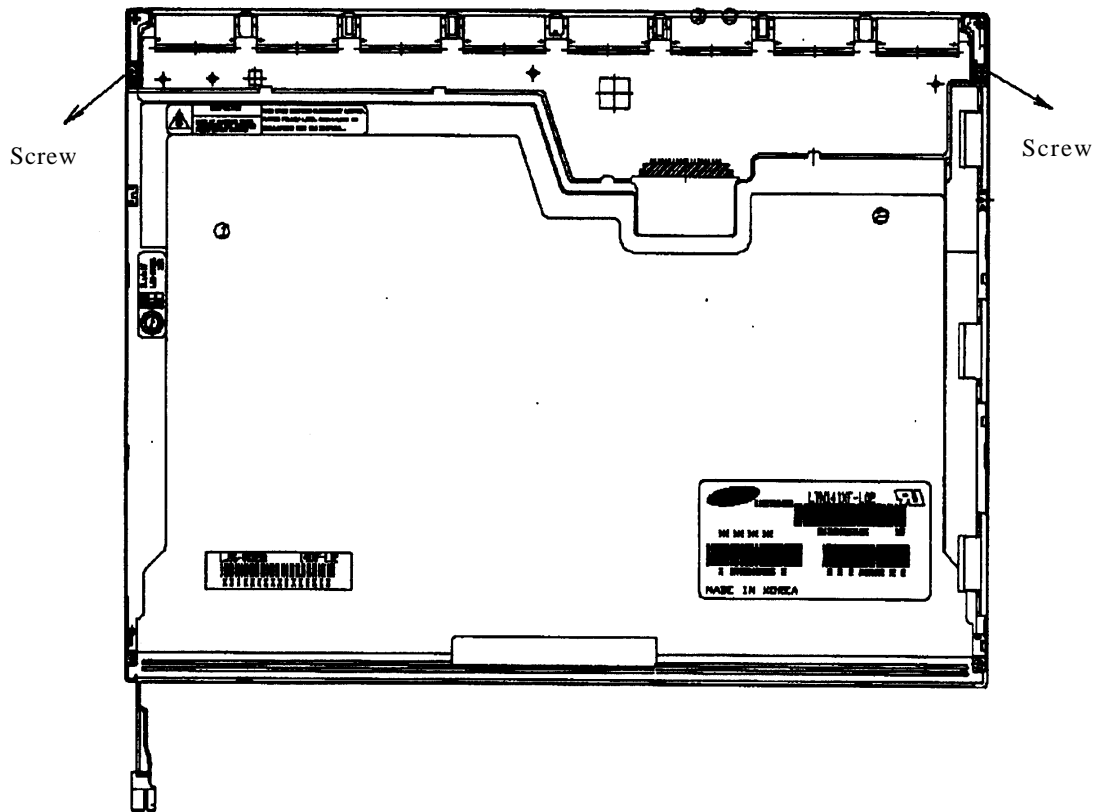
Figure 4-56 Replacing 14.1 Inch Samsung fluorescent lamp (2)

3. Remove the metal bezel from the plastic chassis by detaching the top hooks, side hooks and bottom hooks.
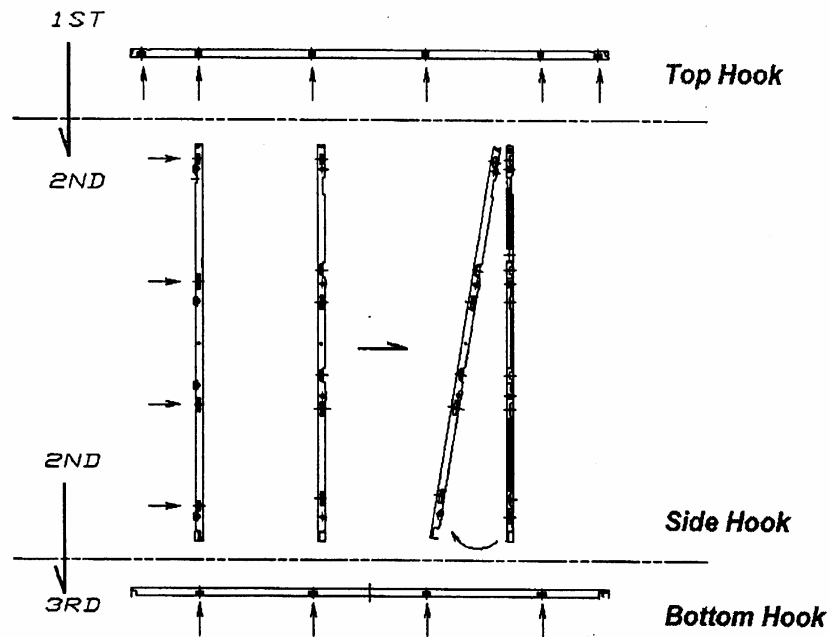
Figure 4-57 Replacing 14.1 Inch Samsung fluorescent lamp (3)

4. Remove the panel from the backlight unit. Be careful not to damage the TCP.
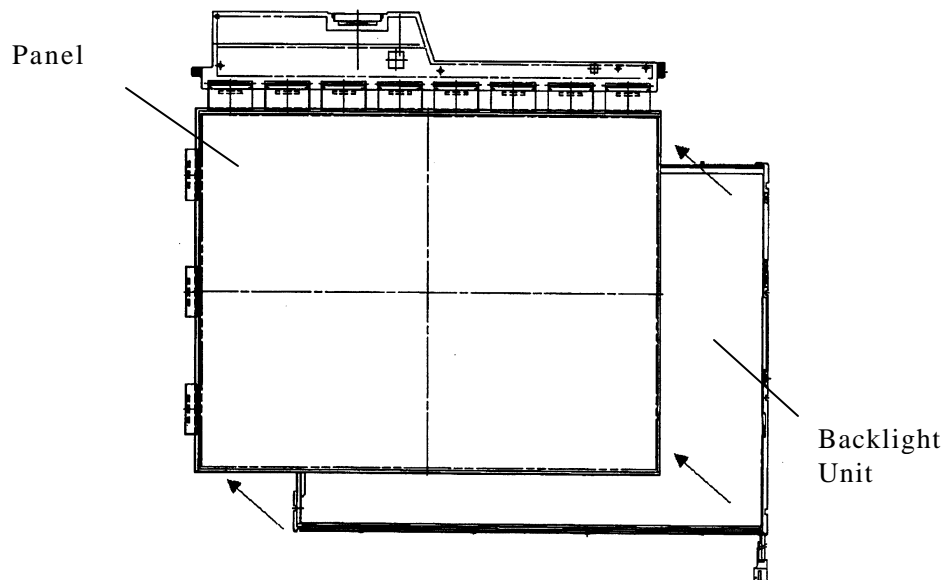
Figure 4-58 Replacing 14.1 Inch Samsung fluorescent lamp (4)

5. Remove two clips. Remove the sheets (lens sheet, diffusion sheet, light guide and reflection sheet).
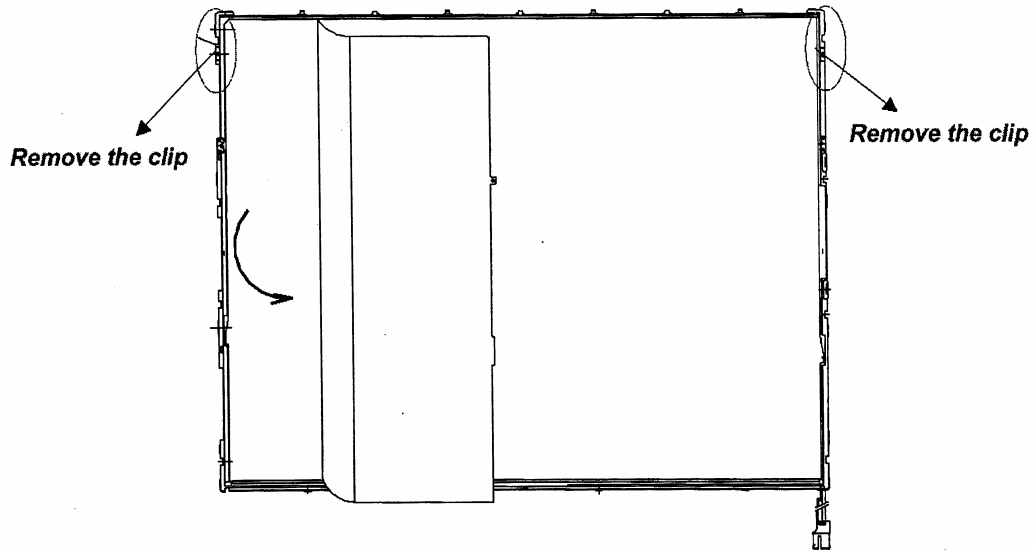
Figure 4-59 Replacing 14.1 Inch Samsung fluorescent lamp (5)

6. Remove two screws fixing the lamp cover and remove the lamp cover.
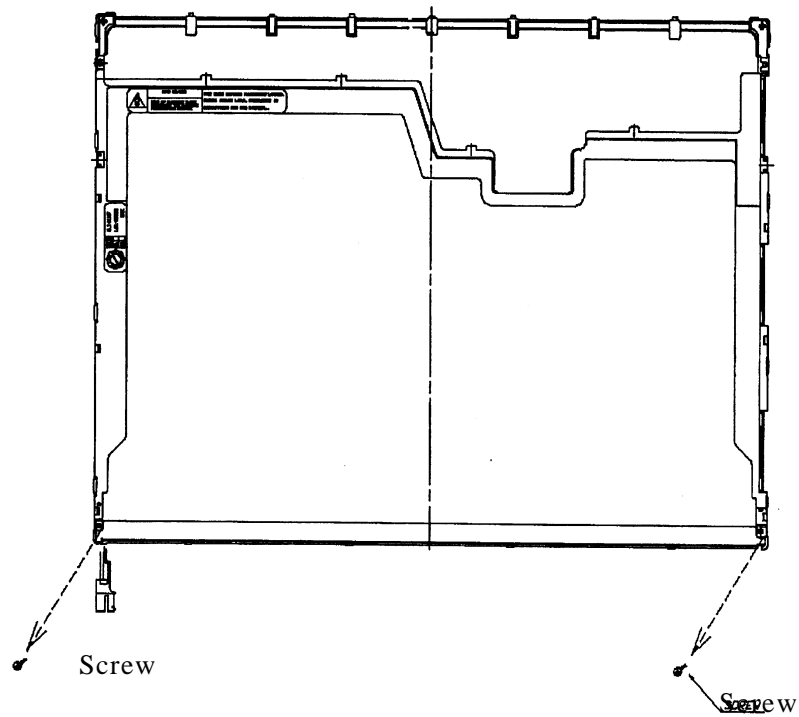
Figure 4-60 Replacing 14.1 Inch Samsung fluorescent lamp (6)

7. Remove the GND cable of the FL lamp from the plastic chassis.
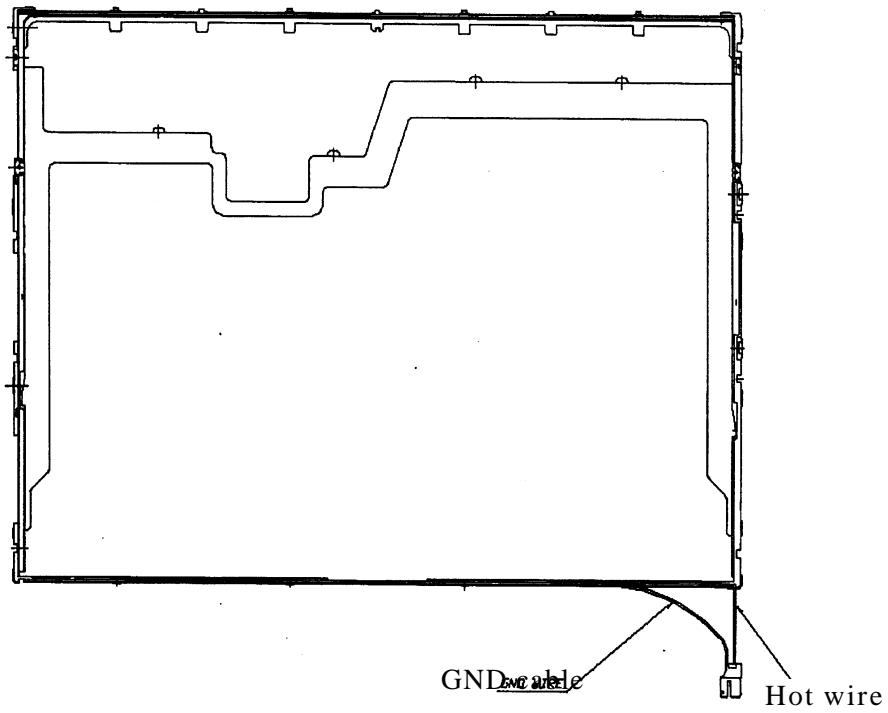
Figure 4-61 Replacing 14.1 Inch Samsung fluorescent lamp (7)

8. Remove the lamp unit from the plastic chassis and replace the lamp with a new one.
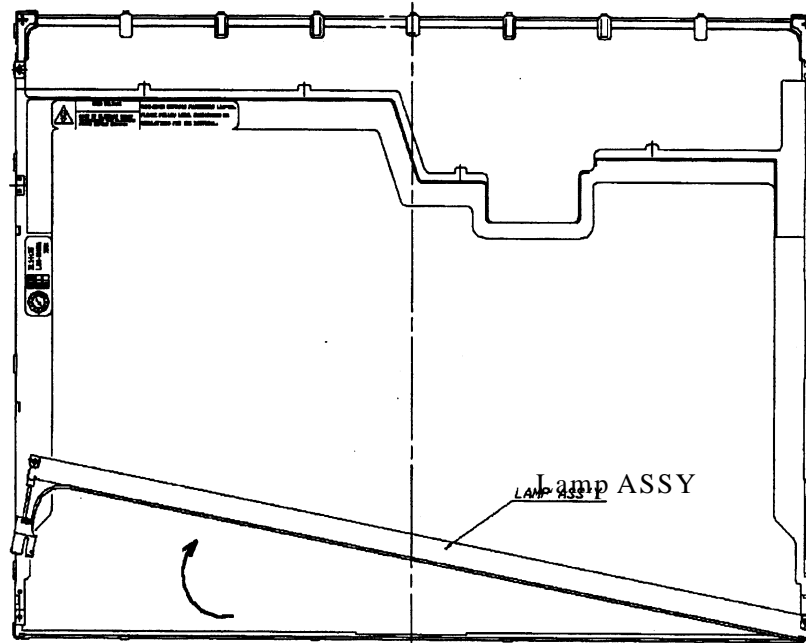
Figure 4-62 Replacing 14.1 Inch Samsung fluorescent lamp (8)

9. The assembly procedure is the reverse of the above disassembly procedure.

4.26.3   Replacing the 14.1 Inch XGA TMD Fluorescent lamp

The following describes the procedure for replacing the fluorescent lamp (See Figure 4-63 to Figure 4-74)

Disassembling Fluorescent lamp

Peeling off the tapes and insulation sheets

1. Flip the module over and place it on a flat surface that is free of foreign objects.

2. In the order (1), (2), and (3) shown in Figure 4-63, remove the tape for fixing the FL tube cable, two pieces of tape on the bezel that are close to the FL tube, and the X-PCB insulation sheet.

CAUTION: (1) Be careful not to damage the TAB.

(2) Leave the insulation sheet on the bezel to allow the reuse of the sheet.
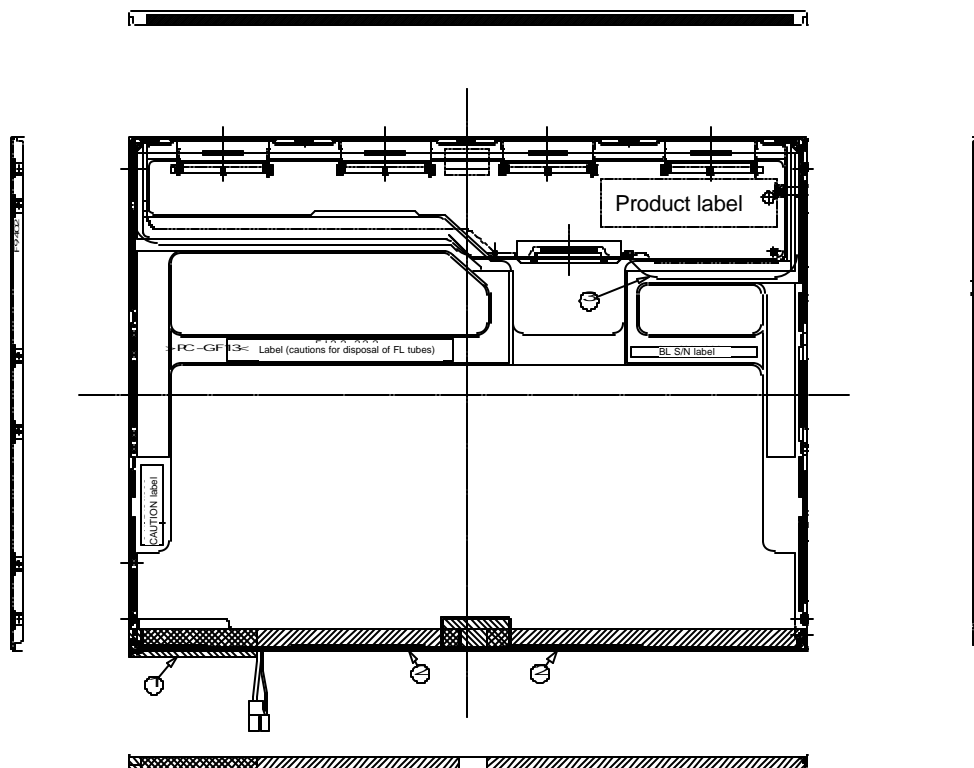
Figure 4-63 Replacing 14 Inch TMD fluorescent lamp (1)

Removing the screws

1. Spread out the insulation sheet without detaching it from the side of the bezel, as shown in Figure 4-46.

2. In the order (1) and (2) shown in Figure 4-64, remove the screws from the left- and right-hand sides of the module.

CAUTION: *To unfasten the screws, use an insert bit of point size 0 for Philips screwdrivers.*
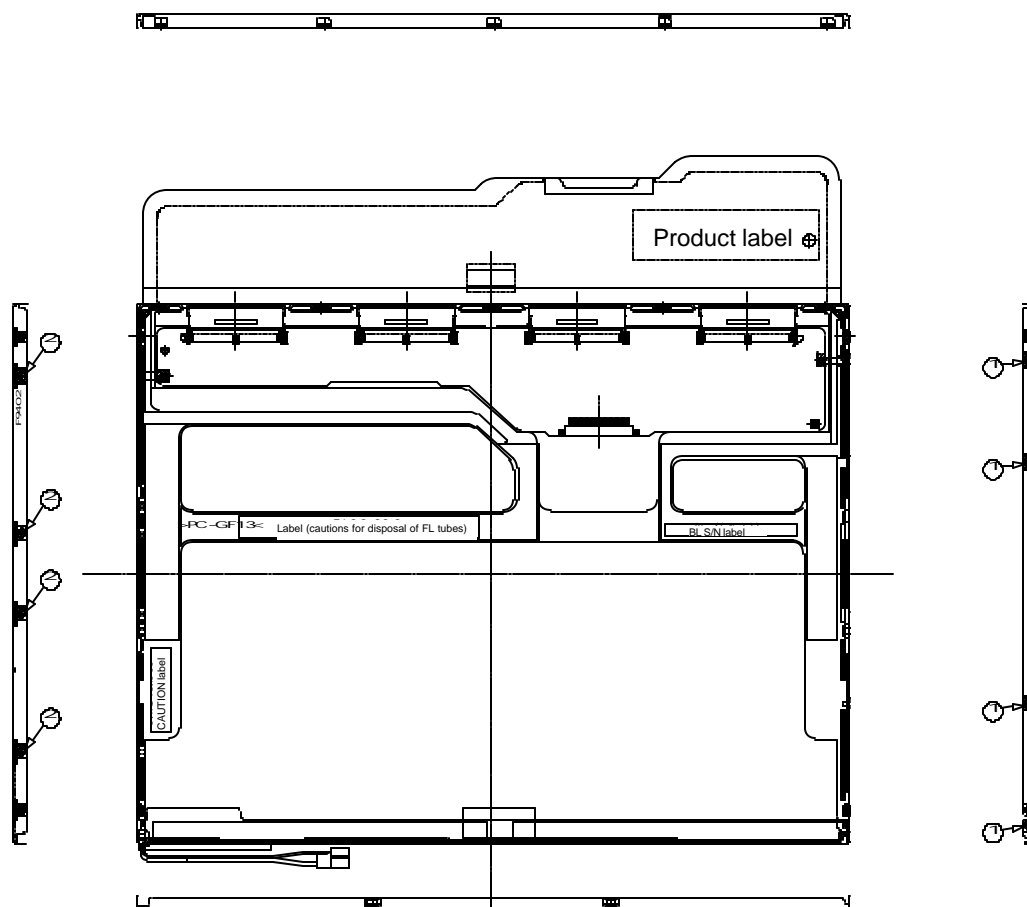
Figure 4-64 Replacing 14 Inch TMD fluorescent lamp (2)

Removing the bezel

1. Without removing the insulation tape, flip the module over again so that the display screen can face up.

2. Release the latches of the bezel and frame. (On the sides, there are five latches in the upper area and two latches in the lower area.)

3. Gently remove the double-sided tape from the cell at the reverse side of the bottom of the bezel and remove the bezel.

4. Remove the double-sided tape remaining at the bottom of the cell and on the reverse side of the bezel.

CAUTION: *Do not damage the TAB when releasing the latches on the upper area.*
When removing the bezel, gently remove the top double-sided tape at the
bottom of the surface of the bezel to prevent cell damage. Be careful not to
deform the bezel.
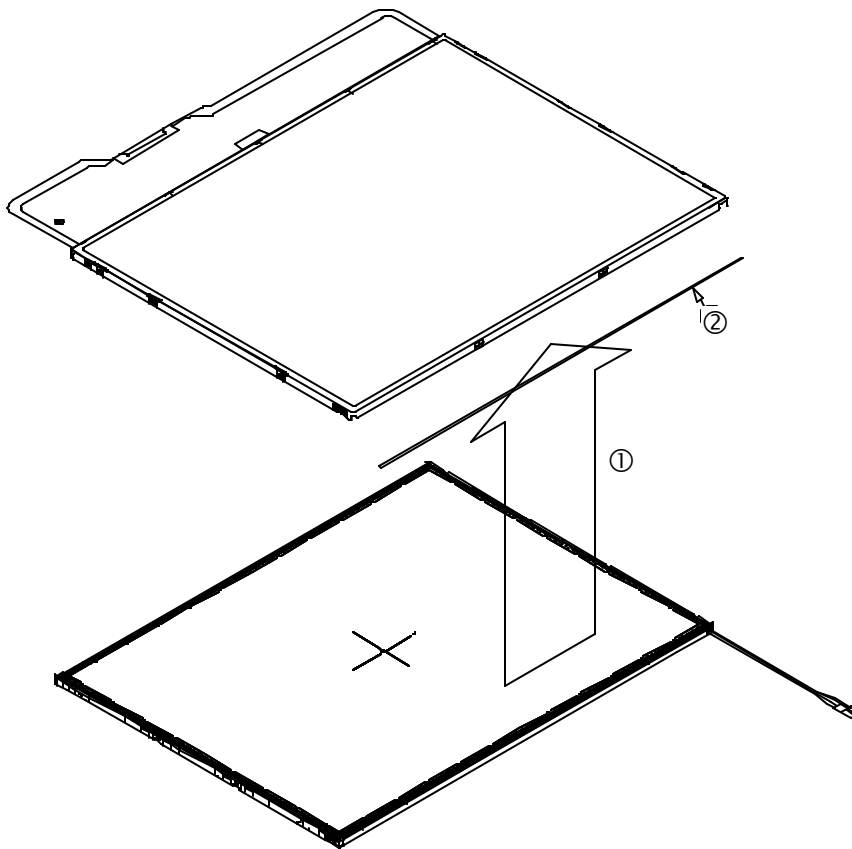
Figure 4-65 Replacing 14 Inch TMD fluorescent lamp (3)

Opening the PCB

1. Spread out the PCB horizontally, as shown in Figure 4-66.

CAUTION: *Be careful not to damage the TAB.*

Open the X-PCB from the reverse side.
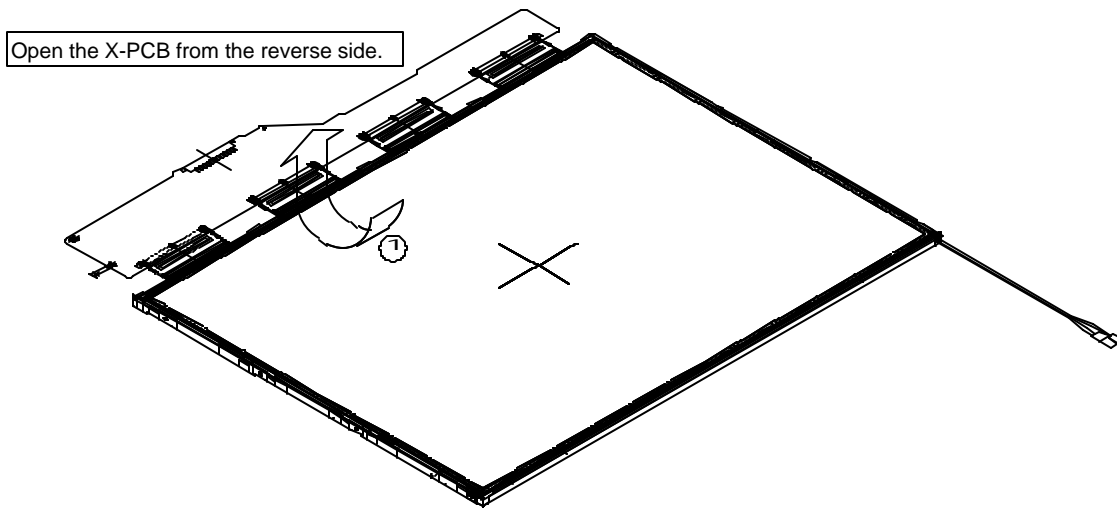
Figure 4-66 Replacing 14 Inch TMD fluorescent lamp (4)

Removing the PCB-assembly cell

1. Remove the cell of the PCB assembly from the backlight assembly, as indicated by (1) in Figure 4-67. Completely remove the double-sided tape remaining on the reverse side of the cell.

CAUTION: *On the cell, three areas are bonded to the frame with the double-sided tape (as shown in Figure 4-67, one area is at the top, and two areas are at the bottom of both sides). Remove the cell gently, taking care not to damage it. Be careful not to peel off the masking tape in the three areas on the cell.*

Remove the cell by peeling off the three pieces of double-sided adhesive tape.
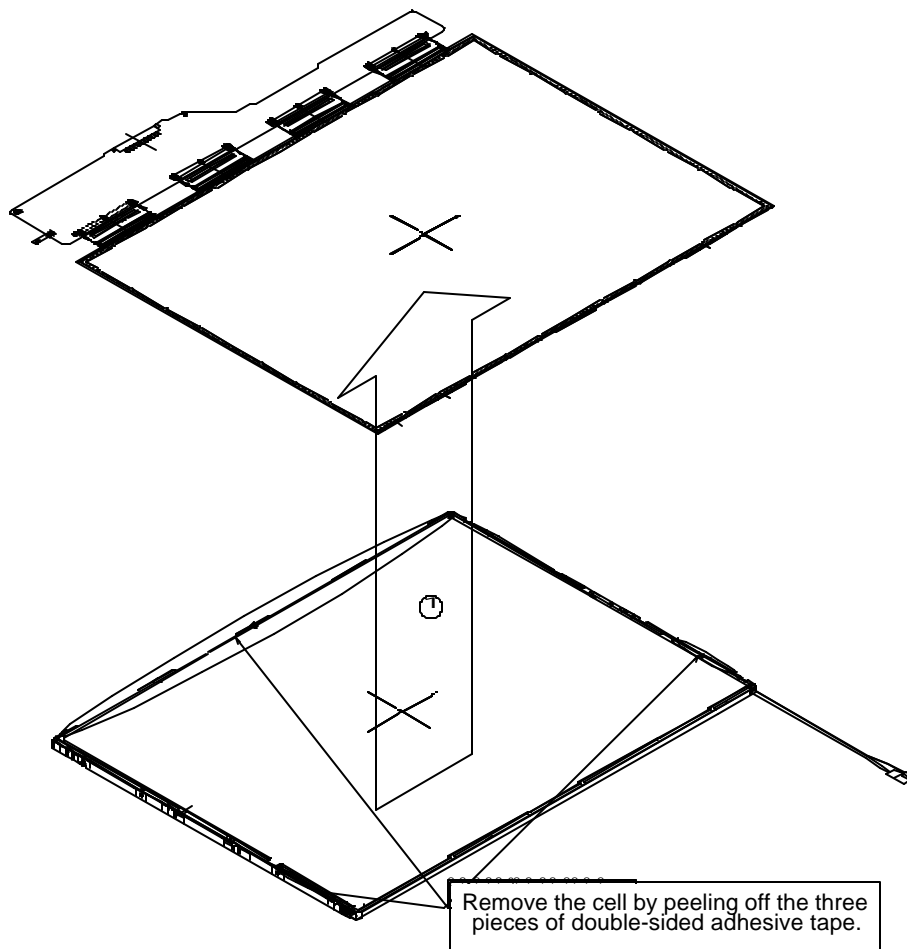
Figure 4-67 Replacing 14 Inch TMD fluorescent lamp (5)

Assembling Fluorescent lamp

Putting the double-sided tapes on the bezel

1. Attach the double-sided tape to the reverse side of the bezel, as shown in Figure 4-68.
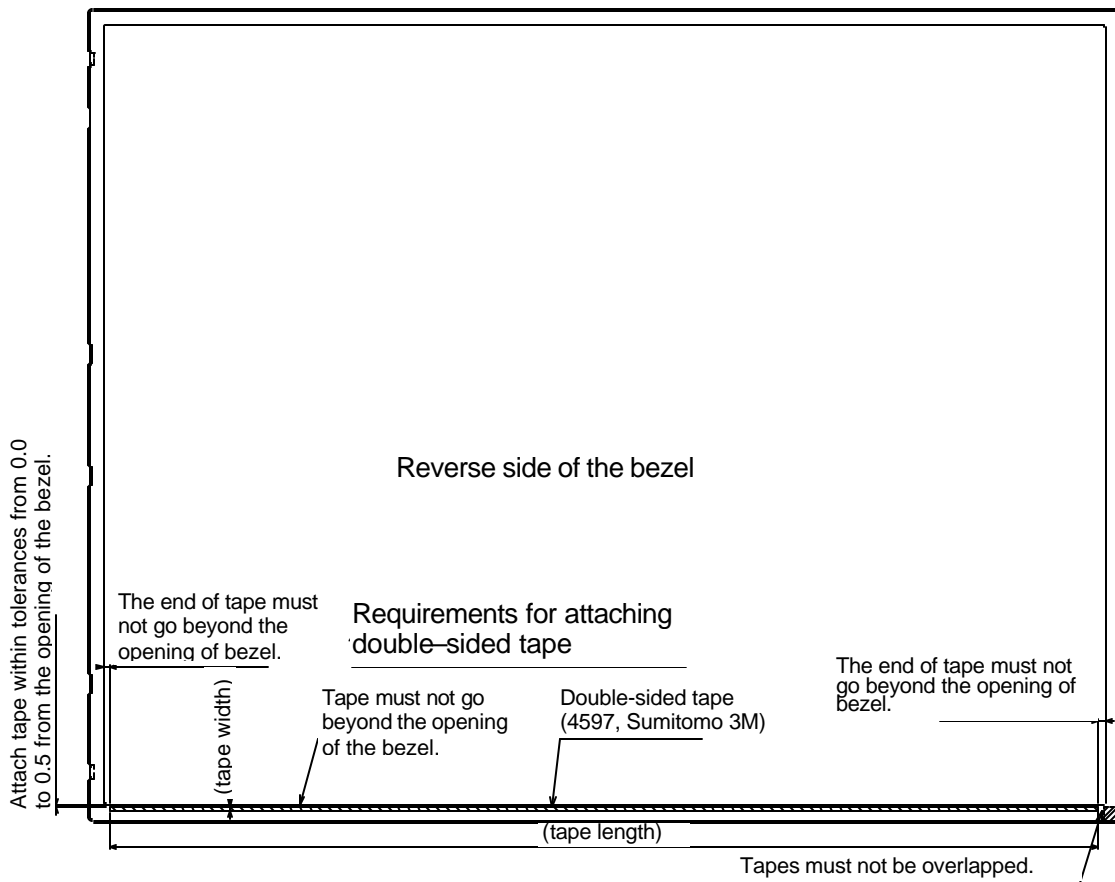
Figure 4-68 Replacing 14 Inch TMD fluorescent lamp (6)

Checking the backlight

1. Inspect the replacement backlight according to Figure 4-69.

The frame must not be
overlaid with the prism
sheet, etc.

The frame must
not be overlaid
with the prism
sheet, etc.

The sheet must not be
dislocated from the frame.

Sheet retaining tape

Align the tape with the rib of frame.
The frame must not be overlaid.

The sheet must not be
dislocated from the frame.

The frame must not be
overlaid with the sheet.

The sheet must not be
dislocated from the frame.

Figure 4- 69 Replacing 14 Inch TMD fluorescent lamp (7)

Assembling PCB-assembly cell

1. Remove the paper (coated with a mold release) from the double-sided tape in the three
   areas on the replacement backlight unit. The areas are at the top and on both sides. See
   Figure 4-70.

2. Turn the backlight on.

3. Check that the backlight is free of dust, foreign objects, or damage. Perform this check also
   for the reverse side of the cell. Then install the cell of the PCB assembly in the backlight unit.

---

*CAUTION: Align the top left corner of the cell with the corresponding corner of the
           backlight unit, as indicated by - in Figure 4-70.
           Be careful not to damage the TAB.*
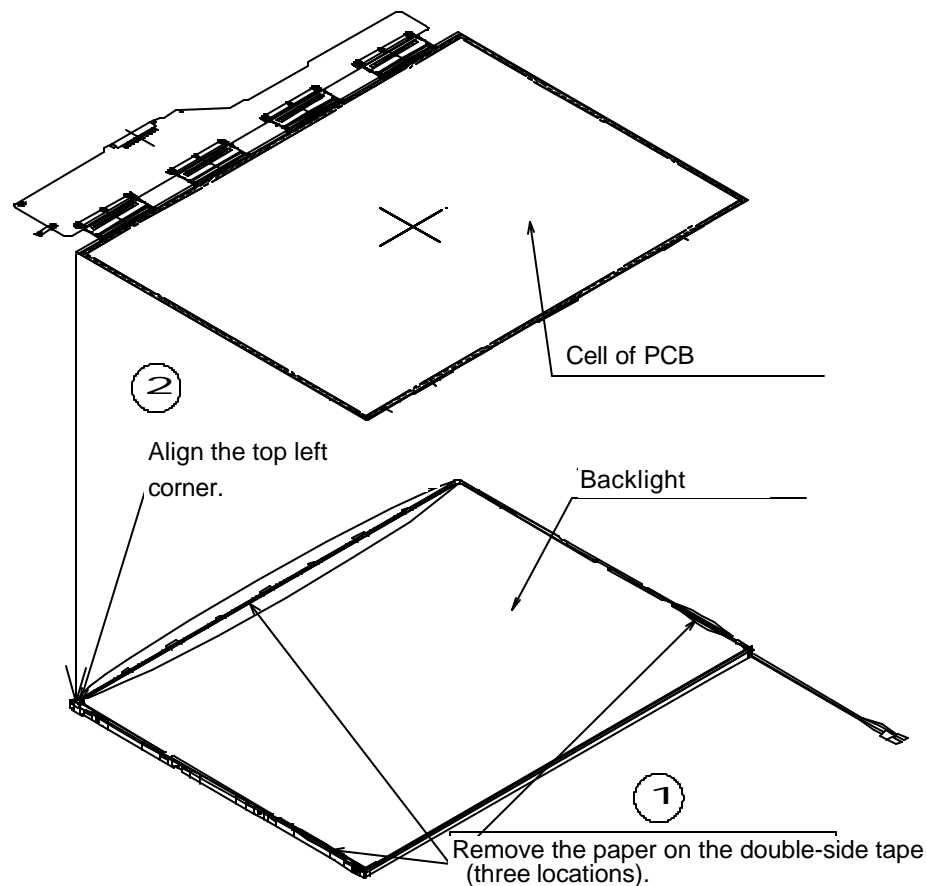
Figure 4-70 Replacing 14 Inch TMD fluorescent lamp (8)

Folding down and temporary fixing of the TAB/PCB

1. Fold down the TAB (PCB) toward the reverse side of the backlight unit, as shown in Figure
    4-71.

CAUTION: *Be careful not to damage the TAB.*

For the X-PCB toward the reverse side.
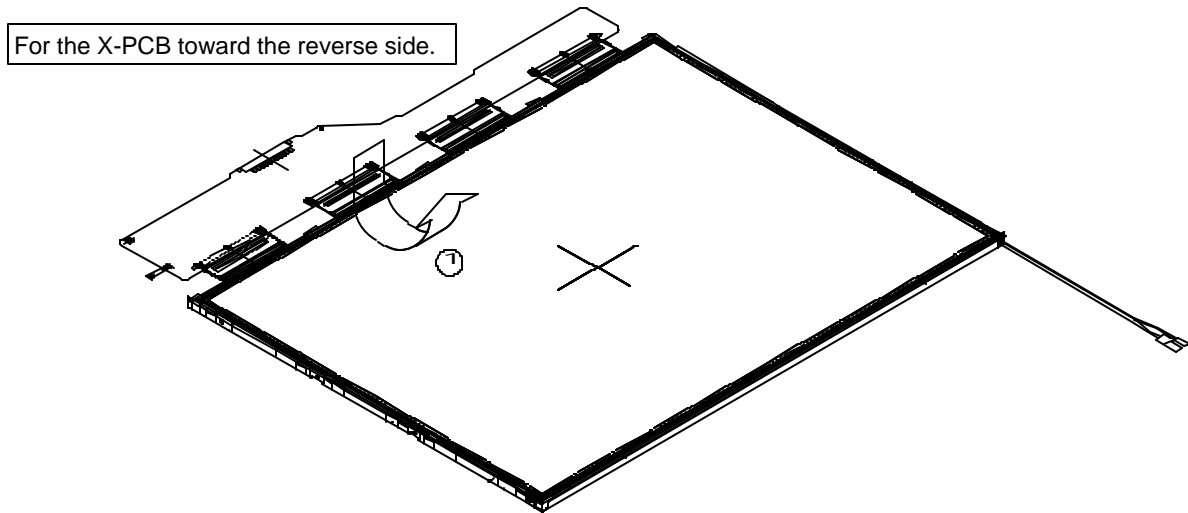
Figure 4-71 Replacing 14 Inch TMD fluorescent lamp (9)

Setting the bezel

1. Start installing the bezel in the upward direction until it stops at the top left corner.

CAUTION: The GND-CU and lamp reflector on the left-hand side must not go beyond
the edges of the bezel.
Be careful not to damage the cables and TAB.
The bezel latches must be engaged (there are five latches on the top edge,
and two latches on the bottom edge).

Next, fit the bezel's edge
close to the TAB.
Close the five latches.

The fold of GND-CU must
not go beyond the

The fold of reflector must not
go beyond the bezel's edge

First, fit the bezel's edge close to the
lamp. Use care not to damage the

Two latches
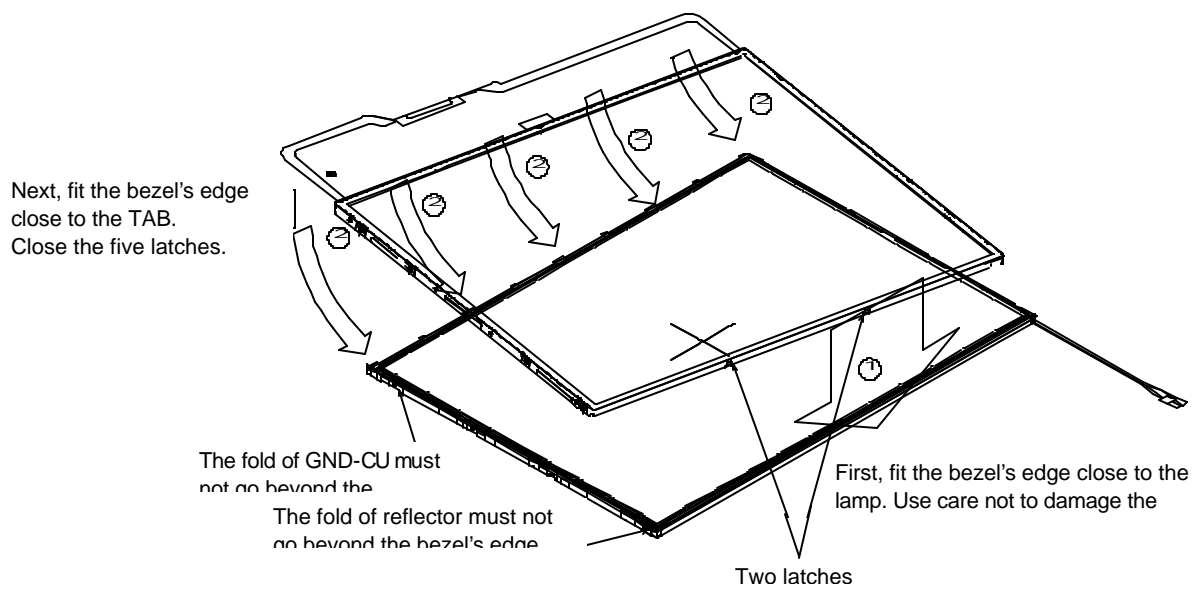
Figure 4-72 Replacing 14 Inch TMD fluorescent lamp (10)

Fasten screws of the PCB and bezel

1. Fasten four screws on the left edge in the order (5), (6), (7), and (8) shown in Figure 4-73.

2. Fasten four screws on the right edge in the order (1), (2), (3), and (4) shown in Figure 4-73.

CAUTION: *Fasten the screws in the orders shown in Figure 4-73. No loose fastening is allowed.*
The tightening torque must not exceed 0.147N ?m (1.5kgf?cm) for all the eight screws.
For the Philips screwdrivers, use an insert bit of point size 0.

Fasten the eight M2× 2.2 screws.
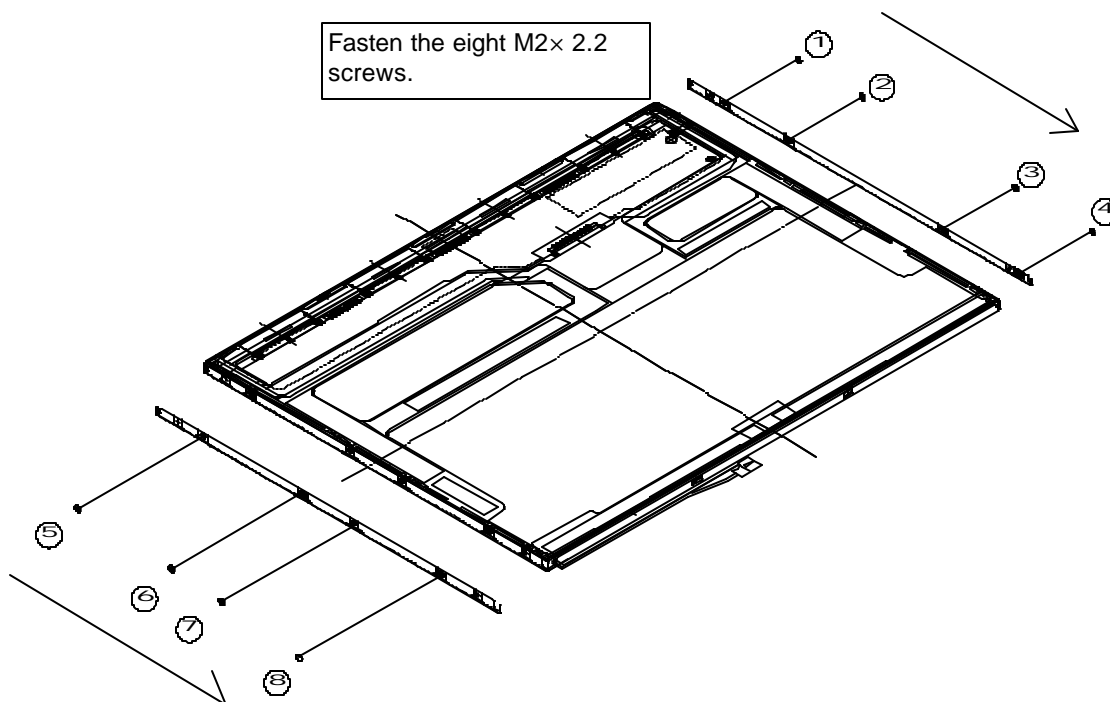
Figure 4-73 Replacing 14 Inch TMD fluorescent lamp (11)

Attaching the tapes and insulation sheet

1. Attach the PCB insulation sheet (one point).

2. Attach the tape for the bezel to the bottom area close to the lamp (two points).

3. Attach the tape for fixing the FL tube cable (one point).

CAUTION: *When attaching tape and insulation sheet, be careful not to damage the TAB and lamp cable connections.*
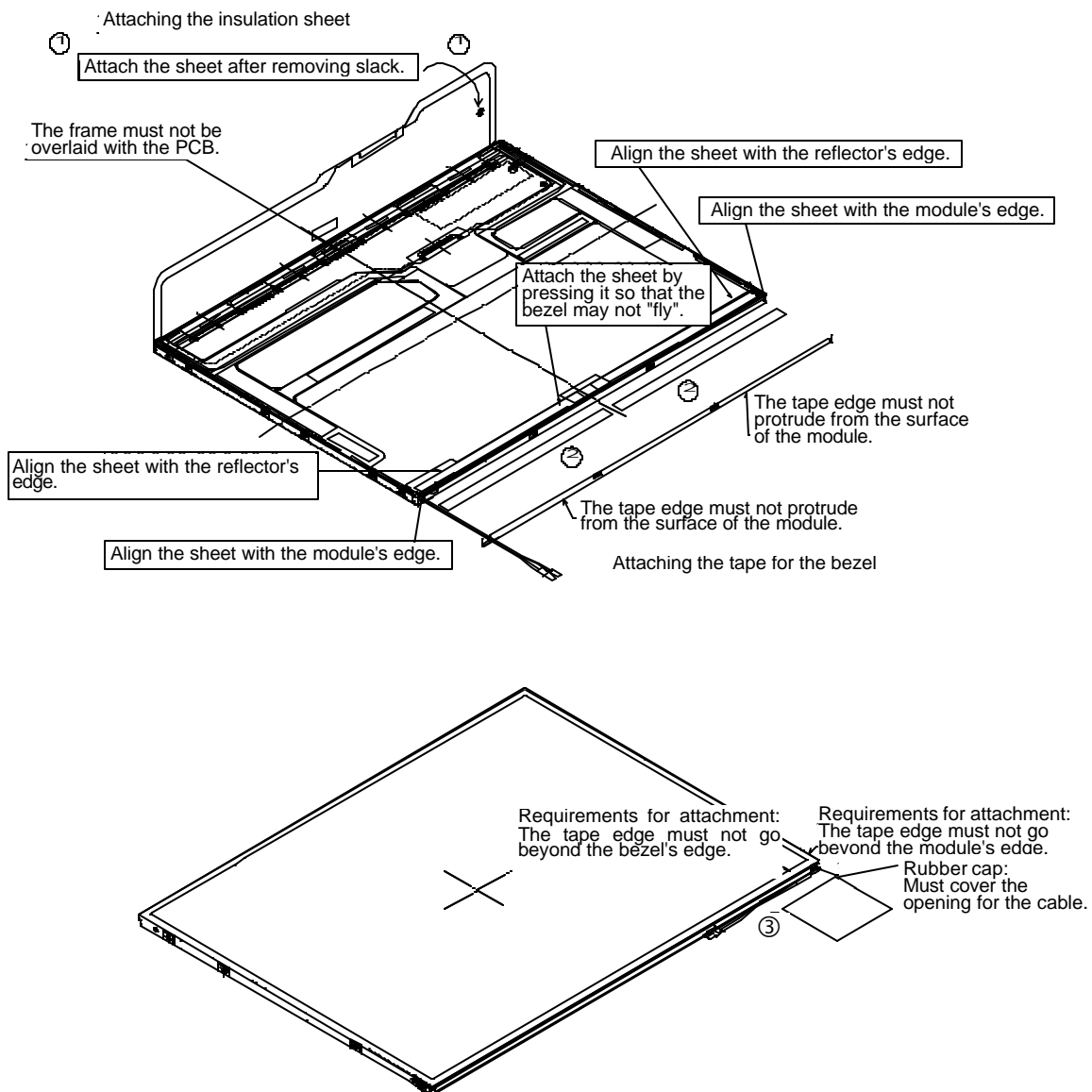
Figure 4-74 Replacing 14 Inch TMD fluorescent lamp (12)

4.26.4   Replacing the 15.0 Inch XGA CHIMEI Fluorescent lamp

Disassembling the 15.0 Inch XGA CHIMEI Fluorescent lamp

To disassemble the 15.0 inch XGA CHIMEI fluorescent lamp, follow the steps below and refer to figures 4-75 to 4-80.

1.   Remove the CU tape, yellow tape and protector film X.
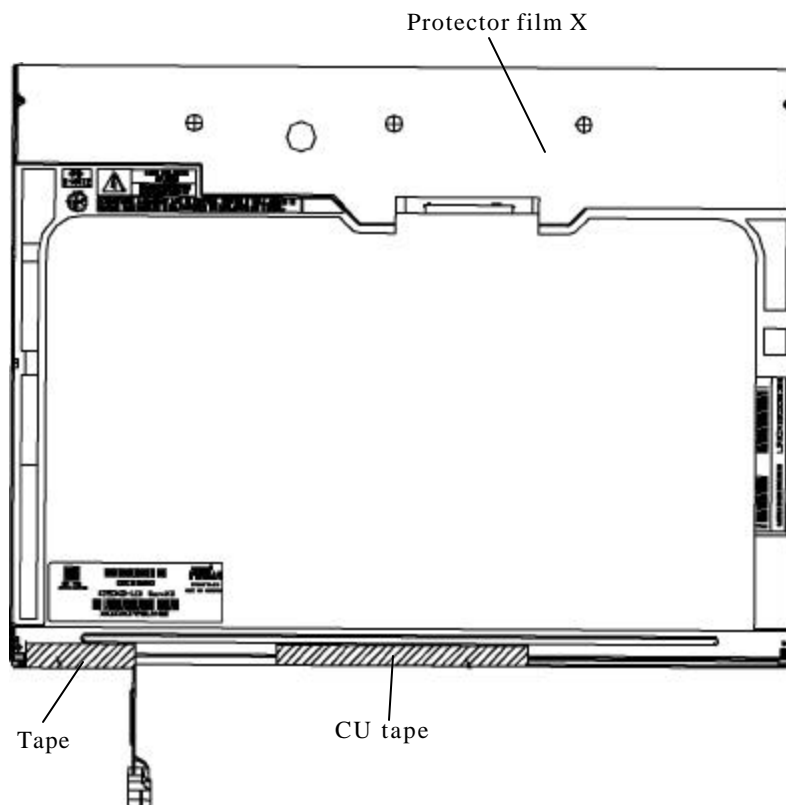
Figure 4-75 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (1)

2. Remove the two screws (B) fixing the X-PCB. Then remove the eight screws (C) fixing the metal frame. Release the two hooks (A).
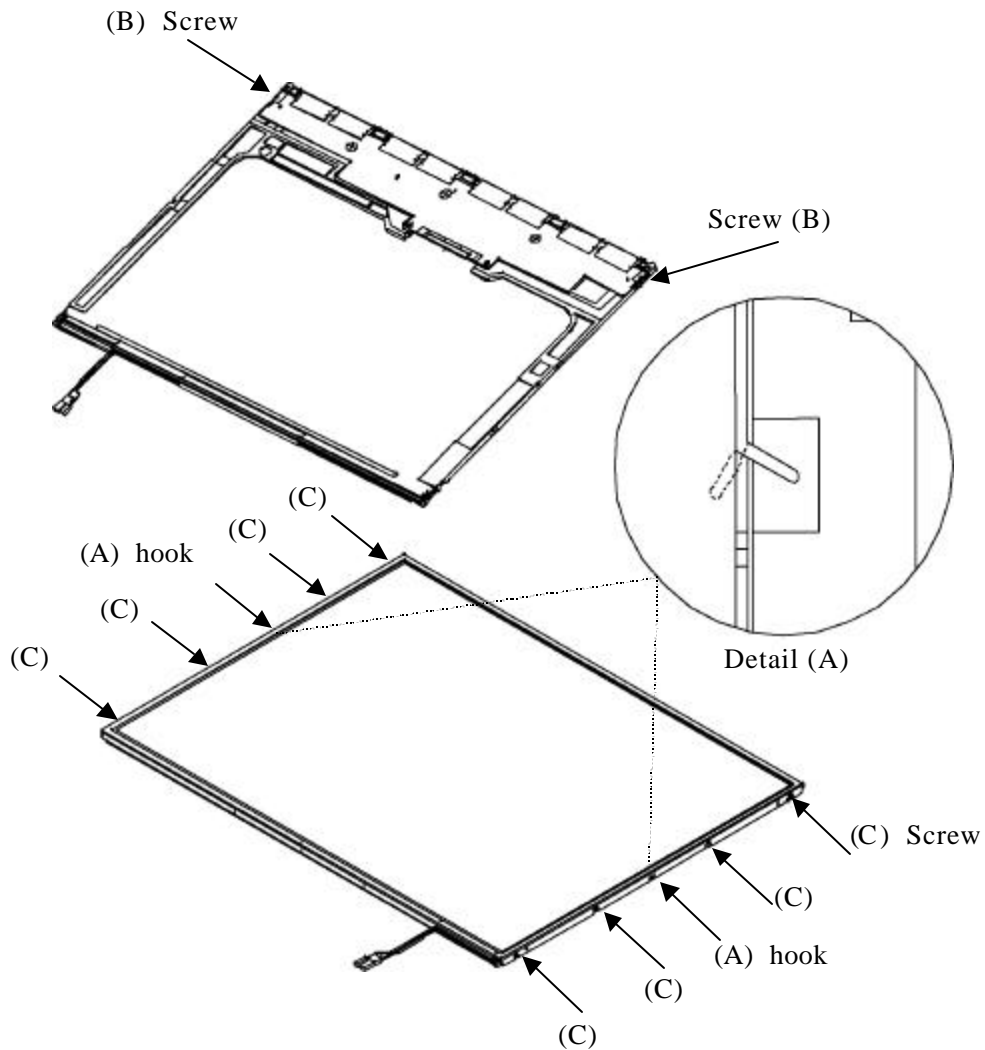
Figure 4-76 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (2)

3.   Release the latch.

NOTE: *Remove the metal frame parallel no to damage it.*

Latch

Metal frame

Backlight
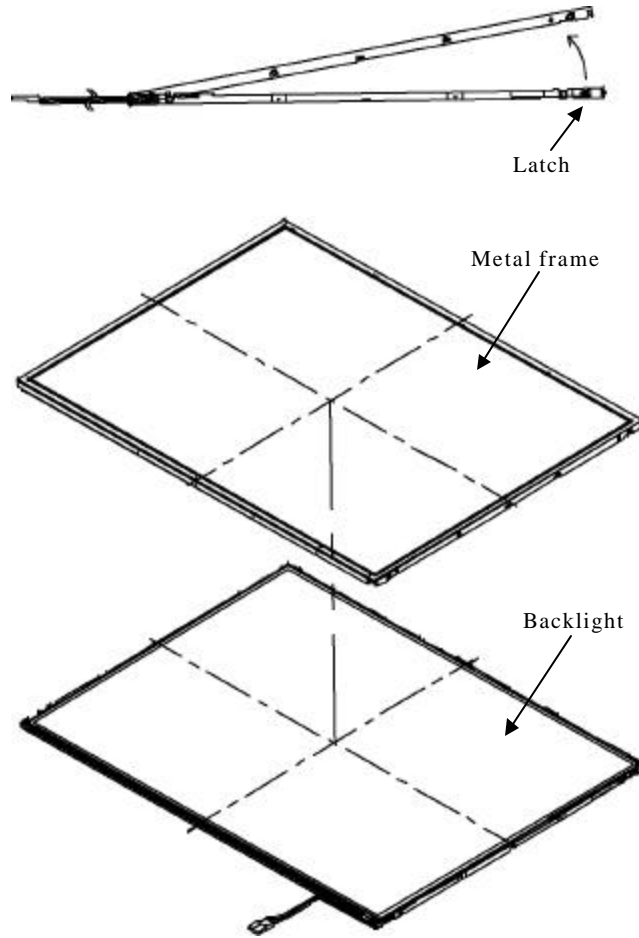
Figure 4-77 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (3)

4. Remove the X-PCB. When removing the X-PCB, be careful not to damage the TCP.
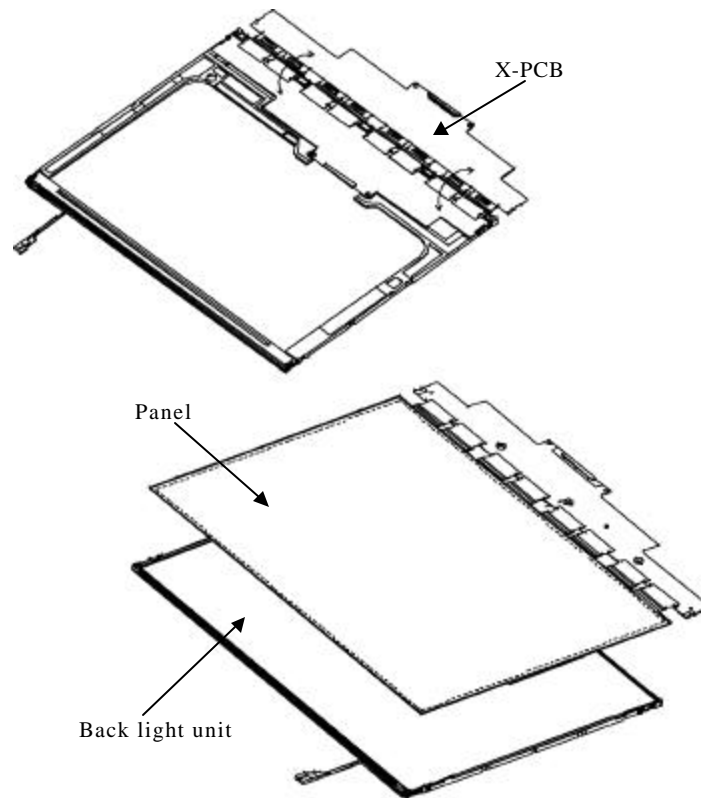
Figure 4-78 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (4)

5. Remove the three spacers from the BEFIII-M diffuser sheet. Remove the DEFIII-M diffuser sheet, BEFIII-T diffuser sheet and two tapes from the backlight unit in order. When removing the sheets, be careful not to damage them.
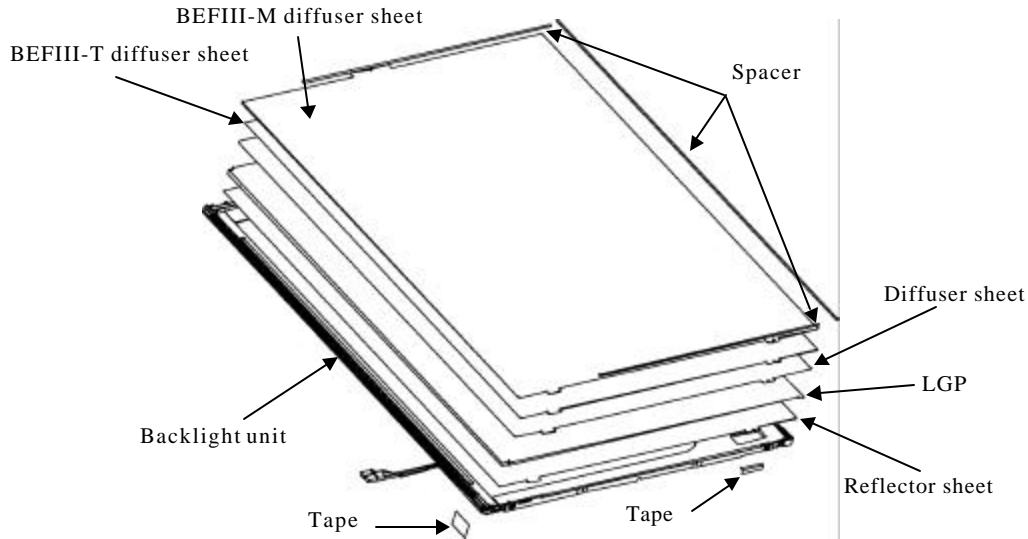
Figure 4-79 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (5)

6. Remove the two screws.
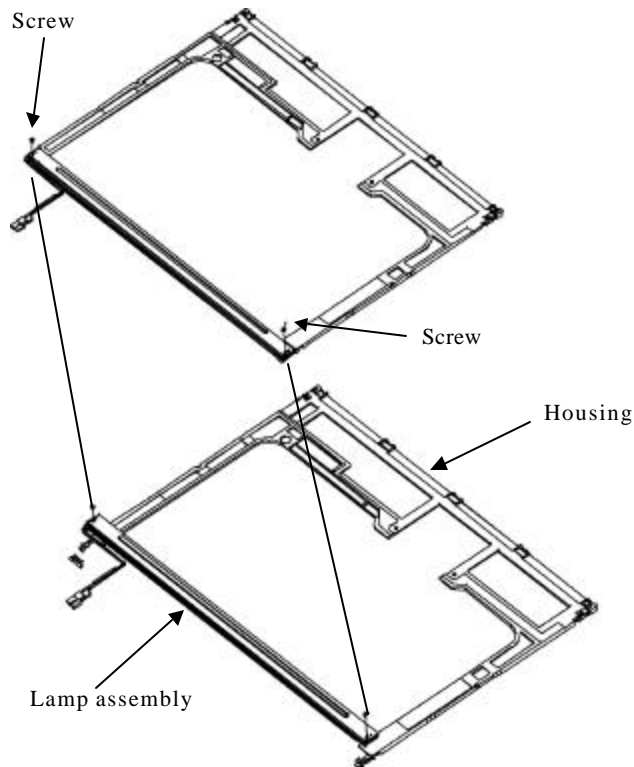
Figure 4-80 Replacing 15.0 Inch CHIMEI fluorescent lamp (XGA) (6)

Assembling the 15.0 Inch XGA CHIMEI fluorescent lamp

To assemble procedure of the 15.0 inch XGA CHIMEI fluorescent lamp, follow the reverse steps of the disassembling steps above.

4.26.5   Replacing the 15.0 Inch XGA LG.Philips Fluorescent lamp

CAUTION: When replacing the fluorescent lamp, wear finger covers or gloves to avoid contaminating or damaging the LCD panel. Be careful not to let dust or other foreign substance into the module.

Disassembling the 15.0 Inch XGA LG.Philips Fluorescent lamp

To disassemble the 15.0 inch XGA LG.Philips fluorescent lamp, follow the steps below and refer to figures 4-81 to 4-84.

1. Remove the outside tape and cover shield.

    1) Remove the adhesive tape fixing the B/L wire. Be careful not to apply to the B/L wire.

    2) Remove the cover shield (G). Be careful not to apply excessive force to the gate TCP.

    3) Remove the cover shield (C). Be careful not to apply excessive force to the source PCB.

CUATION: Wear anti-static gloves to prevent circuit damage caused by ESC.

    4) Remove the tape shield and adhesive tape fixing the top tape. Be careful not to apply excessive force to the top case.
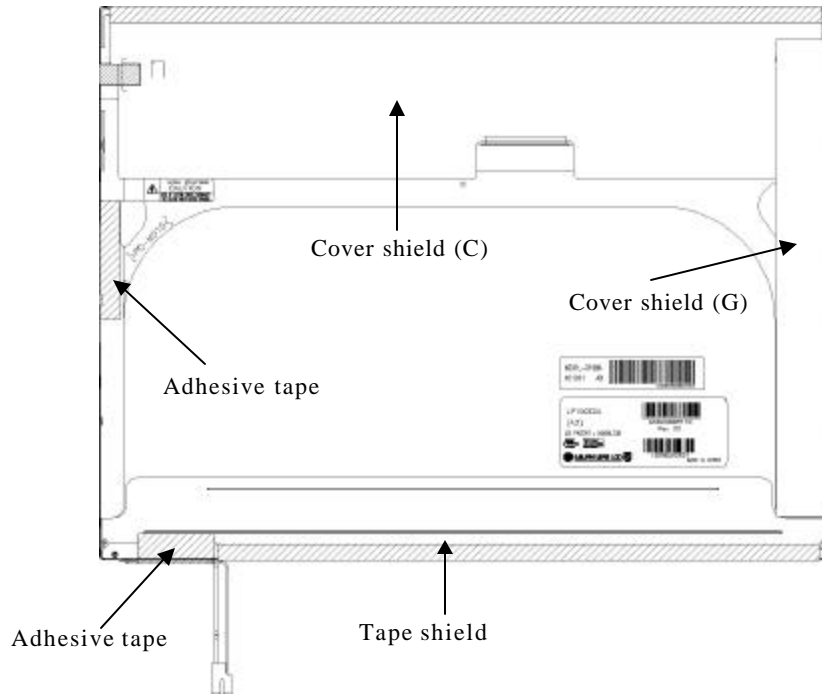
Figure 4-81 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (1)

2. Remove the top case. Be careful not to apply excessive force to the top case and gate TCP.

Top case
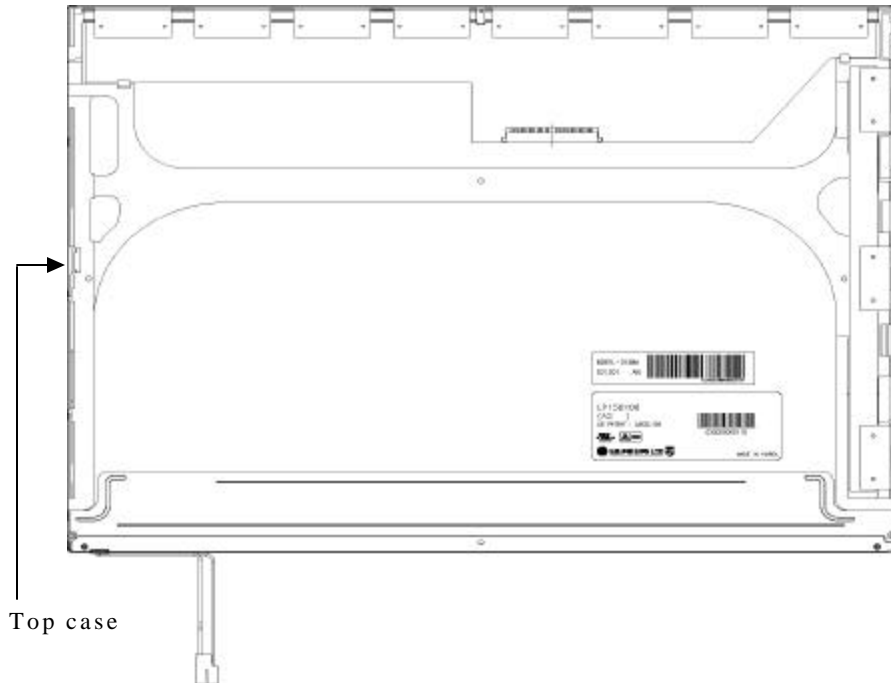
Figure 4-82 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (2)

3. Remove the source PCB and gate PCB.

    1) Remove the source PCB. Be careful not to apply excessive force to the PCB or TCP when removing the double-sided tape.
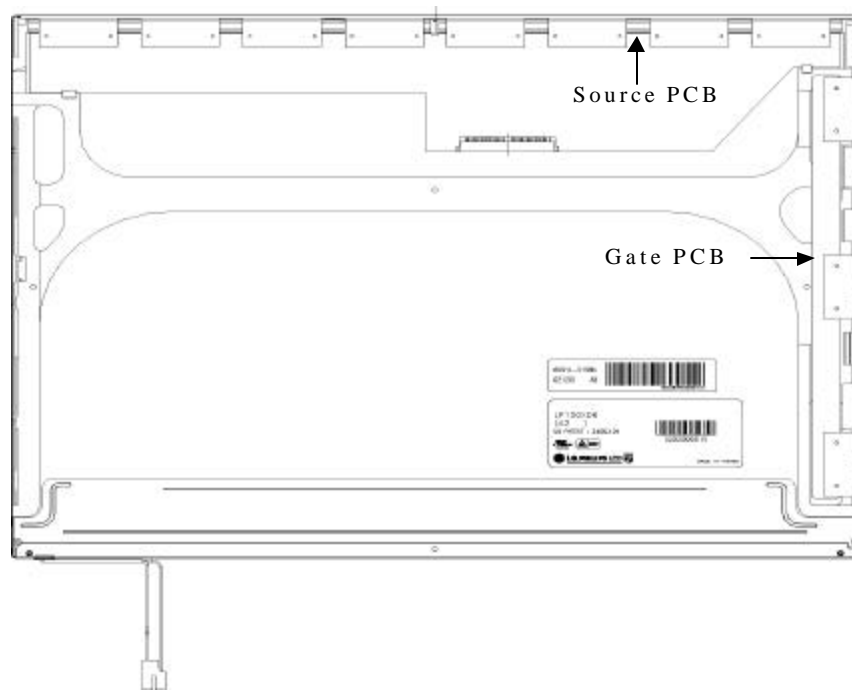
    2) Remove the gate PCB. Be careful not to apply excessive force to the PCB or TCP when removing the double-sided tape.

Figure 4-83 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (3)

4. Remove the board assembly, adhesive tape, light guide and cover assembly bottom (L).

   1) Remove the board assembly.

   2) Remove the adhesive tape securing the sheets (four points).

   3) Remove the sheets and light guide.

NOTE: No penetration of foreign object is indispensable not to scratch the sheets.

---

   4) Remove the screw and cover assembly bottom (L).

NOTE: Maximum value of torque is 1.5kg·cm.
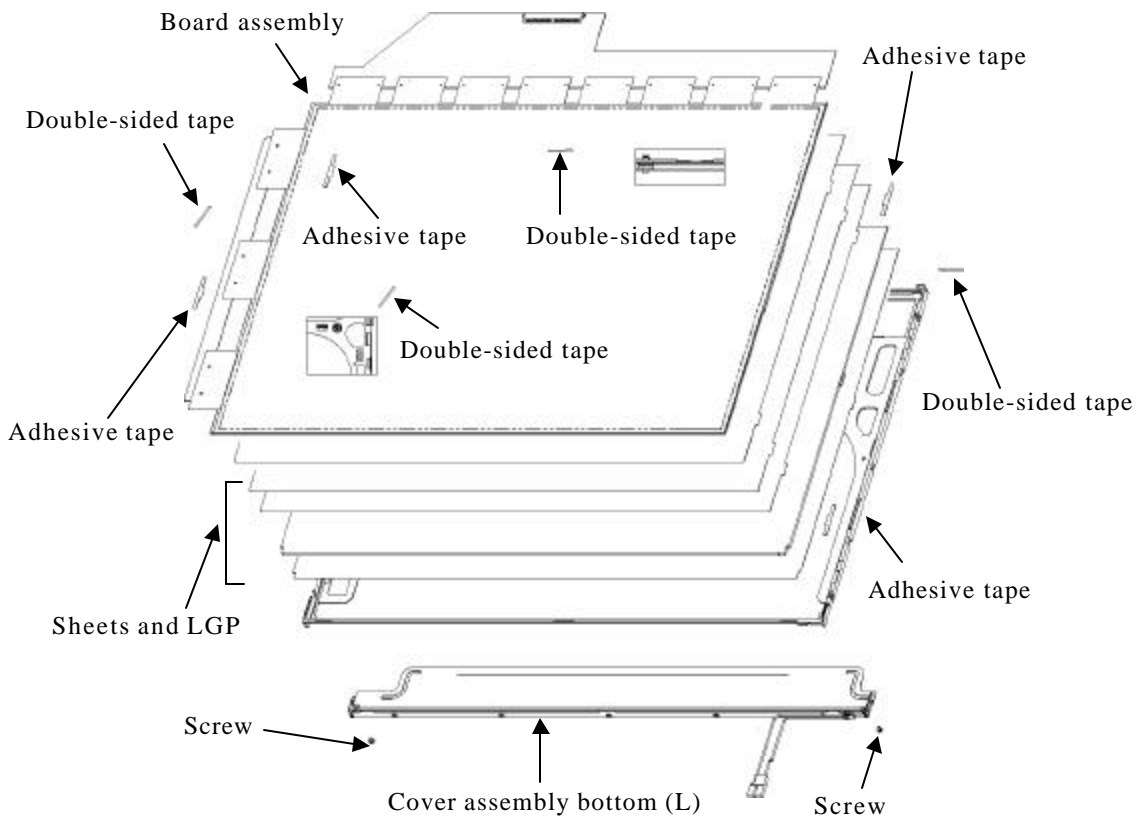
Figure 4-84 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (4)

Assembling the 15.0-inch XGA LG.Philips Fluorescent lamp

To assemble the 15.0-inch XGA LG.Philips fluorescent lamp, follow the steps below and refer to figures 4-85 to 4-88.

    1.   Install the cover assembly bottom (L), sheets, light guide, adhesive tape and board assembly.

         1)   Remove the protect film from the cover assembly bottom (L).

         2)   Secure the cover assembly bottom (L) with the two screws.

NOTE: Maximum value of torque is 2.0kg· cm.

---

         3)   Install the light guide and sheets. (Secure the reflection sheets with double-sided tape.)

NOTE: No penetration of foreign object is indispensable not to scratch the surface of the sheets.

---

         4)   Stick the adhesive tape to fix the sheets.

         5)   Install the board assembly. (Secure the gate PCB with double-sided tape.)

NOTE: Do not apply excessive force to the PCB and TCP.

Board assembly

Double-sided tape

Adhesive tape

Adhesive tape   Double-sided tape

Double-sided tape

Double-sided tape

Adhesive tape

Sheets and LGP

Adhesive tape
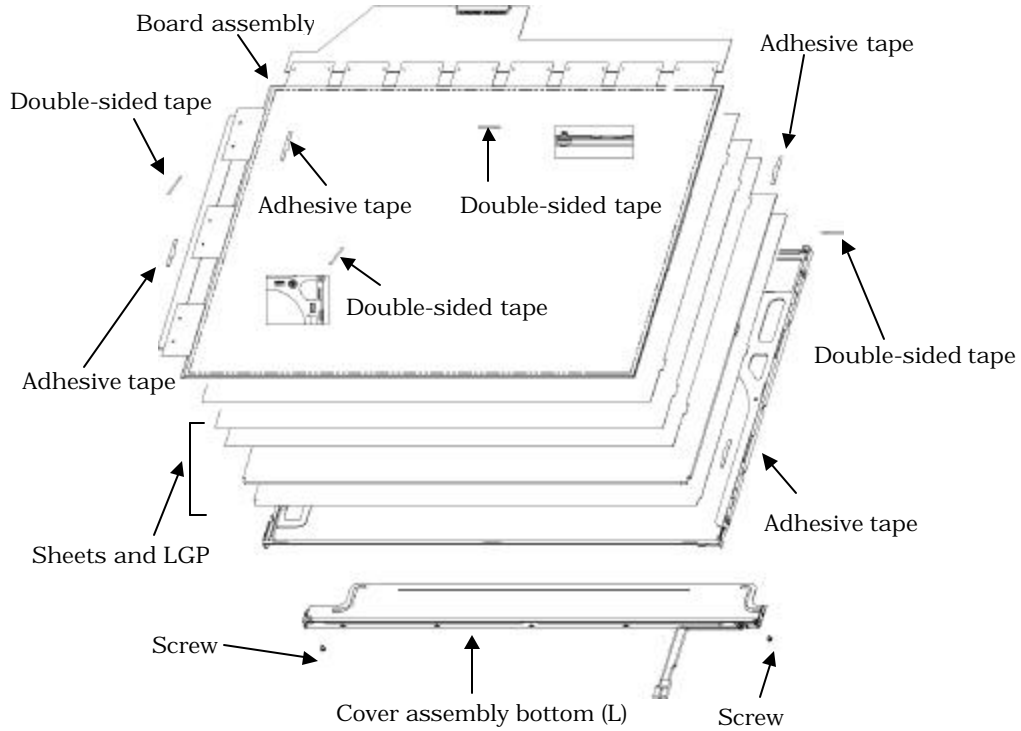
Screw

Cover assembly bottom (L)   Screw

Figure 4-85 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (5)

2. Install the source PCB and gate PCB.

    1) Install the source PCB. Be careful not to apply excessive force to the TCP.

    2) Install the gate PCB. Be careful not to apply excessive force to the TCP.
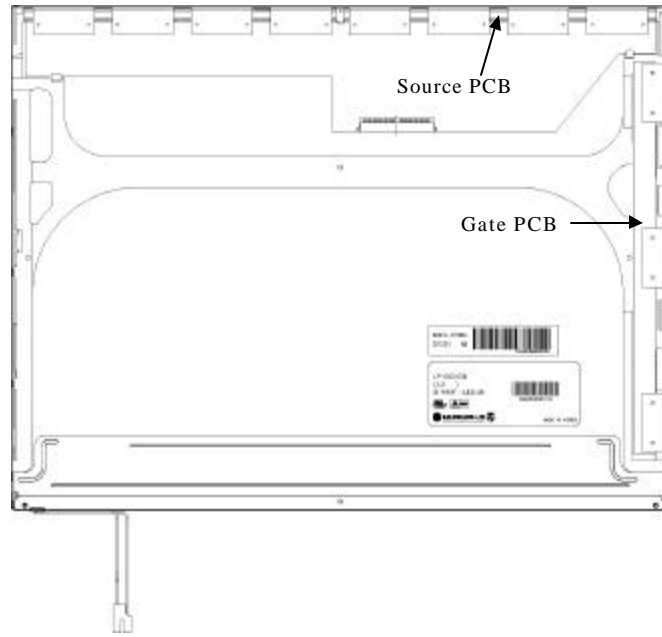
Figure 4-86 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (6)

3. Install the top case. Be careful not to apply excessive force to the gate TCP.
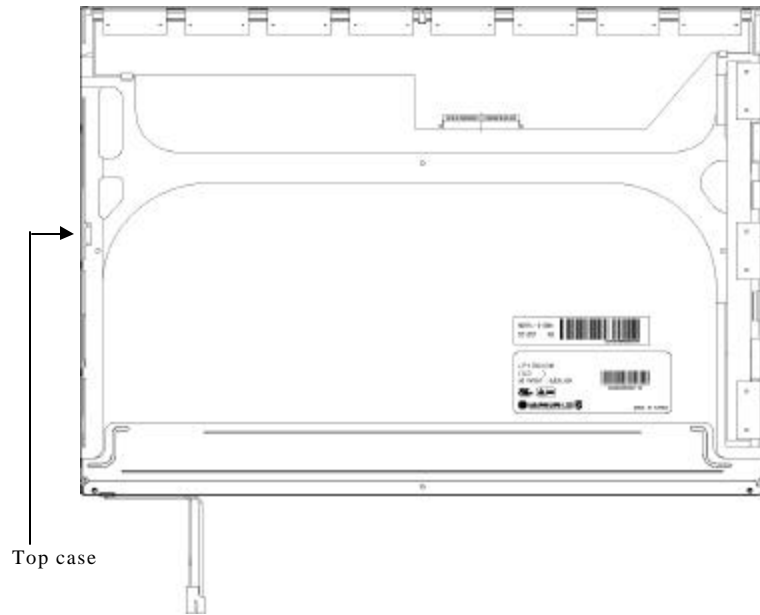
Top case

Figure 4-87 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (7)

4. Stick the outside tape and install the cover shield.

1) Stick the tape shield and adhesive tape to fix the top case.

NOTE: Be careful not to apply excessive force to the top case.

2) Install the cover shield (C).

NOTE: Be careful not to apply excessive force to the control PCB.

CAUTION: Wear anti-static gloves to prevent circuit damage to the source PCB.

3) Install the cover shield (G).

NOTE: Be careful not to apply excessive force to the gate TCP.

4) Stick the adhesive tape to fix the B/L wire.

NOTE: Be careful not to apply excessive force to the B/L wire.
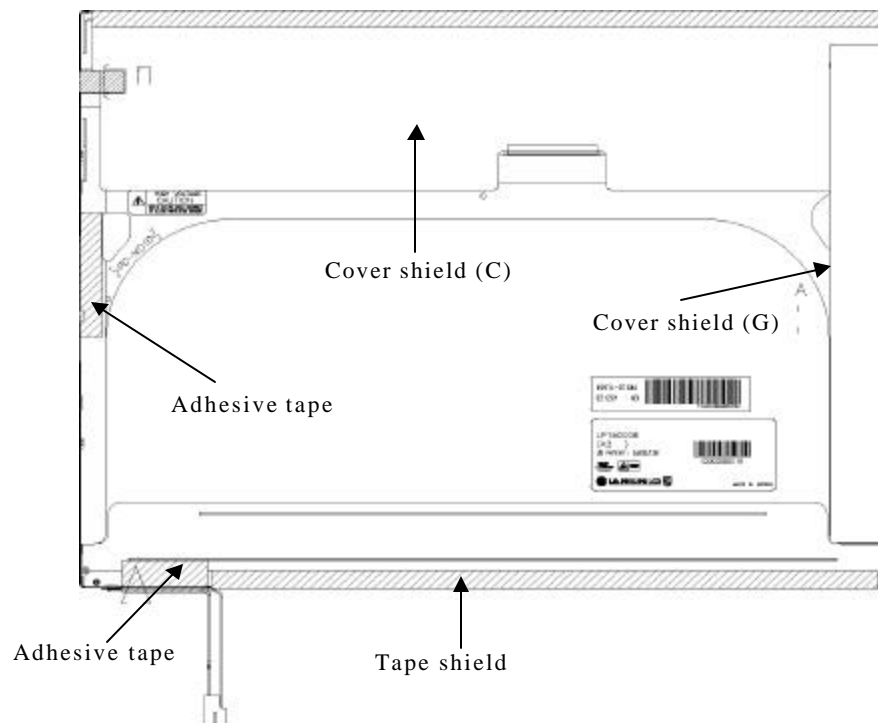
Figure 4-88 Replacing 15.0 Inch LG.Philips fluorescent lamp (XGA) (8)

4.26.6   Replacing the 15.0 Inch XGA Samsung Fluorescent lamp

Disassembling the 15.0 Inch XGA Samsung Fluorescent lamp

To disassemble the 15.0 inch XGA Samsung fluorescent lamp, follow the steps below and refer to figures 4-89 to 4-97.

1. Remove the PCB cover.

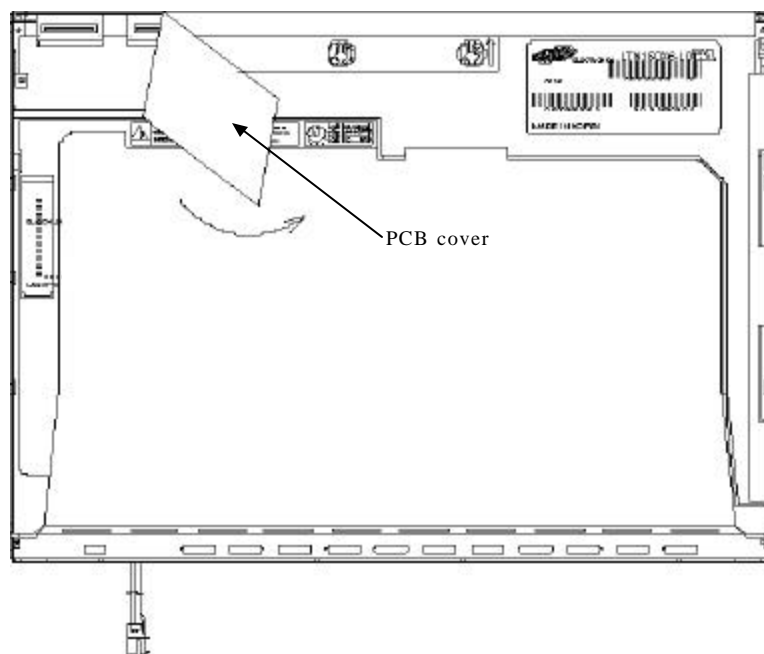NOTE: *When removing the PCB cover, be careful not to damage the COF.*

Figure 4-89 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (1)
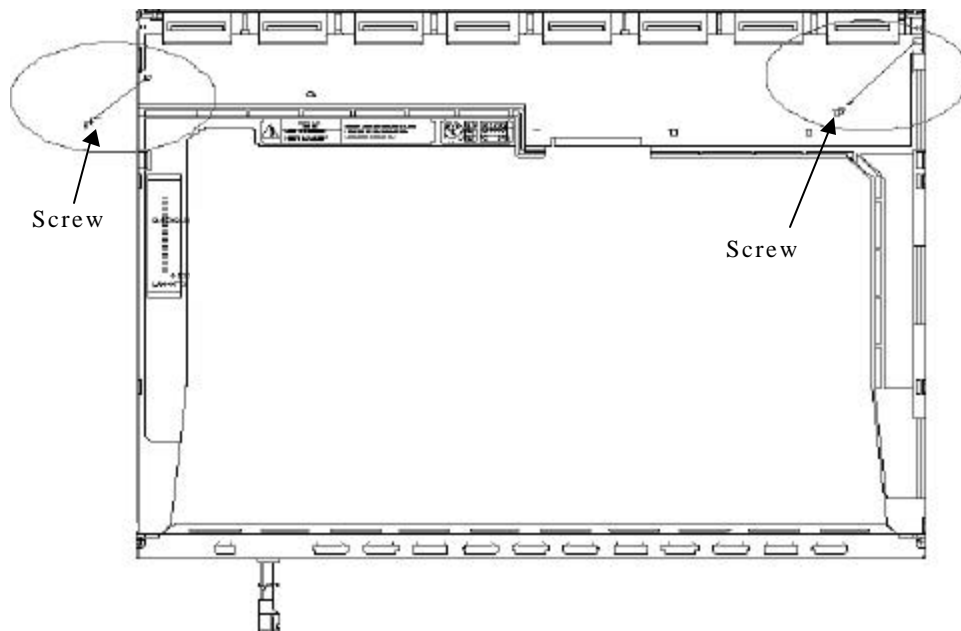
2. Remove the two screws.

Figure 4-90 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (2)

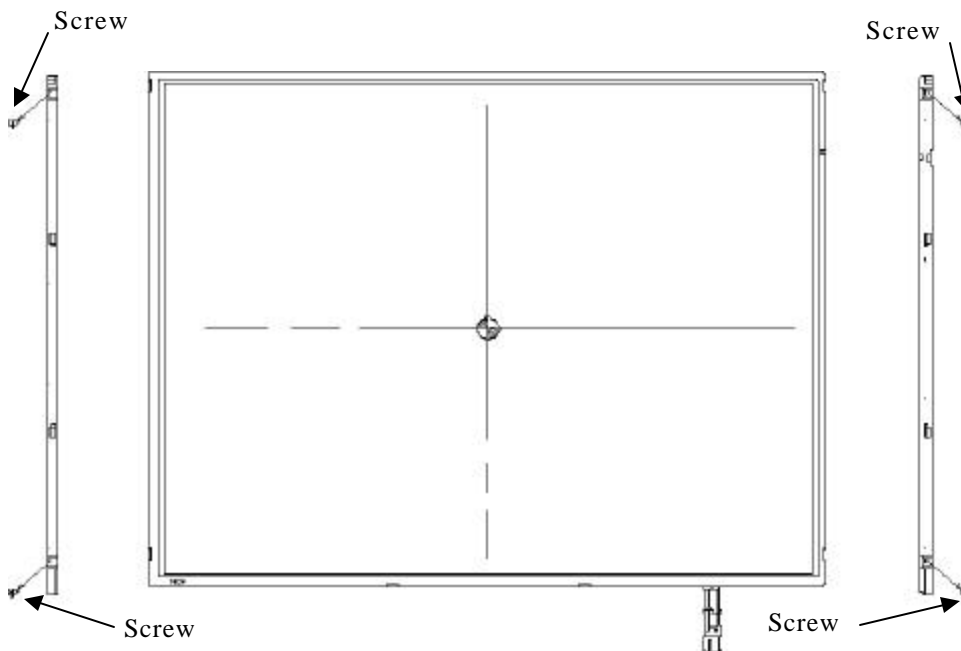3. Remove the four screws from the top chassis.

Figure 4-91 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (3)

4. Remove the four bottom hooks and four side hooks (left and right). Then remove the top
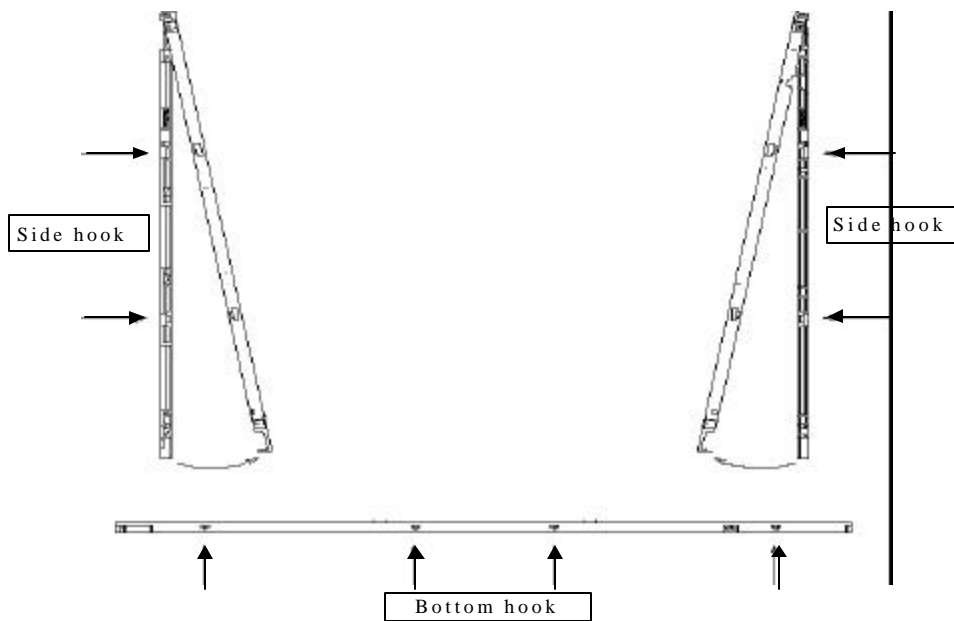   chassis from the mold frame.

Figure 4-92 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (4)

5. Remove the panel assembly from the mold frame.

NOTE: *When removing the panel assembly, be careful not to damage the COF.*

Panel assembly

Mold frame

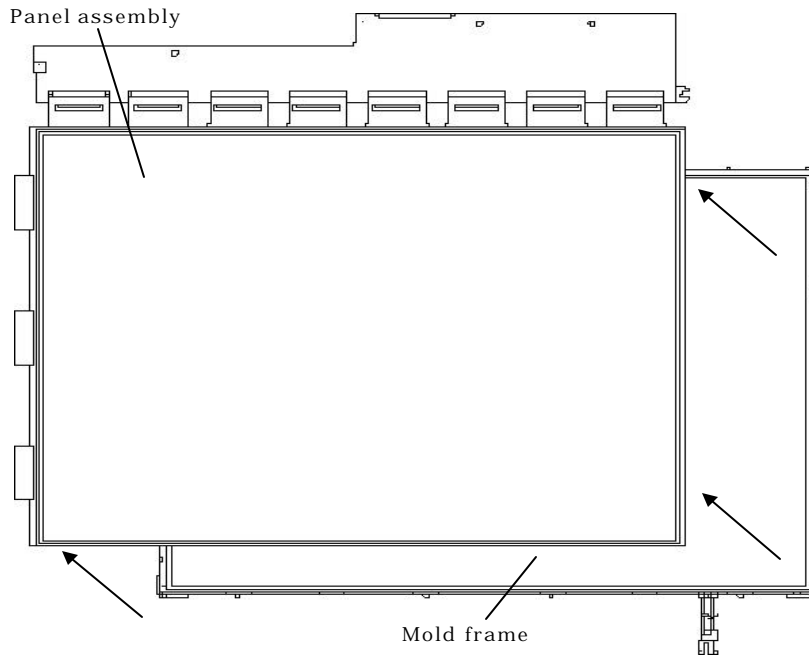*Figure 4-93 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (5)*

6.   Remove the sheets and clips.

    1)   Remove the two clips fixing the sheets.

    2)   Remove the sheets (protection sheet, prism sheet (L, U), diffusion sheet, LGP and reflection sheet).
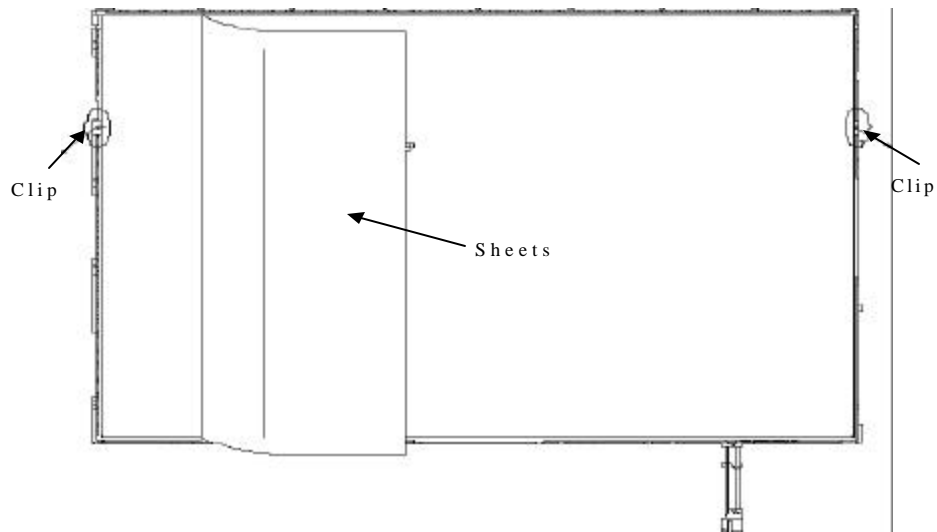

Figure 4-94 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (6)

7.   Remove the lamp back cover.

    1)   Remove the two screws from the lamp back cover.
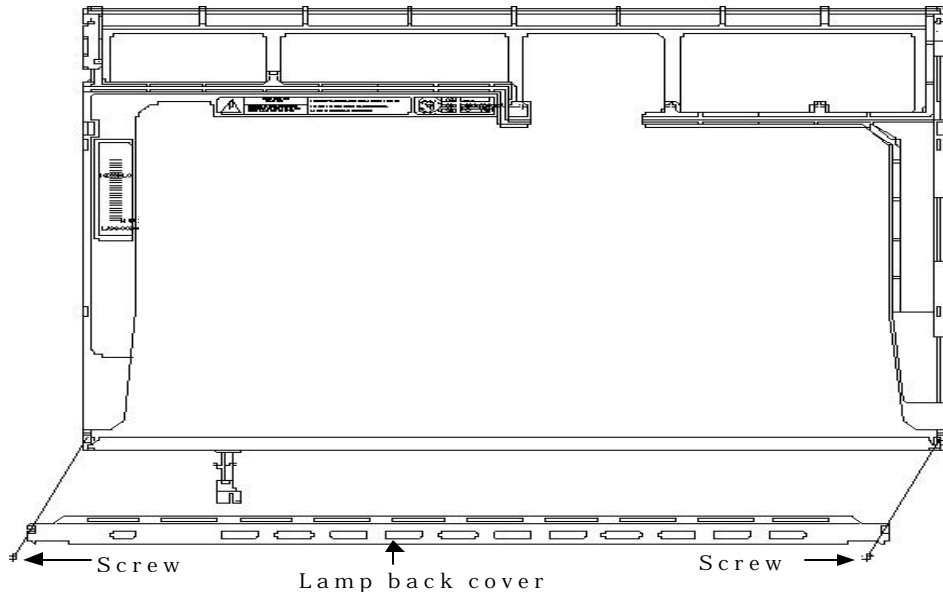
    2)   Remove the lamp back cover.

Figure 4-95 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (7)

8. Remove the lamp wire from the wire guide of the mold frame.

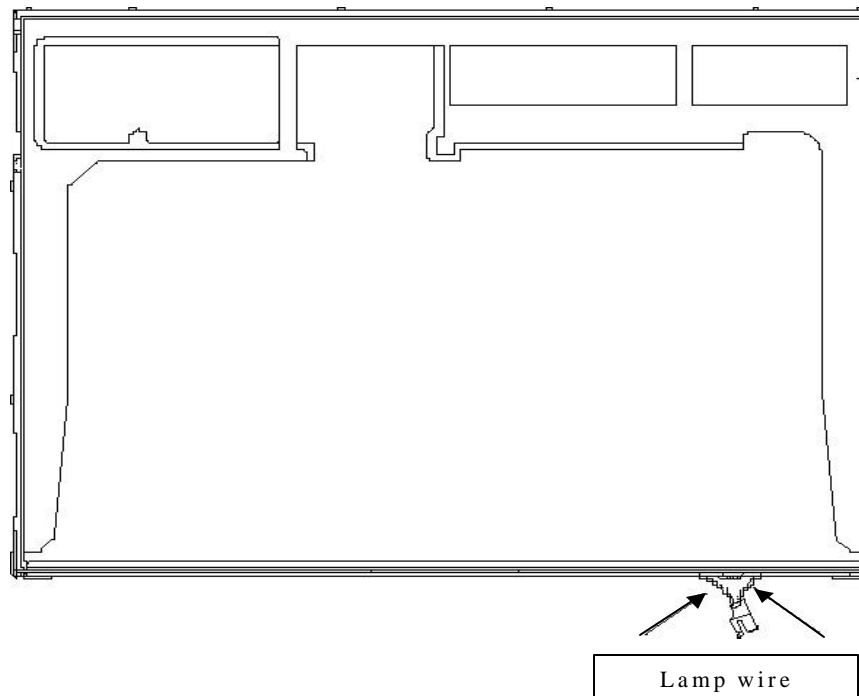*Figure 4-96 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (8)*

9. Remove the lamp assembly from the mold frame.

Lamp assembly

Mold frame
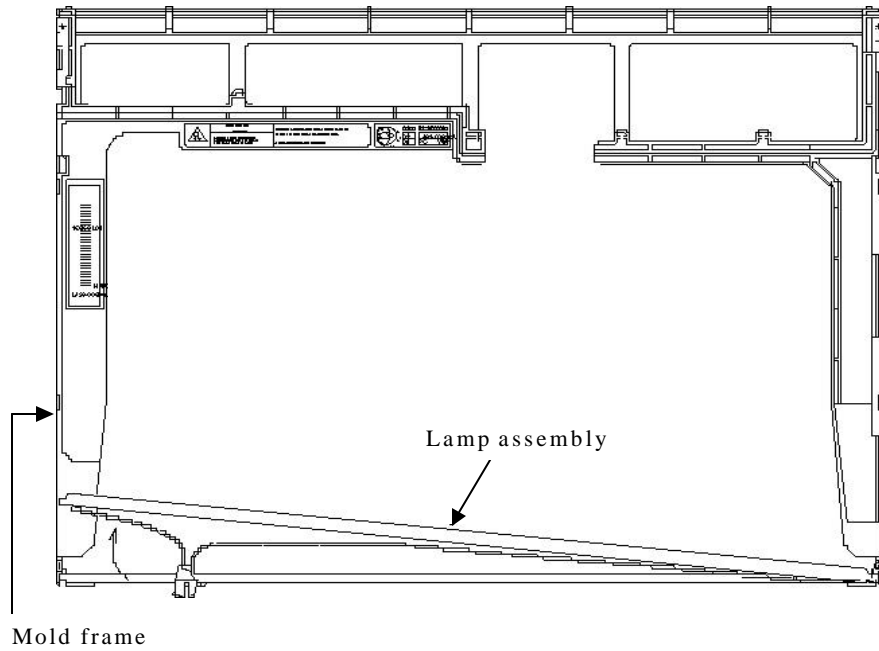
Figure 4-97 Replacing 15.0 Inch Samsung fluorescent lamp (XGA) (9)

Assembling the 15.0-inch XGA Samsumg Fluorescent lamp

The assembly procedure of the 15.0-inch XGA Samsung fluorescent lamp is the reverse of the above disassembly procedure.

4.26.7   Replacing the 15.0 Inch XGA Sharp Fluorescent lamp

Disassembling the 15.0 Inch XGA Sharp Fluorescent lamp

To disassemble the 15.0-inch XGA Sharp fluorescent lamp, follow the steps below and refer to figures 4-98 to 4-107.

1. Turn the LCD module face down, and remove the protection cover S (A), protection cover G (B), fixing tape (C) and fixing tape for lead wire (D).

> *NOTE:* *1) Be careful not to damage the TCP or chips.*
>
> *2) The protection cover G is reused. Discard the other tapes removed.*
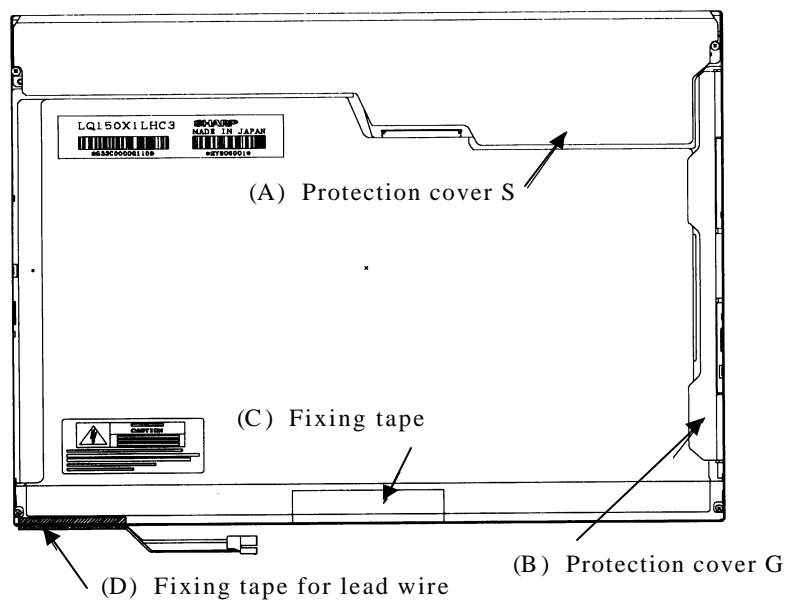
Figure 4-98 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (1)

2. Remove the four screws on the sides.

Screw loosening torque: 1.2kg•cm
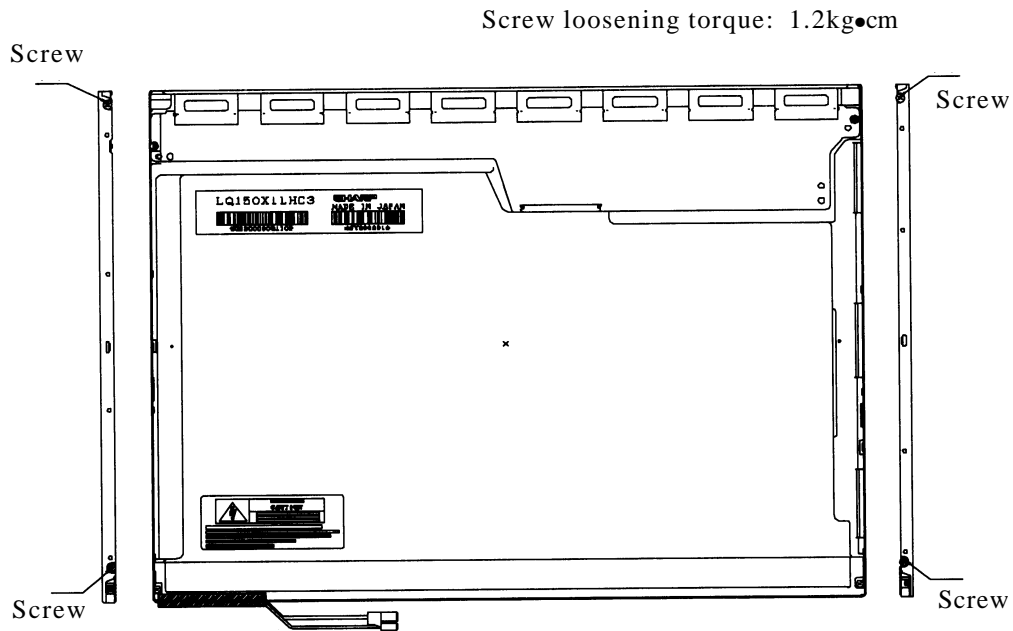
Figure 4-99 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (2)

3. Turn the LCD module face up and remove the bezel (E).
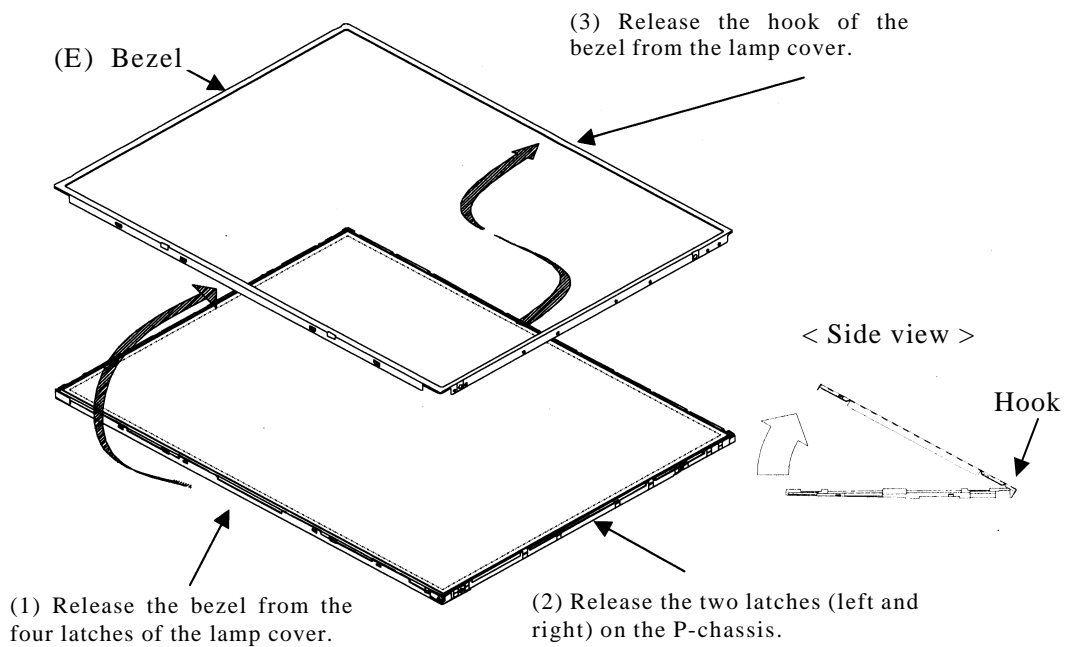
Figure 4-100 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (3)

4. Turn the LCD module face down and remove the two screws fixing the board. Then open the bent portion of the TCP of the board and remove the backlight.
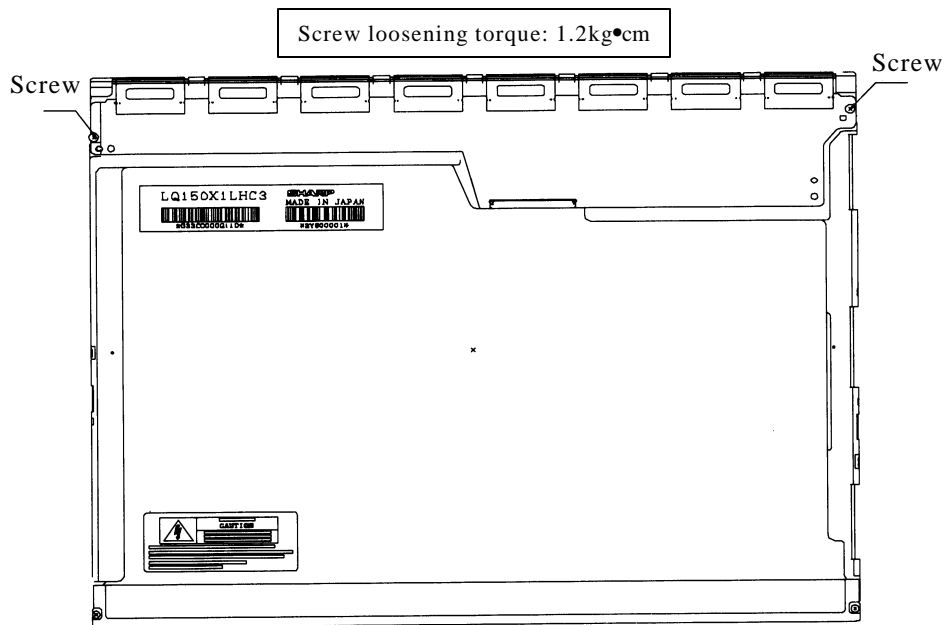
Figure 4-101 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (4)
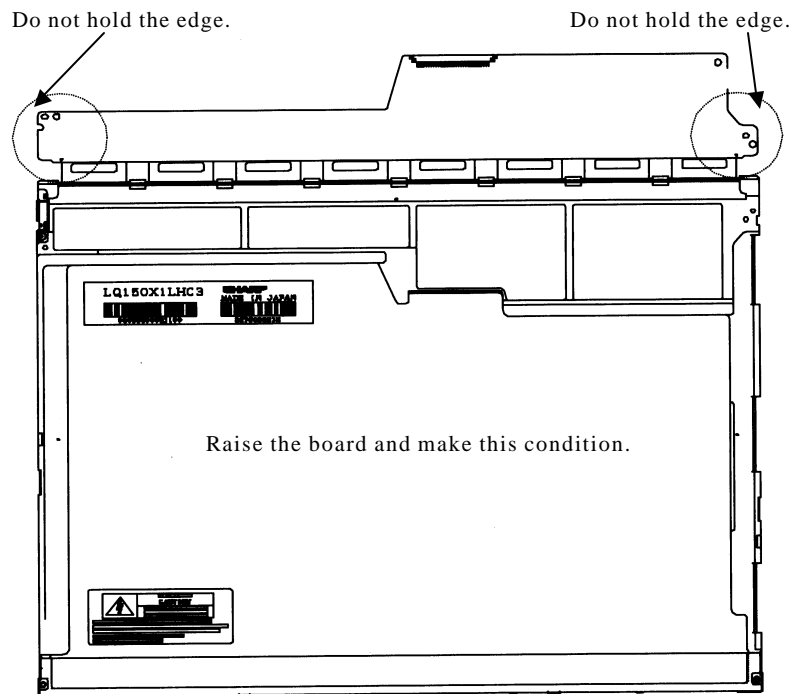
Figure 4-102 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (5)

5. Turn the LCD module face up and remove the LCD panel (I) from the backlight unit (H).

CAUTION: *Wear finger sacks or gloves during the work not to soil or scratch the LCD panel or backlight unit.*

(I) LCD panel
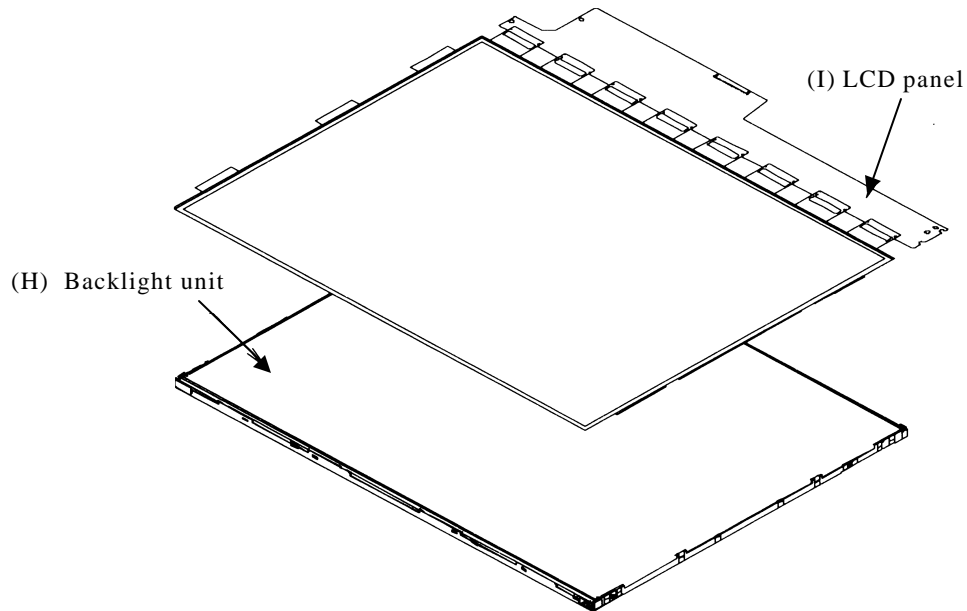
(H) Backlight unit

Figure 4-103 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (6)

6. Turn the backlight unit (H) removed face down and remove the two screws (D) and lamp cover (J).

NOTE: Be careful not to scratch or soil the sheets.

(H) Backlight unit

Screw loosening torque: 1.2kg•cm

(D) Screw

(D) Screw

(J) Lamp cover
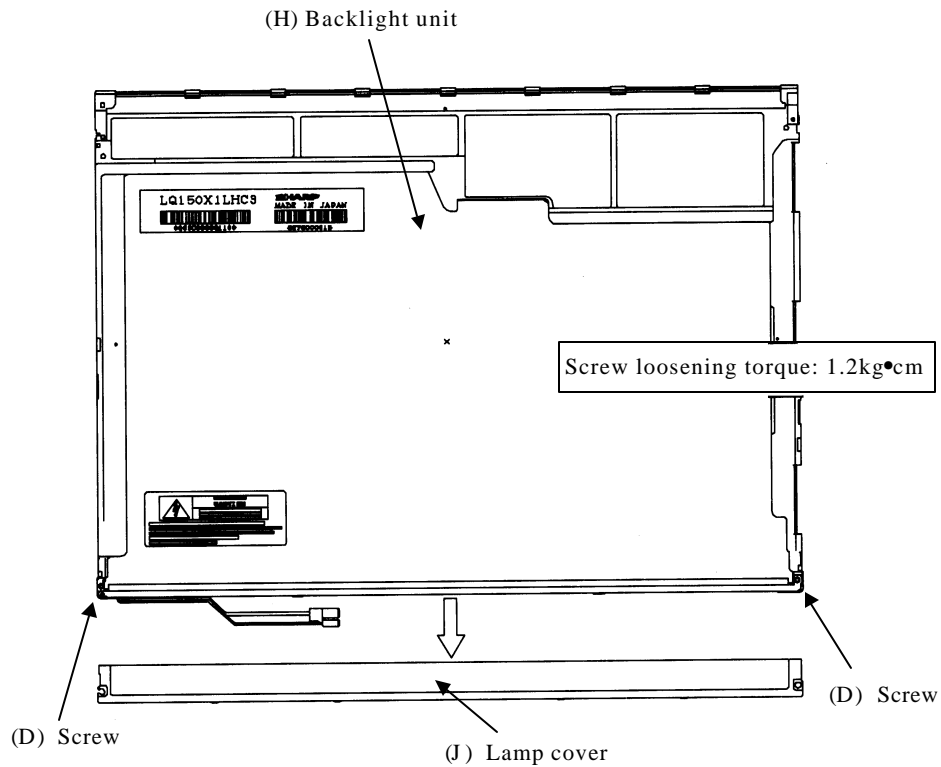
Figure 4-104 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (7)

7. Turn the backlight unit face up and remove the upper diffusion sheet (K), lens sheet (L) and light guide (M).

NOTE: Be careful not to scratch or soil the removed sheets or light guide to reuse them.

Do not remove the reflection sheet
under the light guide.

(K) Upper diffusion sheet

(L) Lens sheet

(M) Light guide
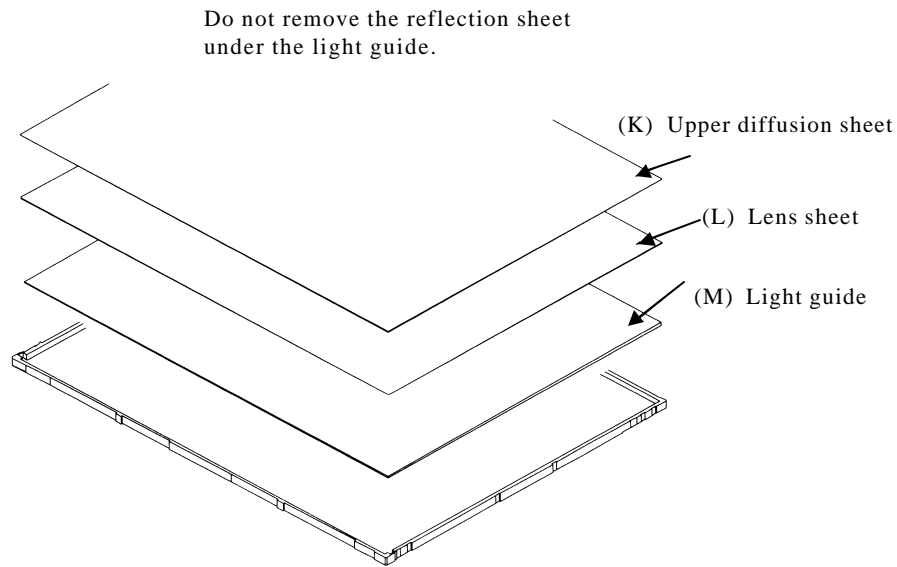
Figure 4-105 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (8)

8. Remove the four double-sided tapes (N, O, P, Q).

NOTE: *Discard the removed tapes. Do not reuse them.*

(N) Double-sided tape 1

(P) Double-sided tape 3

(O) Double-sided tape 2

(Q) Double-sided tape 4
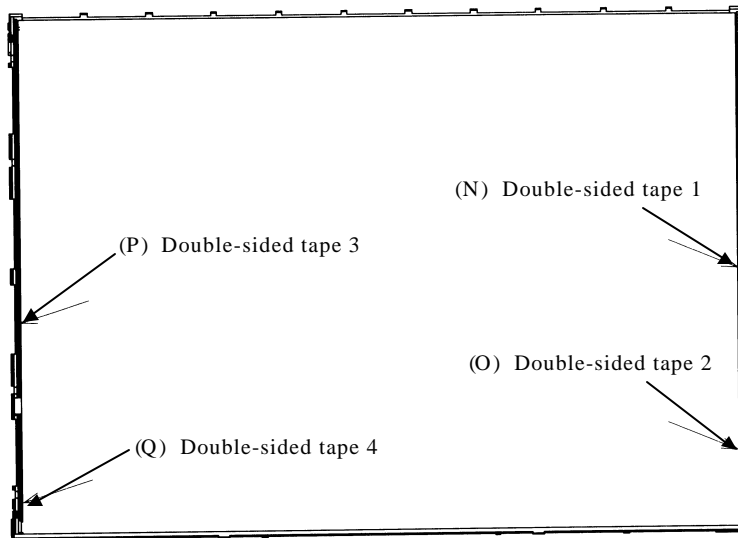
Figure 4-106 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (9)

9. Turn the backlight unit face down and remove the lamp unit (R) from the P-chassis.

CAUTION: *When removing the lamp unit, be careful not to break the lamp, or bend the reflection sheet.*
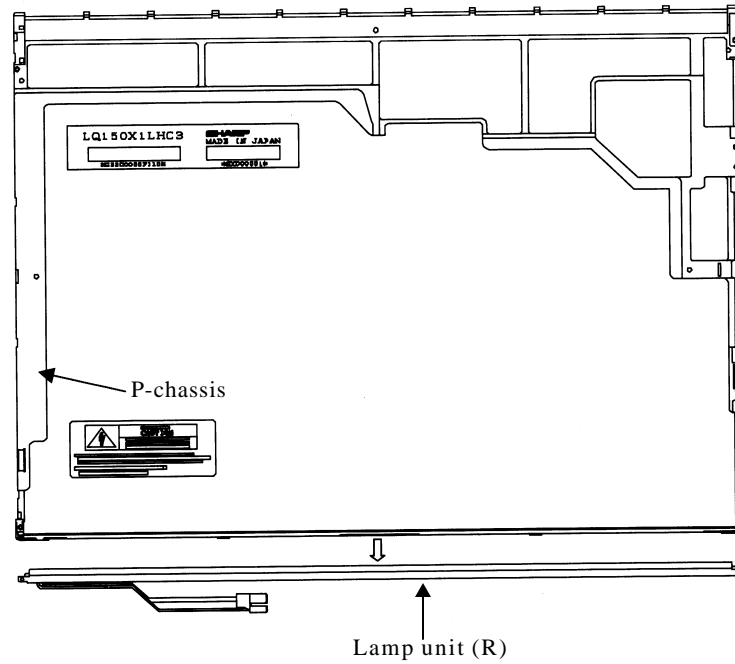
Figure 4-107 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (10)

Assembling the 15.0 Inch XGA Sharp Fluorescent Lamp

To assemble the 15.0 Inch Sharp XGA fluorescent lamp, follow the steps below and refer to figures 4-108 to 4-120.

1. Stick the four double-sided tapes (N, O, P, Q) on the P-chassis.
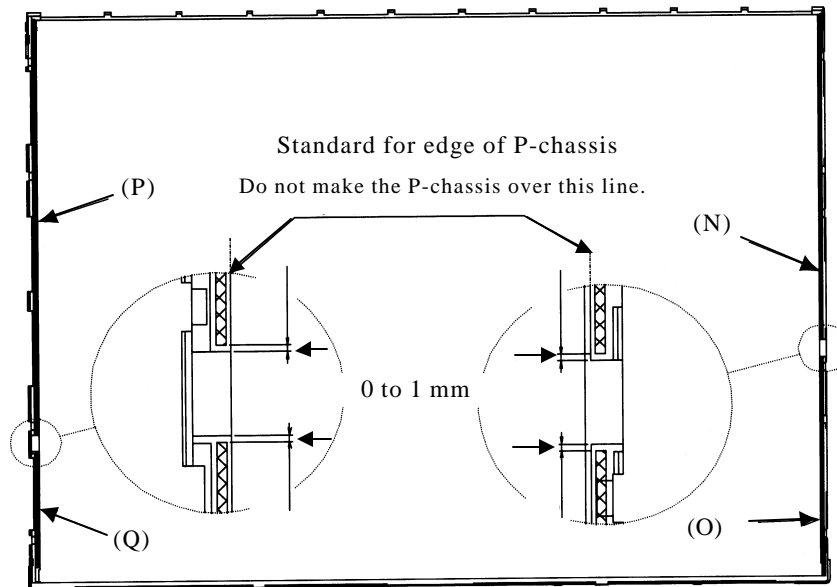
Figure 4-108 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (11)

2. Turn the backlight unit face down and install a new lamp unit (R) on the P-chassis.

NOTE: When install the lamp unit (R), be careful not to bend or damage the reflection sheet.
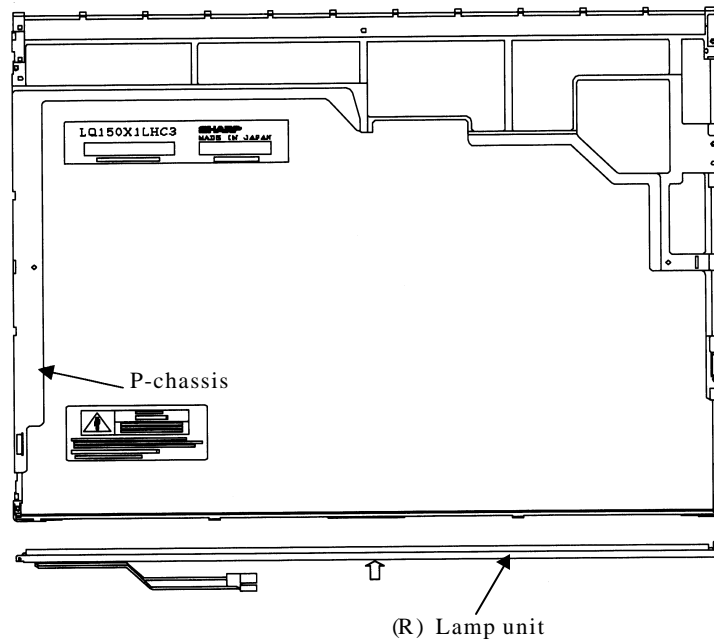
Figure 4-109 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (12)

Install the lamp unit without floating.

Install the reflection sheet as it is placed inside the reflector.

Install the lead wire into this groove.
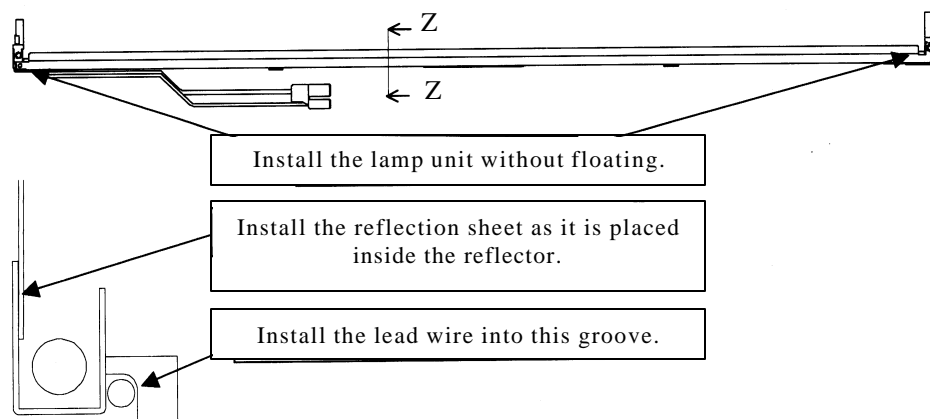
Cross-section drawing of Z-Z

Figure 4-110 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (13)

3. Install the lamp cover (J) on the backlight unit and secure it with the two screws (D).

(J) Lamp cover

Screw tightening torque: 1.0kg•cm

(D) Screw

(D) Screw
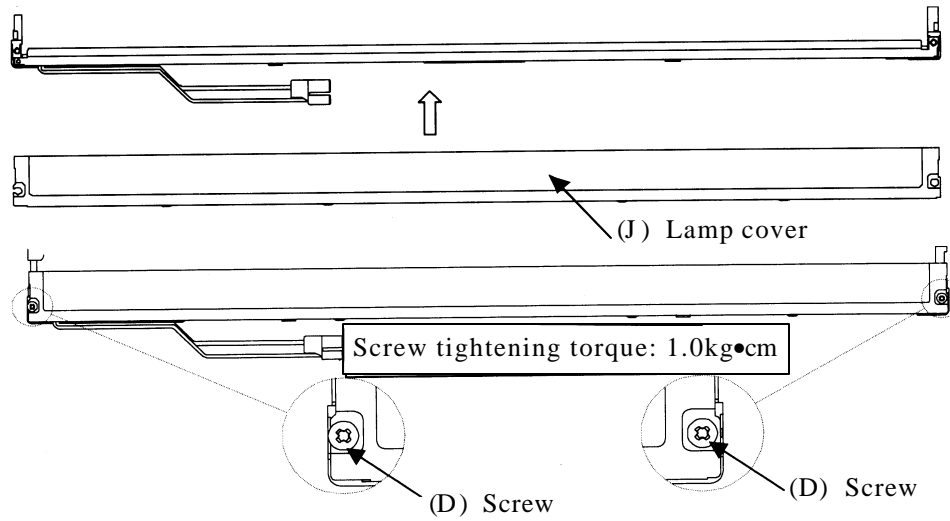
Figure 4-111 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (14)

4. Install the light guide (M) on the backlight unit.

Insert the light guide straight not to deform the reflector.

Backlight unit
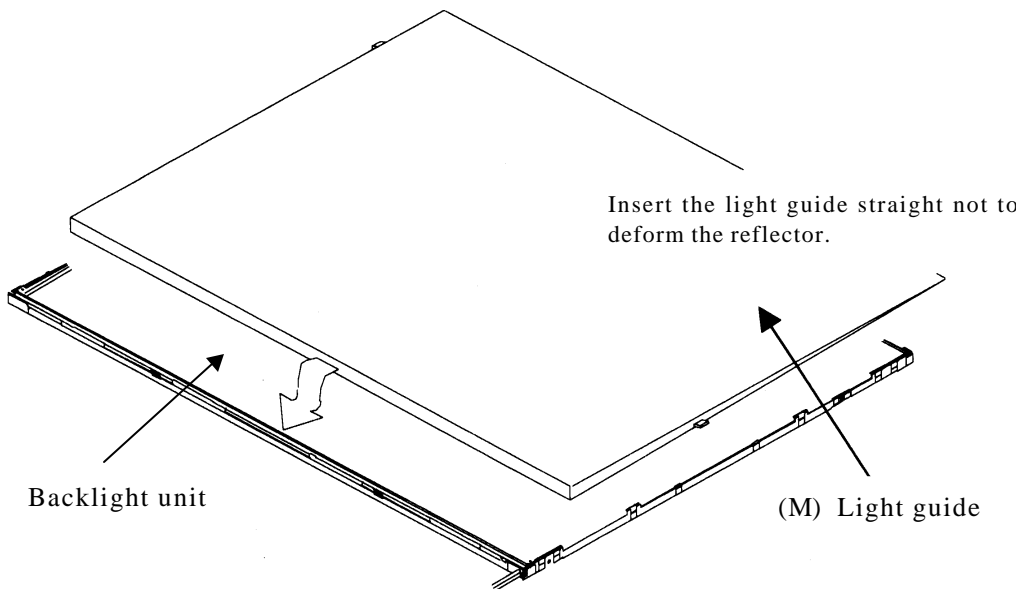
(M) Light guide

Figure 4-112 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (15)

5. Place the lens sheet (L) and upper diffusion sheet (K) on the backlight unit with light guide(M).

(K) Upper diffusion sheet

(L) Lens sheet

(M) Light guide

Make sure there is no dust or scratch.

Do not make any sheet over the edge of P-chassis.
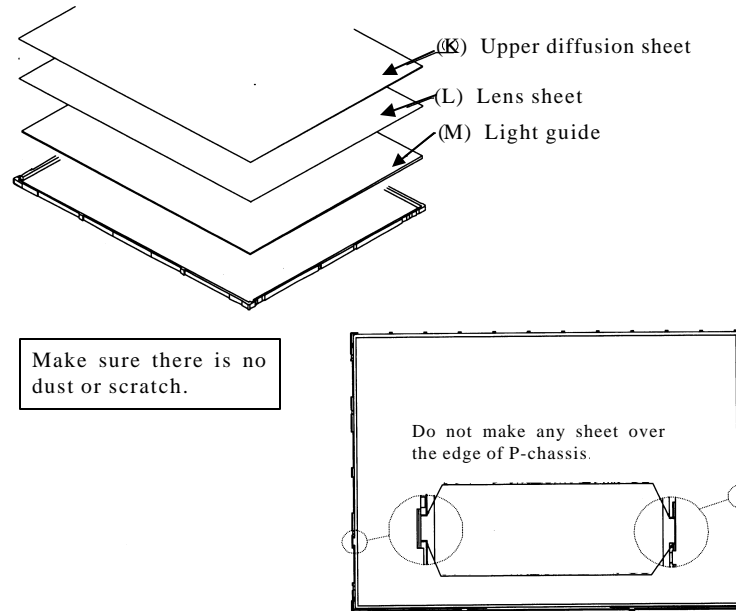
Figure 4-113 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (16)

6. Place the LCD panel (I) on the backlight unit (H).

NOTE: *Make sure there is no dust between the LCD panel and backlight unit. If any dust is found, remove it with crepe tape or others which has no remaining of paste.*

(I) LCD panel

(H) Backlight unit

Guide rib   Guide rib

Guide rib   Guide rib

Make sure the LCD panel is installed in the guide rib surely.
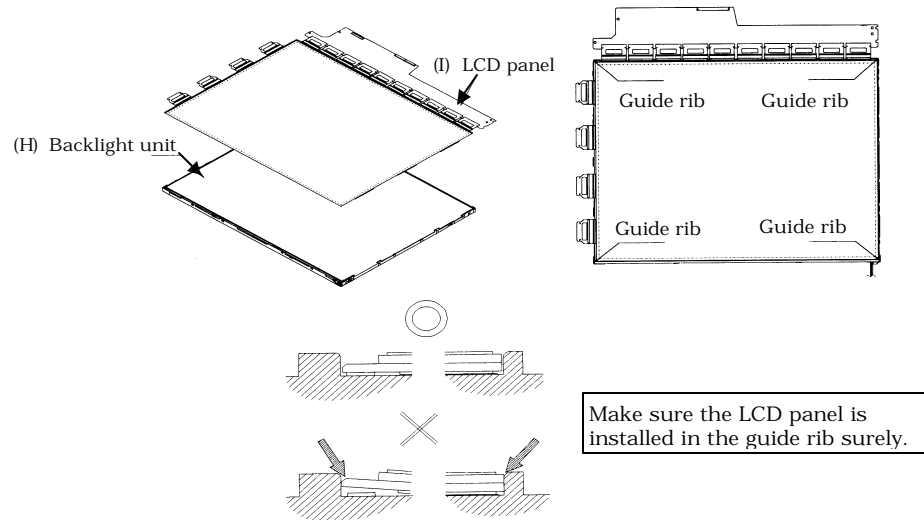
Figure 4-114 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (17)

7. Bend the TCP attaching to the source board and secure it with the two screws.

Do not hold the edge.   Do not hold the edge.
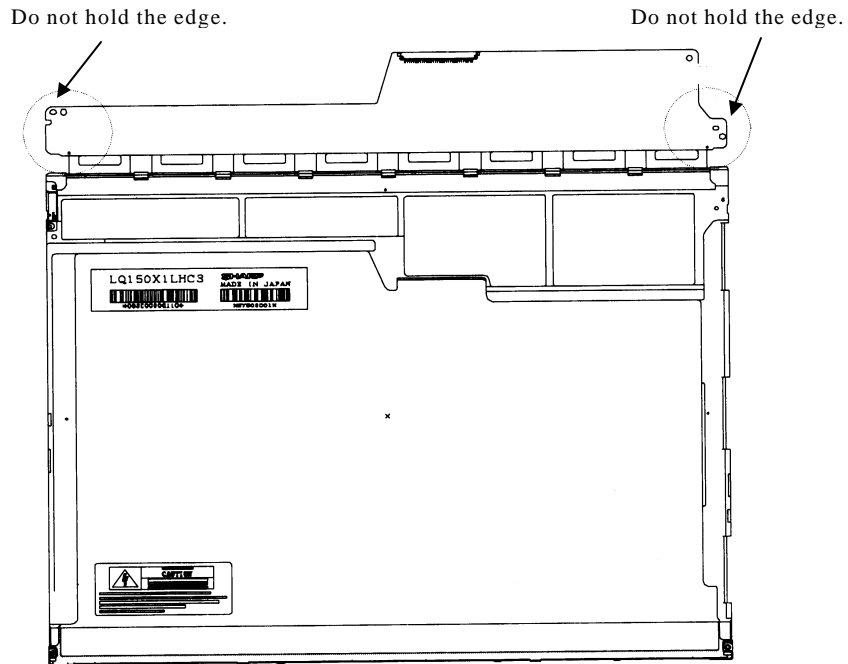
Figure 4-115 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (18)

Screw   Screw
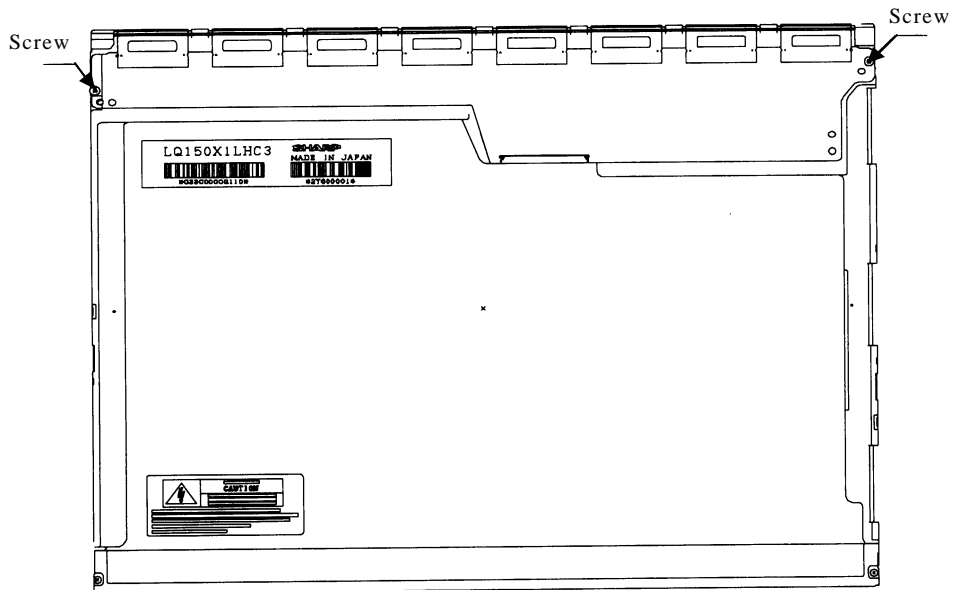
Figure 4-116 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (19)

8. Install the bezel (E) on the lamp cover and hook the four latches on the lamp cover and two latches on the P-chassis.

(E) Bezel

(1) Hitch the hook of the bezel on the rib of the P-chassis.

< Side view >

Hook
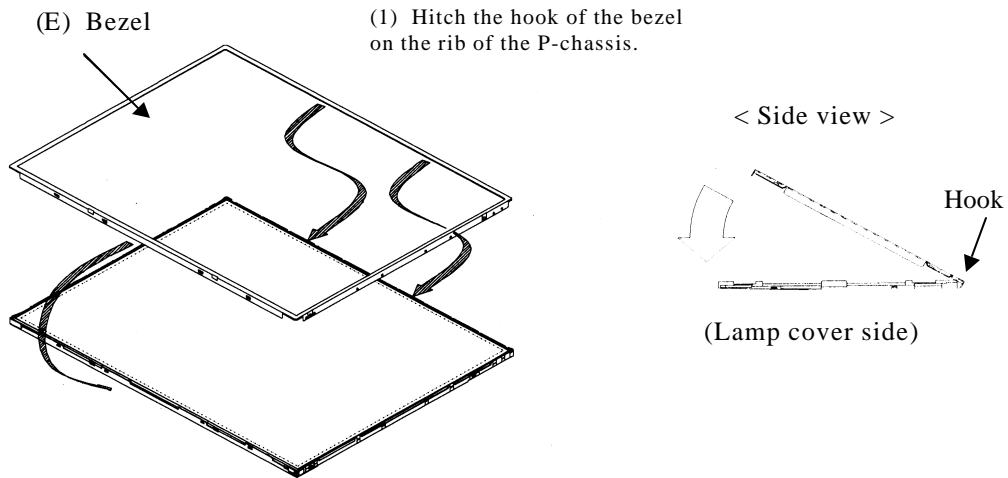
(Lamp cover side)

(2) Lean the bezel on the lamp cover without interference with the TCP.

Figure 4-117 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (20)

Make sure of mating of the bezel and the rib of the P-chassis.

LQ150X1LHC3

Make sure of mating of the bezel and the latch of
the P-chassis.

Make sure of mating of the bezel
and the latch of the P-chassis.
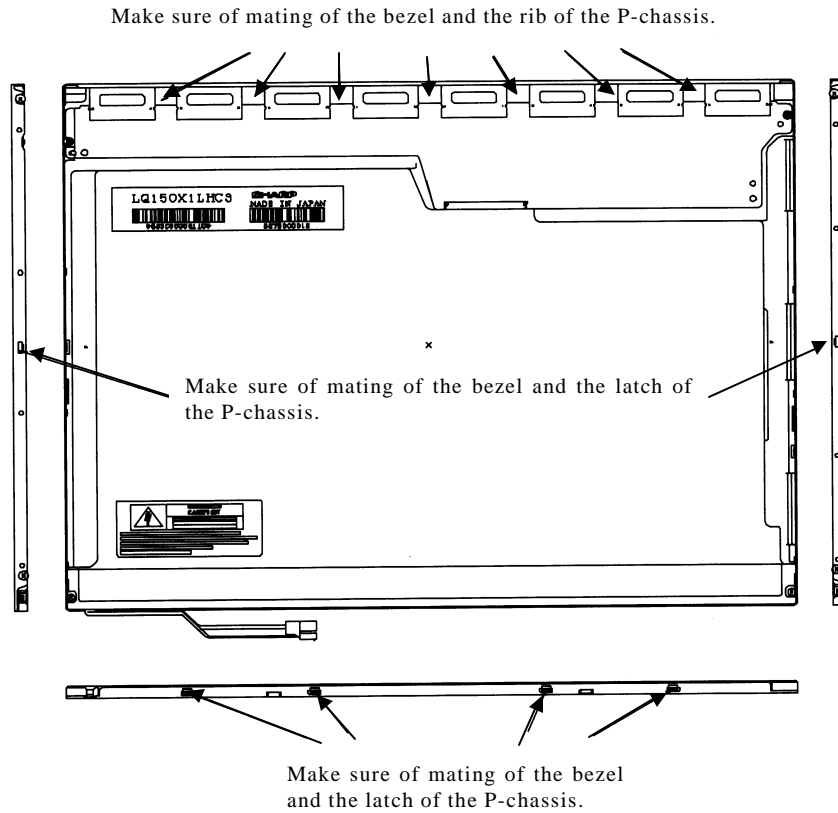
Figure 4-118 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (21)

9. Secure the sides of the unit with the four screws.
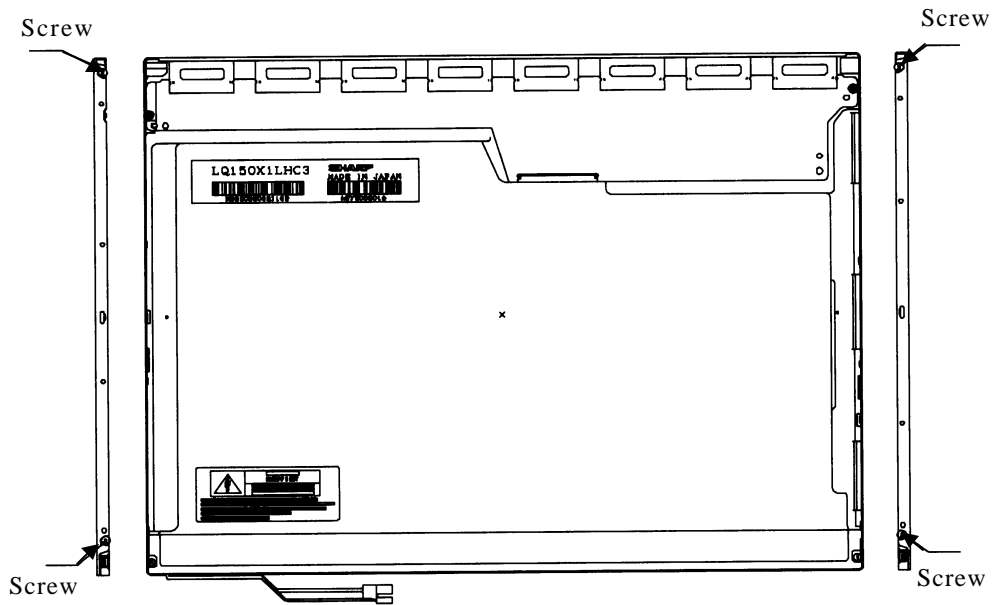
Figure 4-119 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (22)

10. Stick the protection cover G (B), protection cover S (A), fixing tape (C) and fixing tape for lead wire (D).

Fit the cover according to the outline of the screw.

(A)

(C)   (B)

(D)   0 to 1 mm

0 to 0.5 mm

Do not make the tape over the top of the module.

The tape MUST NOT appear on the display.

Stick the tape according to the outline of the
LCD module. Make sure the tape does not
appear on the side of the module.
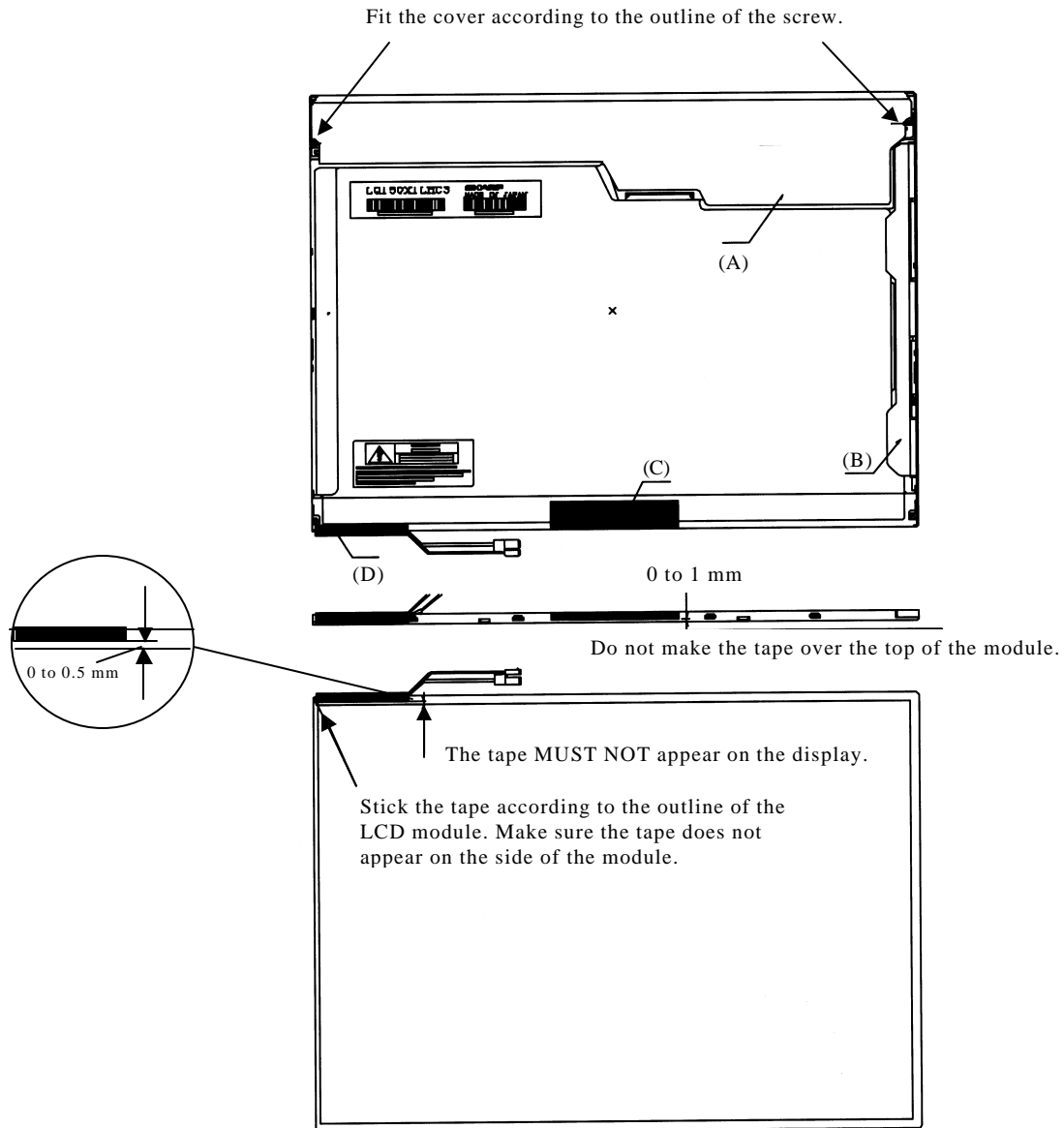
Figure 4-120 Replacing 15.0 Inch Sharp fluorescent lamp (XGA) (23)

4.26.8   Replacing the 15.0 Inch SXGA+ LG.Philips Fluorescent lamp

> *CAUTION: When you replace the fluorescent lamp, wear finger covers or gloves to avoid contaminating or damaging the LCD module. Be careful not to let dust or other foreign substances into the LCD module.*

Disassembling the 15.0 Inch SXGA+ LG.Philips Fluorescent lamp

To disassemble the 15.0 inch SXGA+ LG.Philips fluorescent lamp, follow the steps below and refer to figures 4-121 to 4-124.

1. Remove the outside tape and cover shield.

    1) Remove the adhesive tape fixing the B/L wire. Be careful not to apply excessive force to the B/L wire.

    2) Remove the cover shield (G). Be careful not to apply excessive force to the gate TCP.

    3) Remove the cover shield (C). Be careful not to apply excessive force to the source PCB.

> *CAUTION: Wear anti-static gloves to prevent circuit damage caused by ESC.*

    4) Remove the tape shield and adhesive tape fixing the top case. Be careful not to apply excessive force to the top case.

Figure 4-121 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (1)

2. Remove the top case. Be careful not to apply excessive force to the top case or gate TCP.

Top case

Figure 4-122 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (2)

3. Remove the source PCB and gate PCB.

    1) Remove the source PCB. Be careful not to apply excessive force to the PCB or
        TCP when removing double-sided tape.

    2) Remove the gate PCB. Be careful not to apply excessive force to the PCB or TCP
        when removing double-sided tape.

Source PCB

Gate PCB
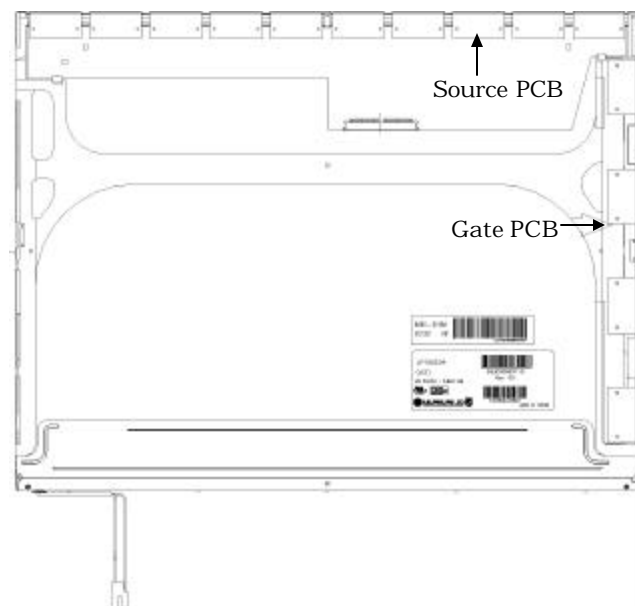
Figure 4-123 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (3)

4. Remove the board assembly, adhesive tape, light guide and cover assembly bottom (L).

    1) Remove the board assembly.

NOTE: This process should be made in a clean room to prevent scratch or particle on polarizer or B/L assembly.

---

    2) Remove the adhesive tape fixing the sheets (four points).

    3) Remove the sheets and light guide.

NOTE: No penetration of foreign object is indispensable not to scratch on the surface of each sheet.

---

    4) Remove the two screws fixing the cover assembly bottom (L).

NOTE: Maximum value of torque is 1.5kg·cm.
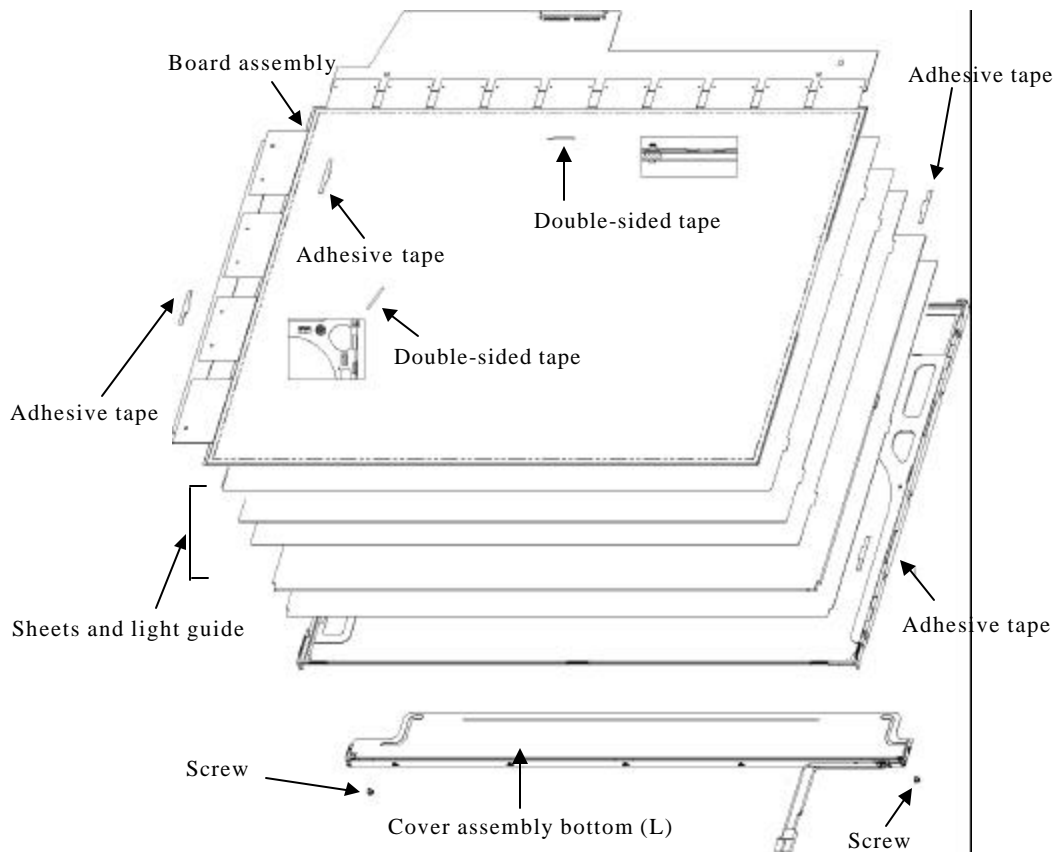
Figure 4-124 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (4)

Assembling the 15.0 Inch SXGA+ LG.Philips Fluorescent lamp

To assembling the 15.0 inch SXGA+ LG.Philips fluorescent lamp, follow the steps below and refer to figures 4-125 to 4-128.

1. Install the cover assembly bottom (L), sheets, light guide, adhesive tape and board assembly.

   1) Remove the protect sheet from the cover assembly bottom (L).

   2) Secure the cover assembly bottom (L) with the two screws.

NOTE: Maximum value of torque is 2.0kg·cm.

   3) Install the light guide and sheets. (Secure the reflection sheet with double-sided tape.)

NOTE: No penetration of foreign object is indispensable not to scratch on the surface of the sheets and light guide.

   4) Stick the adhesive tape to fix the sheets.

   5) Install the board assembly. (Secure the gate PCB with double-sided tape.)

NOTE: *Be careful not to apply excessive force to the PCB and TCP.*
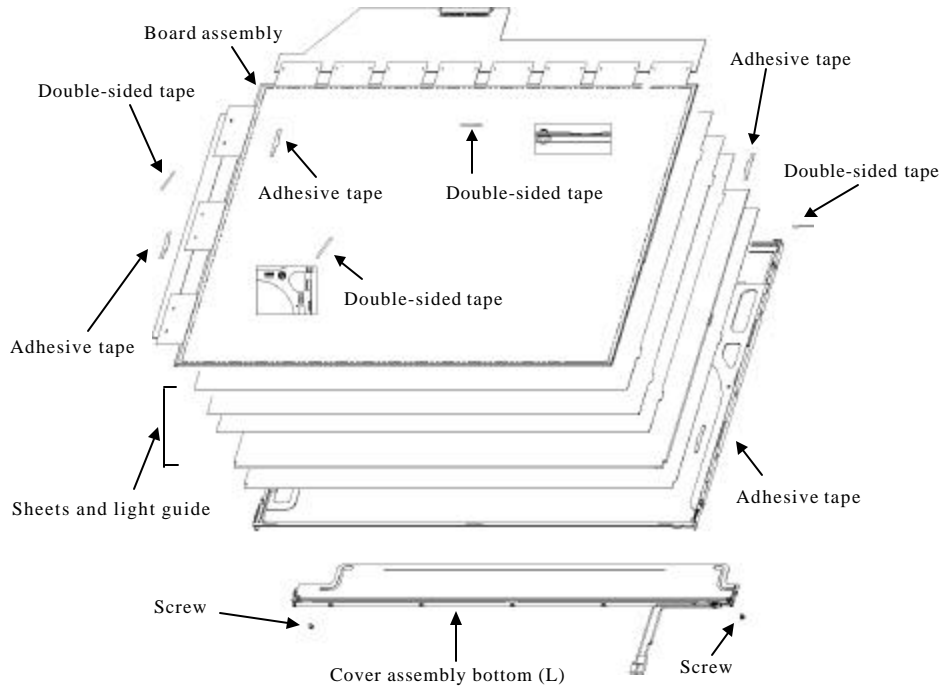
Figure 4-125 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (5)

2. Install the source PCB and gate PCB.

    1) Install the source PCB. Be careful not to apply excessive force to the TCP.

    2) Install the gate PCB. Be careful not to apply excessive force to the TCP.
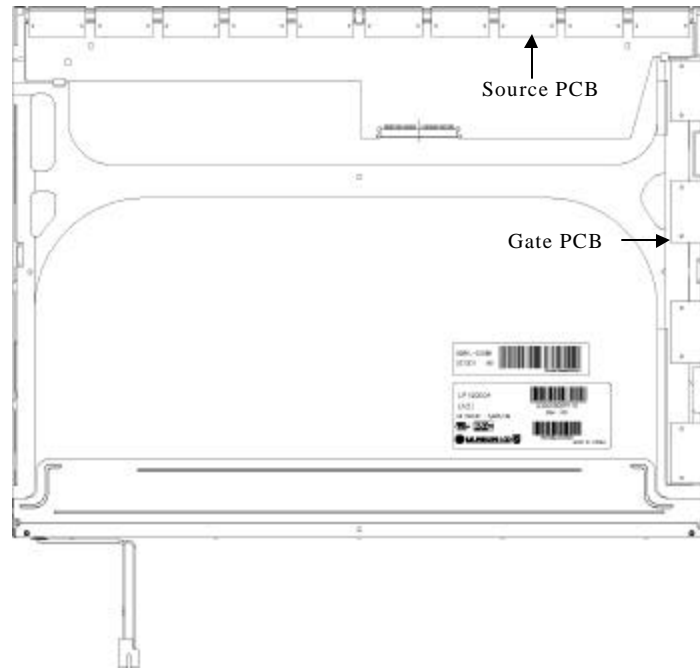
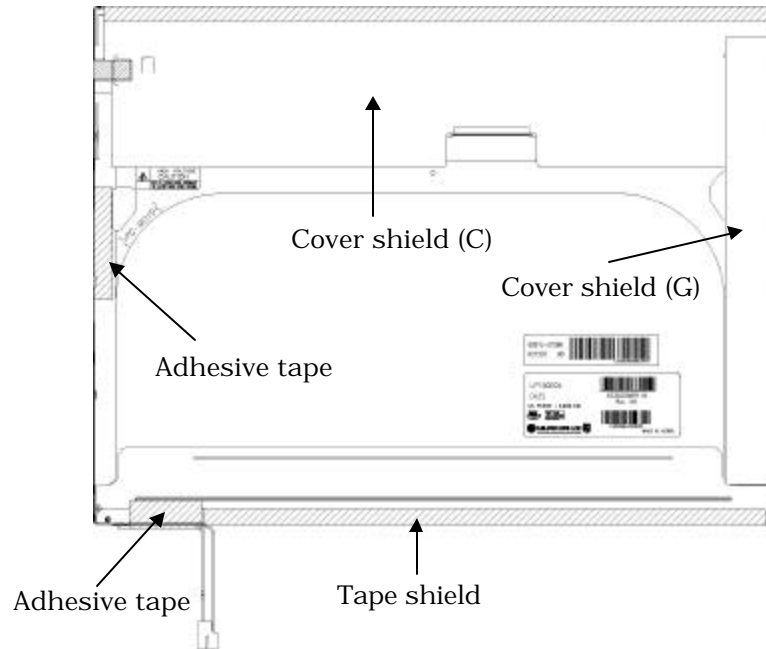*Figure 4-126 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (6)*

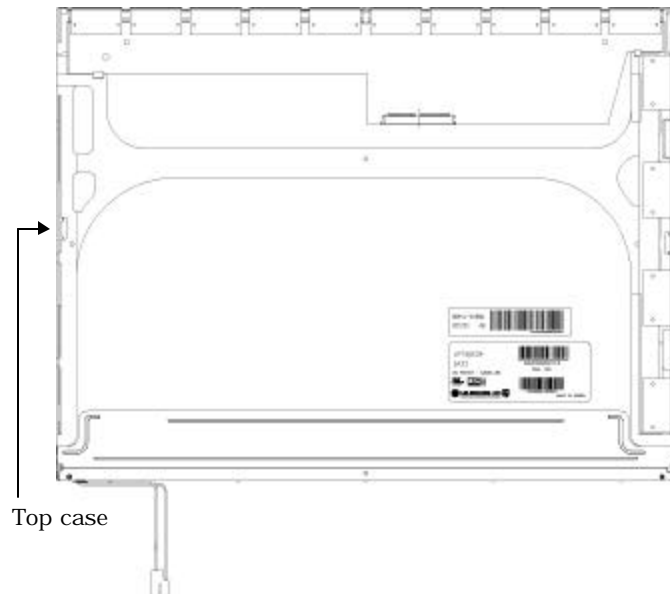3. Install the top case. Be careful not to apply excessive force to the gate TCP.
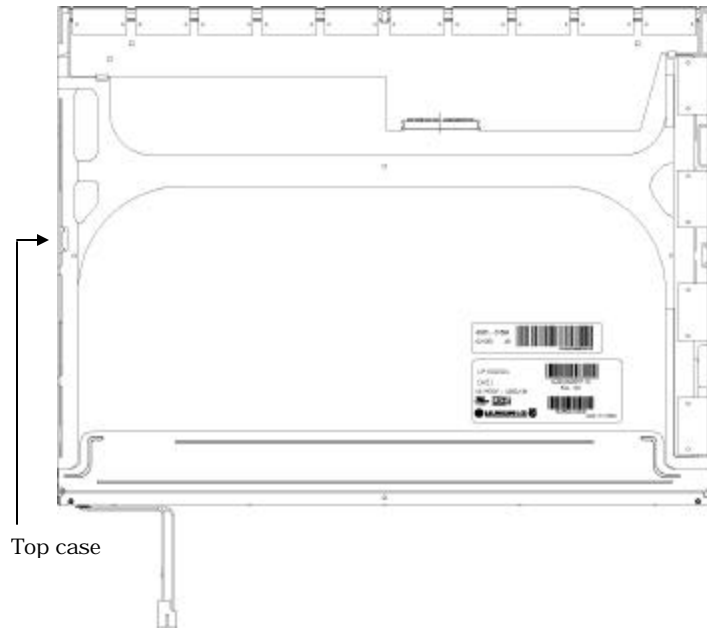
Top case

Figure 4-127 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (7)

4.   Stick the out side tape and cover shield.

    1)   Install the tape shield and adhesive tape to fix the top case. Be careful not to apply excessive force to the top case.

    2)   Install the cover shield (C). Be careful not to apply excessive force to the control PCB.

> *CAUTION: Wear anti-static gloves to prevent circuit damage caused by ESC.*

    3)   Install the cover shield (G). Be careful not to apply excessive force to the gate TCP.

    4)   Stick the adhesive tape to fix the B/L wire. Be careful not to apply excessive force to the B/L wire.
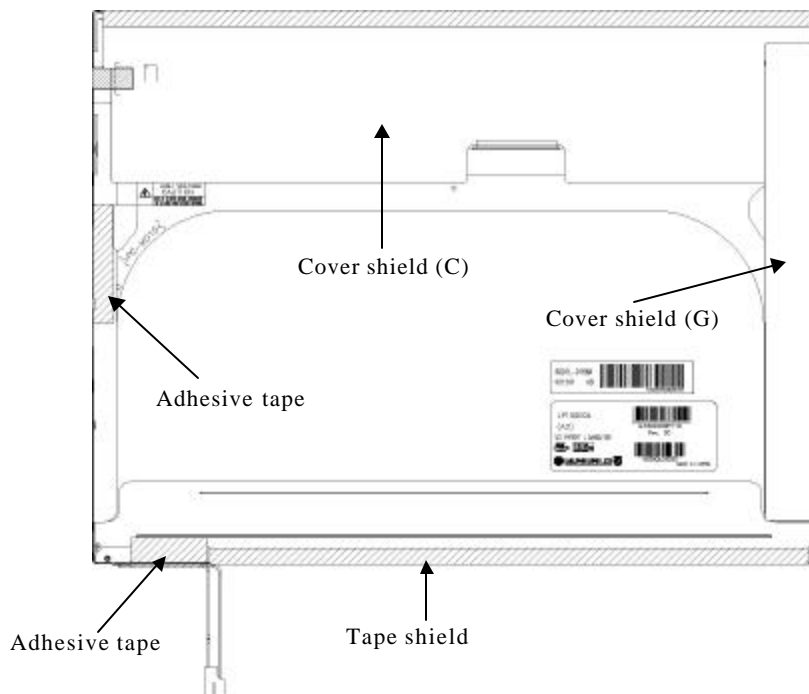
Figure 4-128 Replacing 15.0 Inch LG.Philips fluorescent lamp (SXGA+) (8)

4.26.9   Replacing the 15.0 Inch SXGA+ Sharp Fluorescent lamp

CAUTION: *When you replace the fluorescent lamp, wear finger covers or gloves to avoid contaminating or damaging the LCD module. Be careful not to let dust or other foreign substances into the LCD module.*

Disassembling the 15.0-inch SXGA+ Sharp Fluorescent lamp

To disassemble the 15.0 inch SXGA+ Sharp fluorescent lamp, follow the steps below and refer to Figures 4-129 to 4-138.

1. Turn the LCD module face down, and remove the protection cover S (A), protection cover G (B), fixing tape (C) and fixing tape for lead wire (D).

NOTE: *1) Be careful not to damage the TCP or chips.*

2) Discard the tapes removed. Do not reuse them.
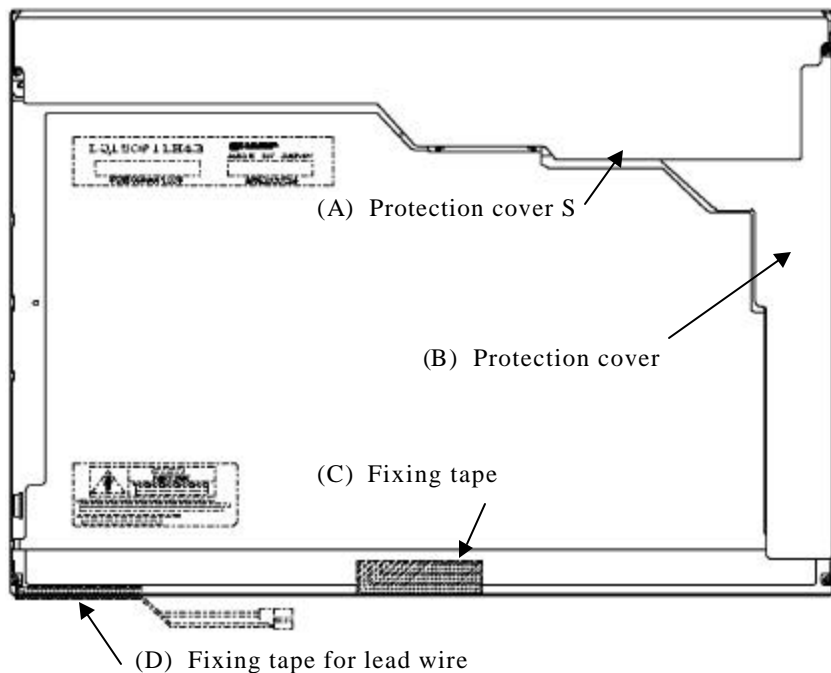
Figure 4-129 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (1)

2. Remove the four screws on the sides.
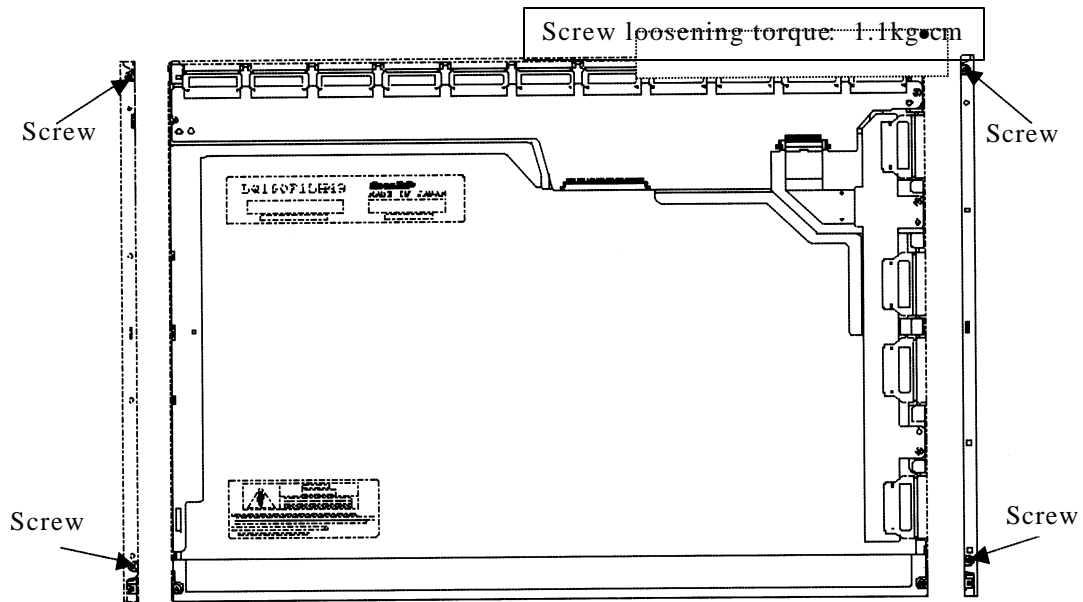
Figure 4-130 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (2)

3. Turn the LCD module face up and remove the bezel (E).
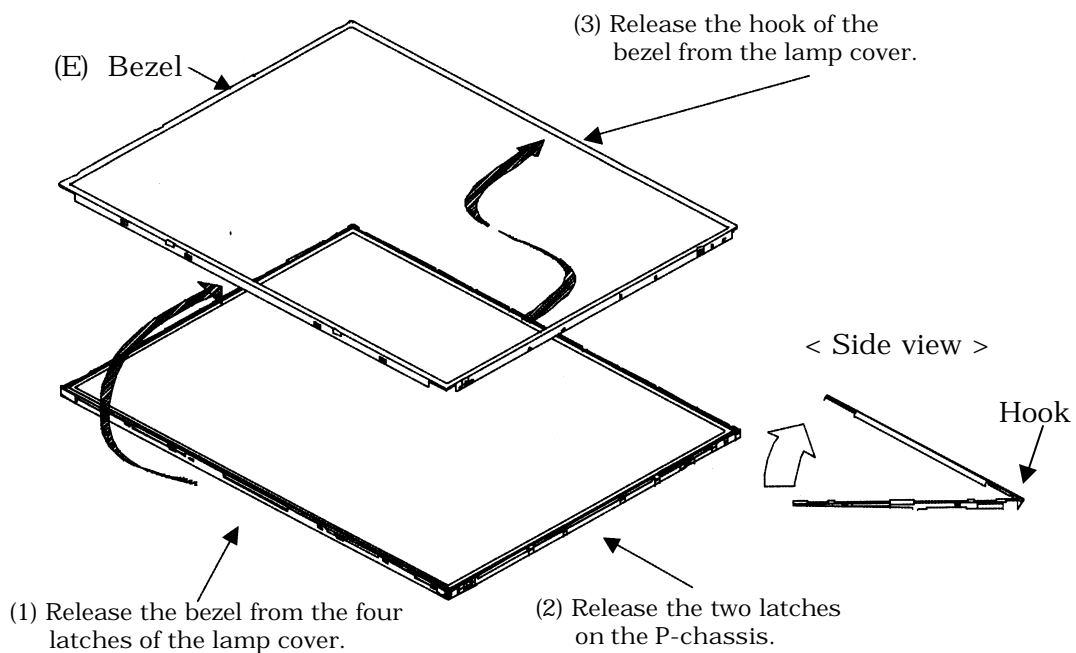
Figure 4-131 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (3)

4. Turn the LCD module face down. Remove four screws fixing the board and remove the FPC (G). Open the bent portion of the TCP of the board and remove the backlight.
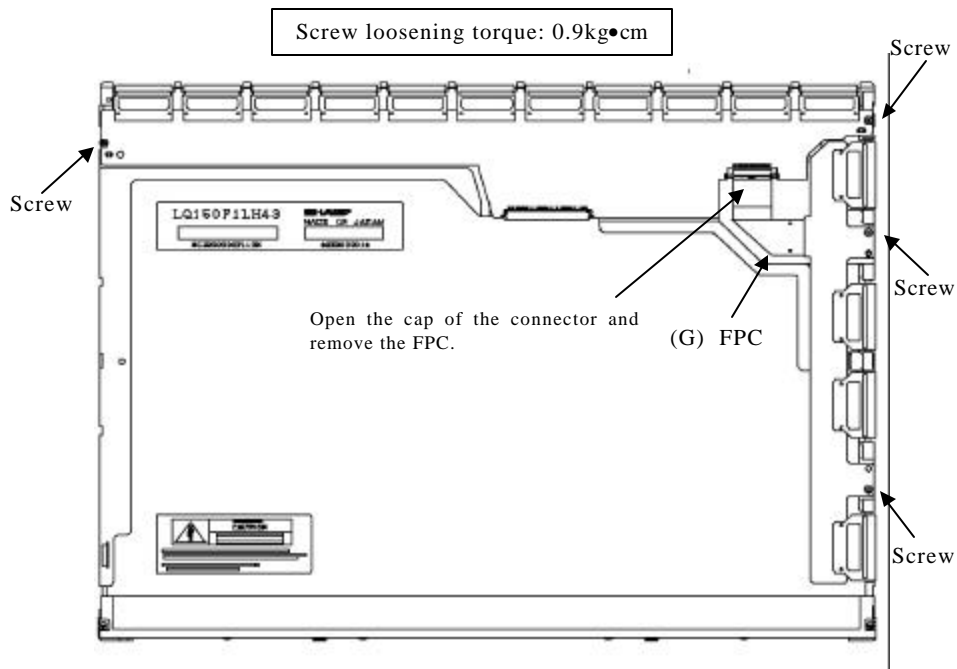
Figure 4-132 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (4)
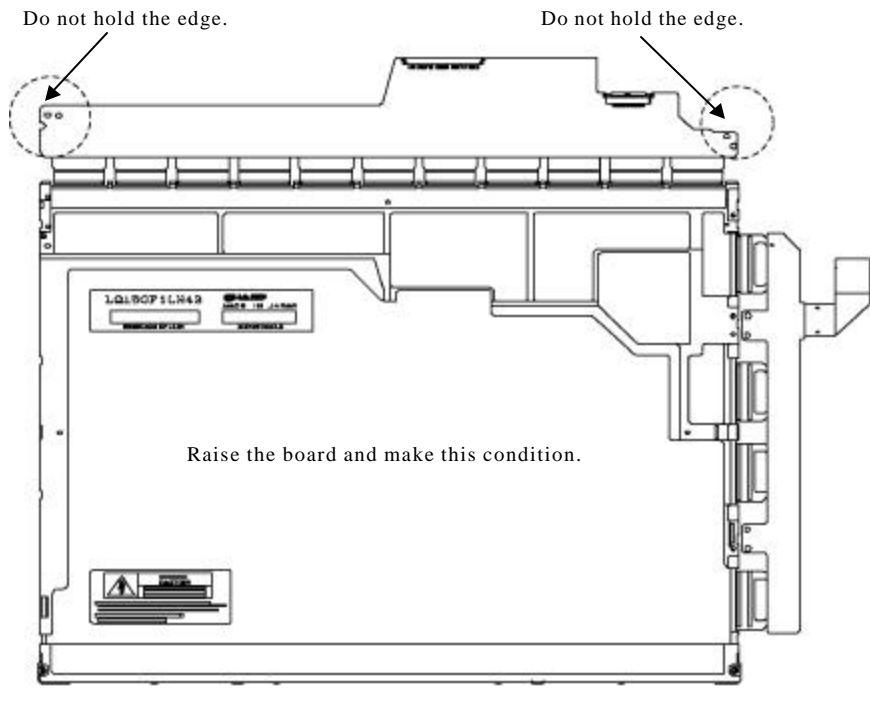
Figure 4-133 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (5)

5. Turn the LCD module face up and remove the LCD panel (I) from the backlight unit (H).

NOTE: *Wear finger sacks or gloves during the work not to soil or scratch the LCD panel or backlight unit.*

(I) LCD panel
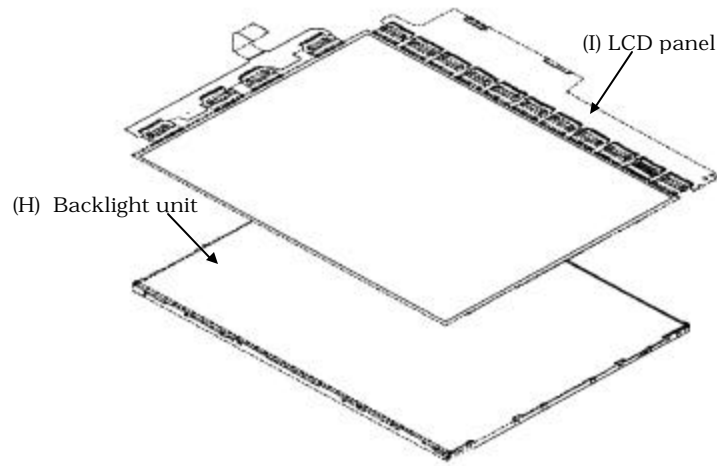
(H) Backlight unit

Figure 4-134 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (6)

6. Turn the backlight unit (H) removed face down and remove two screws (D) and lamp cover (J).

NOTE: *Be careful not to scratch or soil the sheets.*

(H) Backlight unit

Screw loosening torque: 1.1kg•cm

(D) Screw

(D) Screw

(J) Lamp cover
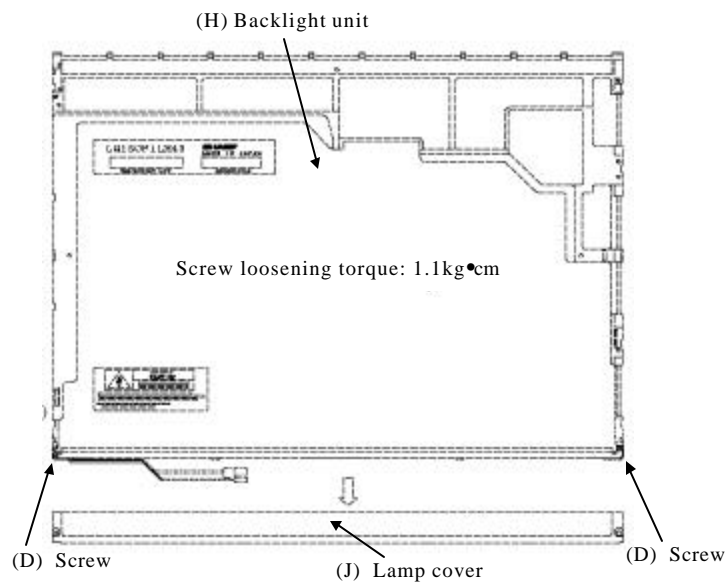
Figure 4-135 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (7)

7. Turn the backlight unit face up and remove the upper diffusion sheet (K), lens sheet (L) and light guide (M).

NOTE: The light guide and sheets are reused. Be careful not to scratch or soil them.

Do not remove the reflection
sheet under the light guide.

(K) Upper diffusion sheet

(L) Lens sheet

(M) Light guide
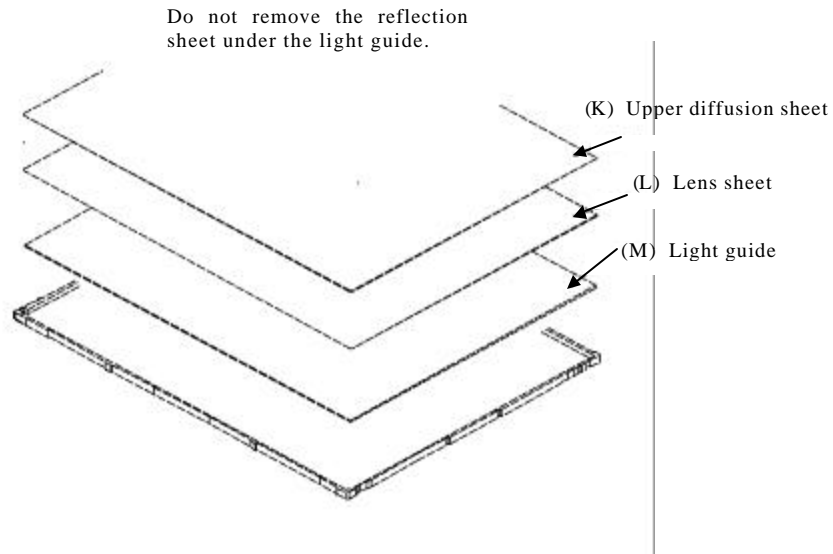
Figure 4-136 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (8)

8. Remove the four double-sided tapes (N, O, P, Q).

NOTE: Discard the removed tapes. Do not reuse them.

(N) Double-sided tape 1

(P) Double-sided tape 3

(O) Double-sided tape 2

(Q) Double-sided tape 4
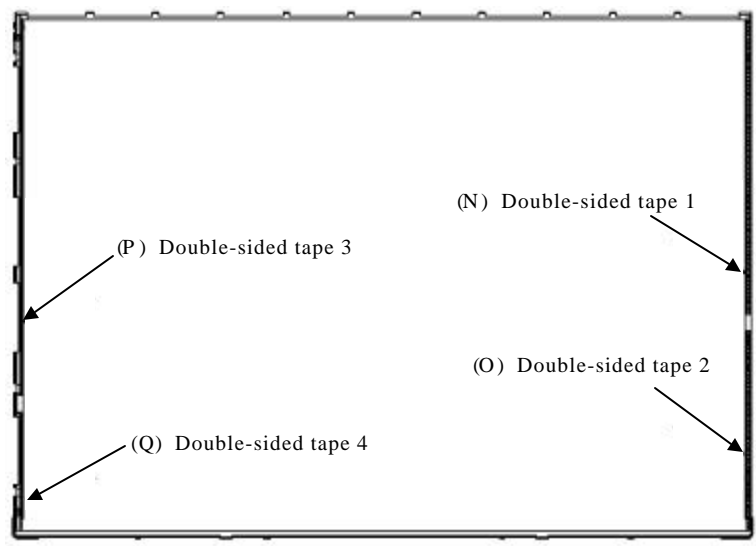
Figure 4-137 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (9)

9. Turn the backlight unit face down and remove the lamp unit (R) from the P-chassis.

CAUTION: *When removing the lamp unit, be careful not to break the lamp, or bend the reflection sheet.*
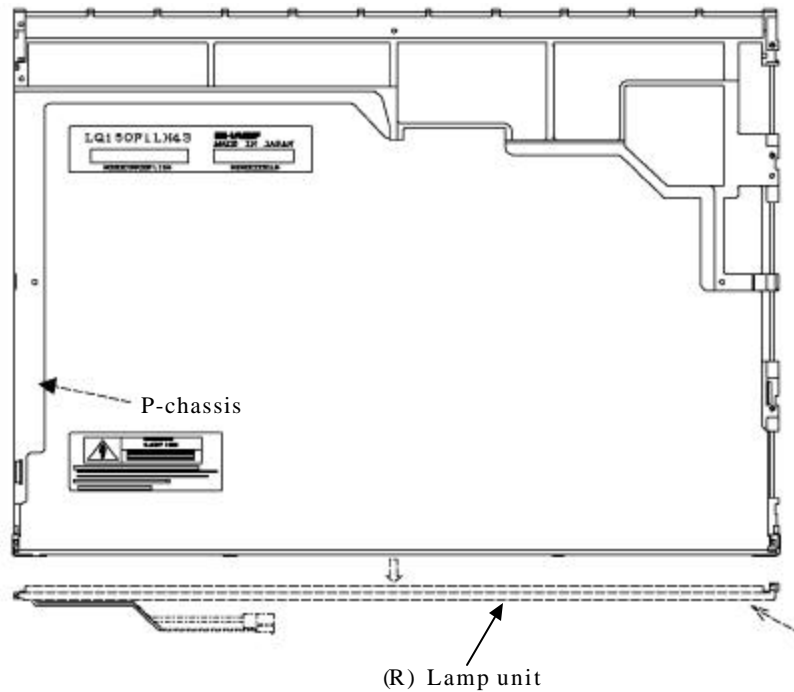
Figure 4-138 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (10)

Assembling the 15.0 Inch SXGA+ Sharp Fluorescent Lamp

To assemble the 15.0 inch SXGA+ Sharp fluorescent lamp, follow the steps below and refer to Figures 4-139 to 4-153.

1. Stick four double-sided tapes (N, O, P, Q) on the P-chassis.
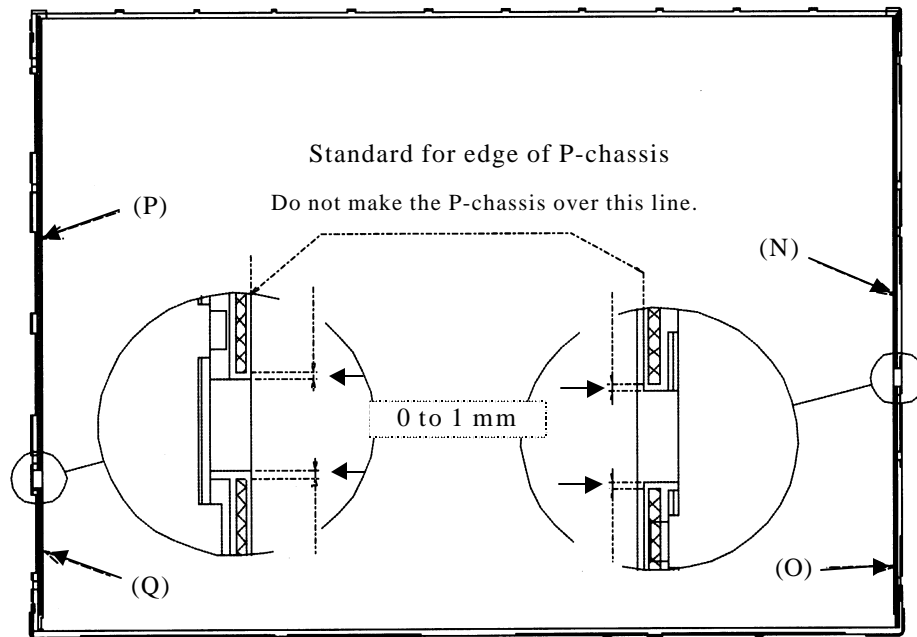
Figure 4-139 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (11)

2. Turn the backlight unit face down and install a new lamp unit (R) on the P-chassis.
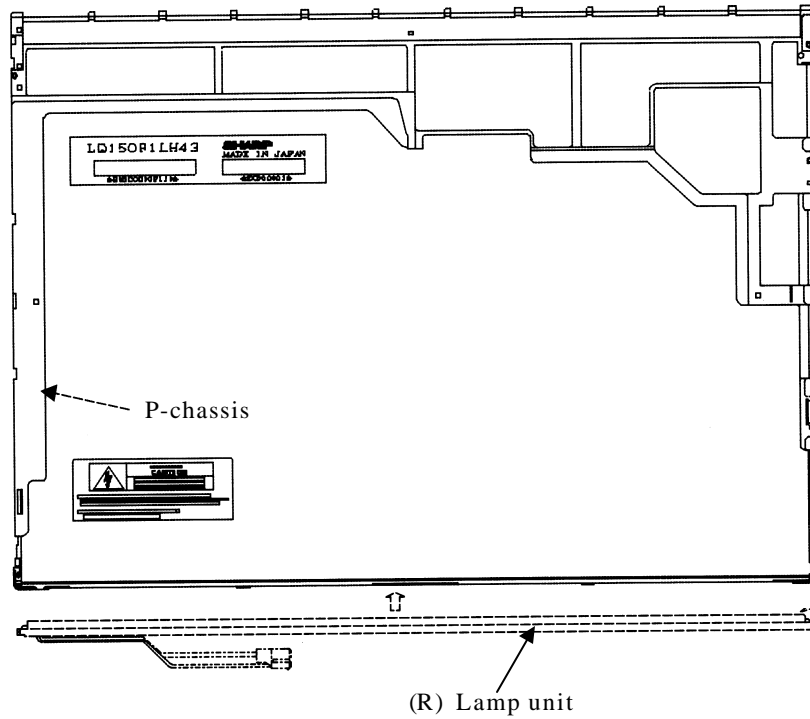
Figure 4-140 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (12)

> *NOTE: When install the lamp unit, be careful not to bend or damage the reflection sheet.*
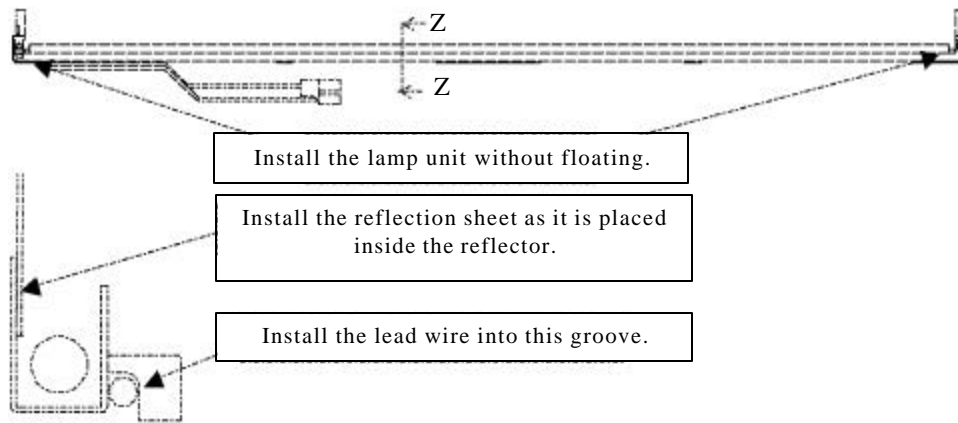
Cross-section drawing of Z-Z

Figure 4-141 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (13)

3. Install the lamp cover (J) on the backlight unit and secure it with the two screws(D).

(J) Lamp cover

(D) Screw   (D) Screw

Screw tightening torque: 0.9kg●cm
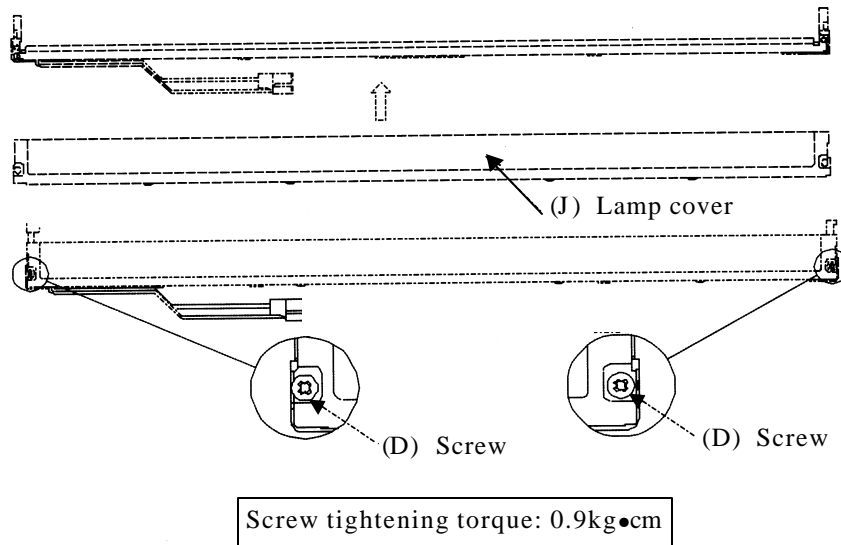
Figure 4-142 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (14)

4. Install the light guide (M) on the backlight unit.

Insert the light guide straight not to deform the reflector.

Backlight unit
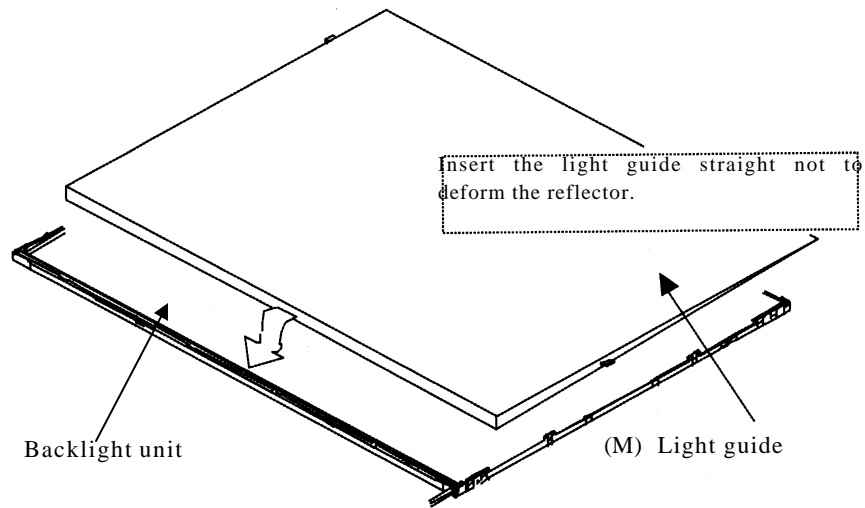
(M) Light guide

Figure 4-143 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (15)

5. Place the lens sheet (L) and upper diffusion sheet (K) on the backlight unit with light guide (M).

(K) Upper diffusion sheet

(L) Lens sheet

(M) Light guide

Make sure there is no dust or scratch.

Do not make any sheet over the edge of P-chassis
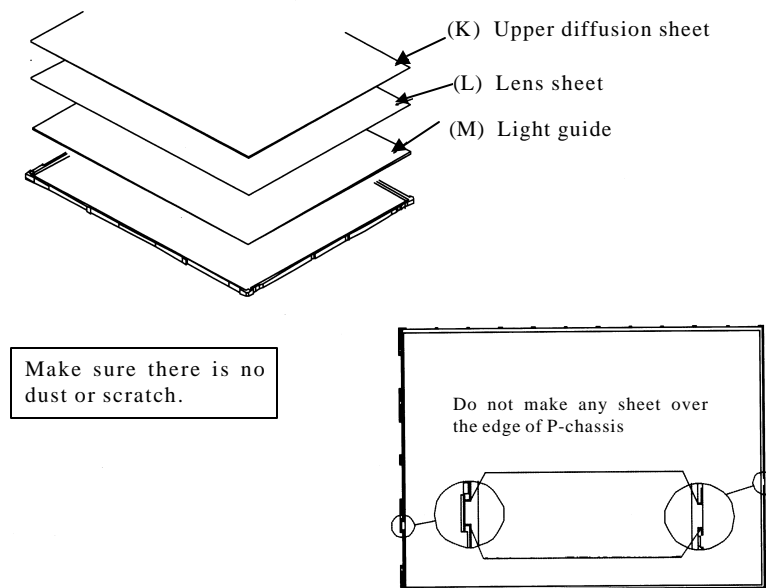
Figure 4-144 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (16)

6. Place the LCD panel (I) on the backlight unit (H).

NOTE: *Make sure there is no dust between the LCD panel and backlight unit. If any dust is found, remove it with crepe tape or others, which has no remaining of paste.*

(I) LCD panel

(H) Backlight unit

Make sure the LCD panel is installed in the guide rib surely.

Guide rib   Guide rib

Guide rib   Guide rib
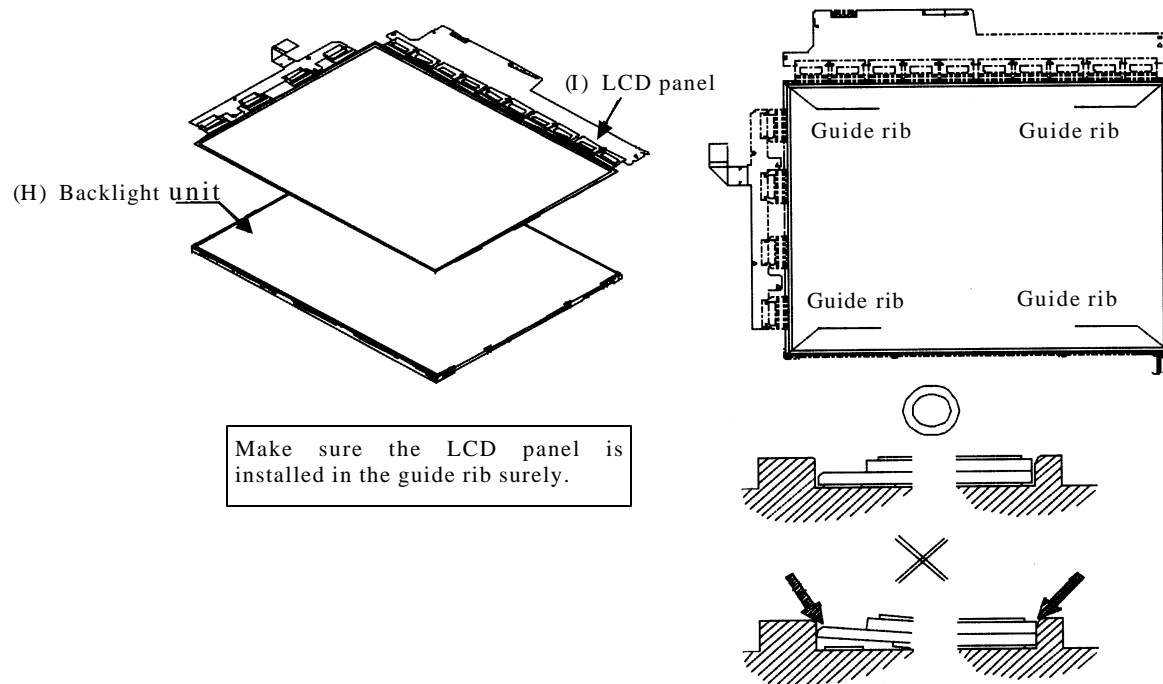
Figure 4-145 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (17)

7. Bend the TCP attaching to the source board and secure it with two screws. Then bend the TCP attaching to the gate board with two screws and insert the FPC (G) into the connector of the source board.
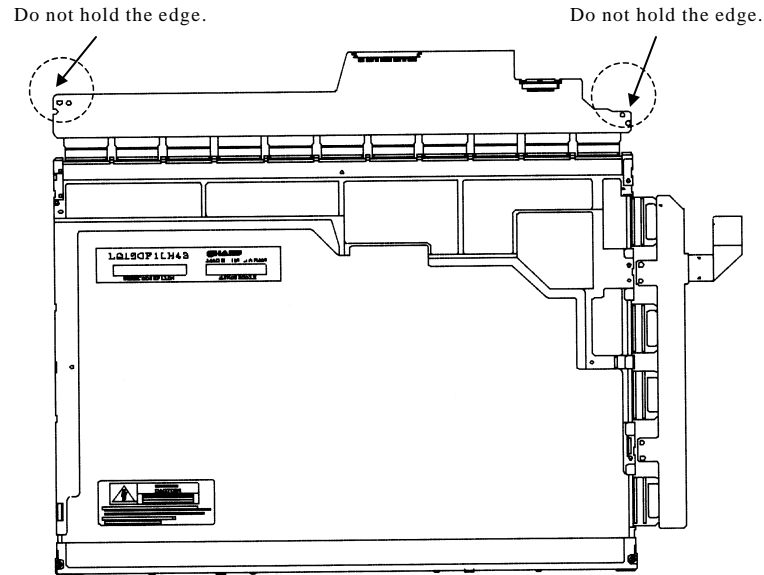
Figure 4-146 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (18)

Check the condition after mating.
*Check the condition of the concave portion of
  the FPC and the outline of the connector.
*Insert the FPC to the end. There shall be no
  out of position in θ.
*Lock surely the connector.

Poor mating: Failure   Out-of-position in θ: Failure

Fold the source board.

Fit the pin and the hole.

Screw

Screw

Screw

LQ150P1LH43

Fit the pin and the hole.

(G)

Fit the pin and the hole.

Screw tightening torque: 0.9kg•cm

Do not cover the projection.

Fold the gate board.

Screw

Figure 4-147 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (19)

8. Install the bezel (E) on the lamp cover. Attach four latches on the lamp cover and two latches on the P-chassis.

(E) Bezel

(1) Hitch the hook of the bezel on the rib of the P-chassis.

< Side view >

Hook
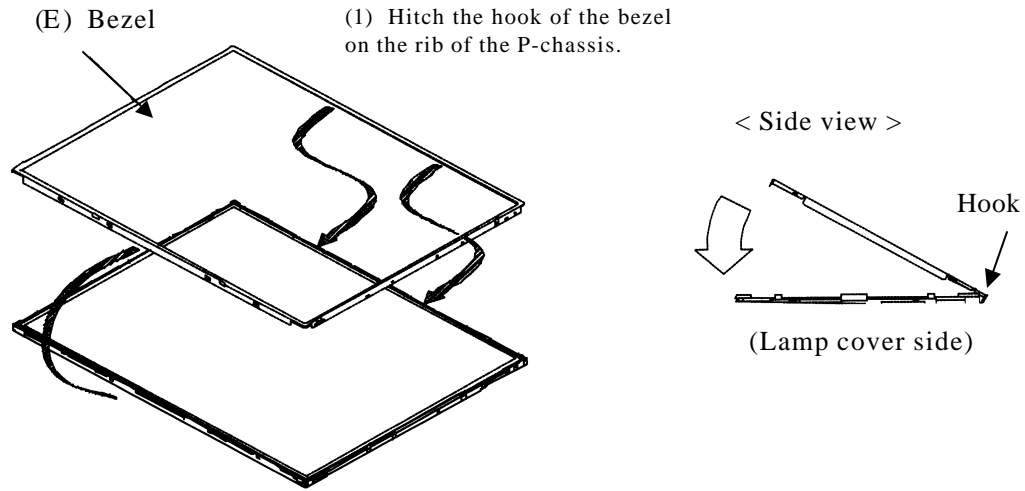
(Lamp cover side)

(2) Lean the bezel on the lamp cover without interference with the TCP.

Figure 4-148 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (20)

Make sure of mating of the bezel and the rib of the P-chassis.

Make sure of mating of the bezel and the latch of the P-chassis.

Make sure of mating of the bezel and the latch of the P-chassis.
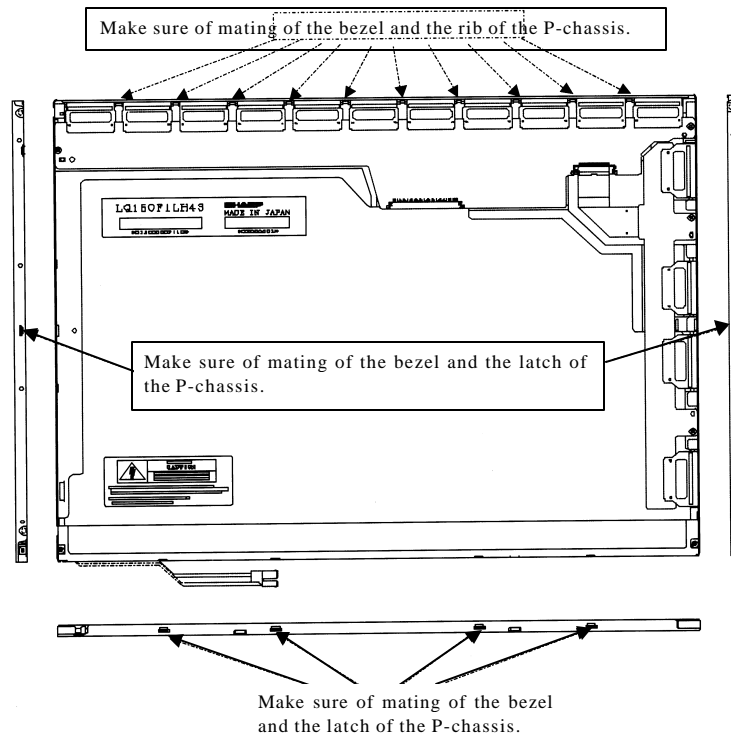
Figure 4-149 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (21)

9. Secure the sides of the unit with the four screws.
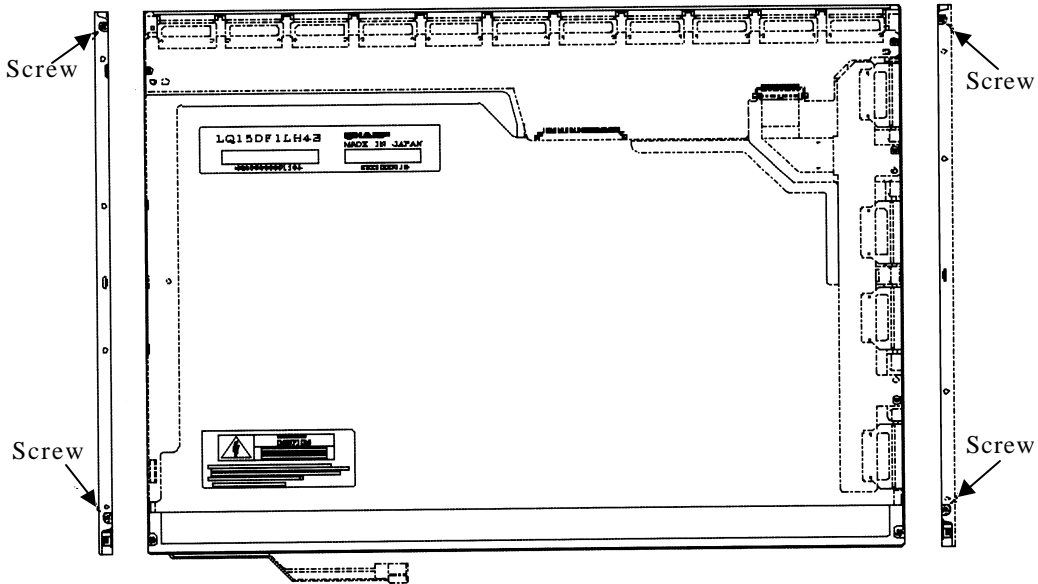
Figure 4-150 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (22)

10. Stick the protection cover G (B).
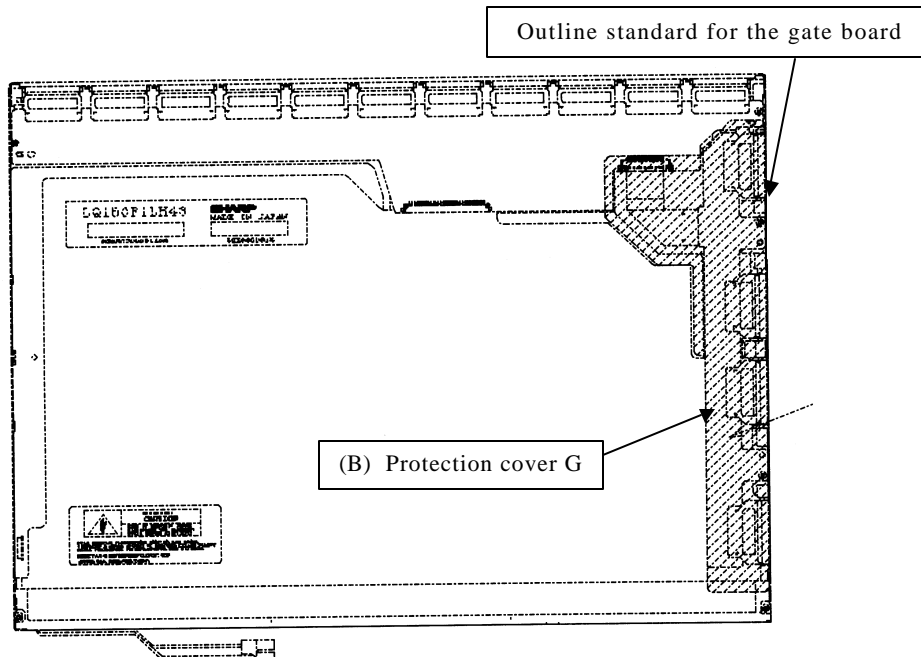
Figure 4-151 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (23)

11. Stick the protection cover S (A), fixing tape (C), fixing tape for lead wire (D).

Stick to the side of the bezel.

Fit the cover according to the outline of the screw.

Fit the cover according to the outline of the screw.

(A)

Make sure the lead wire is closely attached to the bezel.

Stick the fixing tape at the center of the module.

0 to 1 mm

0 to 0.5 mm

(D)

(C)

Do not make the tape over the top of the module.

The tape MUST NOT appear on the display.

Stick the tape according to the outline of the module. Make sure the tape does not appear on the side of the module.

Figure 4-152 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (24)

Make sure the edge of plastic resin is between ± 0.5.

Edge of plastic resin

0 to 1 mm

0 to 1 mm

Standard for the outline of board

Standard for the outline of screw (left and right)
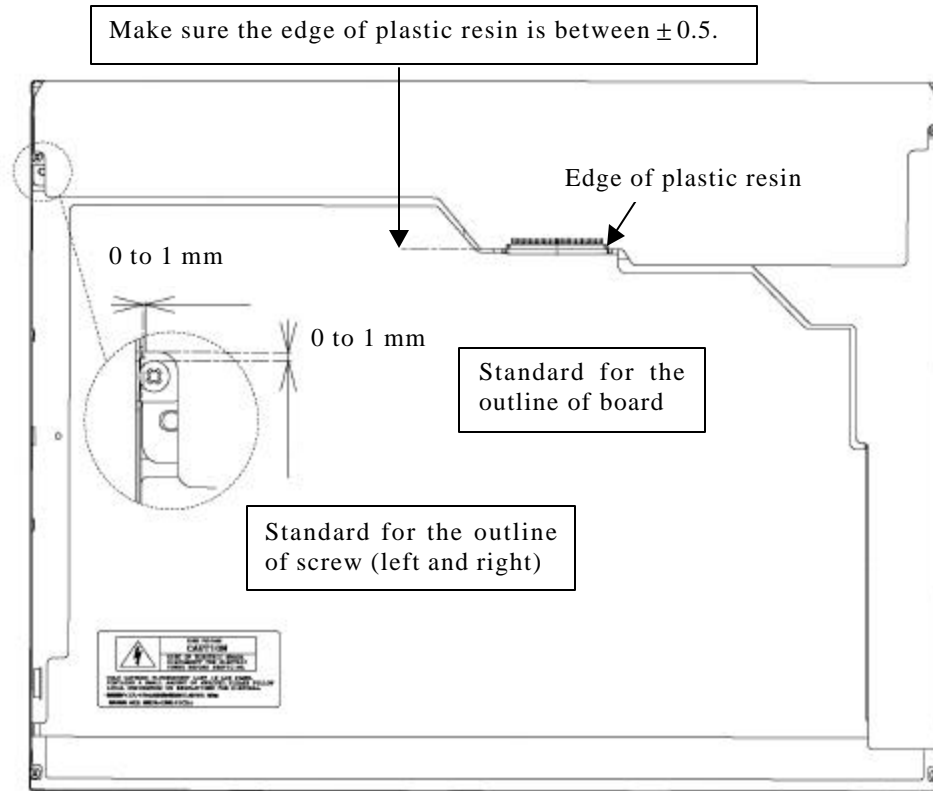
Figure 4-153 Replacing 15.0 Inch Sharp fluorescent lamp (SXGA+) (25)

Appendices

Appendix   Contents

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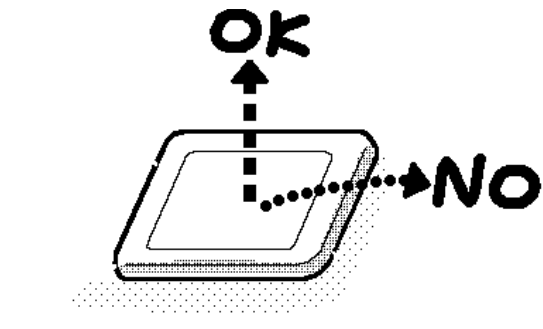
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws.
   Do not force the module into place, because stress can affect its performance.

   Also, the panel's polarized surface is easily scarred, so be carefully when handling it.
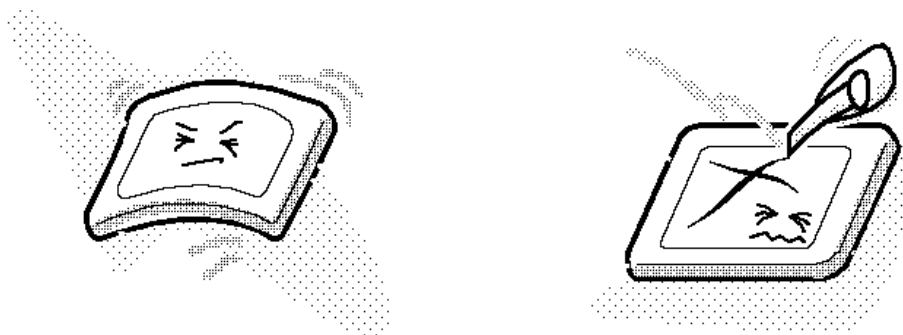
3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

    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.
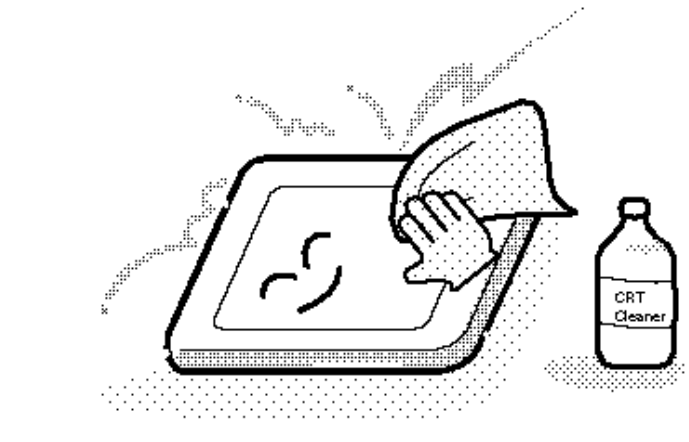
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.
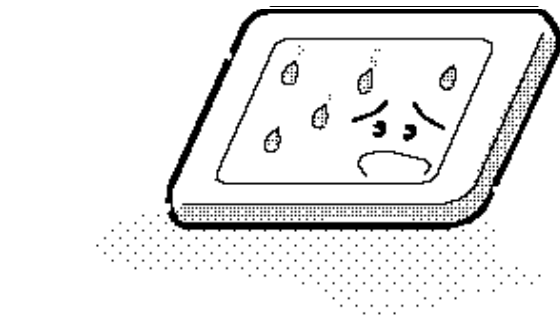
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
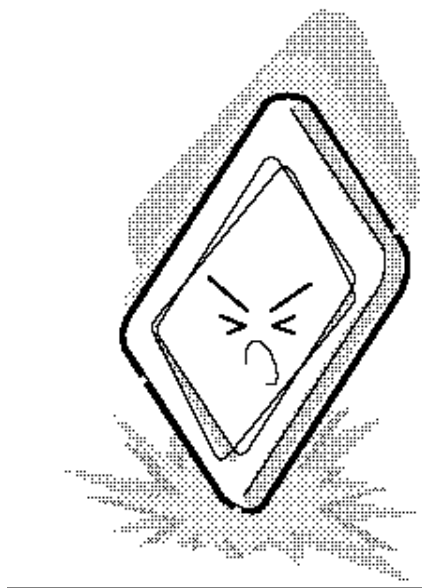
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.
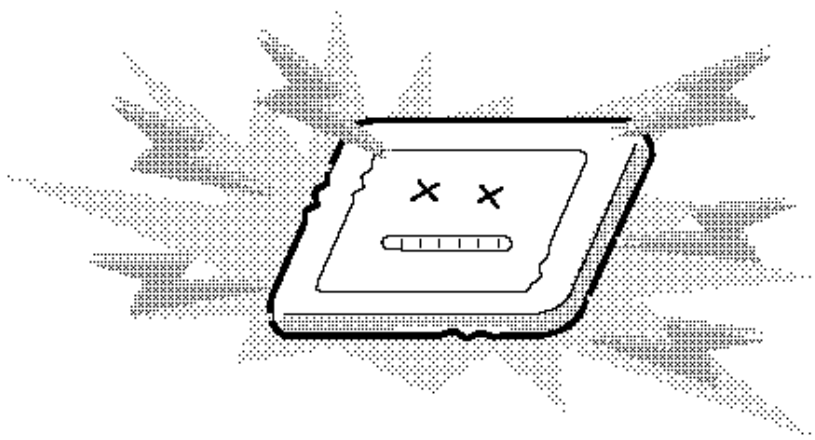
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
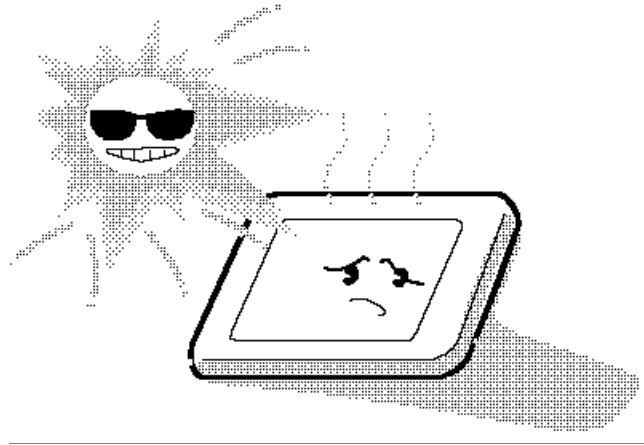
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
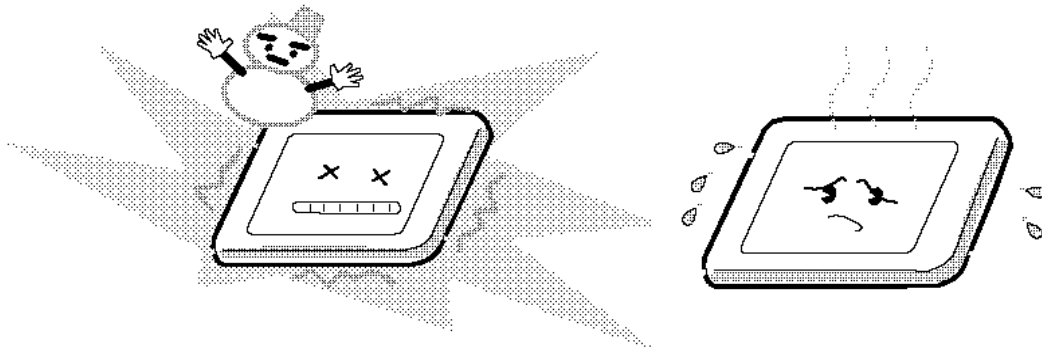
9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
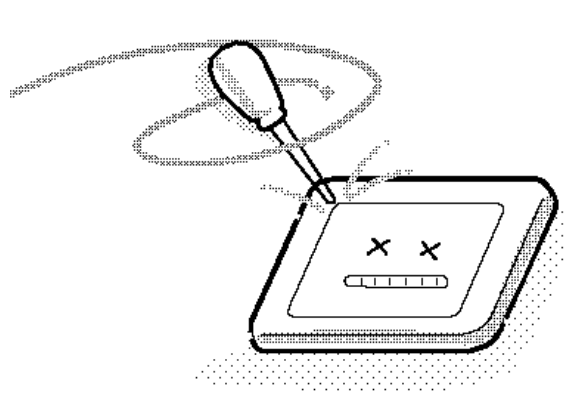
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.
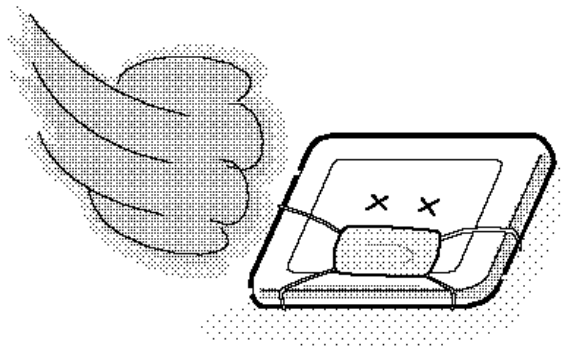
Appendix B   Board Layout

B.1   System Board FLM1M* Front View
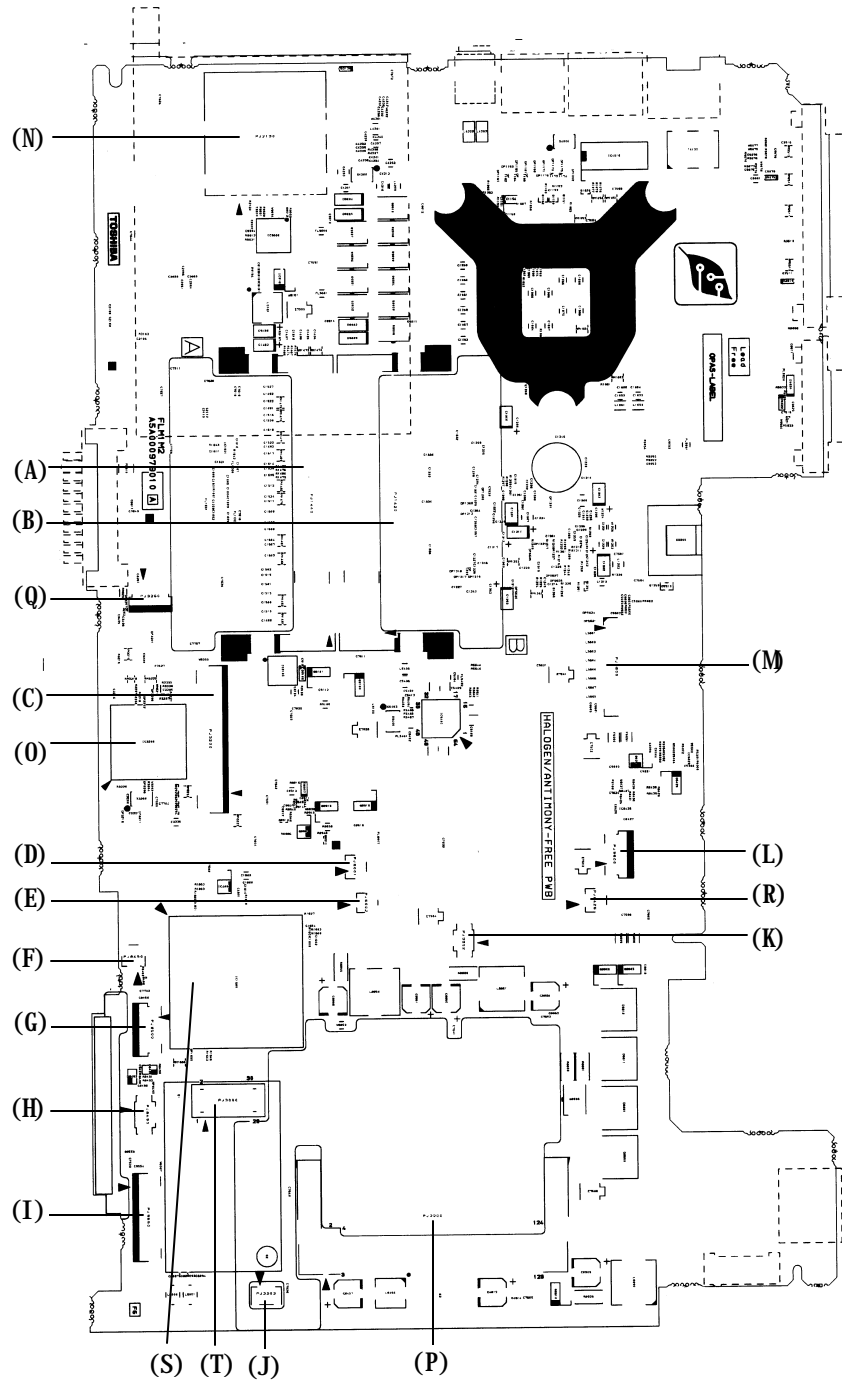
Figure B-1   System board FLM1M layout (front)*

Table B-1 System board FLM1M* ICs and connectors (front)

Mark	Number	Name
(A)	PJ1440	Memory slot
(B)	PJ1420	Memory slot
(C)	PJ3200	Keyboard I/F connector
(D)	PJ6001	Speaker connector (Right)
(E)	PJ6002	Speaker connector (left)
(F)	PJ8450	Fan connector 1
(G)	PJ9500	LE board I/F connector
(H)	PJ8490	RTC battery connector
(I)	PJ9550	SD board I/F connector
(J)	PJ3203	Debugging connector
(K)	PJ3302	Sensor switch connector
(L)	PJ9600	CD board I/F connector
(M)	PJ5600	LCD I/F connector
(N)	PJ2130	SC card I/F connector
(0)	IC3200	EC/KBC
(P)	PJ2200	Wireless LAN I/F connector
(Q)	PJ3260	Touch pad I/F connector
(R)	PJ8425	Fan connector 2
(S)	IC1600	ICH4-M
(T)	PJ3000	MDC I/F connector

B.2   System Board FLM1M* Back View
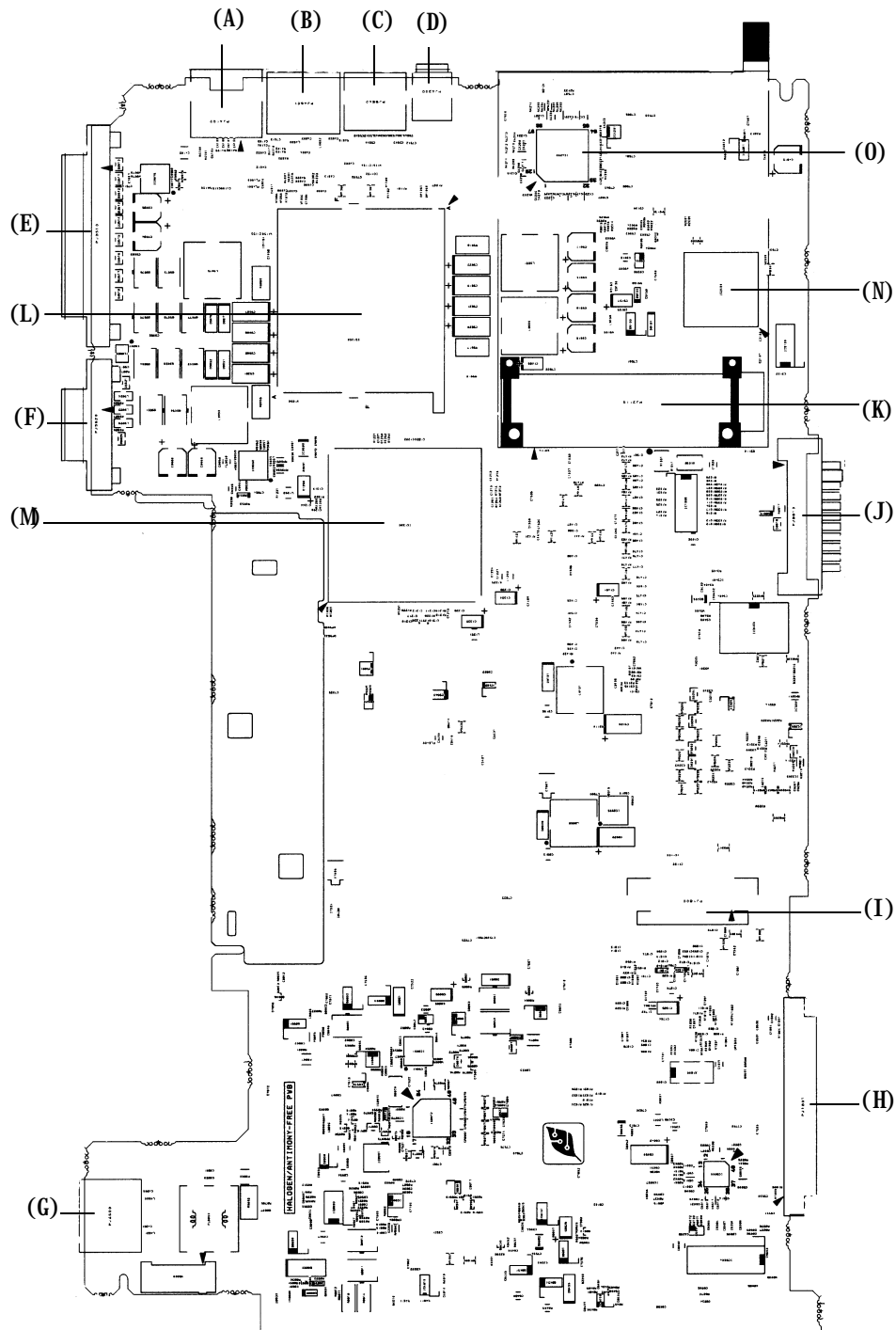
Figure B-2   System board FLM1M layout (back)*

Table B-2 System board FLM1M* ICs and connectors (back)

Mark	Number	Name
(A)	PJ4100	Network I/F connector
(B)	PJ4601	USB port 2/3 connector
(C)	Reserved	Reserved
(D)	PJ4200	IEEE1394 I/F connector
(E)	PJ3510	Parallel port I/F connector
(F)	PJ5620	CRT connector
(G)	PJ4600	USB port 0/1 connector
(H)	PJ1801	HDD I/F connector
(I)	PJ1800	CD-ROM I/F connect
(J)	PJ8810	Main Battery connector
(K)	PJ2110	PC card I/F connect
(L)	IS1050	CPU socket
(M)	IC1200	Montara-GT
(N)	IC2000	YEBISUSS
(O)	IC4200	1394 PHY/LINK

B.3   Sound Board FLM1S* View

(Front)

(Back)
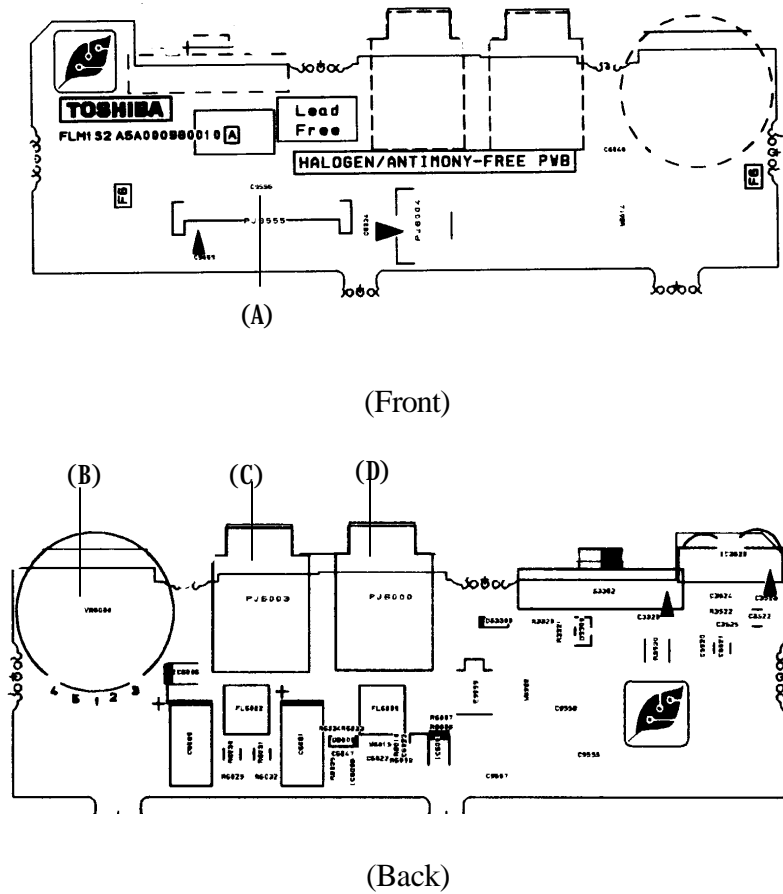
Figure B-3   Sound board FLM1S layout*

Table B-3   Sound board FLM1S ICs and connectors*

Mark	Number	Name
(A)	PJ9555	System board I/F connector
(B)	VR6000	Volume
(C)	PJ6003	Headphone connector
(D)	PJ6000	External microphone connector

B.4   LE Board FLM1L* Front View
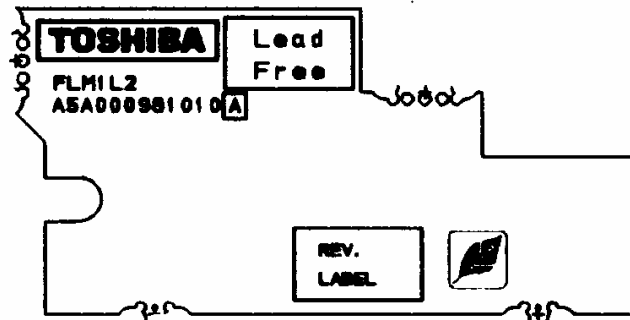
(Front)
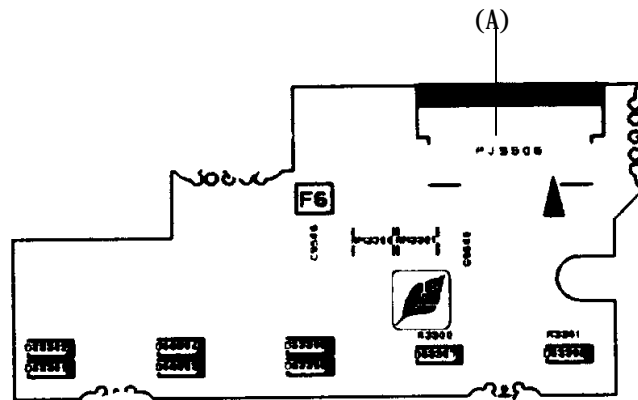
(Back)

Figure B-4 LE Board FLM1L layout*

Table B-4 LE Board FLM1L ICs and connectors*

Mark	Number	Name
(A)	PJ9505	System board I/F connector

Appendix C   Pin Assignment

System Board

C.1   PJI1420/PJ1440 Memory connector (200-pin)

Table C-1 Memory connector (200-pin)(1/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	VREF	-	2	VREF	-
3	GND	-	4	GND	-
5	SDQ05-B2P	I/O	6	SDQ01-B2P	I/O
7	SDQ04-B2P	I/O	8	SDQ05-B2P	I/O
9	2R5-B2V	-	10	2R5-B2V	-
11	SDQS0-B2P	I/O	12	SDM00-B2P	I
13	SDQ06-B2P	I/O	14	SDQ02-B2P	I/O
15	GND	-	16	GND	-
17	SDQ07-2P	I/O	18	SDQ03-2P	I/O
19	SDQ09-B2P	I/O	20	SDQ13-B2P	I/O
21	2R5-B2V	-	22	2R5-B2V	-
23	SDQ08-B2P	I/O	24	SDQ12-B2P	I/O
25	SDQ51-B2P	I/O	26	SDM01-B2P	I
27	GND	-	28	GND	-
29	SDQ14-B2P	I/O	30	SDQ10-B2P	I/O
31	SDQ11-B2P	I/O	32	SDQ15-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	SDQ20-B2P	I/O	42	SDQ21-B2P	I/O
43	SDQ17-B2P	I/O	44	SDQ16-B2P	I/O
45	2R5-B2V	-	46	2R5-B2V	-
47	SDQS2-B2P	I/O	48	SDM02-B2P	I
49	SDQ18-B2P	I/O	50	SDQ23-B2P	I/O
51	GND	-	52	GND	-
53	SDQ22-B2P	I/O	54	SDQ19-B2P	I/O

Table C-1 Memory connector (200-pin)(2/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
55	SDQ25-B2P	I/O	56	SDQ31-B2P	I/O
57	2R5-B2V	-	58	2R5-B2V	-
59	SDQ24-B2P	I/O	60	SDQ28-B2P	I/O
61	SDQS3R-B2P	I/O	62	SDM03-B2P	I
63	GND	-	64	GND	-
65	SDQ25-B2P	I/O	66	SDQ29-B2P	I/O
67	SDQ30-B2P	I/O	68	SDQ27-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	SMA12-B2P	I	100	SMA11-B2P	I
101	SMA09-B2P	I	102	SMA08-B2P	I
103	GND	-	104	GND	-
105	SMA07-B2P	I	106	SMA06-B2P	I
107	SMA05-B2P	I	108	SMA04-B2P	I
109	SMA03-B2P	I	110	SMA02-B2P	I
111	SMA01-B2P	I	112	SMA00-B2P	I
113	2R5-B2V	-	114	2R5-B2V	-
115	SMA10-B2P	I	116	SBS1-B2P	I
117	SBS0-B2P	I	118	SRAS-B2N	I
119	SWE-B2N	I	120	SCAS-B2N	I
121	SCS0-B2N	I	122	SCS1-B2N	I
123	N.C	-	124	N.C	-

Table C-1 Memory connector (200-pin)(3/4)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
125	GND	-	126	GND	-
127	SDQ37-B2P	I/O	128	SDQ32-B2P	I/O
129	SDQ36-B2P	I/O	130	SDQ37-B2P	I/O
131	2R5-B2V	-	132	2R5-B2V	-
133	SDQS4-B2P	I/O	134	GND	-
135	SDQ35-B2P	I/O	136	SDQ34-B2P	I/O
137	GND	-	138	GND	-
139	SDQ38-B2P	I/O	140	SDQ39-B2P	I/O
141	SDQ44-B2P	I/O	142	SDQ46-B2P	I/O
143	2R5-B2V	-	144	2R5-B2V	-
145	SDQ45-B2P	I/O	146	SDQ41-B2P	I/O
147	SDQS5-B2P	I/O	148	SDM05-B2P	I
149	GND	-	150	GND	-
151	SDQ43-B2P	I/O	152	SDQ47-B2P	I/O
153	SDQ40-B2P	I/O	154	SDQ42-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	SDQ53-B2P	I/O	164	SDQ52-B2P	I/O
165	SDQ48-B2P	I/O	166	SDQ53-B2P	I/O
167	2R5-B2V	-	168	2R5-B2V	-
169	SDQ56-B2P	I/O	170	SDM06-B2P	I
171	SDQ50-B2P	I/O	172	SDQ51-B2P	I/O
173	GND	-	174	GND	-
175	SDQ55-B2P	I/O	176	SDQ54-B2P	I/O
177	SDQ60-B2P	I/O	178	SDQ57-B2P	I/O
179	2R5-B2V	-	180	2R5-B2V	-
181	SDQ56-B2P	I/O	182	SDQ61-B2P	I/O
183	SDQS7-B2P	I/O	184	SDM07-B2P	I
185	GND	-	186	GND	-
187	SDQ59-B2P	I/O	188	SDQ58-B2P	I/O
189	SDQ63-B2P	I/O	190	SDQ62-B2P	I/O
191	2R5-B2V	-	192	2R5-B2V	-
193	SMBDAT-P3P	I/O	194	GND	-

Table C-1 Memory connector (200-pin)(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   PJ1801 HDD I/F connector (44-pin)

Table C-2 HDD I/F connector (44-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	IDRSTA-P5N	I	2	GND	-
3	PDD07-P3P	I	4	PDD08-P3P	O
5	PDD06-P3P	I	6	PDD09-P3P	O
7	PDD05-P3P	I	8	PDD10-P3P	O
9	PDD04-P3P	I	10	PDD11-P3P	O
11	PDD03-P3P	I	12	PDD12-P3P	O
13	PDD02-P3P	I	14	PDD13-P3P	O
15	PDD01-P3P	I	16	PDD14-P3P	O
17	PDD00-P3P	I	18	PDD15-P3P	O
19	GND	-	20	N.C	-
21	PDDREQ-P3P	I	22	GND	-
23	PDIOW-P3N	I	24	GND	-
25	PDIOR-P3N	I	26	GND	-
27	PIORDY-P3P	I	28	GND	-
29	PDDACK-P3N	I	30	GND	-
31	PDIRQ-P3P	I	32	N.C	-
33	PDA1-P3P	I	34	N.C	-
35	PDA0-P3P	I	36	PDA2-P3P	O
37	PDCS1-P3N	I	38	PDCS3-P3N	O
39	HDDLED-P5N	I	40	GND	-
41	P5V	-	42	P5V	-
43	GND	-	44	N.C	-

C.3   PJ1800 CD-ROM I/F connector (50-pin)

Table C-3 CD-ROM I/F connector (50-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	CDAUDL-PXP	I	2	CDAUDR-PXP	I
3	CD-GND	I	4	N.C	-
5	IDRSTB-P5N	O	6	SDD08-P3P	I/O
7	SDD07-P3P	I/O	8	SDD09- P3P	I/O
9	SDD06- P3P	I/O	10	SDD10- P3P	I/O
11	SDD05- P3P	I/O	12	SDD11- P3P	I/O
13	SDD04- P3P	I/O	14	SDD12- P3P	I/O
15	SDD03- P3P	I/O	16	SDD13- P3P	I/O
17	SDD02- P3P	I/O	18	SDD14- P3P	I/O
19	SDD01-E5P	I/O	20	SDD15- P3P	I/O
21	SDD00-P3P	I/O	22	SDDREQ- P3P	I
23	GND	-	24	SDIOR -P3N	O
25	SDIOW-P3N	O	26	GND	-
27	SIORDY -P3P	I	28	SDDACK-P3N	O
29	IRQ15-P3P	I	30	N.C	-
31	SDA1-P3P	O	32	N.C	O
33	SDA0-E3P	O	34	SDA2-E3P	O
35	SDCS1-P3P	O	36	SDCS3-P3N	O
37	SDASP-P5N	I/O	38	P5V	I
39	P5V	-	40	P5V	I
41	P5V	-	42	P5V	I
43	GND	-	44	GND	-
45	GND	-	46	N.C	-
47	N.C	-	48	GND	-
49	N.C	-	50	N.C	-

C.4   PJ2110 PC card I/F connector (68-pin)

Table C-4 PC card I/F connector (68-pin) (1/2)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	ACAD00-EYP	I/O
3	ACAD01-EYP	I/O	4	ACAD03-EYP	I/O
5	ACAD05-EYP	I/O	6	ACAD07-EYP	I/O
7	ACCBEO-EYP	I/O	8	ACAD09-EYP	I/O
9	ACAD11-EYP	I/O	10	ACAD12-EYP	I/O
11	ACAD14-EYP	I/O	12	ACCBE1-EYN	I/O
13	ACPAB-EYP	I/O	14	ACRERR-EYN	I/O
15	ACGNT-EYN	I/O	16	ACTNT-EYN	I/O
17	MCVCCA	I/O	18	MCVPPA	I/O
19	ACCLK-EYP	I/O	20	ACTBDY-EYN	I/O
21	ACCBE2-EYN	I/O	22	ACAD18-EYP	I/O
23	ACAD20-EYP	I/O	24	ACAD21-EYP	I/O
25	ACAD22-EYP	I/O	26	ACAD23-EYP	I/O
27	ACAD24-EYP	I/O	28	ACAD25-EYP	I/O
29	ACAD25-EYP	I/O	30	ACAD27-EYP	I/O
31	ACAD29-EYP	I/O	32	ACD02-EYP	I/O
33	ACCLKR-EYN	I/O	34	GND	-
35	GND	-	36	ACCD1-E3N	I/O
37	ACAD02-EYP	I/O	38	ACAD04-EYP	I/O
39	ACAD06-EYP	I/O	40	ACD14-EYP	I/O
41	ACAD08-EYP	I/O	42	ACAD10-EYP	I/O
43	ACVS1-E3P	I/O	44	ACAD13-EYP	I/O
45	ACAD15-EYP	I/O	46	ACAD16-EYP	I/O
47	ACA18-EYP	I/O	48	ACLOCK-EYN	I/O
49	ACSTOP-EYN	I/O	50	ACDEVS-EYN	I/O
51	MCVCCA	I	52	MCVPPA	I/O
53	ACTRDY-EYN	I/O	54	ACFRAM-EYN	I/O
55	ACAD17-EYP	I/O	56	ACAD19-EYP	I/O
57	ACYS2-E3P	I/O	58	ACRST-EYN	I/O

Table C-4 PC card I/F connector (68-pin) (2/2)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
59	ACSERR-EYN	I/O	60	ACREQ-EYN	I/O
61	ACCBE3-EYN	I/O	62	ACAUDI-EYP	I
63	ACSTSC-EYP	I	64	ACAD28-EYP	I/O
65	ACAD30-EYP	I/O	66	ACAD31-EYP	I/O
67	ACCD2-E3N	I	68	GND	-

C.5   PJ2130 SD card I/F connector (12-pin)

Table C-5 SD card I/F connector (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	SDAT3-E3P	I/O	2	SDCMD-E3P	I/O
3	GND	-	4	SD-E3V	-
5	SDCLK-E3P	O	6	GND	-
7	SDAT0-E3P	I/O	8	SDAT1-E3P	I/O
9	SDAT2-E3P	I/O	10	SDCD-E3N	I
11	SDWP-E3P	I	12	GND	-

C.6   PJ2200 Mini PCI I/F connector (124-pin)

Table C-6 Mini PCI I/F connector (124-pin) (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	(WLON-S3N)	O	14	N.C.	-
15	GND	-	16	N.C.	-
17	PIRQD-P3N	I/O	18	P5V	-
19	P3V	-	20	PIRQG-P3N	I/O
21	N.C.	-	22	N.C.	-
23	GND	-	24	E3V	-
25	X33MPC-P3P	O	26	PCIRS1-S3N	O
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	I/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/O	48	AD26-P3P	I/O
49	GND	-	50	GND	-
51	AD21-P3P	I/O	52	AD22-P3P	O
53	AD19-P3P	I/O	54	AD20-P3P	O
55	GND	-	56	PAR-P3P	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-6 Mini PCI I/F connector (124-pin) (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	TRDY-P3N	I/O
67	SERR-P3N	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	N.C.	-
119	GND	-	120	GND	-
121	N.C.	-	122	N.C.	-
123	N.C.	-	124	E3V	-

C.7   PJ3000 MDC I/F connector (30-pin)

Table C-7 MDC I/F connector (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	N.C	-	2	GND	-
3	GND	-	4	N.C	-
5	N.C	-	6	N.C	-
7	N.C	-	8	GND	-
9	N.C	-	10	N.C	-
11	N.C	-	12	N.C	-
13	N.C	-	14	N.C	-
15	GND	-	16	E3V	-I
17	E3V	-	18	N.C	-
19	GND	-	20	GND	-
21	N.C	-	22	M97SY2-P3P	I
23	M97OT2-P3P	I	24	N.C	-
25	M97RS2-S3N	I	26	M97IN2-E3P	O
27	GND	-	28	GND	-
29	GND	-	30	X97BC2-P3P	I/O

C.8   PJ3200 Keyboard I/F connector (34-pin)

Table C-8 Keyboard I/F connector (34-pin)

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-S3N	I
13	KBSC07-S3N	O	14	KBSC08-S3N	O
15	KBSC09-S3N	O	16	KBRT01-S3N	I
17	KBRT02-S3N	I	18	KBRT03-S3N	I
19	KBSC10-S3N	O	20	KBSC11-S3N	O
21	KBRT04-S3N	I	22	KBRT05-S3N	I
23	KBSC12-S3N	O	24	KBSC13-S3N	O
25	KBRT06-S3N	I	26	KBRT07-S3N	I
27	KBSC14-S3N	O	28	KBSC15-S3N	O
29	P5V	-	30	N.C	-
31	N.C	-	32	N.C	-
33	N.C	-	34	P5V	-

C.9   PJ3260 PAD I/F connector (8-pin)

Table C-9 PAD I/F connector (8-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	P5V	-	2	P5V	-
3	IPSDAT-P5P	I/O	4	IPSCLK-P5P	I/O
5	N.C	-	6	GND	-
7	GND	-	8	GND	-

C.10   PJ3302 Sensor Switch Connector (2-pin)

Table C-10 Sensor Switch connector (2-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	PNLOFF-S3N	I	2	GND	-

C.11   PJ3510 Parallel I/F Connector (25-pin)

Table C-11 Parallel I/F connector (25-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	STROB-P5N	I	2	PDB00-P5P	I/O
3	PDB01-P5P	I/O	4	PDB02-P5P	I/O
5	PDB03-P5P	I/O	6	PDB04-P5P	I/O
7	PDB05-P5P	I/O	8	PDB06-P5P	I/O
9	PDB07-P5P	I/O	10	ACK-P5N	I
11	BUSY-P5P	I	12	PE-P5P	I
13	SELCT-P5P	I	14	AUTFD-P5N	O
15	ERROR-P5N	I	16	PINIT-P5N	O
17	SLIN-P5N	O	18	GND	-
19	GND	-	20	GND	-
21	GND	-	22	GND	-
23	GND	-	24	GND	-
25	GND	-			

C.12   PJ4100 Network I/F connector (8-pin)

Table C-12-1 Network I/F connector (8-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	(TDP-P3P)	-	2	(TDN-P3P)	-
3	(RDP-P3P)	I	4	(RCT)	-
5	(RCT)	-	6	(RDN-P3N)	I
7	(RCT)	-	8	(RCT)	-

C.13　PJ4200 1394 I/F connector (4-pin)

Table C-13 1394 I/F connector (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	TPB0-P3N	I/O	2	TPB0-P3P	I/O
3	TPA0-P3N	I/O	4	TPA0-P3P	I/O

C.14　PJ4600 USB 0/1 I/F connector (8-pin)

Table C-14 USB 0/1 I/F connector (8-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
A1	USBPOV-E5V	O	A2	USBP2-S3N	I/O
A3	USBP2-S3P	I/O	A4	GND	-
B1	USBPOV-E5V	O	B2	USBP3-S3N	I/O
B3	USBP3-S3N	I/O	B4	GND	-

C.15　PJ4601 USB 2/3 I/F connector (8-pin)

Table C-15 USB 2/3 I/F connector (8-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
A1	USBPOV-E5V	O	A2	USBP0-S3N	I/O
A3	USBP0-S3P	I/O	A4	GND	-
B1	USBPOV-E5V	O	B2	USBP1-S3N	I/O
B3	USBP1-S3N	I/O	B4	GND	-

C.16   PJ5600 LCD connector (40-pin)

Table C-16 LCD connector (40-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	BRT0-P5P	O
3	TXDA1-PYP	O	4	BRT1-P5P	O
5	TXDTA1-PYN	O	6	BRT2-P5P	O
7	TXDTA0-PYP	O	8	FL-P5V	-
9	TXDTA0-PYN	O	10	FL-P5V	-
11	TXCLKA-PYP	O	12	FL-P5V	-
13	TXCLKA-PYN	O	14	BRT2DA-S3P	O
15	TXDAT2-PYP	O	16	GND	-
17	TXDTA2-PYN	O	18	GND	-
19	GND	-	20	GND	-
21	TXDTBO-PYP	O	22	GND	-
23	TXDTB0-PYP	O	24	GND	-
25	TXDTB2-PYP	O	26	GND	-
27	TXDTB2-PYN	O	28	PNL0-P3P	I
29	TXCLKB-PYP	O	30	PNL1-P3P	I
31	TXCLKB-PYN	O	32	PNL2-P3P	I
33	TXDTB1-PYP	O	34	GND	-
35	TXDTB1-PYN	O	36	GND	-
37	PNL-P3V	-	38	GND	-
39	PNL-P3V	-	40	GND	-

C.17   PJ5620 CRT I/F connector (15-pin)

Table C-17 CRT I/F connector (15-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	RED-PXP		2	GREEN-PXP	
3	BLUE-PXP		4	N.C	
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	(DDC-P5V)	-	10	GND	-
11	N.C	-	12	(DDCDA)	O
13	(HSYNC)	O	14	(VSYNC)	O
15	(DDCACK)	O			

C.18   PJ5640 TV connector (4-PIN)

Table C-18 TV connector (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	CHROMA-PYP	O	2	LUMINA-PYP	O
3	GND	-	4	GND	-

C.19   PJ6001 Speaker Connector (Left) (3-pin)

Table C- 19 Speaker Connector (Left) (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	SPOTL-PXP	O	2	N.C	-
3	SPOTL-PXN	O			

C.20   PJ6002 Speaker Connector (Right) (2-pin)

Table C- 20 Speaker Connector (right) (2-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	SPOTR-PXP	O	2	SPOTR-PXN	O

C.21   W8800 DC-IN connector (4-pin)

Table C-21 DC-IN connector (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	ADPDC	O	2	ADPDC	O
3	GND	-	4	GND	-

C.22   PJ8810 1st Battery connector (10-pin)

Table C-22 1st Battery connector (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	PVBL1	-	2	BTMP1	O
3	(DCHG)	-	4	M5V	-
5	PSCL-S5P	I/O	6	PSDA-S5P	I/O
7	GND	-	8	DBT10V-S5N	O
9	GND	-	10	GND	-

C.23   PJ8490 RTC Battery Connector (3-pin)

Table C-23 RTC Battery connector (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	(R3V)	-	2	N.C	-
3	GND	-			

C.24   PJ8450 FAN1 connector (3-pin)

Table C-24 FAN 1 connector (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	FAN VCC	-	2	GND	-
3	FANG0-P3P	I			

C.25   PJ8425 FAN2 connector (3-pin)

Table C-25 FAN 2 connector (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	FAN VCC	-	2	GND	-
3	FANG1-P3P	I			

C.26   PJ9500 LE Board I/F connector (13-pin)

Table C-26 LE Board I/F connector (13-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	CDRLED-P5N	O
3	HDDLED-P5N	O	4	P5V	-
5	BAT1GR-S5N	O	6	BAT1OR-S5N	O
7	M5V	-	8	(PWLEGR-S3N)	O
9	(PWLEOR-S3N)	O	10	GND	-
11	DCINGR-S5N	O	12	DCINOR-S5N	O
13	M5V	-			

C.27　PJ9550 SD Board I/F connector (30-pin)

Table C-27 SD Board I/F connector (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	P3V	-
3	P3V	-	4	P3V	-
5	P3V	-	6	IRMODE -P3P	I/O
7	IRTX-P3P	O	8	IRRX-P3N	I
9	FIR-GND	-	10	FIR-GND	-
11	FIR-GND	-	12	GND	-
13	(BTLED-S3N)	O	14	S3V	-
15	BTSWON-S3P	I	16	GND	-
17	VROUTR -PXP	I/O	18	VROUTL -PXP	I/O
19	MMREFV-P2V	I/O	20	LOUTL-PXP	I/O
21	LOUTR-PXP	I/O	22	A-GND	-
23	MICIN-PXP	I/O	24	A-GND	-
25	A-GND	-	26	SPKEN-P5P	I
27	HEDL-PXP	I/O	28	HEADR-PXP	I/O
29	A4R7-P4V	-	30	A4R7-P4V	-

C.28　PJ9600 CD Board I/F connector (10-pin)

Table C-28 CD Board I/F connector (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	N.C	-
3	CDBDET-S3N	O	4	N.C	-
5	CDNEXT-S3N	I	6	CDPREV-S3N	I
7	CDSTOP-S3N	I	8	CDPLAY-S3N	I
9	GND	-	10	BND	-

LE Board

C.29 PJ9505 System Board I/F connector (13-pin)

Table C-29 System Board I/F connector (13-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	CDRLED-P5N	I
3	HDDLED-P5N	I	4	P5V	-
5	BAT1GR-S5N	I	6	BAT1OR-S5N	I
7	M5V	-	8	(PWLEGR-S3N)	I
9	(PWLEOR-S3N)	I	10	GND	-
11	DCINGR-S5N	I	12	DCINOR-S5N	I
13	M5V	-			

SD Board

C.30   PJ9555 System Board I/F connector (30-pin)

Table C-30 System Board I/F connector (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	P3V	-
3	P3V	-	4	P3V	-
5	P3V	-	6	IRMODE -P3P	I/O
7	IRTX-P3P	I	8	IRRX-P3N	O
9	FIR-GND	-	10	FIR-GND	-
11	FIR-GND	-	12	GND	-
13	(BTLED-S3N)	I	14	S3V	-
15	BTSWON-S3P	O	16	GND	-
17	VROUTR -PXP	I/O	18	VROUTL -PXP	I/O
19	MMREFV-P2V	I/O	20	LOUTL-PXP	I/O
21	LOUTR-PXP	I/O	22	A-GND	-
23	MICIN-PXP	I/O	24	A-GND	-
25	A-GND	-	26	SPKEN-P5P	O
27	HEDL-PXP	I/O	28	HEADR-PXP	I/O
29	A4R7-P4V	-	30	A4R7-P4V	-

C.31   PJ6000 External microphone connector (5-pin)

Table C-31 External microphone connector (5-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	(MICIN-PXP)	I
3	(MMREFV-P2V)	O	4	GND	-
5	GND	-			

C.32   PJ6003 Headphone connector (6-pin)

Table C-32 Headphone connector (6-pin)

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	(SPKEN-P5P)	I	6	N.C	-

CD Board

C.33   PJ9605 System Board I/F connector (10-pin)

Table C-33 System Board I/F connector (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
1	GND	-	2	N.C	-
3	CDBDET-S3N	I	4	N.C	-
5	CDNEXT-S3N	O	6	CDPREV-S3N	O
7	CDSTOP-S3N	O	8	CDPLAY-S3N	O
9	GND	-	10	BND	-

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	
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	13	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[{	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	

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 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break		Note
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. *   Combined 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**
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

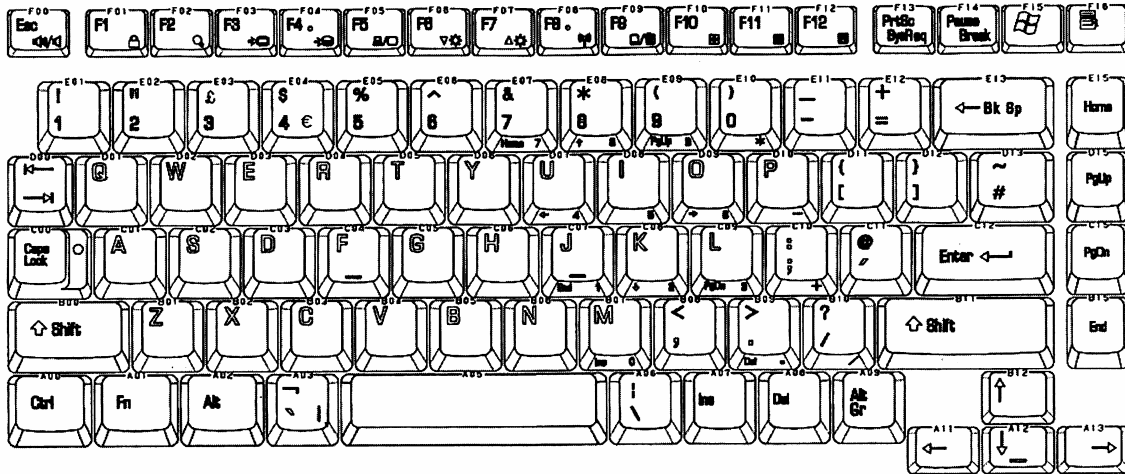## E.1   United Kingdom (UK) Keyboard

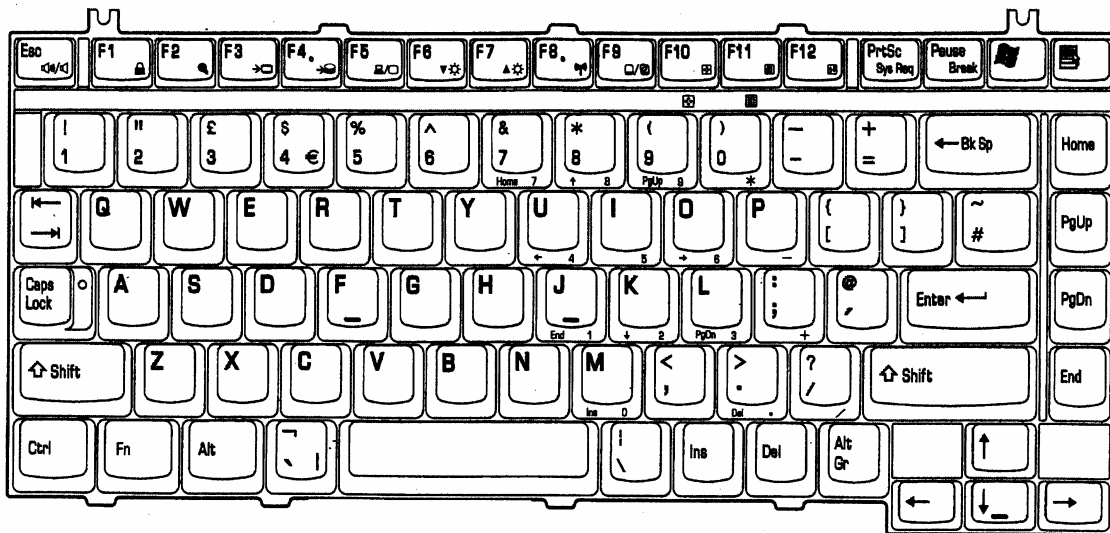
Figure E-1 UK keyboard (made by Fujitsu G83C0001K110)

Figure E-2 UK keyboard (made by ALPS UE2024P136)
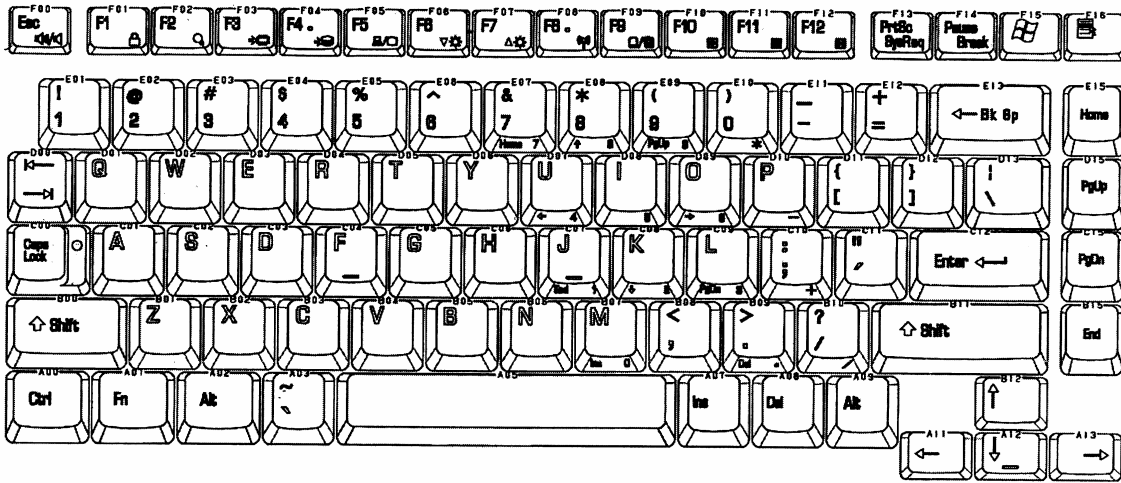
E.2　United States (US) Keyboard

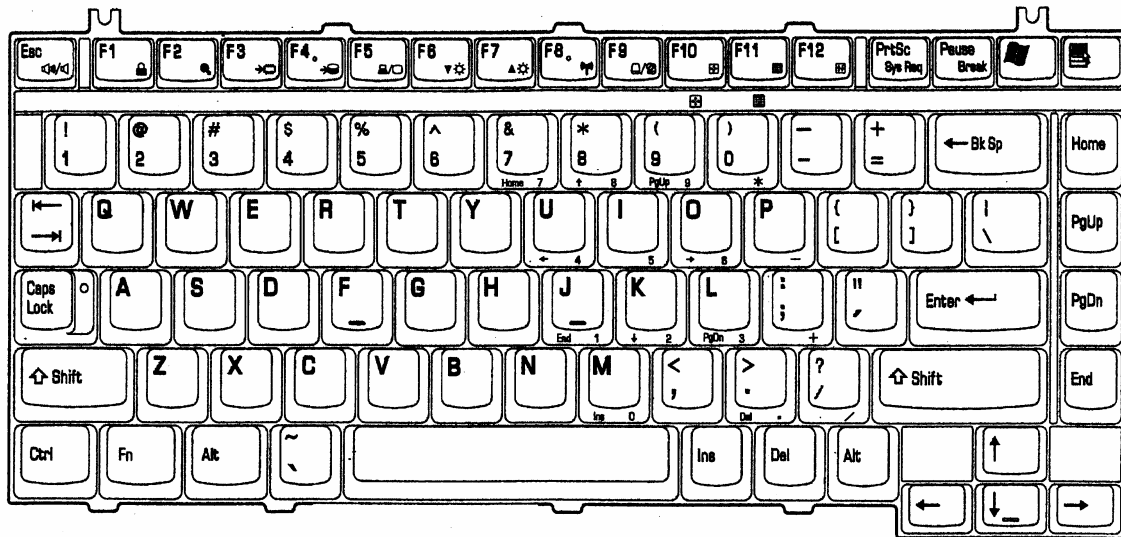*Figure E-3　US keyboard (made by Fujitsu G83C0001K210)*

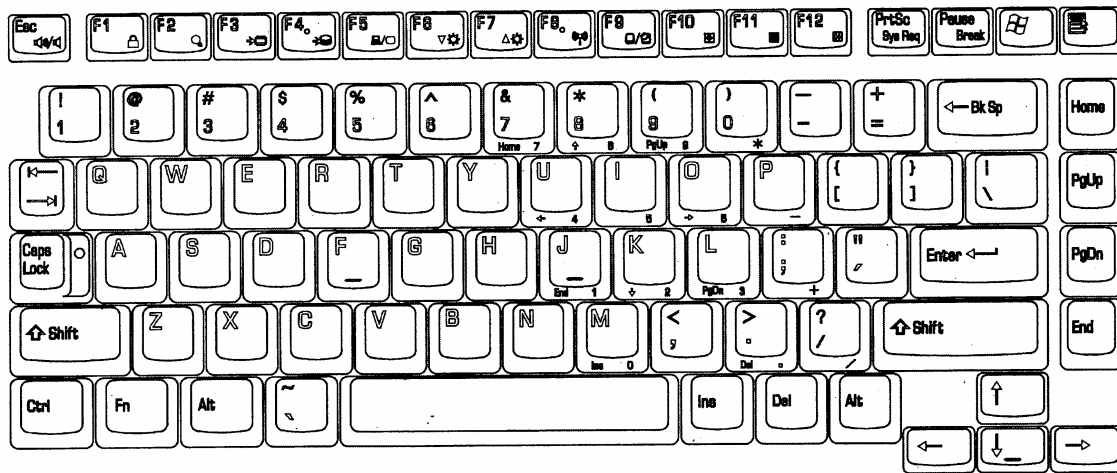*Figure E-4　US keyboard (made by ALPS UE2024P137)*

Figure E-5 US keyboard (made by NMB G83C0000E510)

Appendix F   Wiring Diagrams
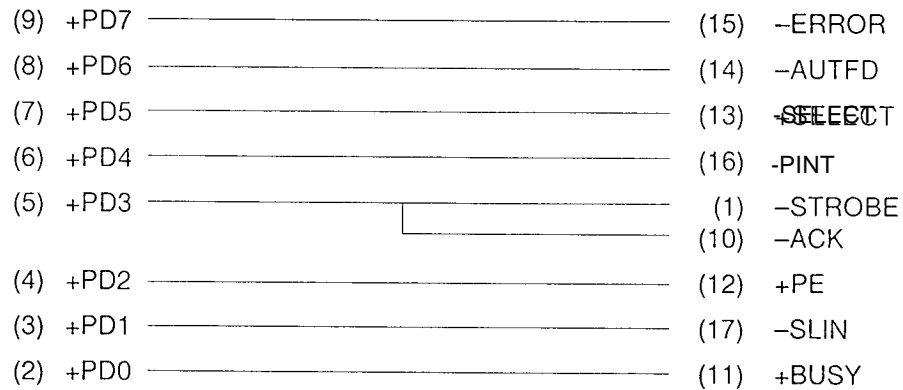
F.1   Parallel Port Wraparound Connector

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

Figure F-1 Parallel port wraparound connector

F.2   LAN Loopback Connector

```
(1) BIBAP (TX+)   ────────────────────   (3) BIDBP (RX+)

(2) BIDAN (TX-)   ────────────────────   (6) BIDBN (RX-)
```
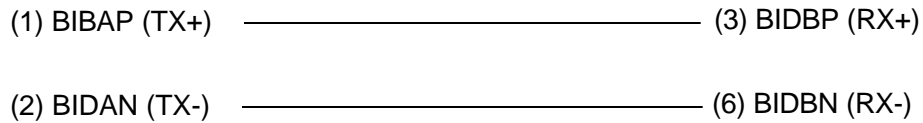
Figure F-2 LAN loopback Connector

Appendix G   BIOS Rewrite Procedures

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

Tools

To rewrite the BIOS, you need the following tool:

❑ BIOS/EC/KBC rewriting disk for the computer that has renewed BIOS data.

Rewriting the BIOS

1. Set the system to boot mode.

2. Turn off the power to the computer.

3. Remove the external cable and PC card.

4. Connect an USB FDD and insert the BIOS/EC/KBC rewriting disk into the USB FDD.

5. Turn on the power while holding down the No. 01 key.

    For example

    (US Keyboard)
    (UK Keyboard)

    (Keep holding down the key until a message appears on the screen.)
    The BIOS rewriting starts.

6. When the process is completed, eject the BIOS/EC/KBC rewriting disk and the system is automatically reset.

Appendix H   EC/KBC Rewrite Procedures

This Appendix explains how to rewrite the EC/KBC system program when you update the EC/KBC system.

Tools

To rewrite the EC/KBC, you need the following tool:

❑ BIOS/EC/KBC rewriting disk for the computer

Rewriting the EC/KBC

> *NOTE:* 1. *Rewrite the EC/KBC only when instructed by a diagnostic disk release notice.*
>
> 2. *Connect the AC adaptor to the computer when you rewrite the EC/KBC.*
>
> 3. *Do not turn off the power while you are rewriting the EC/KBC. If the rewrite fails, it might be impossible to start up the computer.*
>
> 4. *If you fail to rewrite EC/KBC, then when you next turn on the power, a message may be displayed that the contents of the EC/KBC have been erased. In this case, insert the BIOS/EC/KBC rewriting disk, and the EC/KBC will be rewritten.*
>
> 5. *Normally it takes about 30 seconds to rewrite the EC/KBC. It may take 3 minutes (maximum), depending on the conditions of the computer or ICs. The computer is not hung up. Allow sufficient time. Never reboot or turn off the power to the computer before the rewriting is completed.*

1. Set the system to boot mode.

2. Turn off the power to the computer.

3. Remove the external cable and PC Card.

4. Connect an USB FDD and insert the BIOS/EC/KBC rewriting disk into the USB FDD.

5. Turn on the power while holding down the **Tab** key. (Keep holding down the key until a message appears on the screen.) The BIOS/EC/KBC rewriting starts.

6. When the EC/KBC rewrite is completed, the system is automatically turned off.

Appendix I   Reliability

The following table shows MTBF (Mean Time Between Failures).

Table I-1 MTBF

MTBF	Time (hours)
System	5,109