

**Toshiba Personal Computer**  
**Satellite M20**  
**Maintenance Manual**

**TOSHIBA CORPORATION**

S/ No.

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Toshiba Satellite M20 Maintenance Manual

First edition Jan 2003

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## Preface

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This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite M20, referred to as Satellite M20 in this manual.

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, RTC battery or backup 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 M20 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



## 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 XXXXX that appears on its display is presented in the type face below:

```
Format complete  
System transferred
```

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# Table of Contents

---

## Chapter 1 Hardware Overview

1.1	Features .....	1-1
1.2	System Unit Components.....	1-6
1.3	2.5-inch HDD .....	1-12
1.4	DVD-ROM Drive.....	1-13
1.5	CD-ROM Drive.....	1-14
1.6	CD-R/RW Drive.....	1-15
1.7	CD-RW/DVD-ROM Drive .....	1-16
1.8	Power Supply .....	1-17
1.9	Batteries.....	1-19

## Chapter 2 Troubleshooting

2.1	Outline.....	2-1
2.2	Basic Flowchart.....	2-2
2.3	Power Supply .....	2-6
2.4	System Board .....	2-10
2.5	2.5-inch HDD .....	2-20
2.6	Keyboard .....	2-25
2.7	Display .....	2-27
2.8	DVD-ROM Drive.....	2-29
2.9	CD-ROM Drive.....	2-31
2.10	LAN.....	2-33
2.11	Cooling Module.....	2-34

## Chapter 3 Diagnostic Programs

3.1	General .....	3-1
3.2	Quick Start.....	3-3
3.3	Option.....	3-9

3.4	Subtests.....	3-18
3.5	System Test .....	3-22
3.6	Memory Test .....	3-29
3.7	Storage.....	3-34
3.8	Video .....	3-39
3.9	Communication (COMM).....	3-47
3.10	Peripherl .....	3-54
3.11	Audio.....	3-58
3.12	Mode Error Codes and description.....	3-59

## Chapter 4 Replacement Procedures

4.1	General .....	4-1
4.2	Cooling Module.....	4-18
4.3	CPU .....	4-21
4.4	HDD .....	4-24
4.5	Selectable Bay Module.....	4-27
4.6	Touch Pad.....	4-31
4.7	RTC Battery .....	4-35
4.8	Wireless Lan Card.....	4-37
4.9	Keyboard .....	4-39
4.10	Speaker .....	4-42
4.11	Bluetooth Card.....	4-44
4.12	Top Cover with the Display Assembly .....	4-46
4.13	I/O Board.....	4-50
4.14	System Board .....	4-51
4.15	Display Mask.....	4-53
4.16	Inverter Board .....	4-55
4.17	LCD Module .....	4-57

## Appendices

Appendix A	Handling the LCD Module .....	A-1
Appendix B	Board Layout .....	B-1
Appendix C	Pin Assignments.....	C-1
Appendix D	Keyboard Scan/Character Codes .....	D-1
Appendix E	Key Layout.....	E-1
Appendix F	Wiring Diagrams.....	F-1
Appendix G	BIOS Rewrite Procedures.....	G-1
Appendix H	EC/KBC Rewrite Procedures.....	H-1



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# **Chapter 1**

## **Hardware Overview**

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## **Chapter 1     Contents**

---

1.1	Features .....	1-1
1.2	System Unit Components .....	1-6
1.3	2.5-inch HDD .....	1-12
1.4	DVD-ROM Drive .....	1-13
1.5	CD-ROM Drive .....	1-14
1.6	CD-R/RW Drive .....	1-15
1.7	CD-RW/DVD-ROM Drive .....	1-16
1.8	DVD-Multi Drive.....	1-17
1.9	Power Supply .....	1-18
1.10	Batteries .....	1-19
	1.10.1   Main Battery.....	1-19
	1.10.2   Battery Charging Control .....	1-19
	1.10.3   RTC Battery .....	1-20

**Figures**

Figure 1-1 Front of the computer..... 1-5  
Figure 1-2 System unit configuration ..... 1-5  
Figure 1-3 System unit block diagram..... 1-6  
Figure 1-4 2.5-inch HDD..... 1-12  
Figure 1-5 DVD-ROM drive ..... 1-13  
Figure 1-6 CD-ROM drive ..... 1-14

**Tables**

Table 1-1 2.5-inch HDD specifications ..... 1-12  
Table 1-2 DVD-ROM drive specifications..... 1-13  
Table 1-3 CD-ROM drive specifications..... 1-14  
Table 1-4 CD-R/RW drive specifications..... 1-15  
Table 1-5 CD-RW/DVD-ROM drive specifications ..... 1-16  
Table 1-6 DVD-Multi drive specifications..... 1-17  
Table 1-7 Battery specifications ..... 1-19  
Table 1-8 Quick/normal charging time..... 1-19  
Table 1-9 RTC battery charging/data preservation time ..... 1-20

## 1.1 Features

The Toshiba Satellite M20 is a lightweight notebook PC based on the Mobile Banias processor, providing high-speed processing capabilities and advanced features. The computer employs a Lithium Ion battery that allows it to be battery-operated for a longer period of time. The display uses a 14.1-inch XGA LCD panel, capable of displaying up to 16M colors at a resolution of 1024 by 768 pixels (XGA).

The (PGA socket supports BTO/CTO for the CPU so that the system can be designed to suit your needs.

The computer has the following features.

Processor

The CPU is the Mobile Banias (Pentium M).

1.3, 1.4, 1.5, or 1.6 GHz

Host bridge system controller

System controller: Intel 855 GM (MONTARA-GM) + ICH4-M

Memory

The computer has a pair of SO DIMM slots and comes standard with one 256MB module. It supports PC2100 and uses SO DIMMs (DDR SDRAM) driven at 2.5 V, accepting BTO/CTO for your memory requirements. It can incorporate up to 2 GB of main memory using the following sizes of memory modules:

- 256 MB (16M×16×8P)
- 512 MB (16M×16×16P)
- 512 MB (32M×16×8P)
- 1024 MB (64M×16×8P)
- 1024 MB (32M×16×16P)

Hard disk drive (HDD)

The computer accommodates one 2.5-inch HDD with any of the following storage capacities:

- 20 GB (9.5 mm thick) ATA100
- 30 GB (9.5 mm thick) ATA100
- 40 GB (9.5 mm thick) ATA100
- 60 GB (9.5 mm thick) ATA100
- 80 GB (9.5 mm thick) ATA100

Floppy disk drive (FDD)

An external 3.5-inch FDD can be connected to a USB port.

A 3.5-inch three-mode drive is available that supports 720KB, 1.2MB, and 1.44MB formats.

Selectable bay

The Selectable Bay can accommodate a DVD-ROM drive, CD-ROM drive, CD-RW drive, CD-RW/DVD-ROM or Multi-Drive.

This bay can also be used to install a secondary HDD or secondary battery available as an option.

Display

The LCD displays available come in the following three sizes:

- 14.1" XGA-TFT color display, resolution 1024×768, 16M colors

The computer can use an external monitor along with the LCD display at the same time.

Keyboard

The keyboard has 85 keys conforming to the US key layout.

The keyboard has 86 keys confirming to the UK key layout.

The keyboard has 86 keys confirming to the Korea key layout.

Batteries

The computer has a removable Lithium Ion battery pack and an internal RTC battery.

Universal Serial Bus (USB) ports

The computer has two USB ports to daisy-chain a maximum of 127 USB devices. The serial data transfer rate is 480 Mbps (high speed), 12 Mbps (full speed) or 1.5 Mbps (low speed). These ports support PnP installation and hot plugging.

Parallel port

A Centronics compatible parallel port is provided to connect a printer or another parallel device. The port is IEEE-1284 compliant and supports Extended Capabilities Port (ECP).

Serial port (RS-232C port)

A 9-pin serial interface port is provided to connect a serial device such as a serial printer, mouse, or modem.

External monitor port

A 15-pin external monitor port is provided, through which the computer automatically recognizes an external VESA DDC 2B compatible monitor.

PS/2™ mouse/keyboard port

A 6-pin PS/2 mouse/keyboard port is provided to connect an IBM( PS/2 compatible keyboard or mouse. It accepts a Y splitter cable.

PC Card slot

A PC Card slot is provided to hold either two PC Card Standard Type II (5.0 mm) cards or one Type III (10.5 mm) card, capable of using a variety of PC Cards including 16-bit Multiple Function PC Cards and CardBus cards.

Toshiba Pointing Device

Toshiba Pointing Device is AccuPoint.

Fast Serial InfraRed (FIR) communications port

An IrDA 1.1 compatible FIR port is provided, enabling wireless communication at a high speed of 1.15 or 4 Mbps.

Sound system

The AD1981B integrated audio controller supports multimedia. The sound system contains the following:

- MIDI replay feature
- Stereo speakers
- Headphone jack
- External microphone jack

LAN

The internal LAN board supports 10BASE-T and 100BASE-TX, enabling connection to a LAN at up to 100 Mbps. It also supports Wake-up On LAN. The LAN board has the RJ45 jack to directly accommodate a LAN cable.

Wireless LAN

The internal Mini PCI Card slot support both IEEE802.11.b and IEEE802.11a&b combo card. The antenna is integrated in the system unit.

Internal modem

The computer contains a MDC, enabling data and fax communication. It supports ITU-TV.92. The transfer rates are 56 Kbps for data reception, 33.6 Kbps for data transmission, and 14,400 bps for fax transmission. Note, however, that the actual speed depends on the line quality. The RJ11 modem jack is used to accommodate a telephone line.

Figures 1-1 and 1-2 show the front of the computer and its system unit configuration, respectively.



Figure 1-1 Front of the computer

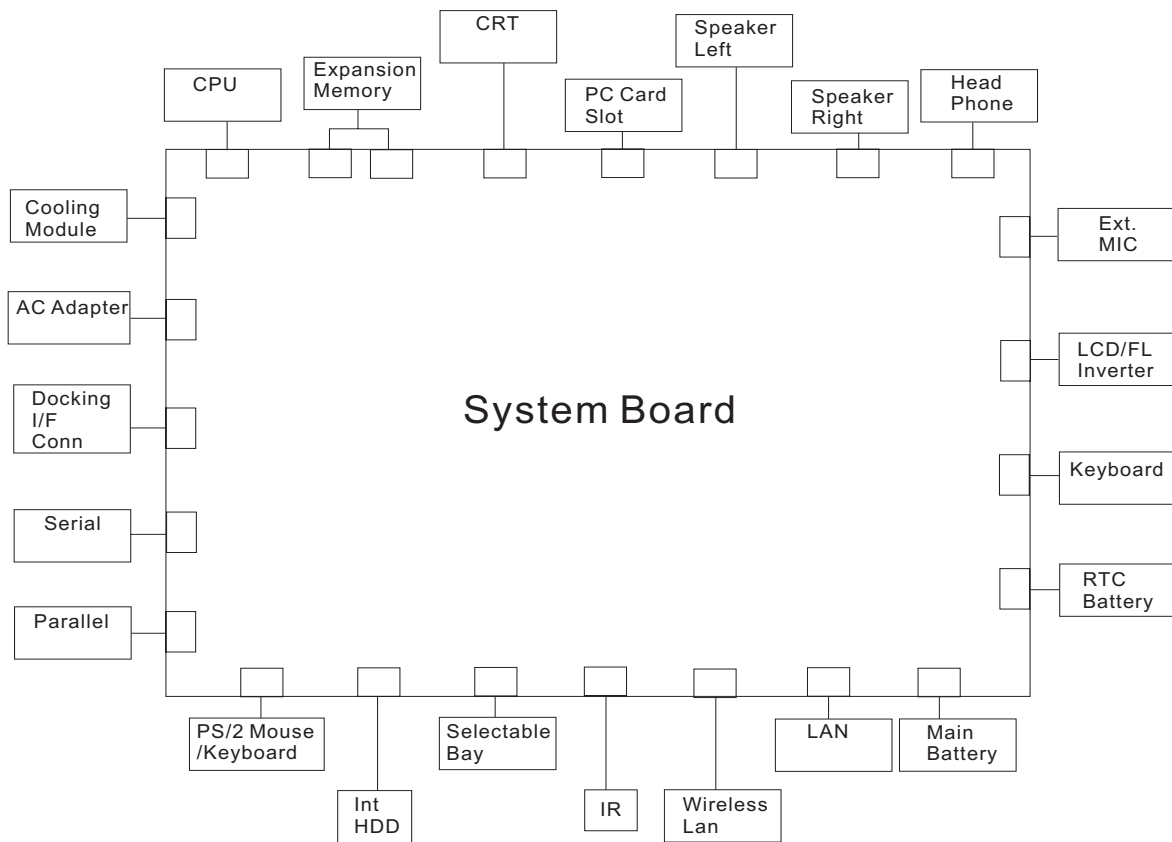


Figure 1-2 System unit configuration

### 1.2 System Unit Components

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

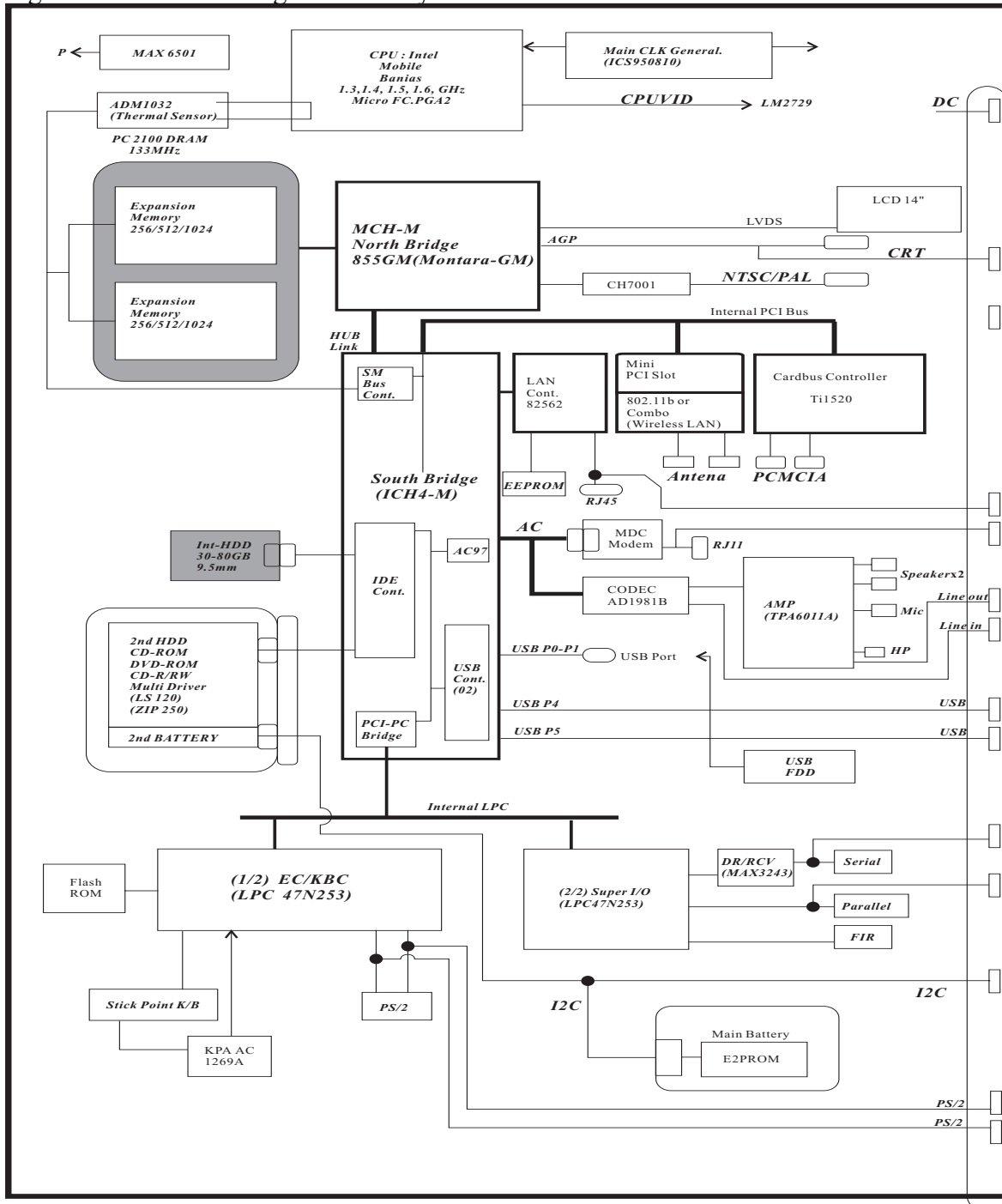


Figure 1-3 System unit block diagram



The system unit of the computer consists of the following components:

Processor: Mobile Banias

● Mobile Banias

- Core speed: 1.3, 1.4, 1.5, 1.6 GHz
- System bus: 400 MHz
- Core operating at 1.484 V(1.4/1.5/1.6 GHz), 1.388V(1.3 GHz)
- Integrated level 1 cache: 64 KB  
(32KB instruction cache and 32KB data cache)
- On-die level 2 cache 1 MB
- Enhanced Intel® SpeedStep® technology

Memory

Two BTO/CTO-capable expansion memory slots are provided, coming standard with one 256MB module. They can hold 256/512MB/1024MB expansion memory modules available as options to grow up to 2 GB.

● PC2100 DDR SDRAM supported

● 256/512/1024MB modules supported

- 256 MB (16M x 16 x 8P)
- 512 MB (16M x 16 x 16P)
- 512 MB (32M x 16 x 8P)
- 1024 MB (32M x 16 x 16P)
- 1024 MB (64M x 16 x 8P)

● 2.5 volt operation

● No parity bit

● 64-bit data transfer

❑ BIOS ROM (flash E2PROM)

- 4Mb x 1 chip (512KB flash parts)
  - 64 KB used for system BIOS
  - 64 KB used for VGA
  - 20 KB used for PnP
  - 10 KB for PCI
  - 24 KB used for Boot Block
  - 20 KB used for LOGO
  - 58 KB used for LAN
  - 64 KB used for EC BIOS
  - 11 KB used for ACPI
  - 36 KB used for PM
  - 13 KB used for SCU
  - 3 KB used for USB
  - 2 KB used for CF card
  - 4 KB used for CPU
  - 6 KB used for Crisis
  - 113 KB reserved

❑ System controllers

- North Bridge: Intel 855 GM (MONTARA-GM)
  - CPU interface and control
  - DRAM control
  - PCI master/slave interface (PCI R2.2 compliant)
  - Embedded video controller
  
- South Bridge: Intel ICH4-M
  - Enhanced DMA controller
  - Interrupt controller
  - Counter/timer
  - PCI IDE controller
  - Support for ATA-66 (GB) and ATA-100 (30/40/60 GB)
  - USB interface
  - SMBus interface
  - Super I/O interface
  - Power management control
  - Suspend/resume control
  - ACPI support

❑ PC Card controller

- Ti1520

- CardBus/PC Card controller
- ❑ Video controller
  - North Bridge embedded
    - LCD control
    - External RGB output control
    - NTSC/PAL output control

- ❑ Video RAM
  - Up to 64MB shared with main memory

- ❑ Sound controller

The ICH4-M integrated audio controller supports multimedia. The sound system contains the following:

- MIDI replay feature
- Stereo speakers
- Headphone jack
- External microphone jack
- ICH4-M integrated audio controller + AD1981B
  - 3D sound (surround) feature
  - 16-bit, 48-KHz stereo record/replay feature
  - Full-duplex (simultaneous record/replay capability)
- ❑ KBC/EC (Keyboard Controller/Embedded Controller)

A single LPC 47N253 chip is used to serve as KBC/ EC.and Super IO.

- KBC
  - Scan controller function
  - Interface controller function
  - Controlling the switching between the AccuPoint and external PS/2 mouse or between the built-in keyboard and external PS/2 keyboard or their simultaneous operation

- EC
  - Power supply sequence control
  - Thermal control
  - LED control
  - Beep control
  - Device ON/OFF
  - Cooling fan speed control
  - Universal I/O port
  - Dock power supply control
  - Battery capacity check
  - Flash memory reprogramming function
  - EC access interface
  - I2C communication control
  -
- RS-232C driver
  - MAX3243
    - Conversion of signal levels for communication with an external device
- Battery E<sup>2</sup> PROM
  - 24C02 equivalent (128 words x 16 bits, I2C interface) integrated in the battery pack
    - Storing records of battery use
- Clock Generator
  - ICS950810A
    - Generating the clock signal required for the system
    -
- Modem Controller
  - Built-in MDC card with XircomLucent Mars3+SiDAA
  - Functions of the modem controller:
    - Digital signal conductor protection
    - Ring wake-up support
    - Communication codes supported:
      - For data communication:
        - V.90 (56K bps) data communication control
        - V.32 bis (14.4K, 12K, 9600)
        - V.22 bis (2400, 1200)
        - V.22 (1200)
        - V.23 (1200, 600, 75)
        - V.21 (300)

For fax:

V.17 (14.4K, 12K, 9600, 7200)

V.29 (9600, 7200, 4800)

V.27 ter (4800, 2400)

V.21 ch2 (300)

– AC97 interface

LAN controller

•Intel 82562

- Wake-up On LAN support
- Remote boot support
- 100BASE-TX support

Wireless LAN controller

•Support following 4 kind of miniPCI wireless LAN cards.

- IEEE802.11b (Agere)
- IEEE802.11b (Intel)
- IEEE802.11b (Cisco)
- IEEE802.11a&IEEE802.11b (Atheros)

•Transfer Rate

- IEEE802.11b : max11Mbits/s
- IEEE802.11a : max54Mbits/s

•Frequency Channel

- IEEE802.11b : 2.4GHz
- IEEE802.11a : 5.0GHz
- 

Super I/O

•LPC 47N253

- Serial port control
- Parallel port control
- Infrared communications control

### 1.3 2.5-inch HDD

The computer contains an extremely low-profile and lightweight, high-performance HDD. The HDD incorporates a 2.5-inch magnetic disk and mini-Winchester type magnetic heads.

Storage capacities supported are 20,30, 40, 60 and 80 GB.

The HDD interface is Enhanced IDE, ATA66 (for GB), or ATA100 (for 20/30/40/60/80 GB).

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

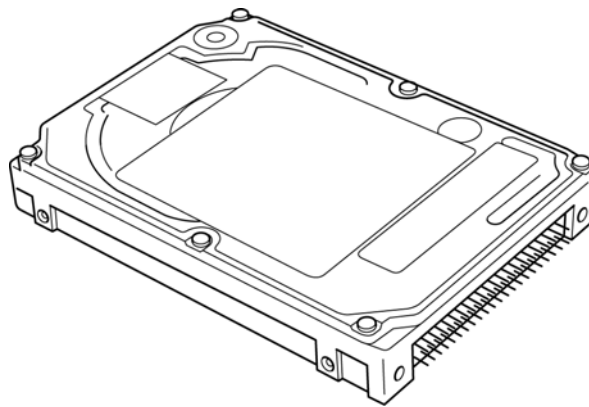


Figure 1-4 2.5-inch HDD

Table 1-1 2.5-inch HDD specifications

Item	Specifications						
	Toshiba	Hitachi	Toshiba	Toshiba	Hitachi	Hitachi	Toshiba
	MK6021 GAS	DK23EB-60	MK6022 GAX	MK3021 GAS	DK23EB-40	DK23EA-30	MK4019 GAX
Formatted capacity (GB)	60.0116GB	60.0116GB	60.0116GB	30.0058GB	40.0007GB	30.0058GB	40.0007GB
User data sectors	117,210,240	117,210,240	117,210,240	58,605,120	78,140,160	58,605,120	78,140,160
Bytes/sector	512	512	512	512	512	512	512
Rotational speed (RPM)	4200rpm	5400rpm	5400rpm	4200rpm	5400rpm	4200rpm	5400rpm

## 1.4 DVD-ROM Drive

The DVD-ROM drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs. The drive provides high-speed data transfer, playing back a DVD at up to 8x speed and reading up to 10,820 Kbytes per second from DVD-ROM and 3,600 Kbytes per second from CD-ROM.

The DVD-ROM drive is shown in Figure 1-5 and its specifications are listed in Table 1-2.

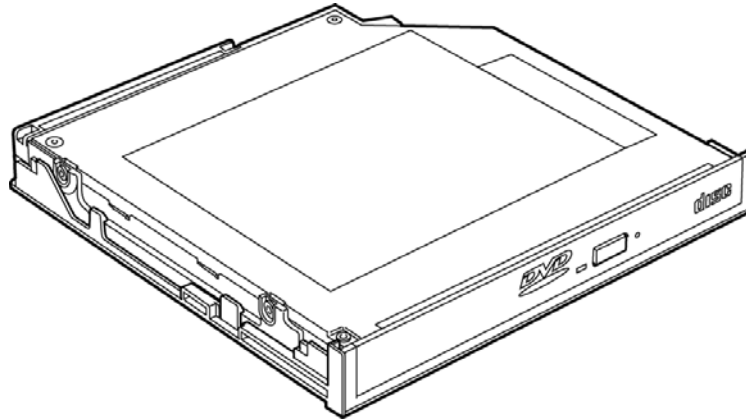


Figure 1-5 DVD-ROM drive

Table 1-2 DVD-ROM drive specifications

Item	DVD-ROM mode	CD-ROM mode
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2)	
Access time (ms)		
Average random access (ms)	110 (Typ.)	85 (Typ.)
Average full stroke access (ms)	200 (Typ.)	180 (Typ.)
Rotational speed (RPM)	4,670 Max	5,100Max
Data buffer size (Kbytes)	256	
Formats supported	DVD-ROM, DVD-R (Read) 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) CD-R (Read), CD-RW (Read)	

## 1.5 CD-ROM Drive

The CD-ROM drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs. The drive provides high-speed data transfer at up to 24x.

The CD-ROM drive is shown in Figure 1-6 and its specifications are listed in Table 1-3.

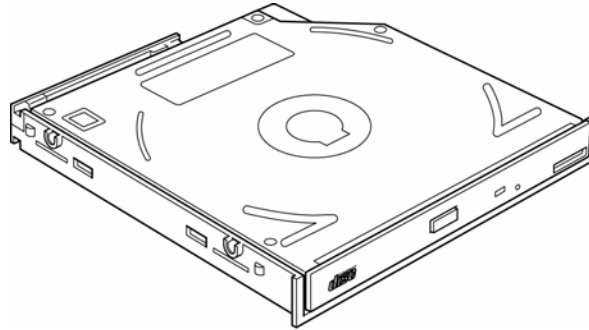


Figure 1-6 CD-ROM drive

Table 1-3 CD-ROM drive specifications

Item	24x mode (Max.)
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2)
Access time (ms)	
Average random access	110 (Typ.)
Average full stroke access	240 (Typ.)
Rotational speed (RPM)	5,136
Data buffer size (Kbytes)	128
Formats supported	CD-DA, CD-ROM, CD-R, CD-ROM XA, CD-I FMV, Photo CD (Multisession) , VIDEO CD, CD Extra (CD Plus), CD-G, CD-RW



## 1.6 CD-R/RW Drive

The CD-R/RW drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs.

The specifications of the CD-R/RW drive are listed in Table 1-4.

*Table 1-4 CD-R/RW drive specifications*

Item	Specifications
Data transfer rate (Mbytes/s)	16.6 (U-DMA transfer mode 2)
Access time (ms)	110 (max 24, Typ.)
Speed	Read: CD-ROM, CD-R      (max 24) CD-RW             (max 24) Write: CD-R               (max 8) CD-RW             (max 8)
Cache (Mbytes)	2
Formats supported	Video CD, Photo CD, CD-ROM, CD-ROM XA, CD-EXTRA, CD-R, CD-Rewritable, CD-DA, CD-Text

## 1.7 CD-RW/DVD-ROM Drive

The CD-RW/DVD-ROM drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs. At maximum, the drive can play back a DVD at 8x speed, read CD-ROM at 24x speed, and write CD-R at 24x speed and CD-RW at 10x speed.

The specifications of the CD-RW/DVD-ROM drive are listed in Table 1-5.

Table 1-5 CD-RW/DVD-ROM drive specifications

Item	DVD-ROM mode	CD-ROM mode	CD-R/CD-RW (Write mode)
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2) 16.7 (PIO mode 4, Multiword DMA mode 2)		
Access time (ms)			
Average random access	110	90	-
Average full stroke access	250	200	-
Rotational speed (RPM)	4,594 Max	5,136 Max	2,297 Max
Data buffer size (Mbytes)	2		
Formats supported	DVD: DVD-ROM (DVD-5, DVD-9, DVD-10, DVD-18), DVD-R (read)  CD: CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW		CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)

## 1.8 DVD-Multi Drive

The DVD-Multi drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs.

The specifications of the DVD-Multi drive are listed in Table 1-6.

*Table 1-6 DVD-Multi drive specifications*

<b>Item</b>	<b>DVD-Multi mode</b>
Data transfer rate (Mbytes/s)	PIO Mode 4(16.6MB/sec) Ultra DMA Mode 2(33.3MB/sec)
Average seek time	DVD-ROM: 170ms CD-ROM: 130ms DVD-S: 130ms DVD-R/DVD-RW: 150ms
Data buffer size (Mbytes)	2MB
Formats supported	DVD-RAM, DVD-R, DVD-RW, DVD-ROM, DVD-Video, CD-R, CD-RW, CD-DA, CD-ROM/XA, CD-ROM, Video-CD, CD-I, Photo CD, CD-Extra, CD-TEXT

## 1.9 Power Supply

The power supply unit provides many different voltages for the system board and performs the following functions:

1. Power input monitor
  - Checks whether the DC power supply (AC adapter) is connected to the computer.
  - Checks whether the battery pack is connected to the computer.
  - Monitors the DC power supply input voltage (AC Adapter output voltage).
2. Power supply's internal control
  - Turns on and off the battery pack charging power supply.
  - Issues a charging current instruction to the PWM control IC of the battery pack charging power supply.
  - Controls the supply of DC power supply input (AC Adapter output) to the power supply unit.
  - Controls the supply of power to the system block (load/logic circuit side).
  - Controls forced shutdown if the power supply malfunctions.
3. Logic circuit control
  - Instructs the gate array to enable/disable tuning the power on.
  - Controls power-on/off operation.
4. Status display
  - Turns on the DC IN LED (in orange or green).
  - Battery indicator (in orange or green)
5. External interface
  - Performs communication through the I2C bus (via the internal EC/KBC).
  - Transfers the power supply operation mode.
6. Output monitor
  - Monitors the voltage output to the system block (load/logic circuit side).
  - Monitors the voltage, overvoltage, input/output current of the battery pack.
  - Monitors the internal temperature of the battery pack.
  - Monitors the supply voltage from the AC adapter.

## 1.10 Batteries

The computer has the following three types of batteries:

- Main battery pack
- Real time clock (RTC) battery
- Secondary battery pack (Optionally installed in the selectable bay)

Table 1-6 lists the specifications of these batteries.

*Table 1-7 Battery specifications*

Battery name	Material	Output voltage	Capacity
Main battery pack (6 cells)	Lithium Ion	10.8 V	4,300 mAh
RTC battery	Lithium Ion	3.0 V	17 mAh
Secondary battery pack (6 cells)	Lithium Ion	10.8V	3,600 mAh

### 1.10.1 Main Battery

The main battery pack serves as the computer's main power source when the AC adapter is not attached. The main battery maintains the state of the computer so that it can resume it.

### 1.10.2 Battery Charging Control

Battery charging is controlled by LPC 47N253. When the AC adapter and battery pack are attached to the computer, the LPC 47N253 controls the charge on/off state and detects a full charge.

- Battery Charge

When the AC adapter is attached, the battery is charged by off-state charge when the system is powered off or by on-state charge when it is powered on.

*Table 1-8 Quick/normal charging time*

	Charge time
Off-state charge	About 3 hours
On-state charge	About 5 hours

**NOTE:** The time required for normal charge depends on the power consumption by the system. Using the fluorescent lamp and frequently accessing the disk consume much power and lengthen the charge time.

Any of the following cases stops battery charge:

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

Detection of full charge

A full charge is detected only when the battery is being charged by quick or normal charge. A full charge is detected when either of the following conditions is met:

1. The current in the battery charging circuit drops below the predetermined value.
2. The charging time exceeds the fixed limit.

### 1.10.3 RTC Battery

The RTC battery provides power to keep the current date, time and other system information in memory while the computer is turned off. Table 1-8 lists the charging time and data preservation period of the RTC battery.

*Table 1-9 RTC battery charging/data preservation time*

Status		Time
Charging time	AC Adapter or main battery pack used (power on)	About 8 hours

---

# **Chapter 2**

# **Troubleshooting**

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## Chapter 2 Contents

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2.1	Outline.....	2-1
2.2	Basic Flowchart .....	2-2
2.3	Power Supply .....	2-6
	Procedure 1 Power Icon Check.....	2-6
	Procedure 2 Connection Check.....	2-8
	Procedure 3 Replacement Check .....	2-9
2.4	System Board.....	2-10
	Procedure 1 Message Check .....	2-11
	Procedure 2 Printer Port LED Check (in Boot Mode).....	2-12
	Procedure 3 Printer Port LED Check (in Resume Mode).....	2-17
	Procedure 4 Test Program Check .....	2-18
	Procedure 5 Replacement Check .....	2-18
2.5	2.5-inch HDD.....	2-19
	Procedure 1 Message Check .....	2-19
	Procedure 2 Partition Check .....	2-19
	Procedure 3 Format Check.....	2-20
	Procedure 4 Test Program Check .....	2-21
	Procedure 5 Connector Check and Replacement Check.....	2-22
2.6	Keyboard.....	2-23
	Procedure 1 External Keyboard Check.....	2-23
	Procedure 2 Test Program Check .....	2-23
	Procedure 3 Connector Check and Replacement Check.....	2-23
2.7	Display .....	2-25
	Procedure 1 External Monitor Check .....	2-25
	Procedure 2 Test Program Check .....	2-25
	Procedure 3 Connector Check and Replacement Check.....	2-25
2.8	DVD-ROM Drive .....	2-27
	Procedure 1 DVD-ROM Cleaning Check.....	2-27
	Procedure 2 Test Program Check .....	2-27
	Procedure 3 Connector Check and Replacement Check.....	2-27



2.9	CD-ROM Drive .....	2-29
	Procedure 1 CD-ROM Cleaning Check.....	2-29
	Procedure 2 Test Program Check .....	2-29
	Procedure 3 Connector Check and Replacement Check.....	2-29
2.10	LAN .....	2-31
	Procedure 1 Test Program Check .....	2-31
	Procedure 2 Connector Check and Replacement Check.....	2-31
2.11	Cooling Module .....	2-32
	Procedure 1 Test Program Check .....	2-32
	Procedure 2 Connector Check and Replacement Check.....	2-32

**Figures**

Figure 2-1 Basic flowchart ..... 2-3  
Figure 2-2 Printer port LED ..... 2-12  
Figure 2-3 Printer port LED board ..... 2-12

**Tables**

Table 2-1 Printer port LED boot mode status (1/3)..... 2-14  
Table 2-2 Printer port LED resume mode status (1/7) ..... 2-17  
Table 2-3 HDD error code and status..... 2-21

## 2.1 Outline

This chapter describes the fault diagnosis procedures for field replaceable units (FRUs) in the computer.

The FRUs covered here are as follows:

- |                   |                  |             |
|-------------------|------------------|-------------|
| 1. System board   | 2. 2.5-inch HDD  | 3. Keyboard |
| 4. Display        | 5. DVD-ROM drive | 6. CD-ROM   |
| 7. Cooling module | 8. Lan           |             |

See Chapter 4 for the procedures to replace FRUs and Chapter 3 for the procedures to use test programs

The following tools are required to perform the diagnostic procedures:

1. Diagnostics (maintenance test program) disk
2. Phillips screwdrivers (2 mm, 2.5 mm)
3. Cleaning disk kit (for CD-ROM/ DVD-ROM drive cleaning)
4. Bootable CD
5. Printer port LED (i.e LPT Port LED)
6. Printer port (parallel port) loopback connector (i.e. LPT Port)
7. Serial port loopback connector (i.e. COM Port)
8. PC Card loopback connector
9. Multimeter
10. External monitor
11. External PS/2 keyboard
12. External PS/2 mouse
13. Multimedia sound system with line-in and line-out ports
14. Headphone
15. Microphone
16. External FDD attachment
17. A-BEX TEST CD-ROM TCDR-702
18. Music CD
19. DVD-ROM TSD-1 (TOSHIBA EMI DVD Test Media)

## **2.2 Basic Flowchart**

The basic flowchart in Figure 2-1 serves as a guide for identifying a possibly faulty FRU.

Before going through the diagnostic flowchart steps, verify the following:

- Make sure the Toshiba version of Windows® XP has been installed on the HDD.  
Any other operating system can cause the computer to malfunction.
  
- Make sure any piece of optional equipment has been installed.

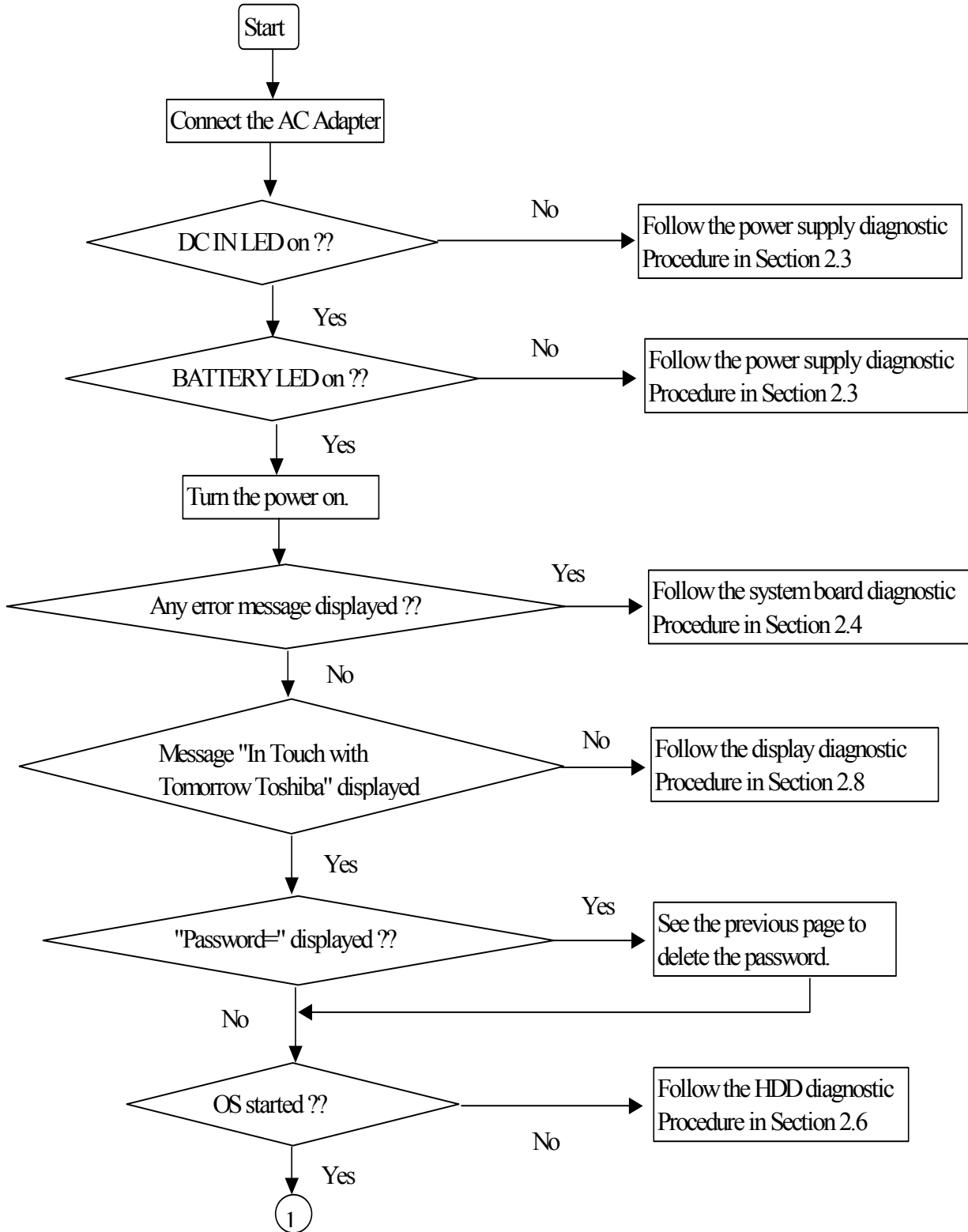


Figure 2-1 Basic flowchart (1/2)

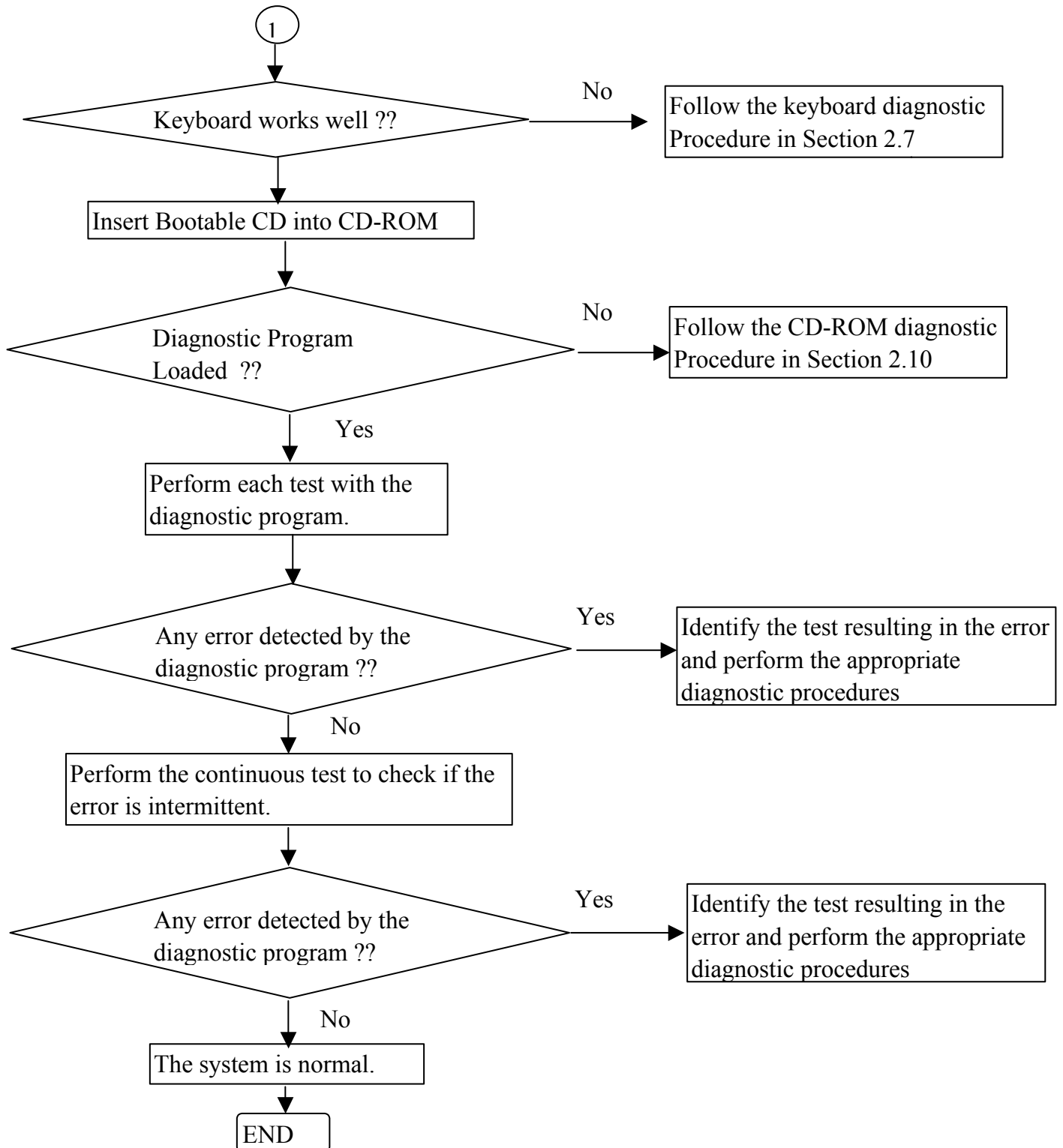


Figure 2-1 Basic flowchart (2/2)

If the diagnostic program cannot detect an error, the error may be intermittent. Run the continuous test program repeatedly to isolate the problem. Check the log utilities function to confirm which diagnostic test detected the error, then perform the appropriate troubleshooting procedures as follows:

1. If an error is detected by the System test, Memory test, Async test, Printer test, Sound test, or Real Timer test, follow the system board troubleshooting procedures in Section 2.4.
2. If an error is detected by the Hard Disk test, follow the HDD troubleshooting procedures in Section 2.6.
3. If an error is detected by the Keyboard test, follow the keyboard troubleshooting procedures in Section 2.6.
4. If an error is detected by the Display test, follow the display troubleshooting procedures in Section 2.8.
5. If an error is detected by the DVD-ROM test, follow the DVD-ROM troubleshooting procedures in Section 2.9.
6. If an error is detected by the CD-ROM test, follow the CD-ROM troubleshooting procedures in Section 2.10.
7. If an error is detected by the LAN test, follow the LAN troubleshooting procedures in section 2.12.
8. If an error is detected by the Fan On/Off test, follow the cooling module troubleshooting procedures in Section 2.13.

## 2.3 Power Supply

The power supply in the computer controls many functions and components. To check if the power supply is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

- Procedure 1 Power Icon Check
- Procedure 2 Connection Check
- Procedure 3 Replacement Check

### Procedure 1 Power Icon Check

The following two power LEDs indicate the power supply status:

- Battery LED
- DC IN LED

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

- Battery LED

Battery LED	Power supply status
On in orange	Battery being charged
On in green	Battery fully charged, with AC adapter connected
Blinking in orange (at equal intervals)	Battery low *1 while driving the computer
Off	Else



DC IN LED

DC IN LED	Power supply status
On in green	DC power being supplied (from the AC adapter)
Off	Else

If the DC IN LED off, follow the steps below:

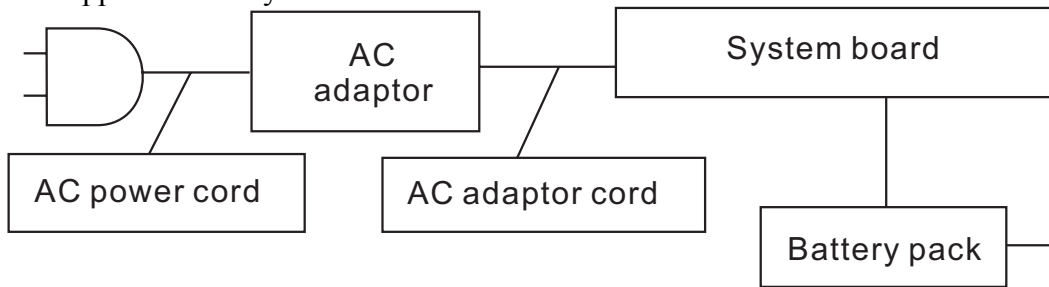
1. Remove the battery pack and the AC adapter to shut off power supply to the computer.
2. Attach the battery and AC adapter back again.

If the LED still off, follow the steps below:

- Check 1      Make sure the DC IN LED goes on in green. If it does not, go to Procedure 2.
- Check 2      Make sure the Battery LED goes on in orange or green. If it does not, go to Procedure 3.

**Procedure 2 Connection Check**

Power is supplied to the system board as illustrated below:



Follow the steps below to check whether each connector has been connected correctly:

- Check 1      Make sure the AC adaptor and AC power cord have been firmly plugged into the DC IN 15V socket and wall outlet, respectively. When they have been connected correctly, perform Check 2.
- Check 2      Connect a new AC adaptor and AC power cord.
- If the DC IN LED does not go on, go to Procedure 3.
  - If the battery LED does not go on, perform Check 3.
- Check 3      Make sure the battery pack has been correctly installed in the computer. If the battery LED does not go on while the battery pack has been installed correctly, go to Procedure 3.

**Procedure 3 Replacement Check**

The system board, power supply board, or CPU may be faulty. Disassemble the computer according to Chapter 4 and follow the steps below:

- Check 1      Replace the power supply board with a new one. If the battery pack is still not working properly, perform Check 2.
  
- Check 2      Replace the system board with a new one. If the battery pack is still not working properly, perform Check 3.
  
- Check 3      Replace the CPU with a new one.

## **2.4 System Board**

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

Procedure 1 Message Check

Procedure 2 Printer Port LED Check (in Boot Mode)

Procedure 3 Printer Port LED Check (in Resume Mode)

Procedure 4 Test Program Check

Procedure 5 Replacement Check

**Procedure 1 Message Check**

When the power is turned on, the system performs the self-diagnostic Power On Self Test (POST) embedded in the BIOS ROM. The POST tests and initializes each IC on the system board.

- If an error message appears on the display, perform Check 1.
- If there is no error message, go to Procedure 2.
- If there is no error beep code tone out, go to Procedure 4
- If Toshiba MS-DOS or Toshiba Windows 2000/XP is loaded normally, go to Procedure 5.

**Check 1** If the following error message is displayed on the screen, press the **F1** key as prompted. These errors occur when the system configuration preserved in the RTC memory (generally called CMOS memory) does not match the actual configuration or when the data is lost.

If you press the **F1** key as prompted by the message, the TSETUP screen appears to set the system configuration. If the error message appears frequently when the power is turned on, replace the RTC battery. If any other error message is displayed, perform Check 2.

```
*** Bad RTC battery ***  
Check system. Then press [F1] key
```

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

The error message appears when either data stored in RAM to be resumed is lost because the battery has been exhausted or the system board is faulty. If any other error message displays, perform Check 3

```
RESUME FAILURE and PRESS ANY KEY TO CONTINUE.
```

**Check 3** The POST checks the system board. When the POST detects an error, the system stops  
or a error beep code tone out  
or an error POST message appears.

**Procedure 2 Printer Port LED Check (in Boot Mode)**

The printer port LED displays the POST status and error status by turning lights on and off as an eight-digit binary value obtained in the boot mode after the system unit is switched on. Figure 2-2 shows the printer port LED.

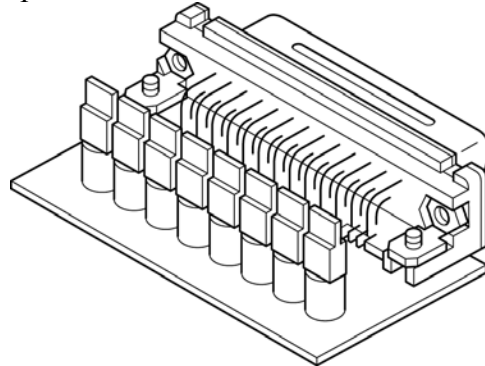


Figure 2-2 Printer port LED

Figure 2-3 illustrates how the printer port LED shows a status value.

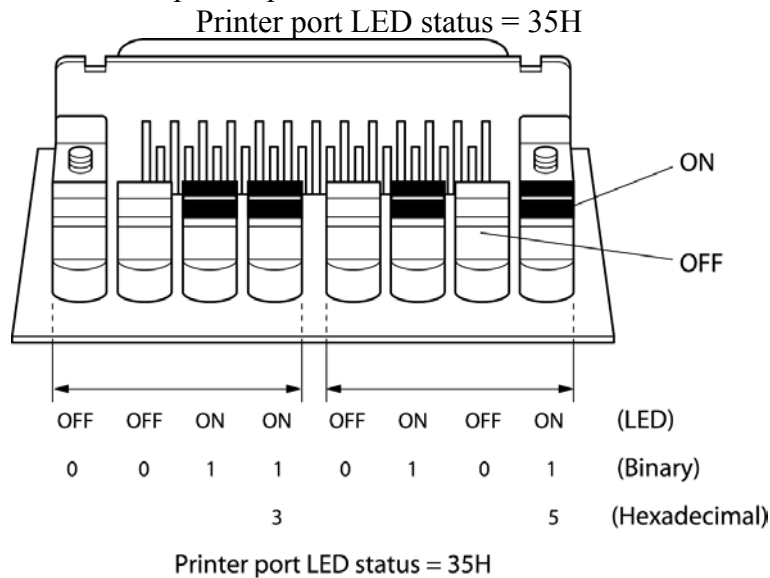


Figure 2-3 Printer port LED board

Follow the steps below to use the printer port LED:

1. Turn on the computer and set the boot mode.
2. Turn off the computer.
3. Plug the printer port LED into the computer's parallel port (printer port).
4. Read the LED status from left to right as you are facing the back of the computer.
5. Convert the LED status from binary to hexadecimal notation.
6. If the final LED status is FFh (normal status), go to Procedure 5.
7. If the final LED status matches any other status in Table 2-1, go to Procedure 6.

**NOTE:** *The printer port LED displays each status upon completion of the corresponding POST test item. If the POST terminates with 21h displayed on the printer port LED, for example, the POST has completed KBC initialization and detected an error*

Table 2-1 Printer port LED boot mode status (1/3)

LED Status (Hexadecimal)	Test Item	Description
0H	DIAG_SYSTEM_INIT	Boot started,read the cmos data for makesure main board power is stable
1H	DIAG_A20_DISABLE	Disable A20 through A20
2H	DIAG_INIT_CHIPSET	Initialize ChipsetSet,load chipset default size cache RAM
3H	DIAG_TEST_RAM	send patten for test the basic 640k RAM
4H	DIAG_MOVE_BB_LOADER	Move boot load segment into the RAM
5H	DIAG_EXECUTE_IN_DRAM	program execution from DRAM
6H	DIAG_USER_FLASH_CHECK	Test print port for check crisis option is enable or not
7H	DIAG_SHADOW_BIOS	Decompress the system BIOS, and Shadow System BIOS to RAM
8H	DIAG_CHECKSUM_BIOS	Checksum System BIOS ROM
9H	DIAG_NORMAL_BOOT	Jump to the reset point
AH	DIAG_CRISIS_BOOT	Proceed with Crisis Boot,first initial superio and boot device
FH	DIAG_FATAL_ERROR	Fatal Error,like the RAM error or ROM error
00H	DIAG_CRISIS_BEGIN	Start process the Crisis recovery procedure
99H	DIAG_RESUME_RAM_ERROR	Resume SMRAM not Found
10H	DEBUG_MISC_RESET	Disable internal cache ram,and reset cpu
11H	DEBUG_CS_FAST_A20_RESET	Turn off FASTA20 for post,and check have keyboard control or
12H	DEBUG_POST_SIGNAL_POR	Initial PIC enable INT and Signal Power On Reset
13H	DEBUG_CS_CHIP_INIT	Initialize the Chipset and hook PCI BIOS
14H	DEBUG_OEM_ISA_VGA_SEARCH	Search For ISA Bus VGA Adapter, from address c000 to e000
15H	DEBUG_HWIO_SETUP_CTC1	Initialize Counter and Timer chip
16H	DEBUG_OEM_SET_CMOS_REGS	User register config through CMOS
17H	DEBUG_CS_MEMORY_SIZE	Size Memory, and detect memory timing, setup memory controller
18H	DEBUG_POST_TEST_RAM	Initialize and test the first 64k memory
19H	DEBUG_GEN_TEST_ROMS	checksum the system ROM
1AH	DEBUG_HWIO_RESET_INTS	Reset PIC's status
1BH	DEBUG_VIDEO_VIDEO_INIT	Initialize Video Adapter(s),and check vga rom and vga ram
1CH	DEBUG_VIDEO_EQUIP_INIT	Initialize Video (6845 Regs),set display mode
1DH	DEBUG_VIDEO_COLOR_INIT	Initialize Color Adapter,and setup display reg.
1EH	DEBUG_VIDEO_BW_INIT	Initialize Monochrome Adapter,and setup display reg
1FH	DEBUG_HWIO_TEST_DMA_PAG	Send out some value,to test 8237A Page Registers



Table 2-2 Printer port LED boot mode status (2/3)

LED Status (Hexadecimal)	Test Item	Description
20H	DEBUG_KEYB_SELFTEST_CTLR	Send selftest command (AAH) to test Keyboard controller if o.k. return (55h)
21H	DEBUG_KEYB_RESET_KEYBOARD	Test Keyboard Controller and initialize keyboard controller
22H	DEBUG_POST_CHECK_CMOS_RAM	Send test petten to Check CMOS Ram
23H	DEBUG_POST_TEST_BATT_CMOS	Test Battery Fail & check CMOS X-SUM
24H	DEBUG_HWIO_TEST_DMA_CTLRS	Use DMA to copy data for Test the DMA controllers
25H	DEBUG_HWIO_INIT_8237	Initialize 8237A Controller
26H	DEBUG_POST_INIT_VECS	Install and Initialize interrupt Vectors
27H	DEBUG_RAM_QUICK_SIZE	Enter memory protect mode,use change RAM bank to do RAM Quick Sizing
28H	DEBUG_RAM_PROT_ENTRY_1	Memory protected mode entered safely
29H	DEBUG_RAM_SIZE_DONE	Test the basic 640k ram,RAM test completed
2AH	DEBUG_RAM_PROT_EXIT	Protected mode exit successful
2BH	DEBUG_CS_SHADOW_SETUP	Shadow system and video BIOS to RAM if CMOS requests shadowSetup.Shadow
2CH	DEBUG_VIDEO_EQUIP_INIT_INIT	Going To Initialize 6845 CRT controller
2DH	DEBUG_VIDEO_BW_SEARCH	Search For Monochrome Adapter
2EH	DEBUG_VIDEO_COLOR_SEARCH	Search For Color Adapter
2FH	DEBUG_VIDEO_SIGNON	Signon messages displayed
30H	DEBUG_OEM_CONFIG_KBD_CTL	For special initialize of keyboard controller
31H	DEBUG_KEYB_PRESENT_TEST	Test the keyboard controller .If Keyboard Present
32H	DEBUG_KEYB_TEST_IRQ1	Clear keyboard buffer and sen keyboard command to test Keyboard Interrupt
33H	DEBUG_KEYB_TEST_CMD	Send keyboard command to turn off keyboard LED and Test some Keyboard Command Byte
34H	DEBUG_RAM_FULL_TEST	TEST memory procedure, for test,blank and count all RAM
35H	DEBUG_RAM_PROT_ENTRY_2	Enter the memory protected mode for test all expand memory
36H	DEBUG_RAM_TEST_DONE	Test and blank all memory complete
37H	DEBUG_RAM_PROT_EXIT_2	Switch the memory from Protected mode to real mode
38H	DEBUG_KEYB_OUTPUT_PORT	Disable A20 status for memory test finish
39H	DEBUG_CS_CACHE_SETUP	Setup Cache Controller
3AH	DEBUG_HWIO_TEST_PERIODIC	Check and test the timer 0 interrupt function is Working
3BH	DEBUG_GEN_CHECK_RTC	test for RTC ticking
3CH	DEBUG_GEN_INIT_HARD_VECS	Install and initialize the hardware vectors
3DH	DEBUG_MOUSE_INIT	Clear keyboard buffer for search and Init the Mouse
3EH	DEBUG_KEYB_SET_LEDS_1	Send keyboard command to Update keyboard NUMLOCK status
3FH	DEBUG_OEM_DEVICE_CONFIG	special init of COMM and LPT ports

Table 2-2 Printer port LED boot mode status (3/3)

LED Status (Hexadecimal)	Test Item	Description
40H	DEBUG_CS_CONFIG_PORTS	Configure the COMM and LPT ports
41H	DEBUG_FLOP_INIT	According cmos data to initialize the floppies
42H	DEBUG_WINI_INIT	Scan and initialize the hard disk, and display the result on crt
43H	DEBUG_HWIO_ROM_INIT	Search option rom from c800 to e000 and to Initialize option ROMs
44H	DEBUG_OEM_INIT_POWER_MAN	Check special device initial power management function
45H	DEBUG_KEYB_SET_LEDS_2	Clear keyboard buffer and Update NUMLOCK status
46H	DEBUG_HWIO_FIND_80X87	Test For Coprocessor Installed,and enable coprocessor interrupt
47H	DEBUG_OEM_LAST_MINUTE_INIT	Run OEM functions before boot, and enable L1,L2 cache
48H	DEBUG_MISC_LAUNCH_INT19	Post code will finish,ready to run int19 and load OS
49H	DEBUG_BEGIN_BOOT_CODE	Into Int19, to boot from floppy or other boot device
50H	DEBUG ACPI_INIT	Initialize the ACPI function
51H	DEBUG_PM_CPU_INIT	Power manager initial & GEYSERVILLE CPU initialize
52H	DEBUG_USB_HC_INIT	Clear USB status register and Initialize the USB Hub controller

**Procedure 3 Printer Port LED Check (in Resume Mode)**

The printer port LED displays the POST status and error status by turning lights on and off as an eight-digit binary value obtained in the resume or suspend mode after the system unit is switched on.

Follow the steps below to use the printer port LED:

1. Turn on the computer and set the resume or suspend mode.
2. Turn off the computer.
3. Plug the printer port LED into the computer's parallel port (printer port).
4. Read the LED status from left to right as you are facing the back of the computer.
5. Convert the LED status from binary to hexadecimal notation.
6. If the final LED status is FFh (normal status), go to Procedure 5.
7. If the final LED status matches any other status in Table 2-2, go to Procedure 6.

Table 2-2 Printer port LED resume mode status (1/7)

< Resume mode >

LED Status (Hexadecimal)	Test Item	Description
0H	DIAG_SYSTEM_INIT	Boot started,read the cmos data for makesure main board power is stable
1H	DIAG_A20_DISABLE	Disable A20 through A20
2H	DIAG_INIT_CHIPSET	Initialize ChipsetSet,load chipset default size cache RAM
3H	DIAG_TEST_RAM	send patten for test the basic 640k RAM
4H	DIAG_MOVE_BB_LOADER	Move boot load segment into the RAM
5H	DIAG_EXECUTE_IN_DRAM	program execution from DRAM
6H	DIAG_USER_FLASH_CHECK	Test print port for check crisis option is enable or not
7H	DIAG_SHADOW_BIOS	Decompress the system BIOS, and Shadow System BIOS to RAM
8H	DIAG_CHECKSUM_BIOS	Checksum System BIOS ROM
9H	DIAG_NORMAL_BOOT	Jump to the reset point
AH	DIAG_CRISIS_BOOT	Procecd with Crisis Boot,first initial superio and boot device
FH	DIAG_FATAL_ERROR	Fatal Error,like the RAM error or ROM error
00H	DIAG_CRISIS_BEGIN	Start process the Crisis recovery procedure
99H	DIAG_RESUME_RAM_ERROR	Resume SMRAM not Found

**Procedure 4 Test Program Check**

The maintenance test program contains several programs for diagnosing the system board and CPU. Execute the following test programs using the procedures described in Chapter 3.

1. System test
2. Memory test
3. Keyboard test
4. Display test
5. Printer test (i.e LPT Port test)
6. COM Port test
7. Hard Disk test
8. Mouse test
9. IrDA test
10. SD Card test
11. CD-ROM/DVD-ROM test
12. Sound test
13. LAN test

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

**Procedure 5 Replacement Check**

The system board, memory, or CPU may be defective. Disassemble the computer following the steps described in Chapter 4 and replace the system board, memory module or CPU with a new one.

## 2.5 2.5-inch HDD

To check if the 2.5-inch HDD is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Message Check

Procedure 2 Partition Check

Procedure 3 Format Check

Procedure 4 Test Program Check

Procedure 5 Connector Check and Replacement Check

**CAUTION:** *The contents of the 2.5-inch HDD will be erased when the HDD 2.5-inch HDD diagnostic test or formatting is executed. Save the required contents of the HDD to floppy disks or other storage drive in advance.*

### Procedure 1 Message Check

When the computer's HDD does not function properly, some of the following error messages may appear on the display. Follow the steps below to check the HDD.

Check 1 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 2 Check TSETUP to see if the Hard Disk option has been set to "Not used". If so, choose another setting and restart the computer. If the problem persists, go to Procedure 2.

### Procedure 2 Partition Check

Enter the Toshiba MS-DOS system. Perform the following checks:

Check 1 Type **C:** and press the **Enter** key. If you cannot change to drive C, perform Check 2. If you can change to drive C, perform Check 3.

Check 2 Type **FDISK** and press the **Enter** key. Choose "Display partition information" from the FDISK menu. If drive C is listed, perform Check 3. If drive C is not listed, return to the FDISK menu and choose the option to create a DOS

partition on drive C. Then restart the computer.. If the problem persists, go to Procedure 3.

Check 3 If drive C is listed as active in the FDISK menu, perform Check 4. If drive C is not listed as active, return to the FDISK menu and choose the option to set the active partition for drive C. Then restart the computer. If the problem persists, perform Check 4.

Check 4 Enter **DIR C:** and press the **Enter** key. If the following message is displayed, go to Procedure 3. If contents of drive C are listed on the display, perform Check 5.

```
Invalid media type reading drive C
Abort, Retry, Fail?
```

Check 5 Use the SYS command in the Toshiba MS-DOS system to install system files. If the following message appears on the display, the system files have been transferred to the HDD. Restart the computer. If the problem persists, go to Procedure 3.

```
System transferred
```

**NOTE:** *If the computer is running Windows 2000/XP and the hard disk capacity is more than 512 MB, the FDISK program will ask if you need support for a partition larger than 2 GB. Select Y for large partition support; however, be sure to read the precaution regarding access by other operating systems.*

### Procedure 3 Format Check

The 2.5-inch HDD is formatted using the low-level format program and the MS-DOS FORMAT program. Using these programs, follow the steps below to format the HDD.

Check 1 Enter **FORMAT C:/S/U** to format the HDD and transfer system files. If the following message appears on the display, the HDD has been 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 Run the test program to format the 2.5-inch HDD with a low-level format option. See Chapter 3 for details on how to use the test program. If the following message appears on the display, the HDD low-level format is complete. Partition and format the HDD using the MS-DOS FORMAT command.

```
Format complete
```

If you cannot format the HDD using the test program, go to Procedure 4.

#### Procedure 4 Test Program Check

Run the HDD test program stored on the maintenance test program disk for all test items. See Chapter 3 for details on how to use the test program.

If an error is detected during the HDD test, an error code and status will be displayed. The error codes and their status names are listed in Table 2-3. If an error code is not generated and the problem still exists, go to Procedure 5.

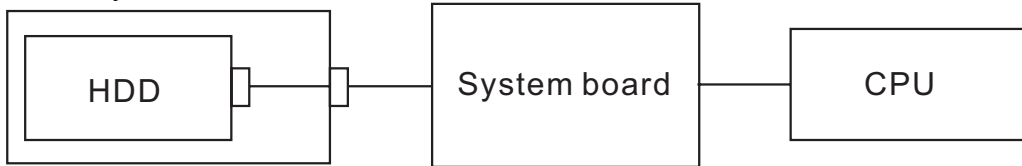
Table 2-3 HDD error code and status

Code	Status
1	Get Parameter Fail !
2	Read Old Data Error
3	Write Pattern Error
4	Read Back Data Error
5	Data Compare Error
6	Restore Data Error
7	Read Verify Error
9	Seek Error
10	Disk Controller Self Test Failed
11	Disk Controller Test unexpected interrupt Failed
12	Disk Controller action Test Failed
13	disk dos not support SMART
14	disk read attribute threshold error
15	disk read attribute value error
16	disk SMART attribute value error

**Procedure 5 Connector Check and Replacement Check**

The HDD or system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

- Check 1      Make sure the following connectors have been firmly connected to the HDD, system board and CPU.



If any connector is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

- Check 2      The HDD may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 3.
- Check 3      The System board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 4.
- Check 4      The CPU may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4.



## 2.6 Keyboard

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

Procedure 1 External Keyboard Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

### Procedure 1 External Keyboard Check

Connect a PS/2 or compatible keyboard to the computer's PS/2 keyboard/mouse port, then boot the computer. The computer automatically detects the external keyboard even if resume mode is enabled.

If the external keyboard works correctly, the internal keyboard may be faulty. Go to Procedure 3.

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

### Procedure 2 Test Program Check

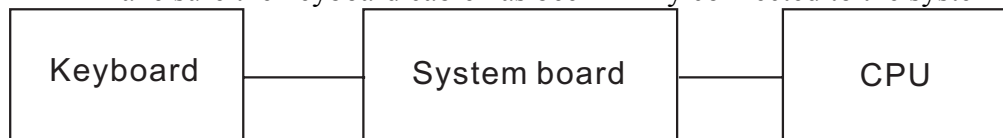
Execute the Keyboard test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.

If an error is detected in the test, go to Procedure 3. If no error is detected, the keyboard itself is normal.

### Procedure 3 Connector Check and Replacement Check

The keyboard or system board may be disconnected or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the keyboard cable has been firmly connected to the system board.



If the cable is loose or off, reconnect it firmly and return to Procedure 2. If there is still an error, perform Check 2.

Check 2 The keyboard may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 3.

- Check 3      The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the keyboard is still not functioning properly, perform Check 4.
- Check 4      The memory may be defective. Replace the memory module with a **new one** following the steps described in Chapter 4. If the problem persists, perform Check 5.
- Check 5      The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

## 2.7 Display

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

Procedure 1 External Monitor Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and 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 even if resume mode is enabled. If the external monitor works correctly, the internal LCD, LCD/FL cable, or FL may be faulty. Go to Procedure 3.

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

### Procedure 2 Test Program Check

Insert the diagnostics bootable CD in the computer's CD ROM, turn on the computer and run the test. See Chapter 3 for information on how to perform the test.

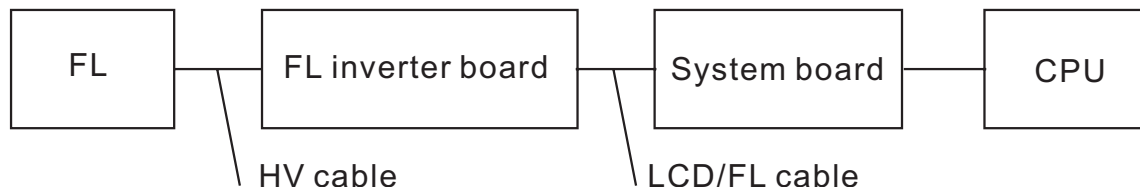
If an error is detected in the test, go to Procedure 3. If no error is detected, the display itself is normal.

### Procedure 3 Connector Check and Replacement Check

The display unit has an LCD module, Fluorescent lamp (FL), panel close switch and FL inverter board. Any of the components or their connections may be defective. Disassemble the computer following the steps described in Chapter 4, then perform the following checks:

- (1) If the FL does not light, perform Check 1.
- (2) If characters or graphics are not displayed normally, perform Check 5.
- (3) If the FL remains lit when the display is closed, the panel close switch may be defective. Perform Check 8.

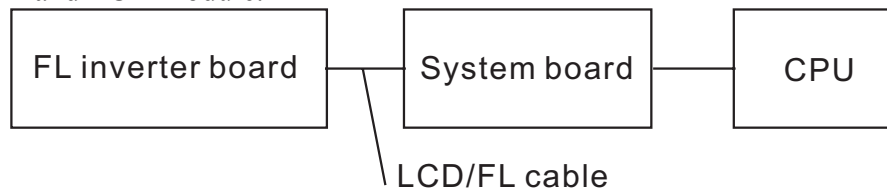
Check 1 Make sure the following cables have been firmly connected to the system board and FL inverter board.



If any of the cables is loose or off, reconnect it firmly and return to Procedure 3. If there is still an error, perform Check 2.

Check 2 The LCD/FL cable may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 3.

- Check 3 The FL may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 4.
- Check 4 The FL inverter board may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 5.
- Check 5 Make sure the LCD/FL cable has been firmly connected to the system board and LCD module.



- If the cable is loose or off, reconnect it firmly and return to Procedure 3. If there is still an error, perform Check 6.
- Check 6 The LCD/FL inverter cable may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 7.
- Check 7 The LCD module may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 8.
- Check 8 The System board may be faulty. Replace it with a new one. If there is still an error, perform Check 9.
- Check 9 The CPU may be faulty. Replace it with a new one following the instructions in Chapter 4.
- Check 10 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 10.

## 2.8 DVD-ROM Drive

To check if the internal DVD-ROM drive is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 DVD-ROM Cleaning Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

### Procedure 1 DVD-ROM Cleaning Check

1. Turn off the power to the computer.
2. Open the DVD tray by inserting a slender object such as a straightened paper clip into the eject hole. The object must be long enough to activate the eject mechanism.
3. Clean the laser pickup lens with a lens cleaner. Apply the cleaner to a cloth and wipe the lens.
4. If the DVD-ROM drive still does not function properly after cleaning, go to Procedure 2.

### Procedure 2 Test Program Check

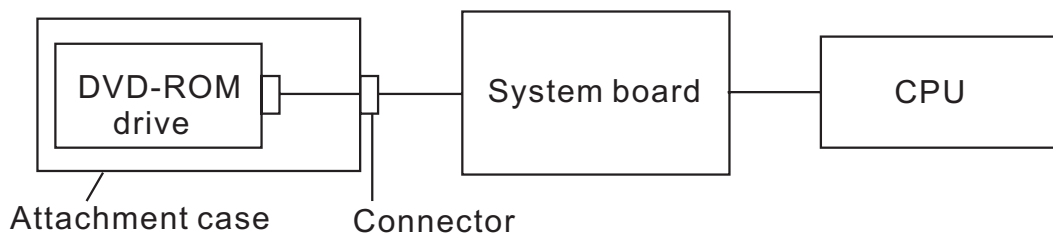
Execute the CD-ROM/DVD-ROM drive test program available as part of the maintenance test program. Insert the diagnostics CD in the computer's CD-ROM, turn on the computer and run the test. Then insert a test DVD (Toshiba-EMI DVD-ROM TEST DISK TSD-1) into the DVD-ROM drive. See Chapter 3 for information on how to perform the test.

If any error is detected by the test, go to Procedure 3.

### Procedure 3 Connector Check and Replacement Check

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

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



If the connector is loose or off, reconnect it firmly and return to Procedure 2.

If there is still an error, perform Check 2.

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

- Check 3      The DVD-ROM drive may be faulty. Replace the DVD-ROM drive with a new one following the steps in Chapter 4. If the DVD-ROM drive is still not functioning properly, perform Check 4.
- Check 4      The system board may be faulty. Replace it with new one following the instructions in Chapter 4. If the DVD-ROM drive is still not functioning properly, perform Check 5.
- Check 5      The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persist, perform Check 6.
- Check 6      The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persist, perform Check 3.

## 2.9 CD-ROM Drive

To check if the internal CD-ROM drive is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 CD-ROM Cleaning Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

### Procedure 1 CD-ROM Cleaning Check

1. Turn off the power to the computer.
2. Open the CD tray by inserting a slender object such as a straightened paper clip into the eject hole. The object must be long enough to activate the eject mechanism.
3. Clean the laser pickup lens with a lens cleaner. Apply the cleaner to a cloth and wipe the lens.
4. If the CD-ROM drive still does not function properly after cleaning, go to Procedure 2.

### Procedure 2 Test Program Check

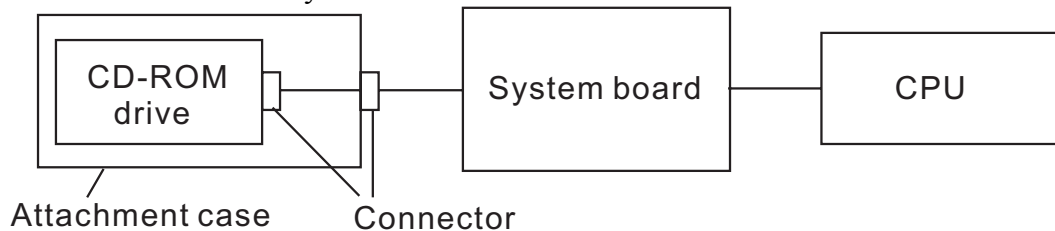
Execute the CD-ROM/DVD-ROM drive test program available as part of the maintenance test program. Insert the diagnostics CD in the computer's CD-ROM, turn on the computer and run the test. Then insert a test CD (A-BEX TCDR-702) into the CD-ROM drive. See Chapter 3 for information on how to perform the test.

If any error is detected by the test, go to Procedure 3.

### Procedure 3 Connector Check and Replacement Check

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

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



If the connector is loose or off, reconnect it firmly and return to Procedure 2. If there is still an error, perform Check 2.

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

- Check 3      The CD-ROM drive may be faulty. Replace the CD-ROM drive with a new one following the steps in Chapter 4. If the CD-ROM drive is still not functioning properly, perform Check 4.
- Check 4      The system board may be faulty. Replace it with new one following the instructions in Chapter 4. If the CD-ROM drive is still not functioning properly, perform Check 5.
- Check 5      The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persist, perform Check 6.
- Check 6      The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.



## 2.10 LAN

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

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

### Procedure 1 Test Program Check

Execute the LAN test program available as part of the maintenance test program. This program checks the LAN. Insert the Bootable CD into the CD-ROM. Turn on the computer and run the test. See Chapter 3 for information on how to perform the test.

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

### Procedure 2 Connector Check and Replacement Check

The LAN connector (RJ45) is mounted on the system board. If the LAN malfunctions, the system board or CPU might be faulty.

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

- Check 1      The system board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the LAN is still not functioning properly, perform Check 2.
- Check 2      The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 3.
- Check 3      The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

## 2.11 Cooling Module

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

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

### Procedure 1 Test Program Check

Execute the Fan On/Off test program available as part of the maintenance test program. This test program checks the cooling module. Insert the diagnostics bootable CD in the computer's CD-ROM, turn on the computer and run the test. See Chapter 3 for information on how to perform the test.

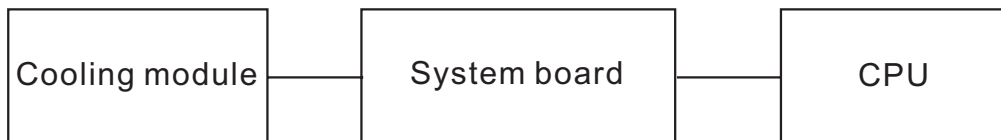
If any error is detected by the test, go to Procedure 2.

### Procedure 2 Connector Check and Replacement Check

The cooling module is connected to the system board. If the cooling module malfunctions, there may be a bad connection between the cooling module and the system board or either might be faulty.

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

Check 1 Make sure the cooling module has been firmly connected to the connector on the system board. Also make sure that the tape is not stuck to any part of the fan and that the fan is free of foreign matter.



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If the tape is stuck to any part of the fan, stick it back to the specified point. If a foreign matter is found in the fan, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

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

Check 3 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 5.

Check 4 The CPU may be faulty. Replace it with a new one following the steps in Chapter 4.

Check 5      The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

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## **Chapter 3**

# **Diagnostic Programs**

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## Chapter 3 Contents

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3.1	General.....	1
3.2	Quick Start.....	3
3.2.1	Quick Test.....	3
3.2.2	Customization Test.....	3
3.2.3	Audio Play Test.....	7
3.2.4	Audio Record Test.....	7
3.2.5	DMI Read.....	7
3.2.6	DMI Write.....	7
3.2.7	System Information.....	9
3.2.8	View Logs.....	10
3.2.9	Exit to MS DOS.....	10
3.2.10	The Diagnostics Screen Explanation.....	10
3.3	Options.....	14
3.3.1	Overview.....	14
3.3.2	Batch Parameters Configuration.....	15
3.3.3	Item's Parameters Configuration.....	17
3.3.4	Load Batch Parameters.....	18
3.3.5	Save Batch Parameters.....	18
3.3.6	LOG Parameters Setting.....	19
3.3.7	Specify LOG Viewer.....	20
3.3.8	Display LOG File.....	20
3.3.9	LOG Viewer.....	21
3.3.10	LOG File Sample.....	22
3.4	Subtests.....	24
3.5	System Test.....	28
3.6	Memory Test.....	32
3.7	Storage.....	36
3.8	Video.....	40
3.9	Communication (COMM).....	48
3.10	Peripheral.....	54

3.11 Error Codes and description..... 57  
3.12 Quick Test Item List ..... i



## 3.1 General

This chapter explains the diagnostic programs for testing and diagnosing the functions of the hardware components of this computer. The diagnostic programs can be categorized into two types: OPTION and DIAGNOSTIC TEST.

**NOTE:** Before running a test, be sure to:

1. Check that all the cables are connected securely.
2. Exit the application that is currently running and close Windows.

The OPTION consists of the following functions:

- Select All Items
- Test All Items
- Edit Batch Parameters
- Load Batch Parameters
- Save Batch Parameters
- Log Parameters
- Specify Log Viewer
- Display Error Log File
- DOS Shell
- Exit to DOS

The DIAGNOSTIC TEST Devices provides the following tests:

- System Test
- Memory Test
- Storage Test
- Video Test
- Communication Test
- Peripheral Test
- Audio Test
- DMI Read/Write
- System Information

Get the following tools prepared before running the diagnostic programs:

- A Service Diagnostic BOOT CD
- A Formatted FLOPPY DISK
- A LPT Loop back Connector (for LPT port Loop back test)
- A standard LPT printer (for LPT Printer test)
- A Test Media CD (A-BEX TEST CD-ROM TCDR-702)(for CD-ROM test)
- A Test Media DVD (Toshiba-EMI DVD-ROM TEST DISK TSD-1)
- An External Monitor (for DISPLAY test)



- A Serial Port Loop back Connector (for serial port test)
- A CD-ROM Driver (for CD-ROM test)
- A Microphone
- An Audio CD (for CD-ROM audio play test)
- A Data CD (for CD-ROM test)
- A Test Media CDRW/DVD-CDRW Drive
- A Rewritable CDRW (Direct CD Format)

The following chapters describe all the test details. The test items could be selected from the DIAGNOSTIC TEST menu.

**Note:**

When boot up the unit for the first time, system will automatically select the location of the result log file. If a USB floppy drive is connected, and an unprotected floppy diskette with more than 50KB spare space in the drive, system will save all log files into the root directory of the diskette; otherwise, system will save all log files in the root directory of RAM disk.

## 3.2 Quick Start

Boot from Service Diagnostic CD, the following screen will be displayed:

```
Satellite M20 Service Diagnostic Version 1.00
=====
1. Quick Test
2. Customization Test
3. Audio Play Test
4. Audio Record Test
5. DMI Read
6. DMI Write
7. System Information
8. View Logs
9. Exit to MS-DOS
-----
Enter Your Choice (1--9):
```

Please select a test item or select **9** to exit to MS-DOS:

### 3.2.1 Quick Test

When this item selected, system will run the configured test items and generate a test report automatically.

When the test completes, a file named Quick.log would be saved in the defined location.

For the backup purpose of the log file, system will automatically rename Quick.log to Quick.old when Quick.log is created and there is already a file quick.log existed.

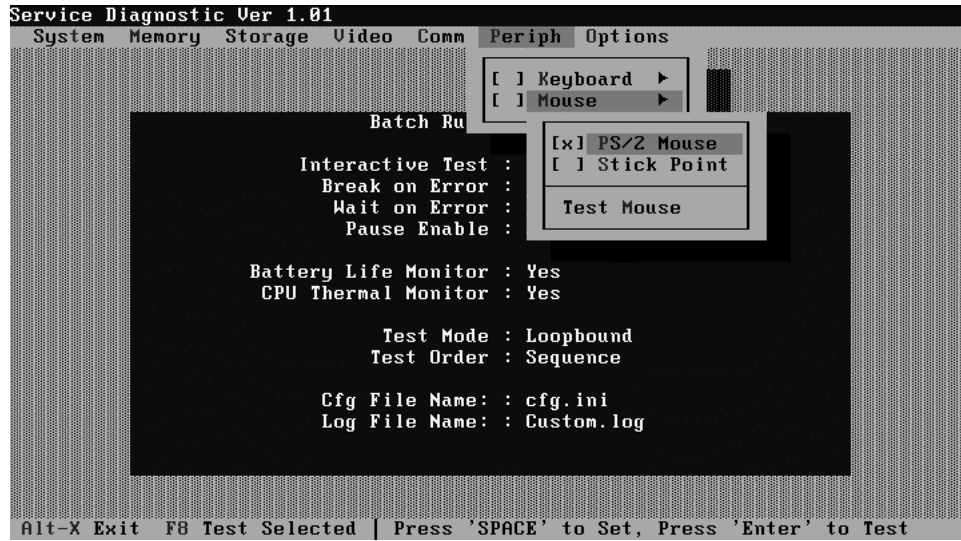
Testing all items will take 8-15 minutes. User must plug the COM Test Fixture & LPT Text Fixture before testing. During the testing, user is required to verify the test result.

The detail of test item please reference [Quick Test Item List](#).

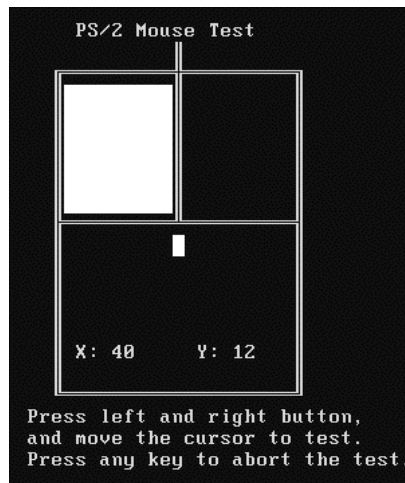
### 3.2.2 Customization Test

When this item selected, system will run the diagnostic programs according to the procedures you defined. When the test complete, a file named Custom.log will be saved in the defined location Please see the following example-- Mouse test.

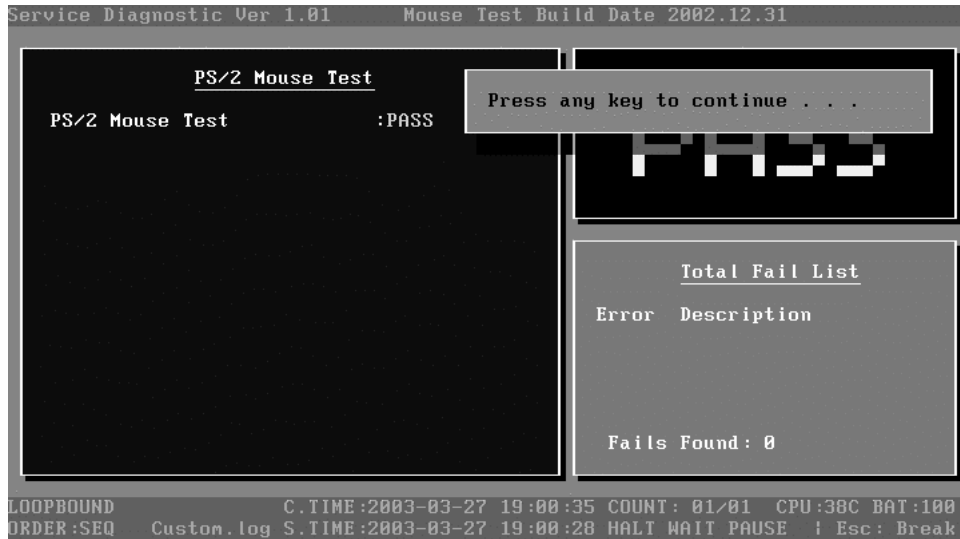
1. Use arrow key to select 'PS2 Mouse' item on 'Peripheral' in the menu, then press **Space** key to select it. (When selected, there is a **X** marked in the [ ])



Select 'Test Mouse' or press **F8** to run the test. The test information would prompt in the screen as below. This test item need user to verify whether the mouse works normally.



The test result will be displayed in the following screen:

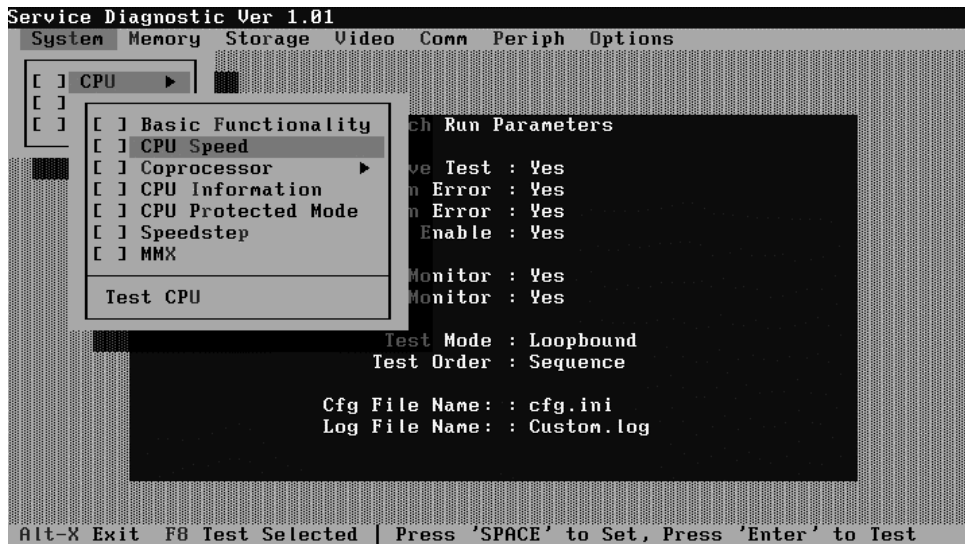


Here is another method to run the test: Highlight a test item by using arrow keys, then press **Enter** to start. If there are parameters provided, user should set parameters in the parameter dialog window.

### CPU Speed Test (Step by Step):

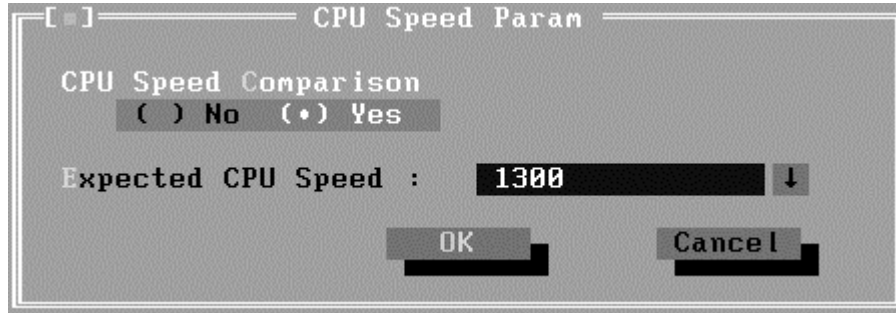
1. Select test item:

Select **System—CPU—CPU Speed**, then press the **Enter** key.



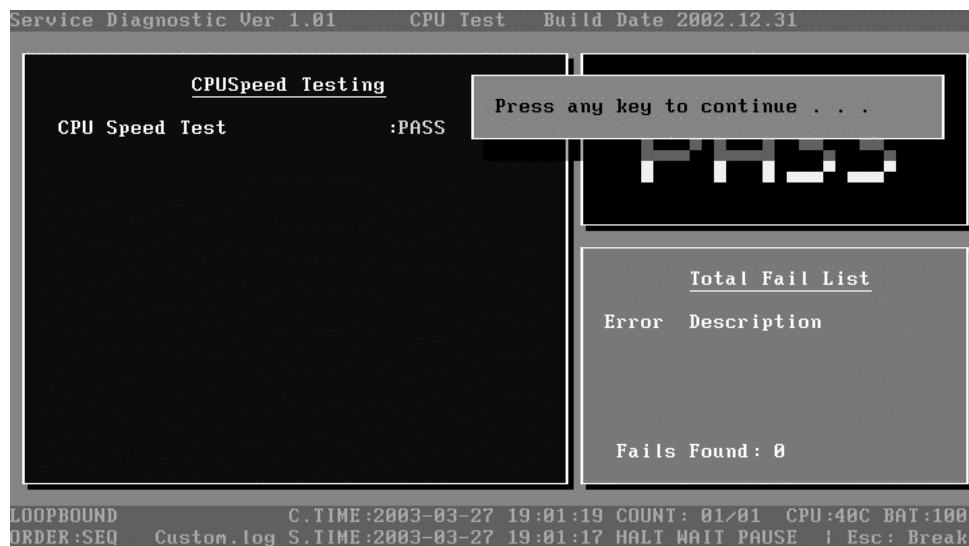
2. Parameters Setting

Choose the **OK** button after you set the proper parameters in the following window.



### 3. Test Result

System will automatically run and display the test result as follows:



Following is the comparison report of the two testing methods mentioned above:

#### 1) Configuration and Running

As to the method used in Mouse test, the user is required to select test items by pressing **Space** key and set the parameters artificially, (See [3.3.3 Item's Parameters Configuration](#)) Then press **F8** to start test. Each parameter should be configured in advance by the use, otherwise the default parameters would be used. Using this method, user is allowed to select more than one test item at one time.

#### 2) Running the current test item

As to the method adopted in CPU Speed test, user should highlight the test item and press **Enter** to start testing. And the user has to setup the parameters every time before running the test. Using this method, only one test item would be tested at one time.

### 3.2.3 Audio Play Test

Check whether the system could playback audio normally. When the test complete, a file named Audio\_P.log will be saved in the defined location.

### 3.2.4 Audio Record Test

Check whether the system could record the sound and playback it normally. When the test complete, a file named Audio\_R.log will be saved in the defined location.

Because no internal microphone, a message is showed before the test as below:

*Please ensure that the external microphone were linked, and  
Press any key to continue ...*

### 3.2.5 DMI Read

Read the information from the system's SMBIOS and display it in the screen as follows:

```
          DMI Information                               Version 1.00
-----
Manufacture   : TOSHIBA
Product Name  : Satellite M20
Version      : PSM20Q-00001
Serial Number : 33CS0159S
UUID         : 207D56805F2611D7A70E00A0D1DF0B4A
OEM Part Number : Insyde Software SM-B
OEM SW Number :

-----
          Press any key to exit...
```

User can press any key to exit the program.

### 3.2.6 DMI Write

In addition to reading the DMI information, **DMI Write** also permit attributes editing and updating: Manufacture, Product Name, Version, Serial Number, UUID and OEM Part Number, etc. The following screen will be displayed:

```

DMI Information - Modify                                     Version 1.00
-----
Manufacture       :  TOSHIBA
                    TOSHIBA
Product Name     :  Satellite M20
                    Satellite M20
Version          :  PSM200-00001
                    PSM200-00002
Serial Number    :  33CS0159S
                    33CS0159S
UUID             :  207D56805F2611D7A70E00A0D1DF0B4A
                    207D56805F2611D7A70E00A0D1DF0B4A
OEM Part Number  :  Insyde Software SM-B
                    Insyde Software SM-B
OEM SW Number    :
-----
F2:Confirm the change  F4:Ignore the change  ESC: Exit
Press ENTER key to complete an item's modification

```

In this screen, there are two lines which attribute could be edited and updated. The 1<sup>st</sup> line (the font in yellow with blue background) shows the attribute's value that is read from the current system and the 2<sup>nd</sup> line (the font in red with turquoise background) shows the same value as that in the 1<sup>st</sup> line before user's editing. User can modify the attribute's value in the 2<sup>nd</sup> line and press **Enter** to confirm the current editing and continue editing the next attribute.

During the editing, user could press **F2** to confirm the DMI attribute update or press **F4** to ignore the modification. Press **ESC** to exit the program of DMI Write.

The confirmation screen is as below:

```

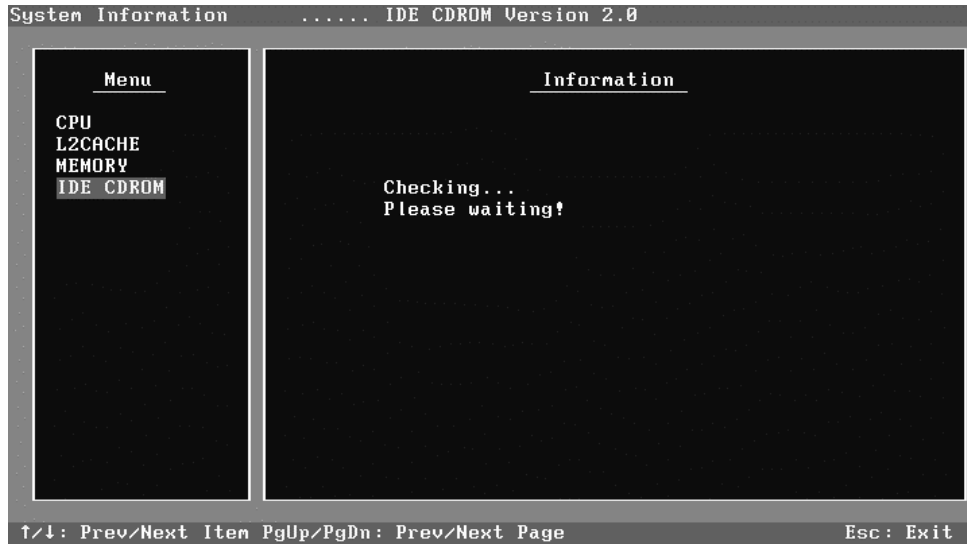
DMI Information - Check                                     Version 1.00
-----
Manufacture       :  TOSHIBA
Product Name     :  Satellite M20
Version          :  PSM200-00002
Serial Number    :  33CS0159S
UUID             :  207D56805F2611D7A70E00A0D1DF0B4A
OEM Part Number  :  Insyde Software SM-B
OEM SW Number    :
-----
F2: Save the change   F4: Edit again

```

The attributes that have been modified would be marked in red, otherwise in yellow. User could press **F2** to save the changes, or press **F4** to ignore and exit the current program.

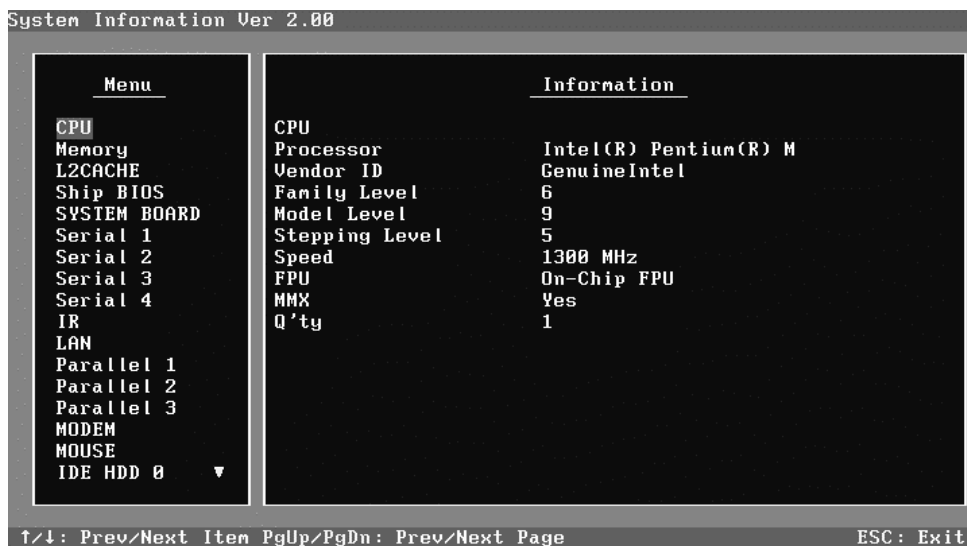
### 3.2.7 System Information

This function is used to read the system information. When the test complete, a file named System.log will be saved in the defined location during the reading process, the following screen will be displayed to indicate that the progress is in detection:



On the left column of the above screen, the detected hardware components are listed. The corresponding information of the detected hardware components is displayed on the right of the screen. It displays the current running status information of the check program. The name of the program is marked on the top of the screen. At the bottom, the function keys are listed for user operation. During the detection, keyboard operation is invalid.

When the detection finished, the hardware components information will be displayed as follows:





User can use function keys listed on the bottom of the screen to display the configuration of the component or exit the current program. On the left column, the components information is listed and user can use arrow keys or **PgUp/PgDn** to view the list and highlight the chosen component. On the right column, the configuration information of the highlighted component is listed. Press **ESC** to exit this program.

### 3.2.8 View Logs

User can enter one choice to view a log file in the screen as follows.

```

Select a Log to view:
=====
1. Quick Test Log
2. Customization Test Log
3. Audio Play Test Log
4. Audio Record Test Log
5. System Information
6. Exit to Main Menu
-----
Enter Your Choice (1--6):

```

### 3.2.9 Exit to MS DOS

Select this item to exit to MS DOS.

### 3.2.10 The Diagnostics Screen Explanation

Below is an example of running a test item. It includes the following parts: Diagnostics Windows, Test Status Area, Progress Bar, Error List, Test Item's Title, Status Bar and Message Box.

```

Service Diagnostic Ver 1.01      Memory Tester Build Date 2002.12.31
-----
  Bit Stuck High
Base Memory Test      :PASS
Extended Memory Test  :
-----
                TEST
-----
  Total Fail List
Error Description
-----
  Fails Found: 0
-----
  USER BREAK
  CONTINUE
  SKIP
  ABORT
  ABORT ALL
-----
  LOOPBOUND          C.TIME:2003-03-27 19:02:34 COUNT: 01/01 CPU:41C BAT:100
  ORDER:SEQ         Custom.log S.TIME:2003-03-27 19:02:26 HALT WAIT PAUSE ; Esc: Break

```

## 1. Diagnostics Windows

When a test item is running, a Diagnostics Windows is displayed in full screen. It consists of the following parts: Title Bar, Test Running Status and Report Panel, Status Bar. There would prompt a message box called USER BREAK in the central of the window whether user press **ESC** to interrupt the test.

## 2. Test Running Status and Report Panel

Test Running Status and Report Panel are located on the middle of Diagnostics Windows.

- ◆ Test item name, test process and test result are displayed in the left;
- ◆ Test status and result are displayed in the upper right corner of the screen. It displays the test status of the current test item – TEST (in testing), PASS (test finished and its result is passed), FAIL (test finished and its result is failed) and SKIP (test skipped).
- ◆ The error list of each test module is displayed at the lower right corner of the screen. It would display the total error quantity found in the test, the most recent five error codes and description would be shown here. Detailed error report could be viewed with Logview.exe.
- ◆ When pressing **ESC** key during the test process, a User Break Windows will be popped up for the user to select.

## 3. USER BREAK

Pressing **ESC** key to interrupt the test, USER BREAK message box would be prompted out in the central of Diagnostics Window for the user to select the following actions:

- ◆ **CONTINUE**---- Continue the test;
- ◆ **SKIP**---- Stop the sub-item of current test item to go to the next item's test;
- ◆ **ABORT**----Stop the current test item to test the next module.
- ◆ **ABORT ALL**---- Stop all the selected test items. User could use the hot key **Ctrl+D** to achieve the same operation. When the user calls **ABORT ALL**, the following message box will prompt for his selecting.



## 4. Title Bar:

Title Bar located at the top of the window, it includes information as follows:

- ◆ **Program Name and Its Version:** Service Diagnostic Ver1.01;
- ◆ **Test Module Name:** Label the name and version of the test module. For example, in the above screen, the name of the test module is ‘Memory Tester Build Date 2002.12.31’.
- ◆ **Status Bar:** Located at the bottom of the screen as follows:

```
LOOPBOUND QUICK_B.INI C.TIME:2003-03-27 19:17:53 COUNT: 01/01 CPU:38C BAT:100
ORDER:SEQ quick.log S.TIME:2003-03-27 19:17:11 HALT WAIT PAUSE | Esc: Break
```

The status bar is used to indicate the current script setting and test status. It consists of two lines that includes the information as follows:

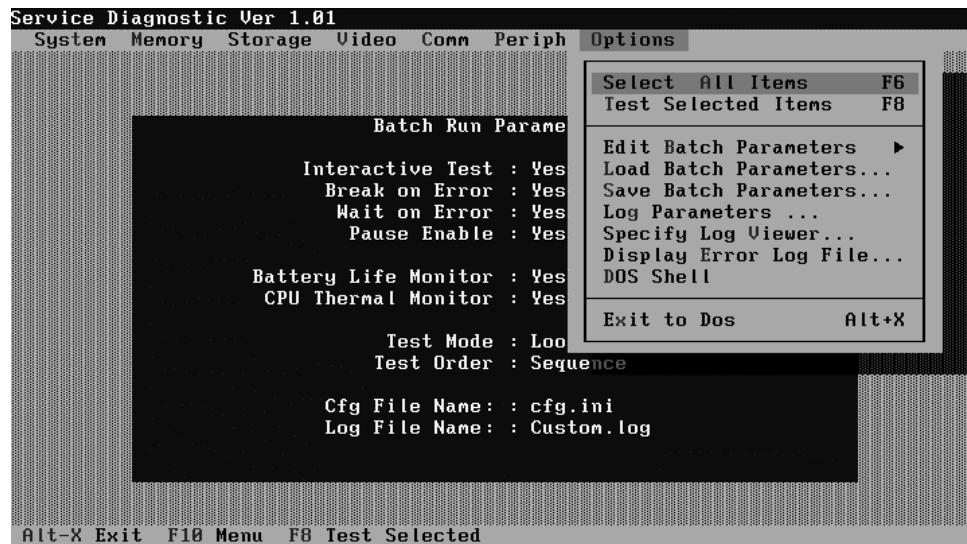
- ◆ **Test Mode:** TIMEBOUND or LOOPBOUND, e.g. LOOPBOUND in the above screen;
- ◆ **Script File Name:** Script file name, e.g. ‘Quick\_B.INI’ in the above screen;
- ◆ **Current Time(C. TIME):** Current system time, e.g. ‘C.TIME: 2003-03-27 19:17:53’ in the above screen;
- ◆ **Test Time Remaining (LEFT):** In TIMEBOUND mode, it would display the remaining test time at the same location as Current TIME (C. TIME) in the above screen;
- ◆ **Current Loop Count:** In LOOPBOUND mode, it will display the total LOOP number planning to execute and the current LOOP number have been finished, e.g. ‘COUNT: 01/01’ in the above screen;
- ◆ **CPU Temperature:** Detect the temperature in the current CPU, e.g. ‘CPU: 38C’ in the above screen;
- ◆ **Remaining Battery Capacity:** Remaining Battery Capacity detected in the current Battery, e.g. ‘BAT: 100%’;
- ◆ **Test Order:** Define the test sequence. There are two sequence modes: Sequential Test Mode and Random Test Mode. The default mode is Sequential Test Mode, it would displays ‘ORDER: SEQ’ as in the above screen;
- ◆ **LOG File Name:** Display the file name of the test log, e.g. Quick.Log in the above screen;
- ◆ **Start Test Time (S.TIME):** Display the test start time for the current test item or the test script, e.g. ‘S.TIME: 2003-03-27 19:17:11’ in the above screen;
- ◆ **Break On Error:** Display ‘HALT’ as shown in the above screen when ‘Break On Error’ is enabled;
- ◆ **Wait On Error:** Display ‘WAIT’ as shown in the above screen when ‘Wait On Error’ is enabled;

- ◆ **Pause Enable:** Display PAUSE when “Pause Enable” is enabled;
- ◆ **Manual Interrupt Method:** Display ‘Esc: Break’ to tell the user how to manually interrupt the test process.

## 3.3 Options

### 3.3.1 Overview

In Service Diagnostics, with the **Options** menu user can configure the batch parameters, test item's parameters and those parameters created by the LOG file.



#### Options Menu Notes:

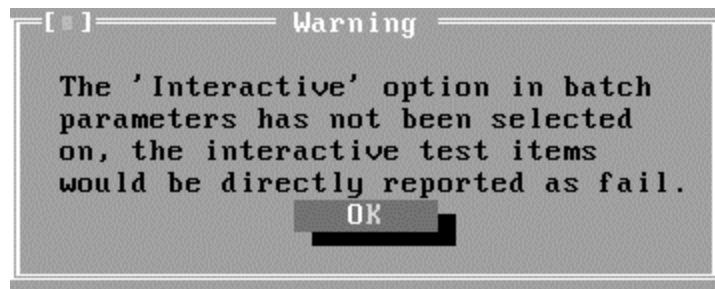
- Select All/None Items

Switch between selecting all test items and selecting none, the hot key is **F6**.

- Test Selected Items

Execute all selected test items in this editor, the hot key is **F8**.

If “Interactive” option in batch parameters has not been selected on, a warning message would be shown as below:



- Edit Batch Parameters

Configure batch parameters and all the test item's parameters.

- Load Batch Parameters

Upload all the test items and parameters in the \*.ini file

- Save Batch Parameters

Save all parameters and test items configured in the editor to a specified file

- Log Parameters

Configure LOG parameters.

- Specify LOG Viewer

Specify the viewer for the LOG file.

- Display Error Log File

Load the LOG file viewer specified in the Specify Log Viewer to view the LOG file.

- DOS Shell

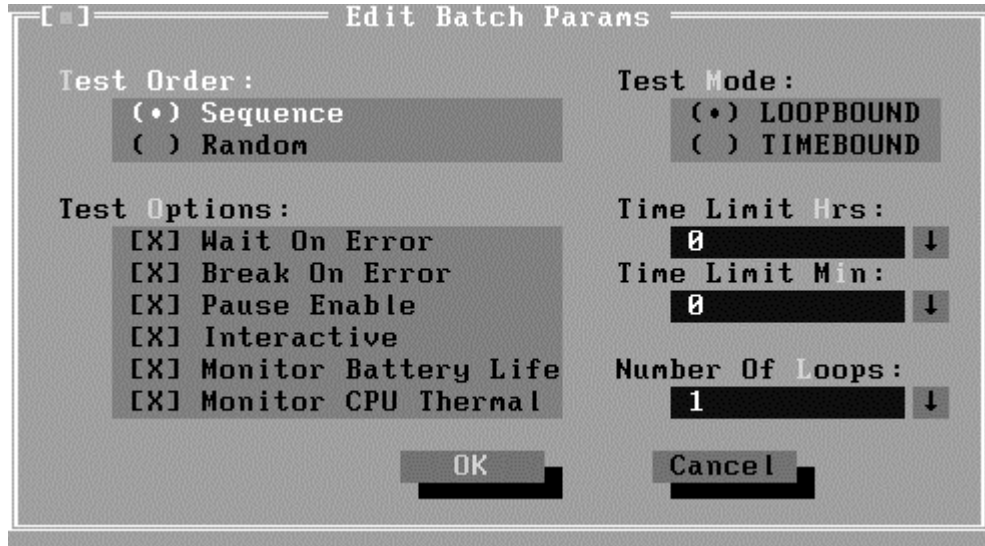
Enter the DOS Shell and execute the DOS programs. You can also exit to the Service Diagnostics Editor by command of **EXIT**.

- Exit to DOS

Exit the Service Diagnostics Editor and back to DOS.

### 3.3.2 Batch Parameters Configuration

The batch parameters configuration screen can be accessed through Service Diagnostics/OPTIONS -> EDIT BATCH PARAMETERS -> BATCH PARAMETERS:



- **Test Order**

Specify the order of the test items. Choose 'Sequence' to adopt the sequential mode; choose 'Random' to run the test items in random sequence.

- **Test Options**

Choose one of the following options:

- ✓ **Wait On Error**

Wait for further confirmation while an error occurs.

- ✓ **Break On Error**

Stop the test when a test item fails.

- ✓ **Pause Enable**

Pause at the end of each test items and wait for the user to response with the test items that requires the user to assist the test processes, such as the key stroke test.

- ✓ **Interactive**

Whether the option here is enabled, it would affect all the test items while the same option in “Item Parameters Configuration” only affect that test item

- ✓ **Monitor Battery Life**

Monitor the remaining battery capacity (percent).

- ✓ **Monitor CPU Thermal**

Monitor the CPU temperature.

- **Test Mode**

- ✓ **LOOPBOUND**

The chosen test items will run repeatedly according to the times specified in the 'Number of Loops'.

- ✓ **TIMEBOUND**

The chosen test items will run for an extent time specified in 'Time Limit Hrs' and 'Time Limit Min'.

- **Time Limit Hrs**

Specify the hours whether 'TIMEBOUND' is chosen under the batch mode.

- **Time Limit Min**

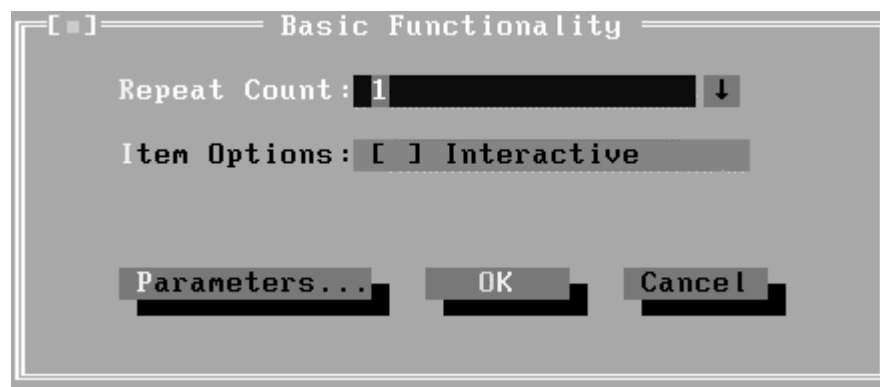
Specify the minutes whether 'TIMEBOUND' is chosen under the batch mode.

- **Number Of Loops**

Specify the repeating times when 'Loop Bound' is chosen under the batch mode.

### 3.3.3 Item's Parameters Configuration

The test items' parameters configuration screen can be accessed through Service Diagnostics/Options -> Edit Batch Parameters -> Item's Parameters-> System->CPU-> Basic Functionality:



- **Repeat count**

Repeat times of the test item.

- **Interactive**

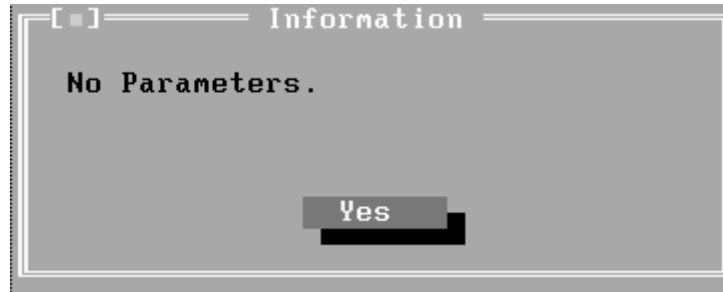
Pause at the end of test items and wait for the user to response whether the test item requires the user to assist the test process, such as the Key Stroke test.



Whether the option here is enabled, it only affects the current test item.

- **Parameters**

For the test items with specific parameters, this option will call the related configuration screens. Otherwise, the program will show the following dialogue window:

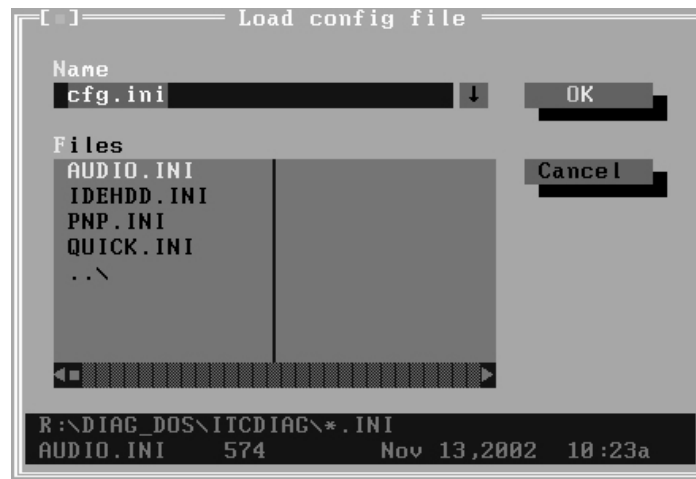


Parameters for the specific test items:

Some test items (Memory, HDD, e g...) have their individual parameters, which can be configured in their parameters setting window.

### 3.3.4 Load Batch Parameters

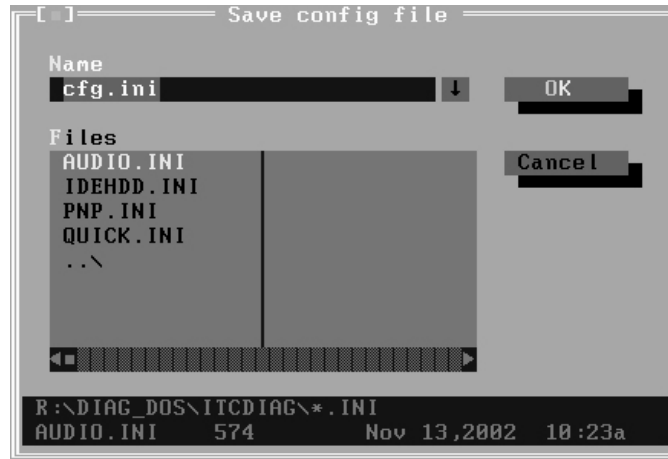
Batch parameter is saved in the script file whose extension name is INI (\*.INI). Below is the screen shot of “Load Batch Parameters”.



In this window, you can specify the .INI files that you wanted to be edited or modified.

### 3.3.5 Save Batch Parameters

Here you can save the edited or modified content to the batch parameters files.



### 3.3.6 LOG Parameters Setting...

You can access the Log Parameters screen through Service Diagnostics\Options - Generate Report.



- **Report Destination**

With 'NONE' selected, no log file will be generated; With 'FILE' selected, a log file with the name specified in 'Log File Name' will be generated.

- **Log Options**

- ✓ **Log Errors**

With this parameter selected, errors will be recorded when the test fails.

- ✓ **Log Test Activities**

With this parameter selected, the subtest results will be recorded.

- ✓ **Log Test Start Time**

With this parameter selected, the start time of the test will be recorded.

✓ **Log Test End Time**

With this parameter selected, the end time of the test will be recorded.

✓ **Log Errors Only**

With this parameter selected, errors will be recorded only when the test fails.

✓ **Log Errors Only with Time**

With this parameter selected, errors and time will be recorded only when the test fails.

✓ **Append to Old Log File**

With this parameter selected, the new log will be added to the old one.

✓ **Log Device Info on Fail**

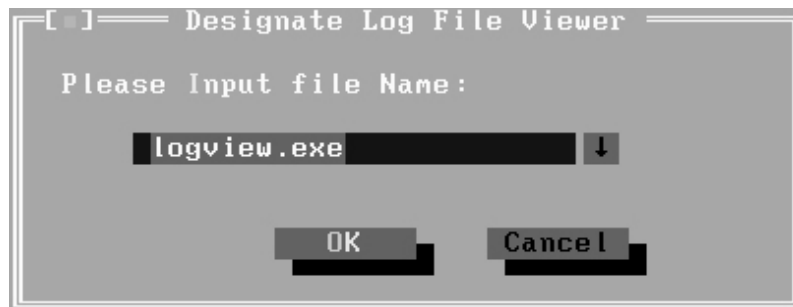
With this parameter selected, details of the failed test will be recorded.

• **Log file Name**

Specify the Log file name. You can input the detail path of the file. System will show the detail path of the file.

### 3.3.7 Specify LOG Viewer

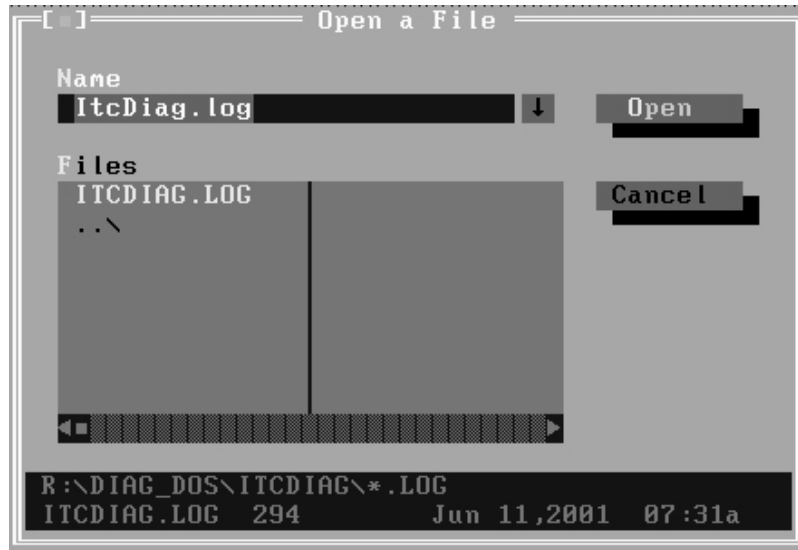
You can specify the Log file viewer in the Specify Log Viewer screen.



The default viewing program of Service Diagnostics is **LogView.exe**

### 3.3.8 Display LOG File

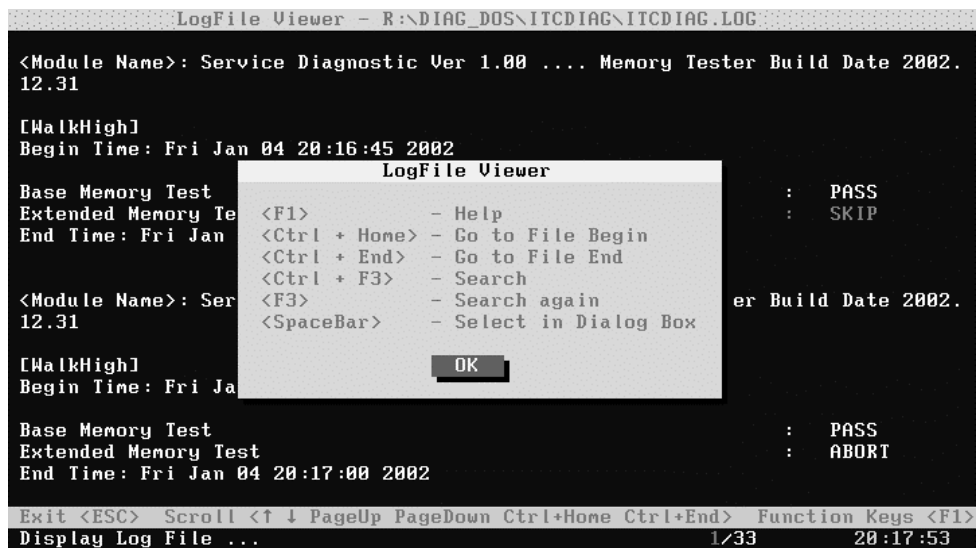
You can specify the Log file for viewing in the Display Error Log File screen.



In this screen, you can specify a Log file and view it with the viewer designated in Specify LOG Viewer.

### 3.3.9 LOG Viewer

Service Diagnostic Log viewer:



- ↑, ↓

Scroll a line backward or forward on the screen.

- **Page Up, Page Down**

Scroll a page backward or forward on the screen.

- **Esc**  
Exit the Log viewer.
- **F1**  
Display the Help information about the Logviewer operations and the functional keys.
- **Ctrl+Home**  
Go to the start of the log file.
- **Ctrl+End**  
Go to the end of the log file.
- **Ctrl+F3**  
Prompt the search dialogue for the user to input the string to be looked for and specify the searching method.
- **F3**  
Find the next corresponding strings given.

### 3.3.10 LOG File Sample

Log file is a test result file, which records the following information: Test module name, Test item name, Start/End time and the test result (including PASS, FAIL, SKIP and ABORT). When a failure is found, both the error code and the error information were recorded.

In the Log file, we use **Test Items** as the test item name, which could not be modified in the whole time. And we use the **Internal Name** as name in the program's UI, which corresponds to the test item name and could be modified according to the user's favorite.

The following section is a sample of log file:

*DIAG REPORT*

*<Module Name>: Service Diagnostic Ver 1.00 .... Keydoard Test Build Date 2002.12.31*

*[KBLed]*

*Begin Time: Thu Mar 13 14:38:05 2003*

*Green Test on LED : PASS*  
*ALL LED Test on keyboard : PASS*  
*Orange Test on LED : PASS*  
*HDD Green LED Test Press p-key pause : PASS*  
*End Time: Thu Mar 13 14:38:25 2003*

*<Module Name>: Service Diagnostic Ver 1.00 .... System Board Test Ver2002.12.31*

*[Speaker]*  
*Begin Time: Thu Mar 13 14:39:24 2003*

*Speaker : FAIL*  
*ITEM TEST FAIL*  
*Function ID :306*  
*Error Code :30612*  
*Error Message :System Board Speaker Error*  
*End Time: Thu Mar 13 14:39:34 2003*

## 3.4 Subtests

Test Group	Sub Item ID	Subtest	Test ID	Test Items	Internal Name
System	01	CPU	01	Basic Functionality Test	[CPUBasicFun]
			02	CPU Speed	[CPUSpeed]
			03	Coprocessor NPU Basic Functions NPU Interrupt	Coprocessor [NPUFun] [NPUInterrupt]
			04	CPU Information	[CPUInformation]
			05	CPU Protected Mode	[Protect]
			06	Speedstep	[Speedstep]
			07	MMX	[MMX]
	02	Board	01	DMA Controller	[DMACtrl]
			02	Interval Timer	[Timer]
			03	Clock / Calendar	[RealClock]
			04	Speaker	[Speaker]
			05	PCI System	[PCI]
			06	Plug and Play	[PnP]
			07	ACPI Test	[ACPI]
	03	FAN	01	FAN Speed Test	[FANSpeed]
Memory	01	BIOS ROM			[BIOSROM]
	02	Pattern	01	Bit Stuck High Test	[BSHigh]
			02	Bit Stuck Low Test	[BSLow]
			03	Checker Board Test	[ChkBd]
			04	CAS Line Test	[CASLine]
			05	Incremental Test	[Incrment]
			06	Decremental Test	[Decrment]
			07	Incremental Decremental Test	[Idcrment]
	03	Extended Pattern	01	Read/Write Cycle Test	[XWRCycle]
			02	Read Cycle Test	[XRCycle]
	04	Walking 1's Test			[WalkHigh]
	05	Walking 0's Test			[WalkLow]
	06	Memory Address			[Address]
	07	Refresh Test			[Refresh]
	08	Cache Memory			[CacheOne]
	09	Random Memory	01	Randomize Test	[Random]

			02	Random Increment Read/Write	[RandIncr]
	10	Data Bus Test			[DataBus]
	11	Memory Speed Test			[MemSpeed]
Storage	01	HDD	01	Sequential/Random R/W	[SeqRdRW1]
			02	Sequential/Random Seek	[Seek1]
			03	Performance	[Perform1]
			04	Controller Check	[Controller1]
			05	Diagnostic Read/Write	[DiagRW1]
			06	SMART Test	[SMART1]
	02	CDROM	01	Controller Test	[CDRWController1]
			02	Data Transfer Rate	[CDRWTransRate1]
			03	Audio CD Play	[CDRWAudio1]
			04	Data CD Butterfly Seek	[CDRWButterfly1]
			05	Data CD Random Seek	[CDRWSeek1]
			06	Data CD Sequence Seek	[CDRWSFSeek1]
			07	CDRW Write Test	[CDRWWrite1]
			08	Tray Eject Test	[CDRWTray1]
Video	01	Text Mode	01	Character Test	[CharTest]
			02	Text Attribute	[Attribut]
			03	Text Page Selection	[PageSel]
			04	Text Color	[Color]
			05	80*25 Text Mode	[Text Mode]
	02	640*480 VGA Mode			[VGAMode]
	03	VESA Video Modes	01	640X480 Video Modes VESA 640x480x256 Mode VESA 640x480x32K Mode VESA 640x480x64K Mode VESA 640x480x16M Mode VESA 640x480x32bit Mode	[V640480_8] [V640480_15] [V640480_16] [V640480_24] [V640480_32]
			02	800X600 Video Modes VESA 800x600x256 Mode VESA 800x600x32K Mode VESA 800x600x64K Mode VESA 800x600x16M Mode VESA 800x600x32bit Mode	[V800600_8] [V800600_15] [V800600_16] [V800600_24] [V800600_32]
			03	1024X768 Video Modes VESA 1024x768x256 Mode VESA 1024x768x32K Mode VESA 1024x768x64K Mode VESA 1024x768x16M Mode VESA 1024x768x32bit Mode	[V1024768_8] [V1024768_15] [V1024768_16] [V1024768_24] [V1024768_32]



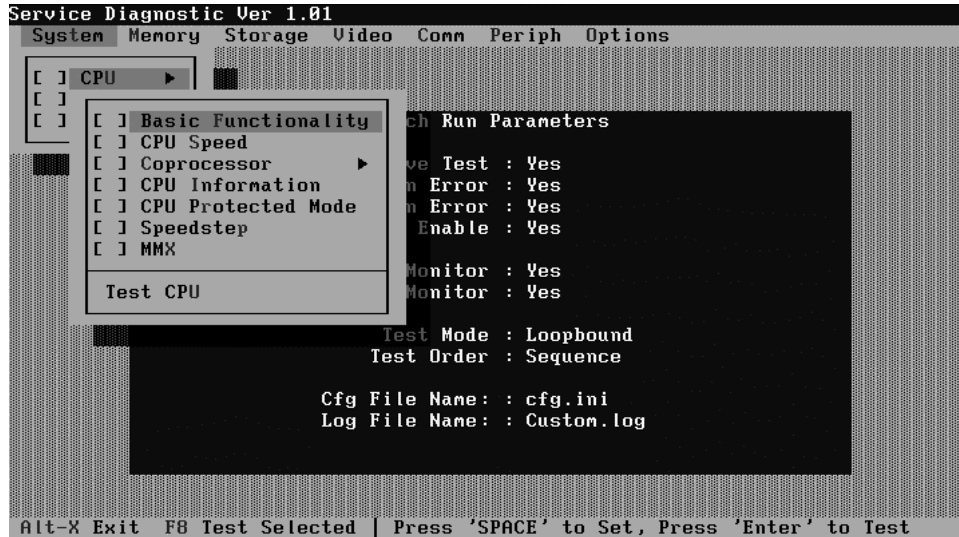
			04	1280X1024 Video Modes VESA 1280x1024x32K Mode VESA 1280x1024x64K Mode VESA 1280x1024x16M Mode VESA 1280x1024x32bit Mode	[V12801024_15] [V12801024_16] [V12801024_24] [V12801024_32]
			05	1400X1050 Video Modes VESA 1400x1050x32K Mode VESA 1400x1050x64K Mode VESA 1400x1050x16M Mode VESA 1400x1050x32bit Mode	[V14001050_15] [V14001050_16] [V14001050_24] [V14001050_32]
			06	1600X1200 Video Modes VESA 1600x1200x32K Mode VESA 1600x1200x64K Mode VESA 1600x1200x16M Mode VESA 1600x1200x32bit Mode	[V16001200_15] [V16001200_16] [V16001200_24] [V16001200_32]
	04	VESA Video Memory			[VESAMEM]
	05	AGP Test			[AGP]
	06	LCD Panel Test			[LCDPanel]
	07	Register Test			[Register]
	08	Color Purity Test			[ColPurity]
	09	Direct Color Test			[DirectColor]
	10	DAC/Palette Address			[DACPalAddr]
	11	Bitblt Engine Test			[Bitblt]
COMM	01	LPT	01	Register Check	[LPTRegister1]
			02	IRQ Check	[LPTInterrupt1]
			03	External Loopback	[LPTExLoopback1]
			04	ECP Mode	[LPTECP1]
			05	Printer Check	[LPTPrinter1]
	02	COM	01	Register Check	[COMRegister1]
			02	IRQ Check	[COMInterrupt1]
			03	Internal Loop back	[COMInLoopback1]
			04	External Loop back	[COMExLoopback1]
			05	FIFO Test	[COMFIFO1]
			06	Parity Check	[COMParity1]
			07	Stop Bits Check	[COMStopbit1]
			08	Word Length Check	[COMWordlength1]
	03	IrDA	01	IrDA Master	[IrMaster]
			02	IrDA Slave	[IrSlave]
	04	LAN Card	01	Device ID Detection	[DeviceID]
			02	Vendor ID Detection	[VendorID]

			03	Mac Address Detection	[MAC Address]
Peripheral	01	Keyboard	01	Keyboard Map	[KBMap]
			02	Keyboard Data Line	[KBDataLn]
			03	Keyboard Led	[KBLed]
			04	Keyboard Clock Line	[KBClokLn]
	02	Mouse	01	PS2 Mouse	[MSPS2]
			02	Stick Point	[MSStick]

## 3.5 System Test

Move arrow keys and press the **Space** key to select CPU test item from Service Diagnostic menu, then highlight **CPU** and press the **Enter** to run this test item.

### Subtest 01 CPU

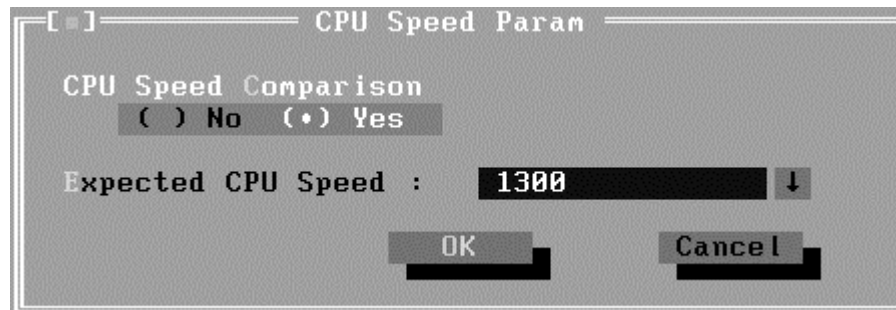


#### 1. Basic Functionality Test

This test item is to check whether the CPU works normally through math and logic calculation including verifying the general registers, math registers and logic registers.

#### 2. CPU Speed

This test item is to detect the work frequency of the current CPU. User should change the parameters setting in the following window before the test:



**CPU Speed Comparison**--Whether you want to make a comparison of the CPU speed with the value set in 'Expected CPU Speed', you should choose 'Yes'; otherwise, 'No'.

**Expected CPU Speed**--Specify the expected CPU Speed value you want for further comparison.

### 3. Coprocessor

#### ✓ NPU Basic Functions Test

This test item is to check whether the precision of the numeric processor in the float calculation is up to the IEEE standards.

#### ✓ NPU Interrupt Test

This test item is to check whether NPU transfers the abnormal Interrupt program correctly by forcing an abnormal float.

### 4. CPU Information

This test item is used for getting & showing CPU Information. It will be displayed as follows:

```

Service Diagnostic Ver 1.01      CPU Test      Build Date 2002.12.31
-----
CPUInformation Testing
CPU Information :
Standard Speed = 1300MHz
Current Speed = 1295MHz
PROCESSOR ID = 06FF95
BRAND ID = 0X16 Reserved
L2 Cache = 1024K
Unique ID = Disable
MSR17 = 00001400A70600D8
MSR2A = 0000000000004843
PASS

Press any key to continue . . .

Total Fail List
Error Description

Fails Found : 0

LOOPBOUND C.TIME:2003-03-27 19:04:59 COUNT: 01/01 CPU:38C BAT:100
ORDER:SEQ Custom.log S.TIME:2003-03-27 19:04:43 HALT WAIT PAUSE | Esc: Break

```

### 5. CPU Protected Mode Test

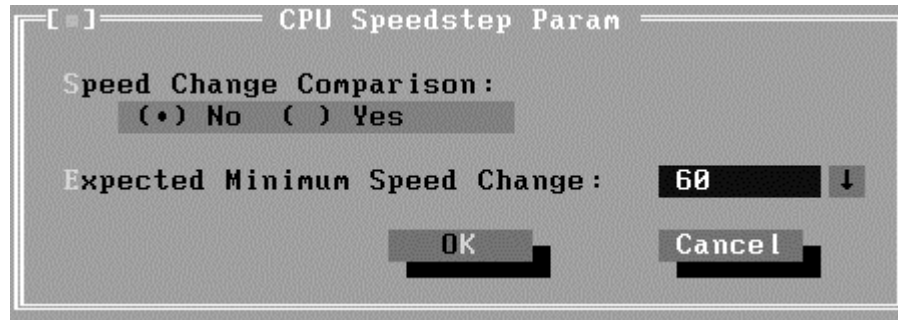
This test item is to check whether CPU protected mode instruction works normally.

### 6. Speedstep

Intel Speedstep technology is supported by the mobile CPU of Pentium III or above which allows a mobile PC user to operate at a higher frequency when plugged into a wall outlet and automatically switch to a lower power and frequency when running on battery, conserving battery life.

This test item is to check whether the CPU supports Speedstep function according to the change of the CPU work frequency in Maximum Performance mode and Battery Optimized mode.

Below is the parameter dialog window of CPU Speedstep test item:



**Speed Change Comparison**—When ‘No’ is chosen, system only reports the CPU speed at Maximum Performance mode and Battery Optimized mode. Otherwise, it will compare the CPU speed at Maximum Performance mode with that at Battery Optimized mode. Whether the difference between the two speeds is greater than the value specified in ‘Expected Minimum Speed Change’, system will report ‘PASS’, otherwise ‘FAIL’.

**Expected Minimum Speed Change**—Specify the minimum change range of CPU speeds under AC and DC power supply.

## 7. MMX

The test item is to confirm whether the CPU supports MMX instructions.

### Subtest 02 Board

#### 1. DMA Controller

This test item is to check whether the DMA controller works normally.

#### 2. Interval Timer

This test item is to check whether the Interval Timer (18.2Hz, 55ms) works normally.

#### 3. Clock/Calendar

This test item is to check whether the system clock/calendar works normally.

#### 4. Speaker

This test item is to check whether the speaker currently used works normally. It requires the user respond to the test instructions.

#### 5. PCI System

This test item is to check whether the bus number, device number and function number in PCI bus are valid.

#### 6. Plug and Play

This test item is to check:

1. Whether the current system supports Plug-n-Play,
2. Whether there is an ESCD (Extended System Configuration Data) in the BIOS
3. Whether there is PCI-to-ISA bridge in the system
4. Whether there is PCI bus in the system.

#### 7. ACPI Test

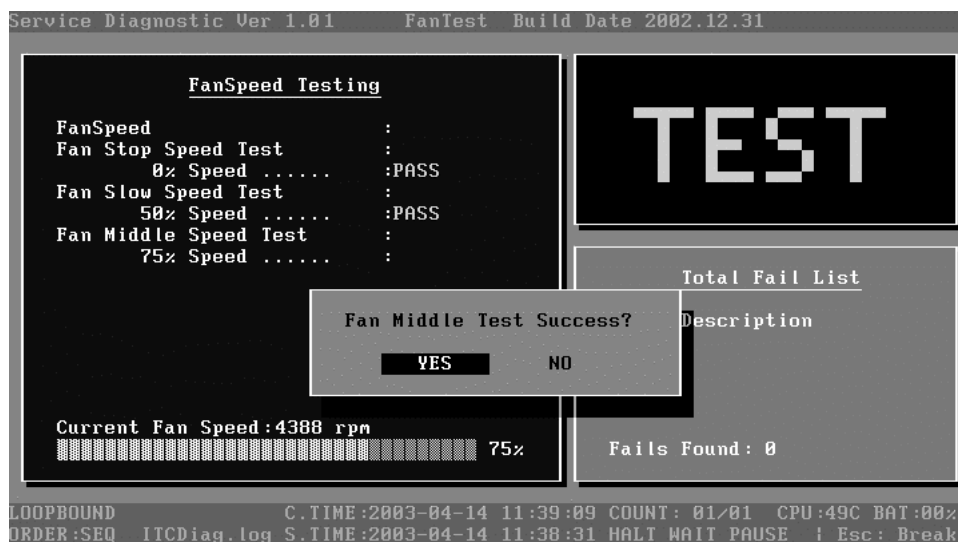
ACPI test includes two sub-items as below:

System Address Map Test: Check the correctness of ACPI system memory map, and whether its mapping scope is within real memory.

ACPI Table Test: Check the correctness of ACPI relative configuration tables in the current system.

### Subtest 03 FAN Speed Test

This test item is to check whether the fan currently used works normally in the different speeds of stop, slow, middle and fast.



## 3.6 Memory Test

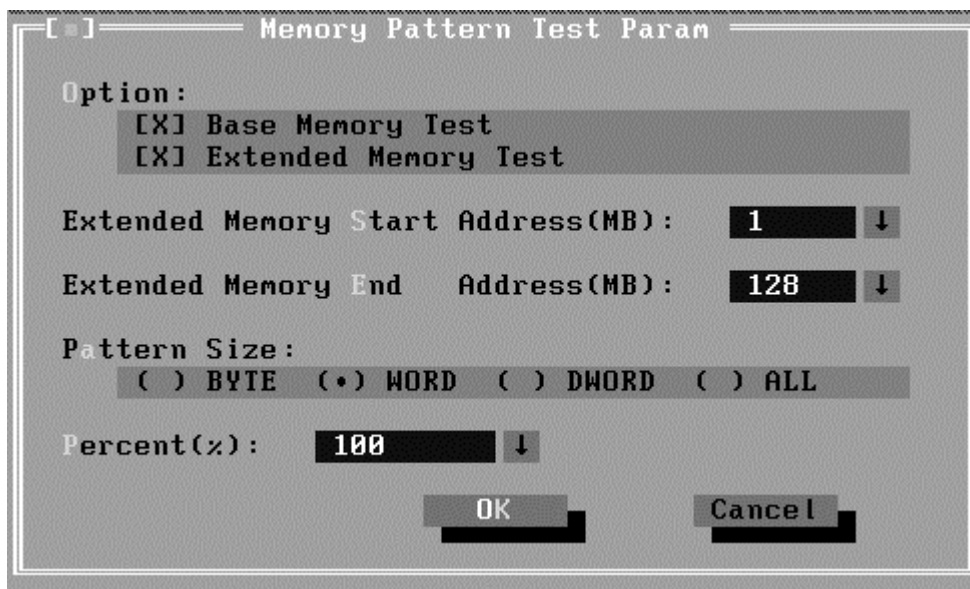
This test module is to check whether the memory chip works normally.

### Subtest 01 BIOS ROM

This test item is to check the validity of BIOS ROM that includes two sub-items -- ROM Read and ROM Write Protection. ROM Read is to check whether BIOS ROM could be correctly read out, ROM Write Protect is to check whether BIOS ROM is write-protected.

### Subtest 02 Pattern

This test item is to check whether the system memory includes base memory and extended memory that could be accessed correctly through writing and reading with a series of designed pattern data. Below is the parameter setting dialog window.



**Option:** Choose the memory part to be tested – Base Memory Test or Extended Memory Test;

**Extended Memory Start Address (MB) & Extended Memory End Address (MB):** Set the range of extended memory that is to be tested, the test coverage would be based on the setting and the value in ‘Percent (%)’ mentioned at below;

**Pattern Size:** Choose the pattern size – BYTE, WORD, DWORD or ALL;

**Percent (%):** Choose the percentage of the defined range of the memory to be tested;

## 1. Bit Stuck High Test

Data pattern: Every bit is '1' (Each bit is high)

## 2. Bit Stuck Low Test

Data pattern: Every bit is '0'(Each bit is low);

## 3. Checker Board Test

Data pattern: Lo-byte and hi-byte are composed with 0101(0x5) and 1010 (0xA);

## 4. CAS Line Test

Data pattern: Lo-byte and hi-byte are composed with 0000 (0x0) and 1111(0xF);

## 5. Incremental Test

Data pattern: A series of increasing data from 0 by adding 1 each time;

## 6. Decrement Test

Data Pattern: A series of decreasing data from the maximum (e.g. 0xFFFF) by subtracting 1 each time;

## 7. Incremental / Decrement Test

Data Pattern is a series of data whose low byte is increasing data from 0x00 and high byte is decreasing data from 0xFF.

**Subtest 03    Extended Pattern**

In addition to the above pattern test with the memory, there are Read/Write Cycle test and Read Cycle Test for the extended memory.

Below is the parameter dialog window of the extended pattern test.





**Extended Memory Start Address and Extended Memory End**

**Address (MB):** Set the range of extended memory that is to be tested. The test coverage will base on the value setting in 'Percent (%)' mentioned at below.

**Percent (%):** Choose the percentage of the defined range of the memory to be tested.

## 1. Write/Read Cycle Test

Test by using both read and write instructions.

## 2. Read Cycle Test

Test by using read instructions.

**Subtest 04 Walking 1's Test**

The test item is to make sure that there is no short circuitry issue in memory chip. The parameter dialog window is the same as that in 'Subtest 02 Pattern'.

**Subtest 05 Walking 0's Test**

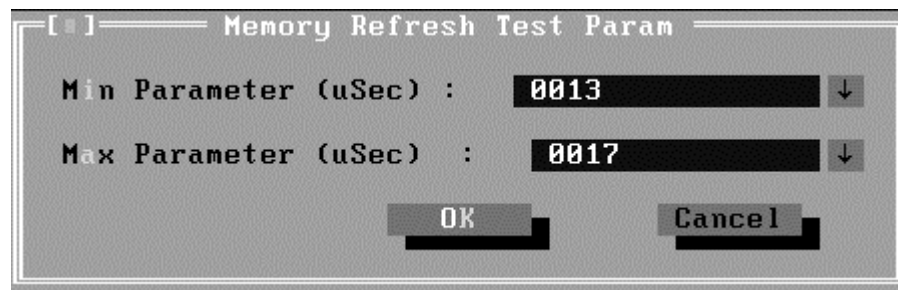
The test item is to make sure that there is no open circuitry issue in memory chip. The parameter dialog window is the same as that in 'Subtest 02 Pattern'.

**Subtest 06 Memory Address**

This test item is to check short and open issue on memory address lines.

**Subtest 07 Refresh Test**

This test item is to check whether the memory refresh works normally. The parameter dialog window is as follows:

**Subtest 08 Cache Memory**

The test item is to check whether the CPU internal cache memory could be accessed correctly.

**Subtest 09 Random Memory**

Random Memory test includes the following two test items: Randomize Test and Random Incremental Read/Write Test. The parameter dialog window is the same as that in 'Subtest 03 Extended Pattern'.

**1. Randomize Test**

This test item is to check whether the memory could be correctly accessed with randomized data and randomized memory address.

**2. Random Increment Read/Write**

This test item is to check whether the memory could be correctly accessed with randomized memory address and a series of incremental data.

**Subtest 10 Data Bus Test**

This test item is to check whether the data bus works normally.

**Subtest 11 Memory Speed Test**

This test item is to check the data transferring rate for the cache memory and the system memory.

## 3.7 Storage

### Subtest 01 HDD

This test item runs on IDE hard disks. It checks the functions and performance of IDE hard disk.

In order to protect user's HDD data, the password must be verified when the HDD test is being done. The screen is as follows:



#### Password : hard disk

##### 1. Sequential/Random R/W

This test item is to check the HDD's Read/Write function through data writing and reading to HDD.

This test item needs user to submit the parameters:



**LBA Start, LBA End**--Specify the start and end byte in LBA (Large Block Address);

**Retry**—Specify the maximum retrying times **whether** the operation fails;

**Percent**—Specify the coverage rate in percentage of the total disk;

**Test Mode**—Choose test mode from the following options:

**(1) Read & Write**—Write data on the disk, then read it out and compare the two value;

**(2) Read Verify**—Read data only;

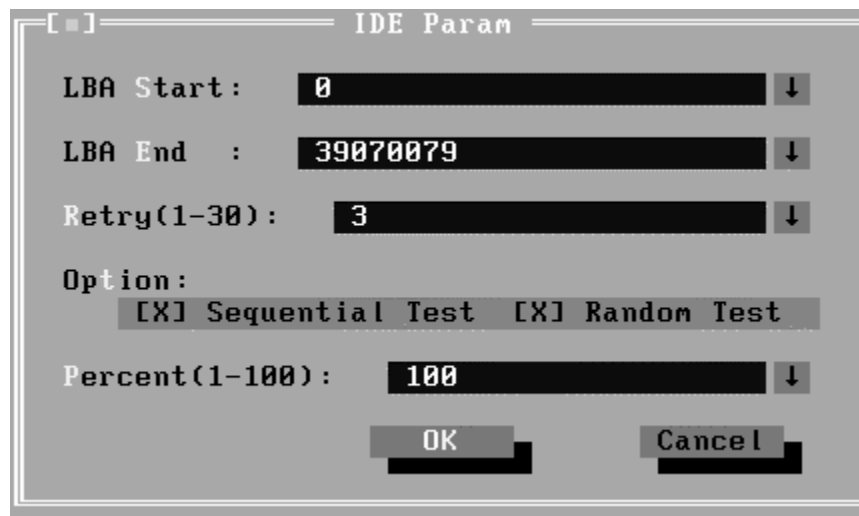
**(3) Unprotected Write**—Write data on the disk without backup original data.

**Option**—Select sequential test or random test

## 2. Sequential/Random Seek

The test item is to check the correctness of the HDD's sector seeking function.

This test item involves the following parameters:



**LBA Start, LBA End**-- specify start and finish byte in LBA(Large Block Address);

**Retry**-- Specify the maximum retrying times **whether** the operation fails;

**Option**-- Select sequential test or random test;

**Percent**-- Specify the coverage rate in percentage of the total disk.

## 3. Performance

Check the HDD's seeking speed and transferring the data rate.

This test item involves the following parameter:



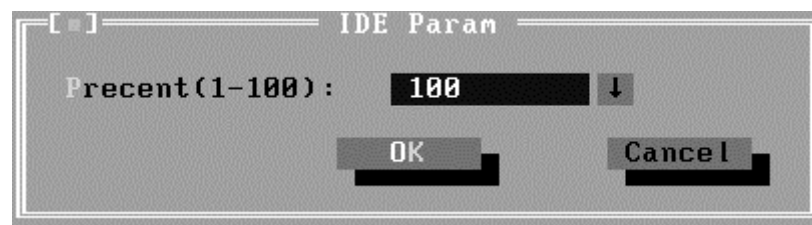
**Retry**--Specify the maximum retrying times **whether** the operation fails.

#### 4. Controller Check

Check the HDD controller's status, including HDD interrupt and unexpected interrupt.

#### 5. Diagnostic Read/Write

This test item is a quick test to verify whether the HDD could be correctly accessed and the user could specify the percentage in the below dialog.



**Percent (1-100)**-- Specify the coverage rate in percentage of the total disk.

#### 6. SMART Test

SMART stands for Self-Monitoring, Analysis and Reporting Technology. SMART test will compare the attribute values with the threshold value in the HDD's controller to confirm whether there is any failure in the HDD

### Subtest 02 CDROM

The CDROM test runs on IDE CDROM/DVD-ROM & CD-RW, it will check the CDROM driver's functionality and performance.

#### 1. Controller Test

Check the CDROM controller's status.

#### 2. Data Transfer Rate

Check the data transfer rate of the CDROM drive. It will read data from the CDROM disc and calculate the data transfer rate. This test needs a data CD.

### 3. Audio CD Play

This test item is to check whether the audio play normally.

It needs an audio CD.



**Start/End Track Number**-- Specify the Track range to be played;

**Time (1-20)** -- Specify the time each track to be played.

### 4. Data CD Butterfly Seek

Check the seek function of the CDROM drive. It will perform a serial of seeking operations. First locate the minimum LBA address, then the maximum, the sub-minimum, the sub-maximum and meet at center point. This test needs a data CD.

### 5. Data CD Random Seek

Check the random seek function of CDROM drive. Random access will reflect the performance of the heads' random movement and seek. It tests 1000 times.

### 6. Data CD Sequence Seek

Check the sequential seek function of CDROM drive. Perform location test to CD-RW under LBA mode with the location address increasing in sequence.

### 7. CDRW Write Test

Check the write function of CDRW drive. The CDRW disk must be formatted with Direct CD format.

### 8. Tray Eject Test

Check the eject function of the CDROM. It will eject the CDROM and ask the user to confirm if operation success.

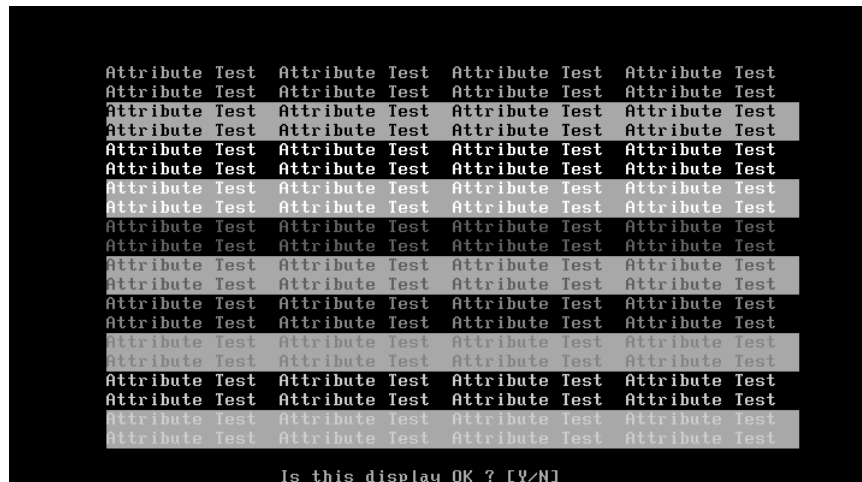


It would display the below texts of the different attributes in the screen

1. Text in normal attribute;
2. Text in blinking normal attribute;
3. Text in inverse attribute;
4. Text in blinking inverse attribute;
5. Text in hi-intensity attribute;
6. Text in blinking hi-intensity attribute;

Users need to check whether all texts displayed correctly in the above six attributes and key in the answer 'Y' or 'N' to the prompts 'Is this display OK? [Y/N]'.

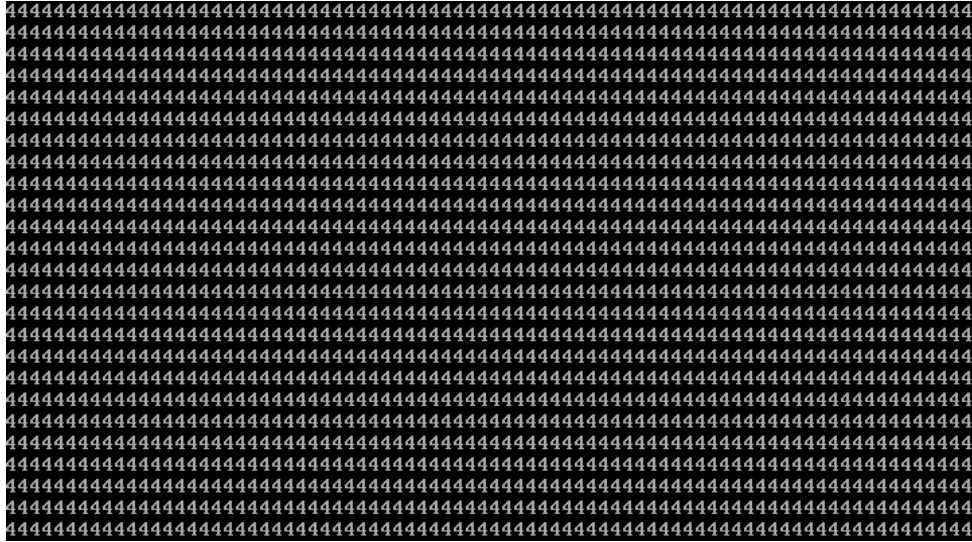
Below is the test screen of Text Attribute.



### 3. Text Page Selection

This test item is to check whether the video memory could be correctly written and read in VGA text mode. Based on the comparison of written data with read data, the program would report PASS or FAIL.





4. Text Color

This test item is to check whether all 16 colors foreground and all 8 colors background works normally in VGA text mode.

The bit4-6 of the attribute byte of a character defines 8 background colors (black, blue, green, cyan, red, brown, magenta, and light gray), and the bit0-3 defines 16 foreground colors (dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and white besides the above 8 colors).

In the test, user is required to respond based on the instruction in the screen.



5. 80 \* 25 Text Mode

This test item is to check whether 80\*25 Text Mode works normally.

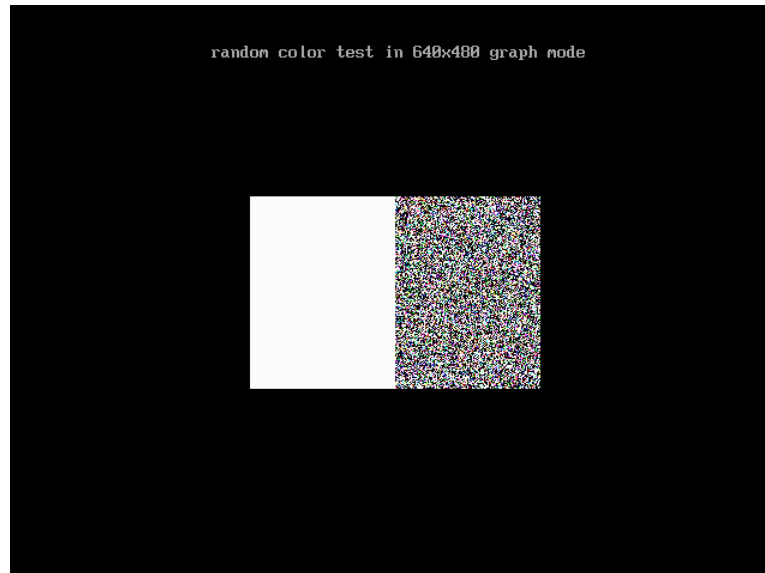
In the test, user is required to respond based on the instruction in the screen.



### Subtest 02 640 \* 480 VGA Mode

This test item is to check whether 680\*480 VGA Text mode works normally.

In the test, user is required to respond based on the instruction in the screen.

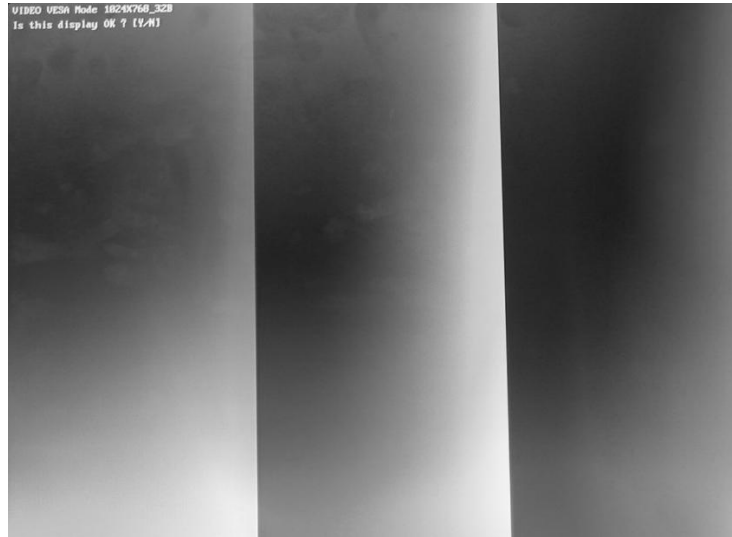


### Subtest 03 VESA Video Modes

This test item is to check whether all the video modes supported by the video card works normally.

In the test, user is required to respond following the instruction in the screen.

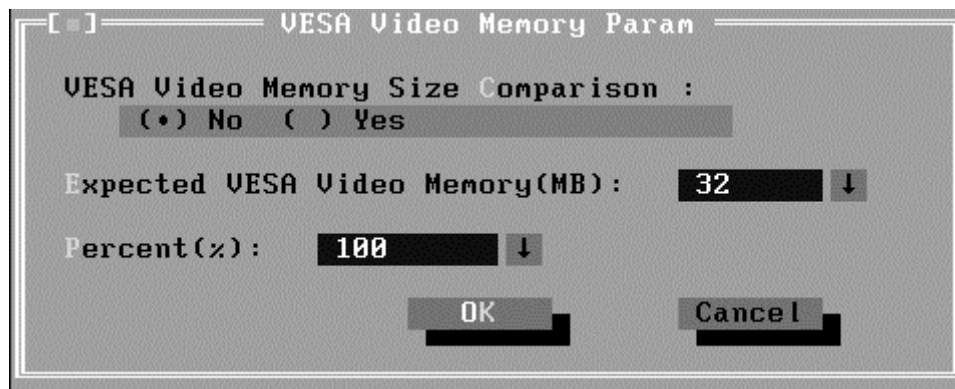
1. 640X480 Video Modes Test



2. 800X600 Video Modes Test
3. 1024X768 Video Modes Test
4. 1280 x1024 Video Modes Test
5. 1400 X1050 Video Modes Test
6. 1600 X1200 Video Modes Test

#### Subtest 04 VESA Video Memory

This test item is to check whether VESA video memory could be correctly accessed (write data & read data). Below is the test item's parameter dialog window:

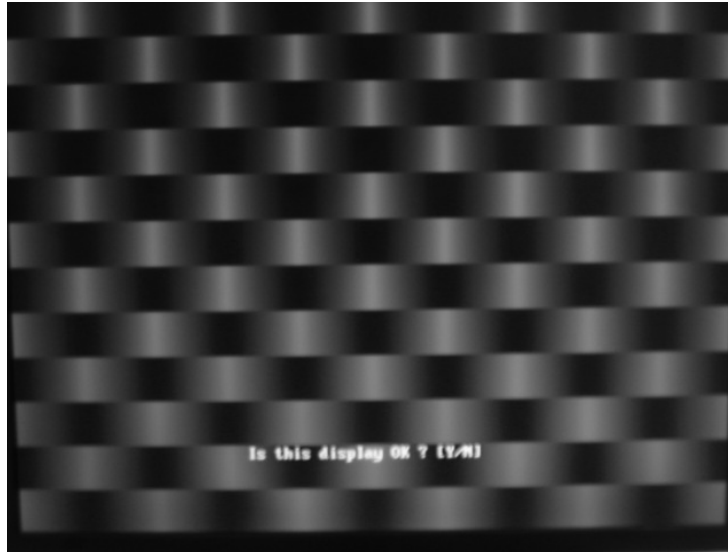


#### Subtest 05 AGP Test

This test item is to report the system's Accelerated Graphics Port status and check whether AGP registers works normally.

**Subtest 06 LCD Panel Test**

This test item is to check whether there is any fault in its resolution by displaying the RGB gradient color screens.

**Subtest 07 Register Test**

This test item is to check whether the registers of the video adapter works normally.

**Subtest 08 Color Purity Test**

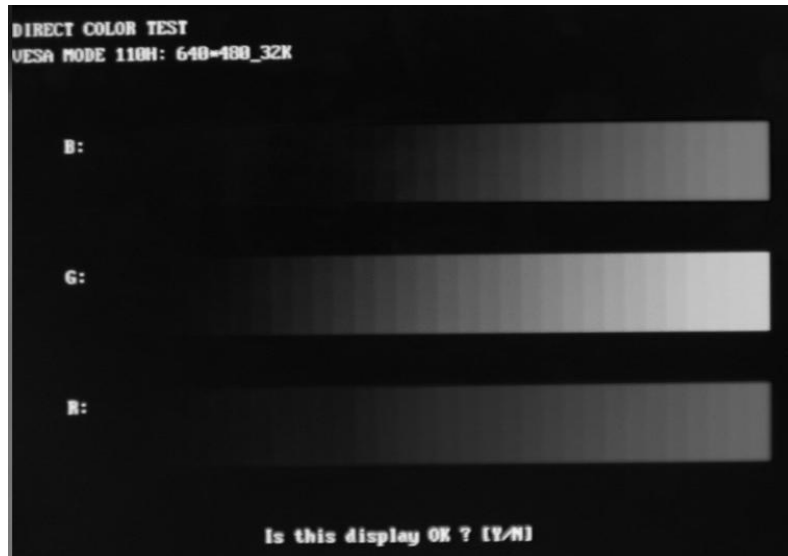
This test item is to check whether the system (the video adapter and the display) could display the purity color of red, green, blue, black and white.

In the test, user is required to respond based on the instruction in the screen.

**Subtest 9 Direct Color Test**

This test item is to check the video adapter's composing ability of direct color in high and true color mode.

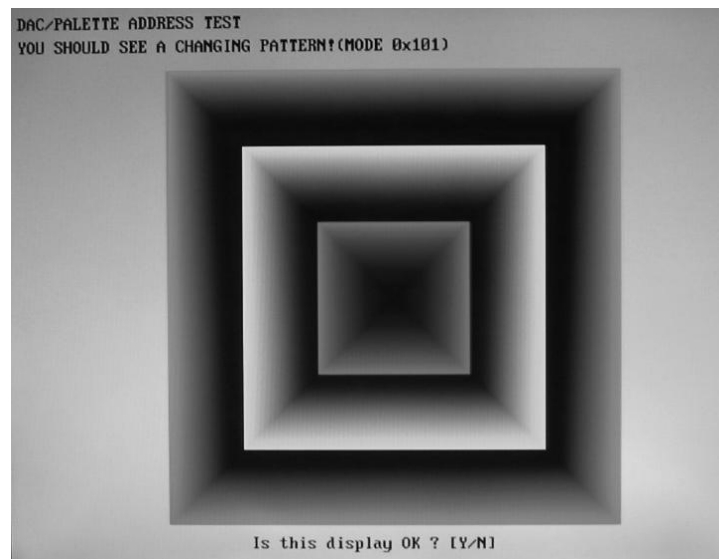
In the test, user is required to respond based on the instruction in the screen.



### Subtest 10 DAC/Palette Address

This test item is to check the function of DAC registers and Palette registers.

In the test, user is required to respond based on the instruction in the screen.



### Subtest 11 BitBlt Engine Test

This test item is to check whether the BitBlt engine works normally.

BitBlt is the abbreviation of 'Bit Block Translate', that means the copy of data block for 3 types, from video memory to video memory, from video memory to system memory, and from system memory to video memory.

What should be done is to write the data of the type of BitBLT operation and the location of BitBLT source area and destination area into the BitBLT registers, and all those operations will be completed automatically by BitBLT engine with minimum CPU intervention.

## 3.9 Communication (COMM)

### Subtest 01 LPT

This test item is to check whether there is open or short circuit issue in the external pins by looping back the external pins, controlling the voltage of each data pin, control pin and status pin.

The test requires an external connector to insert into the tested LPT port. Below is the connector's description.

Fixture Description:

(9) + PD7	_____	(15) -ERROR
(8) + PD6	_____	(14) -AUTFD
(7) + PD5	_____	(13)
(6) + PD4	_____	(16) -PINIT
(5) + PD3	_____	(1) - STROBE
	_____	(10) - ACK
(4) + PD2	_____	(12) + PE
(3) + PD1	_____	(17) - SLIN
(2) +PD0	_____	(11)+ BUSY

Note: (1)~(17) ----- Pin number

PD0~ PD7-----Data Line

**Status Line** ----- -ERROR(S3), +SELECT(S4), -ACK(S6), +PE(S5), +BUSY(S7)

**Control Line**----- -AUTFD(C1), -PINIT(C2), -STROBE(C0), -SLIN(C3)

#### 1. Register Check

Check whether the data register and control register works normally.

#### 2. IRQ Check

Check whether LPT interrupt works normally.

#### 3. External Loop back

Check whether there is open or short circuit issue.

#### 4. ECP Mode

Check whether it supports ECP (Extended Capabilities Port) feature.

5. Printer Check

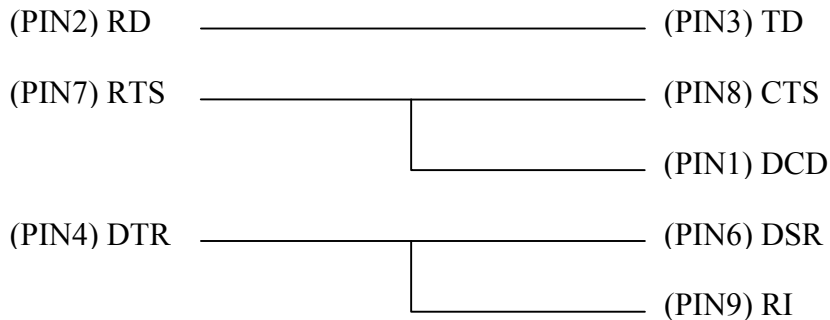
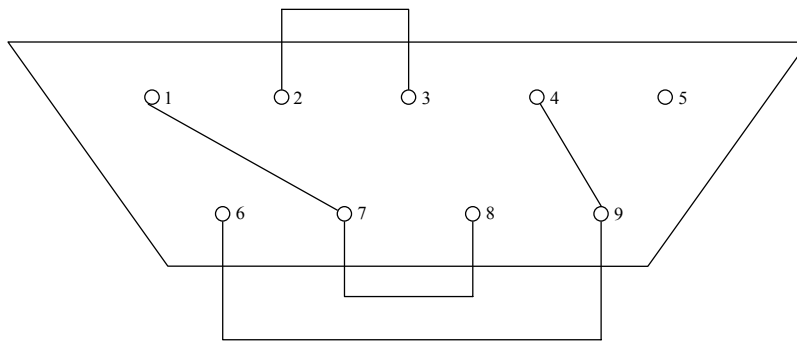
Check whether it could connect to a standard LPT printer and print out the text correctly. Here are some samples of LPT printers.

- HP DeskJet 200
- EPSON STYLUS COLOR 440
- EPSON STYLUS COLOR 460
- EPSON STYLUS C41SX
- EPSON EPL-5700 (LaserJet Printer)
- HP Laser jet 6P (Laser Jet Printer)

**Subtest 02 COM**

This test item shorts circuits in the external pins, to unite data sending and data receiving as self-shake and self-circle. Below is the external connector's description:

Fixture Status



1. Register Check

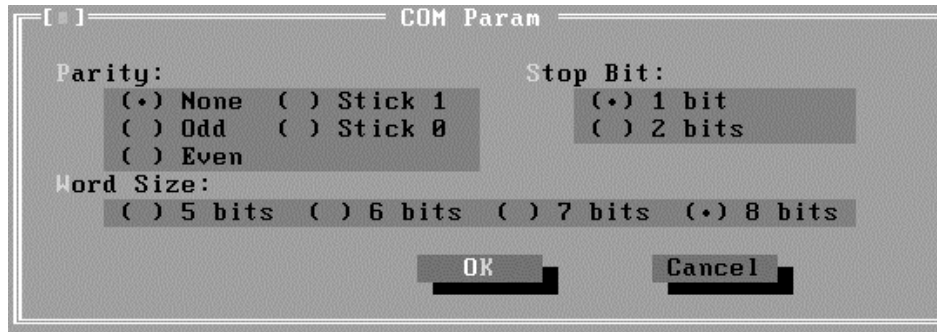


Check whether COM port register could be correctly accessed and works normally.

## 2. IRQ Check

Check the COM port's IRQ function.

Below is the parameter dialog window of the IRQ Check.



**Parity:** Choose the parity mode;

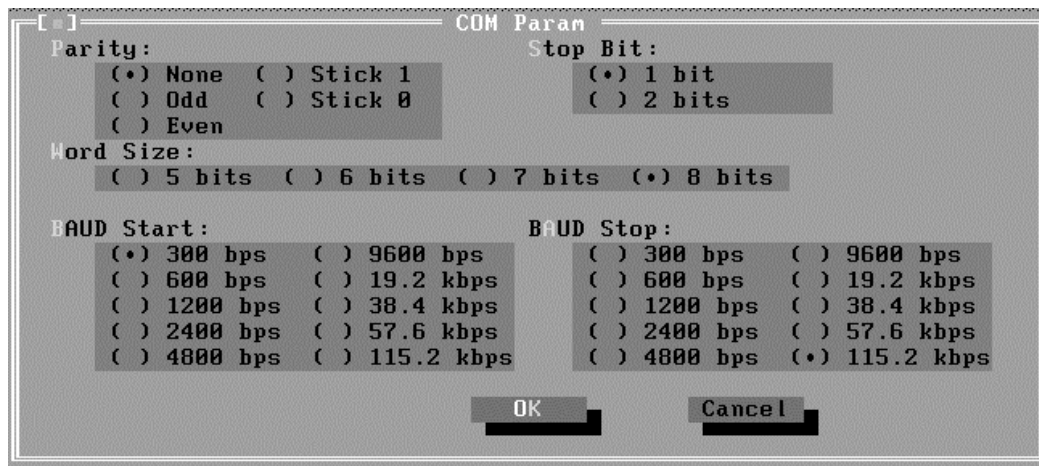
**Stop Bit:** Choose the stop bit;

**Word Size:** Choose the bit number in one word;

## 3. Internal Loop back

This test item is to check whether the COM port could correctly send and receive data at different transferring rate through internal cycle system.

Below is the parameter dialog window.



**Parity:** Choose the parity mode;

**Stop Bit:** Choose the stop bit;

**Word Size:** Choose the bit number in one word;

**Baud Start/End:** Select the start baud rate and end baud rate. All the baud rates between the start and end baud rate would be tested in the test.

4. External Loop back

This test item is to check whether there is no open circuit issue in the COM port.

The parameter dialog window is the same as that in '3. Internal Loop back'.

5. FIFO Test

Check whether FIFO works normally.

The parameter dialog window is the same as that in '2. IRQ Check'.

6. Parity Check

Verify whether the parity check in the COM port works normally.

7. Stop Bits Check

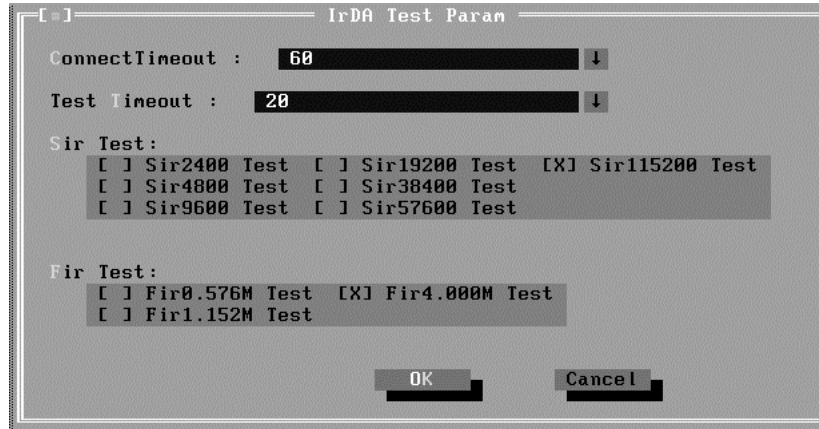
Verify whether the stop bits check in the COM port works normally.

8. Word Length Check

Verify whether the word length check in the COM port works normally.

**Subtest 03 IrDA**

This test item is divided into Fast IR (FIR) and Slow IR (SIR). FIR supports the transfer rates of 0.576Mbps, 1.152Mbps and 4.000Mbps; SIR supports the transfer rates of 2400bps, 4800bps, 9600bps, 19200bps, 38400bps, 57600bps, and 115200bps. The unit under testing (UUT) is called Slave, that requires a unit whose IrDA works normally (that is called Master) for transferring data between Slave and Master. Below is the parameter dialog window of IrDA test.



**Connect Timeout:** Define the time that slave connecting to master (in seconds);

**Test Timeout:** Define the time that testing each transfer rate(in seconds);

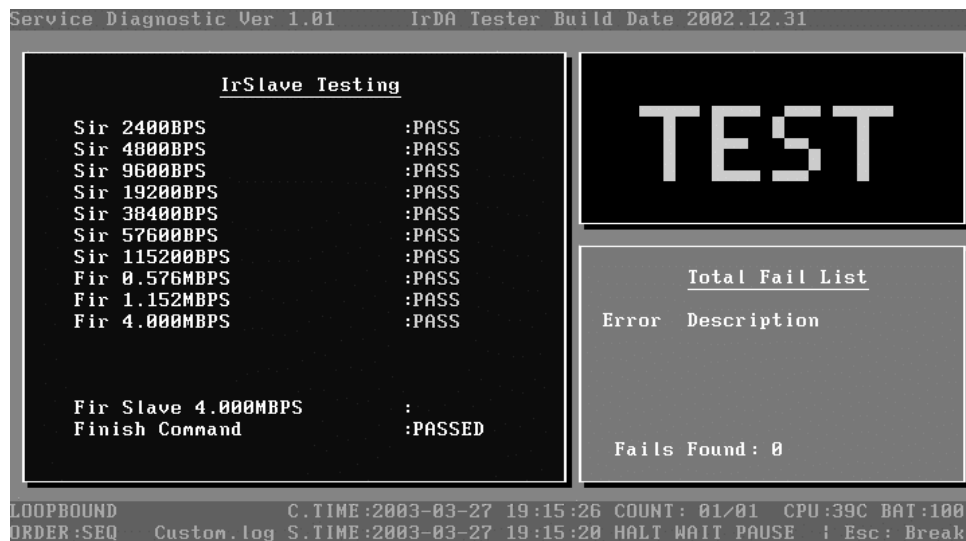
**SIR Test:** Choose the transfer rates to be checked in Slow IR;

**FIR Test:** Choose the transfer rates to be checked in Fast IR.

Below are the operation steps:

- ✧ Prepare a Master whose IrDA works normally, then run the test item in 'Comm/IrMaster' under Diagnostics menu; The master stays here to wait for slave requesting.
- ✧ Prepare a slave. User should choose the test item 'Comm/IrSlave' and set parameters.

Below is the Slave Testing window.



Below is the Master Testing window:

```

Service Diagnostic Ver 1.01      IrDA Tester Build Date 2002.12.31
-----
                IrMaster Testing
-----
IrMaster          :
5d 5e 5f 60 61 62 63 64 65 66
67 68 69 6a 6b 6c 6d 6e 6f 70
71 72 73 74 75 76 77 78 79 7a
7b 7c 7d 7e 7f 06 81 81 82 82
2b 2c 2d 2e 2f 30 31 32 33 34
35 36 37 38 39 3a 3b 3c 3d 3e
3f 40 41 42 43 44 45 46 47 48
49 4a 4b 4c 4d 4e 4f 50 51 52
53 54 55 56 57 58 59 5a 5b 5c

1 20 176
SIR Master 2400BPS      :
Get Data Head          :

Total Fail List
-----
Error  Description

Fails Found : 0

LOOPBOUND      C.TIME:2003-03-27 19:15:06 COUNT: 01/01 CPU:40C BAT:100
ORDER:SEQ      Custom.log S.TIME:2003-03-27 19:14:57 HALT WAIT PAUSE ; Esc: Break

```

#### Subtest 04 LAN Card

This test item is to check whether the module can detect the existence of the network card and display its related information.

1. Device ID Detection

Detect the device ID of the network card.

2. Vendor ID Detection

Detect the vendor ID of the network card.

3. MAC Address Detection

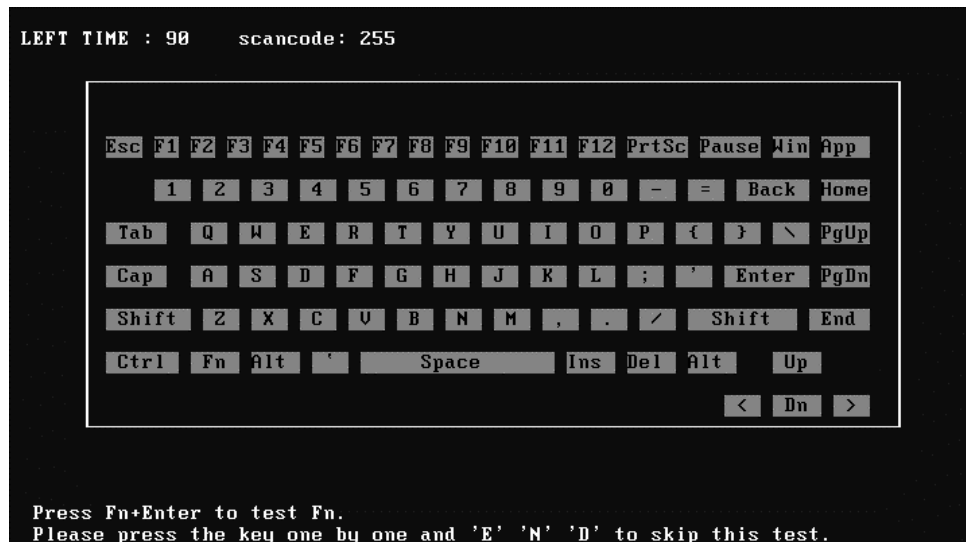
Detect the MAC address of the network card.

## 3.10 Peripheral

### Subtest 01 Keyboard

This test item is to check whether the keyboard works normally.

#### 1. Keyboard Map



This test item is to check whether each key in the keyboard works normally.

It requires user to press the key and check whether the key in the screen has been changed in color. User can terminate test by typing 'E', 'N', 'D'.

It should be noted that 'Fn' key must be tested by pressing together with 'Enter' key (while holding down 'Fn' key, press down 'Enter' key).

When the user has checked all the keys and all the keys in the screen have been changed in color, the diagnostics program would automatically ends the test and reports the pass information.

Whether keyboard test failure, program can terminated the test and report the fail information when it is time to timeout.

#### 2. Keyboard Clock Line Test

Check whether the keyboard clock line works normally

#### 3. Keyboard data Line Test

Check whether the keyboard data line works normally

## 4. Keyboard LED Test

Check whether the following LED on the unit works normally. It requires user to respond with the prompt instruction.

**1: AC Power LED**

**2: DC Power LED**

**3: Battery LED**

**4: HDD access LED**

**5: FDD LED**

**6: CAP/Number/Scroll LED**

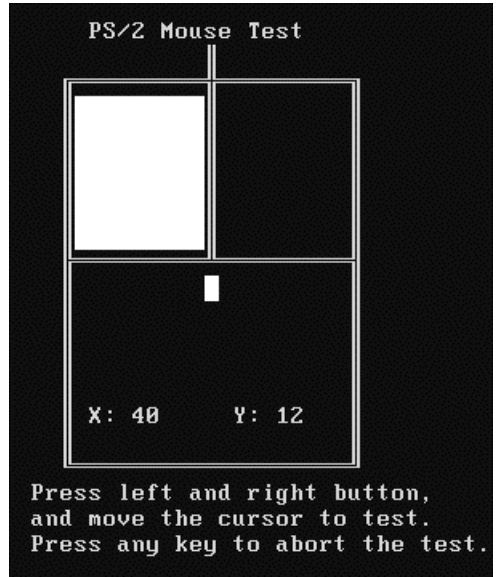
LED	1	2	3	4	5	6
Orange	No	Yes	Yes	No	Yes	No
Green	Yes	Yes	Yes	Yes	No	Yes

**Subtest 02 Mouse Test**

Check whether the point devices can work normally.

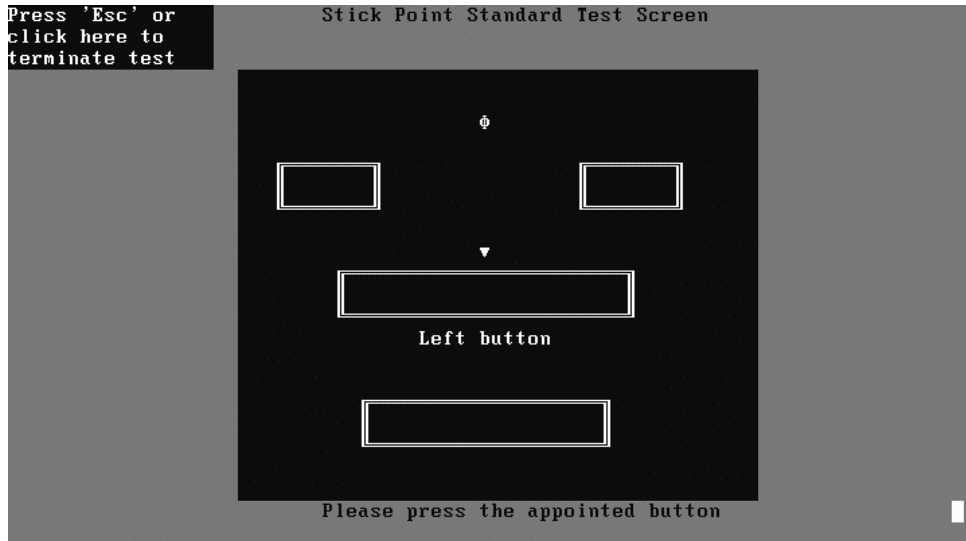
## 1. PS/2 Mouse

To test PS/2 mouse's functionality, user should insert a PS/2 mouse before booting the unit; At the below screen of PS/2 mouse test, user can press the left button, right button, and move the mouse to verify its functions.



2. Stick Point

This test item needs to be done by hand. When it draws a cursor on the screen, user needs to move the mouse and watch whether the cursor moves to the correct direction with the movement of the mouse.



### 3.11 Error Codes and description

The format of 'Error Code' is 'ddxee', and 'dd' is the device ID (1~2 chars), 'xx' is test function ID of device (2 chars), 'ee' is the error code of device (2 chars); the range of error code is from 01 to 99 in each device (the common error codes in all device are set to 99 and spanned).

Device	Error Code	Description	Cause	Action
<b>ddxx</b>	<b>ee</b>	<b>Common Error</b>		
	94	Interactive Mode Needed	The test is not under interactive mode.	Check whether the interactive test mode is adopted.
<b>01xx</b>		<b>CPU</b>		
	01	CPU General Function Error	The CPU General Function register is damaged.	Replace the CPU.
	02	CPU Arithmetic Error	The CPU Arithmetic Register is damaged.	As above.
	03	CPU Logic Error	The CPU Logic Register is damaged.	As above.
	04	CPU Type Error	The CPU Type is not supportable.	Check whether the CPU is Intel CPU.
	05	CPU Speed Error	The CPU speed differs from the expected value.	Check the CPU speed and the set expected speed.
	06	NPU General Function Error	The NPU arithmetic unit is damaged.	Replace the CPU.
	07	NPU Interrupt Error	The NPU is damaged.	As above.
	08	CPU Information Error	Information of the CPU can not be acquired.	Check whether the CPU is Intel CPU.
	09	Protected Instruction Error	The CPU is damaged.	Replace the CPU.
	10	Does not Support CPU Speedstep	The CPU does not support Speedstep.	Check whether the power change mode is correct.
	11	CPU Speedstep Power Change Error	The power mode is not correctly changed.	As above.
	12	CPU Speedstep Speed Change Error	The CPU frequency can not alternate normally with the change of power mode.	Confirm with the same type CPU.
	21	MMX Test Error	The CPU MMX register is damaged.	Replace the CPU.
<b>02xx</b>		<b>Memory</b>		



	01	Read Error	The ROM BIOS has Physical problems.	Test this unit on multiple machines.
	02	Write-Protect Error	The ROM BIOS has Physical problems.	As above.
	03	Base Memory Error Address	The test pattern read out from the base memory is different from the one that has been written in this address.	Test this memory chip on multiple machines.
	04	(XMS)Memory Problem	The test pattern read out from the extension memory is different from the one that has been written in this address.	As above.
	05	(XMS) Out Of Range	Wrong parameters setup.	Check and reset the parameters.
	06	Address Test Error	Interference between different address channels.	Test this memory chip on multiple machines.
	07	Toggle Bit Error	Errors with the timer chip.	As above.
	08	Interval Error	The acquired refreshing frequency is out of the estimated range.	Reset the estimated range.
	09	L1 Cache test Error	The pattern read out from the L1 Cache is different from the one that has been written in the same address.	Test this unit on multiple machines.
	12	Data Bus Error	Interference between different data channels.	As above.
	14	Speed Error	Failure during the transfer speed test.	As above.
<b>03xx</b>		<b>Board</b>		
	01	DMA Test Error	DMA channel can not transfer data normally.	Repeat multiple times. Whether there is always the same error, replace the board.
	04	Interval Timer Error	The difference between the actual precision of the interval timer and its theory value is out of the permitted range. The timer counts imprecisely.	As above.
	05	Periodic Faster Error	The frequency is beyond the standard.	As above.
	06	Periodic Slower Error	The frequency is below the standard.	As above.

	07	Update-ended Interrupt Error	R/W errors with the RTC refreshing interrupt controller.	As above.
	08	RTC Alarm Error	The PC speaker's sound source -- counter/timer 8253 can not produce corresponding timing signal.	As above.
	12	System Board Speaker Error	The Speaker can not sound normally.	Check the volume tuner.
	13	PCI Bus Error	No PCI.	Check the board.
	14	PCI Bus Scan Error	PCI test fails.	As above.
	15	PCI Device Access Error	PCI access fails.	As above.
	16	PCI Config Verification Error	Wrong PCI configuration.	Check PCI configuration on main board or PCI Device configuration.
	17	PCI to ISA Bridge Error	PCI-ISA bridge errors.	Repeat multiple times. If there is always the same error, replace the board.
	18	ESCD Error	ESCD errors.	As above.
	51	No Find RSDP	No RSDP is found.	Repeat multiple times. If there is always the same error, replace the board.
	52	Address Map Test Error	Errors with the Address Map test.	As above.
	53	ACPI Table Test Error	Errors with the ACPI table test.	As above.
<b>34xx</b>		<b>FAN</b>		
	01	Fan Slow Speed Test Fail	The fan slow speed test fails.	Check the FAN connection.
	02	Fan Stop Test Fail	The fan stop test fails.	As above.
	03	Fan Fast Speed Test Fail	The fan fast speed test fails.	As above.
<b>04xx</b>		<b>Video</b>		
	01	Text Attribute Error	Physical problems with the video card.	Check whether there is any physical problem with the video card.
	02	Text Page Selection Error	As above.	As above.
	03	Text Color Error	As above.	As above.
	04	Text Mode Error	As above.	As above.
	05	VGA Mode Error	1) Physical problems with the video card. 2) Physical problems with the monitor.	1) Check whether there is any physical problem with the video card. 2) Check whether there is any

				physical problem with the monitor.
	06	Character Test Error	Physical problems with the video card.	Check whether there is any physical problem with the video card.
	07	DAC/Palette Address Test Error	As above.	As above.
	08	Color Purity Test Error	Physical problems with the video card or the monitor.	Check whether there is any physical problem with the video card or the monitor.
	09	VESA Mode 15bits Direct Color Test Error	As above.	As above.
	10	VESA Mode 16bits Direct Color Test Error	As above.	As above.
	11	VESA Mode 24bits Direct Color Test Error	As above.	As above.
	12	Get the PCX graphics map Error	Failure in getting PCX graphics map.	Check for the PCX graphics map.
	13	Bitblt Engine Test Error	Physical problems with the video card.	Check and see whether the video card has any physical problem.
	14	VESA Video Memory Test Error	As above.	As above.
	15	VESA VRAM Test Error	Physical problems with the video card or the monitor.	Check whether there is any physical problem with the video card or the monitor.
	16	AGP Test Error	AGP configuration register errors.	Check and see whether the AGP video card has any physical problem.
	17	LCD Panel Test Error	Lower LCD color resolution.	Replace the LCD.
	19	Register Test Error	Physical problems with the video card.	Check and see whether the video card has any physical problem.
	20	Adapter not support DDC	The video card doesn't support DDC.	
	21	Monitor not support DDC	The monitor doesn't support DDC.	
	21	8bits Text and Attribute Test Error	1) Physical problems with the video card. 2) Physical problems with the monitor.	1) Check and see whether the video card has any physical problem. 2) Check and see whether the monitor has any physical problem.
	26	8bits Video Mode Test	As above.	As above.

		Error		
	27	15bits Video Mode Test Error	As above.	As above.
	28	16bits Video Mode Test Error	As above.	As above.
	29	24bits Video Mode Test Error	As above.	As above.
	30	32bits Video Mode Test Error	As above.	As above.
<b>31xx</b>		<b>Audio</b>		
	01	Audio Play Fail	Cannot play music.	Check the Audio connection, replace the external fixture, and repeat the test.
	02	Record Fail	Cannot record.	As above.
<b>11xx</b>		<b>LPT</b>		
	01	Data Register Error	The data register can not perform normally.	Check the external fixture and BIOS setup, and repeat the test.
	02	Control Register Error	The control register can not perform normally.	As above.
	03	Does not Support ECP Mode(Ver3.20)	LPT does not support ECP mode.	Check the BIOS setup, and repeat the test.
	04	FIFO Test Error	LPT cannot perform normally under FIFO TEST mode (ECP internal mode).	As above.
	05	IRQ Active Error	1.LPT IRQ cannot be activated. 2. The external fixture does not match with the chosen version.	Check the external fixture and BIOS setup, and repeat the test.
	06	No Fixture On The Port	No external fixtures on LPT port.	As above.
	09	CTR/STR Connection Error	1. There is OC (Open Circuit) or SC (Short Circuit) on the LPT port CTR/STR.2. The external fixture does not match with the chosen version.	Check the external fixture and the port pins, and repeat the test.
	10	DTR/STR Connection Error	As above.	As above.
	11	Toshiba Fixture Error	As above.	As above.
	12	No Paper	No papers in the printer.	Check for papers in the printer.

	13	OFF Line	No papers in the printer.	Check and see whether the printer is connected to the computer.
	14	Power OFF	No papers in the printer.	Check and see whether the printer is supplied with power.
	15	No Printer Found.	Unrecognizable printer type.	Test with another type of printer.
	16	Line Trouble	Line problems or other with the printer.	Check for the printer on LPT, make sure it's correctly connected.
<b>12xx</b>		<b>COM</b>		
	01	DLL Test Error	The DLL register of COM PORT does not perform normally.	1) Try with other test software. 2) Replace the SUPER IO chip.
	02	DLM Test Error	The DLM register of COM PORT does not perform normally.	As above.
	03	LCR Test Error	The LCR register of COM PORT does not perform normally.	As above.
	04	IER Test Error	The IER register of COM PORT does not perform normally.	As above.
	05	MCR Test Error	The MCR register of COM PORT does not perform normally.	As above.
	06	Transmit Buffer Empty Over Time Error	COM PORT data transfer out of time.	As above.
	07	Data Ready Over Time Error	COM PORT data receive out of time.	1) Check for the external fixture on COM PORT. 2) Try with other test software. 3) Replace the SUPPER IO chip.
	08	IRQ3 Not Happen Error	The COM PORT interrupt occupying IRQ3 can not be recognized by the system.	1) Try with other test software. 2) Replace the SUPER IO.
	09	IRQ4 Not Happen Error	The COM PORT interrupt occupying IRQ4 can not be recognized by the system.	As above.
	10	Transmit Buffer Empty Interrupt Error	The Transmit Buffer Empty Interrupt can not be invoked.	As above.
	11	Data Receive Ready Interrupt Error	The Data Receive Ready Interrupt can not be invoked.	1) Check for the external fixture on the COM PORT; 2) Try with other test software; 3) Replace the SUPPER IO chip.

	12	Modem Status Change Interrupt Error	The Modem Status Change Interrupt cannot be invoked.	As above.
	13	FIFO Disable Over Time Error	1) UART version is below 16550 and does not support FIFO. 2) COM PORT FIFO does not perform normally.	1) Whether the COM PORT does not support FIFO, this test should be ignored. 2) Check for the external fixture on the COM PORT; 3) Try with other test software; 4) Replace the SUPPER IO chip.
	14	FIFO Cannot Enable Error	As above.	As above.
	15	FIFO Touch off Over Time Error	As above.	As above.
	16	Data Received Check Error	The Data Receive Check of COM PORT does not perform normally.	1) Check for the external fixture on the COM PORT; 2) Try with other test software; 3) Replace the SUPPER IO chip.
	17	Data Receive Error	The Data Receive of COM PORT does not perform normally.	1) Try with other test software; 2) Replace the SUPPER IO chip.
	18	RTS-CTS Connection Test Error	There is OC with the RTS-CTS pins.	1) Check whether the external fixture of correct version is connected. 2) Try with other test software; 3) Replace the SUPPER IO chip.
	19	DTR-DSR Connection Test Error	There is OC with the DTR-DSR pins.	As above.
<b>08xx</b>		<b>LAN Card</b>		
	01	PCI bus Error during device ID test	Don't Scan PCI device	Don't support PCI BIOS
	02	PCI Ethernet card not present during device ID test	Don't find Net card	Please insert Net cad
	03	Intel PCI Ethernet card not present during MAC test	Don't found Net Card, This Card can't be Read MAC by this method	Please update netcard or use other method
<b>09xx</b>		<b>Keyboard</b>		
	01	Keyboard Map & Stroke Test Fail	Keyboard Map & Stroke Test fails.	Check the KBD connection and repeat the test.
	02	LED Flash Test Fail	LED Flash test fails.	As above.
	03	Clock Line Test Fail	Clock Line Test fails.	As above.

	04	Data Line Test Fail	Data Line Test fails.	As above.
<b>05xx</b>		<b>Mouse</b>		
	04	PS2 Mouse Test Fail	PS2 Mouse Test fails.	Replace the mouse.
		Stick Point Test Fail	Stick Point Test Fail	Check the mouse connection and repeat the test.
<b>14xx</b>		<b>IrDA Test</b>		
	01	2400BPS Test Error	Failure with the infrared port or the configuration program is not executed.	Rerun the configuration program or check the infrared port.
	02	4800BPS Test Error	As above.	As above.
	03	9600BPS Test Error	As above.	As above.
	04	19200BPS Test Error	As above.	As above.
	05	38400BPS Test Error	As above.	As above.
	06	57600BPS Test Error	As above.	As above.
	07	115200BPS Test Error	As above.	As above.
	08	0.576MBPS Test Error	As above.	As above.
	09	1.152MBPS Test Error	As above.	As above.
	10	4.000MBPS Test Error	As above.	As above.
	11	Connect time out	Failure with the infrared port or the configuration program is not executed.	Rerun the configuration program or check the infrared port. Check the master.
<b>20xx</b>		<b>IDE-HDD</b>		
	01	Get Parameter Fail !	Wrong test parameters are input by user.	Reinput the correct parameters.
	02	Write Pattern Error	HD is damaged.	Send the HD for repair.
	03	Data Compare Error	HD is damaged.	As above.
	04	Read Verify Error	HD is damaged.	As above.
	05	Seek Error	HD is damaged.	As above.
	06	Disk Controller Self Test Failed	The HD controller is damaged.	As above.
	07	Disk Controller Test unexpected interrupt Failed	The HD controller is damaged.	As above.
	09	Disk Controller action Test Failed	The HD controller is damaged.	As above.
	10	Disk dos not support SMART	Disk dos not support SMART	Change HD which supported SMART and test again
	11	Disk read attribute threshold error	Disk read attribute threshold error	Send the HD for repair.

	12	Disk read attribute value error	Disk read attribute value error	As above.
	13	Disk SMART attribute value error	Disk SMART attribute value error	As above.
<b>21xx</b>		<b>IDE-CDROM</b>		
	01	No Disk in CDROM	No disk is found in the CD-ROM.	Insert a disk into the CD-ROM.
	02	The Disk in CDROM is not Data Disk	The disk in the CD-ROM is not Data Disk.	Insert a DATA CD.
	03	IDE-CD Controller Error	Functional errors with the CD-ROM.	Send the CD-ROM for repair.
	04	CD Read Error	Either the disk or the CD-ROM is damaged.	Replace the disk or send the CD-ROM for repair.
	05	The Disk in CDROM is not Audio-CD	The disk in the CD-ROM is not Audio-CD.	Insert an Audio-CD.
	06	Audio-CD Play Error	Errors with the Audio-CD playing.	Replace the Audio-CD or send the CD-ROM for repair.
	07	CD Seek Error	Either the disk or the CD-ROM is damaged.	Replace the disk or send the CD-ROM for repair.
	08	The Disk in CDROM is not CD-RW	The Disk in CDROM is not CD-RW	Replace a CD-RW disk with Direct CD format or send the CD-ROM for repair.
	09	Eject Error	Wrong CD-ROM drive.	Exit from the wrong drive.





### 3.12 Quick Test Item List

Device	Test Items	Comment
CPU	Basic Functionality	
	NPU Basic Functions	
	CPU Information	
Memory	BIOS ROM	
	Cache Memory	
	Bit Stuck High Test	10%
	Bit Stuck Low Test	10%
	Address Test	
Board	Interval Timer	
	Clock / Calendar	
	ACPI Test	
FAN	FAN Speed	
Video	1024X768 Video Modes Test	
	VESA 1024x768x64K Mode	
	VESA 1024x768x32bit Mode	
	VESA Video Memory	5%
	Color Purity Test	
	Direct Color Test	
	LCD Panel	
HDD	Sequential/Random R/W	25%
	SMART Check	
LAN Card	Device ID Detection	
	Vendor ID Detection	
	Mac Address Detection	
LPT	IRQ Check	Fixture
	External Loop back	Fixture
COM	IRQ Check	Fixture
	Internal Loop back	Fixture
	External Loop back	Fixture

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## **Chapter 4**

# **Replacement Procedures**

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## Chapter 4 Contents

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4.1	General.....	4-1
	Safety Precautions.....	4-2
	Before You Begin.....	4-4
	Disassembly Procedures.....	4-5
	Assembly Procedures.....	4-5
	Tools and Equipment.....	4-6
	Screw Tightening Torque.....	4-6
	Colors of Screw Shanks.....	4-7
	Symbols of Screws on the Computer Body.....	4-7
	Symbol examples.....	4-7
	Removing the Battery Pack.....	4-8
	Installing the Battery Pack.....	4-10
	Removing the Optional PC Card.....	4-10
	Installing the Optional PC Card.....	4-11
	Removing the Optional Memory.....	4-12
	Installing the Optional Memory.....	4-14
	Removing the MDC Card.....	4-15
	Installing the MDC Card.....	4-16
4.2	HDD.....	4-17
	Removing the HDD.....	4-17
	Installing the HDD.....	4-19
4.3	Selectable Bay Modules.....	4-20
	Removing the Selectable Bay Module.....	4-20
	Installing the Selectable Bay Module.....	4-21
	Disassembling the DVD-ROM Drive.....	4-22
	Assembling the DVD-ROM Drive.....	4-23
4.4	Switch Cover.....	4-24
	Removing the Switch Cover.....	4-24

	Install the Switch Cover.....	4-25
4.5	Keyboard.....	4-26
	Removing the Keyboard.....	4-26
	Installing the Keyboard.....	4-28
4.6	Wireless LAN Card.....	4-29
	Removing the Wireless LAN Card.....	4-29
	Installing the Wireless LAN Card.....	4-30
4.7	Speakers.....	4-31
	Removing the Speakers.....	4-31
	Installing the Speakers.....	4-32
4.8	Display Mask.....	4-33
	Removing the Display Mask.....	4-33
	Installing the Display Mask.....	4-36
4.9	FL Inverter Board.....	4-37
	Removing the FL Inverter Board.....	4-38
	Installing the FL Inverter Board.....	4-40
4.10	LCD Modules.....	4-39
	Removing the 14.1-inch LCD Module.....	4-39
	Installing the 14.1-inch LCD Module.....	4-42
4.11	Top Cover.....	4-43
	Removing the Top Cover.....	4-43
	Installing the Top Cover.....	4-45
4.12	RTC Batteries.....	4-47
	Removing the RTC Battery.....	4-48
	Installing the RTC Battery.....	4-48
4.13	Power Supply Board.....	4-49
	Removing the Power Supply Board.....	4-49
	Installing the Power Supply Board.....	4-49
4.14	Sound Board.....	4-50
	Removing the Sound Board.....	4-50
	Installing the Sound Board.....	4-51
4.15	Cooling Module.....	4-52

	Removing the Cooling Module.....	4-52
	Installing the Cooling Module .....	4-53
4.16	CPU.....	4-55
	Removing the CPU .....	4-55
	Installing the CPU.....	4-56
4.17	System Board.....	4-58
	Removing the System Board .....	4-58
	Installing the System Board.....	4-59
4.18	Membrane Switch.....	4-60
	Removing the Membrane Switch.....	4-60
	Installing the Membrane Switch.....	4-60
4.19	Samsung 14.1-inch FL.....	4-61
	Removing the Samsung 14.1-inch FL tube.....	4-61
	Installing the Samsung 14.1-inch FL tube .....	4-68
4.20	Toshiba 14.1-inch FL.....	4-69
4.21	Sharp 14.1-inch FL .....	4-82

## Figures

Figure 4-1	Battery lock .....	4-8
Figure 4-2	Removing the battery pack .....	4-9
Figure 4-3	Removing the PC card .....	4-11
Figure 4-4	Removing the memory cover .....	4-12
Figure 4-5	Removing the optional memory .....	4-13
Figure 4-6	Removing the MDC cover .....	4-15
Figure 4-7	Removing the MDC card .....	4-16
Figure 4-8	Removing the HDD cover .....	4-18
Figure 4-9	Removing the HDD pack .....	4-19
Figure 4-10	Removing the HDD bracket .....	4-19
Figure 4-11	Removing the selectable bay module .....	4-21
Figure 4-12	Removing the connector from the DVD-ROM drive .....	4-23
Figure 4-13	Removing the frame from the DVD-ROM drive .....	4-24
Figure 4-14	Removing the Switch cover .....	4-25
Figure 4-15	Removing the Switch Cover .....	4-26
Figure 4-16	Removing the screws .....	4-27
Figure 4-17	Removing the keyboard .....	4-28
Figure 4-18	Removing the wireless LAN card cover .....	4-30
Figure 4-19	Removing the wireless LAN card .....	4-31
Figure 4-20	Removing the speakers .....	4-32
Figure 4-21	Removing the speakers .....	4-33
Figure 4-22	Removing the display mask .....	4-34
Figure 4-22-01	Removing the display mask step (1) .....	4-35
Figure 4-22-02	Removing the display mask step (2) .....	4-35
Figure 4-22-03	Removing the display mask step (3) .....	4-35
Figure 4-22-04	Removing the display mask step (4) .....	4-35
Figure 4-22-05	Removing the display mask step (5) .....	4-36
Figure 4-22-06	Removing the display mask step (6) .....	4-36
Figure 4-22-07	Removing the display mask step (7) .....	4-36



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Figure 4-22-08 Removing the display mask wrong step (1).....	4-37
Figure 4-22-09 Removing the display mask wrong step (2).....	4-37
Figure 4-22-10 Removing the display mask wrong step (3).....	4-37
Figure 4-23 Removing the FL inverter board.....	4-38
Figure 4-24 Disconnecting the cables.....	4-39
Figure 4-25 14.1-inch LCD module and screws.....	4-40
Figure 4-26 Removing LCD Panel Holder Screw.....	4-41
Figure 4-27 Removing LCD Latch Holder Screw.....	4-42
Figure 4-28 Removing LCD/FL Cable Connector.....	4-42
Figure 4-29 Removing the screws from the bottom and back of the computer.....	4-44
Figure 4-30 Removing the top cover.....	4-45
Figure 4-31 Removing the RTC battery.....	4-48
Figure 4-32 Removing the power supply board.....	4-49
Figure 4-33 Removing the sound board.....	4-50
Figure 4-34 Removing the cooling module.....	4-52
Figure 4-35 Applying silicon greases.....	4-53
Figure 4-36 Removing the CPU.....	4-55
Figure 4-37 Installing the CPU.....	4-56
Figure 4-38 Fixing the CPU.....	4-57
Figure 4-39 Removing the selectable bay cover, HDD case, and cable for DC jack.....	4-58
Figure 4-40 Removing the system board.....	4-59
Figure 4-41 Removing the membrane switch.....	4-60
Figure 4-42 Removing the PCB cover and tape.....	4-61
Figure 4-43 Removing the two screws for fixing the power supply board.....	4-62
Figure 4-44 Releasing the 18 hooks.....	4-63
Figure 4-45 Removing the panel assembly.....	4-64
Figure 4-46 Removing the clips and backlight sheets.....	4-65
Figure 4-47 Removing the screws for fixing the FL tube back cover.....	4-66
Figure 4-48 Disconnecting the FL tube ground wire.....	4-66
Figure 4-49 Removing the FL tube.....	4-67
Figure 4-50 Removing the tape and insulation sheet.....	4-69
Figure 4-51 Removing the screws.....	4-70

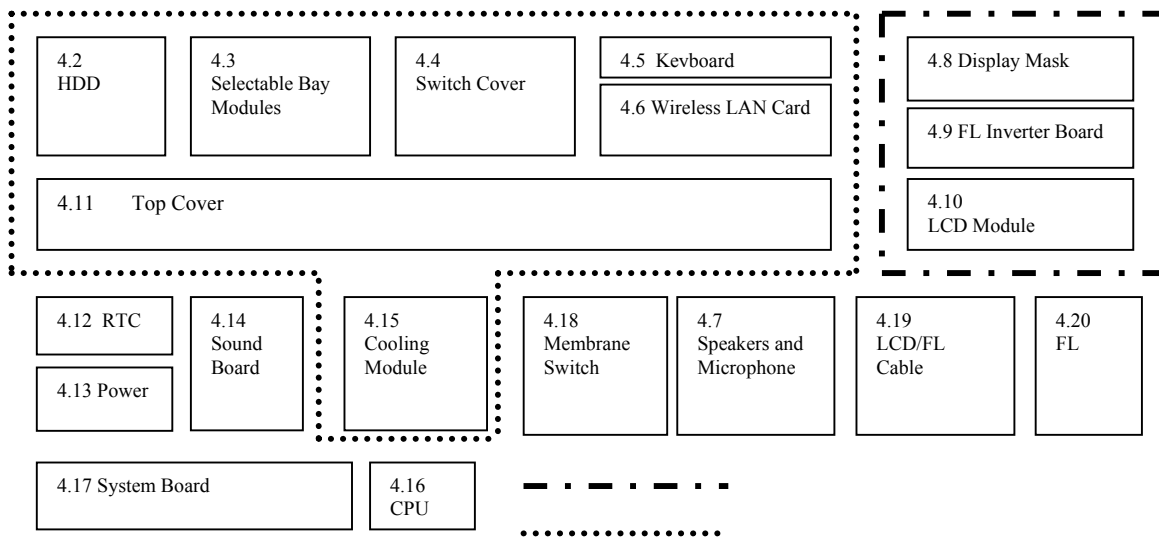
Figure 4-52 Removing the double-sided tape.....	4-71
Figure 4-53 Spreading out the PCB horizontally.....	4-72
Figure 4-54 Removing the cell of the PCB assembly.....	4-73
Figure 4-55 Attaching double-sided tape to the bezel's reverse side.....	4-74
Figure 4-56 Inspecting the replacement backlight.....	4-75
Figure 4-57 Removing the paper coated with a mold release.....	4-77
Figure 4-58 Folding down the TAB .....	4-78
Figure 4-59 Aligning the bezel .....	4-79
Figure 4-60 Fixing the bezel.....	4-80
Figure 4-61 Attaching the insulation sheet and tape .....	4-81
Figure 4-62 Removing the protective cover and tape .....	4-82
Figure 4-63 Removing the screws from the sides.....	4-83
Figure 4-64 Removing the clips close to the lamp .....	4-83
Figure 4-65 Removing the bezel.....	4-84
Figure 4-66 Removing the lamp cover .....	4-84
Figure 4-67 Replacing the lamp unit .....	4-85
Figure 4-68 Attaching the bezel.....	4-86
Figure 4-69 Fastening the screws on both sides .....	4-86
Figure 4-70 Attaching the protective cover and tapes.....	4-87
Figure 4-71 Visual inspections .....	4-88





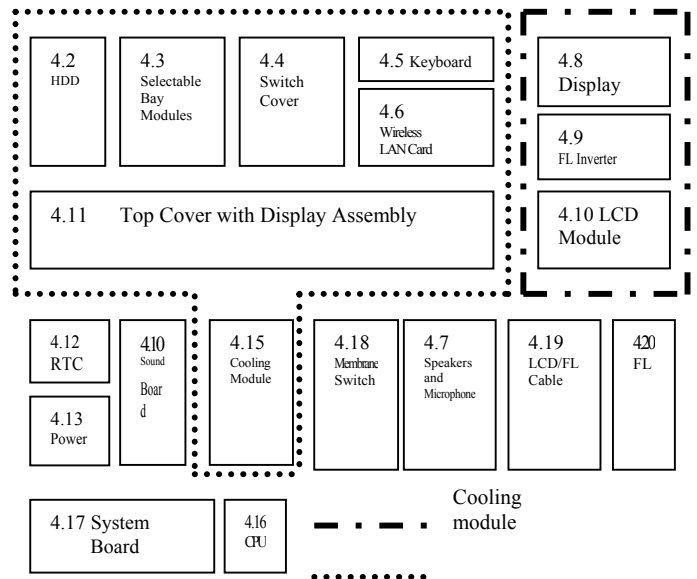
## 4.1 General

This chapter explains how to disassemble the computer and replace Field Replaceable Units (FRUs). Some replacement procedures may not require you to remove all the surrounding FRUs to replace only one FRU. The chart below shows the FRUs in the order in which they should be removed in a top-down manner, irrespective of their physical locations. The FRUs shown in the top area of the chart should normally be removed before removing the FRUs shown in the bottom area. To replace the FRUs, first identify the suspect FRU for the system failure. Next, according to this chart, determine the FRUs that need to be removed before removing the suspect FRU. After you determined those FRUs, go to the appropriate sections according to the section numbers shown in the boxes. Then start removal and replacement.



How to use the chart (two examples):

- For removing the Cooling Module  
First, remove the top cover with the display assembly. Then, remove the HDD, selectable bay module, switch cover, keyboard, and wireless LAN card, all of which are shown above the top cover with the display assembly.
- For removing the LCD Module  
First, remove the display mask and FL inverter board, both of which are shown above the LCD module.



## Safety Precautions

Before you begin disassembling, read the following safety precautions carefully. Be sure to follow them while you are working.

### **DANGER:**

1. *Always use the genuine batteries or replacement batteries authorized by Toshiba. Batteries other than those differ in specifications and are incompatible with the computer. They may burst or explode. Never heat or disassemble the battery packs to avoid leakage of alkaline solutions. Never throw the battery packs into a fire. If this is violated, they will explode.*
2. *The components such as the power supply and FL inverter carry high voltages. When you partially disassemble the computer and turn on the components, use extreme care not to touch the connectors and components to avoid the risk of electrical shock. Do not disassemble individual components during first-level maintenance.*

### **WARNING:**

1. *To avoid the risk of electrical shock, turn the computer off and remove the AC adapter from the electrical outlet.*
2. *Because the battery in the computer is left charged, the risk of electrical shock remains even after the AC adapter is removed from the electrical outlet. To avoid the risk of electrical shock, be sure to put off any metal jewelry or accessories such as necklaces, bracelets, and rings before starting work. Never work with your hands wet or damped.*
3. *To avoid personal injury, use care to the sharp edges or corners of the components.*

**CAUTION:**

1. *Before replacing a component, make sure that the replacement component meets the required specifications. To avoid computer failures, never use components that do not meet the specifications.*
2. *To avoid internal damage such as short circuits and fire, never drop metal objects such as screws, pins, paper clips, etc. into the components. When a screw is removed, be sure to replace a screw that is the same size as the original screw. Make sure that all the screws are fastened securely. Loose screws can cause short circuits, overheating, smoke, or fire.*
3. *Before raising an FRU or other component, make sure that all the component cables have been disconnected to avoid the risk of electrical shock caused by accidental contact with the energized components.*
4. *For AC input, be sure to use the AC adapter and AC power cable that come with your computer or Toshiba-recommended equivalents.*
5. *To avoid the risk of electrical shock, make sure that all the replacement components meet the specifications of the computer and that all the cables and connectors are fastened securely.*
6. *Inside the PC are components that become hot during operation (such as the CPU and cooling module). To avoid burns, let the hot components cool down before starting inspection or repair task.*

## Before You Begin

Before you begin disassembling the computer, keep in mind the precautions and advice in this section. Always begin disassembling from removing the AC adapter and battery pack. Remove the optional parts and accessories as well. The procedures for removing the batteries will be explained later.

Disassemble the computer only when an abnormality has occurred.

Use only the recommended tools.

To run and store the computer, be sure to prepare a working environment that is free from:

- Dust and contaminants
- Static electricity
- Extremely high or low temperatures and extremely high humidity

Run the diagnostic tests explained in Chapter 2 of this manual to identify the FRU that has probably caused the system failure.

Perform only the required machine operations. Use only the disassembly and reinstallation procedures described in this manual.

Place the removed components in a safe place away from the computer so that they may not be damaged or get in the way of you doing your work.

Normally, a number of screws need to be removed or replaced during disassembling. Place the removed screws in a safe place so that you can easily find the right screws for the right components.

When assembling the computer, use the specified screws to fasten the parts to the specified locations. See the appropriate explanations and figures for screw sizes.

To avoid personal injury, use care to handle components that have sharp edges or corners.

After you have replaced an FRU, check that the FRU works correctly to ensure normal computer operation.



## Disassembly Procedures

The cable connectors come in these two basic types:

- Pressure plate connectors
- Normal pin connectors

To remove a pressure plate connector, pull up the tabs on either side of the connector's plastic pressure plate and gently pull the cable out of the connector. To reconnect the cable to the pressure plate's connector, raise the pressure plate up to a satisfactory height and slide the cable into the connector. Fix the cable to the correct position by pressing down the sides of the pressure plate so that the plate can be flush with the sides of the connector. Grasp and pull the cable gently to check that the cable is connected firmly. If the cable came off the connector, reinsert the cable by raising the pressure plate up to a satisfactory height.

Normal pin connectors are used for all the other types of cables. These connectors can be installed or removed by simply inserting them or pulling them out.

## Assembly Procedures

You have to reassemble the computer after you disassembled the computer and fixed the component that caused the problem.

When reassembling the computer, keep the following general guidelines in mind:

- Take your time to carry out the suggested instructions completely. Hurried reassembling can often cause problems.
- Check that all the cable and connectors are fastened securely.
- Before fixing the FRUs or other parts, check that the cables are not caught by the screws or FRUs.
- Check that all the latches are closed securely.
- Check that all the required screws are used to fix the FRUs. Using wrong screws can damage the threads or heads of the screws or does not ensure firm FRU fixing.

After installing an FRU, make sure that the FRU and computer can work normally.

## Tools and Equipment

For the safety of you and other people in the working environment, it is strongly recommended to use electrostatic discharge (ESD) equipment. The proper use of this equipment will ensure successful repair work and reduce the costs for fixing damaged components. The equipment and tools required for disassembling and reassembling are:

- One 2 mm Phillips screwdriver
- One 4 mm flat-blade screwdriver
- One 4 mm LHSTIX screwdriver
- Tweezers (for pulling out screws)
- ESD mats (for the floor and work desks)
- An ESD wrist strap or heel grounder
- Anti-static carpets or flooring
- Air ionizers (for highly electrostatic sensitive areas)
- A plastic card (in credit card size)

## Screw Tightening Torque

To fasten screws, follow the torque values listed below. Overtightening can damage components and screws. Undertightening can loosen the fastening or make screws come off, which may result in short circuits or other damage.

- |  |                        |
|--|------------------------|
| <input type="checkbox"/> M2 (2 mm)               | 0.22 N·m (2.2 kgf·cm)  |
| <input type="checkbox"/> M2.5 (2.5 mm)           | 0.36 N·m (3.5 kgf·cm)  |
| <input type="checkbox"/> M3 (3 mm)               | 0.51 N·m (5.0 kgf·cm)  |
| <input type="checkbox"/> LCD screws              |                        |
| - By DTI   | 0.153 N·m (1.5 kgf·cm) |
| - By Sharp                                       | 0.092 N·m (0.9 kgf·cm) |
| - By Samsung                                     | 0.153 N·m (1.5 kgf·cm) |
| <input type="checkbox"/> M2.5x4 PSP TITE screws  | 0.204 N·m (2.0 kgf·cm) |
| <input type="checkbox"/> M2.5x6 GIZA TITE screws | 0.36 N·m (3.5 kgf·cm)  |

### Colors of Screw Shanks

For easy identification of the correct screws, the screw shanks are colored according to their lengths, as follows:

- Screws of an even-numbered length      Brown
  - Screws of an odd-numbered length      White
  - Screws of a special length      Blue
- Screws of a special length are those of a length having decimal places, such as 2.5 mm and 2.6 mm.

### Symbols of Screws on the Computer Body

For easy maintenance, the screw types are shown on the computer body as symbols. A symbol consists of a letter representing the screw type and a numeral representing the screw length.

- |  |  |
|--|--|
| <input type="checkbox"/> Screw type            | Letter   |
| <input type="checkbox"/> Bind screw            | B (stands for bind)                                |
| <input type="checkbox"/> Flat-head screw       | F (stands for flat-head)                           |
| <input type="checkbox"/> Super flat-head screw | S (stands for super flat-head)                     |
| <input type="checkbox"/> Tapping screw         | T (stands for tapping)                             |
| <input type="checkbox"/> LHSTIX screw          | *  |
| <input type="checkbox"/> Other screws          | U (stands for unique-pan head screws, studs, etc.) |

### Symbol examples

- 6 mm bind screw      B6
  - 12 mm bind screw      B12
  - 5 mm stud      U5
- (The numeral represents the rounded length of the threaded portion irrespective of the entire stud length.)

## Removing the Battery Pack

Remove the battery pack according to the following procedures and Figures 4-1 and 4-2.

**CAUTION:** When handling the battery packs, use care not to short circuit the terminals. Do not drop, hit, twist, or bend the battery packs. Do not scratch or break up their casing.

1. Turn the computer upside down so that its front can face you.
2. Slide out the battery lock.

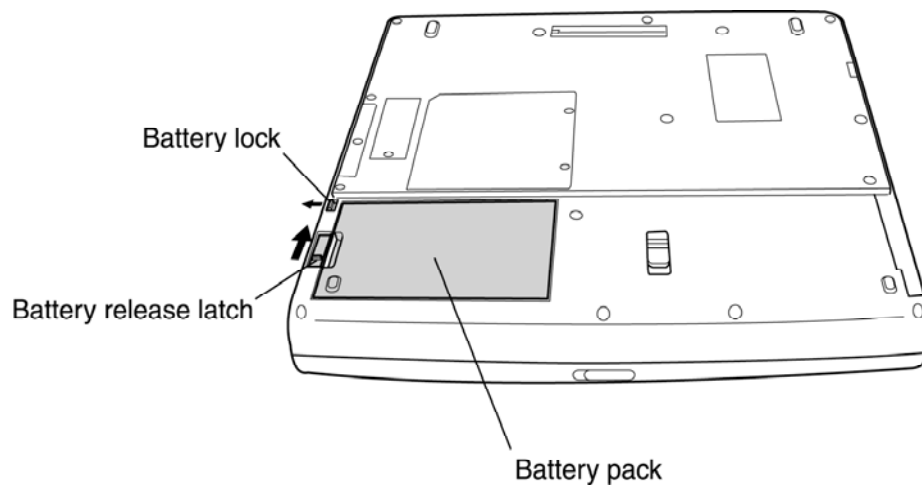
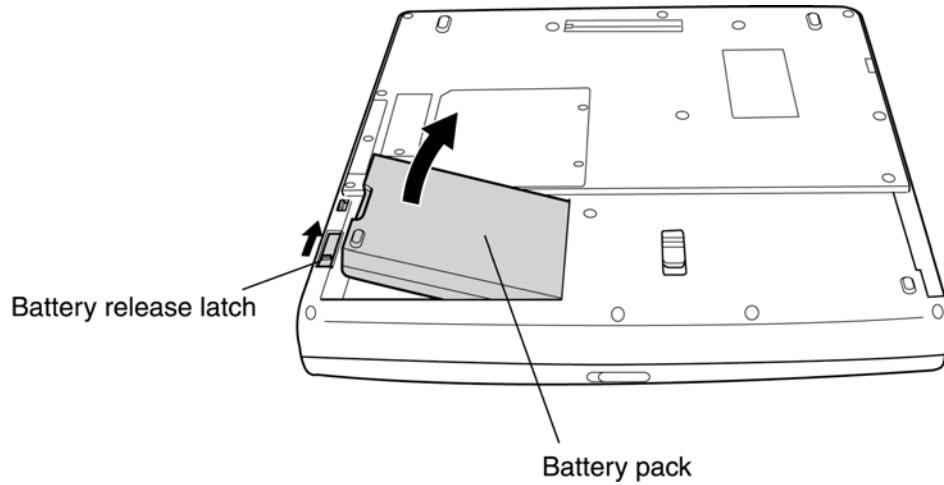


Figure 4-1 Battery lock

3. Slide the battery release latch and remove the battery pack from the computer.

**NOTE:** Dispose of the used battery packs as required by local ordinances or regulations.



*Figure 4-2 Removing the battery pack*

## Installing the Battery Pack

Install the battery pack according to the following procedures and Figures 4-1 and 4-2.

**CAUTION:** *The battery packs contain a lithium ion battery, which can explode by improper replacement, use, handling, or disposal. Always dispose of the battery packs as required by local ordinances or regulations. Use only replacement batteries recommended by Toshiba.*

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

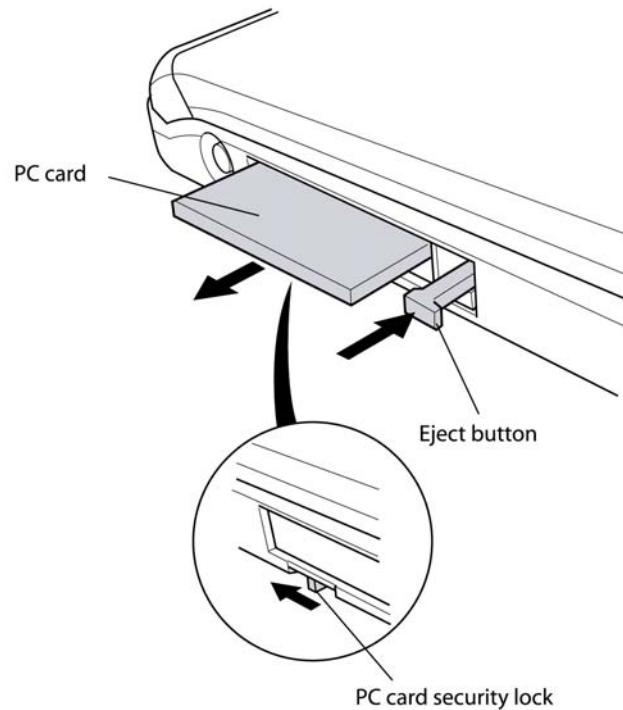
1. Gently insert a new or recharged battery pack into place. Check that the battery release latch slides in and stops with a click.
2. Slide in the battery lock.

## Removing the Optional PC Card

Remove the optional PC card according to the following procedures and Figure 4-3, after checking that computer is turned off in boot mode.

**CAUTION:** *Install or remove the PC card correctly, according the manuals of the PC card and the operating system you are using.*

1. Unlock the PC card by sliding the PC card security lock.
2. Push the eject button for the PC card to be removed until it stops and release the button.
3. When the eject button popped out slightly, push it again.
4. When the PC card popped out, grasp it and pull it out.



*Figure 4-3 Removing the PC card*

### **Installing the Optional PC Card**

Install the optional PC card according to the following procedures and Figure 4-3, after checking that the computer is turned off in boot mode.

1. Insert the PC card gently until it stops and is seated securely.
2. After checking that the PC card is seated securely, push the PC card release lever slightly.
3. Lock the PC card by sliding the PC card security lock.

After the PC card is installed, check the hardware configuration in the Hardware Setup or TSETUP program to make sure that the PC card is compatible with the current hardware configuration.

## Removing the Optional Memory

Remove the optional memory (module) according to the following procedures and Figures 4-4 and 4-5, after checking that the computer is turned off in boot mode.

**CAUTION:** Remove the optional memory after turning off the computer. If this is violated, the computer or memory can be damaged.

1. Turn the computer upside down.
2. Remove the two M2.5x4 white bind screws.
3. Remove the memory cover.

**CAUTION:** Do not touch the connectors on the memory modules or in the computer. Contaminated connectors can cause memory access problems.

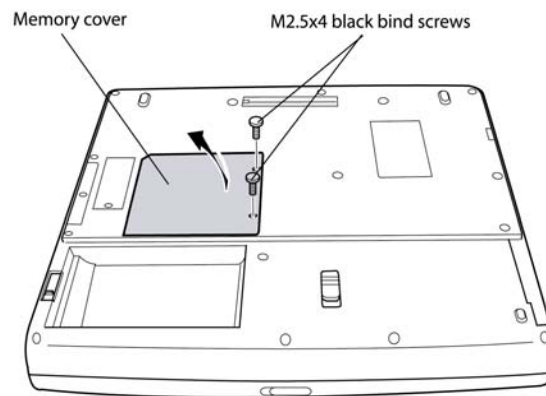


Figure 4-4 Removing the memory cover



4. Spread out the two memory lock stoppers so that the memory module can be raised.
5. Pull the memory module up and out at an angle, using care to the connectors.

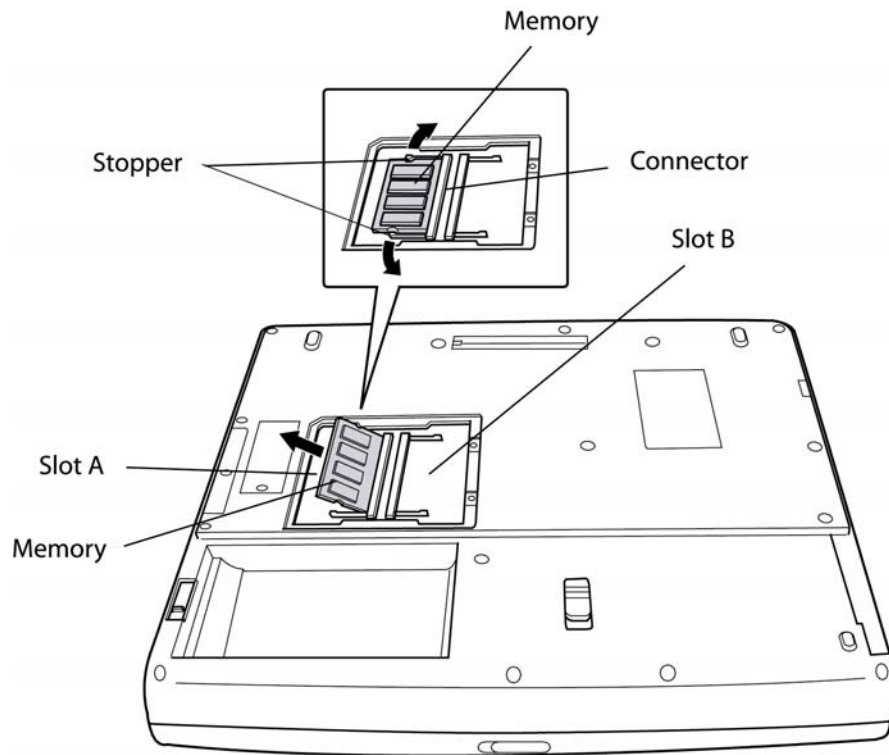


Figure 4-5 Removing the optional memory

## Installing the Optional Memory

Install the optional memory (module) according to the following procedures and Figures 4-4 and 4-5, after checking that the computer is turned off in boot mode.

**CAUTION:** *Install the optional memory after turning off the computer. If this is violated, the computer or memory can be damaged.*

1. Insert the memory module into the connector at an angle of 45 degrees.
2. Tilt the memory module so that it can be fixed with both memory lock stoppers.
3. Reinstall the memory cover.
4. Fasten the cover with the two M2.5x4 white bind screws.

After the computer is turned on, check the hardware configuration in the Hardware Setup or TSETUP program to make sure that the installed memory module has been recognized by the system. If it has not been recognized yet, check the connections.

**CAUTION:** *To prevent system malfunctions, always use Slot A first to insert the memory modules.*

## Removing the MDC Card

Remove the MDC Card (Modem Daughter Card) according to the following procedures and Figures 4-6 and 4-6, after checking that the computer is turned off in boot mode.

**CAUTION:** Remove the MDC card after turning off the computer. If this is violated, the computer or MDC card can be damaged.

1. Turn the computer upside down.
2. Remove one M2.5x4 black bind screw.
3. Remove the MDC cover.

**CAUTION:** Do not touch the connectors on the MDC card or in the computer. Contaminated connectors can cause MDC card failures.

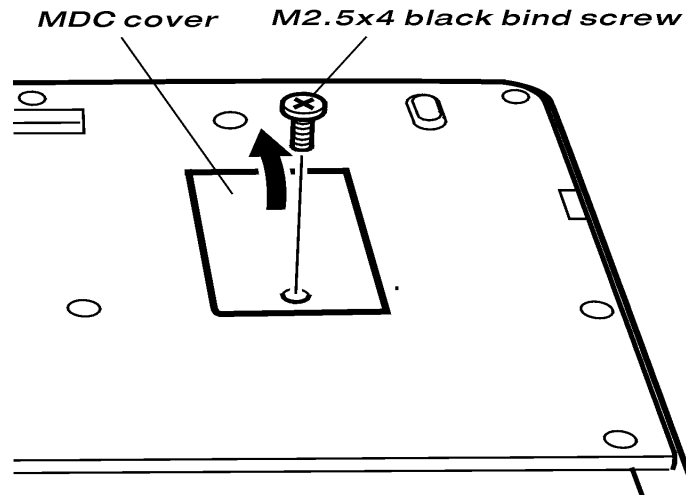


Figure 4-6 Removing the MDC cover

4. Remove the two M2.2x4 white bind screws for fixing the MDC card.
5. Raise the MDC card and disconnect it from CN501.
6. Disconnect the MDC cable from the connector PJ1 on the MDC card.

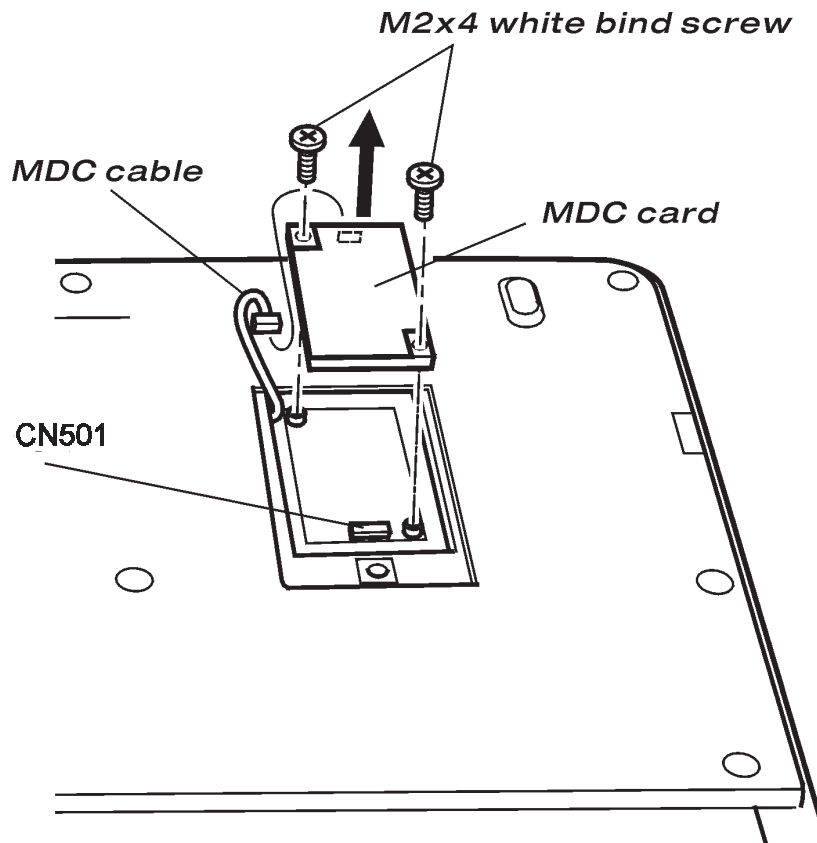


Figure 4-7 Removing the MDC card

## Installing the MDC Card

Install the MDC card according to the following procedures and Figures 4-6 and 4-7, after checking that the computer is turned off in boot mode.

**CAUTION:** *Install the MDC card after turning off the computer. If this is violated, the computer or MDC card can be damaged.*

**CAUTION:** *Do not touch the connectors on the MDC card or in the computer. Contaminated connectors can cause MDC card failures.*

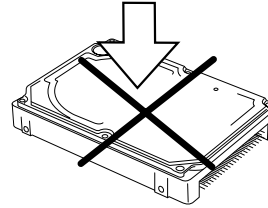
1. Connect the MDC cable to the connector PJ1 on the MDC card.
2. Connect the MDC card to CN501 on the system board.
3. Fix the MDC card with the two M2.2x4 white bind screws.
4. Install the MDC cover.
5. Fix the MDC cover by fastening one M2.5x4 white bind screw.

After the computer is turned on, check the hardware configuration in the Hardware Setup or TSETUP program to make sure that the installed MDC card has been recognized by the system. If it has not been recognized yet, check the connections.

## 4.2 HDD

### Removing the HDD

**CAUTION:** Do not press the top or bottom of the drive. Applying such pressure can corrupt the data in the drive or damage the drive.



Remove the HDD (hard disk drive) according to the following procedures and Figures 4-8, 4-9, and 4-10.

1. Remove one M2.5x6 black bind screw for fixing the HDD cover.
2. Remove the HDD cover by sliding it in the direction of the arrows.

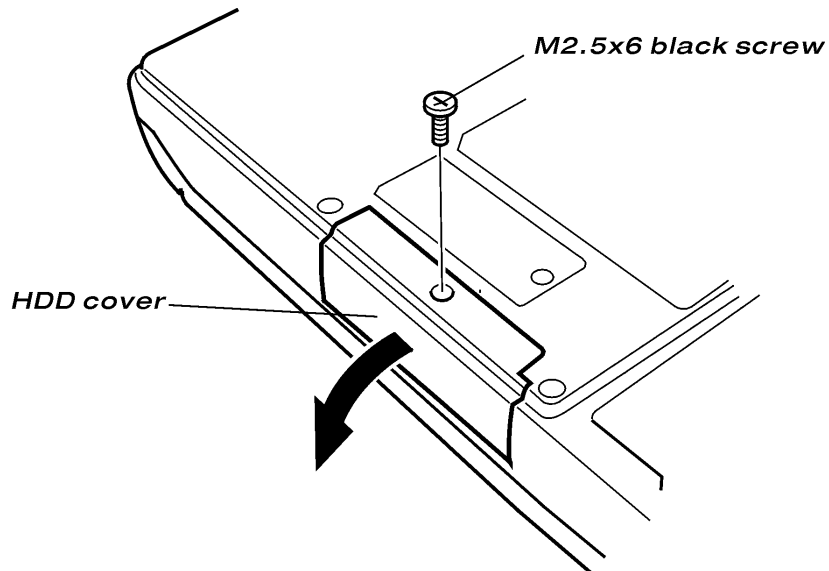


Figure 4-8 Removing the HDD cover

3. Remove the HDD pack by pulling the white vinyl grip attached to the HDD pack. Use care not to touch the connectors.

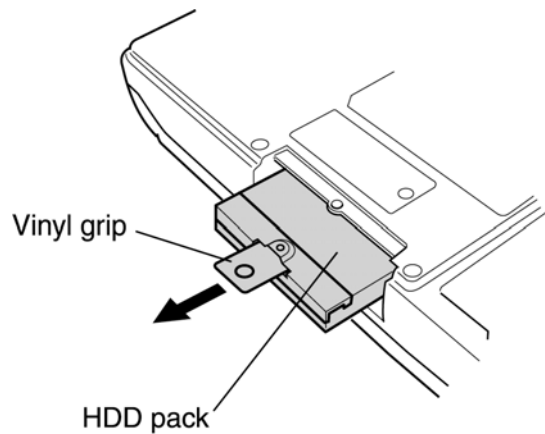


Figure 4-9 Removing the HDD pack

**NOTE:** Do not disassemble the HDD pack when it is working normally. Disassemble or replace the HDD pack only if it failed.

4. Place the HDD pack on a flat surface (such as a desk), and remove the two M3x4 white flat-head screws.
5. Remove the HDD bracket.

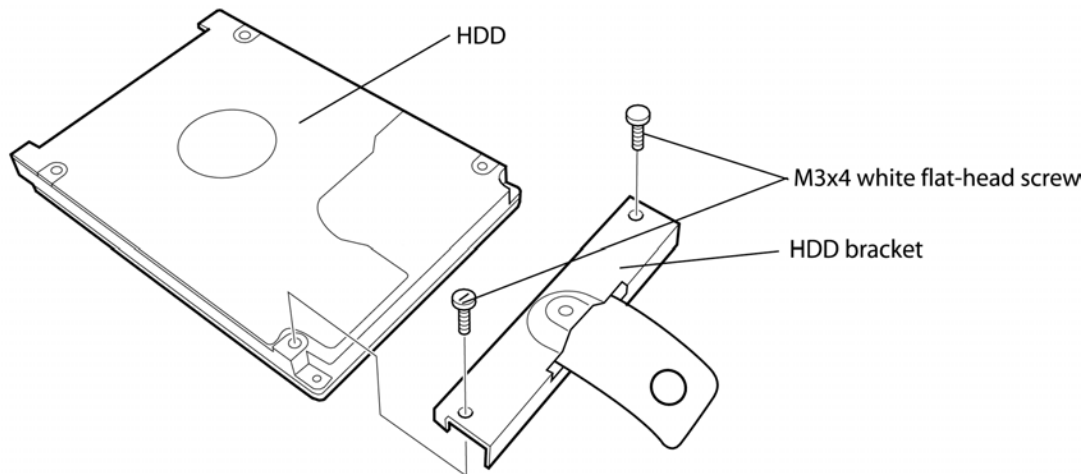


Figure 4-10 Removing the HDD bracket

**CAUTION:** Do not apply pressure to the top or bottom of the drive.

## Installing the HDD

Install the HDD according to the following procedures and Figures 4-8, 4-9, and 4-10.

**CAUTION:** To avoid damage, always hold the HDD only by its sides.

1. Attach the HDD bracket and white plastic grip to the HDD pack.
2. Fix the HDD and its bracket with the two M3x4 black flat-head screws.

**CAUTION:** When installing the HDD pack into the computer, do not press the center of the HDD pack to prevent the HDD bracket from being distorted. Always hold the HDD pack by its sides.

3. Install the HDD pack into the correct position in the computer. Connect the HDD pack to the computer, holding the HDD pack by its sides.
4. Insert the white plastic grip into the gap between the computer and HDD pack, and install the HDD cover.
5. Fix the HDD cover with one M2.5x6 black bind screw.



## 4.3 Selectable Bay Modules

### Removing the Selectable Bay Module

**NOTE:** The installation and removal procedures are the same for all the modules that can be installed in the selectable bays. See the appropriate sections for the disassembly procedures of the specific modules.

Remove the selectable bay module according to the following procedures and Figure 4-11.

1. Turn the computer upside down.
2. When the lock screw is in the locked position, remove the lock screw and attach it to the hole for temporarily retaining the lock screws.
3. By sliding the release lever in the direction of the arrow, pull out the selectable bay module in the direction of the arrow.

For removing the selectable bay cover, see the explanations of "Disassembling the CD-ROM Drive."

**CAUTION:** Handle the selectable bay module carefully, because it becomes hot during operation.

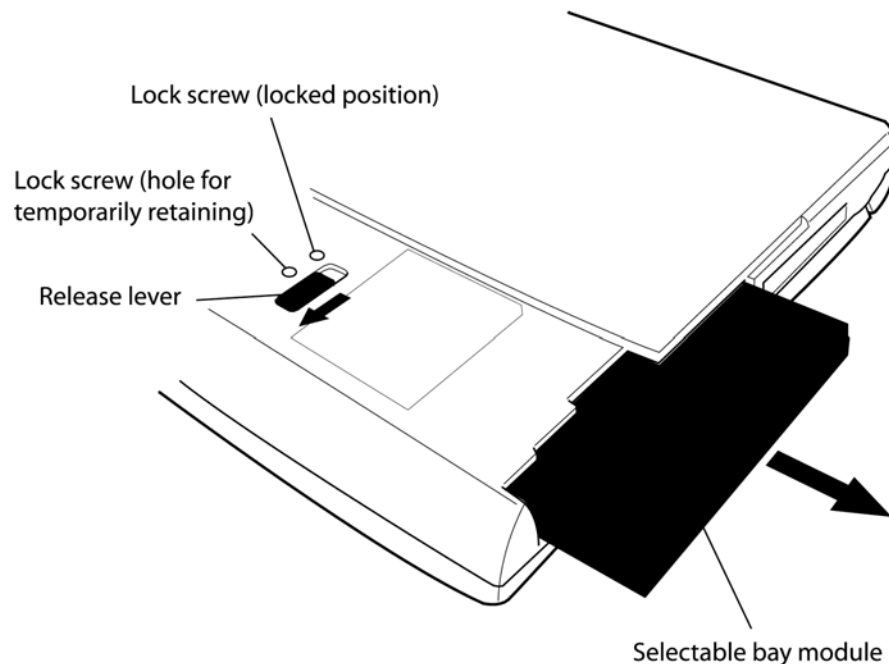


Figure 4-11 Removing the selectable bay module

### **Installing the Selectable Bay Module**

Install the selectable bay module according to the following procedures and Figure 4-11.

1. Place the selectable bay module in the correct position and slide it in.
2. Push it until it clicks into place.

## Disassembling the DVD-ROM Drive

**NOTE:** Do not disassemble the DVD-ROM drive when it is working normally. Disassemble or replace the DVD-ROM drive only if it failed.

Disassemble the DVD-ROM drive according to the following procedures and Figures 4-12 and 4-13.

1. Remove the two **M2x8 black bind screws**.
2. Remove the **connector cover** and **connector** from the DVD-ROM drive.

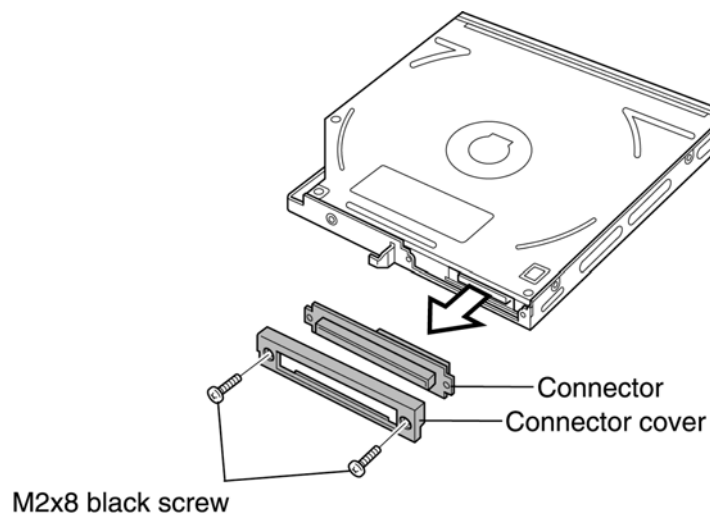


Figure 4-12 Removing the connector from the DVD-ROM drive

3. Remove the five **M2x3 white super flat-head screws**.
4. Remove the **frame**.

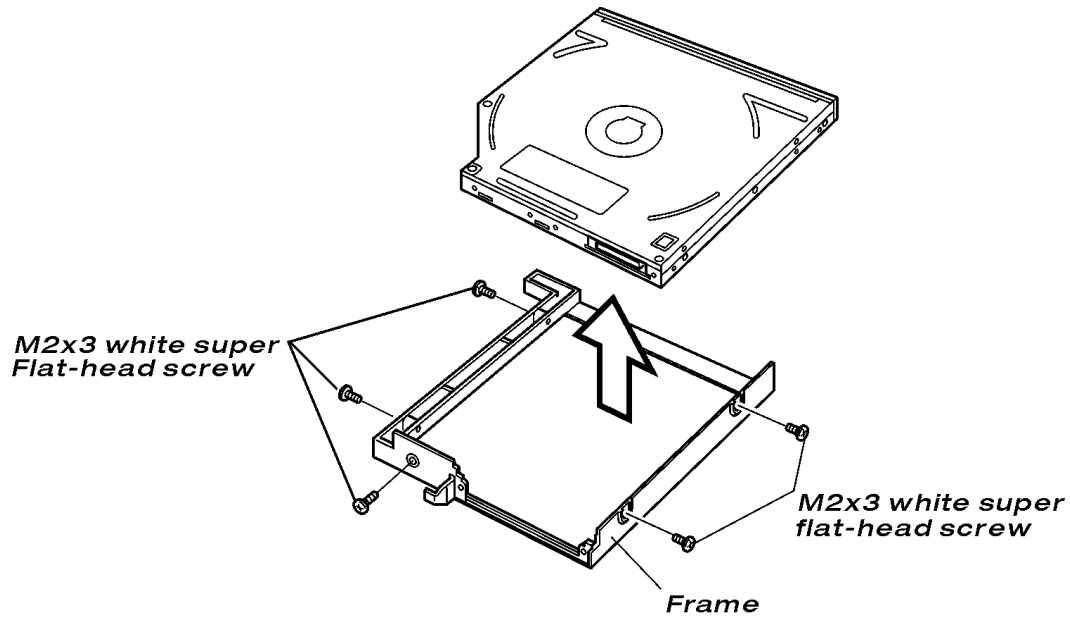


Figure 4-13 Removing the frame from the DVD-ROM drive

### Assembling the DVD-ROM Drive

Assemble the DVD-ROM drive according to the following procedures and Figures 4-12 and 4-13.

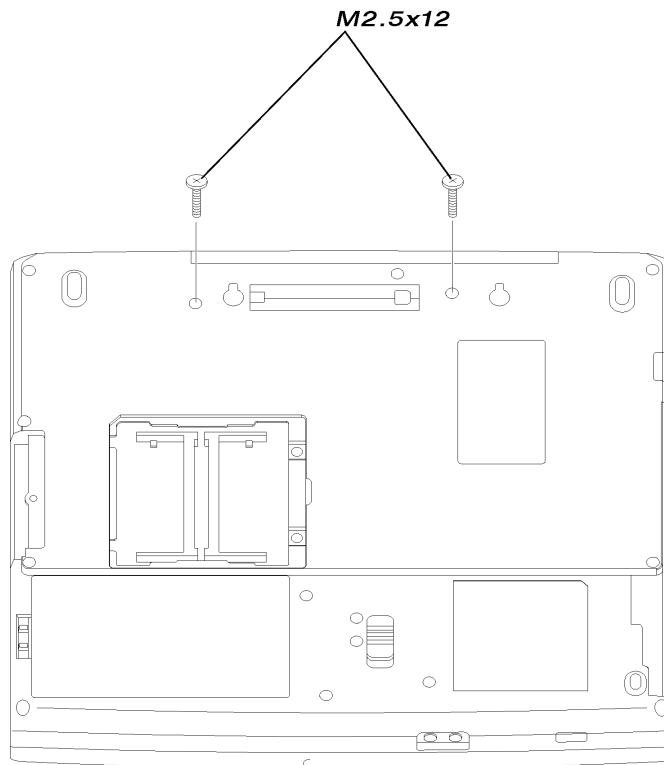
1. Attach the frame to the DVD-ROM drive.
2. Fix the frame with the five M2x3 white super flat-head screws.
3. Attach the connector and connector cover to the DVD-ROM drive, and fix them with the two M2x8 black bind screws.

## 4.4 Switch Cover

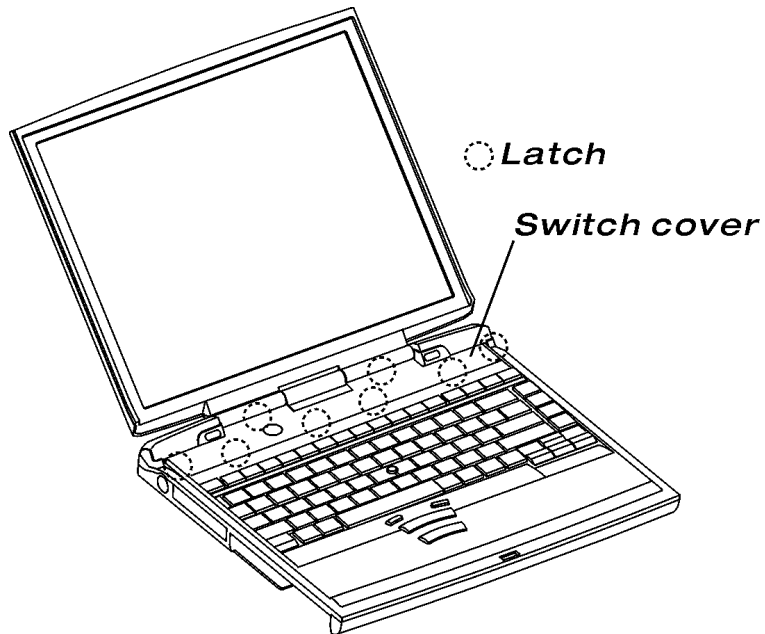
### Removing the Switch Cover

Remove the switch cover according to the following procedures and Figures 4-14 and 4-15.

1. Turn the computer upside down.
2. Remove two M2.5x12 black bind screws.
3. Remove the eight latches on the switch cover.



*Figure 4-14 Removing the Switch cover*



*Figure 4-15 Removing the Switch Cover*

### **Install the Switch Cover**

Install the switch cover according to the following procedures and Figures 4-14 and 4-15.

1. Install the switch cover.
2. Turn the computer upside down.
3. Fix switch cover with two M2.5x12 black bind screws.

## 4.5 Keyboard

### Removing the Keyboard

Remove the keyboard according to the following procedures and Figures 4-16 and 4-17.

**CAUTION:** To avoid fingernail damage, do not pull out the keyboard holder by clamping it with your fingernails.

1. Open the display panel.
2. Remove the keyboard lock and M2.5x2 black bind screws.
3. Move the keyboard in the direction of the arrow until the keyboard connector appears.

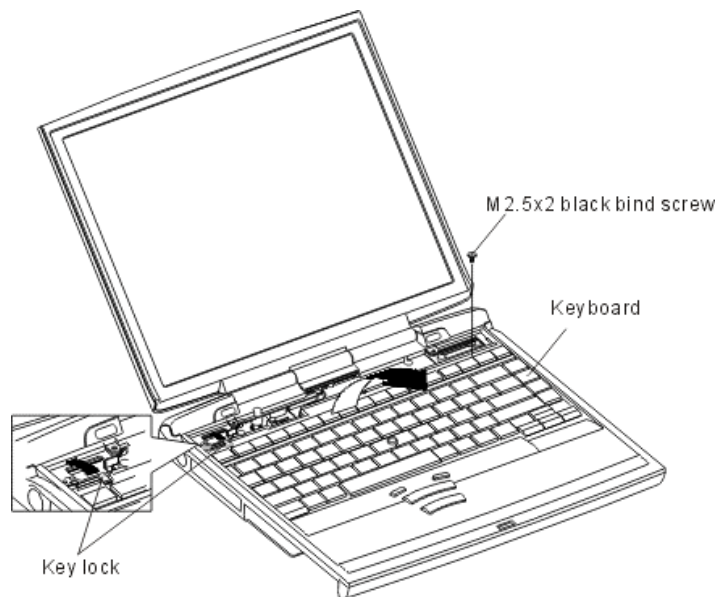
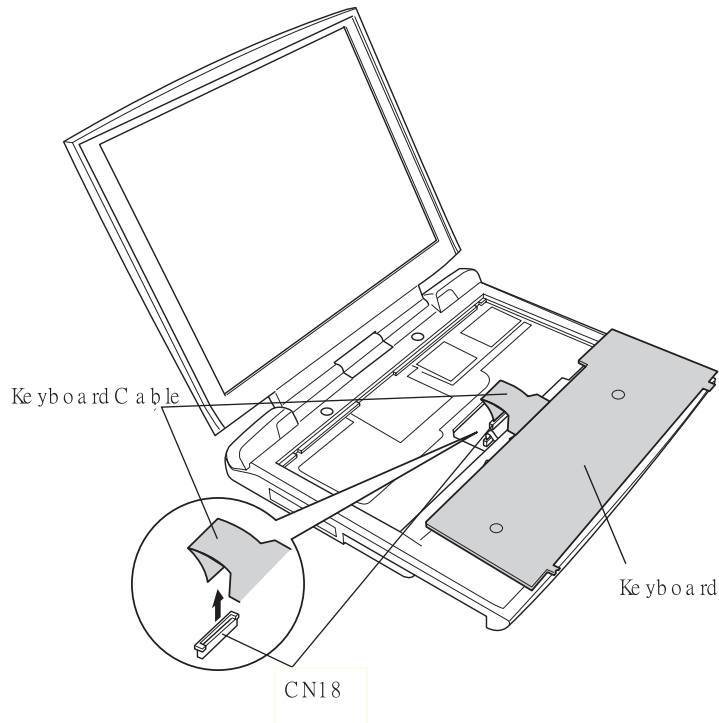


Figure 4-16 Removing the keyboard lock and screws

4. Disconnect the keyboard cable from CN18 on the system board and remove the keyboard.



*Figure 4-17 Removing the keyboard*

### **Installing the Keyboard**

Install the keyboard according to the following procedures and Figures 4-16 and 4-17.

1. Connect the keyboard cable to CN18 on the system board.
2. Align the latches on the front of the keyboard with the latch holes on the top cover.
3. Fix the keyboard with the keyboard lock and M2.5x2 black bind screws.
4. Install the keyboard holder in the correct position and fasten the five latches securely.



## 4.6 Wireless LAN Card

### Removing the Wireless LAN Card

**NOTE:** This securing touch pad cover screw type depends on W-LAN cards

- If IEEE802.11 a&b(combo) card is installed, a torx screw is secured.
- If IEEE802.11 a&b(combo) card is not installed, a normal screw is secured.
- If another module is installed, M2x4 black LHSTIX screw is secured.

Remove the wireless LAN card according to the following procedures and Figures 4-18 and 4-19.

1. Remove one M2x4 black screw.
2. Remove the wireless LAN card cover.

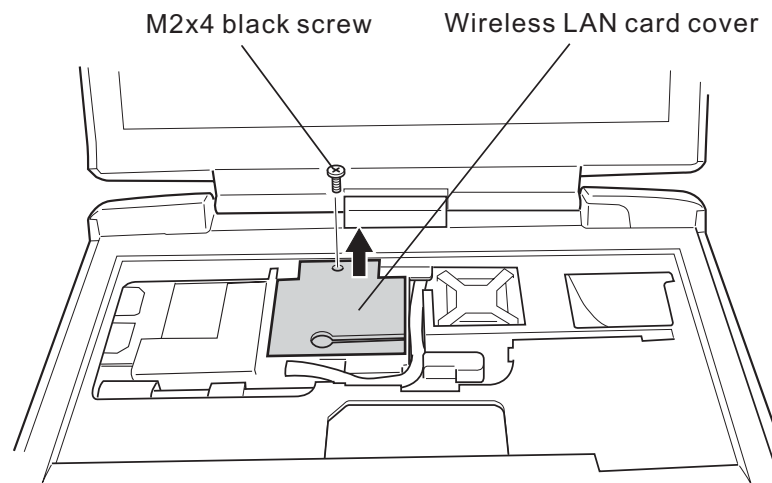


Figure 4-18 Removing the wireless LAN card cover

3. Remove the glass tape.

**CAUTION:** Do not touch the connectors on the wireless LAN card and in the computer with bare hands. Wireless LAN cards can fail if they are contaminated with sweat, natural oils, etc. from your hands.

4. Disconnect the two antenna cables with the tweezers.
5. Spread out both the left and right stoppers for fixing the wireless LAN card until the card can be raised.

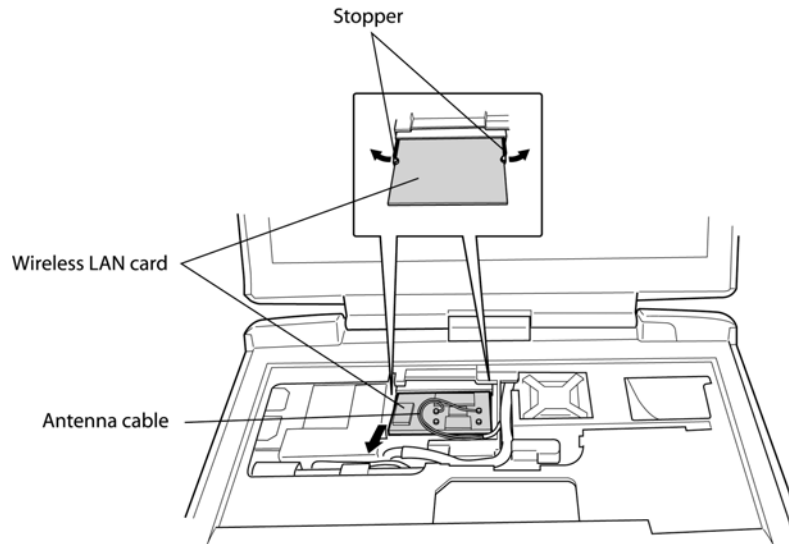


Figure 4-19 Removing the wireless LAN card

6. Pull the wireless LAN card up and out at an angle.

### Installing the Wireless LAN Card

Install the wireless LAN card according to the following procedures and Figures 4-18 and 4-19.

1. Insert the wireless LAN card into the connector at angle of 45 degrees.
2. Tilt the wireless LAN card and fix it with the left and right stoppers.
3. Connect the two antenna cables with the tweezers.

**CAUTION:** Do not touch the connectors on the wireless LAN card and in the computer with bare hands. Wireless LAN cards can fail if they are contaminated with sweat, natural oils, etc. from your hands.

4. Fix the antenna cables with glass tape.
5. Install the wireless LAN card cover.
6. Fix the cover with one M2x4 black screw.

## 4.7 Speakers

### Removing the Speakers

Remove the speakers according to the following procedures and Figure 4-20 and 4-21.

1. Turn the computer upside down, remove the two M2.5x20 black bind screws
2. Disconnect the speaker cables CN8 and CN9 on the system board.
3. Remove the speaker cables from the guides (grooves) on the top cover.
4. Remove the two and M2.5x6 black flat-head screws (one screw for one speaker).
5. Remove the left and right speakers.

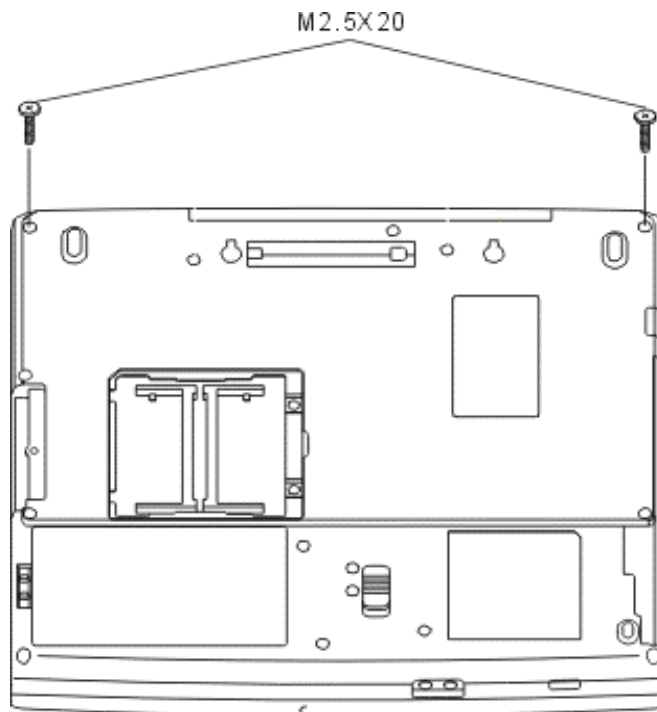
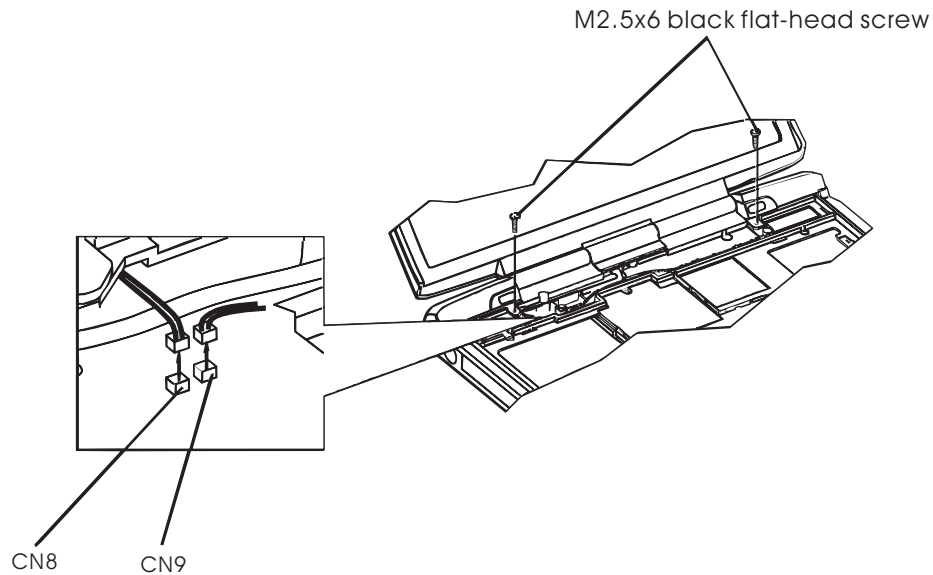


Figure 4-20 Removing the speakers



*Figure 4-21 Removing the speakers*

### **Installing the Speakers**

Install the speakers according to the following procedures and Figure 4-20 and 4-21.

1. Place the left and right speakers in their correct position and fix them with the M2.5x6 black flat-head screws.  
(one screw for onespeaker).
2. Push the speaker cables into the guides on the top cover.
3. Fix the two M2.5x20 black bind screws.

## 4.8 Display Mask

### Removing the Display Mask

Remove the display mask according to the following procedures and Figure 4-22.

1. Remove the six seals for covering the screws.
2. Remove the two M2.5x6 black flat-head screws and four white flat-head screws.

**NOTE:** When removing the screws, support the display by its back with one hand.

3. Release the following 20 latches on the display mask, in that order:
  - Eight bottom latches
  - Four latches on each of the left and right sides
  - Four top latches

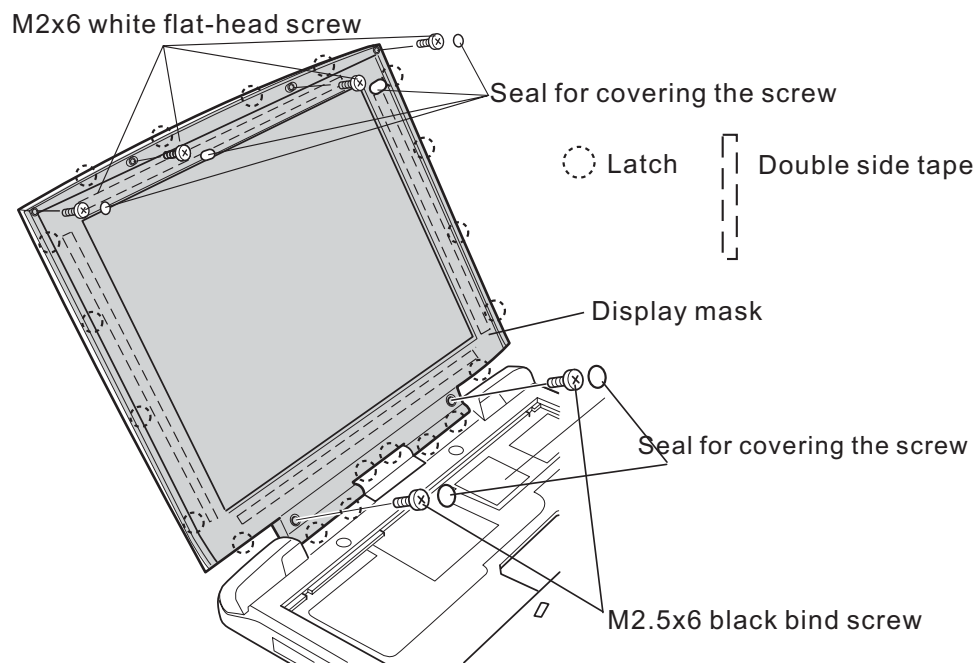


Figure 4-22 Removing the display mask

## 4. The precise steps to remove the display mask from LCM Panel

*Fig 4-22-01 Removing display mask step (1)**Fig 4-22-02 Removing display mask step (2)*

- a. Starting remove along the LCM upside outermost direction, until the latch of display mask separate from LCM bottom cover.  
Then fully separate the display mask and LCM panel in the upside portion.

*Fig 4-22-03 Removing display mask step (3)**Fig 4-22-04 Removing display mask step (4)*

- b. Same as above step-a, fully separate the display mask and LCM panel in left side portion and right side portion.



*Fig 4-22-05 Removing display mask step (5)*

*Fig 4-22-06 Removing display mask step (6)*

c. The last step is to fully separate the downside portion of display mask and LCM panel.



*Fig 4-22-07 Removing display mask step (7)*

**Warning:** Don't remove along the LCM innermost direction as below photos show since very strong glue double-side tape exists between display mask and LCM panel, or the display mask will be broken easily.



Fig 4-22-08 Removing display mask wrong step (1)



Fig 4-22-09 Removing display mask wrong step (2)



Fig 4-22-10 Removing display mask wrong step (3)

## Installing the Display Mask

Install the display mask according to the following procedures and Figure 4-22.

1. Place the display mask in the correct position and fasten the following 20 latches, in that order:
  - Eight top latches
  - Four latches on each of the left and right sides
  - Four bottom latches
2. Fix the display mask with the six M2.5x6 black flat-head screws.

**NOTE:** When fastening the screws, support the display by its back with one hand.

3. Attach the six seals to the screw heads to cover the screws.

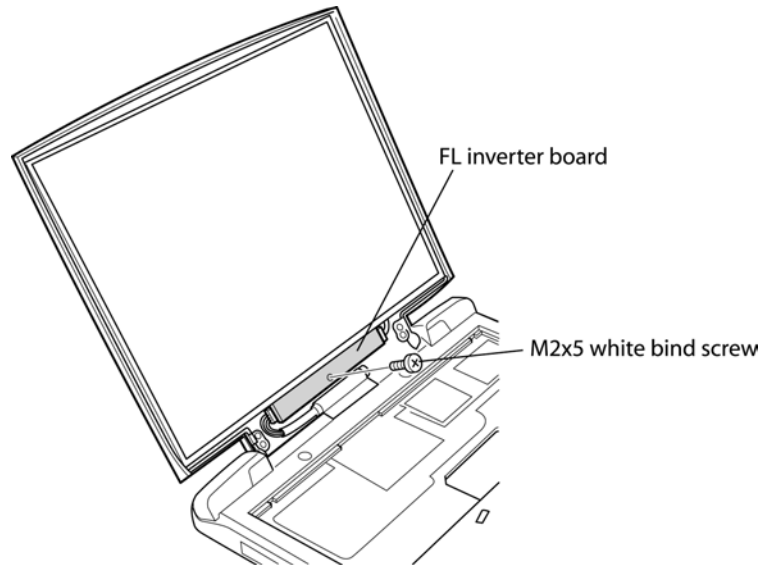


## 4.9 FL Inverter Board

### Removing the FL Inverter Board

Remove the FL inverter board according to the following procedures and Figure 4-23 and 4-24.

1. Remove the M2x5 white bind screw.



*Figure 4-23 Removing the FL inverter board*

2. Raise the FL inverter board and disconnect the LCD/FL cable from CN1.
3. Disconnect the HV cable from CN2 and remove the FL inverter board.

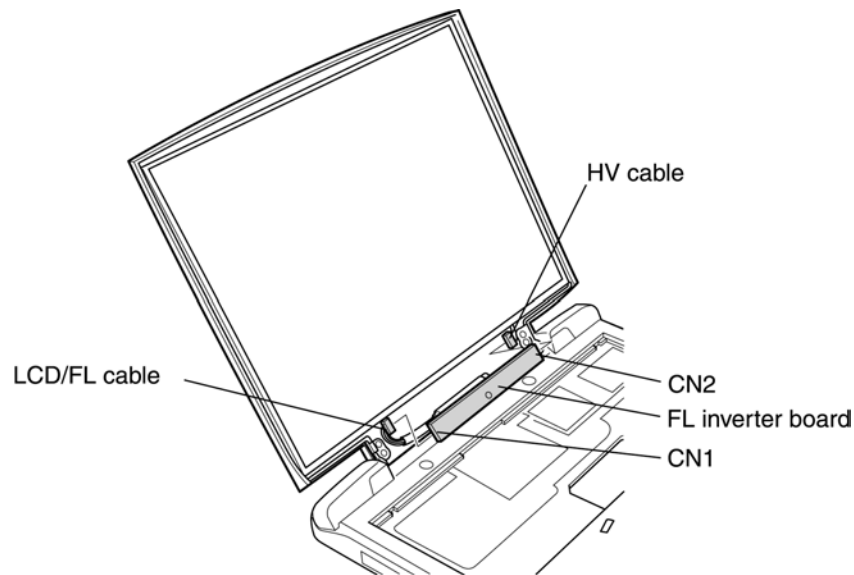


Figure 4-24 Disconnecting the cables

### Installing the FL Inverter Board

Install the FL inverter board according to the following procedures and Figures 4-23 and 4-24.

1. Connect the LCD/FL cable to CN1, and connect the HV cable to CN2.
2. Place the FL inverter board in the correct position.
3. Fasten the M2x5 white bind screw to fix the FL inverter board.

## 4.10 LCD Modules

**NOTE:** ICs are fragile. Use extreme care not to apply pressure to the ICs along the edges of the LCD module.

**NOTE:** Dispose of used LCD panels (fluorescent (FL) tubes) as required by local ordinances or regulations.

### Removing the 14.1-inch LCD Module

Remove the 14.1-inch LCD module according to the following procedures and Figures 4-25 and 4-28.

1. Open the display panel. Disconnect the LCD/FL cable CN7 on the system board.
2. Remove the three M2.5x4 black bind screws for fixing the LCD module.
3. Carefully tilt the LCD module toward you.

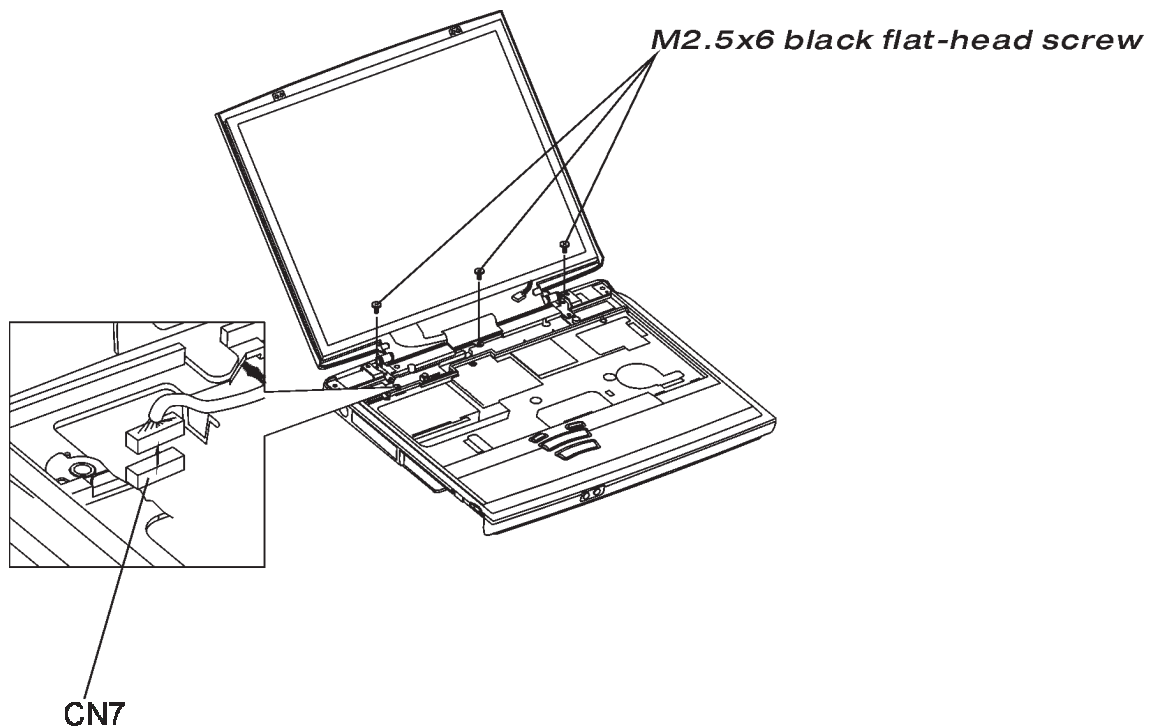


Figure 4-25 Removing the 14.1-inch LCD module and screws

4. Remove the two M2x6 white bind screws and M2x4 white bind screws for fixing the LCD.
5. Remove the four M2x4 white bind screws for fixing the hinge bracket.

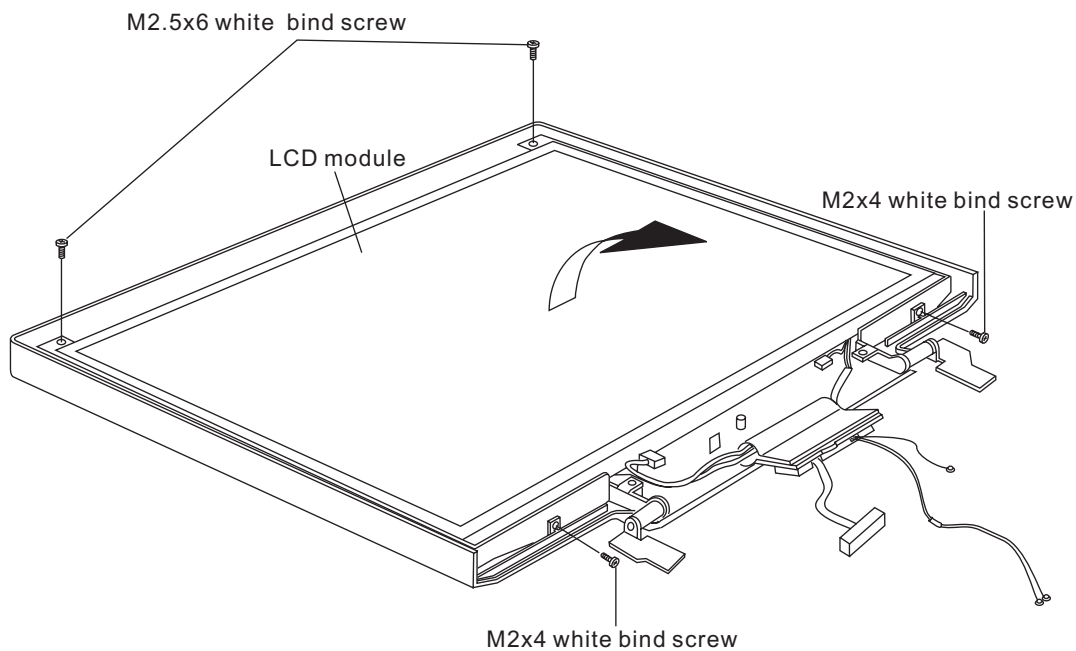


Figure 4-26 Remove LCD Panel Holder Screw

6. Remove the tape and gasket for securing the LCD/FL cable connector and disconnect the LCD/FL cable.

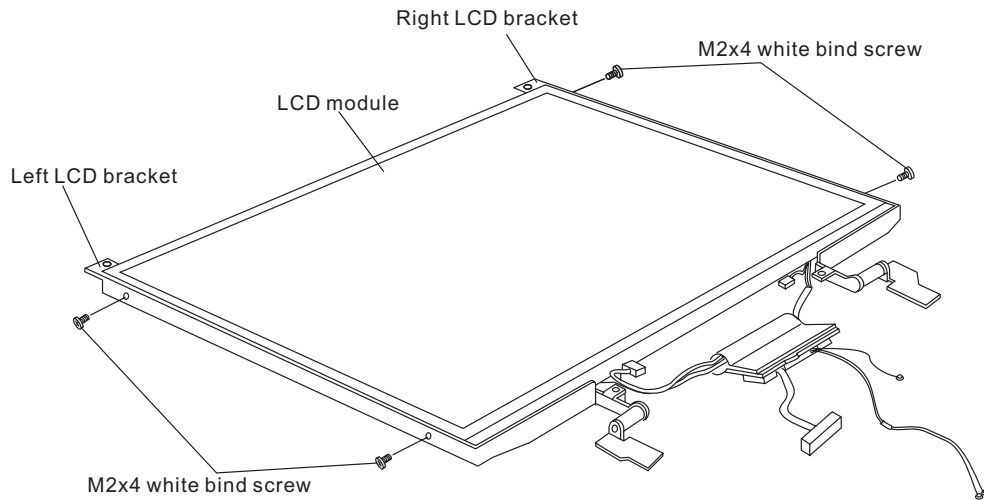


Figure 4-27 Remove LCD Latch Holder Screw

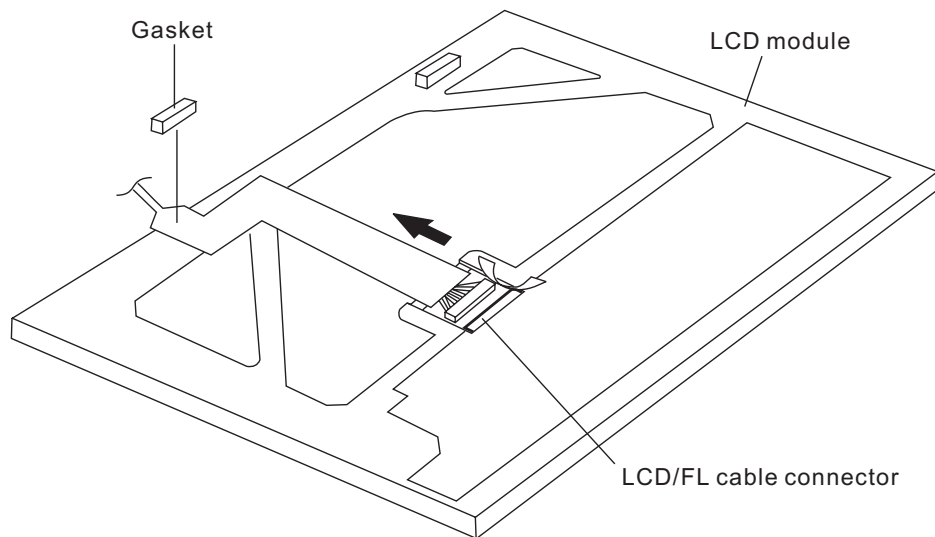


Figure 4-28 Remove LCD/FL Cable Connector

**Installing the 14.1-inch LCD Module**

Install the 14.1-inch LCD module according to the following procedures.

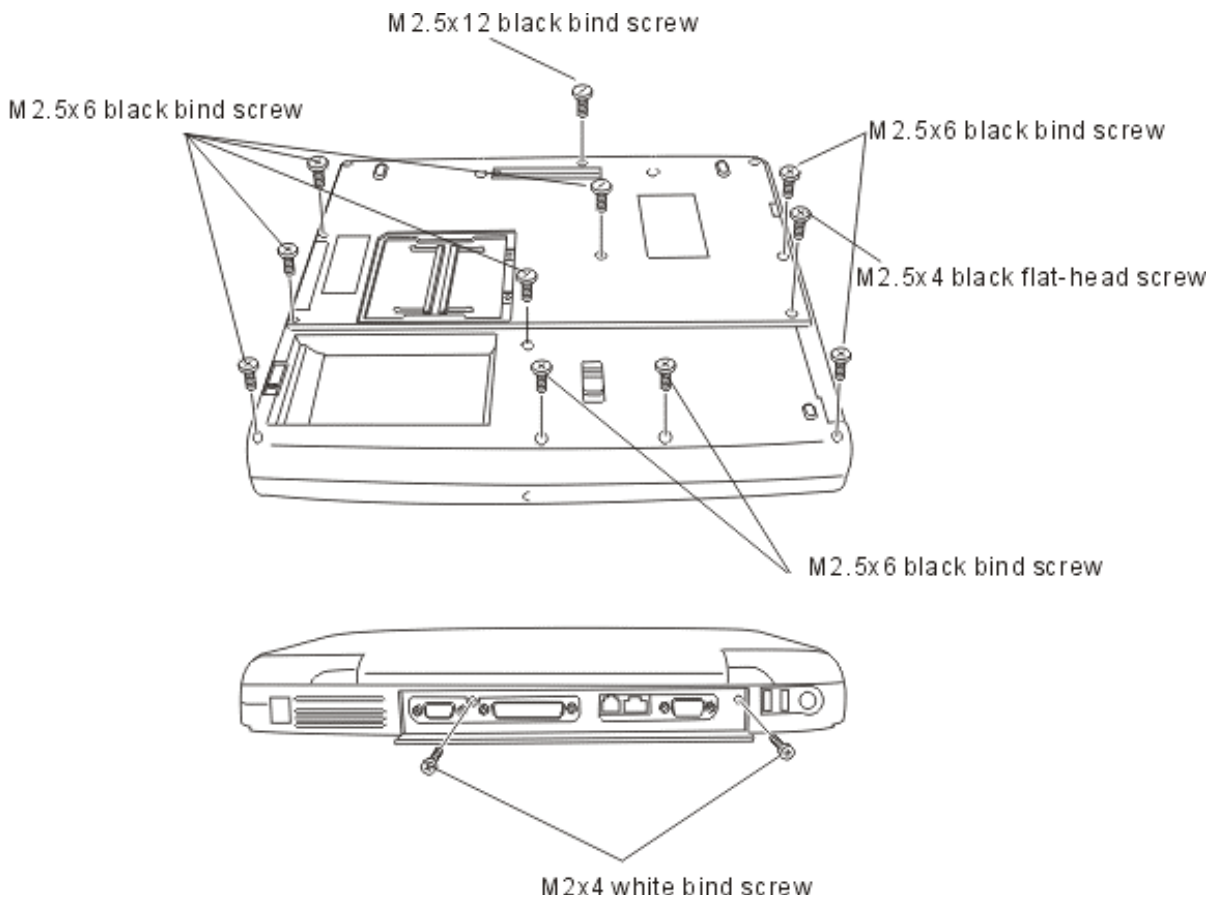
1. Connect the LCD/FL cable to the LCD module.
2. Attach the tape and gasket for securing the LCD/FL cable connector to cover the connected area of the connector.
3. Place the hinge bracket in the correct position and fix it with the four M2x4 white bind screws.
4. Place the LCD in the correct position and fix it with the two M2x6 white bind screws and M2x4 white bind screws.
5. Place the LCD module in the correct position and fix it with the three M2.5x4 black bind screws.

## 4.11 Top Cover

### Removing the Top Cover

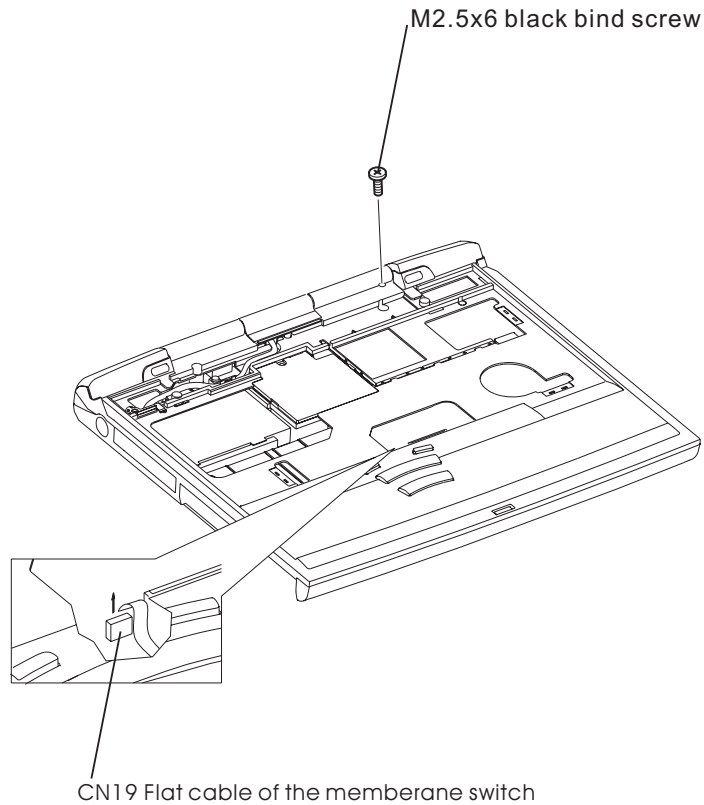
Remove the top cover according to the following procedures and Figures 4-29 and 4-30.

1. Turn the computer upside down, and remove the following 14 screws:
  - Ten M2.5x6 black bind screws
  - One M2.5x4 black bind screws
  - One M2.5x12 black bind screw
  - Two M2x4 white bind screws



*Figure 4-29 Removing the screws from the bottom and back of the computer*

2. Restore the normal computer placement and remove the M2.5x6 black bind screw.
3. Disconnect the flat cable of the membrane switch from CN19 on the system board.



*Figure 4-30 Removing the top cover*

4. Remove the top cover, using care to the three latches at the front.



## Installing the Top Cover

Install the top cover according to the following procedures.

1. Fix the M2.5x6 black bind screw.
2. Connect the flat cable of the membrane switch to CN!9 on the system board.
3. Turn the computer upside down and fix it with the following 14 screws:
  - Ten M2.5x6 black bind screws
  - One M2.5x4 black bind screws
  - One M2.5x12 black bind screw
  - Two M2x4 white bind screw

## 4.12 RTC Batteries

**WARNING:** To replace RTC (real-time clock) batteries, always use genuine batteries or replacement batteries authorized by Toshiba. Using batteries other than those can cause battery explosions or other damage.

Never use an RTC battery that looks abnormal. Replace it with a new one, and dispose of the old battery as required by local ordinances or regulations.

Check for any of the following symptoms:

1. Electrolyte leakage
  - Corrosion (looks blue-green) on the battery connector or cable
  - Corrosion on the computer's battery connector
  - White powder on parts of the battery
  - White powder in the battery tray
  - Clear liquid on the battery
  - Clear liquid in the battery tray
  - Clear liquid on the boards around the battery
2. Damage to the connection cable
3. Damage to the connector housing

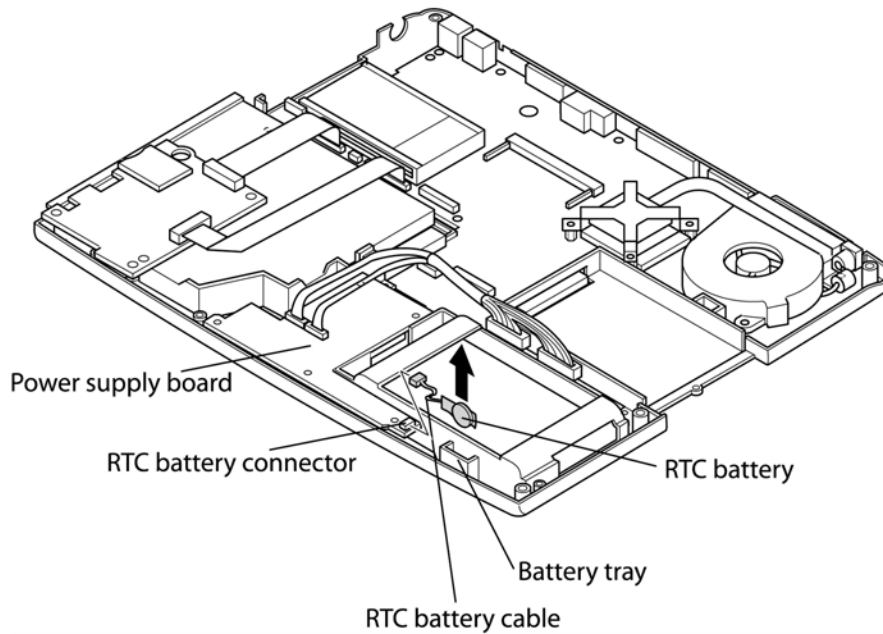
If you found any powder or liquid in or around the battery tray, clean it up immediately. Use extreme care not to let the leaked substance transfer to your eyes or mouth. Do not inhale fumes from the leaked substance.

If the leaked substance was accidentally transferred to your skin, eyes, or mouth, clean the affected area thoroughly with clean water.

## Removing the RTC Battery

Remove the RTC battery according to the following procedures and Figure 4-31.

1. Disconnect the RTC battery cable from the RTC battery connector on the power supply board.
2. Take the RTC battery out of the battery tray.



*Figure 4-31 Removing the RTC battery*

## Installing the RTC Battery

Install the RTC battery according to the following procedures and Figure 4-31.

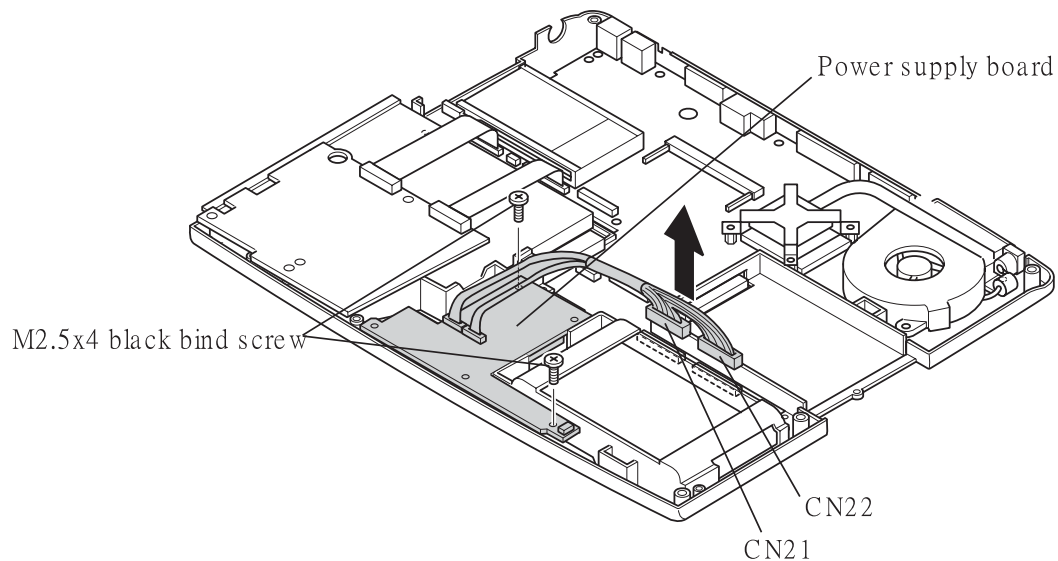
1. Connect the RTC battery cable to the RTC battery connector on the power supply board.
2. Place the RTC battery in the correct position.

## 4.13 Power Supply Board

### Removing the Power Supply Board

Remove the power supply board according to the following procedures and Figure 4-32.

1. Disconnect the cable harnesses from CN21 and CN22 on the system board.
2. Remove the two M2.5x4 black bind screws for fixing the power supply board.
3. Remove the power supply board.



*Figure 4-32 Removing the power supply board*

### Installing the Power Supply Board

Install the power supply board according to the following procedures and Figure 4-32.

1. Connect CN521, CN522 on the power supply board to CN20, CN23 on the system board and place the power supply board in the correct position.
2. Fix the power supply board with the two M2.5x4 black bind screws.
3. Connect the cable harnesses to CN21 and CN22 on the system board.

## 4.14 Sound Board

### Removing the Sound Board

Remove the sound board according to the following procedures and Figure 4-33.

1. Disconnect the SUMI-cards (flat cables) from CN1001 and CN1000 on the sound board.
2. Remove the M2.5x4 black flat-head screw for fixing the sound board.
3. Remove the lever of the slide switch.
4. Remove the sound board

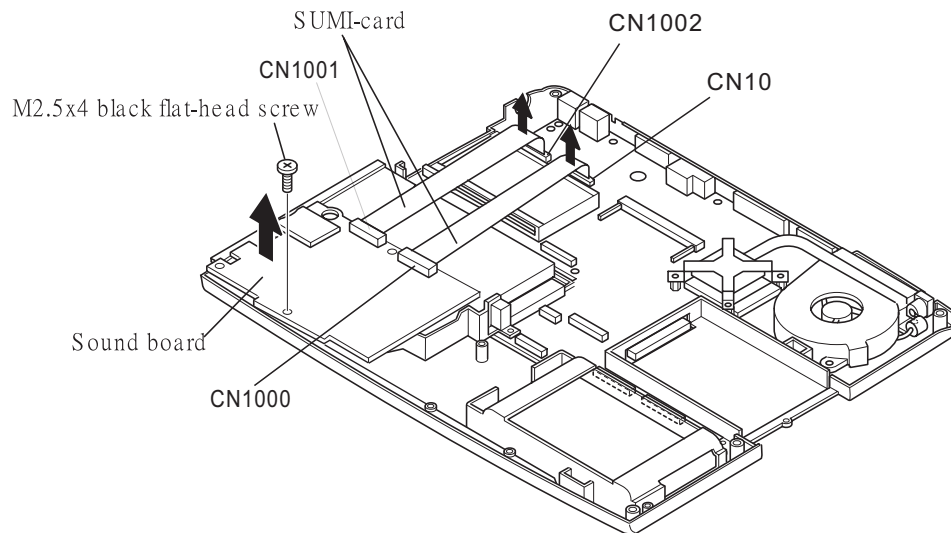


Figure 4-33 Removing the sound board

**Installing the Sound Board**

Install the sound board according to the following procedures and Figures 4-33.

1. Connect the SUMI-cards to CN1001 and CN1000 on the sound board.
2. Place the sound board in the correct position.
3. Attach the lever of the slide switch to the correct position.
4. Fix the sound board with the M2.5x4 black flat-head screw.
5. Connect the SUMI-cards to CN1002 and CN10 on the system board.

## 4.15 Cooling Module

**CAUTION:** When removing the cooling module, keep the following in mind:

1. The cooling module can become very hot during operation. Be sure to let it cool down before starting the repair work.
2. Do not touch or give shock to the fan in the cooling module.

### Removing the Cooling Module

Remove the cooling module according to the following procedures and Figure 4-34.

1. Disconnect the cable of the cooling module from CN15 on the system board.
2. Remove the two M2.5x6 black flat-head screws and four M2x4 white bind screws.
3. Remove the cooling module.

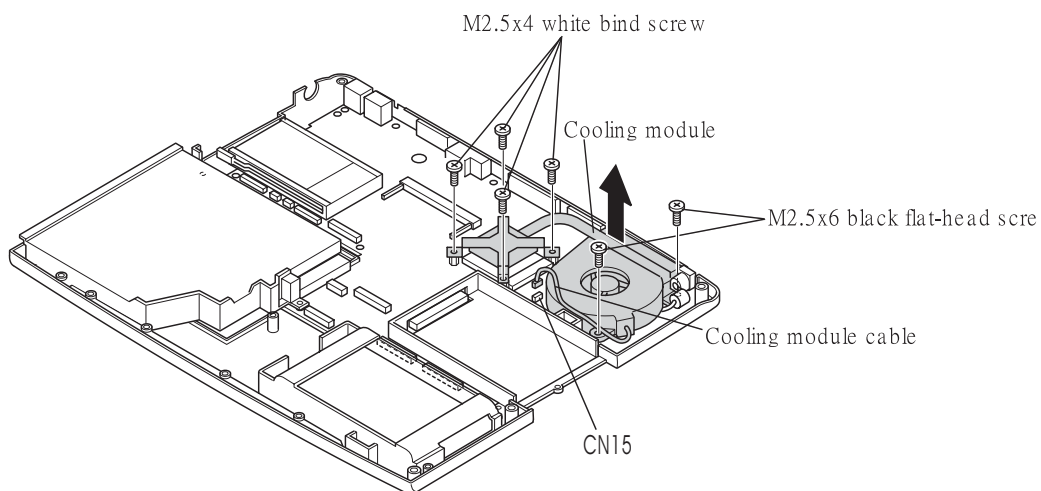


Figure 4-34 Removing the cooling module

## Installing the Cooling Module

Install the cooling module according to the following procedures and Figures 4-34 and 4-35.

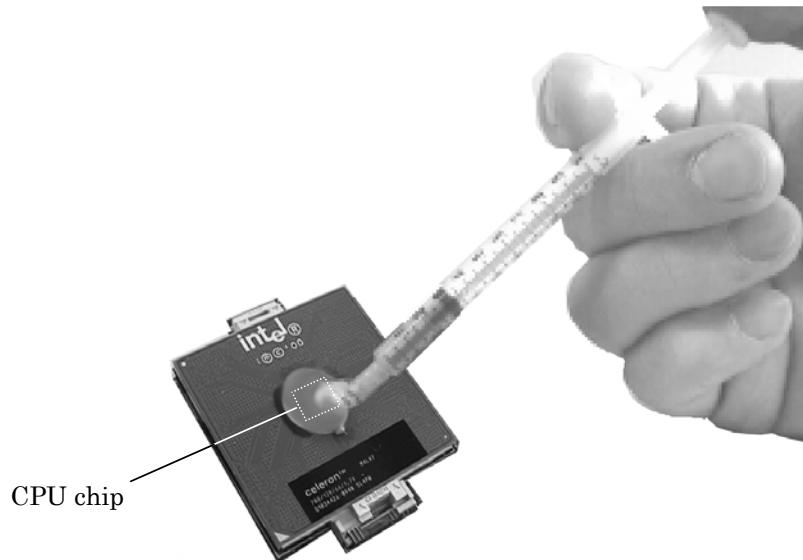
**CAUTION:** *When installing the cooling module, keep the following in mind:*

1. *Be sure to confirm the correct position for the module.*
2. *Before reinstalling the cooling module you removed, be sure to attach a new heat conductive sheet to the CPU.*
3. *Route the cooling module cable between the module and HDD case.*

1. When silicon greases are already applied to the CPU and fan module, wipe them off with a cloth.

By using a special syringe, apply silicon greases to the CPU chip so that the entire CPU chip can be covered with the greases.

**NOTE:** *Apply silicon greases with a special syringe to cover the surface of the CPU chip completely.*



*Figure 4-35 Applying silicon greases*

2. Place the cooling module in the correct position.
3. Fasten the four M2x4 white bind screws.
4. Fasten the two M2.5x6 black flat-head screws.



5. Connect the cooling module cable to CN15 on the system board.

## 4.16 CPU

**CAUTION:** When removing the CPU, keep the following in mind:  
The CPU can become very hot during operation. Be sure to let it cool down before starting repair work.

### Removing the CPU

Remove the CPU according to the following procedures and Figure 4-36.

**CAUTION:** Remove the CPU by aligning the triangle with the shaded area.

1. Unlock the CPU by rotating the cam on the CPU socket 180 degrees to the left with a flat-blade screwdriver (in the order shown in the figure below).
2. Remove the CPU.

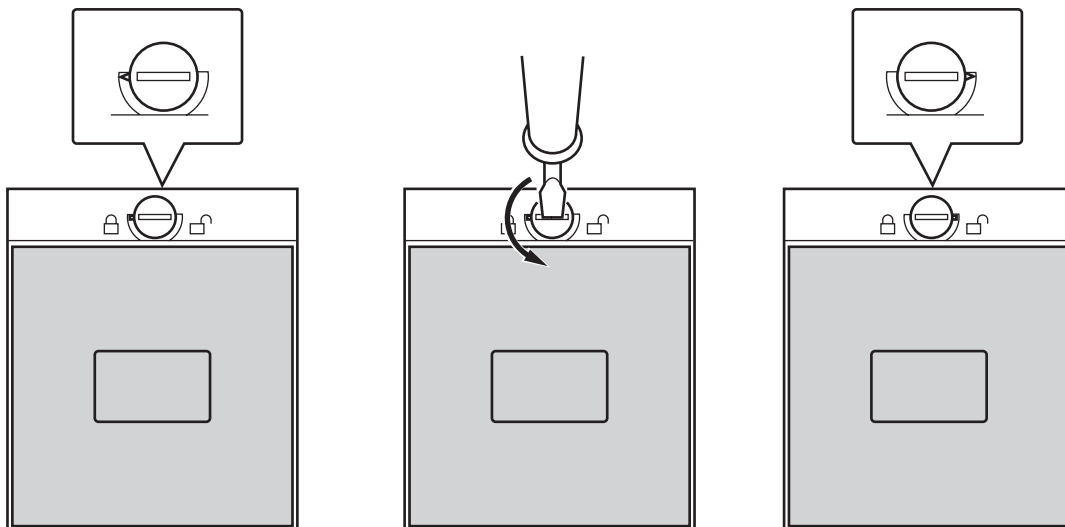


Figure 4-36 Removing the CPU

## Installing the CPU

Install the CPU according to the following procedures and Figures 4-36 and 4-38.

1. Check that the triangle on the cam is in the unlocking position.
2. Attach the CPU to the correct position in the CPU socket. Align the CPU with the CPU socket by using the triangle as a guide.

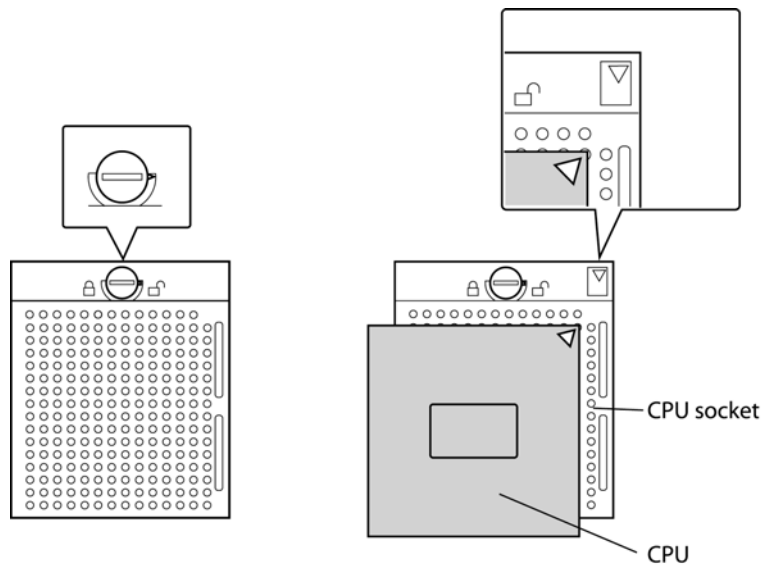


Figure 4-37 Installing the CPU

**CAUTION:** Place the CPU by aligning the triangle with the shaded area.

3. Fix the CPU by rotating the cam 180 degrees to the right with a flat-blade screwdriver.

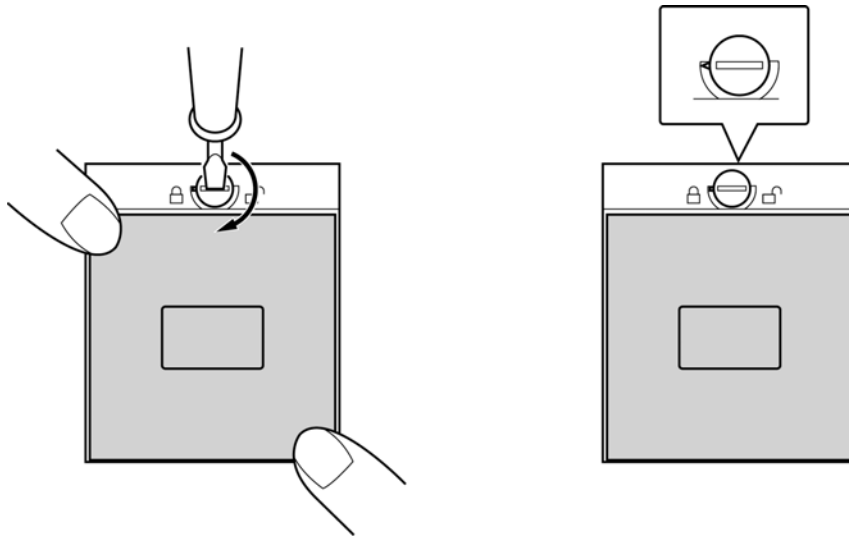


Figure 4-38 Fixing the CPU

## 4.17 System Board

### Removing the System Board

Remove the system board according to the following procedures and Figures 4-39 and 4-40.

1. Remove the three M2.5x6 flat-head screws and selectable bay cover.
2. Disconnect the SUMI-cards from CN1002 and CN10 on the system board.
3. Remove the M2.5x6 flat-head screw and HDD case.
4. Disconnect the cable for the DC jack from CN11.

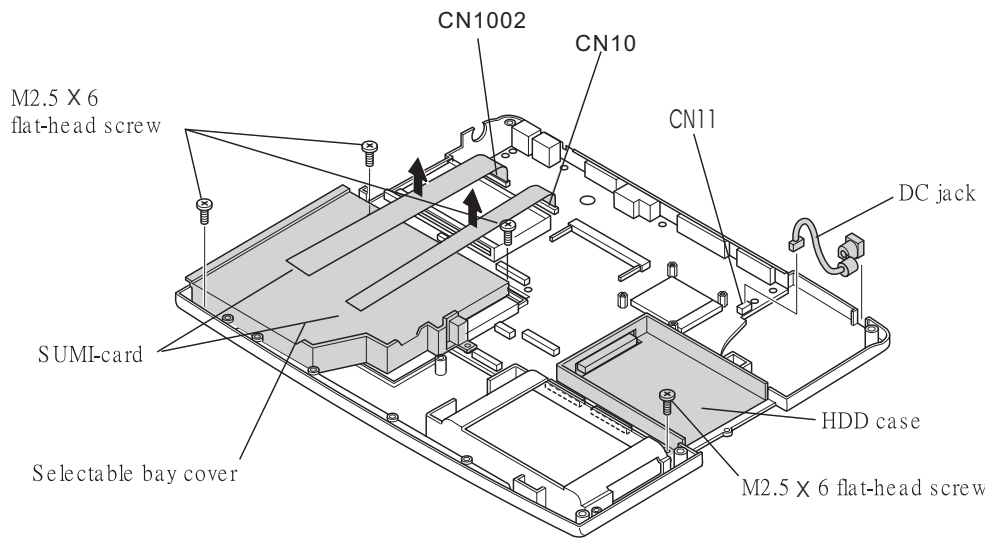


Figure 4-39 Removing the selectable bay cover, HDD case, and cable for DC jack

**CAUTION:** The HDD case must be installed on the system board after the HDD case has been placed in the correct position. If not so, parts on the board can be damaged when the HDD case is removed.

5. Remove the three M2.5x4 black flat-head screws for fixing the system board.
6. Remove the system board.

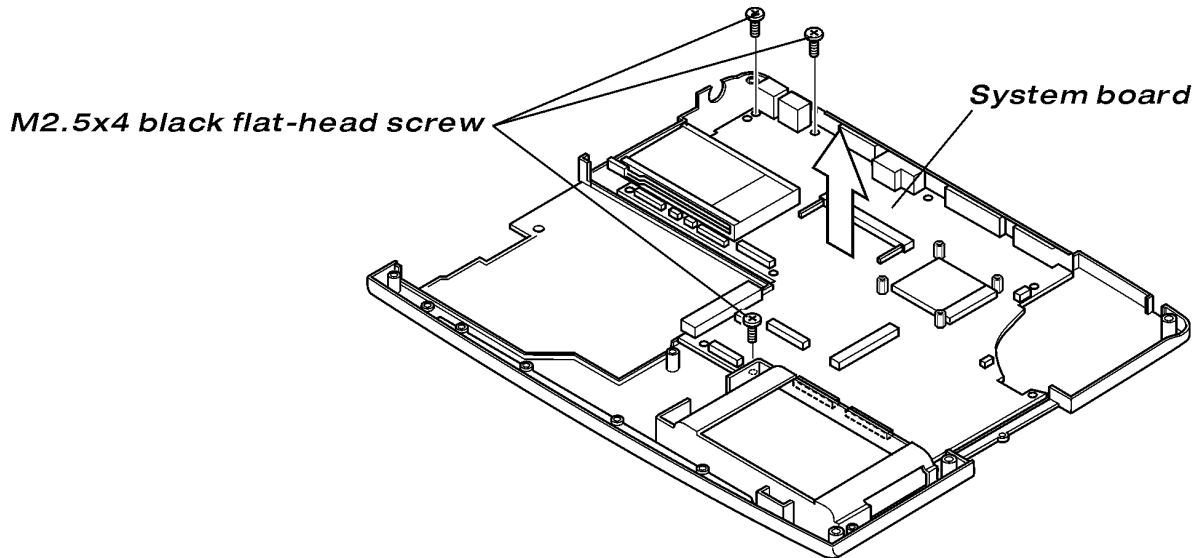


Figure 4-40 Removing the system board

### Installing the System Board

**CAUTION:**

1. When installing the system board, be sure to seat the board in the correct position. Misseated system boards can cause device damage when the computer is reassembled.
2. Route the cable for DC jack between the guide ribs on the base body. The cooling module can not be installed without correct routing.

Install the system board according to the following procedures and Figures 4-39 and 4-40.

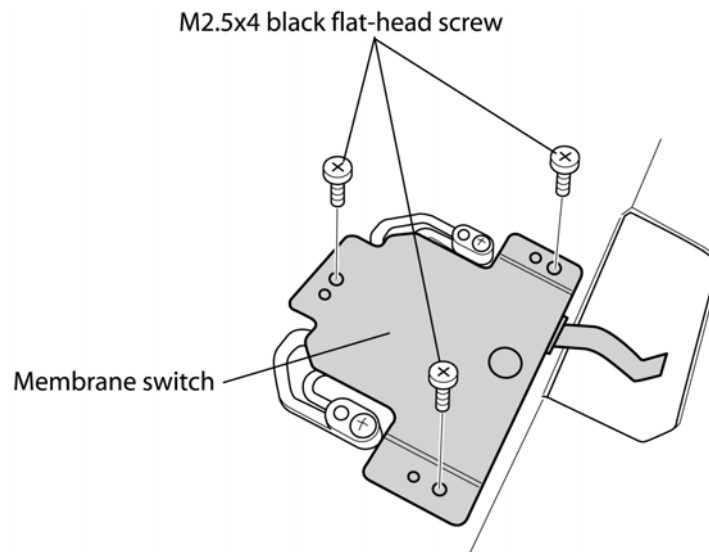
1. Place the system board in the correct position and fix it with the four M2.5x4 black flat-head screws.
2. Connect the cable for DC jack to the correct area and CN11.
3. Place the HDD case in the correct position and fix it with the M2.5x6 black flat-head screw.
4. Connect the SUMI-cards to CN1002 and CN10 on the system board.
5. Place the selectable bay cover in the correct position and fixed it with the three M2.5x6 black flat-head screws.
6. Fasten the three M2.5x4 screws and fix the system board and I/O board to the base cover.

## 4.18 Membrane Switch

### Removing the Membrane Switch

Remove the membrane switch according to the following procedures and Figure 4-41.

1. Remove the three M2.5x4 black flat-head screws.
2. Remove the membrane switch.



*Figure 4-41 Removing the membrane switch*

### Installing the Membrane Switch

Install the membrane switch according to the following procedures and Figure 4-41.

1. Place the membrane switch in the correct position.
2. Fix it with the three M2.5x4 black flat-head screws.

## 4.19 Samsung 14.1-inch FL

### Removing the Samsung 14.1-inch FL tube

Remove the Samsung 14.1-inch FL tube according to the following procedures and Figures 4-42 to 4-49.

1. Flip the LCD module over and remove the PCB cover and three pieces of tape.

**CAUTION:** Use care not to damage the PCB.

*Figure 4-42 Removing the PCB cover and tape*



2. Remove the two screws for fixing the power supply board.

**CAUTION:** Use care not to damage the PCB.

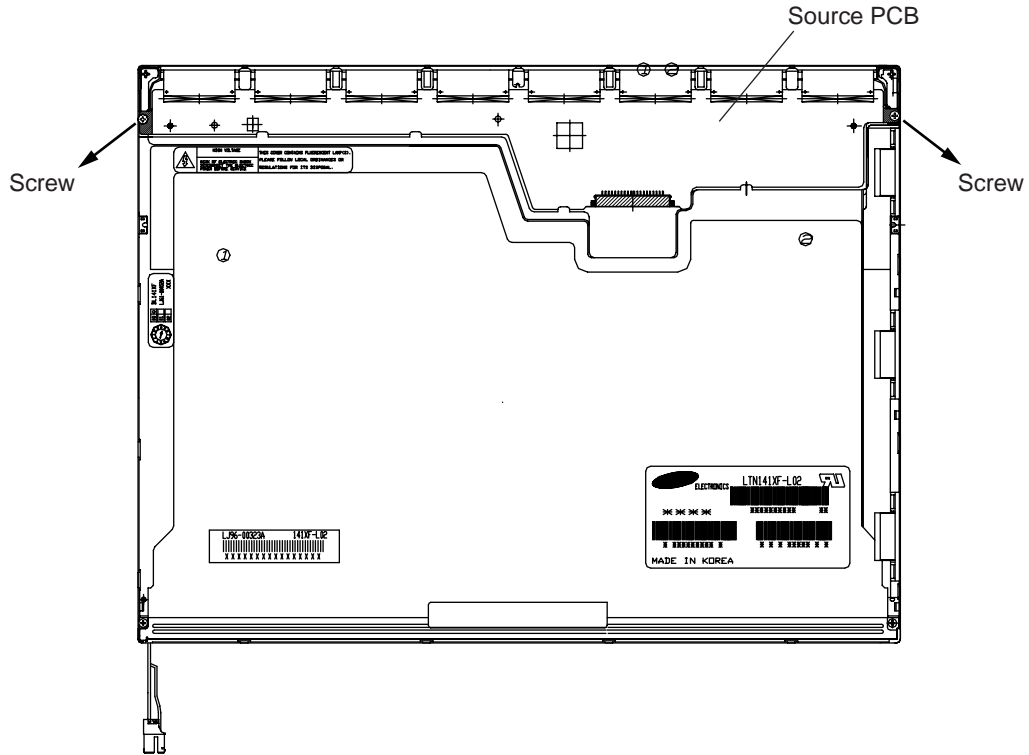


Figure 4-43 Removing the two screws for fixing the power supply board

3. Release the 18 hooks and remove the upper chassis from the frame. There are six hooks at the top, four hooks on each of the left- and right-hand sides, and four hooks at the bottom.

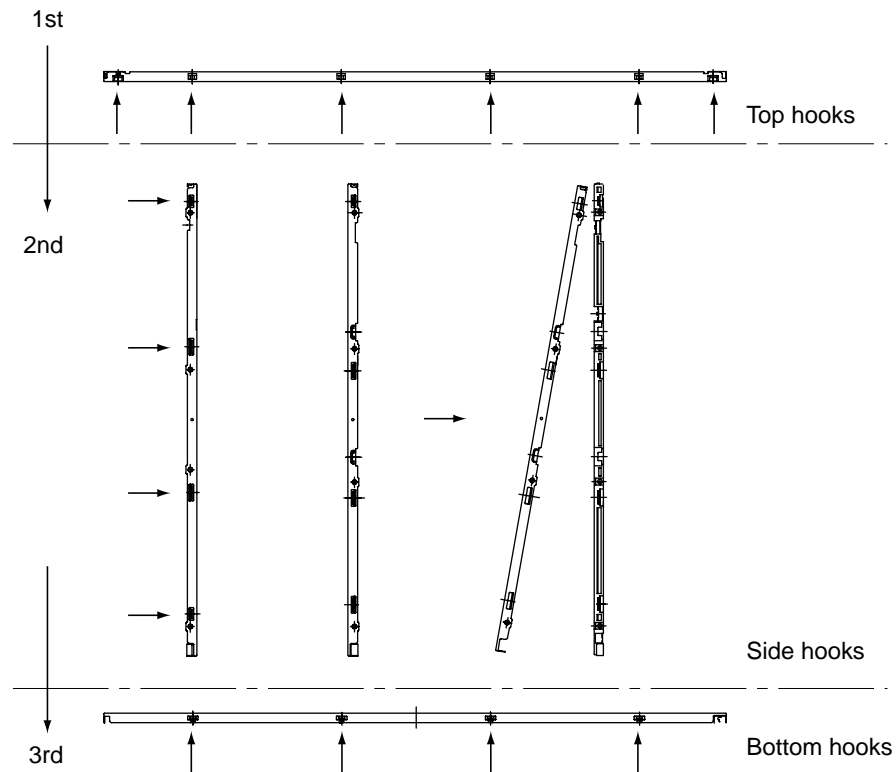


Figure 4-44 Releasing the 18 hooks

4. Remove the panel assembly from the backlight assembly.

**CAUTION:** Use care not to damage the TCP during working.

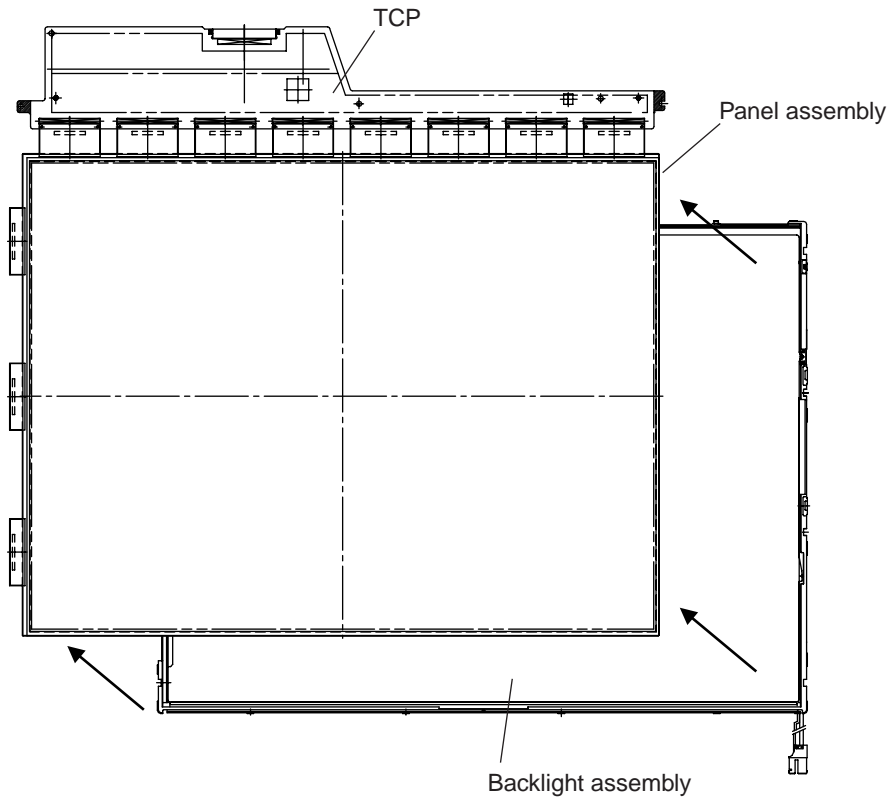


Figure 4-45 Removing the panel assembly

5. Remove the two clips.
6. Remove these:
  - Prism sheet
  - Diffuser sheet
  - Light guide plate (LGP)
  - Reflective sheet

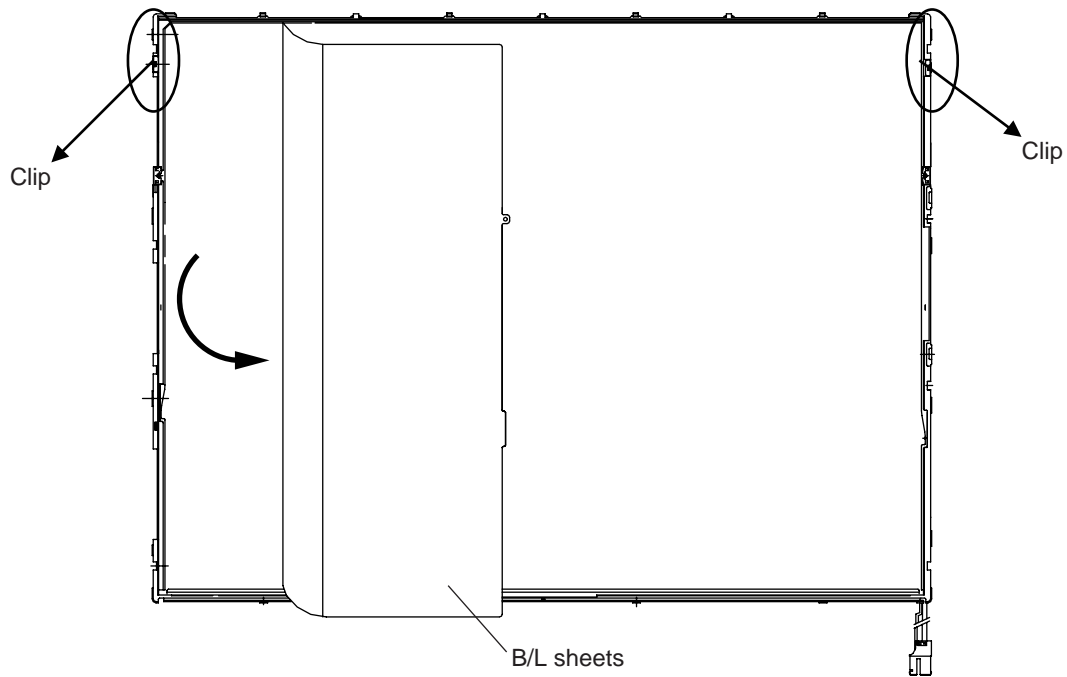


Figure 4-46 Removing the clips and backlight sheets

7. Remove the two screws for fixing the back cover of the FL tube.

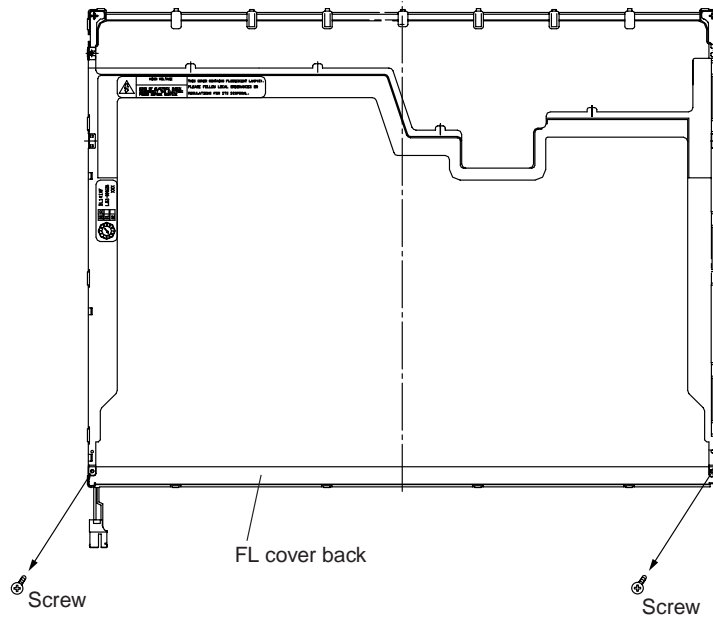


Figure 4-47 Removing the screws for fixing the FL tube back cover

8. Disconnect the ground wire of the FL tube from the frame.

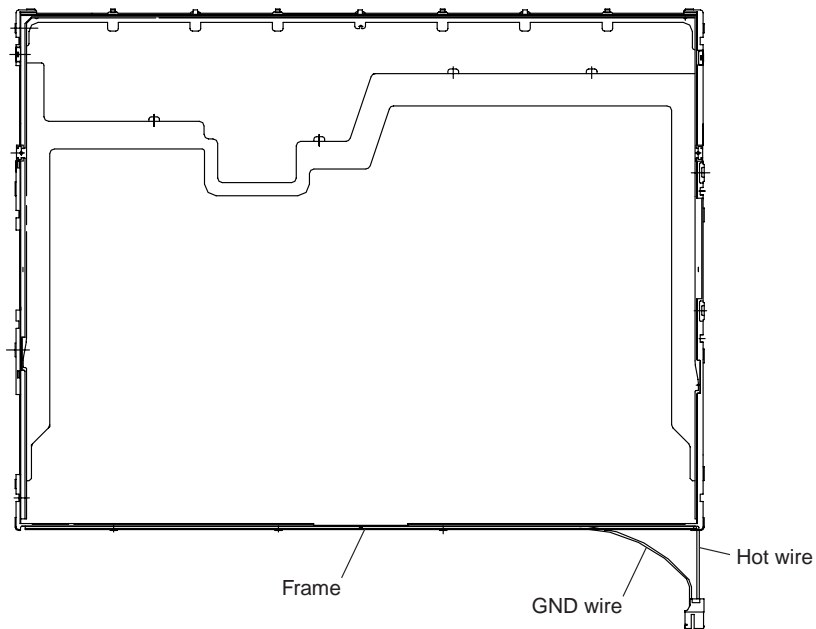


Figure 4-48 Disconnecting the FL tube ground wire

9. Remove the FL tube from the frame.

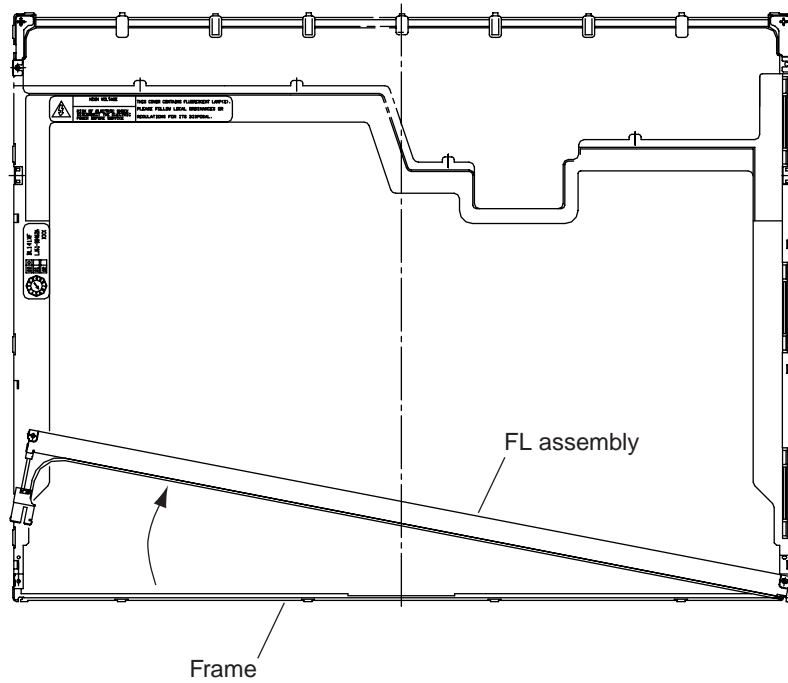


Figure 4-49 Removing the FL tube

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### Installing the Samsung 14.1-inch FL tube

Install the Samsung 14.1-inch FL tube according to the following procedures and Figures 4-42 to 4-49.

1. Place the FL tube on the correct location in the frame.
2. Connect the ground wire to the frame.
3. Fix the back cover of the FL tube with the two screws.
4. Attach these:
  - Reflective sheet
  - Light guide plate
  - Diffuser sheet
  - Prism sheet
5. Fasten the two clips.
6. Place the panel assembly on the correct location in the backlight assembly.
7. Place the upper chassis on the frame. Fit the hooks into the holes. There are four hooks at the bottom, four hooks on each of the left- and right-hand sides, and six hooks at the top.
8. Fix the power supply board with the two screws.
9. Attach the PCB cover and three pieces of tape.

## 4.20 Toshiba 14.1-inch FL

Replace the Toshiba 14.1-inch FL tube according to the following procedures and Figures 4-50 to 4-61.

1. Attach a protective sheet to the display screen of the module.
2. Flip the module over and place it on a flat surface that is free of foreign objects.
3. In the order ①, ②, and ③ shown in Figure 4-50, 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. Use care not to damage the TAB.
2. Leave the insulation sheet on the bezel to allow the reuse of the sheet.

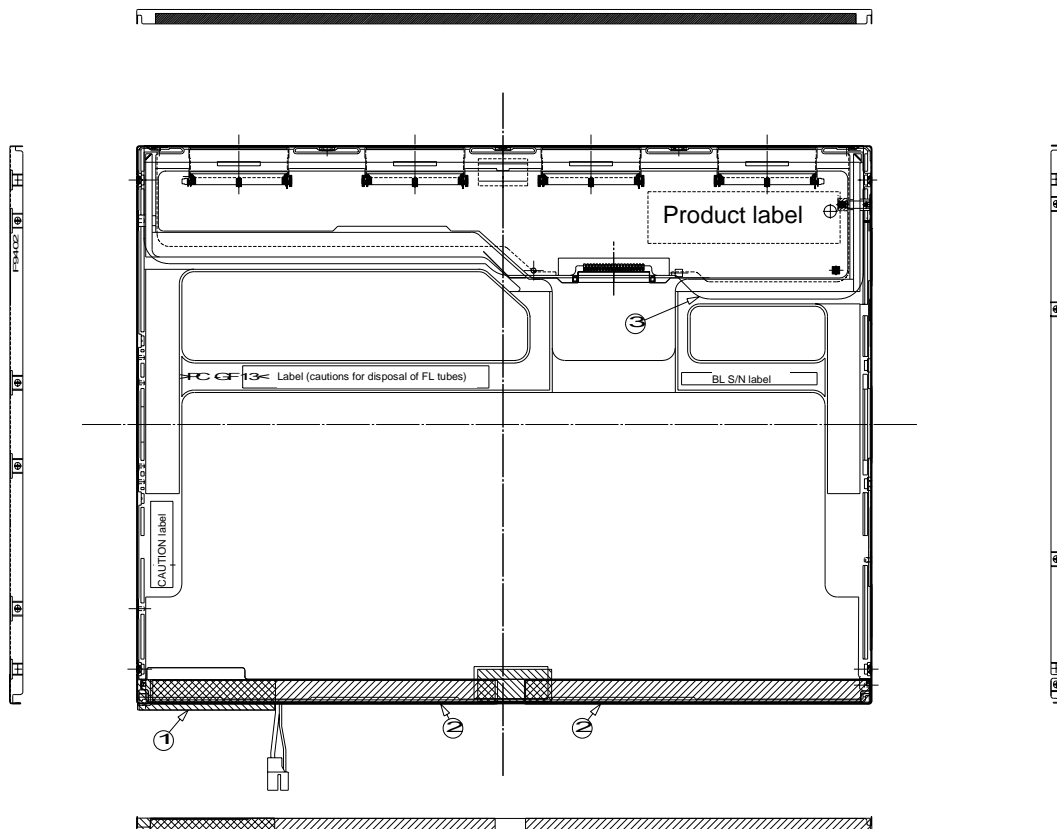


Figure 4-50 Removing the tape and insulation sheet



- Spread out the insulation sheet without detaching it from the side of the bezel, as shown in Figure 4-51.
- In the order ① and ② shown in Figure 4-51, 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.

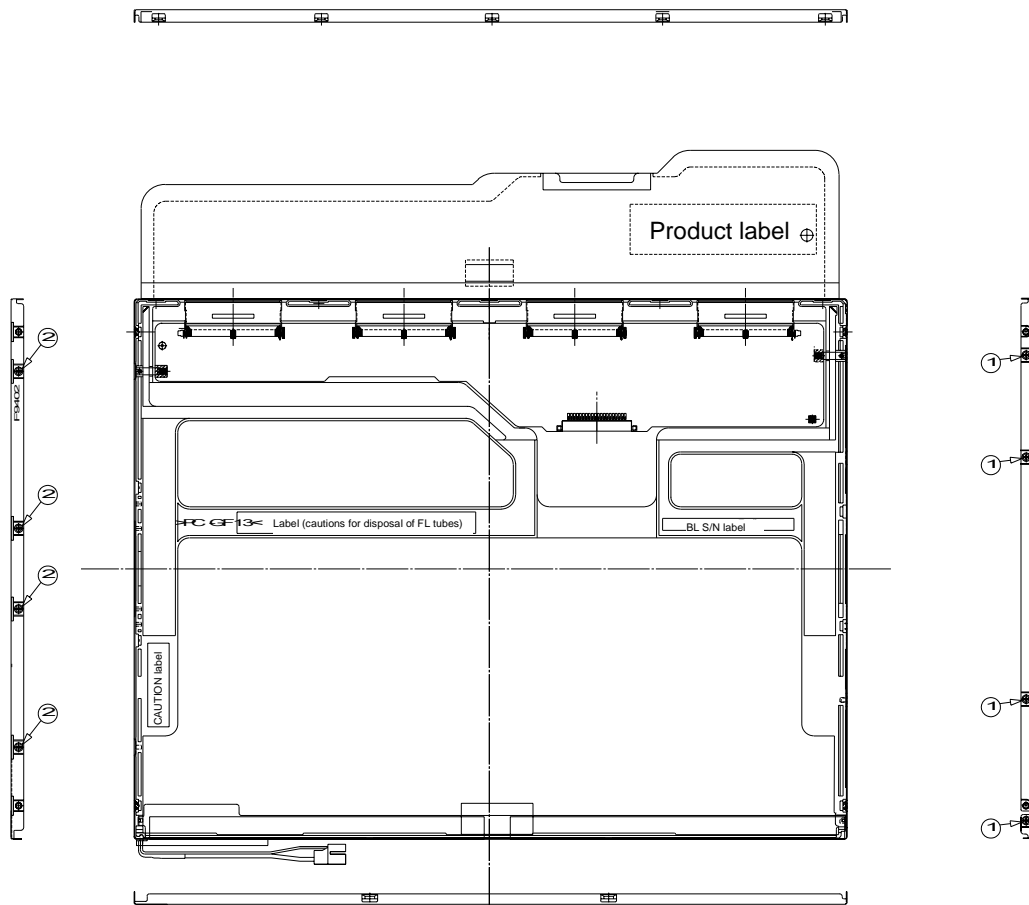


Figure 4-51 Removing the screws

6. Without removing the insulation tape, flip the module over again so that the display screen can face up.
7. 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.)
8. Gently remove the double-sided tape from the cell at the reverse side of the bottom of the bezel and remove the bezel.
9. 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. Use care not to deform the bezel.

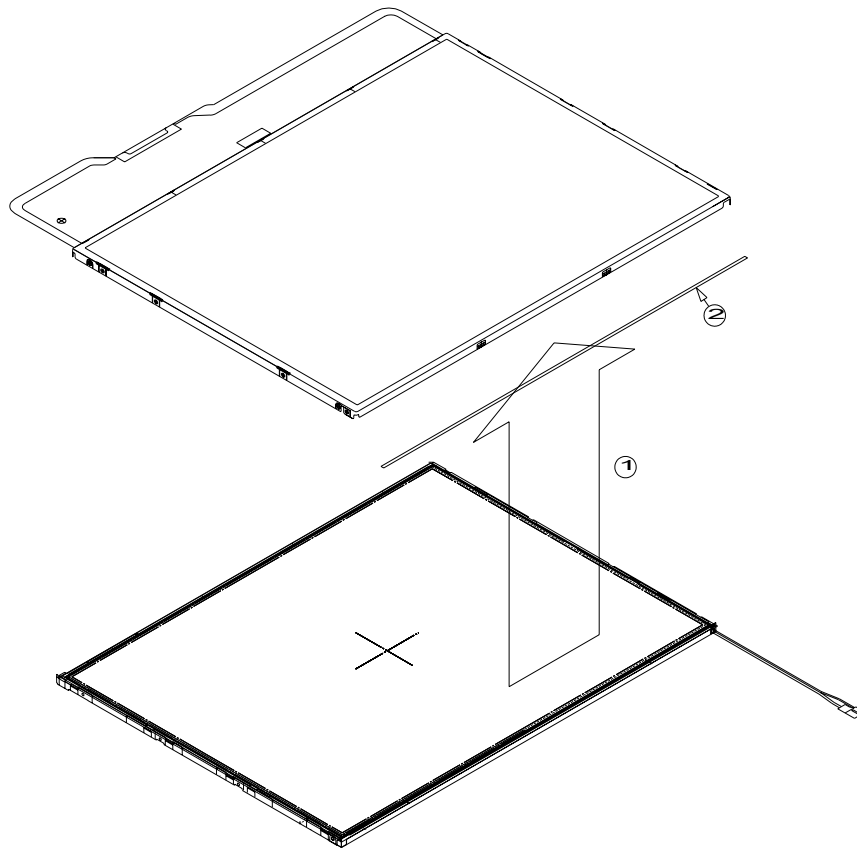


Figure 4-52 Removing the double-sided tape

10. Spread out the PCB horizontally, as shown in Figure 4-53.

**CAUTION:** Use care not to damage the TAB.

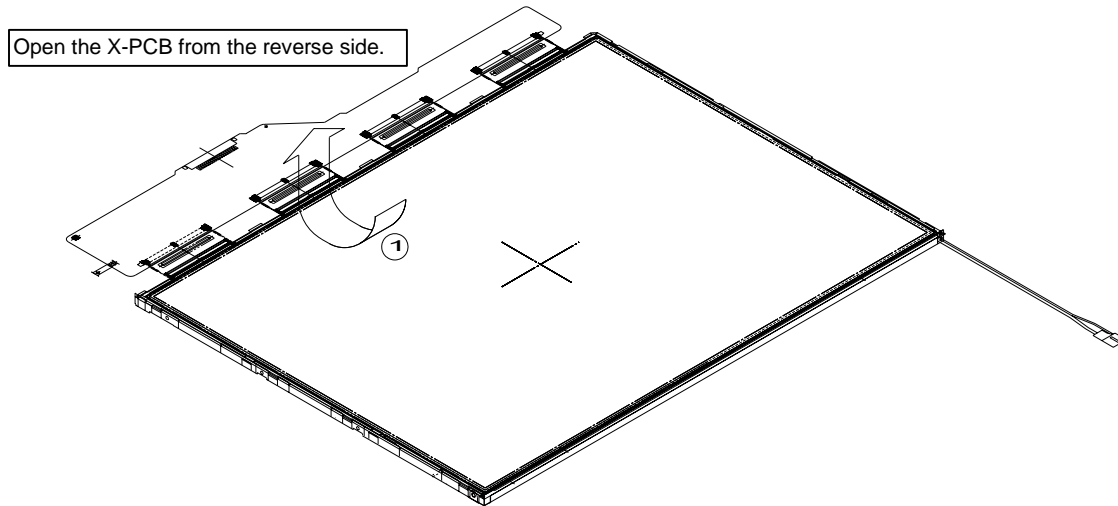


Figure 4-53 Spreading out the PCB horizontally

11. Remove the cell of the PCB assembly from the backlight assembly, as indicated by ① in Figure 4-54. 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 4-54, 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. Use care not to peel off the masking tape in the three areas on the cell.

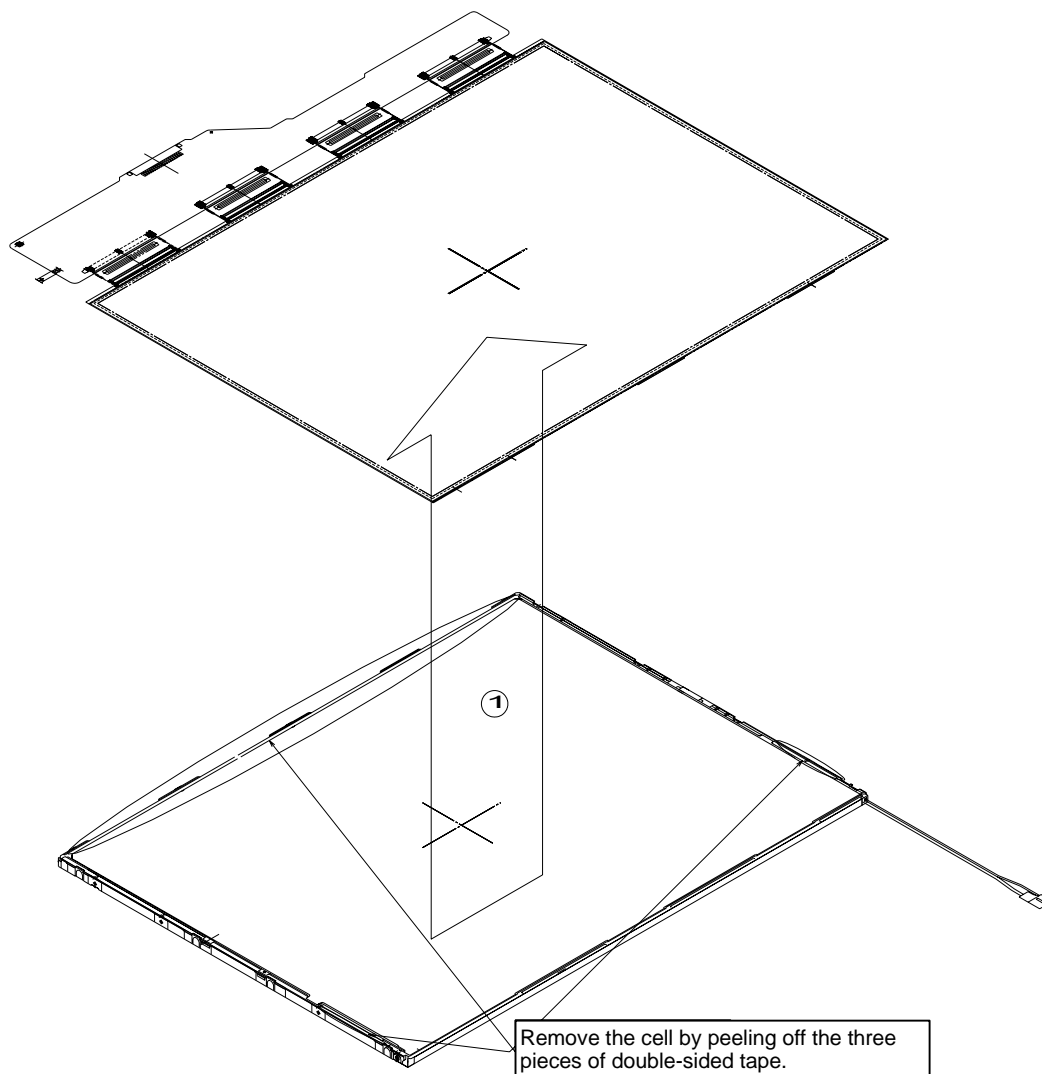


Figure 4-54 Removing the cell of the PCB assembly

12. Attach the double-sided tape to the reverse side of the bezel, as shown in Figure 4-55.

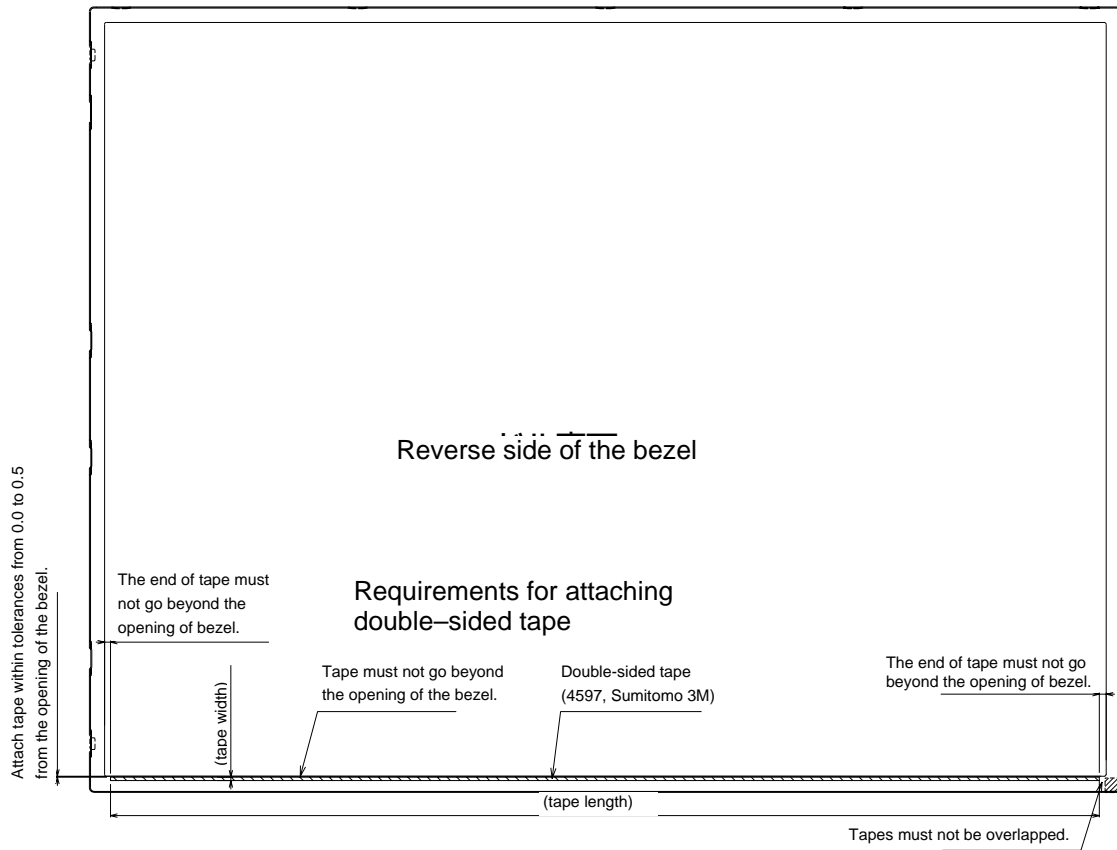


Figure 4-55 Attaching double-sided tape to the bezel's reverse side

13. Inspect the replacement backlight according to Figure 4-56.

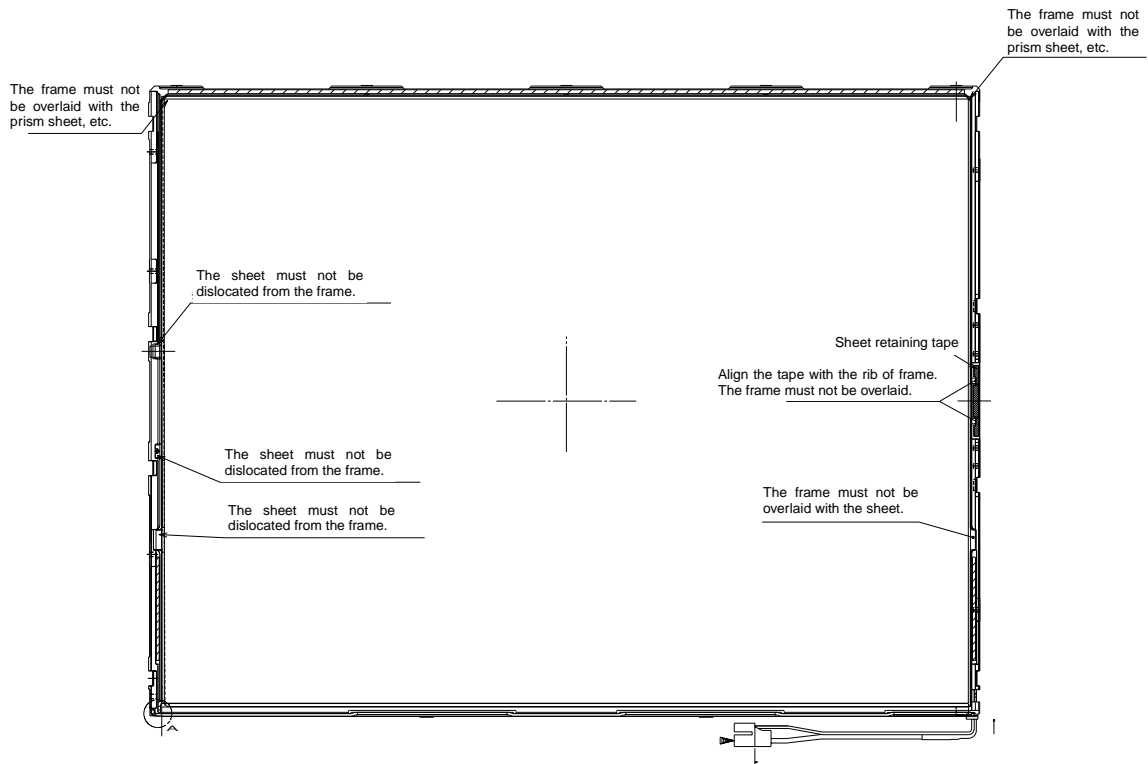


Figure 4-56 Inspecting the replacement backlight

14. 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 4-57.
15. Turn the backlight on.
16. 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 ② in Figure 4-57. Use care not to damage the TAB.

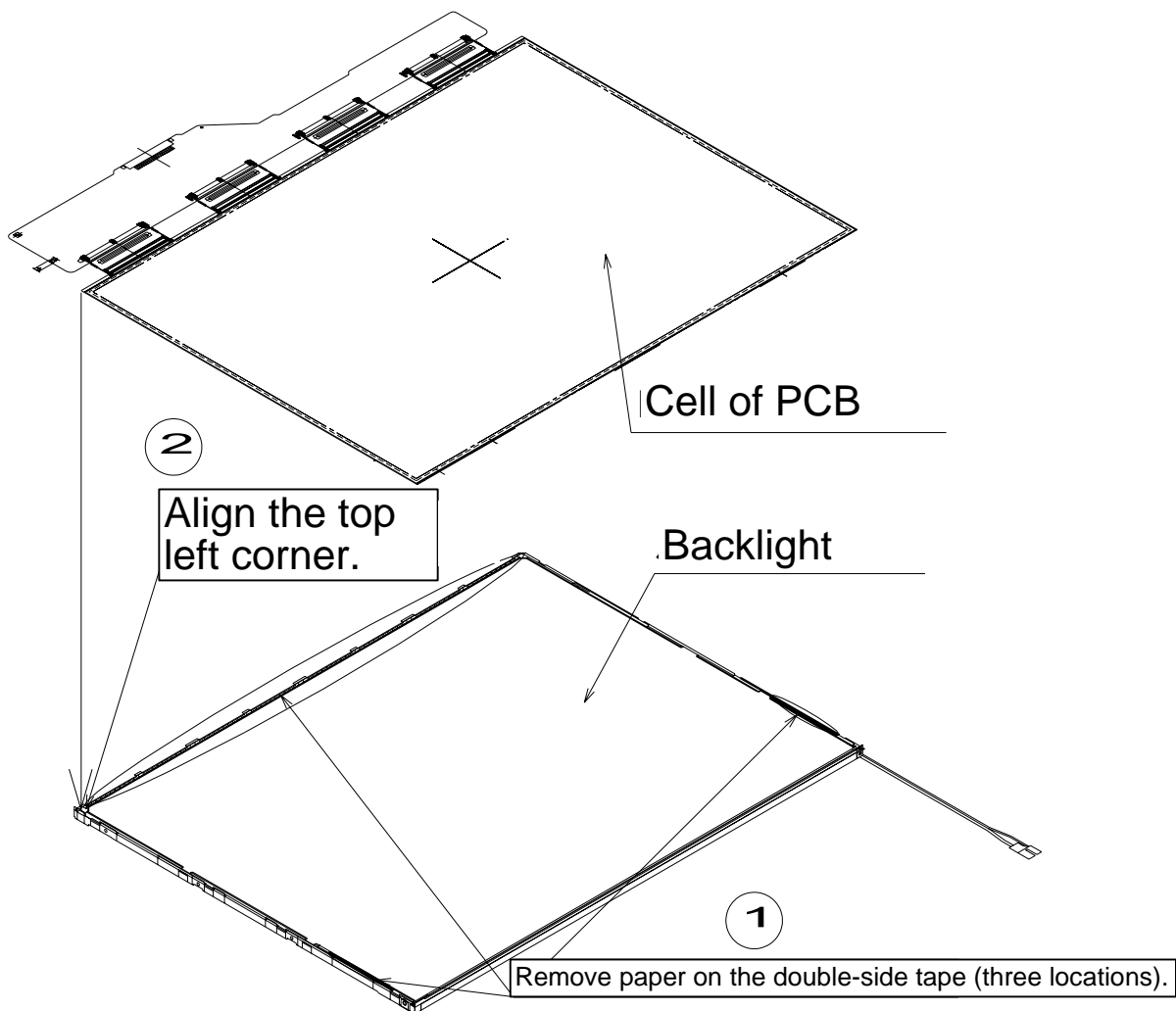


Figure 4-57 Removing the paper coated with a mold release

17. Fold down the TAB (X-PCB) toward the reverse side of the backlight unit, as shown in Figure 4-58.

**CAUTION:** Use care not to damage the TAB.

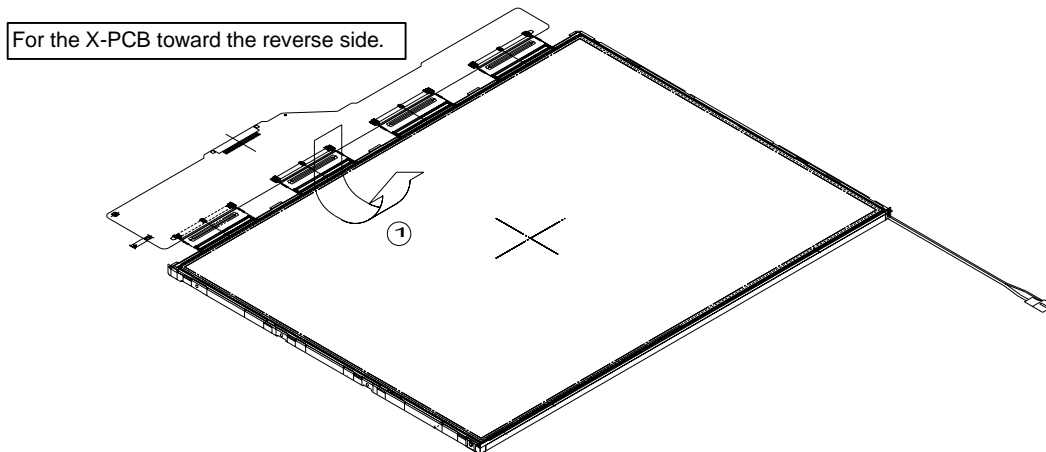


Figure 4-58 Folding down the TAB

18. Start installing the bezel in the upward direction until it stops at the top left corner.

**NOTE:** The GND-CU and lamp reflector on the left-hand side must not go beyond the edges of the bezel.  
Use care 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).



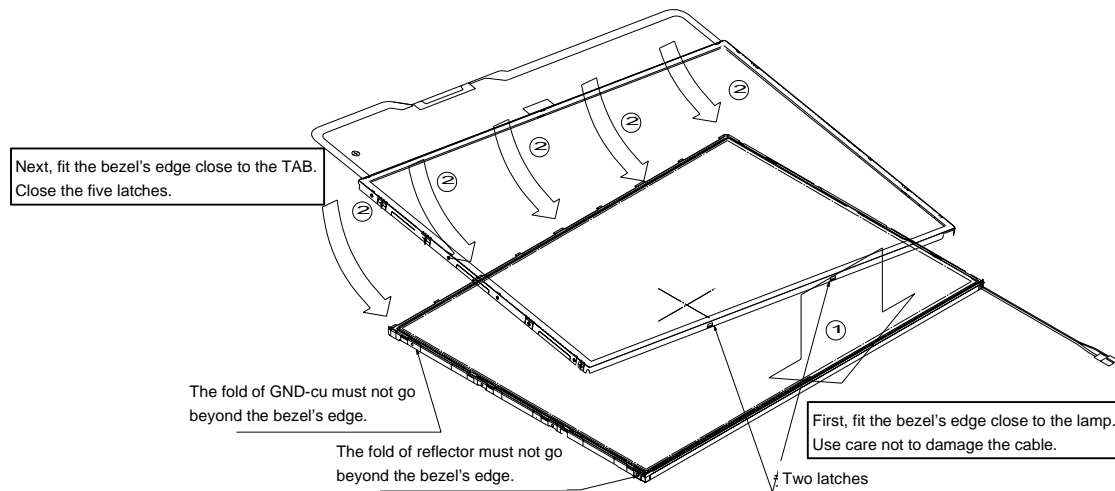


Figure 4-59 Aligning the bezel

19. Fasten the four screws on the left edge in the order ⑤, ⑥, ⑦, and ⑧ shown in Figure 4-59.
20. Fasten the four screws on the right edge in the order ①, ②, ③, and ④ shown in Figure 4-59.

**CAUTION:** Fasten the screws in the orders shown in Figure 4-60. No loose fastening is allowed.

The tightening torque must not exceed  $0.147 \text{ N} \cdot \text{m}$  ( $1.5 \text{ kgf} \cdot \text{cm}$ ) for all the eight screws. For the Philips screwdrivers, use an insert bit of point size 0.

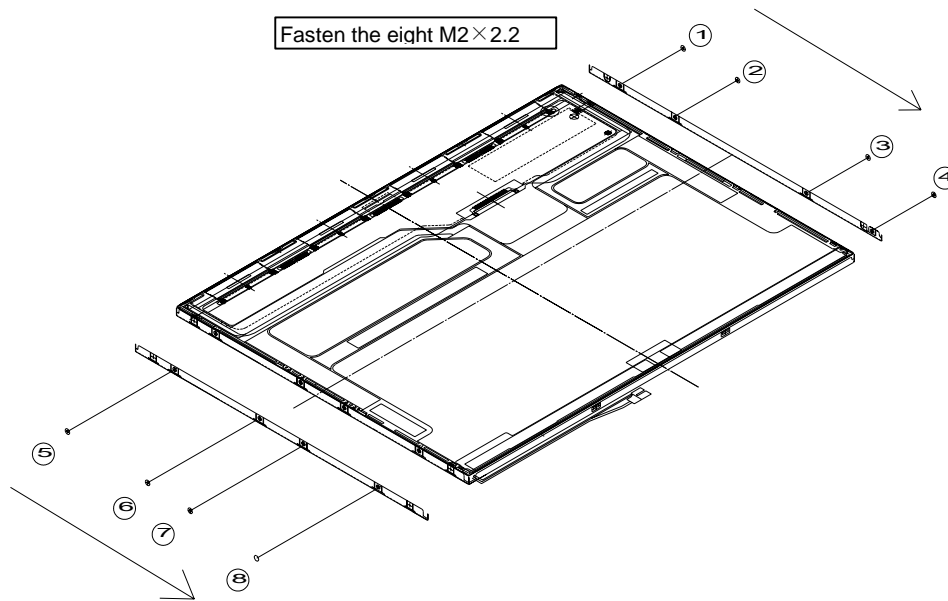


Figure 4-60 Fixing the bezel

21. Attach the PCB insulation sheet (one location).
22. Attach the tape for the bezel to the bottom area close to the lamp (two locations).
23. Attach the tape for fixing the FL tube cable (one location).

**CAUTION:** When attaching tape and insulation sheets, use care not to damage the TAB and lamp cable connections.

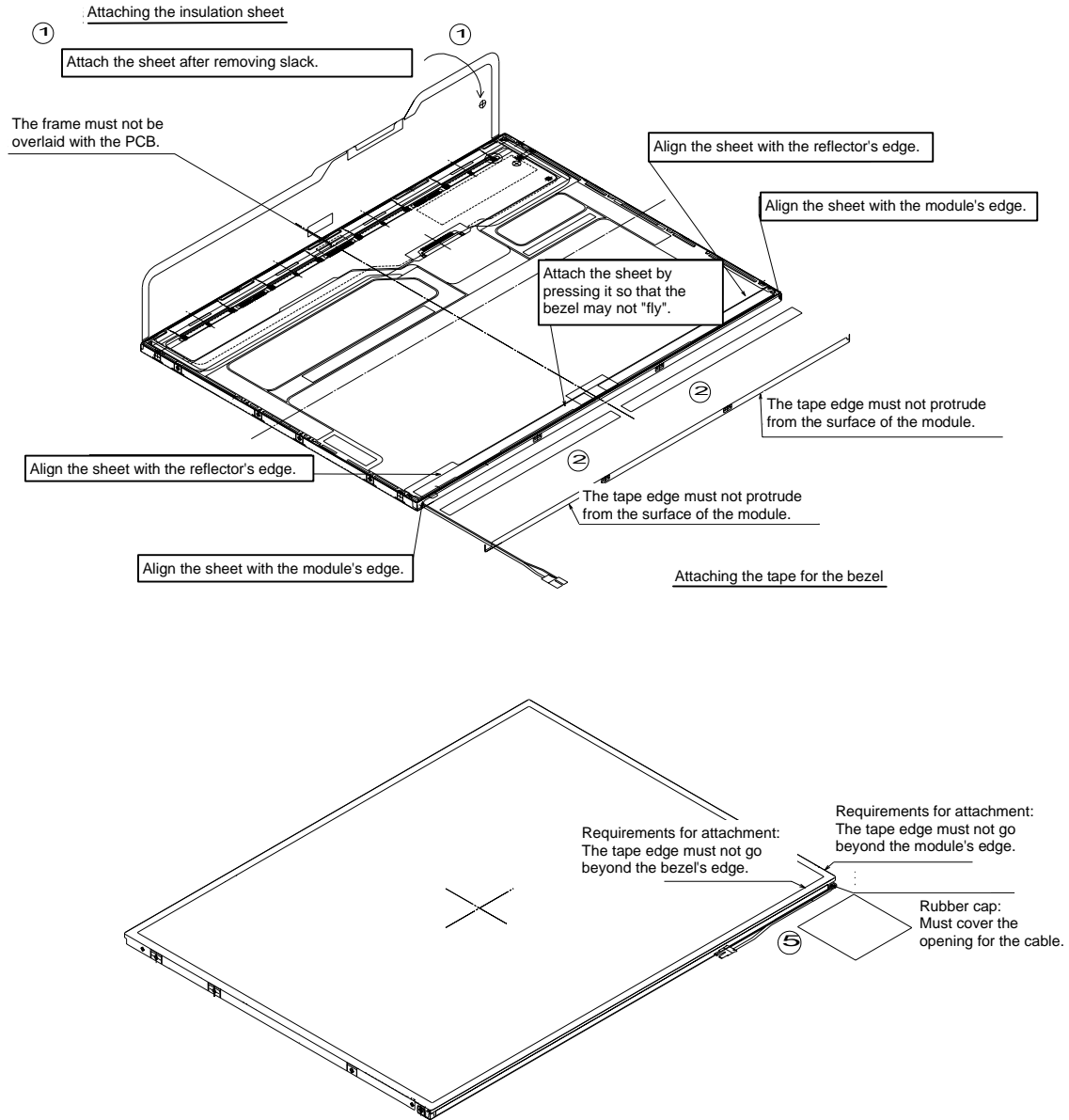


Figure 4-61 Attaching the insulation sheet and tape

## 4.21 Sharp 14.1-inch FL

Replace the Sharp 14.1-inch FL tube according to the following procedures and Figures 4-62 to 4-71.

**CAUTION:** *Wear fingerstalls during working to prevent contamination and damage of the liquid crystal display.*

1. Flip the module over and remove the protective cover S (A), protective cover G (B), aluminum tape (C), tape for lead fixing (D), and retention tape (H). Do not remove the shield tape (I) completely (leave the tape attached partially). Use care not to damage the TCP and chips. Discard the removed tapes.

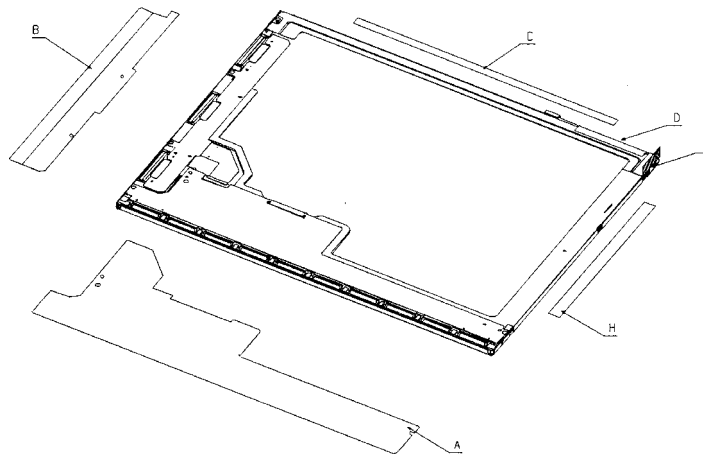
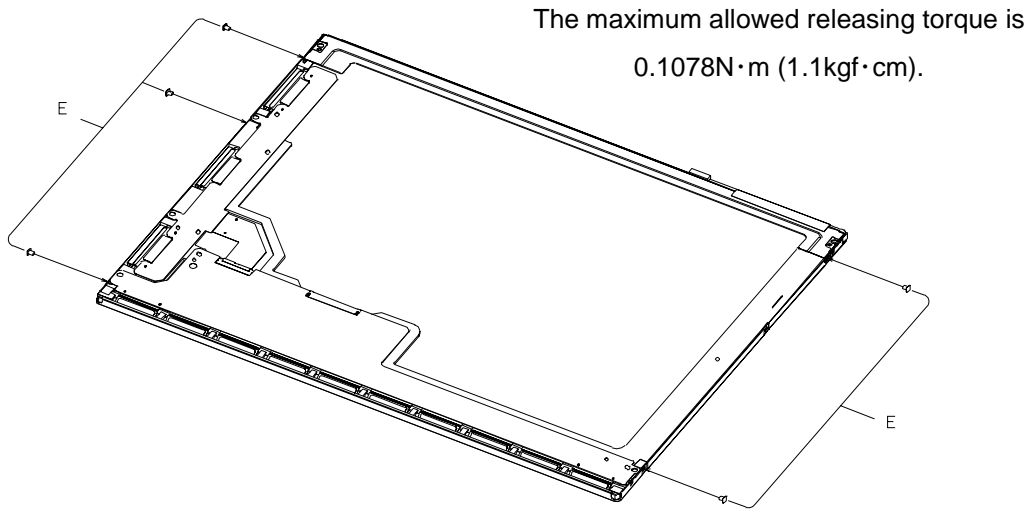


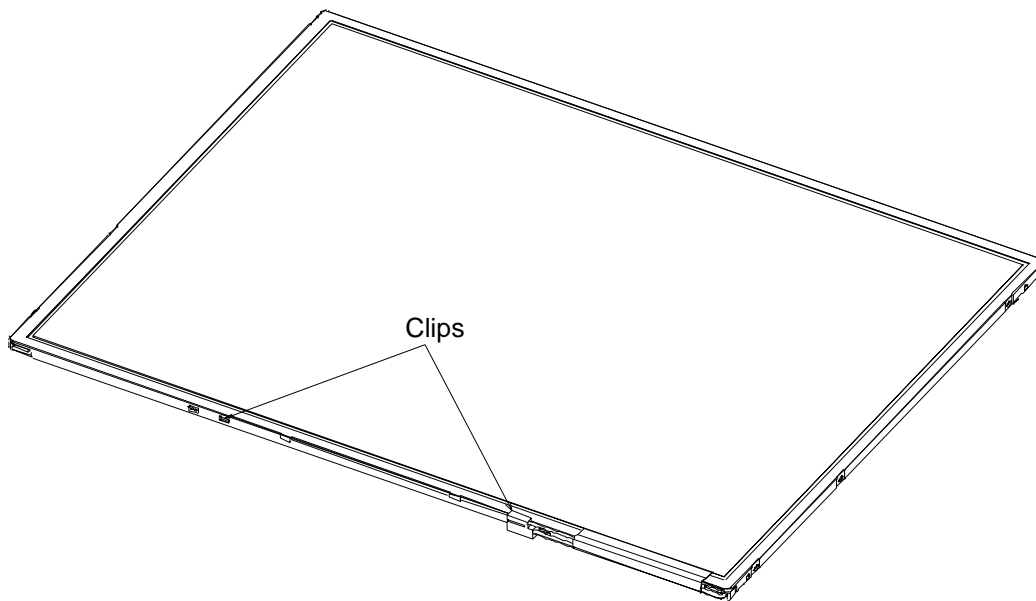
Figure 4-62 Removing the protective cover and tape

2. Remove the screws (E) on both sides.



*Figure 4-63 Removing the screws from the sides*

3. Flip the module over again (with the top of the module facing up) and remove the two clips that are close to the lamp.



*Figure 4-64 Removing the clips close to the lamp*

- Using the U-shaped edge of the bezel as a "hinge," raise the edge of the bezel from which the clips have been removed. Then remove the bezel. Peel off the tape for GND wire fixing (J).

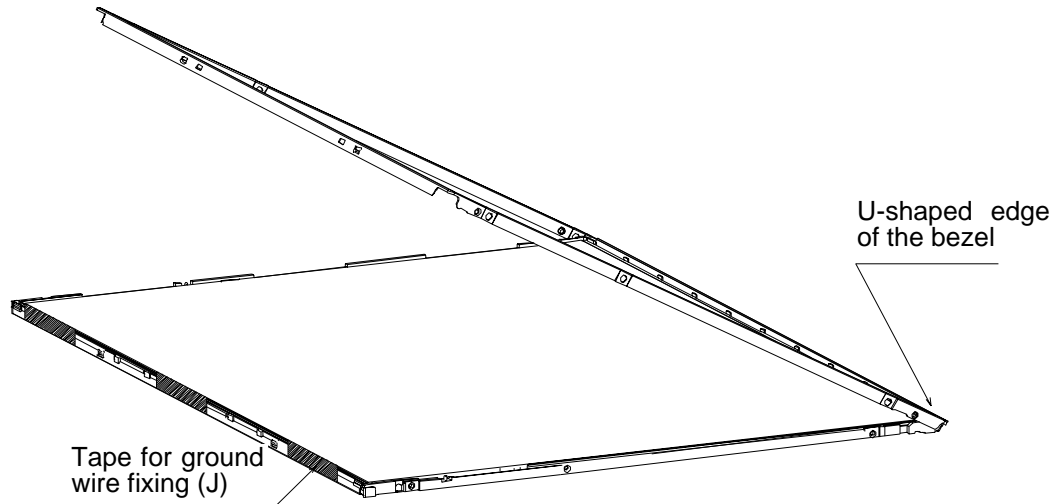


Figure 4-65 Removing the bezel

- Flip the bezel over and remove the two screws (E) and lamp cover (F). Then replace the lamp unit (G) with a new one.

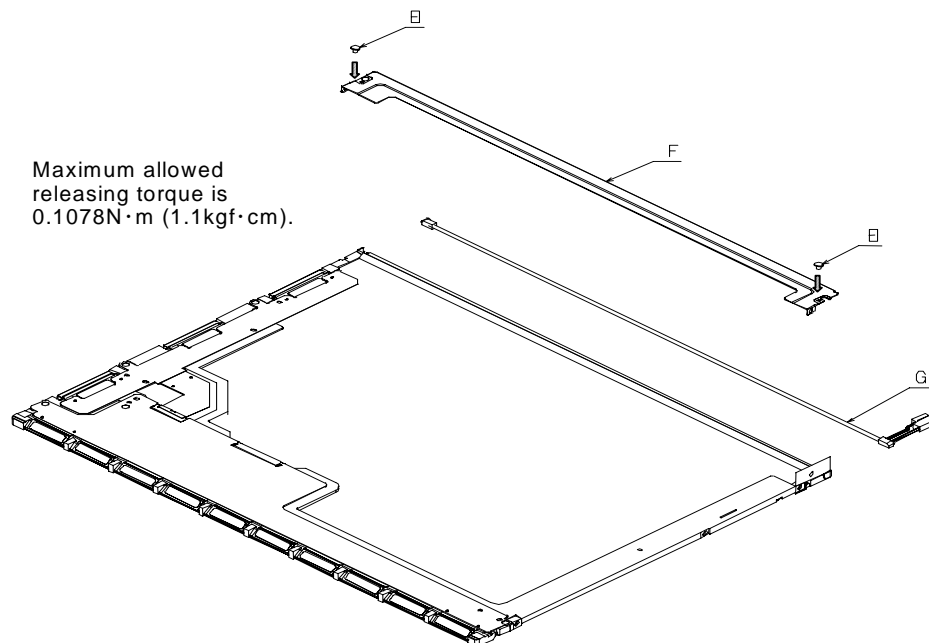


Figure 4-66 Removing the lamp cover

6. Attach the lamp cover (F) and attach the shield tape to the lamp cover after folding it. Then fix the lamp cover with the two screws (E).  
The attached lamp cover must not cover the heads of the engaging pins.  
Around the opening for extracting the lead, the edge of the P chassis should go beyond the edge of lamp cover.

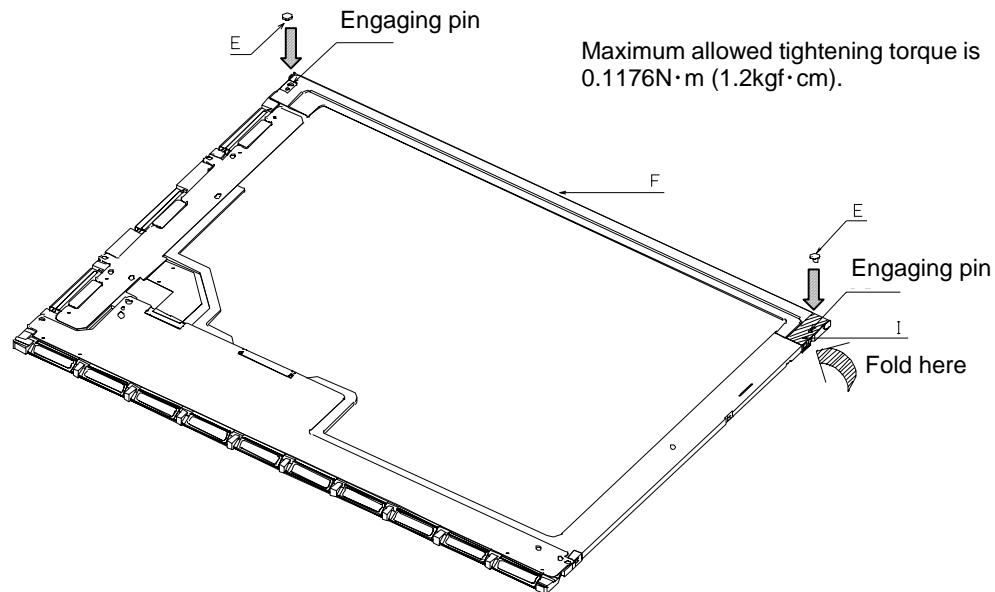


Figure 4-67 Replacing the lamp unit

7. Fix the GND lead with the tape.
8. Check that the guide rib is not overlaid with the panel.
9. After fitting the U-shaped side of the bezel to the P chassis, attach the bezel by pressing the two clips close to the lamp into place.

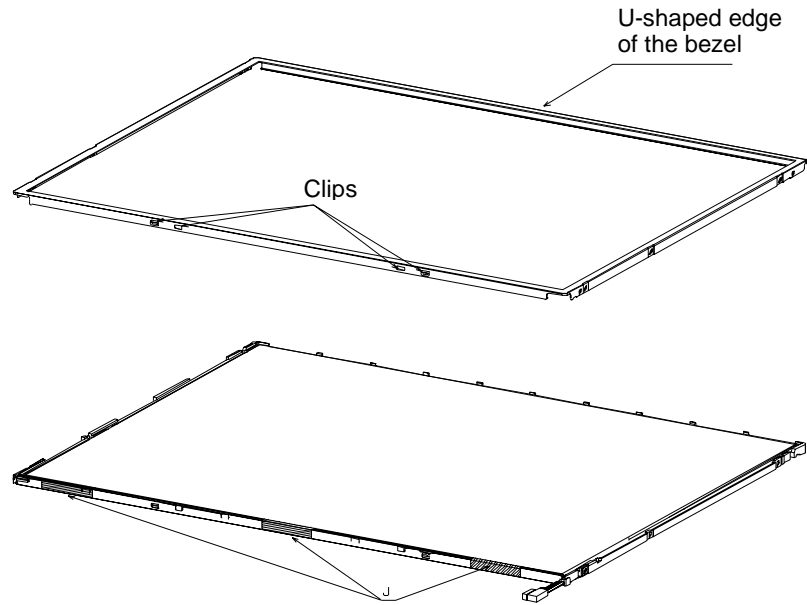


Figure 4-68 Attaching the bezel

10. Fasten the five screws (E) on both sides. Check that the two clip sare engaged in place firmly.

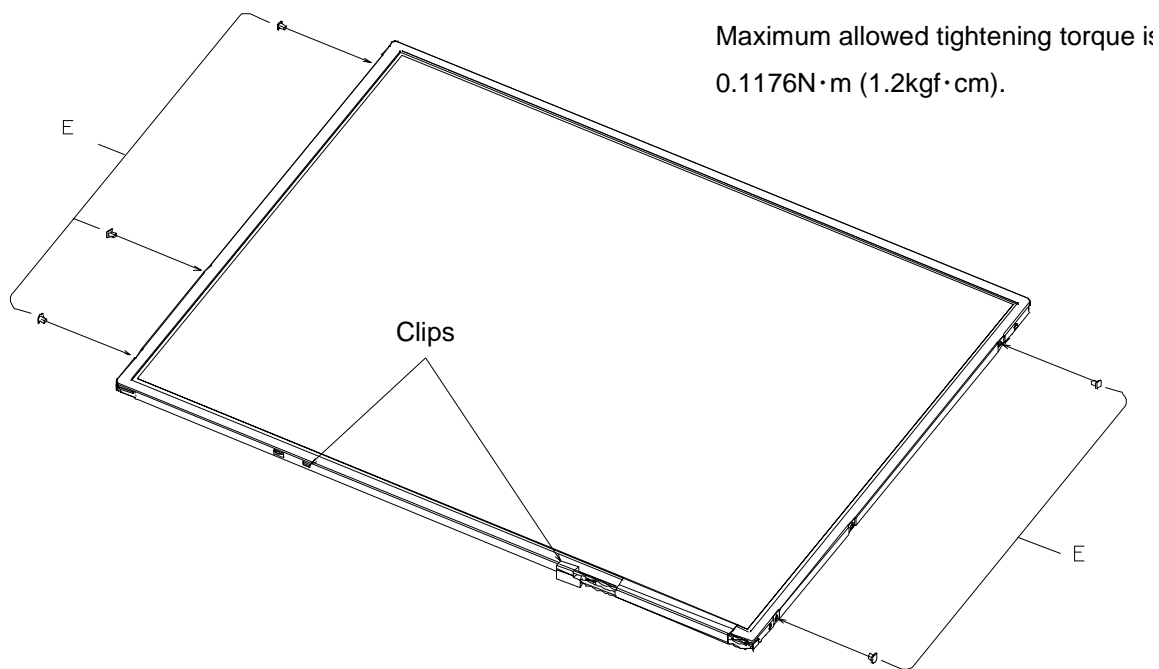


Figure 4-69 Fastening the screws on both sides



11. Attach the protective cover S (A), protective cover G (B), aluminum tape (C), and tape for lead fixing (D), all of which must be new ones.

Attach the protective cover (A) then cover (B), using the engaging pins as the guide. Fold the ends of the covers toward the side of the bezel.

- When attaching the aluminum tape (C)
  - Align a longer side with the marking on the lamp cover on the reverse side of the bezel.
  - Align a shorter side with the edge of the lamp cover.
- When attaching the tape for lead fixing (D)
- Align a longer side with the marking on the lamp cover on the reverse side of the bezel.
  - Align a shorter side with the location where the head of the screw is covered.
- When attaching the retention tape (H)
  - Align both a longer and a shorter sides with the rectangular hole.

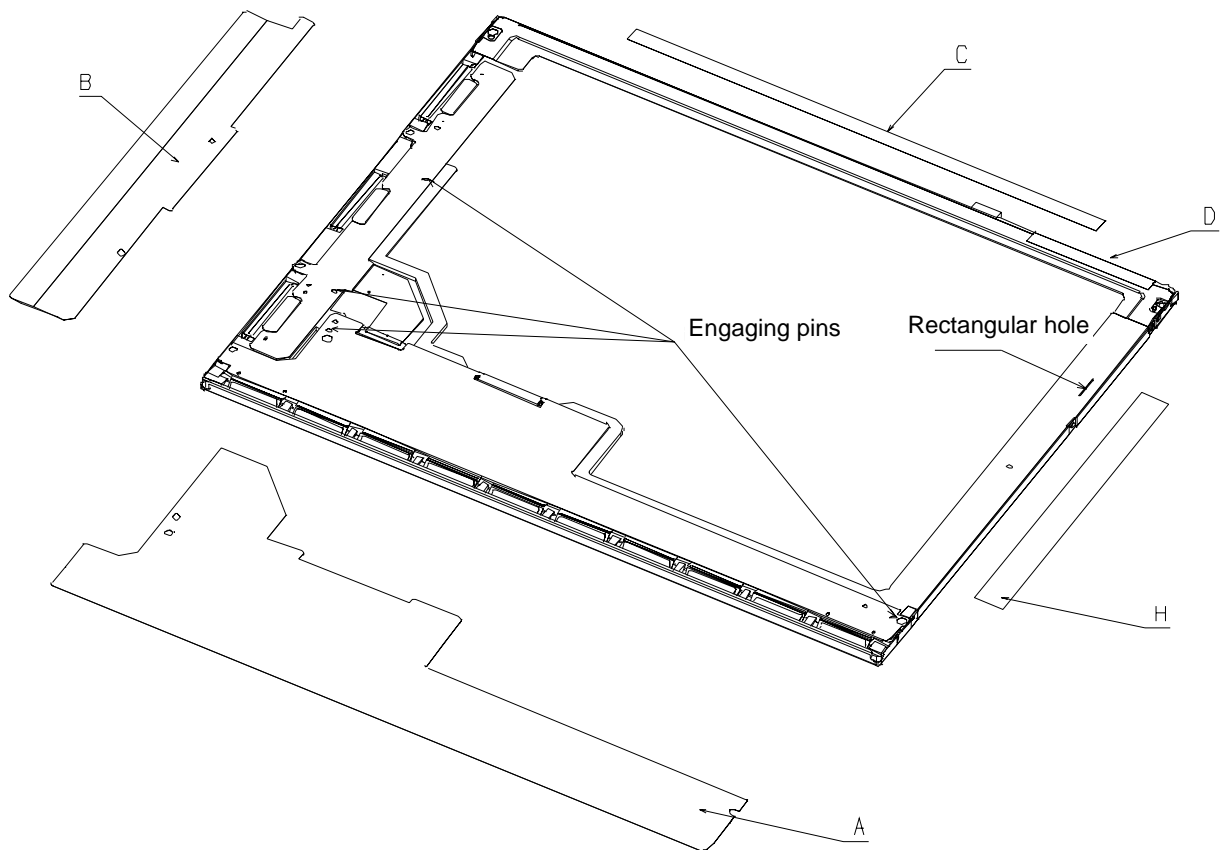


Figure 4-70 Attaching the protective cover and tapes

12. Upon completion of the assembly, perform visual inspections, as shown in Figure 4-90.

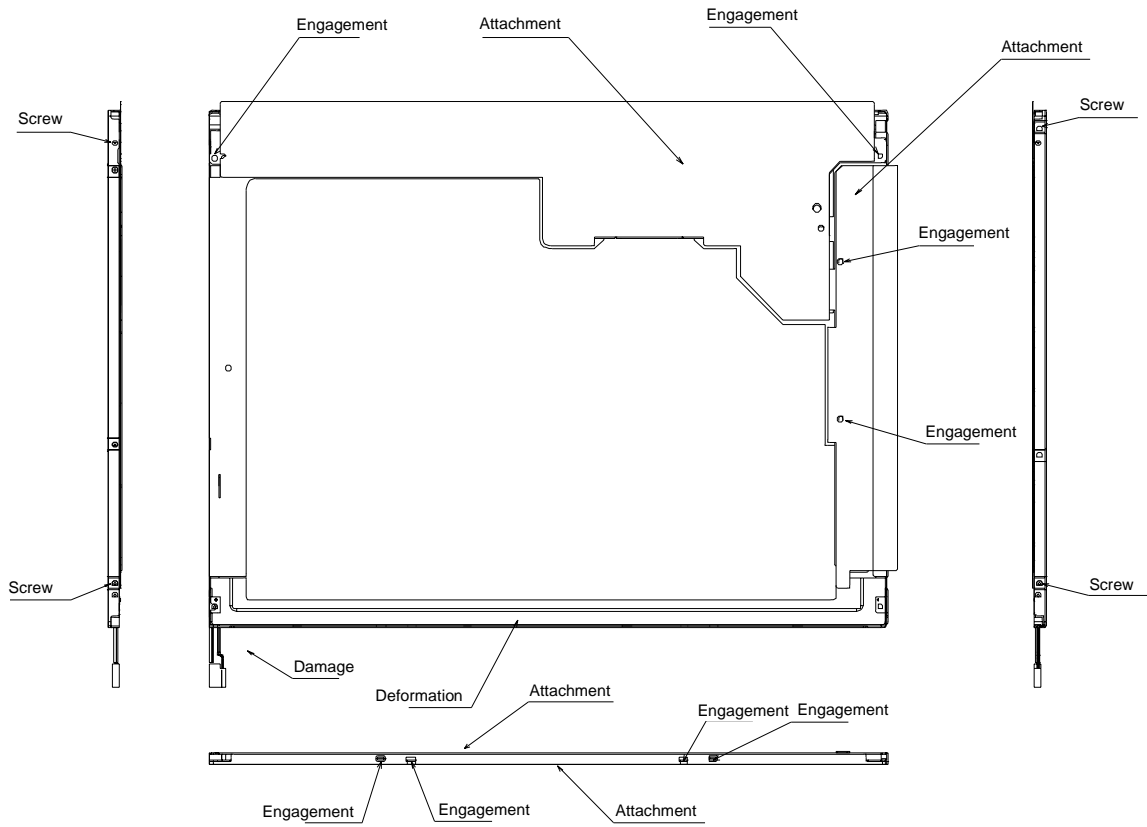


Figure 4-71 Visual inspections

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# **Appendices**

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## Appendix Contents

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<b>Appendix A Handling the LCD Module .....</b>	<b>A-1</b>
<b>Appendix B Board Layout .....</b>	<b>B-1</b>
B.1 System Board Front View .....	B-1
B.2 System Board Back View.....	B-3
B.3 Power Board Front View.....	B-5
B.4 Power Board Back View .....	B-6
<b>Appendix C Pin Assignments.....</b>	<b>C-1</b>
C.1 CN504 Memory Connector (1) (200-Pin).....	C-1
C.2 CN505 Expansion Memory Slot B Connector (2) (200-Pin).....	C-3
C.3 CN7 LCD/FL Inverter Connector (40-Pin).....	C-6
C.4 CN6 External Monitor Connector (15-Pin).....	C-7
C.5 CN14 PC Card Slot Connector (150-Pin) .....	C-8
C.6 CN10 Sound Board I/F Connector (30-Pin).....	C-10
C.7 CN15 Cooling Module Connector (3-Pin).....	C-10
C.8 CN18 Keyboard Connector (34-Pin).....	C-11
C.9 CN501 MDC Connector (30-Pin) .....	C-12
C.10 CN502 MDC I/F Connector .....	C-12
C.11 CN17 Selectable Bay Connector (72-Pin) .....	C-13
C.12 CN16 HDD Connector (44-Pin).....	C-14
C.13 CN5 Parallel Connector (25-Pin) .....	C-15
C.14 CN3 Serial Connector (9-Pin).....	C-15
C.15 CN11 DC IN Connector (4-Pin).....	C-15
C.16 CN22 Power Supply Board I/F Connector (15-Pin) .....	C-16
C.17 CN21 Power Supply Board I/F Connector (14-Pin) .....	C-16
C.18 CN20 Power Supply Connector .....	C-16
C.19 CN23 Power Supply Connector .....	C-17
C.20 CN1 PS/2 Connector (6-Pin).....	C-17

C.21	JACK1 TV OUT Connector (3-Pin) .....	C-17
C.22	CN2 USB Connector (8-Pin).....	C-17
C.23	CN19 Membrane Connector (6-Pin).....	C-18
C.24	CN4 RJ45 (8-Pin+2LED)/RJ11 (2-Pin) Connector .....	C-18
C.25	CN12 MINI PCI Connector (124-Pin).....	C-19
C.26	CN8 Internal Left Speaker Connector (3-Pin) .....	C-21
C.27	CN9 Internal Right Speaker Connector (2-Pin) .....	C-21
C.28	CN503 Expansion Docking connector B (240 pin + power) .....	C-22
C.29	CN520 RTC Battery Connector (2-Pin).....	C-25
C.30	JACK1001 Headphone Connector (8-Pin).....	C-25
C.31	JACK1000 Microphone Connector (8-Pin) .....	C-26
C.32	CN1000 Interface Connector (30-Pin) .....	C-26
C.33	CN1001 IR Connector (10-pin).....	C-26

**Appendix D Keyboard Scan/Character Codes..... D-1**

**Appendix E Key Layout ..... E-1**

E.1	United States (US) Keyboard .....	E-1
E.2	United Kindom (UK) Keyboard .....	E-1
E.3	Korea Keyboard .....	E-2

**Appendix F Wiring Diagrams ..... F-1**

F.1	Parallel Port Wraparound Connector.....	F-1
F.2	Serial Port Wraparound Connector.....	F-1
F.3	Serial Port Direct Cable (9-Pin to 9-Pin) .....	F-2
F.4	Serial Port Direct Cable (9-Pin to 25-Pin).....	F-2

**Appendix G BIOS Rewrite Procedures ..... G-1**

**Appendix H EC/KBC Rewrite Procedures..... H-1**

## Figures

Figure B-1	System Board layout (front).....	B-1
Figure B-2	System Board layout ( back ).....	B-3
Figure E-1	US keyboard.....	E-1
Figure E-2	UK keyboard.....	E-1
Figure E-3	Korea keyboard.....	E-2
Figure F-1	Parallel port wraparound connector.....	F-1
Figure F-2	Serial port wraparound connector.....	F-1
Figure F-3	Serial port direct cable (9-Pin to 9-Pin).....	F-2
Figure F-2	Serial port direct cable (9-Pin to 25-Pin).....	F-2

## Tables

Table B-1	System board ICs and connectors (front).....	B-2
Table B-2	System board ICs and connectors (back).....	B-4
Table C-1	Memory connector (1) pin assignments (200-PIN).....	C-1
Table C-2	Expansion memory slot B connector (2) pin assignments (200-pin).....	C-4
Table C-3	LCD/FL inverter connector pin assignments (40-pin).....	C-7
Table C-4	External monitor connector pin assignments (15-pin).....	C-7
Table C-5	PC card slot connector pin assignments (150-pin).....	C-8
Table C-6	Sound board I/F connector pin assignments (30-pin).....	C-10
Table C-7	Cooling module connector pin assignments (3-pin).....	C-10
Table C-8	Keyboard connector pin assignments (34-pin).....	C-11
Table C-9	MDC connector pin assignments (30-Pin).....	C-12
Table C-10	MDC I/F connector pin assignments (2-Pin).....	C-12
Table C-11	Selectable bay connector pin assignments (72-Pin).....	C-13
Table C-12	HDD connector pin assignments (44-Pin).....	C-14
Table C-13	Parallel connector pin assignments (25-Pin).....	C-15
Table C-14	Serial connector pin assignments (9-Pin).....	C-15
Table C-15	DC IN connector pin assignments (4-Pin).....	C-15
Table C-16	Power supply board I/F connector pin assignments (15-Pin).....	C-16



Table C-17	Power supply board I/F connector pin assignments (14-Pin).....	C-16
Table C-18	CN20 Power supply Connector pin assignments (20-Pin) .....	C-16
Table C-19	CN23 Power Supply Connector pin assignments (20-Pin).....	C-17
Table C-20	PS/2 connector pin assignments (6-Pin) .....	C-17
Table C-21	TV OUT connector pin assignments (3-Pin) .....	C-17
Table C-22	USB connector pin assignments (8-Pin).....	C-17
Table C-23	Membrane connector pin assignments (6-Pin) .....	C-18
Table C-24	RJ45 (8-Pin+2LED)/RJ11 (2-Pin) connector pin assignments.....	C-18
Table C-25	MINI PCI connector pin assignments (124-Pin) .....	C-19
Table C-26	Internal left speaker connector pin assignments (3-Pin).....	C-21
Table C-27	Internal right speaker connector pin assignments (2-Pin) .....	C-21
Table C-28	Expansion Docking connector B (240 pin + power) .....	C-22
Table C-29	RTC battery connector pin assignments (2-Pin).....	C-25
Table C-30	Headphone connector pin assignments (8-Pin) .....	C-25
Table C-31	Microphone connector pin assignments (8-Pin).....	C-26
Table C-32	<i>CN1000 Interface Connector</i> pin assignments (30-Pin).....	C-26
Table C-33	<i>CN1001 IR Connector</i> pin assignments (10-Pin).....	C-26
Table D-1	Scan codes (set 1 and set 2) .....	D-1
Table D-2	Scan codes with left Shift key.....	D-5
Table D-3	Scan codes in Numlock mode.....	D-6
Table D-4	Scan codes with Fn key.....	D-6
Table D-5	Scan codes in overlay mode.....	D-7
Table D-6	No.124 key scan code .....	D-7
Table D-7	No.126 key scan code .....	D-8

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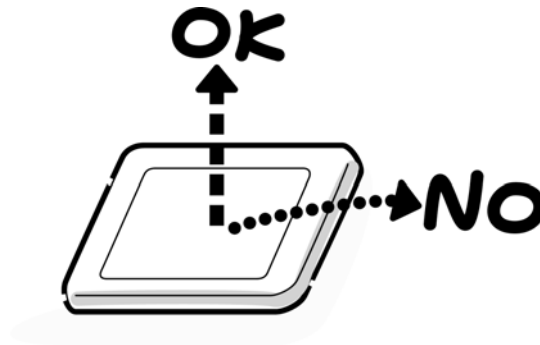
## Appendix A Handling the LCD Module

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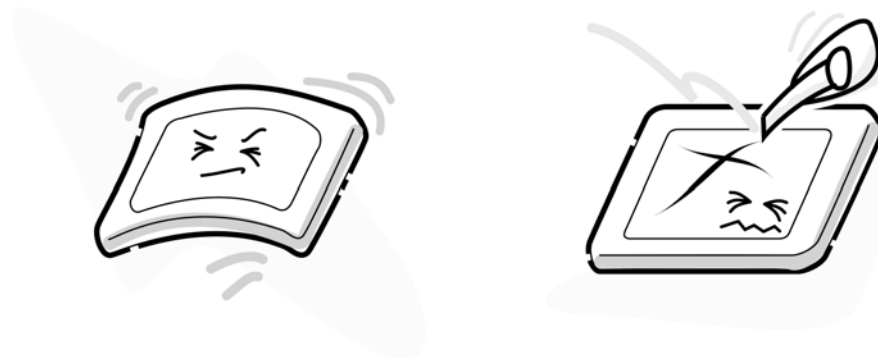
### Precautions for handling the LCD module

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 four holes at the right side and left side of the LCD module with the corresponding holes in the LCD cover before securing the module with four 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.

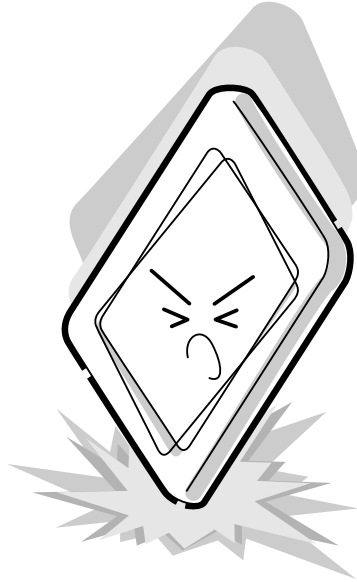
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel. Also, never scratch the surface.



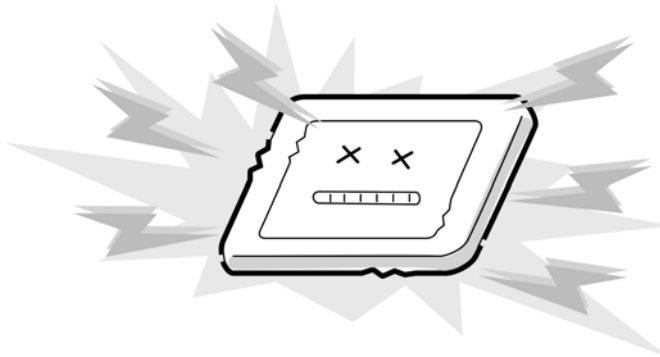
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



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



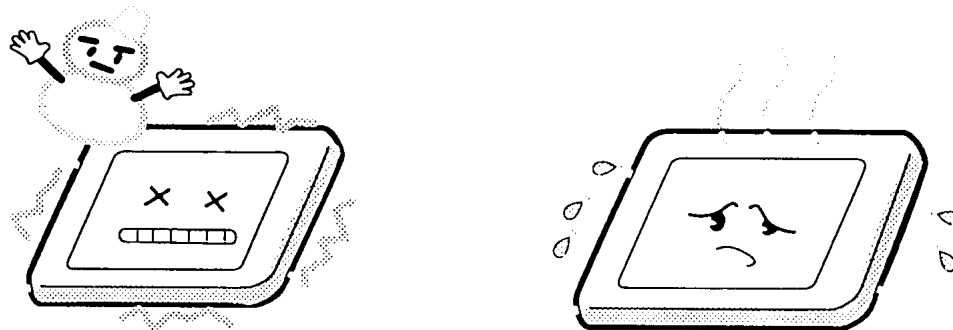
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



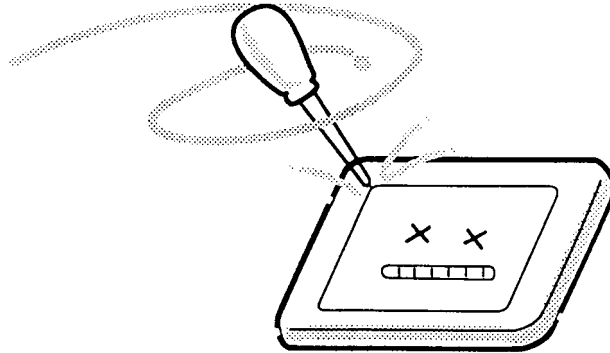
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



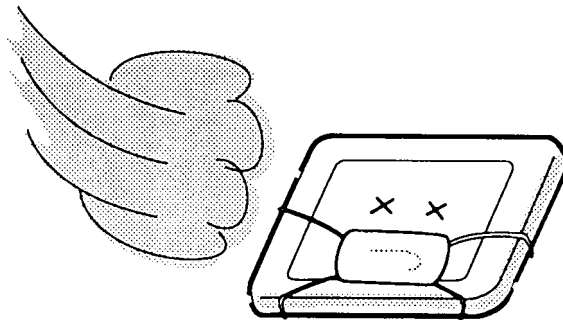
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



9. Do not disassemble the LCD module. Disassembly can cause malfunctions.



10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.



## Appendix B Board Layout

### B.1 System Board Front View

Figure B-1 System Board layout (front)

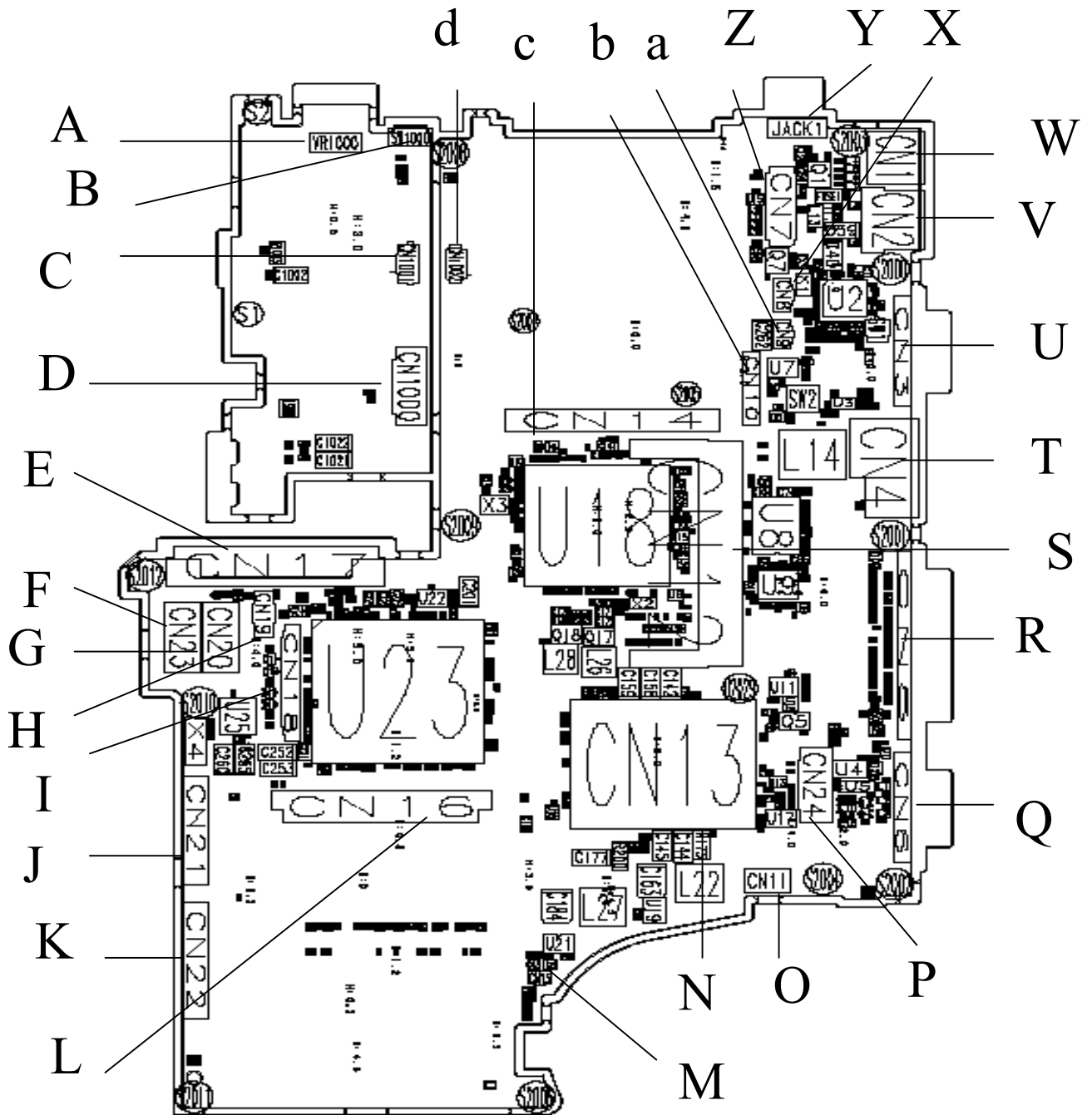


Table B-1 System board ICs and connectors (front)

Mark	Number	Name
A	VR1000	Volume
B	SW1000	Wireless communication switch
C	CN1001	Interface connector
D	CN1000	Interface Connector
E	CN17	Selectable bay Connector
F	CN23	Power supply Connector
G	CN20	Power supply Connector
H	CN19	Membrane Connector
I	CN18	keyboard Connector
J	CN21	Power supply Connector
K	CN22	Power supply Connector
L	CN16	HDD Connector
M	CN15	Cooling module Connector
N	CN13	CPU Connector
O	CN11	DC IN
P	CN24	ITP Port connector
Q	CN6	External monitor connector
R	CN5	Parallel connector
S	CN12	MINI PCI connector
T	CN14	RJ45/RJ11 connector
U	CN3	Serial connector
V	CN2	USB connector
W	CN1	PS/2 Connector
X	CN8	Internal left speaker connector
Y	JACK1	TV OUT connector
Z	CN7	LCD/FL INVERTER connector
a	CN9	Internal right speaker connector
b	CN10	Sound board I/F connector
c	CN1002	Sound board I/F connector
d	CN14	PC CARD SLOT connector



**B.2 System Board Back View**

Figure B-2 System Board layout ( back )

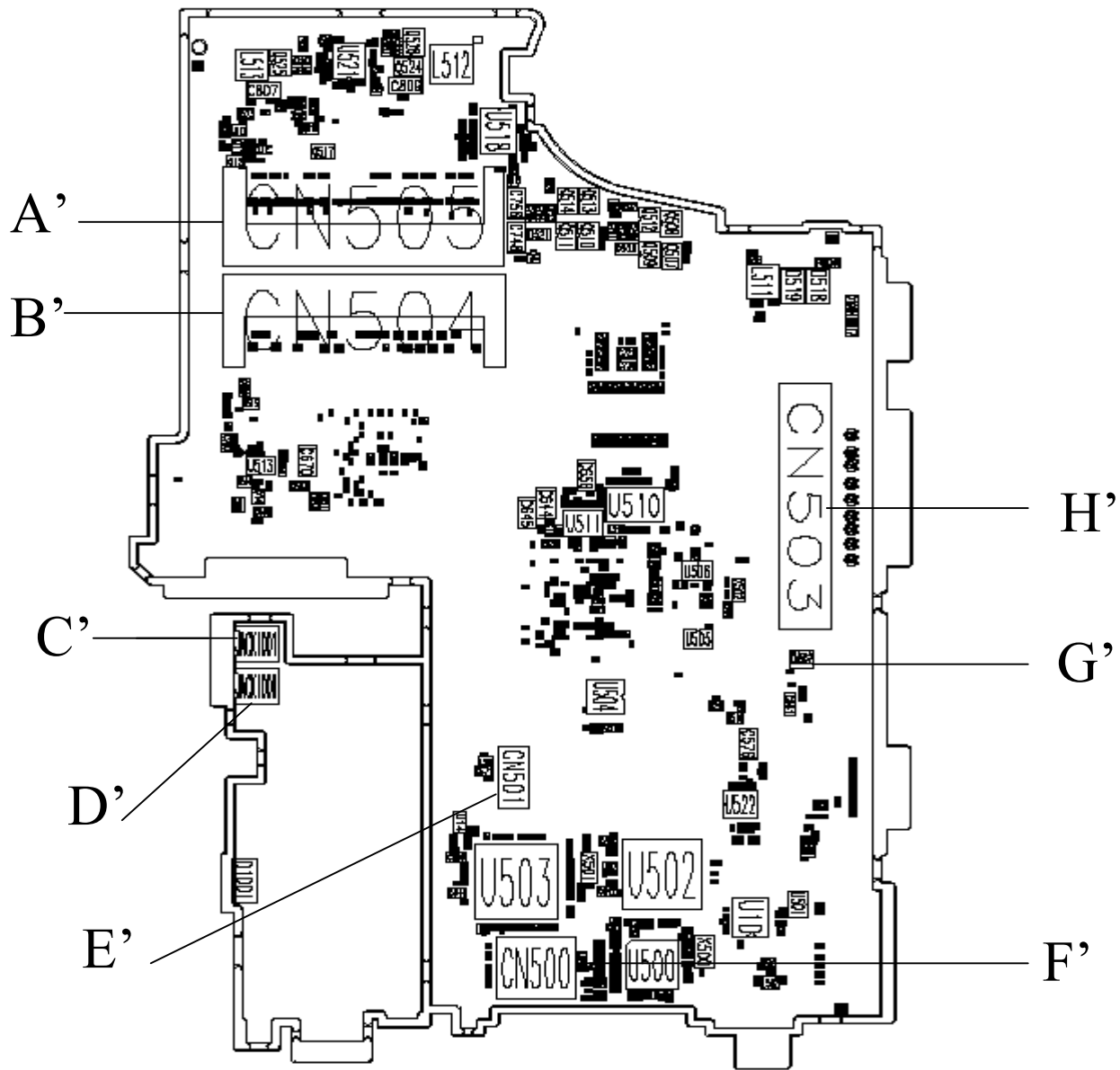
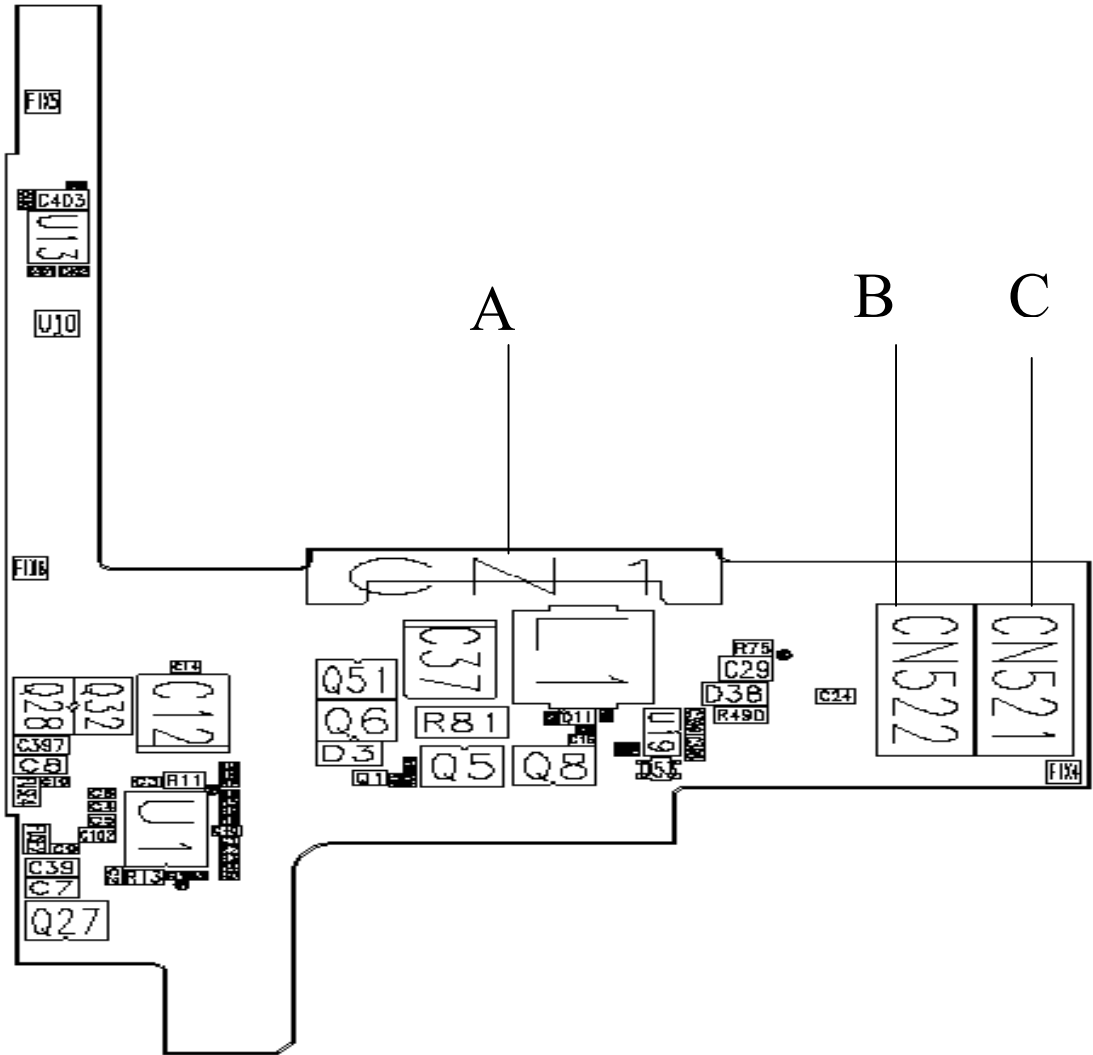


Table B-2 System board ICs and connectors (back)

<b>Mark</b>	<b>Number</b>	<b>Name</b>
A'	CN505	Expansion memory connector slot B
B'	CN504	Memory connector
C'	JACK1001	HEAD PHONE Connector
D'	JACK1000	Microphone Connector
E'	CN501	MDC Connector
F'	CN500	BIOS Socket
G'	CN502	MDC I/F Connector
H'	CN503	Expansion docking Connector B

### B.3 Power Board Front View

Figure B-3 Power Board layout (Front)



## B.4 Power Board Back View

Fig B-4 Power Board Layout (Back View)

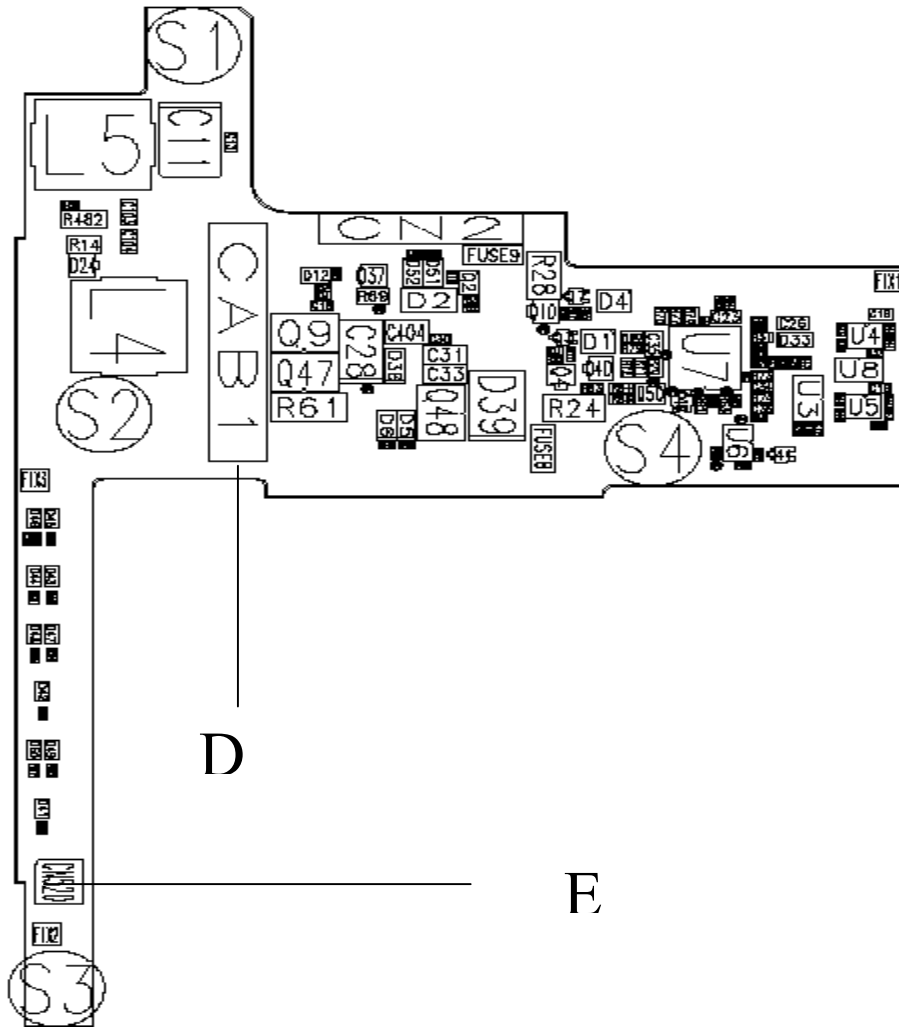


Table -3 Power supply board ICs and connectors

Mark	Number	Name
A	CN1	Main battery connector
B	CN522	System board I/F Connector
C	CN521	System Board I/F Connector
D	CAB1	System board I/F wiring
E	CN2	SUB battery connector

## Appendix C Pin Assignments

### System Board

#### C.1 CN504 Memory Connector (1) (200-Pin)

Table C-1 Memory connector (1) pin assignments (200-PIN)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	SM_VREF	-	2	SM_VREF	-
3	GND	-	4	GND	-
5	M_DATA_R_(0)	I/O	6	M_DATA_R_(4)	I/O
7	M_DATA_R_(1)	I/O	8	M_DATA_R_(5)	I/O
9	+V2.5	-	10	+V2.5	-
11	M_DQS_R(0)	I/O	12	M_DM_R(0)	-
13	M_DATA_R_(2)	I/O	14	M_DATA_R_(6)	I/O
15	GND	-	16	GND	-
17	M_DATA_R_(3)	I/O	18	M_DATA_R_(7)	I/O
19	M_DATA_R_(8)	I/O	20	M_DATA_R_(12)	I/O
21	+V2.5	-	22	+V2.5	-
23	M_DATA_R_(9)	I/O	24	M_DATA_R_(13)	I/O
25	M_DQS_R(1)	I/O	26	M_DM_R(1)	-
27	GND	-	28	GND	-
29	M_DATA_R_(10)	I/O	30	M_DATA_R_(14)	I/O
31	M_DATA_R_(11)	I/O	32	M_DATA_R_(15)	I/O
33	+V2.5	-	34	+V2.5	-
35	M_CLK_DDR0	I/O	36	+V2.5	-
37	M_CLK_DDR0#	I/O	38	GND	-
39	GND	-	40	GND	-
41	M_DATA_R_(16)	I/O	42	M_DATA_R_(20)	I/O
43	M_DATA_R_(17)	I/O	44	M_DATA_R_(21)	I/O
45	+V2.5	-	46	+V2.5	-
47	M_DQS_R(2)	I/O	48	M_DM_R(2)	-
49	M_DATA_R_(18)	I/O	50	M_DATA_R_(22)	I/O
51	GND	-	52	GND	-
53	M_DATA_R_(19)	I/O	54	M_DATA_R_(23)	I/O
55	M_DATA_R_(24)	I/O	56	M_DATA_R_(28)	I/O
57	+V2.5	-	58	+V2.5	-
59	M_DATA_R_(25)	I/O	60	M_DATA_R_(29)	I/O

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
61	M_DQS_R(3)	I/O	62	M_DM_R(3)	-
63	GND	-	64	GND	-
65	M_DATA_R_(26)	I/O	66	M_DATA_R_(30)	I/O
67	M_DATA_R_(27)	I/O	68	M_DATA_R_(31)	I/O
69	+V2.5	-	70	+V2.5	-
71	N.C	-	72	N.C	-
73	N.C	-	74	N.C	-
75	GND	-	76	GND	-
77	N.C	-	78	GND	-
79	N.C	-	80	N.C	-
81	+V2.5	-	82	+V2.5	-
83	N.C	-	84	N.C	-
85	N.C	-	86	N.C	-
87	GND	-	88	GND	-
89	N.C	-	90	GND	-
91	N.C	-	92	+V2.5	-
93	+V2.5	-	94	+V2.5	-
95	M_CKE1	I/O	96	M_CKE0	I/O
97	N.C	-	98	N.C	-
99	M_A_FR_(12)	I/O	100	M_A_FR_(11)	I/O
101	M_A_FR_(9)	I/O	102	M_A_FR_(8)	I/O
103	GND	-	104	GND	-
105	M_A_FR_(7)	I/O	106	M_A_FR_(6)	I/O
107	M_A(5)	I/O	108	M_A(4)	I/O
109	M_A_FR_(3)	I/O	110	M_A(2)	I/O
111	M_A(1)	I/O	112	M_A_FR_(0)	I/O
113	+V2.5	-	114	+V2.5	-
115	M_A_FR_(10)	I/O	116	M_BS1_FR#	I/O
117	M_BS0_FR#	I/O	118	M_RAS_FR#	I/O
119	M_WE_FR#	I/O	120	M_CAS_FR#	I/O
121	M_CS0#	I/O	122	M_CS1#	I/O
123	N.C	-	124	N.C	-
125	GND	-	126	GND	-
127	M_DATA_R_(32)	I/O	128	M_DATA_R_(36)	I/O
129	M_DATA_R_(33)	I/O	130	M_DATA_R_(37)	I/O
131	+V2.5	-	132	+V2.5	-

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
133	M_DQS_R(4)	I/O	134	M_DM_R(4)	-
135	M_DATA_R_(34)	I/O	136	M_DATA_R_(38)	I/O
137	GND	-	138	GND	-
139	M_DATA_R_(35)	I/O	140	M_DATA_R_(39)	I/O
141	M_DATA_R_(40)	I/O	142	M_DATA_R_(44)	I/O
143	+V2.5	-	144	+V2.5	-
145	M_DATA_R_(41)	I/O	146	M_DATA_R_(45)	I/O
147	M_DQS_R(5)	I/O	148	M_DM_R(5)	-
149	GND	-	150	GND	-
151	M_DATA_R_(42)	I/O	152	M_DATA_R_(46)	I/O
153	M_DATA_R_(43)	I/O	154	M_DATA_R_(47)	I/O
155	+V2.5	-	156	+V2.5	-
157	+V2.5	-	158	M_CLK_DDR1#	I/O
159	GND	-	160	M_CLK_DDR1	I/O
161	GND	-	162	GND	-
163	M_DATA_R_(48)	I/O	164	M_DATA_R_(52)	I/O
165	M_DATA_R_(49)	I/O	166	M_DATA_R_(53)	I/O
167	+V2.5	-	168	+V2.5	-
169	M_DQS_R(6)	-	170	M_DM_R(6)	-
171	M_DATA_R_(50)	I/O	172	M_DATA_R_(54)	I/O
173	GND	-	174	GND	-
175	M_DATA_R_(51)	I/O	176	M_DATA_R_(55)	I/O
177	M_DATA_R_(56)	I/O	178	M_DATA_R_(60)	I/O
179	+V2.5	-	180	+V2.5	-
181	M_DATA_R_(57)	I/O	182	M_DATA_R_(61)	I/O
183	M_DQS_R(7)	I/O	184	M_DM_R(7)	-
185	GND	-	186	GND	-
187	M_DATA_R_(58)	I/O	188	M_DATA_R_(62)	I/O
189	M_DATA_R_(59)	I/O	190	M_DATA_R_(63)	I/O
191	+V2.5	-	192	+V2.5	-
193	ICH_SMDAT	I/O	194	+V3S	-
195	ICH_SMCLK	I/O	196	GND	-
197	+V3S	-	198	GND	-
199	N.C	-	200	N.C	-

**C.2 CN505 Expansion Memory Slot B Connector (2) (200-Pin)***Table C-2 Expansion memory slot B connector (2) pin assignments (200-pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	SM_VREF	-	2	SM_VREF	-
3	GND	-	4	GND	-
5	M_DATA_R_(0)	I/O	6	M_DATA_R_(4)	I/O
7	M_DATA_R_(1)	I/O	8	M_DATA_R_(5)	I/O
9	+V2.5	-	10	+V2.5	-
11	M_DQS_R(0)	I/O	12	M_DM_R(0)	-
13	M_DATA_R_(2)	I/O	14	M_DATA_R_(6)	I/O
15	GND	-	16	GND	-
17	M_DATA_R_(3)	I/O	18	M_DATA_R_(7)	I/O
19	M_DATA_R_(8)	I/O	20	M_DATA_R_(12)	I/O
21	+V2.5	-	22	+V2.5	-
23	M_DATA_R_(9)	I/O	24	M_DATA_R_(13)	I/O
25	M_DQS_R(1)	I/O	26	M_DM_R(1)	-
27	GND	-	28	GND	-
29	M_DATA_R_(10)	I/O	30	M_DATA_R_(14)	I/O
31	M_DATA_R_(11)	I/O	32	M_DATA_R_(15)	I/O
33	+V2.5	-	34	+V2.5	-
35	M_CLK_DDR3	I/O	36	+V2.5	-
37	M_CLK_DDR3#	I/O	38	GND	-
39	GND	-	40	GND	-
41	M_DATA_R_(16)	I/O	42	M_DATA_R_(20)	I/O
43	M_DATA_R_(17)	I/O	44	M_DATA_R_(21)	I/O
45	+V2.5	-	46	+V2.5	-
47	M_DQS_R(2)	I/O	48	M_DM_R(2)	-
49	M_DATA_R_(18)	I/O	50	M_DATA_R_(22)	I/O
51	GND	-	52	GND	-
53	M_DATA_R_(19)	I/O	54	M_DATA_R_(23)	I/O
55	M_DATA_R_(24)	I/O	56	M_DATA_R_(28)	I/O
57	+V2.5	-	58	+V2.5	-
59	M_DATA_R_(25)	I/O	60	M_DATA_R_(29)	I/O



Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
61	M_DQS_R(3)	I/O	62	M_DM_R(3)	-
63	GND	-	64	GND	-
65	M_DATA_R_(26)	I/O	66	M_DATA_R_(30)	I/O
67	M_DATA_R_(27)	I/O	68	M_DATA_R_(31)	I/O
69	+V2.5	-	70	+V2.5	-
71	N.C	-	72	N.C	-
73	N.C	-	74	N.C	-
75	GND	-	76	GND	-
77	N.C	-	78	GND	-
79	N.C	-	80	N.C	-
81	+V2.5	-	82	+V2.5	-
83	N.C	-	84	N.C	-
85	N.C	-	86	N.C	-
87	GND	-	88	GND	-
89	N.C	-	90	GND	-
91	N.C	-	92	+V2.5	-
93	+V2.5	-	94	+V2.5	-
95	M_CKE3	I/O	96	M_CKE2	I/O
97	N.C	-	98	N.C	-
99	M_AB(12)	I/O	100	M_AB(11)	I/O
101	M_AB(9)	I/O	102	M_AB(8)	I/O
103	GND	-	104	GND	-
105	M_AB(7)	I/O	106	M_AB(6)	I/O
107	M_AB(5)	I/O	108	M_AB(4)	I/O
109	M_A(3)	I/O	110	M_AB(2)	I/O
111	M_AB(1)	I/O	112	M_A(0)	I/O
113	+V2.5	-	114	+V2.5	-
115	M_AB(10)	I/O	116	M_BS1#	I/O
117	M_BS0#	I/O	118	M_RAS#	I/O
119	M_WE#	I/O	120	M_CAS#	I/O
121	M_CS2#	I/O	122	M_CS3#	I/O
123	N.C	-	124	N.C	-
125	GND	-	126	GND	-
127	M_DATA_R_(32)	I/O	128	M_DATA_R_(36)	I/O
129	M_DATA_R_(33)	I/O	130	M_DATA_R_(37)	I/O
131	+V2.5	-	132	+V2.5	-

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
133	M_DQS_R(4)	I/O	134	M_DM_R(4)	-
135	M_DATA_R_(34)	I/O	136	M_DATA_R_(38)	I/O
137	GND	-	138	GND	-
139	M_DATA_R_(35)	I/O	140	M_DATA_R_(39)	I/O
141	M_DATA_R_(40)	I/O	142	M_DATA_R_(44)	I/O
143	+V2.5	-	144	+V2.5	-
145	M_DATA_R_(41)	I/O	146	M_DATA_R_(45)	I/O
147	M_DQS_R(5)	I/O	148	M_DM_R(5)	-
149	GND	-	150	GND	-
151	M_DATA_R_(42)	I/O	152	M_DATA_R_(46)	I/O
153	M_DATA_R_(43)	I/O	154	M_DATA_R_(47)	I/O
155	+V2.5	-	156	+V2.5	-
157	+V2.5	-	158	M_CLK_DDR4#	I/O
159	GND	-	160	M_CLK_DDR4	I/O
161	GND	-	162	GND	-
163	M_DATA_R_(48)	I/O	164	M_DATA_R_(52)	I/O
165	M_DATA_R_(49)	I/O	166	M_DATA_R_(53)	I/O
167	+V2.5	-	168	+V2.5	-
169	M_DQS_R(6)	-	170	M_DM_R(6)	-
171	M_DATA_R_(50)	I/O	172	M_DATA_R_(54)	I/O
173	GND	-	174	GND	-
175	M_DATA_R_(51)	I/O	176	M_DATA_R_(55)	I/O
177	M_DATA_R_(56)	I/O	178	M_DATA_R_(60)	I/O
179	+V2.5	-	180	+V2.5	-
181	M_DATA_R_(57)	I/O	182	M_DATA_R_(61)	I/O
183	M_DQS_R(7)	I/O	184	M_DM_R(7)	-
185	GND	-	186	GND	-
187	M_DATA_R_(58)	I/O	188	M_DATA_R_(62)	I/O
189	M_DATA_R_(59)	I/O	190	M_DATA_R_(63)	I/O
191	+V2.5	-	192	+V2.5	-
193	ICH_SMDAT	I/O	194	+V3S	-
195	ICH_SMCLK	I/O	196	GND	-
197	+V3S	-	198	GND	-
199	N.C	-	200	N.C	-

### C.3 CN7 LCD/FL Inverter Connector (40-Pin)

Table C-3 LCD/FL inverter connector pin assignments (40-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	+V3S_R2	O
3	GND	-	4	+V3S_R2	O
5	GND	-	6	LVD_YAM0	O
7	PID2	O	8	LVD_YAP0	O
9	GND	-	10	LVD_YAM1	O
11	GND	-	12	LVD_YAP1	O
13	GND	-	14	LVD_YAM2	O
15	GND	-	16	LVD_YAP2	O
17	PID1	O	18	LVD_CLAKM	O
19	PID2	O	20	LVD_CLKAP	O
21	GND	-	22	GND	-
23	N.C	-	24	LVD_DDCPCL K	-
25	LVD_DDCPDAT A	-	26	N.C	-
27	N.C	-	28	N.C	-
29	N.C	-	30	N.C	-
31	GND	-	32	GND	-
33	+V5S_R1	O	34	+V5S_R1	O
35	+V5S_R1	O	36	GND	-
37	GND	-	38	INV_PWM_3	O
39	+V5S	O	40	+V5S	O

### C.4 CN6 External Monitor Connector (15-Pin)

Table C-4 External monitor connector pin assignments (15-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	ROUT	O	2	GOUT	O
3	BOUT	O	4	N.C	-
5	GND	-	6	VGAGND	-
7	VGAGND	-	8	VGAGND	-
9	+V5S	-	10	GND	-
11	N.C	-	12	DAC_DDCADATA	I/O
13	DAC_HSYNC	O	14	DAC_VSYNC	O
15	DAC_DDCACLK	I/O			

## C.5 CN14 PC Card Slot Connector (150-Pin)

Table C-5 PC card slot connector pin assignments (150-pin) (1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	A_CD2#	I	4	A_WP_IO16#	I
5	A_CDAT(10)	I/O	6	A_CDAT(2)	I/O
7	A_CDAT(9)	I/O	8	A_CDAT(1)	I/O
9	GND	-	10	A_CDAT(8)	I/O
11	A_CDAT(0)	I/O	12	A_BVD1	I
13	A_CADR(0)	I/O	14	A_BVD2	I
15	A_CADR(1)	I/O	16	A_REG#	I/O
17	GND	-	18	A_CADR(2)	I/O
19	A_INPACK	I	20	A_CADR(3)	I/O
21	A_WAIT#	I	22	A_CADR(4)	I/O
23	A_RESET	I/O	24	A_CADR(5)	I/O
25	GND	-	26	A_VS2	I/O
27	A_CADR(6)	I/O	28	A_CADR(25)	I/O
29	A_CADR(7)	I/O	30	A_CADR(24)	I/O
31	A_CADR(12)	I/O	32	A_CADR(23)	I/O
33	GND	-	34	A_CADR(15)	I/O
35	A_CADR(22)	I/O	36	A_CADR(16)	I/O
37	ACARDVPP	-	38	N.C	-
39	ACARDVCC	-	40	A_RDY_IREQ	I
41	A_CADR(21)	I/O	42	A_WE#	I/O
43	GND	-	44	A_CADR(20)	I/O
45	A_CADR(14)	I/O	46	A_CADR(19)	I/O
47	A_CADR(13)	I/O	48	A_CADR(18)	I/O
49	A_CADR(8)	I/O	50	A_CADR(17)	I/O
51	GND	-	52	A_CADR(9)	I/O
53	A_IOWR#	I/O	54	A_CADR(11)	I/O
55	A_IORD	I/O	56	A_OE#	I/O
57	A_VS1	I/O	58	A_CADR(10)	I/O
59	GND	-	60	A_CE1#	I/O
61	A_CE2#	I/O	62	A_CDAT(15)	I/O
63	A_CDAT(7)	I/O	64	A_CDAT(14)	I/O
65	A_CDAT(6)	I/O	66	A_CDAT(13)	I/O
67	GND	-	68	A_CDAT(5)	I/O
69	A_CDAT(12)	I/O	70	A_CDAT(4)	I/O
71	A_CDAT(11)	I/O	72	A_CDAT(3)	I/O

Table C-5 PC card slot connector pin assignments (150-pin) (2/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
73	A_CD1#	I	74	GND	-
75	GND	-	76	GND	-
77	GND	-	78	B_CD2#	I
79	B_WP_IO16#	I/O	80	B_CDAT(10)	I/O
81	B_CDAT(2)	I/O	82	B_CDAT(9)	I/O
83	B_CDAT(1)	I/O	84	GND	-
85	B_CDAT(8)	I/O	86	B_CDAT(0)	I/O
87	B_BVD1	I	88	B_CADR(0)	I/O
89	B_BVD2	I	90	B_CADR(1)	I/O
91	B_REG#	I/O	92	GND	-
93	B_CADR(2)	I/O	94	B_INPACK	I
95	B_CADR(3)	I/O	96	B_WAIT#	I/O
97	B_CADR(4)	I/O	98	B_RESET	I/O
99	B_CADR(5)	I/O	100	GND	-
101	B_VS2	I/O	102	B_CADR(6)	I/O
103	B_CADR(25)	I/O	104	B_CADR(7)	I/O
105	B_CADR(24)	I/O	106	B_CADR(12)	I/O
107	B_CADR(23)	I/O	108	GND	-
109	B_CADR(15)	I/O	110	B_CADR(22)	I/O
111	B_CADR(16)	I/O	112	BCARDVPP	-
113	N.C	-	114	BCARDVCC	-
115	B_RDY_IREQ	I	116	B_CADR(21)	I/O
117	B_WE#	I/O	118	GND	-
119	B_CADR(20)	I/O	120	B_CADR(14)	I/O
121	B_CADR(19)	I/O	122	B_CADR(13)	I/O
123	B_CADR(18)	I/O	124	B_CADR(8)	I/O
125	B_CADR(17)	I/O	126	GND	-
127	B_CADR(9)	I/O	128	B_IOWR#	I/O
129	B_CADR(11)	I/O	130	B_IORD	I/O
131	B_OE#	I/O	132	B_VS1	I/O
133	B_CADR(10)	I/O	134	GND	-
135	B_CE1#	I/O	136	B_CE2#	I/O
137	B_CDAT(15)	I/O	138	B_CDAT(7)	I/O
139	B_CDAT(14)	I/O	140	B_CDAT(6)	I/O
141	B_CDAT(13)	I/O	142	GND	-
143	B_CDAT(5)	I/O	144	B_CDAT(12)	I/O
145	B_CDAT(4)	I/O	146	B_CDAT(11)	I/O
147	B_CDAT(3)	I/O	148	B_CD1#	I
149	GND	-	150	GND	-

## C.6 CN10 Sound Board I/F Connector (30-Pin)

Table C-6 Sound board I/F connector pin assignments (30-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+3ALWAYS	-	2	+3ALWAYS	-
3	+V3S	-	4	+V3S	-
5	+AVCC	-	6	+AVCC	I
7	N.C	I	8	N.C	I
9	N.C	I	10	N.C	I
11	GND	I	12	GND	I
13	SPK_OUT_R+	I	14	SPK_OUT_L+	-
15	GND	-	16	GND	-
17	AREF	-	18	GND	
19	VOLUME	I	20	GND	
21	SE_HP#	I	22	GND	-
23	MIC		24	GND	
25	KILL_SWCH	-	26	GND	
27	IR_TX		28	IR_RX	-
29	IR_SD	O	30	GND	O

## C.7 CN15 Cooling Module Connector (3-Pin)

Table C-7 Cooling module connector pin assignments (3-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V5S	-	2	GND	-
3	FAN1_TACH	I			

**C.8 CN18 Keyboard Connector (34-Pin)***Table C-8 Keyboard connector pin assignments (34-pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	N.C	-	2	IPSY	I
3	GND(IPSGND)	-	4	IPSX	I
5	+V5S	-	6	N.C	-
7	SCAN OUT(15)	O	8	SCAN OUT(14)	O
9	SCAN IN(7)	I	10	SCAN IN(6)	I
11	SCAN OUT(13)	O	12	SCAN OUT(12)	O
13	SCAN IN(5)	I	14	SCAN IN(4)	I
15	SCAN OUT(11)	O	16	SCAN OUT(10)	O
17	SCAN IN(3)	I	18	SCAN IN(2)	I
19	SCAN IN(1)	I	20	SCAN OUT(9)	O
21	SCAN OUT(8)	O	22	SCAN OUT(7)	O
23	SCAN IN(0)	I	24	SCAN OUT(6)	O
25	SCAN OUT(5)	O	26	SCAN OUT(4)	O
27	SCAN OUT(3)	O	28	SCAN OUT(2)	O
29	SCAN OUT(1)	O	30	SCAN OUT(0)	O
31	+V5S	-	32	CAPS_LED#_3	O
33	SCROLL_LED#_ 3	O	34	NUM_LED#_3	O

### C.9 CN501 MDC Connector (30-Pin)

Table C-9 MDC connector pin assignments (30-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	N.C	-	2	GND	-
3	N.C	-	4	PHONE	I/O
5	N.C	-	6	NC	-
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	MDC_+V3	-
17	MDC_+3V	-	18	N.C	-
19	GND	-	20	GND	-
21	N.C	-	22	FRAME_SYNC_ICH	I
23	SDATA_OUT_ICH	I	24	N.C	-
25	CODEC_RST#_ICH	I	26	SDATA_IN1_ICH	O
27	GND	-	28	GND	-
29	GND	-	30	BITCLK_3_ICH	I/O

### C.10 CN502 MDC I/F Connector

Table C-10 MDC I/F connector pin assignments (2-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	MDMTIP		2	MDMRNG	



**C.11 CN17 Selectable Bay Connector (72-Pin)***Table C-11 Selectable bay connector pin assignments (72-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	N.C	I	4	GND	-
5	N.C	-	6	GND	-
7	GND	-	8	N.C	O
9	N.C	-	10	N.C	O
11	N.C	-	12	N.C	O
13	N.C	O	14	GND	-
15	SBAY_ID0	O	16	SBAY_ID1	O
17	SBAY_ID2	O	18	GND	-
19	CD_LED#	O	20	SDCS3#_3	O
21	SDCS1#_3	O	22	SDA(2)	O
23	SDA(0)	O	24	+V5S_MB	-
25	+V5S_MB	-	26	+V5S_MB	-
27	SDA(1)	O	28	N.C	-
29	IRQ15_3	I	30	GND	-
31	SDDACK#_35	O	32	N.C	-
33	SDIOR#_35	I	34	GND	-
35	SDIOR#_3	O	36	GND	-
37	SDIOW#_3	O	38	GND	-
39	SDDRQ_35	I	40	GND	-
41	GND	-	42	SDD15	I/O
43	SDD00	I/O	44	SDD14	I/O
45	SDD01	I/O	46	+V5S_MB	-
47	+V5S_MB	--	48	SDD13	I/O
49	SDD02	I/O	50	SDD12	I/O
51	SDD03	I/O	52	SDD11	I/O
53	SDD04	I/O	54	GND	-
55	GND	-	56	SDD10	I/O
57	SDD05	I/O	58	SDD09	I/O
59	SDD06	I/O	60	SDD08	I/O
61	SDD07	I/O	62	GND	-
63	GND	-	64	SDRST#_3	I/O
65	CD_GND	-	66	GND	-
67	CDAUDL	I	68	CDAUDR	I
69	GND	-	70	GND	-
71	N.C	-	72	N.C	-

**C.12 CN16 HDD Connector (44-Pin)**

*Table C-12 HDD connector pin assignments (44-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	PDRST#_3	-	2	GND	O
3	PDD07	I/O	4	PDD08	I/O
5	PDD06	I/O	6	PDD09	I/O
7	PDD05	I/O	8	PDD10	I/O
9	PDD04	I/O	10	PDD11	I/O
11	PDD03	I/O	12	PDD12	I/O
13	PDD02	I/O	14	PDD13	I/O
15	PDD01	I/O	16	PDD14	I/O
17	PDD00	I/O	18	PDD15	I/O
19	N.C	-	20	N.C	-
21	PDDRQ_35	-	22	GND	I
23	PDIOW#_3	-	24	GND	O
25	PDIOR#_3	-	26	GND	O
27	PDIORDY_35	-	28	N.C	I
29	PDDACK#_35	-	30	GND	O
31	IRQ14_3	-	32	N.C	I
33	PDA1	-	34	N.C	O
35	PDA0	O	36	PDA2	O
37	PDCS1#_3	O	38	PDCS3#_3	O
39	HDD_LED#	-	40	GND	I
41	+V5S	-	42	+V5S	-
43	GND	-	44	N.C	-

**C.13 CN5 Parallel Connector (25-Pin)***Table C-13 Parallel connector pin assignments (25-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	STB#	O	2	PDATA_R0	I/O
3	PDATA_R1	I/O	4	PDATA_R2	I/O
5	PDATA_R3	I/O	6	PDATA_R4	I/O
7	PDATA_R5	I/O	8	PDATA_R6	I/O
9	PDATA_R7	I/O	10	ACK#	I
11	BUSY	I	12	PE	I
13	SLCT	I	14	ALF#	O
15	ERROR#	I	16	PINIT#	O
17	SLCTIN#	O	18	GND	-
19	GND	-	20	GND	-
21	GND	-	22	GND	-
23	GND	-	24	GND	-
25	GND	-			

**C.14 CN3 Serial Connector (9-Pin)***Table C-14 Serial connector pin assignments (9-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	DCD	I	2	RXD	I
3	TXD	O	4	DTR	O
5	GND	-	6	DSR	I
7	RTS	O	8	CTS	I
9	RING	I			

**C.15 CN11 DC IN Connector (4-Pin)***Table C-15 DC IN connector pin assignments (4-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	+VADPTR	-	4	+VADPTR	-

**C.16 CN22 Power Supply Board I/F Connector (15-Pin)***Table C-16 Power supply board I/F connector pin assignments (15-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V3ALWAYS	-	2	+V3ALWAYS	-
3	+V3ALWAYS	-	4	+V5ALWAYS	-
5	+V5ALWAYS	-	6	+V5ALWAYS	-
7	+V5ALWAYS	-	8	N.C	-
9	+VBAT	-	10	+VBAT	-
11	N.C	-	12	+VAC	-
13	+VBAT	-	14	+VAC	-
15	+VAC	-			

**C.17 CN21 Power Supply Board I/F Connector (14-Pin)***Table C-17 Power supply board I/F connector pin assignments (14-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	GND	-	4	GND	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	GND	-	10	GND	-
11	GND	-	12	GND	-
13	GND	-	14	GND	-

**C.18 CN20 Power Supply Connector***Table C-18 CN20 Power supply Connector pin assignments (20-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+VADPTR	-	2	+V5a	-
3	CHG_EN	I	4	AC_SEL	I
5	ACPRES	I	6	BAT_LATCH_RS T	-
7	BATT_PWM	O	8	BAT0_CLK	O
9	BAT0_DATA	O	10	BAT1_CLK	O
11	BAT1_DATA	-	12	CHG_0	-
13	DCHG_0	O	14	CHG_1	O
15	DCHG_1	I	16	BATT_IN0	O
17	BATT_IN1	I	18	+V3AON	I
19	SLP_S4#_3R	I	20	RTCVCC	O

**C.19 CN23 Power Supply Connector***Table C-19 CN23 Power Supply Connector pin assignments (20-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	2VREF	-	2	+V3S	-
3	WLON#	I	4	+V5S	I
5	HDD_LED#	I	6	+V3	-
7	PWR_OLED#	O	8	PWR_GLED#	O
9	BAT0_GLED#	O	10	BAT0_GLED#	O
11	BAT1_OLED#	-	12	BAT1_GLED#	-
13	DCIN_OLED#	O	14	DCIN_GLED#	O
15	N.C	I	16	GND	O
17	GND	I	18	GND	I
19	GND	I	20	GND	O

**C.20 CN1 PS/2 Connector (6-Pin)***Table C-20 PS/2 connector pin assignments (6-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	MOUSDT	I/O	2	EXKBDT	I/O
3	GND	-	4	PS2VCC	-
5	MOUSCK	I/O	6	EXKBCK	I/O

**C.21 JACK1 TV OUT Connector (3-Pin)***Table C-21 TV OUT connector pin assignments (3-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	CVBS_B	O

**C.22 CN2 USB Connector (8-Pin)***Table C-22 USB connector pin assignments (8-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A1	USBVCC1	-	A2	USB_PN0_B	I/O
A3	USB_PP0_B	I/O	A4	GND	-
B1	USBVCC1	-	B2	USB_PN2_B	I/O
B3	USB_PP2_B	I/O	B4	GND	-

**C.23 CN19 Membrane Connector (6-Pin)***Table C-23 Membrane connector pin assignments (6-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	N.C	-	2	IPSSWM	I
3	IPSSWL	I	4	IPSSWR	I
5	GND	-	6	IPSMOD3	I

**C.24 CN4 RJ45 (8-Pin+2LED)/RJ11 (2-Pin) Connector***Table C-24 RJ45 (8-Pin+2LED)/RJ11 (2-Pin) connector pin assignments*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A1	TX+	-	A2	TX-	I
A3	RX+	I	A4	GND	I
A5	GND	I	A6	RX-	I
A7	GND	I	A8	GND	I
A9	LED_LAN#	I	A10	+3ALWAYS	I
A11	LED_LANACT#	I	A12	+3ALWAYS	I
B1	MDMTIP	-	B2	MDMRNG	I

**C.25 CN12 MINI PCI Connector (124-Pin)***Table C-25 MINI PCI connector pin assignments (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#	O	14	N.C	-
15	GND	-	16	N.C	-
17	PIRQC#_3	-	18	+V5S	-
19	+V3S	-	20	PIRQB#_3	-
21	N.C	-	22	N.C	-
23	GND	-	24	+V3	-
25		-	26	PCI_RESET#_3	-
27	CLK_MINIPCI_3R		28	+V3S	-
29	GND	-	30	MPCIGNT0#_3	-
31	MPCIREQ0#_3	I	32	GND	-
33	+V3S	-	34	PCI_PME#_3	-
35	PCI_AD(31)	I/O	36	N.C	-
37	PCI_AD(29)	I/O	38	PCI_AD(30)	I/O
39	GND	-	40	+V3S	-
41	PCI_AD(27)	I/O	42	PCI_AD(28)	I/O
43	PCI_AD(25)	I/O	44	PCI_AD(26)	I/O
45	N.C	-	46	PCI_AD(24)	I/O
	PCI_CBE#(3)	-			

Table C-25 MINI PCI connector pin assignments (124-Pin) (2/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
47	PCI_AD(23)	I/O	48	PCI_AD(20)	I/O
49	GND	-	50	GND	-
51	PCI_AD(21)	I/O	52	PCI_AD(22)	I/O
53	PCI_AD(19)	I/O	54	PCI_AD(20)	I/O
55	GND	-	56	PCI_PAR_3	-
57	PCI_AD(17)	I/O	58	PCI_AD(18)	I/O
59	PCI_CB#(2)	-	60	PCI_AD(16)	I/O
61	PCI_IRDY#_3	-	62	GND	-
63	+V3S	-	64	PCI_FRAME#_3	-
65	CLKRUN#_3	-	66	PCI_TRDY#_3	-
67	PCI_SERR#_3	-	68	PCI_STOP#_3	-
69	GND	-	70	+V3S	-
71	PCI_PERR#_3	-	72	PCI_DEVSEL#_	O
73	PCI_CB#(1)	-	74	GND	-
75	PCI_AD(14)	I/O	76	PCI_AD(15)	I/O
77	GND	-	78	PCI_AD(13)	I/O
79	PCI_AD(12)	I/O	80	PCI_AD(11)	I/O
81	PCI_AD(10)	I/O	82	GND	-
83	GND	-	84	AD09-P3P	I/O
85	PCI_AD(8)	I/O	86	PCI_CB#(0)	-
87	PCI_AD(7)	I/O	88	+V3S	-
89	+V3S	-	90	PCI_AD(6)	I/O
91	PCI_AD(5)	I/O	92	PCI_AD(4)	I/O
93	N.C	-	94	PCI_AD(2)	I/O
95	PCI_AD(3)	I/O	96	PCI_AD(0)	I/O
97	+V5S	-	98	N.C	-
99	PCI_AD(1)	I/O	100	N.C	-
101	GND	-	102	GND	-
103	N.C	-	104	GND	-
105	N.C	-	106	N.C	-
107	N.C	-	108	N.C	-
109	N.C	-	110	N.C	-
111	N.C	-	112	N.C	-
113	GND	-	114	GND	-
115	N.C	-	116	N.C	-
117	GND	-	118	GND	-
119	GND	-	120	GND	-
121	N.C	-	122	N.C	-
123	N.C	-	124	+V3	-



**C.26 CN8 Internal Left Speaker Connector (3-Pin)***Table C-26 Internal left speaker connector pin assignments (3-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	SPK_OUT_L+	O	2	N.C	-
3	SPK_OUT_L-	O			

**C.27 CN9 Internal Right Speaker Connector (2-Pin)***Table C-27 Internal right speaker connector pin assignments (2-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	SPK_OUT_R+	O	2	SPK_OUT_R-	O

**C.28 CN503 Expansion Docking connector B (240 pin + power) ---  
Satellite M20 model no use, only TE2300 model is available.**

Table C-28 Expansion Docking connector B (240 pin + power) (1/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
A1	+VADPTR	-	A2	GND	-
A3	+VADPTR	-	A4	GND	-
1	DCOUT	-	2	DCOUT	-
3	DOCDT1#	I	4	IF_P5V	-
5	MOUSCK	I/O	6	EXKBCK	I/O
7	GND	-	8	Reserved	-
9	DPCONF	I	10	GND	-
11	GND	-	12	DAC_DDCACLK	I/O
13	D_ROUT	O	14	D_GOUT	O
15	D_BOUT	O	16	DVSYNC	O
17	Reserved	-	18	Reserved	-
19	GND	-	20	Reserved	-
21	Reserved	-	22	Reserved	-
23	Reserved	-	24	Reserved	-
25	Reserved	-	26	Reserved	-
27	Reserved	-	28	GND	-
29	GND	-	30	Reserved	-
31	Reserved	-	32	Reserved	-
33	Reserved	-	34	Reserved	-
35	Reserved	-	36	Reserved	-
37	GND	-	38	Reserved	-
39	Reserved	-	40	Reserved	-
41	GND	-	42	Reserved	-
43	Reserved	-	44	Reserved	-
45	GND	-	46	Reserved	-
47	Reserved	-	48	Reserved	-
49	GND	-	50	Reserved	-
51	Reserved	-	52	Reserved	-
53	GND	-	54	Reserved	-
55	Reserved	-	56	Reserved	-
57	N.C	-	58	N.C	-
59	MDMRNG	I/O	60	MDMTIP	I/O
61	DCOUT	-	62	DCOUT	-
63	EJECTRQ#	I/O	64	IF_P5V	-
65	MOUSDT	I/O	66	EXKBDT	I/O

*Table C-28 Expansion Docking connector B (240 pin + power) (2/4)*

<b>Pin No.</b>	<b>Signal Name</b>	<b>I/O</b>	<b>Pin No.</b>	<b>Signal Name</b>	<b>I/O</b>
67	GND	-	68	GND	-
69	GND	-	70	Reserved	-
71	GND	-	72	DAC_DDCADATA	I/O
73	GND	-	74	GND	-
75	GND	-	76	DHSYNC	O
77	Reserved	-	78	Reserved	-
79	GND	-	80	Reserved	-
81	Reserved	-	82	Reserved	-
83	Reserved	-	84	Reserved	-
85	Reserved	-	86	Reserved	-
87	Reserved	-	88	GND	-
89	GND	-	90	Reserved	-
91	Reserved	-	92	Reserved	-
93	Reserved	-	94	Reserved	-
95	Reserved	-	96	Reserved	-
97	GND	-	98	Reserved	-
99	Reserved	-	100	Reserved	-
101	GND	-	102	Reserved	-
103	Reserved	-	104	Reserved	-
105	GND	-	106	Reserved	-
107	Reserved	-	108	Reserved	-
109	GND	-	110	Reserved	-
111	Reserved	-	112	Reserved	-
113	GND	-	114	Reserved	-
115	Reserved	-	116	Reserved	-
117	N.C	-	118	N.C	-
119	N.C	-	120	N.C	-
121	DCOUT	-	122	DCOUT	-
123	DOCK_I2C_CLK	I/O	124	IF-P5V	-
125	+V5ALWAYS	-	126	Reserved	-
127	GND	-	128	Reserved	-
129	USB_PWR_EN	O	130	USB_OC#4	O
131	GND	-	132	USB_PWR_EN	O
133	USB_OC#5	O	134	SHUTDOWN#	-
135	Reserved	-	136	DOU TL+	-

Table C-28 Expansion Docking connector B (240 pin + power) (3/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
137	DINL+		138	DINR-	
139	GND	-	140	PWR_SWIN#_3	I
141	DCD	I	142	DSR	I
143	TXD	O	144	RING	I
145	PE	I	146	PDATA_R(7)	I/O
147	PDATA_R(6)	I/O	148	GND	-
149	GND	-	150	PDATA_R(4)	I/O
151	PDATA_R(1)	I/O	152	PDATA_R(2)	I/O
153	PDATA_R(0)	I/O	154	STRB#	O
155	Reserved	-	156	Reserved	-
157	GND	-	158	Reserved	-
159	Reserved	-	160	Reserved	-
161	GND	-	162	Reserved	-
163	Reserved	-	164	Reserved	-
165	GND	-	166	Reserved	-
167	Reserved	-	168	Reserved	-
169	GND	-	170	Reserved	-
171	Reserved	-	172	Reserved	-
173	GND	-	174	Reserved	-
175	+V3_ICHLAN	-	176	N.C	-
177	N.C	-	178	TERMPL	-
179	TX+	I	180	TX-	I
181	DCOUT	-	182	DCOUT	-
183	DOCK_I2C_DAT	I/O	184	IF-P5V	-
185	Reserved	-	186	Reserved	-
187	GND	-	188	Reserved	-
189	USB_PP4	I/O	190	USB_PN4	I/O
191	GND	-	192	USB_PP5	I/O
193	USB_PN5	I/O	194	DOUTR+	
195	DOUTR-		196	DOUTL-	
197	DINL-		198	DINR+	
199	GND	-	200	RXD	I
201	RTS	O	202	CTS	I
203	DTR	O	204	SLCT	I
205	BUSY	I	206	ACK#	I
207	PDATA_R(5)	I/O	208	GND	-
209	GND	-	210	PDATA_R(3)	I/O

Table C-28 Expansion Docking connector B (240 pin + power) (4/4)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
211	SLCTIN#	O	212	PINIT#	O
213	ERROR#	I	214	ALF#	O
215	Reserved	-	216	Reserved	-
217	GND	-	218	Reserved	-
219	Reserved	-	220	Reserved	-
221	GND	-	222	Reserved	-
223	Reserved	-	224	Reserved	-
225	GND	-	226	Reserved	-
227	Reserved	-	228	Reserved	-
229	GND	-	230	Reserved	-
231	Reserved	-	232	Reserved	-
233	GND	-	234	LED_LANACT#	I
235	LED_LAN#	I	236	DOCDT2#	I
237	N.C	-	238	N.C	-
239	RX+	O	240	RX-	O

**Power Supply Board**

**C.29 CN520 RTC Battery Connector (2-Pin)**

*Table C-29 RTC battery connector pin assignments (2-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	RTCVCC	-	2	GND	O

**Sound Board**

**C.30 JACK1001 Headphone Connector (8-Pin)**

*Table C-30 Headphone connector pin assignments (8-Pin)*

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	AB_SPK_OUT_L +	O
3	AB_SPK_OUT_L +	O	4	N.C	-
5	N.C	I	6	+AVCC_BOARD	-
7	GND	-	8	GND	-

### C.31 JACK1000 Microphone Connector (8-Pin)

Table C-31 microphone connector pin assignments (8-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	AB_MIC	I
3	AB_AREF	O	4	GND	-
5	GND	-	6	AB_AREF	I
7	GND	-	8	GND	-

### C.32 CN1000 Interface Connector (30-Pin)

Table C-32 CN1000 Interface Connector pin assignments (30-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	AB_MIC	I/O-
3	GND	-	4	AB_SE_HP	O
5	GND	-	6	AB_SPK_OUT_R	I
7	GND	-	8	AB_SPK_OUT_L	I
9	GND	-	10	AB_AREF	O
11	GND	-	12	AB_A_RIGHT_R	O
13	GND	-	14	AB_A_LEFT_R	O
15	GND	-	16	AB_A_RIGHT	I
17	GND	-	18	AB_A_LEFT	I
19	GND	-	20	N.C	-
21	N.C	-	22	N.C	-
23	N.C	-	24	N.C	-
25	N.C	-	26	+AVCC_BOARD	-
27	+AVCC_BOARD	-	28	+AVCC_BOARD	-
29	+AVCC_BOARD	-	30	+AVCC_BOARD	-

### C.33 CN1001 IR Connector (10-Pin)

Table C-33 IR connector pin assignments (10-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V3ALWAYS_BOARD	-	2	AB_KILL_SW CH	I
3	+V3S_BOARD	-	4	+V3S_BOAR D	O
5	+V3S_BOARD	-	6	AB_IR_TX	O
7	AB_IR_RX	O	8	AB_IR_SD	O
9	GND	-	10	GND	-

## Appendix D Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 2) (1/4)

Cap No.	Keytop	Code set 1		Code set 2		Note	
		Make	Break	Make	Break		
01	' ~	29	A9	0E	F0	0E	
02	1 !	02	82	16	F0	16	
03	2 @	03	83	1E	F0	1E	
04	3 #	04	84	26	F0	26	
05	4 \$	05	85	25	F0	25	
06	5 %	06	86	2E	F0	2E	
07	6 ^	07	87	36	F0	36	
08	7 &	08	88	3D	F0	3D	*2
09	8 *	09	89	3E	F0	3E	*2
10	9 (	0A	8A	46	F0	46	*2
11	0 )	0B	8B	45	F0	45	*2
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	18	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[ {	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	

Table D-1 Scan codes (set 1 and set 2) (2/4)

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
29	\	2B	AB	5D	F0	5D	*5
30	Caps Lock	3A	BA	58	F0	58	
31	A	1E	9E	1C	F0	1C	
32	S	1F	9F	1B	F0	1B	
33	D	20	A0	23	F0	23	
34	F	21	A1	2B	F0	2B	
35	G	22	A2	34	F0	34	
36	H	23	A3	33	F0	33	
37	J	24	A4	3B	F0	3B	*2
38	K	25	A5	42	F0	42	*2
39	L	26	A6	4B	F0	4B	*2
40	; :	27	A7	4C	F0	4C	*2
41	' "	28	A8	52	F0	52	
43	Enter	1C	9C	5A	F0	5A	*3
44	Shift (L)	2A	AA	12	F0	12	
45	No.102 key	56	D6	61	F0	61	
46	Z	2C	AC	1A	F0	1A	
47	X	2D	AD	22	F0	22	
48	C	2E	AE	21	F0	21	
49	V	2F	AF	2A	F0	2A	
50	B	30	B0	32	F0	32	
51	N	31	B1	31	F0	31	
52	M	32	B2	3A	F0	3A	*2
53	, <	33	B3	41	F0	41	*2
54	. >	34	B4	49	F0	49	*2
55	/ ?	35	B5	4A	F0	4A	*2
57	Shift (R)	36	B6	59	F0	59	



Table D-1 Scan codes (set 1 and set 2) (3/4)

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
58	Ctrl	1D	9D	14	F0	14	*3
60	Alt (L)	38	B8	11	F0	11	*3
61	Space	39	B9	29	F0	29	
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0	11	
75	Ins	E0 52	E0 D2	E0 70	E0 F0	70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0	71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0	6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0	6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0	69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0	75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0	72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0	7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0	7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0	74	*1
110	Esc	01	81	76	F0	76	
112	F1	3B	BB	05	F0	05	
113	F2	3C	BC	06	F0	06	
114	F3	3D	BD	04	F0	04	
115	F4	3E	BE	0C	F0	0C	
116	F5	3F	BF	03	F0	03	
117	F6	40	C0	0B	F0	0B	
118	F7	41	C1	83	F0	83	
119	F8	42	C2	0A	F0	0A	
120	F9	43	C3	01	F0	01	
121	F10	44	C4	09	F0	09	*3

Table D-1 Scan codes (set 1 and set 2) (4/4)

Cap No.	Keytop	Code set 1				Code set 2				Note
		Make		Break		Make		Break		
122	F11	57	D7	78	F0	78			*3	
123	F12	58	D8	07	F0	07			*3	
124	PrintSc	*6	*6	*6	*6				*6	
126	Pause	*7	*7	*7	*7				*7	
202	Fn	—	—	—	—				*4	
203	Win	E0	5B	E0	DB	E0	1F	E0	F0	1F
204	App	E0	5D	E0	DD	E0	2F	E0	F0	2F

**Notes:**

1. \* Scan codes differ by mode.
2. \* Scan codes differ by overlay function.
3. \* Combination with the **Fn** key makes different codes.
4. \* **Fn** key does not generate a code by itself.
5. \* This key corresponds to key No. 42 in a 102-key model.
6. \* Refer to Table D-6, No. 124 key scan code.
7. \* Refer to Table D-7, No. 126 key scan code.

Table D-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1				Code set 2			
		Make		Break		Make		Break	
55	/	E0 AA	E0 35	E0 B5	E0 2A	E0 F0	12 E0 4A	E0 F0	4A E0 12
75	INS	E0 AA	E0 52	E0 D2	E0 2A	E0 F0	12 E0 70	E0 F0	70 E0 12
76	DEL	E0 AA	E0 53	E0 D3	E0 2A	E0 F0	12 E0 71	E0 F0	71 E0 12
79	←	E0 AA	E0 4B	E0 CB	E0 2A	E0 F0	12 E0 6B	E0 F0	6B E0 12
80	Home	E0 AA	E0 47	E0 C7	E0 2A	E0 F0	12 E0 6C	E0 F0	6C E0 12
81	End	E0 AA	E0 4F	E0 CF	E0 2A	E0 F0	12 E0 69	E0 F0	69 E0 12
83	↑	E0 AA	E0 48	E0 C8	E0 2A	E0 F0	12 E0 75	E0 F0	75 E0 12
84	↓	E0 AA	E0 50	E0 D0	E0 2A	E0 F0	12 E0 72	E0 F0	72 E0 12
85	PgUp	E0 AA	E0 49	E0 C9	E0 2A	E0 F0	12 E0 7D	E0 F0	7D E0 12
86	PgDn	E0 AA	E0 51	E0 D1	E0 2A	E0 F0	12 E0 7A	E0 F0	7A E0 12
89	→	E0 AA	E0 4D	E0 CD	E0 2A	E0 F0	12 E0 74	E0 F0	74 E0 12
203	Win	E0 AA	E0 5B	E0 DB	E0 2A	E0 F0	12 E0 1F	E0 F0	1F E0 12
204	App	E0 AA	E0 5D	E0 DD	E0 2A	E0 F0	12 E0 2F	E0 F0	2F E0 12

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

	With left <b>Shift</b>	With right <b>Shift</b>
Set 1	E0 AA _____	E0 B6
	E0 2A _____	E0 36
Set 2	E0 F0 12 _____	E0 F0 59
	E0 12 _____	E0 59

Table D-3 Scan codes in Numlock mode

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

Table D-4 Scan codes with Fn key

Cap No.	Keytop	Code set 1				Code set 2				
		Make		Break		Make		Break		
43	ENT	E0	1C	E0	9C	E0	5A	E0	F0	5A
58	CTRL	E0	1D	E0	9D	E0	14	E0	F0	14
60	LALT	E0	38	E0	B8	E0	11	E0	F0	11
121	ARROW		45		C5		77		F0	77
122	NUMERIC		45		C5		77		F0	77
123	ScrL		46		C5		7E		F0	7E

Table D-5 Scan codes in overlay mode

Cap No.	Keytop		Code set 1				Code set 2			
			Make		Break		Make		Break	
08	7	(7)	47		C7		6C	F0	6C	
09	8	(8)	48		C8		75	F0	75	
10	9	(9)	49		C9		7D	F0	7D	
11	0	(*)	37		B7		7C	F0	7C	
23	U	(4)	4B		CB		6B	F0	6B	
24	I	(5)	4C		CC		73	F0	73	
25	O	(6)	4D		CD		74	F0	74	
26	P	(-)	4A		CA		7B	F0	7B	
37	J	(1)	4F		CF		69	F0	69	
38	K	(2)	50		D0		72	F0	72	
39	L	(3)	51		D1		7A	F0	7A	
40	;	(+)	4E		CE		79	F0	79	
52	M	(0)	52		D2		70	F0	70	
54	.	(.)	53		D3		71	F0	71	
55	/	(/)	E0 35		E0 B5		40 4A	E0 F0	4A	

Table D-6 No.124 key scan code

Key top	Shift	Code set 1				Code set 2			
		Make		Break		Make		Break	
Prt Sc	Common	E0 2A	E0 37	E0 B7	E0 AA	E0 12	E0 7C	E0 F0 7C	E0 F0 12
	Ctrl+	E0 37		E0 B7		E0 7C		E0 F0 7C	
	Shift+	E0 37		E0 B7		E0 7C		E0 F0 7C	
	Alt+		54	D4		84		F0 B4	

*Table D-7 No.126 key scan code*

Key top	Shift	Code set 1						Code set 2							
		Make						Make							
Pause	Common*	E1	1D	45	E1	9D	C5	E1	14	77	E1	F0	14	F0	77
	Ctrl*	E0	46	E0	C6			E0	7E	E0	F0	7E			

\*: This key generates only make codes.

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## Appendix E Key Layout

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

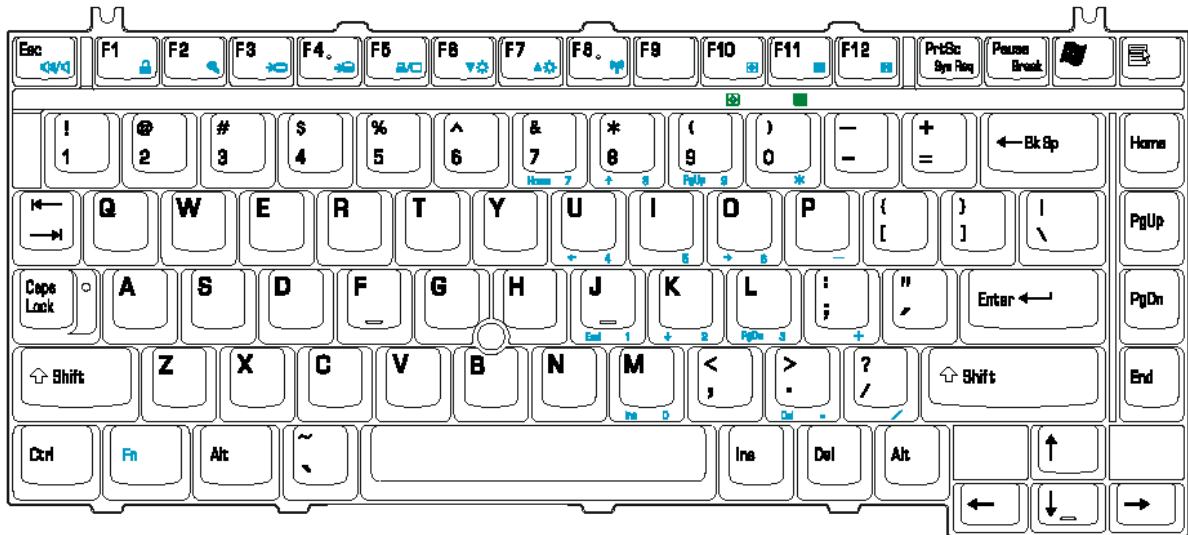


Figure E-1 US keyboard

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

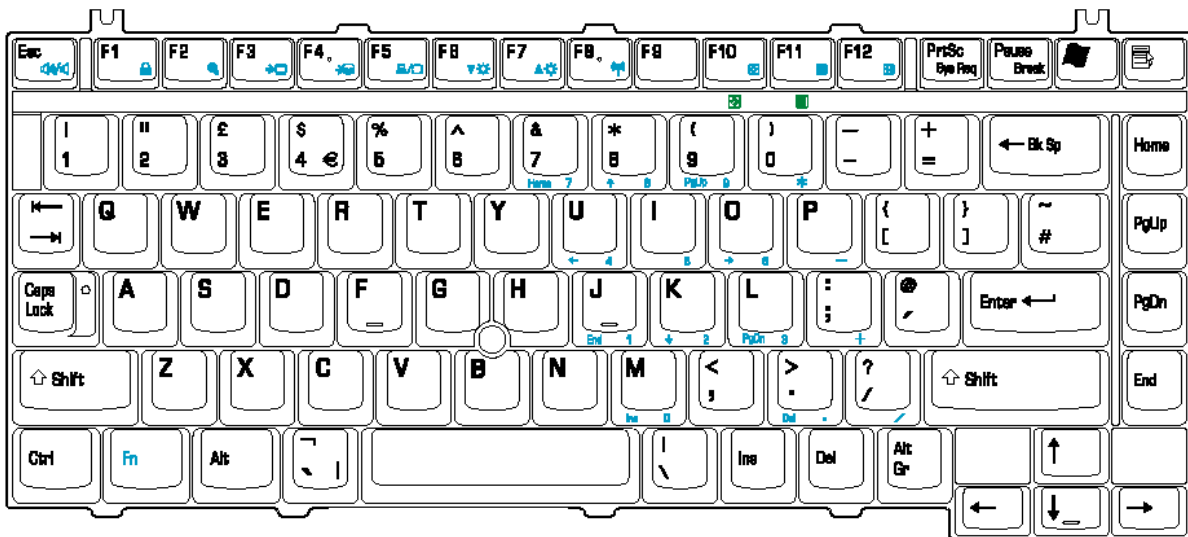


Figure E-2 UK keyboard

### E.3 Korea Keyboard

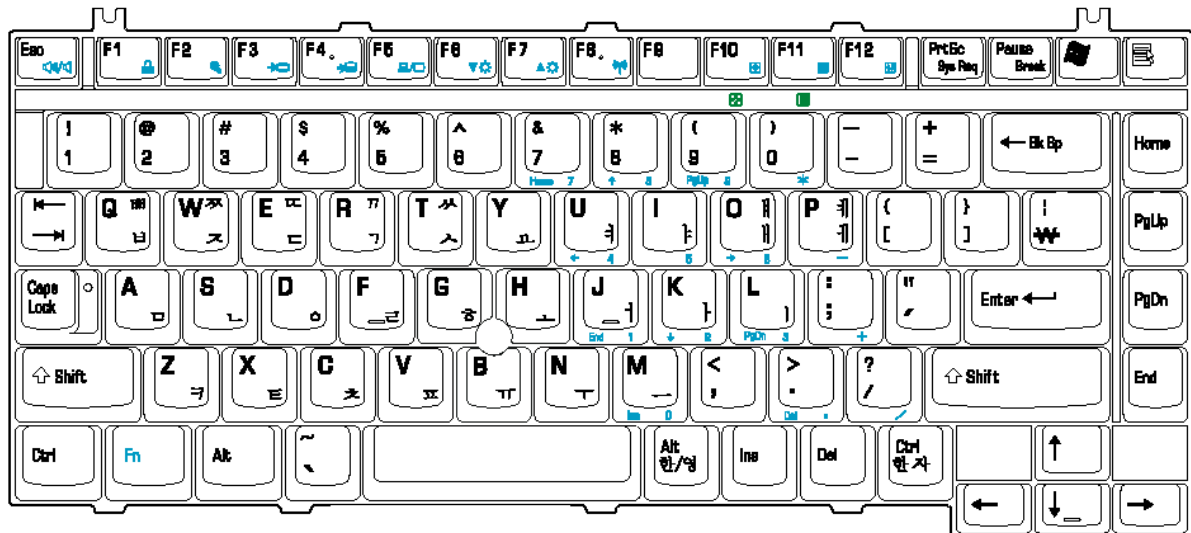
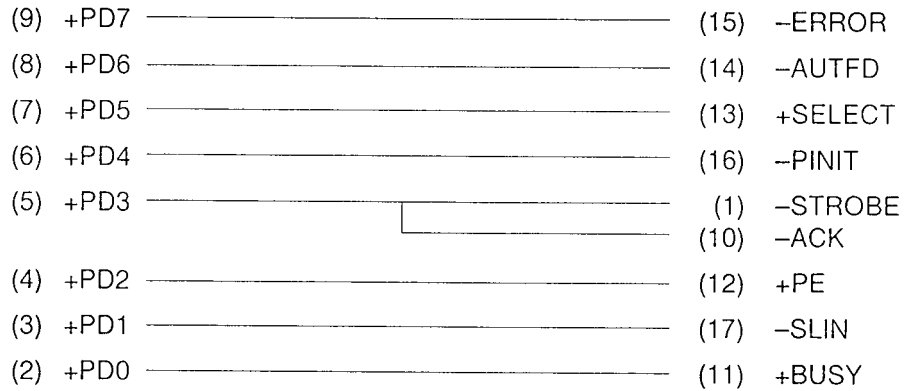


Figure E-3 Korea keyboard



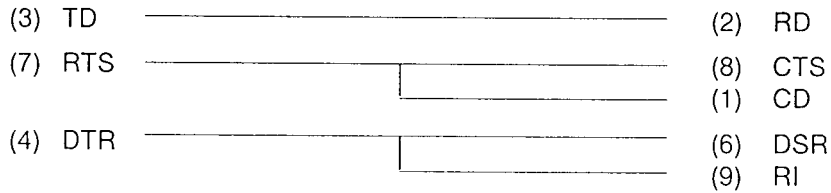
## **Appendix F Wiring Diagrams**

### **F.1 Parallel Port Wraparound Connector**



*Figure F-1 Parallel port wraparound connector*

### **F.2 Serial Port Wraparound Connector**



*Figure F-2 Serial port wraparound connector*

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

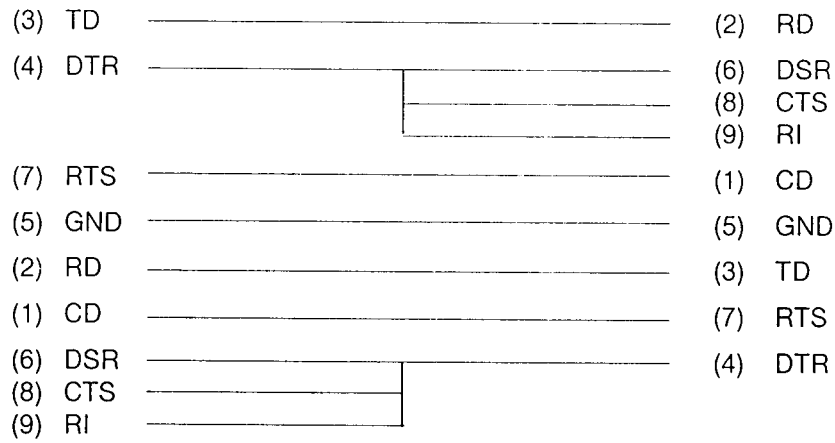


Figure F-3 Serial port direct cable (9-pin to 9-pin)

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

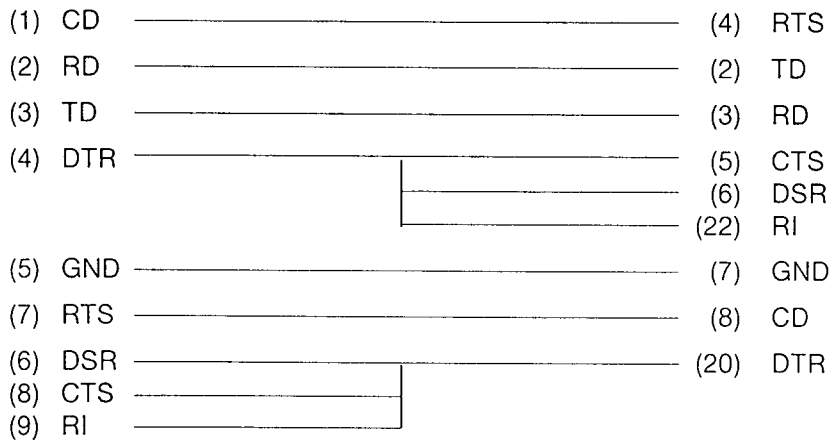


Figure F-4 Serial port direct cable (9-pin to 25-pin)

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## **Appendix G BIOS Rewrite Procedures**

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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 external FDD and insert the BIOS/EC/KBC rewriting disk into either the external FDD.
5. Turn on the power while holding down the [~] key (on the left of the space key). (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.

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## Appendix H EC/KBC Rewrite Procedures

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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

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 external FDD and insert the BIOS/EC/KBC rewriting disk into either the external FDD.
5. Turn on the power while holding down the [↵] key. (Keep holding down the key until a message appears on the screen.) The EC/KBC rewriting starts.
6. When the EC/KBC rewrite is completed, the system is automatically turned off.

- |  |
|--|
| <p><i>Note:</i></p> <ol style="list-style-type: none"><li>1. Rewrite the EC/KBS only when instructed by a diagnostic disk release 1 notice.</li><li>2. Connect the AC adapter to the computer when you rewrite the EC/KBC.</li><li>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.</li><li>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.</li><li>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.</li></ol> |
|--|