Toshiba Personal Computer

Equium A60/Satellite A60

/ Pro A60 / A65

Maintenance Manual

TOSHIBA CORPORATION

S/ No.

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Toshiba Equium A60/Satellite A60/ Pro A60/A65 Maintenance Manual

Second edition Aug 2004

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The information presented in this manual has been reviewed and validated for accuracy. The included set of instructions and descriptions are accurate for the Equium A60/Satellite A60/ Pro A60/A65 at the time of this manual's production. However, succeeding computers and manuals are subject to change without notice. Therefore, Toshiba assumes no liability for damages incurred directly or indirectly from errors, omissions, or discrepancies between any succeeding product and this manual.

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Equium A60/Satellite A60/ Pro A60/A65, referred to as Equium A60/Satellite A60/ Pro A60/A65 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 Equium A60/Satellite A60/ Pro A60/A65 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
     ? 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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Chapter 4   Replacement Procedures

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1.1 Features

The Toshiba Equium A60/Satellite A60/ Pro A60/A65 is a full size notebook PC based on the Intel Portability Mobile Pentium 4 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 14.1-inch XGA and 15-inch XGA LCD panel, capable of displaying up to 26M colors at a resolution of 1024 by 768 pixels (XGA) and 1280 by 1024 pixels(SXGA+), 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 Intel Mobile Pentium 4 (Northwood), Mobile Pentium 4 (Prescott) and Celeron(Northwood), Celeron-D(Prescott).

            Mobile Pentium 4(Northwood) 2.8/3.06/3.2 GHz

            Mobile Pentium 4(Prescott)   518(2.8G)/532(3.06G)/538(3.2G)/552(3.46G)

                                        /558(3.60G) GHz

            Celeron(Northwood)   2.5/2.6/2.7/2.8 GHz

            Celeron-D(Prescott)   325(2.53G)/330(2.66G)/335(2.8G)/340(2.93G)/345(3.06G)

                        350(3.2G) GHz

    ? Host bridge system controller

        System controller: ATi RC300ML

        ? Memory

        The computer has on Board 256MB/512MB memory and one SO DIMMs slot comes standard with DDR 2700 module. It supports PC2700 and uses SO DIMMs (DDR SDRAM) driven at 2.5 V, accepting BTO/CTO for your memory requirements. It can incorporate up to 1.5 GB of main memory

        using the following sizes of memory modules:

      ?   256 MB (16M?16?8P)

      ?   512 MB (32M?16?8P)

      ?   1024 MB (64Mx16x8P)

? Hard Disk Drive (HDD)

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

?   30 GB (9.5 mm thick) ATA100 (4,200rpm)

?   40 GB (9.5 mm thick) ATA100 (4,200rpm)

?   60 GB (9.5 mm thick) ATA100 (4,200rpm)

?   80 GB (9.5 mm thick) ATA100 (4,200rpm)

?   40 GB (9.5 mm thick) ATA100 (5,400rpm)

?   60 GB (9.5 mm thick) ATA100 (5,400rpm)

?   80 GB (9.5 mm thick) ATA100 (5,400rpm)

? ODD

The ODD can accommodate a CD-ROM, DVD-ROM, DVD-R/RW, DVD+-R/+-RW,DVD super Multi drives.

? Display

The LCD displays available come in the following three sizes:

14.1" XGA-TFT/15" XGA-TFT/15" XGA-CSV+-TFT color display, resolution 1024?768, 16M/1280?1024,262,144 colors with dithering.

? Keyboard

The keyboard has 27 kinds countries key.

? Batteries

The computer has a removable 8 Cell or 12 Cell Lithium Ion battery pack and an internal RTC battery (rechargeable).

? Universal Serial Bus (USB) ports

The computer has three USB 1.1/2.0 ports, It is supported to daisy-chain a maximum of 127 USB devices. The serial data transfer rate is 480 Mbps or 12 Mbps and 1.5 Mbps These ports support PnP installation and hot plugging.

? External monitor port

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

? PC Card slot

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

PC card HDD boot does Not be supported.

? SD/MS/MMC Card

This slot is BTO/CTO for your memory card requirements to provide memory card read on your computer

? Toshiba Pointing Device

Toshiba Pointing Device has one kind of input devices TouchPad.

? Sound system

The ALC250 integrated audio controller supports multimedia. The sound system contains the following:

? 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 From S3 PXE boot support. The LAN board has the RJ45 jack to directly accommodate a LAN cable.

? Wireless LAN

The internal Mini PCI Card slot supports IEEE802.11a/g(11ch)/ IEEE802.11g(11ch)/ IEEE802.11a/g(13ch)/ IEEE802.11g(13ch) 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.90/V.92(America, Canada) 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.

? IEEE 1394(optional)

The IEEE 1394 is optional integrated device. to supported IEEE 1394 ports ,The serial data transfer rate is 400 Mbps, These port support hot plugging.

? Parallel Port(optional)

The Parallel Port is optional integrated device. to supported connect a printer or another parallel device. The port is IEEE-1284 compliant and supports Extended Capabilities Port (ECP).

? CD Key

The CD Key supports to play Audio CD directly

? Fast Serial InfraRed (FIR) communications port(optional)

The FIR Port is optional integrated device. It provided an IrDA 1.1 compatible FIR port , enabling wireless communication at a high speed of 1.15 or 4 Mbps.

❖ Figures 1-1 and 1-2 show the computer and its system unit configuration, respectively.
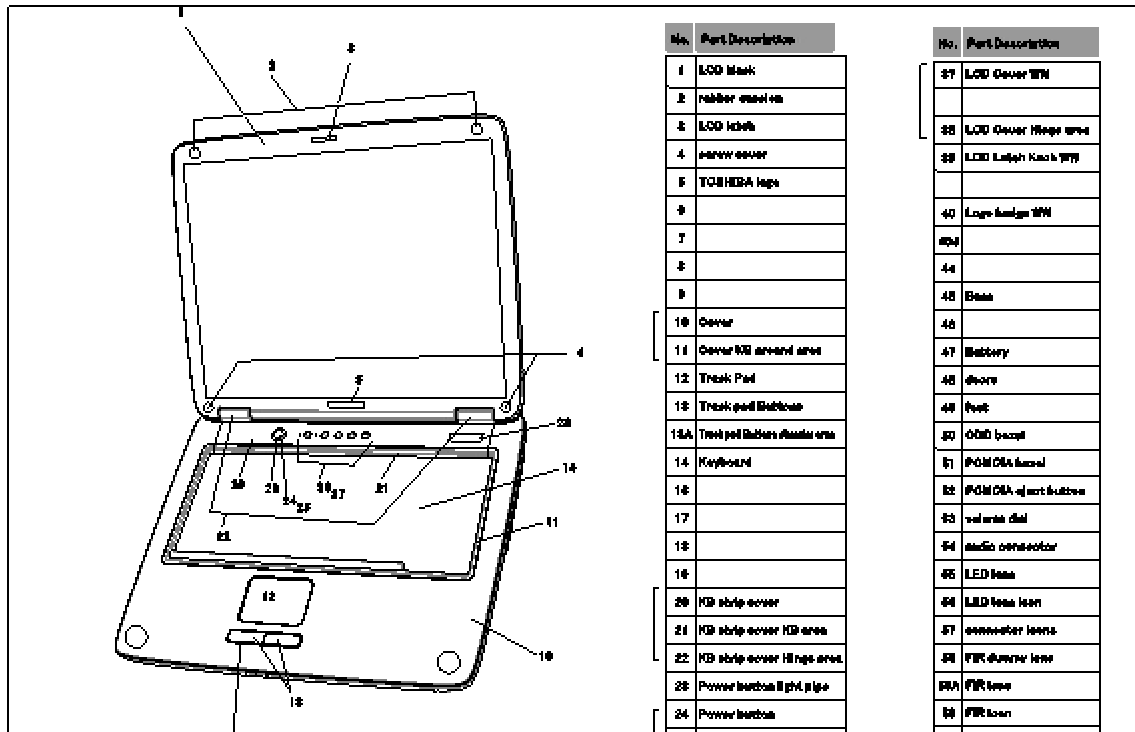
No.	Part Description
1	LCD Mask
2	rubber cushion
3	LCD latch
4	screw cover
5	TOSHIBA logo
6	
7	
8	
9	
10	Cover
11	Cover KB arrand area
12	Track Pad
13	Track pad Button
13A	Track pad Button Assale area
14	Keyboard
15	
17	
18	
19	
20	KB strip cover
21	KB strip cover KB area
22	KB strip cover Hinge area
23	Power button light pipe
24	Power button

No.	Part Description
37	LCD Cover BN
38	LCD Cover Hinge area
39	LCD Latch Kock BN
40	Logo badge BN
40A	
44	
45	Base
46	
47	Battery
48	doors
49	feet
50	ODD bezel
51	PCMCIA bezel
52	PCMCIA eject button
53	volume dial
54	audio connector
55	LED lens
56	LED lens icon
57	connector icons
58	FIR dummy lens
58A	FIR lens
59	FIR icon

Figure 1- 2 The computer Block diagram
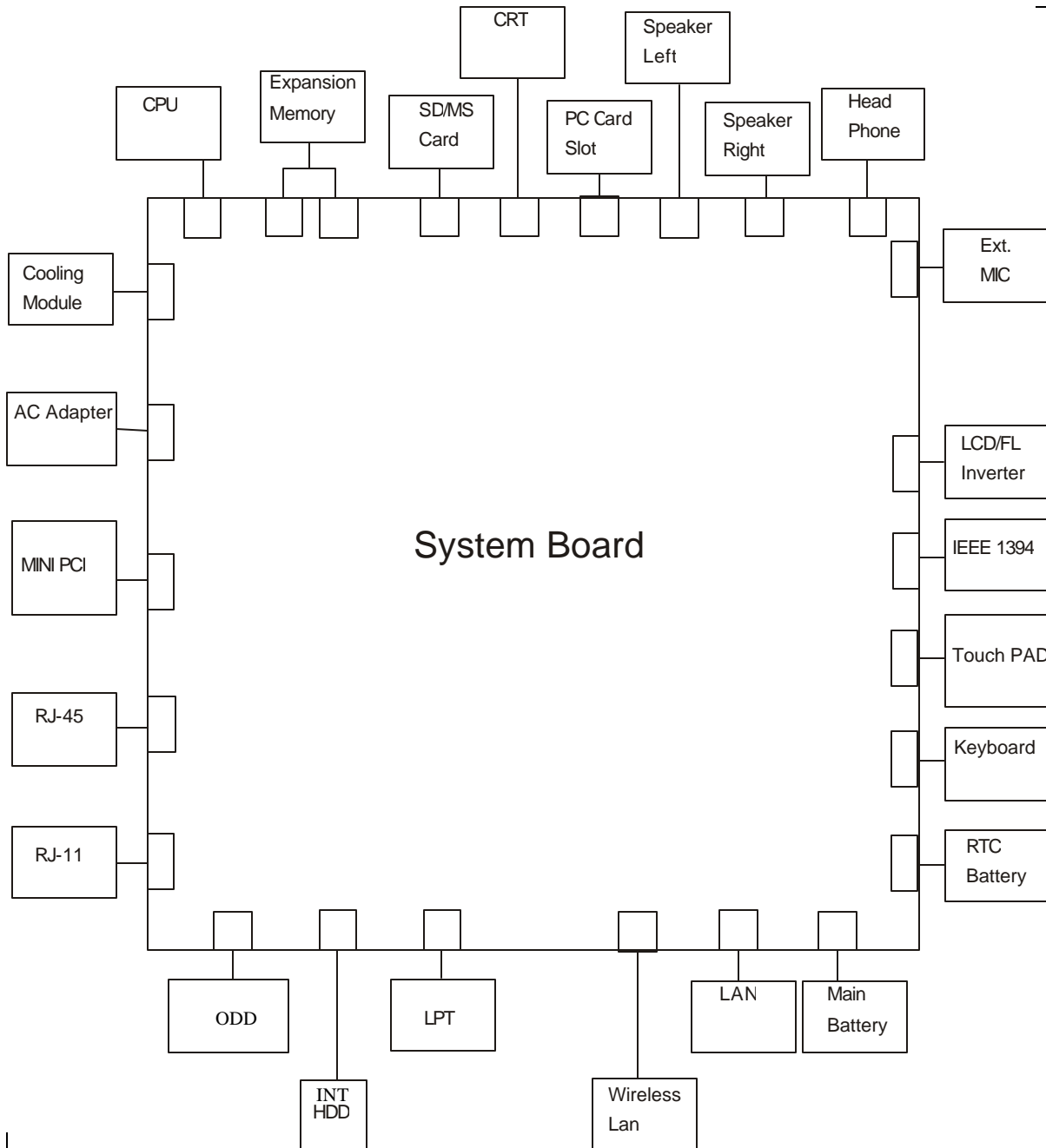
Figure 1- 3 System Board configuration

1.2 System Unit Components

Figure 1-4 is a block diagram of the system unit.
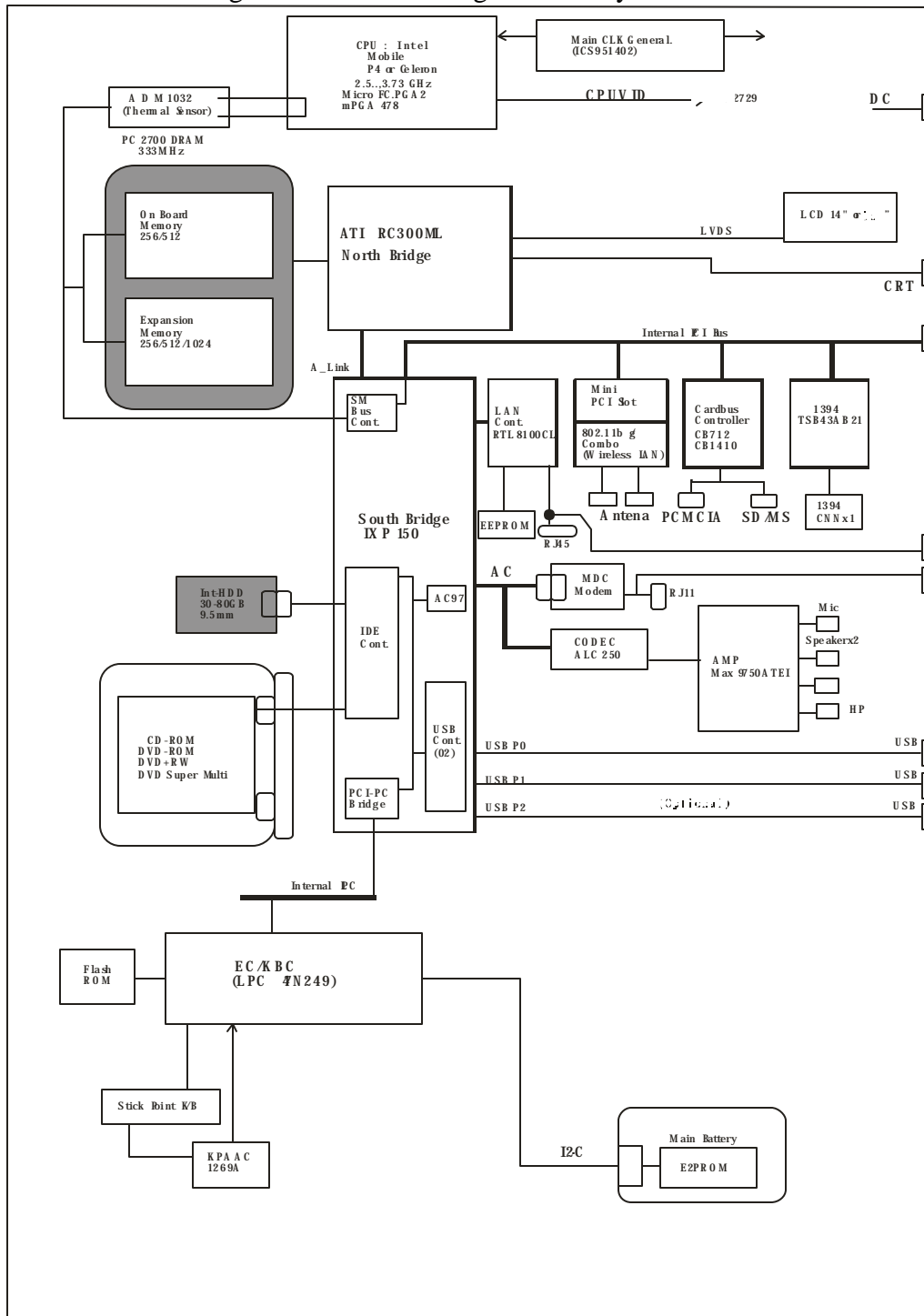
Figure 1-4 System unit block diagram

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

? Processor: Intel Portability Mobile Pentium 4 and Celeron

    ? Mobile Pentium 4 (Prescott)

        ? Core speed: 2.8,3.06,3.2,3.46,3.6 GHz
        ? System bus: 533 MHz
        ? On-die level 2 cache 1 MB
        ? Advanced Power Management features including Enhanced
        Intel ® SpeedStep ® technology

    ? Mobile Pentium 4 (Northwood)

        ? Core speed: 2.8,3.06,3.2 GHz
        ? System bus: 533 MHz
        ? On-die level 2 cache 512 KB
        ? Advanced Power Management features including Enhanced
        Intel ® SpeedStep ® technology

    ? Celeron-D(Prescott)

        ? Core speed: 2.53,2.66,2.8,2.93,3.06,3.2 GHz
        ? System bus: 533 MHz
        ? On-die level 2 cache 256 KB

    ? Celeron(Northwood)

        ? Core speed: 2.5,2.6,2.7,2.8 GHz
        ? System bus: 400 MHz
        ? On-die level 2 cache 128 KB

? Memory

    one BTO/CTO-capable expansion memory slot is provided, They can hold 256/512/1024MB expansion memory modules available as options to grow up to 1.5 GB.

    ? PC2700 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)

    ? 2.5 volt operation

    ? No parity bit

    ? 64-bit data transfer

? BIOS ROM (flash E2PROM)

> ? 4Mb x 1 chip (512KB flash parts)

>> ? 29kb used for EC BIOS
>> ? 46kb used for VGA BIOS
>> ? 29kb used for pxe boot
>> ? 4kb used for logo
>> ? 7kb used for USB
>> ? 14kb used for SCU
>> ? 2kb used for CF Card
>> ? 9kb used for PCI
>> ? 3kb used for ACPI
>> ? 14kb used for PNP
>> ? 35kb used for PM
>> ? 51kb used for system BIOS
>> ? 10kb used for micro code
>> ? 2kb used for DMI
>> ? 4kb used for password
>> ? 24kb used for boot load
>> ? 156kb reserved

? System controllers

> ? North Bridge: ATI RC300ML

>> ? CPU interface and control
>> ? DRAM control
>> ? AGP master/slave interface (AGP1.0 compliant, AGP V2.0 compliant x 4 modes)
>> ? Memory 256MB,Video RAM 64MB
>> ? Memory 512MB,Video RAM 64MB

> ? South Bridge: ATI IXP150

>> ? Enhanced DMA controller
>> ? Interrupt controller
>> ? Counter/timer
>> ? PCI master/slave interface (PCI R2.2 compliant)
>> ? PCI IDE controller
>> ? Support for ATA-100 (30/40/60/80 GB)
>> ? USB interface
>> ? SMBus interface
>> ? LPC interface
>> ? Power management control
>> ? Suspend/resume control
>> ? ACPI support

? PC Card controller

There are 2 kinds of PCMCIA controller by BTO

? ENE CB712

? CardBus/PC Card controller
? 16-bit PCMCIA and 32-bit CardBus.
? SD/MS/MMC Card controller

? ENE CB1410

? CardBus/PC Card controller
? 16-bit PCMCIA and 32-bit CardBus.

? Sound Controller

The IXP 150 integrated audio controller supports multimedia. The sound system contains the following:

? MIDI replay feature

? Stereo speakers

? Headphone jack

? External microphone jack

? IXP 150 integrated audio controller + RealTek 250 (AC97 compliant)

? 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 47N249 chip is used to serve as KBC/ EC and Super IO.

? KBC

? Scan controller function
? Interface controller function

? EC

- ? Power supply sequence control
- ? Overheat shutdown support
- ? LED control
- ? Beep control
- ? Device ON/OFF
- ? Cooling fan speed control
- ? Universal I/O port
- ? Battery capacity check
- ? Flash memory reprogramming function
- ? EC access interface
- ? I2C communication control

? Battery EE PROM

? 24C02 equivalent (128 words x 16 bits, I2C interface) integrated in the battery pack

- ? Storing records of battery use

? Clock Generator

? ICS951402

- ? Generating the clock signal required for the system

? Modem Controller

? Built-in MDC card with askey

? Functions of the modem controller:

- ? Digital signal conductor protection
- ? Ring wake-up support
- ? Communication codes supported:

  For data communication:
  V.90(China)/V.92 data rates: 28kbps/56kbps
  V.34 Extended rates: 33.6K/2400/V.32 turbo, V.32bits,and fallbacks

  For fax:
  V.34,V.17,V.29 V.27 and V.21 Channal 2
  V.253 Class 1 fax

  - AC97 interface

? LAN controller

? REALTEK RTL8100CL

- ? Wake-up On LAN support from S3
- ? PXE boot support
- ? 100BASE-TX support

? Wireless LAN controller

- ？ Support following 2 kinds of mini PCI wireless LAN cards.

    - ？ IEEE 802.11g(Askey)
    - ？ IEEE 802.11a/g(Askey)

- ？ Transfer Rate

    - ？ IEEE 802.11a/g: max54Mbits/s
    - ？ IEEE 802.11g: max54Mbits/s

- ？ Frequency Channel

    - ？ IEEE802.11a/g: 5.4GHz
    - ？ IEEE802.11g: 2.4GHz

- ✍ Super I/O

- ？ LPC 47N249

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 30, 40,60,80 GB.

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

The HDD is shown in Figure 1-4 and some of its specifications are listed in Table 1-1.
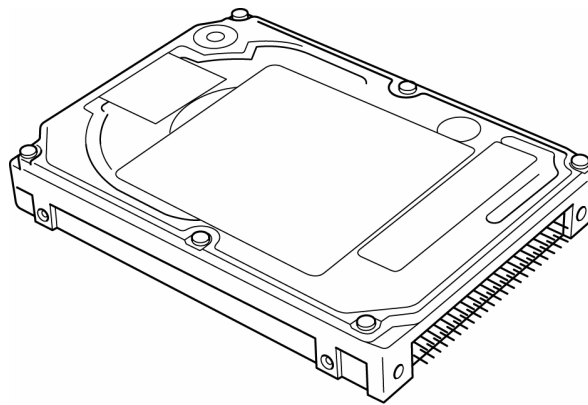
Figure 1- 5 2.5-inch HDD

Table 1- 1 2.5-inch HDD specifications

Item	Specifications							
Capacity (GB)	**30GB**	**40GB**		**60GB**		**80GB**	
Rotational speed (RPM)	4200rpm	4200 rpm	5400 rpm	4200 rpm	5400 rpm	4200 rpm	5400 rpm
User data sectors	58,605,120	78,140,160		117,210,240		156,301,488	
Bytes/sector	512	512		512		512	

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.
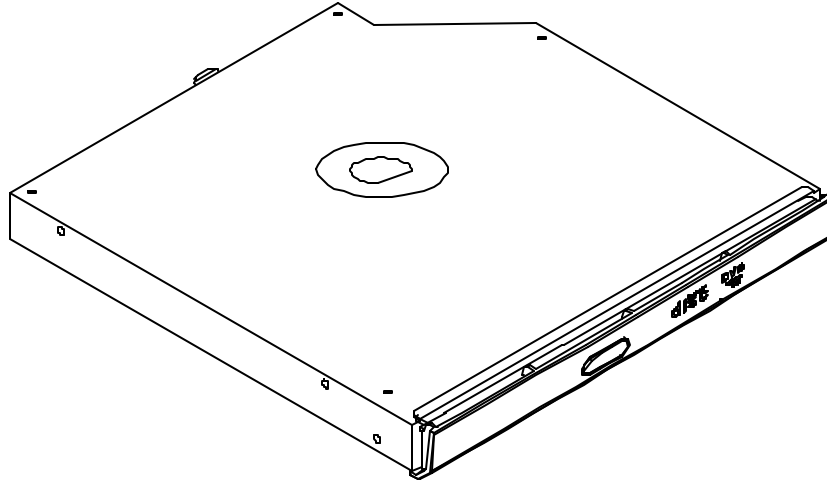
Figure 1-6 DVD-ROM drive

Table 1-2 DVD-ROM drive specifications

Item	DVD-ROM
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2)
Access time (ms) Average random access (ms) Average full stroke access (ms)	100ms
Data buffer size (Kbytes)	192
Formats supported	DVD-R/W, DVD-R (Read),DVD-RAM CD-ROM, CD-R, CD-R (Write), CD-RW (Write)

1.5 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 1-3.

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

Item	DVD-ROM mode	CD-RW 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 Average full stroke access	120	150
Data buffer size (Mbytes)	2	
Formats supported	DVD: DVD-ROM(DVD-5,DVD-9,DVD-10,DVD-18),DVD-R (Ver.1.0,Ver.2.0),DVD-RW(Read Ver.1.1),DVD-RAM(Read Ver.2.1) 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),Muitisession CD(Photo CD,CD-EXTRA,Portfolio,CD-R,CD-RW),CD-R,CD-RW	

1.6 DVD Multi

The DVD-Multi 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 16x speed and CD-RW at 4x speed.

The specifications of the DVD-Multi drive are listed in Table 1-4.

Table 1- 4 DVD-Multi drive specifications

Item	DVD-ROM mode	CD-ROM mode	DVD-RAM 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 Average full stroke access	180	150	
Data buffer size (Mbytes)	2		
Formats supported	DVD: DVD-VIDEO,DVD-ROM,DVD-R(3.9G,4.7G),DVD-RW(Ver.1.1),DVD-RAM CD: CD-DA,CD-ROM, CD-R,CD-RW,CD-ROMXA,PhotoCD(muitiSession),Video CD,CD-Extra(CD+),CD-Text		

1.7 DVD-R/-RW

The DVD-R/-RW 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 16x speed and CD-RW at 4x speed and High speed CD-RW at 8x and DVD-R at 2x and DVD-RW at 1x.

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

Table 1- 5 DVD-R/-RW drive specifications

Item	DVD-ROM mode	CD-ROM mode
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2) 16.6 (PIO mode 4, Multiword DMA mode 2)	
Access time (ms) Average random access Average full stroke access	180	150
Data buffer size (Mbytes)	2	
Formats supported	DVD: DVD-VIDEO,DVD-ROM,DVD-R(3.9G,4.7G) CD: CD-DA,CD-ROM, CD-R,CD-RW,CD-ROMXA,CD-1 Ready, PhotoCD(muitiSession),Video CD,CD-Extra(CD+),CD-Text	

1.8 DVD Dual

The DVD-Dual 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 16x speed and CD-RW at 10x speed and DVD-R/+R at 4x speed and DVD-RW at 2x speed and DVD+RW at 2.4x speed.

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

Table 1- 6 DVD-Dual drive specifications

Item	DVD-ROM mode	CD-ROM 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 Average full stroke access	180	150
Data buffer size (Mbytes)	2	
Formats supported	DVD: DVD-ROM,DVD-R ver2.00 for General (Read/Write), DVD-RW Ver.1.0&1.1&1.2(Read/Write),DVD+R(Read/Write),DVD+RW(Read/Write) CD: KODAK Photo CD Single and Multi-Session,CD-Extra(CD+),Mixed CD,Video CD, CD-R discs (Read/Write), CD-RW , CD test data.	

1.9 DVD Super Multi

The DVD Super Multi 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 16x speed and CD-RW at 4x speed and High speed CD-RW at 8x speed and DVD-R at 4x speed and DVD-RW at 2x speed and DVD+R at 2.4x speed and DVD+RW at 2.4x speed and DVD-RAM at 2x speed.

The specifications of the DVD Super Multi drive are listed in Table 1-7.

Table 1- 7 DVD Super Multi drive specifications

Item	DVD-ROM mode	CD-ROM mode
Data transfer rate (Mbytes/s)	33.3 (U-DMA transfer mode 2) 16.6 (PIO mode 4, Multiword DMA mode 2)	
Access time (ms) Average random access	180	150
Data buffer size (Mbytes)	2	
Formats supported	DVD: DVD-VIDEO,DVD-ROM,DVD-R(3.9G,4.7G),DVD-RW(Ver.1.1),DVD-RAM,DVD+R,DVD+RW. CD: CD-DA,CD-ROM, CD-R,CD-RW,CD-ROMXA, PhotoCD(muitiSession),Video CD,CD-Extra(CD+),CD-Text	

2.0 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 Power LED (in Green or AMBER).

    ?   Battery indicator (in Green or AMBER).

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.

2.1 Batteries

The computer has the following three types of batteries:

? Main battery pack

? Real time clock (RTC) battery

Table 1-5 lists the specifications of these batteries.

Table 1- 8 Battery specifications

Battery name		Material	Output voltage	Capacity
Main battery pack	8 Cell	Lithium Ion	14.8 V	4300 mAh
RTC battery		Lithium Ion	3.0 V	7 mAh

1.1.1 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.

1.1.2 Battery Charging Control

Battery charging is controlled by LPC 47N249. When the AC adapter and battery pack are attached to the computer, the LPC 47N249 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- 9 Quick/normal charging time

State		Charge time
Off-state charge	8 Cell	About 4 hours
On-state charge	8 Cell	About 8 hours or longer

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.

1.1.3   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.

Chapter 2

Troubleshooting

Chapter 2   Contents

Figures

Tables

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. ODD drive
6. LAN
7. SD CARD /Memory Stick
8. Speaker
9. Parallel Port
10. IEEE 1394
11. Cooling module

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 ODD drive cleaning)
4. Bootable CD
5. PC Card loopback connector
6. Multimeter
7. External monitor
8. Headphone
9. Microphone
10. A-BEX TEST DVD
11. Music CD
12. DVD 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:

   ? Ask the user if a password has been registered and, if so, ask him or her to enter the password. If the user has forgotten the system password, use a jump wire to make a short circuit on M/B C561 , then turn the computer power on. When booted, the computer overrides password protection and automatically erases the current password.

   ? Make sure the Windows® XP Home Edition 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.

Start

Connect the AC Adapter

DC IN LED on ?? — No → Follow the power supply diagnostic procedure in Section 2.3

Yes

BATTERY LED on ?? — No → Follow the power supply diagnostic procedure in Section 2.3

Yes

Turn the power on.

Any error message displayed ?? — Yes → Follow the system board diagnostic procedure in Section 2.4

No

Message "In Touch with Tomorrow Toshiba" displayed — No → Follow the display diagnostic procedure in Section 2.7

Yes

"Password=" displayed ?? — Yes → See the previous page to delete the password.

No

OS started ?? — No → Follow the HDD diagnostic procedure in Section 2.5

Yes

①

Figure 2-1   Basic flowchart(1/2)

①

```
                    ┌─────────────────────────┐                No    ┌─────────────────────────────┐
                    │  Keyboard works well ??  │───────────────────→ │ Follow the keyboard diagnostic │
                    └─────────────────────────┘                      │ procedure in Section 2.6       │
                                                                     └─────────────────────────────┘

              ┌─────────────────────────────┐
              │  Insert Bootable CD into ODD │
              └─────────────────────────────┘

                    ┌─────────────────────────┐                No    ┌─────────────────────────────┐
                    │   Diagnostic Program    │───────────────────→ │ Follow the ODD diagnostic      │
                    │   Loaded  ??            │                      │ procedure in Section 2.8       │
                    └─────────────────────────┘                      └─────────────────────────────┘
                              Yes

              ┌─────────────────────────────┐
              │ Perform each test with the   │
              │ diagnostic program.          │
              └─────────────────────────────┘

                    ┌─────────────────────────┐                Yes   ┌─────────────────────────────────┐
                    │ Any error detected by the │──────────────────→ │ Identify the test resulting in the error │
                    │ diagnostic program ??     │                     │ and perform the appropriate      │
                    └─────────────────────────┘                      │ diagnostic procedures            │
                              No                                     └─────────────────────────────────┘

              ┌─────────────────────────────┐
              │ Perform the continuous test to check if the │
              │ error is intermittent.       │
              └─────────────────────────────┘

                    ┌─────────────────────────┐                Yes   ┌─────────────────────────────────┐
                    │ Any error detected by the │──────────────────→ │ Identify the test resulting in the │
                    │ diagnostic program ??     │                     │ error and perform the appropriate │
                    └─────────────────────────┘                      │ diagnostic procedures            │
                              No                                     └─────────────────────────────────┘

              ┌─────────────────────────────┐
              │ The system is normal.        │
              └─────────────────────────────┘

                       ┌─────────┐
                       │   END   │
                       └─────────┘
```

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 2.5.
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 2.7.
5. If an error is detected by the ODD test, follow the ODD troubleshooting procedures in
   Section 2.8.
6. If an error is detected by the LAN test, follow the LAN troubleshooting procedures in
   section 2.9.
7. If an error is detected by the SD Card test, follow the SD Card troubleshooting
   procedures in section 2.10
8. If an error is detected by the Parallel Port test, follow the Parallel Port troubleshooting
   procedures in section 2.11
9. If an error is detected by the Speaker test, follow the Speaker troubleshooting
   procedures in section 2.12.
10. If an error is detected by the IEEE 1394 test, follow the IEEE 1394 troubleshooting
    procedures in section 2.13.
11. 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 Amber	Battery being charged
On in Green	Battery fully charged, with AC adapter connected
Blinking in Amber (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	Battery damage and can't charge during DC-in.
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 Amber or Green. If it does not, go to Procedure 3.

Procedure 2 Connection Check

Power is supplied to the system board as illustrated below:

```
 ┌──────┐      ┌──────────┐        ┌──────────────────────┐
 │      │      │    AC    │        │     System board     │
 │      │      │  adaptor │        │                      │
 └──────┘      └──────────┘        └──────────────────────┘
 ┌──────────────┐   ┌──────────────────┐
 │ AC power cord │   │  AC adaptor cord │      ┌──────────────┐
 └──────────────┘   └──────────────────┘      │ Battery pack │
                                               └──────────────┘
```
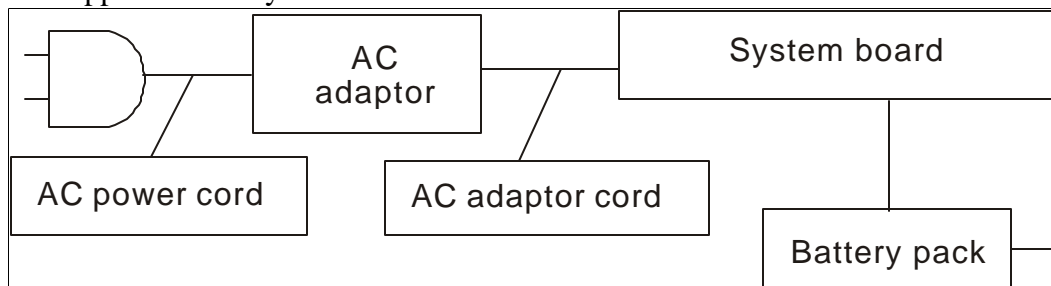
Follow the steps below to check whether each connector has been connected correctly:

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 Test Program Check

Procedure 3 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 MS-DOS or Windows XP Home Edition is loaded normally, go to Procedure 3.

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.

Check 3   **Resume failure and press any key to continue.**

Procedure 2 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. Hard Disk test
6. Mouse test
7. SD Card/Memory stick test
8. ODD test
9. Sound test
10. LAN test

If an error is detected during these tests, go to Procedure 3.

Procedure 3   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 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 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 XP Home edition 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 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 2-1. If an error code is not generated
and the problem still exists, go to Procedure 5.

Table 2- 1 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.

```
┌─────────────────────┐   ┌─────────────────────┐   ┌─────────────────────┐
│  ┌───────────────┐  │   │                     │   │                     │
│  │               │  │   │                     │   │                     │
│  │     HDD       ├──┤───┤    System board     ├───┤        CPU          │
│  │               │  │   │                     │   │                     │
│  └───────────────┘  │   │                     │   │                     │
└─────────────────────┘   └─────────────────────┘   └─────────────────────┘
```
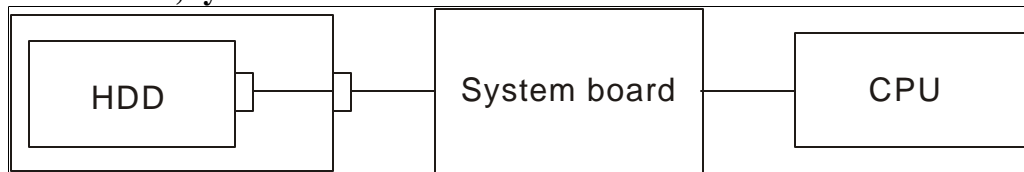
If any connector is loose or off, reconnect it firmly and return to Procedure 1.
If there is still an error, perform Check 2.

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 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 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 2. If no error is detected, the keyboard itself is normal.

Procedure 2 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.**
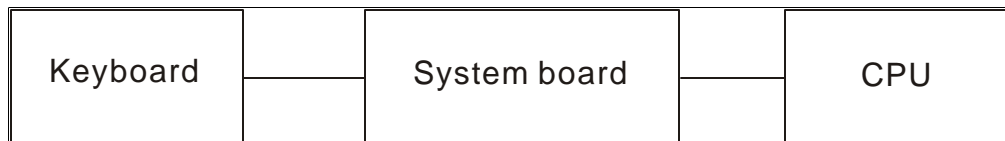
Keyboard		System board		CPU

   If the cable is loose or off, reconnect it firmly and return to Procedure 1. 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 persist, 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.**
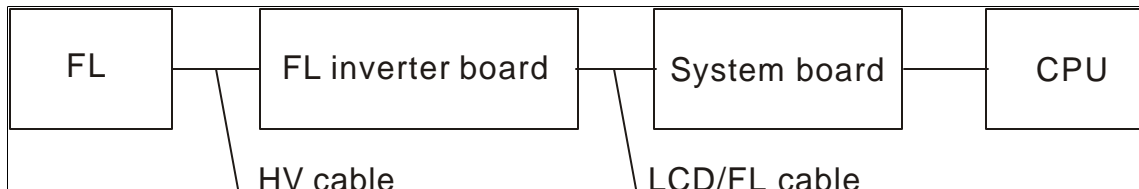
        If any of the cables is loose or off, reconnect it firmly and return to Procedure 3. If there is still an error, perform Check 2.

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.**
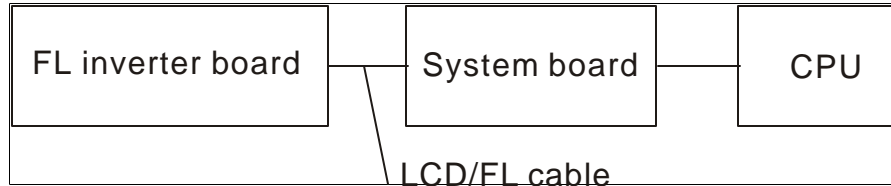
```
┌─────────────────────┐      ┌──────────────────┐      ┌──────────────┐
│  FL inverter board  │──────│   System board   │──────│     CPU      │
│                     │  \   │                  │      │              │
└─────────────────────┘   \  └──────────────────┘      └──────────────┘
                           \ LCD/FL cable
```

                 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 persist, perform Check 10.**

2.8   ODD (Optical Disk Drive)

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

Procedure 1 ODD Cleaning Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

Procedure 1 ODD Cleaning Check

1. Turn off the power to the computer.
2. Open the ODD 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 ODD drive still does not function properly after cleaning, go to Procedure 2.

Procedure 2 Test Program Check

Execute the ODD drive test program available as part of the maintenance test program. Insert the diagnostics CD in the computer's CD, turn on the computer and run the test. Then insert a test ODD (Toshiba-EMI DVD-ROM TEST DISK TSD-1) into the ODD 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 ODD 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 ODD drive and the system board.**
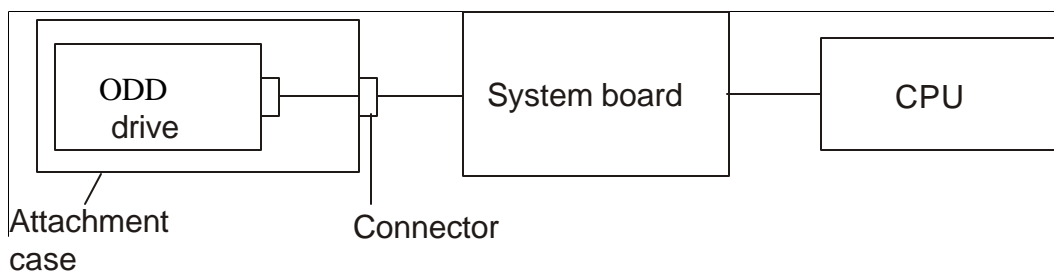
If the connector is loose or off, reconnect it firmly and return to Procedure 2.
If there is still an error, perform Check 2.

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

Check 3   **The ODD drive may be faulty. Replace the ODD drive with a new one following the steps in Chapter 4. If the ODD 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 ODD 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 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 check program available as part of the maintenance test program. This program will check the LAN. Insert the Bootable CD into the CD. Turn on the computer and run the check program. See Chapter 3 for information on how to perform the check. If any abnormal is detected by the check, 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 persist, 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.**

2.10 SD Card/Memory Stick(Optional)

To check if the computer's SD Card/Memory Stick is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check

Procedure 1 Test Program Check

Execute the SD Card/Memory Stick test program available as part of the maintenance test program. This program checks the SD Card/Memory Stick. Insert the Bootable CD into the CD. 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

The SD Card/Memory Stick connector is mounted on the system board. If the SD Card/Memory Stick 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 SD Card/Memory Stick 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 persist, 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 Parallel Port(Optional)

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

Procedure 1 Test Program Check

Procedure 2 Connector Check

Procedure 1 Test Program Check

Execute the Parallel Port test program available as part of the maintenance test program. This program checks the Parallel Port. Insert the Bootable CD into the CD. 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

The Parallel Port connector is mounted on the system board. If the Parallel Port 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 Parallel Port 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 persist, 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.**

2.12 Audio Test

To check if the computer's Speaker 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 Audio 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 2. If no error is detected, the Audio itself is normal.

Procedure 2 Connector Check and Replacement Check

The Audio 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 Speaker cable has been firmly connected to the system board.

```
┌──────────────┐   ┌──────────────┐   ┌──────────────┐
│              │   │              │   │              │
│   Speaker    │───│ System board │───│     CPU      │
│              │   │              │   │              │
└──────────────┘   └──────────────┘   └──────────────┘
```

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

Check 2   The Speaker 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 Audio 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 persist, 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.

2.13 IEEE 1394 Test(Optional)

To check if the computer's IEEE 1394 is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check

Procedure 1 Test Program Check

Execute the IEEE 1394 test program available as part of the maintenance test program. This program checks the IEEE 1394. Insert the Bootable CD into the CD. 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

The IEEE 1394 connector is mounted on the system board. If the IEEE 1394 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 IEEE 1394 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 persist, 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.**

2.14 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
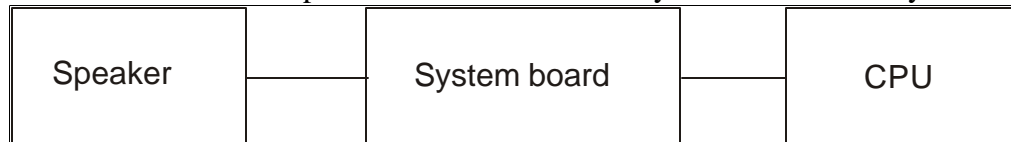
Procedure 1 Test Program Check

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, 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.**

Cooling module	——	System board	——	CPU
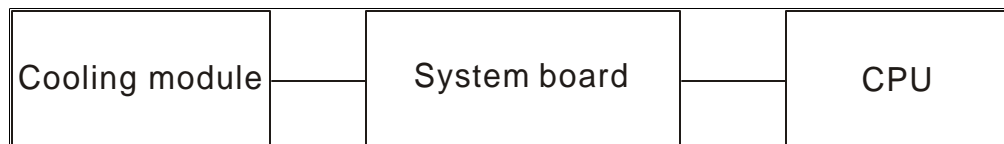
     If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If the tape is stuck to any part of the fan, stick it back to the specified point. If a foreign matter is found in the fan, remove it and then return to Procedure 1. If there is still an error, perform 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 persist, perform Check 4.**

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

Chapter 3

Diagnostic Programs

Chapter 3   Contents

3.1 General

This chapter explains the diagnostic programs which tests and diagnoses the functions of the hardware components of this computer. The diagnostic programs can be classified into two types: OPTION and DIAGNOSTIC TEST.

NOTE 1: This Diagnostic supports dynabook AX, Satellite AW2, Equium A60, Satellite A60 and Satellite Pro A60/A65

NOTE 2: 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 includes 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 include the following tests:

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

Before running the diagnostic programs, get the following tools prepared:

- ✍ A Service Diagnostic BOOT CD
- ✍ A Formatted FLOPPY DISK
- ✍ 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 CD-ROM Driver (for CD-ROM test)
        ✍   Audio Line for audio record test
        ✍   A Data CD (for CD-ROM test)
        ✍   Loop back connector of LPT
        ✍   SD, MS Card

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

Note:

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

3.2   Quick Start

When the system is booting from Service Diagnostic CD, the following screen will be displayed:

```
dynabook AX/ Satellite AW2/ Equium A60/ Satellite A60/ Satellite Pro A60/ A65
   =====================================================
   1. Quick Test
   2. Customization Test
   3. Keyboard Layout Test
   4. Hot Key Test
   5. Audio Play Test
   6. Audio Record Test
   7. Memory Card Test
   8. DMI Read
   9. DMI Write
   A. System Information
   B. View Logs
   0. Exit to MS-DOS
   -----------------------------------------------------
   Enter Your Choice (0~9, A~B):
```

Please select a test item or select **0** to exit to MS-DOS:

3.2.1   Quick Test

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

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

When Quick.log is being created, meanwhile, a file named quick.log has already existed, the system will automatically rename Quick.log to Quick.old for the backup purpose of the log file.

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

For the detail of test item, please refer to Quick Test Item List.

3.2.2   Customization Test

When this item is selected, the system will run the diagnostic programs according to the procedures you defined. When the test is completed, 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 'TouchPad' item on 'Peripheral' in the menu, then press **Space** key to select it. (When it is being selected, there is a **X** marked in the [ ])

Select 'Test Mouse' or press **F8** to run the test. The prompt information would be displayed in the screen as below. This test item needs user to verify whether the mouse works normally.
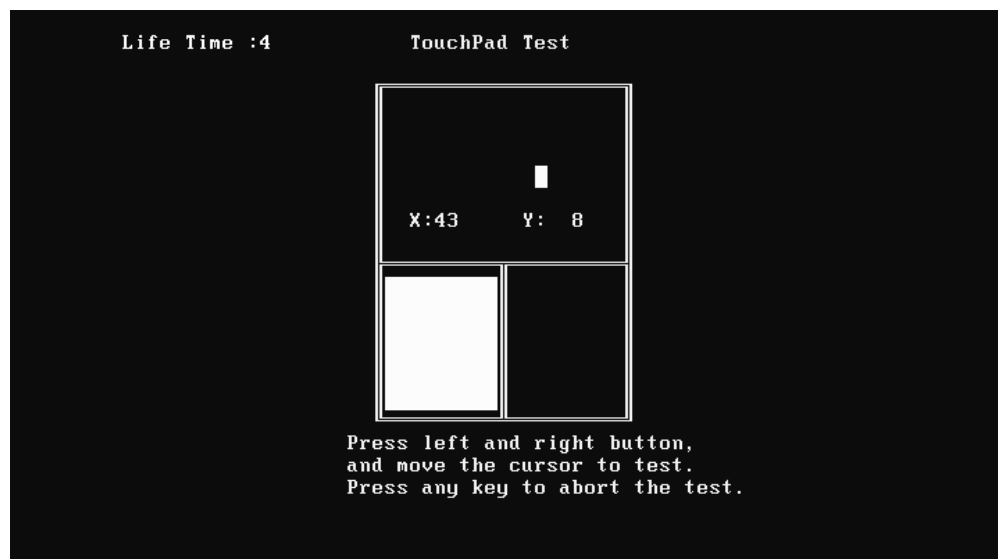
The test result will be displayed in the following screen:

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.

```
┌─[■]══════════ CPU Speed Param ═══════╗
║                                       ║
║  CPU Speed Comparison                 ║
║       (•) No   ( ) Yes                ║
║                                       ║
║  Expected CPU Speed :   2800      ↓   ║
║                                       ║
║                OK          Cancel     ║
║                                       ║
╚═══════════════════════════════════════╝
```
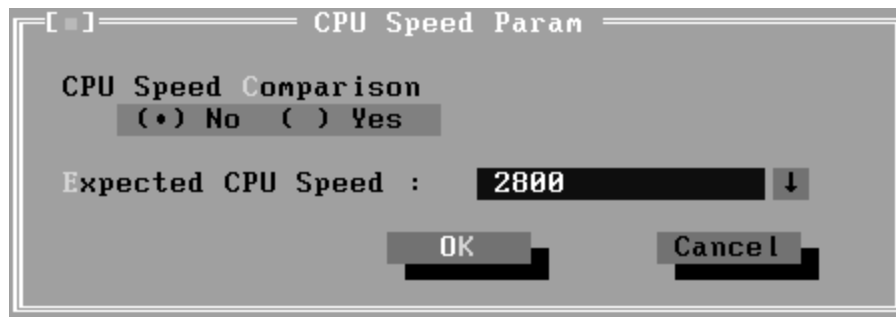
3. Test Result

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

```
Service Diagnostic Ver 2.0      CPU Test   Build Date 2004.7.23

          CPUSpeed Testing         ┌─────────────────────────┐
                                   │ Press any key to continue . . . │
   CPU Speed Test        :PASS     └─────────────────────────┘
                                          PASS

                                   ┌─────────────────────────┐
                                   │       Total Fail List   │
                                   │  Error   Description    │
                                   │                         │
                                   │                         │
                                   │  Fails Found: 0         │
                                   └─────────────────────────┘
LOOPBOUND              C.TIME:2004-08-17 20:37:11 COUNT: 01/01  CPU:54C BAT:84%
ORDER:SEQ  Custom.log S.TIME:2004-08-17 20:37:11 HALT WAIT PAUSE  ↓ Esc: Break
```
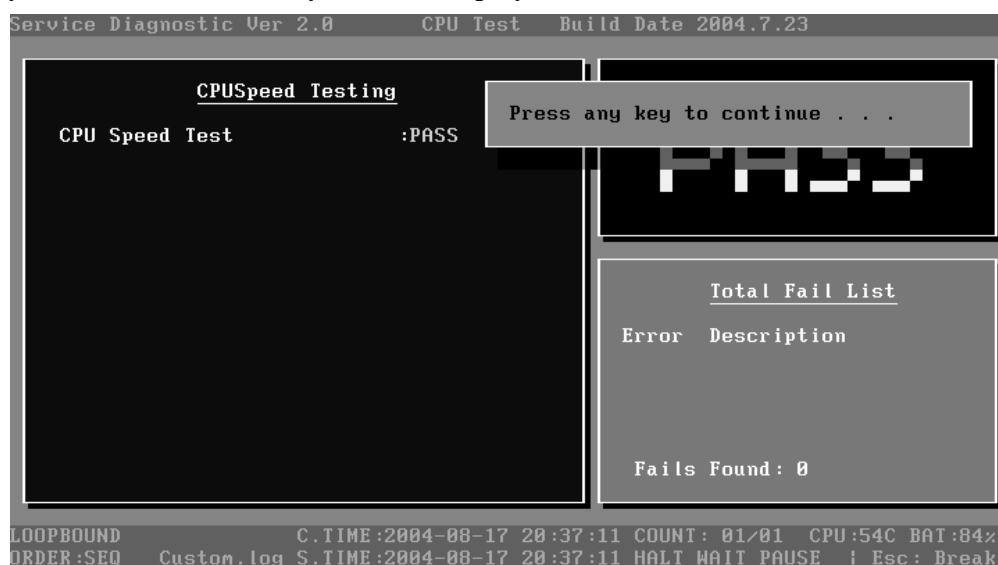
Following is the comparison report of the two testing methods mentioned above:

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 the test. User should configure each parameter in advance; 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 Keyboard Layout test

The test purpose is to check whether 18 kinds of European keyboards run well during the test procedure. When users choose the item, the names of these countries will be displayed on the screen for user choice. User press any index of token in ASCII, and the program will test the kind of keymap of the country.

```
Keyboard Layout Test
====================================================================
1. US (United States)              G. RU (Russian)
2. UK                              H. SL (Swiss/Switzerland)
3. JP (Japaness)                   I. SW (Swedish)
4. BR                              J. NO (Norwegian)
5. SP (Spanish)                    K. DK (Danish)
6. KR (Korean)                     L. TR (TurKey)
7. CF (Canadian-French)            M. GK (Greek)
8. FR (French)                     N. ES (Estonia)
9. GR (German)                     O. HE (Herbrew)
A. IT (Italian)                    P. CZ (Czech)
B. TC (Traditional Chinese, Taiwan) Q. LI (Lithuanian)
C. PT (Portuguese)                 R. HU (Hungary)
D. USE (DU, UE, US International)   S. SA (Slovakia)
E. AR (Arabic)                     T. YU (Yugoslavia)
F. BE (Belgian)
====================================================================
Please Select a Keyboard Layout(1~9,A~T, 0-Exit):
```

The test screen would be shown as below:

```
LEFT TIME : 37     scancode: 255


    Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 Prtsc Pause Win App

       1  2  3  4  5  6  7  8  9  0  -  =   Back    Home

    Tab Q  W  E  R  T  Y  U  I  O  P  {  }  |   PgUp

    Caps A  S  D  F  G  H  J  K  L  :  '   Enter PgDn

    Shift  Z  X  C  V  B  N  M  ,  .  /   Shift   End

    Ctrl Fn Alt ~     Space       Ins Del Alt  Up
                                          <  Dn  >


Press Fn+Enter to test Fn.
Please press the key one by one and 'E' 'N' 'D' to skip this test.
```

It requires user to press the key and check whether the key in the screen changes color or not. User can terminate test by typing '**END**'. When testing the '**Fn**' key, it must press the '**Enter**' key at the same time.

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

If keyboard test fails, program will terminate the test and report the fail information when it is time to timeout.

The test will end when all keys are pressed or test time is out after 100 seconds.

3.2.4 Hot Key Test

User can press the program buttons E1, E2, E3, E4 and E5 one by one, and the test will end either when all keys pressed or test time is out after 10 seconds.

3.2.5 Audio Play Test

Check whether the system could playback audio normally. When the test is completed, a file named Audio_P.log will be saved in the defined location.

3.2.6 Audio Record Test

Check whether the system could record the sound and playback it normally. Before the test, please make sure that the linked line is inserted and the volume is set to maximum. When the test is completed, a file named Audio_R.log will be saved in the defined location.

3.2.7 Memory Card Test

Write/Read Test

Check whether the Memory card(SD/MS) could be correctly accessed.

3.2.8 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 A60
        Version          :   PSA63U-00CS02
        Serial Number    :   64CS1100V
        UUID             :   8BF89380BAAA11D8934B00A0D1DF0E93
        OEM Part Number  :   11111111111111111111
        OEM SW Number    :   11111111111111111111




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

User can press any key to exit the program.

3.2.9   DMI Write

In addition to reading the DMI information, **DMI Write** also permits 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 A60
                           Satellite A60
    Version           :    PSA63U-00CS02
                           PSA63U-00CS02
    Serial Number     :    64CS1100V
                           64CS1100V
    UUID              :    8BF89380BAAA11D8934B00A0D1DF0E93
                           8BF89380BAAA11D8934B00A0D1DF0E93
    OEM Part Number   :    11111111111111111111
                           11111111111111111111
    OEM SW Number     :    11111111111111111111
                           11111111111111111111


    ----------------------------------------------------------------
        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 1st
line (the font in yellow with blue background) shows the attribute's value that is read
from the current system and the 2nd line (the font in red with turquoise background)
shows the same value as that in the 1st line before user's editing. User can modify the
attribute's value in the 2nd line and press **Enter** to confirm the current edition 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 A60
   Version          :   PSA63U-00CS02
   Serial Number    :   64CS1100V
   UUID             :   8BF89380BAAA11D8934B00A0D1DF0E93
   OEM Part Number  :   11111111111111111111
   OEM SW Number    :   11111111111111111111




   ----------------------------------------------------------------
     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.

3.2.10 System Information

This function is used to read the system information. When the test is completed, 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:

```
System Information              IDE ver 3.00

     Menu                            Information

  Battery
  Cache
  CPU
  IDE                      Detecting IDE...
                           Please wait!










 ↑/↓: Prev/Next Item PgUp/PgDn: Prev/Next Page              ESC: Exit
```

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

```
System Information ...

     Menu                              Information

 Battery 1           CPU
 CardBus             Processor              Intel(R) Celeron(R) proces
 Cache                                      sor
 CPU                 Processor ID           bfebfbff00000f29
 IDE 0               Vendor ID              GenuineIntel
 IDE 1               Family Level           15
 IDE 2               Model Level            2
 IDE 3               Stepping Level         9
 IrDA                Speed                  2500 MHz
 LCM                 FPU                    On-Chip FPU
 Memory              MMX                    Yes
 Parallel 1          SSE2                   Yes
 Parallel 2          Q'ty                   1
 Parallel 3
 SBridge
 Ship BIOS
 Video

↑/↓: Prev/Next Item PgUp/PgDn: Prev/Next Page           ESC: Exit
```

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.

NOTE: LCM Information doesn't support CSV (Sharp) LCM.

3.2.11 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. Keyboard Layout Test Log
4. Hot Key Test Log
5. Audio Play Test Log
6. Audio Record Test Log
7. Memory Card Test Log
8. System Information
9. Exit to Main Menu
-------------------------------------
Enter Your Choice (1--9):
```

3.2.12 Exit to MS DOS

Select this item to exit to MS DOS.

3.2.13 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 2.0 ..... Memory Tester Build Date 2004.7.23

            Bit Stuck High
   Base Memory Test             :                    TEST


                          USER BREAK
                                                 Total Fail List
                          CONTINUE
                            SKIP            ror  Description
                            ABORT
                          ABORT ALL


   Testing Address: 0x00003400
   ███████████████                   37%    Fails Found: 0


LOOPBOUND              C.TIME:2004-08-17 19:52:34 COUNT: 01/01  CPU:50C BAT:100
ORDER:SEQ   Custom.log S.TIME:2004-08-17 19:52:34 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.

```
                 Exit All Tests ?

                  YES        NO
```
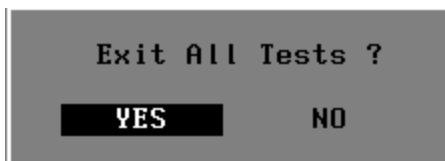
4. Title Bar:

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:2004-01-04 19:24:12 COUNT: 01/01  CPU:38C BAT:100
ORDER:SEQ    quick.log S.TIME:2004-01-04 19:24:11 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.INI' in the above screen;

? **Current Time (C. TIME)**: Current system time, e.g. 'C.TIME:2004-01-04 19:21:27' 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: 49C' in the above screen;

? **Remaining Battery Capacity**: Remaining Battery Capacity detected in the current Battery, e.g. 'BAT: 97%';

? **Test Order**: Define the test sequence. There is 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: 2004-01-04 19:21:16' 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.

```
Service Diagnostic Ver 2.0 ..... Copyright 1998-2004, Inventec (Tianjin) Ltd.
  System  Memory  Storage  Video  Comm  Periph  Options

                                             Select  All Items      F6
                                             Test Selected Items     F8
                         Batch Run Parame
                                             Edit Batch Parameters  ▶
              Interactive Test : Yes         Load Batch Parameters...
                Break on Error : Yes         Save Batch Parameters...
                 Wait on Error : Yes         Log Parameters...
                  Pause Enable : Yes         Specify Log Viewer...
                                             Display Error Log File...
           Battery Life Monitor : Yes        DOS Shell
           CPU Thermal Monitor : Yes
                                             Exit to Dos           Alt+X
                     Test Mode : Loo
                    Test Order : Sequence

                  Cfg File Name: : cfg.ini
                  Log File Name: : Custom.log




Alt-X Exit  F10 Menu  F8 Test Selected
```

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, a warning
message would be shown as below:

```
=[■]===============  Warning  =

   The 'Interactive' option in batch
   parameters has not been selected
   on, the interactive test items
   would be directly reported as fail.
                 OK
```
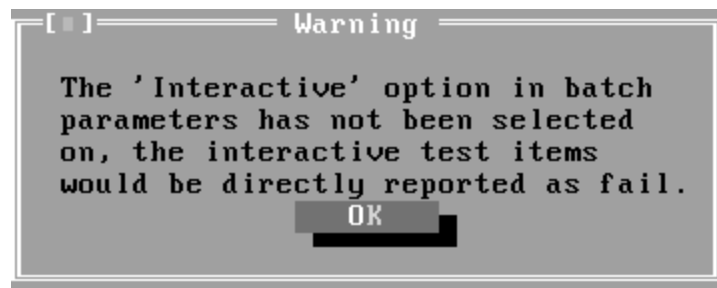
? Edit Batch Parameters

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

? Load Batch Parameters

Upload all the test items and the parameters to the *.ini file.

? Save Batch Parameters

Save all the parameters and the test items that are 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 the 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:

```
┌─[■]════════════ Edit Batch Params ════════
│
│  Test Order:                    Test Mode:
│      (•) Sequence                   (•) LOOPBOUND
│      ( ) Random                     ( ) TIMEBOUND
│
│  Test Options:                  Time Limit Hrs:
│      [X] Wait On Error              ┌─────────────┐ ↓
│      [X] Break On Error             │      0      │
│      [X] Pause Enable           Time Limit Min:
│      [X] Interactive                ┌─────────────┐ ↓
│      [X] Monitor Battery Life       │      0      │
│      [X] Monitor CPU Thermal    Number Of Loops:
│                                     ┌─────────────┐ ↓
│                                     │      1      │
│              ┌────────┐         ┌──────────┐
│              │   OK   │         │  Cancel  │
│              └────────┘         └──────────┘
└────────────────────────────────────────────
```
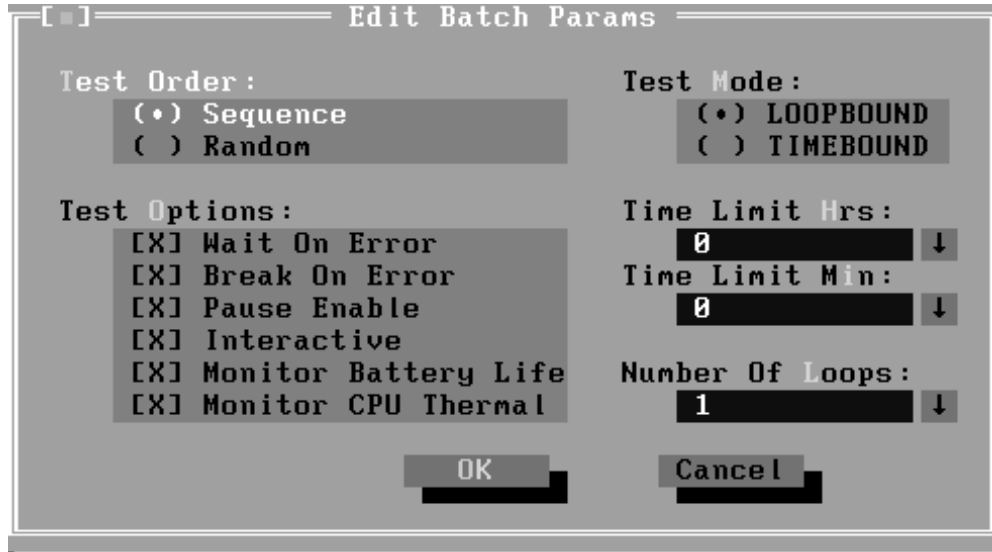
? **Test Order**

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 keystroke test.

? **Interactive**

If the item is enabled during the test, the test items that need user to response can run normally, such as Mouse test; If it is disabled, those test items will report FAIL.

When 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:

```
┌─[■]═══════════ Basic Functionality ═══════════
│
│   Repeat Count: 1                          ↓
│
│   Item Options: [ ] Interactive
│
│
│       Parameters...        OK        Cancel
│
│
└
```
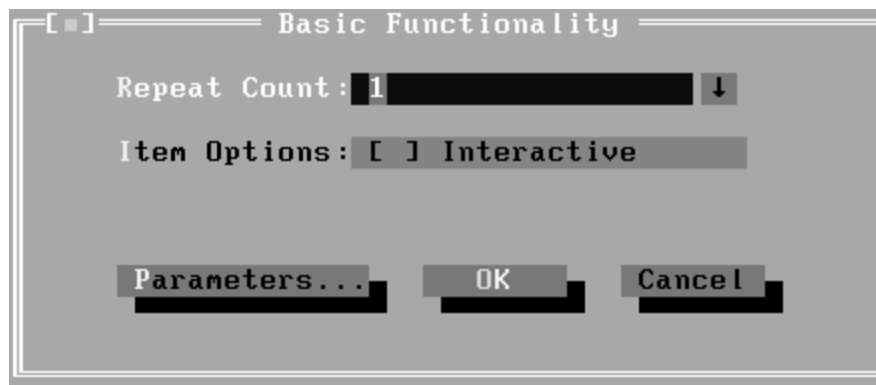
? **Repeat count**

Repeat times of the test item.

? **Interactive**

If the item is enabled during the test, the test items that need user to response can run normally, such as PS2 Mouse test; If it is disabled, those test items will report FAIL.

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:
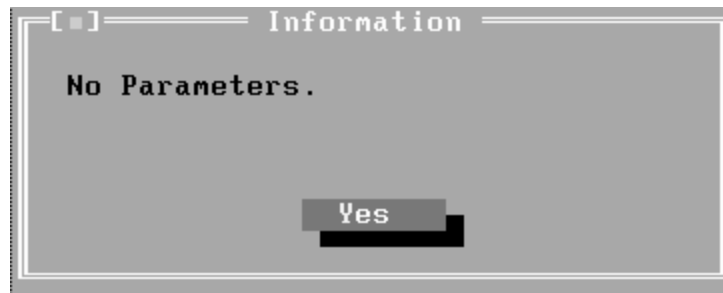
Parameters for the specific test items:

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".

```
┌[■]════════════ Load config file ════════════
  Name
  █cfg.ini                              █ ↓    │   OK   
 
  Files
   AUDIO.INI
   IDEHDD.INI                                     Cancel
   PNP.INI
   QUICK.INI
   ..\
 
 
   ◄■░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░►
 
  R:\DIAG_DOS\ITCDIAG\*.INI
  AUDIO.INI      574         Nov 13,2002   10:23a
```
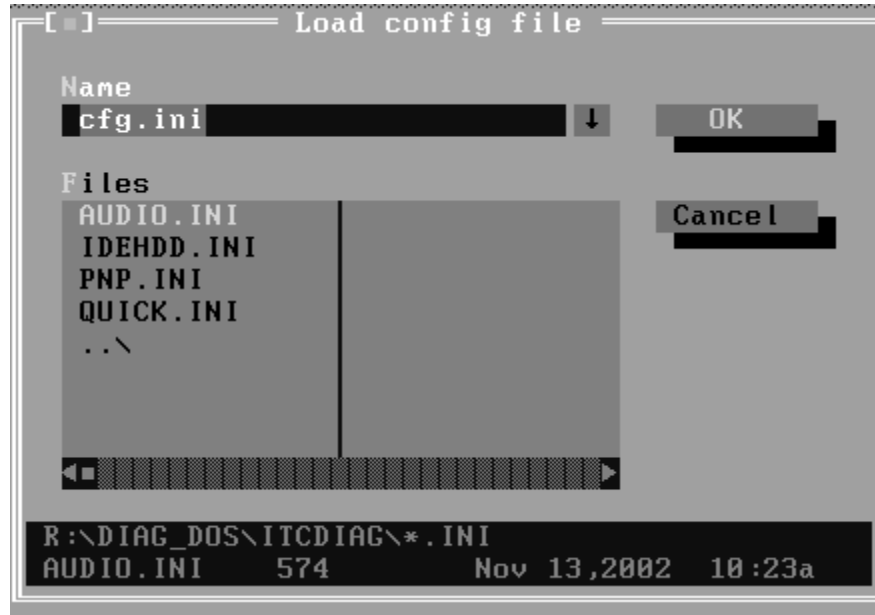
In this window, you can specify the .INI files that you wanted to be edited or modified.

3.3.5 Save Batch Parameters

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

```
┌[■]════════════ Save config file ════════════
  Name
  █cfg.ini                              █ ↓    │   OK   
 
  Files
   AUDIO.INI
   IDEHDD.INI                                     Cancel
   PNP.INI
   QUICK.INI
   ..\
 
 
   ◄■░░░░░░░░░░░░░░░░░░░░░░░░░░░░░░►
 
  R:\DIAG_DOS\ITCDIAG\*.INI
  AUDIO.INI      574         Nov 13,2002   10:23a
```
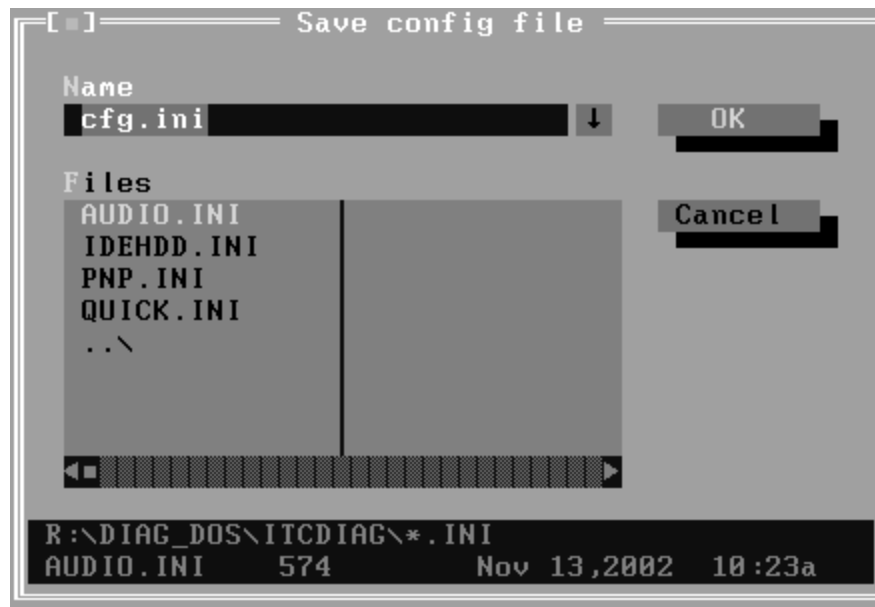
3.3.6 LOG Parameters Setting

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

```
╔═[■]══════════════ Edit Log File Params ═══════════╗
║                                                    ║
║       Report Destination                           ║
║          ( ) NONE  (•) FILE                        ║
║       Log Options:                                 ║
║          [X] Log errors                            ║
║          [X] Log test activites                    ║
║          [X] Log test start time                   ║
║          [X] Log test end time                     ║
║          [ ] Log errors only                       ║
║          [ ] Log errors only with time             ║
║          [X] Append to old Log file                ║
║          [X] Log device info on fail               ║
║                                                    ║
║       Log File Name:                               ║
║          ItcDiag.log                         ↓    ║
║                                                    ║
║             OK            Cancel                    ║
║                                                    ║
╚════════════════════════════════════════════════════╝
```
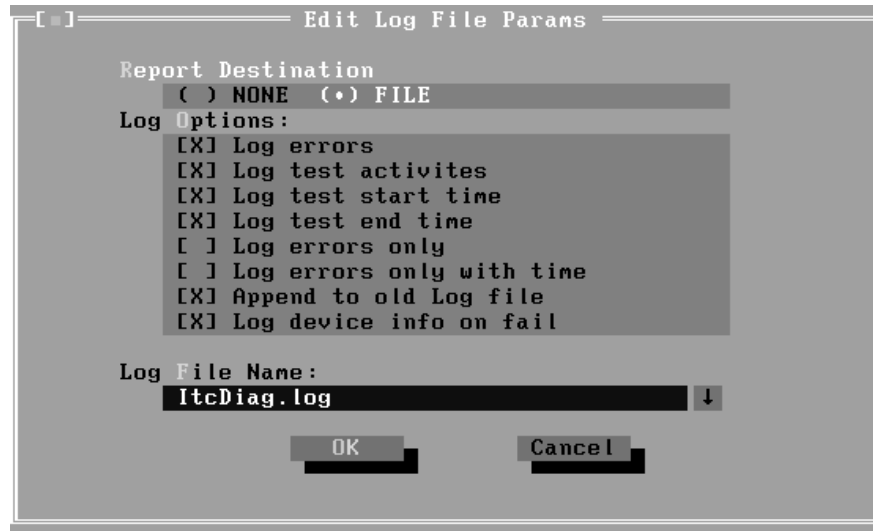
? **Report Destination**

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

? **Log Options**

? **Log Errors**

If selecting this parameter, errors will be recorded when the test fails.

? **Log Test Activities**

If selecting this parameter, the subtest results will be recorded.

? **Log Test Start Time**

If selecting this parameter, the start time of the test will be recorded.

? **Log Test End Time**

If selecting this parameter, the end time of the test will be recorded.

? **Log Errors Only**

If selecting this parameter, errors will be recorded only when the test fails.

? **Log Errors Only with Time**

If selecting this parameter, errors and time will be recorded only when the test fails.

? **Append to Old Log File**

If selecting this parameter, the new log will be added to the old one.

? **Log Device Info on Fail**

If selecting this parameter, 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.

```
=[■]=== Designate Log File Viewer =

 Please Input file Name:

     logview.exe                ↓


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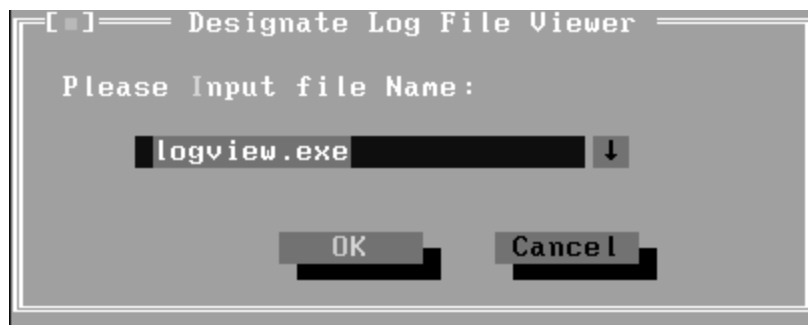
The default viewing program of Service Diagnostics is **LogView.exe.**

3.3.8 Display LOG File

You can specify the Log file for viewing in the Display Error Log File screen.
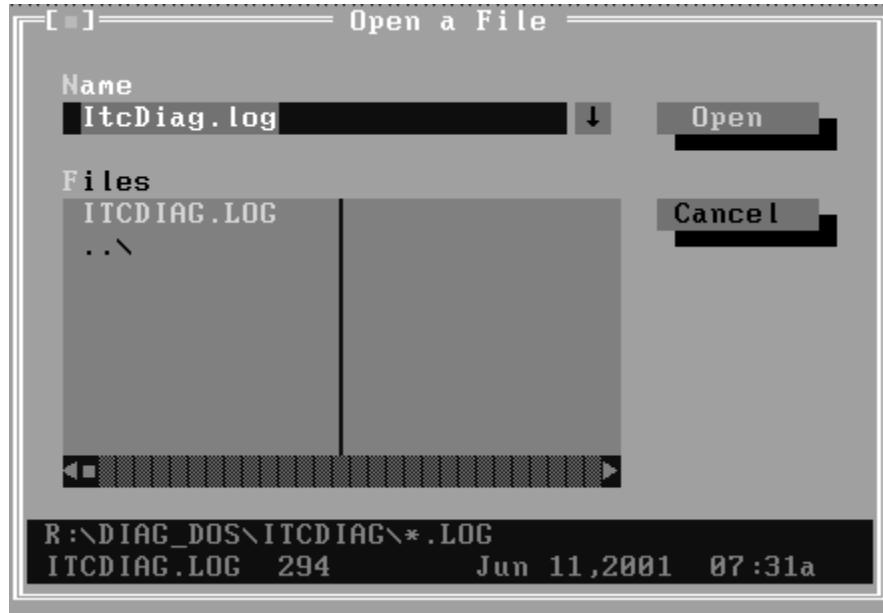
In this screen, you can specify a Log file and view it with the viewer designated in Specify LOG Viewer.

3.3.9 LOG Viewer

Service Diagnostic Log viewer:

? **?, ?**
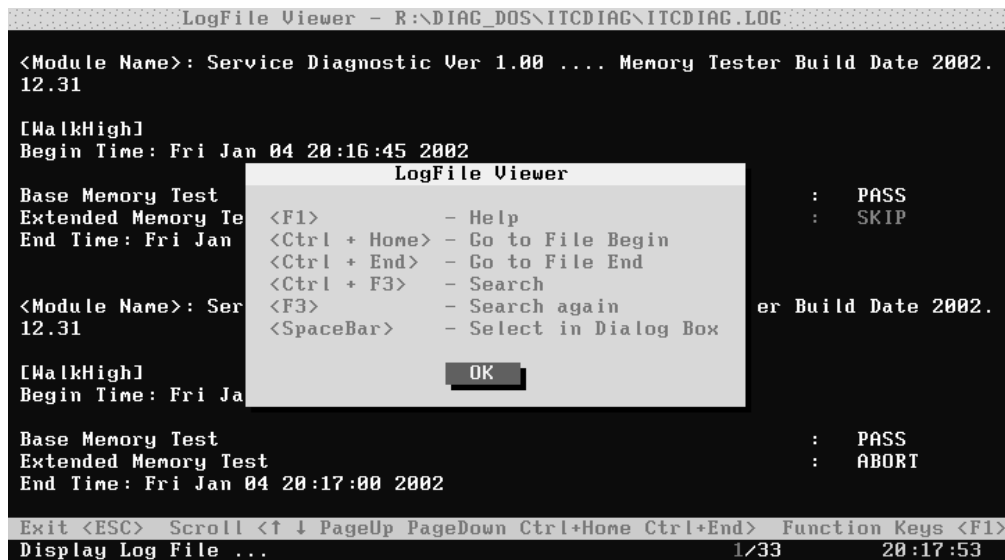
Scroll a line backward or forward on the screen.

? **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 Log viewer 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 1.01 ... Memory Tester Build Date 2002.12.31

[Walk High]

Begin Time: Mon Jan 05 10:45:36 2004

Base Memory Test   *:   PASS*

Extended Memory Test   *:   PASS*

End Time: Mon Jan 05 10:47:51 2004

<Module Name>: Service Diagnostic Ver 1.01 ... Mouse Test Build Date 2002.12.31

[MSTPad]

Begin Time: Mon Jan 05 10:48:54 2004

Touch Pad Test   *:   FAIL*

ITEM TEST FAIL

Function ID   :502

Error Code   :50202

Error Message :Touch Pad Test Fail

End Time: Mon Jan 05 10:49:16 2004

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	PCI System	[PCI]
			05	Plug and Play	[PnP]
			06	ACPI Test	[ACPI]
	03	FAN	01	FAN Speed Test	[FANSpeed]
			02	Chipset Fan Test	[CHIPFAN]
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	[CDRWController]
			02	Data Transfer Rate	[CDRWTransRate]
			03	Data CD Butterfly Seek	[CDRWButterfly]
			04	Data CD Random Seek	[CDRWSeek]
			05	Data CD Sequence Seek	[CDRWSFSeek]
			06	Tray Eject Test	[CDRWTray]
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_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_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_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]
	06	AGP Test			[AGP]
	07	LCD Panel Test			[LCDPanel]
	08	Register Test			[Register]
	09	Color Purity Test			[ColPurity]
	10	Direct Color Test			[DirectColor]
	11	DAC/Palette Address			[DACPalAddr]
	12	Bitblt Engine Test			[Bitblt]
COMM	01	LPT	01	Register Check	[LPTRegister1]
			02	IRQ Check	[LPTInterrupt1]
			03	External Loopback	[LPTExLoopback1]
			04	ECP Mode	[LPTECP1]
	02	IrDA	01	IrDA Master	[IrMaster]
			02	IrDA Slave	[IrSlave]
	03	LAN Card	01	Device ID Detection	[DeviceID]
			02	Vendor ID Detection	[VendorID]
			03	Mac Address Detection	[MAC Address]
	04	1394	01	GUID Detection	[1394 R/W Test]
Peripheral	01	Keyboard	01	Keyboard Data Line	[KBDataLn]
			02	Keyboard Led	[KBLED]
			03	Keyboard Clock Line	[KBClokLn]
	02	Mouse	01	TouchPad	[MSTpad]

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.
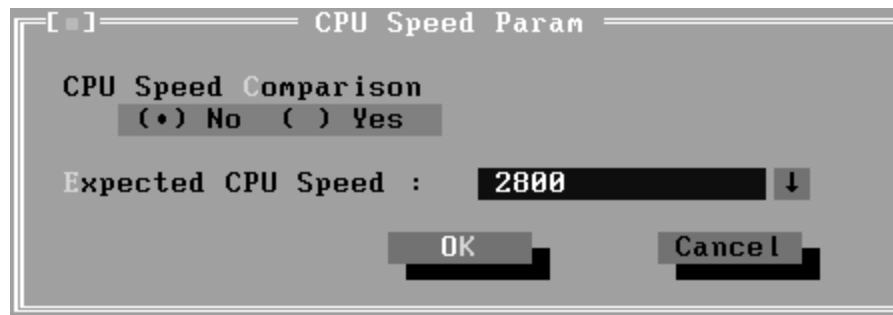
Subtest 01 CPU

```
Service Diagnostic Ver 2.0 ..... Copyright 1998-2004, Inventec (Tianjin) Ltd.
   System  Memory  Storage  Video  Comm  Periph  Options

[ ]  CPU    ▶
[ ]
[ ]     [ ] Basic Functionality    ch Run Parameters
        [ ] CPU Speed...
        [ ] Coprocessor        ▶   ve Test : Yes
        [ ] CPU Information          n Error : Yes
        [ ] CPU Protected Mode       n Error : Yes
        [ ] Speedstep...             Enable : Yes
        [ ] MMX
                                    Monitor : Yes
        Test CPU                    Monitor : Yes

                              Test Mode : Loopbound
                             Test Order : Sequence

                          Cfg File Name: : cfg.ini
                          Log File Name: : Custom.log




Alt-X Exit  F8 Test Selected | Press 'SPACE' to Set, Press 'Enter' to Test
```

1.   Basic Functionality Test

   This test item is to check whether the CPU works normally through math and
   logic calculation, which means 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 Param ═══════
│
│  CPU Speed Comparison
│      (•) No  ( ) Yes
│
│  Expected CPU Speed :   2800              ↓
│
│                   OK          Cancel
│
└
```

> **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 2.0 ..... CPU Test   Build Date 2004.7.23

        CPUInformation Testing
                                   Press any key to continue . . .
CPU Information          :
Standard Speed = 2500MHz
Current Speed = 2499MHz                      PASS
PROCESSOR ID = 0F29
BRAND ID = 0X0A  (Celeron)
L2 Cache = 128KB
Unique ID = Disable                      Total Fail List
MSR17 = 00000A0000000000
MSR2A = 0000000000000000          Error   Description
                         PASS


                                          Fails Found: 0


LOOPBOUND              C.TIME:2004-08-17 19:54:45 COUNT: 01/01  CPU:53C BAT:100
ORDER:SEQ   Custom.log S.TIME:2004-08-17 19:54:45 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

Speedstep is a kind of energy-saving running mode that is supported by the Pentium III or above.

This test item is to check whether the CPU supports Speedstep function according to the change of the CPU work frequency in different power supply mode. In this test item, the user is requires to operate on the screen prompted.

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

```
┌─[■]══════════ CPU Speedstep Param ══════┐
│                                          │
│  Speed Change Comparison:                │
│     (•) No   ( ) Yes                      │
│                                          │
│  Expected Minimum Speed Change:   60  ↓  │
│                                          │
│              OK          Cancel          │
│                                          │
└──────────────────────────────────────────┘
```
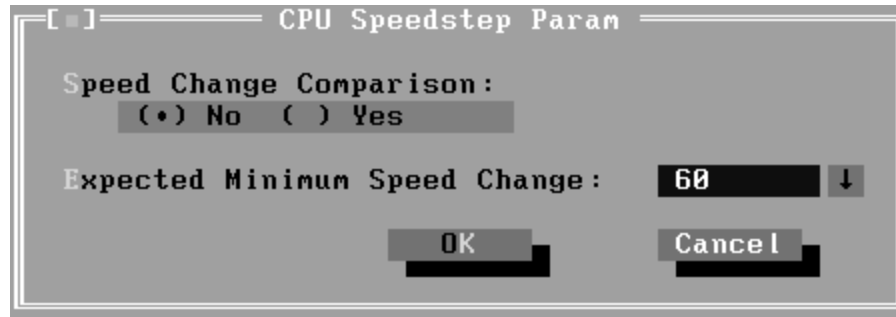
Speed Change Comparison—When choosing 'No', system only reports the CPU speed at the different power supply. Otherwise, it will compare the CPU speed at High Speed and Low Speed. Whether the difference between the two speeds is greater than the value specified in 'Expected Minimum Speed Change', system will report 'PASS', otherwise 'FAIL'.

Expected Minimum Speed Change—Specify the minimum change range of CPU speeds under High Speed and Low Speed.

7. MMX

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

Subtest 02 Boards

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. PCI System

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

5. 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.

6. 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

1. CPU Fan Speed Test

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

```
Service Diagnostic Ver 2.0 ..... FanTest  Build Date 2004.7.23

            FanSpeed Testing              Fan Fast Test Success?
    FanSpeed                :
    Fan Stop Speed Test     :                 YES       NO
      Setting    0 ~  200 rpm :
      Detected    0 rpm      :PASS
    Fan Slow Speed Test     :
      Setting  1900 ~ 2500 rpm :
      Detected 2318 rpm       :PASS              Total Fail List
    Fan Middle Speed Test   :
      Setting  2900 ~ 3500 rpm :          Error   Description
      Detected 3232 rpm       :PASS
    Fan Fast Speed Test     :
      Setting  3600 ~ 4100 rpm :

    Current Fan Speed:3838 rpm
    |||||||||||||||||||||||||||||||||||||100%    Fails Found: 0

LOOPBOUND              C.TIME:2004-08-17 19:56:32 COUNT: 01/01   CPU:53C BAT:100
ORDER:SEQ   Custom.log S.TIME:2004-08-17 19:55:18 HALT WAIT PAUSE  | Esc: Break
```

2. Chipset Fan Speed Test

> This test item is to check whether Chipset Fan exists or not. If it exists, the
> test will check the speed of Chipset Fan at the status of Power On or Power
> Off.

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 Patterns

> 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.

```
┌─[■]════════════ Memory Pattern Test Param ═══════┐
│                                                   │
│  Test Option:                                     │
│     [X] Base Memory  [X] Extended Memory          │
│                                                   │
│  Extended Memory Test Range:                      │
│     (•) Total Size  ( ) Special Size              │
│                                                   │
│     Start Addr(MB):   1     ↓   End Addr(MB):  447  ↓ │
│                                                   │
│  Pattern Size:                                    │
│     ( ) BYTE  (•) WORD  ( ) DWORD  ( ) ALL        │
│                                                   │
│  Percent(%):   100       ↓                        │
│                                                   │
│  Time Limit(h):   0     ↓   Time Limit(m):   0   ↓ │
│                                                   │
│                  OK              Cancel            │
└───────────────────────────────────────────────────┘
```
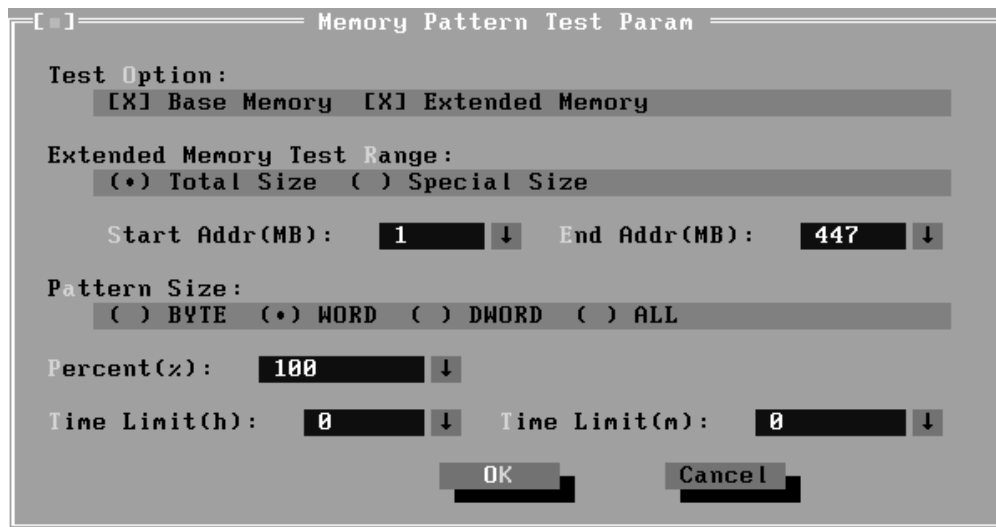
> **Test Option:** Choose the Memory part to take the test– Base Memory or
> Extended Memory.

> **Extended Memory Test Range:** Specify the test coverage range of
> Extended Momory. If user chooses Total Size, it means that the whole
> Extended Momory will be tested. Although user can input the parameter
> into other select box, but the selected result is invalid. If user chooses
> Special Size, the test of Extended Momory will be taken according to the
> coverage range that user chooses or time.

> **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.

Time Limit(h): Choose or Input the time (hour) of the defined range of the memory to be tested.

Time Limit(m): Choose or Input the time (minute) 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 of the memory, there is Read/Write Cycle test and Read Cycle Test for the extended memory.

Below is the parameter dialog window of the extended pattern test.
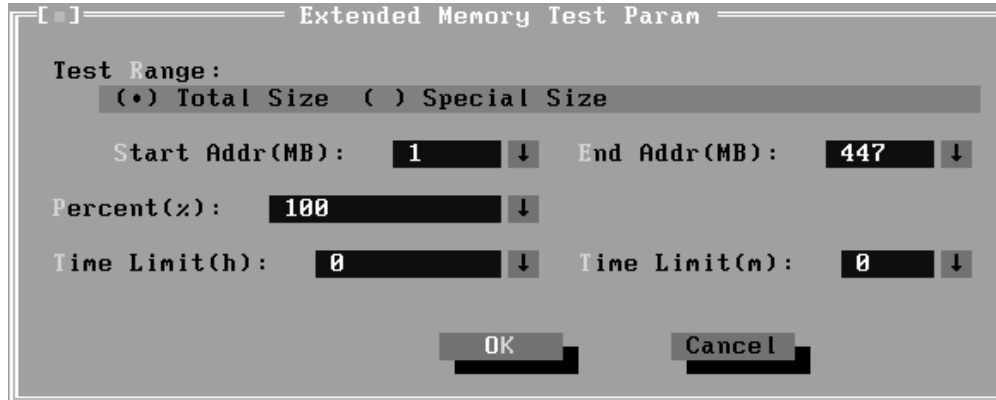
```
=[■]============= Extended Memory Test Param =

  Test Range:
       (•) Total Size  ( ) Special Size

       Start Addr(MB):   1      ↓    End Addr(MB):   447    ↓

  Percent(%):   100           ↓

  Time Limit(h):   0           ↓   Time Limit(m):   0    ↓


                        OK              Cancel
```

Test Range: Specify the test coverage range of Extended Momory. If user chooses Total Size, it means that the whole Extended Momory will be tested. Although user can input the parameter into other select box, but the selected result is invalid. If user chooses Special Size, the test of Extended Momory will be taken according to the coverage range that user chooses or time.

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 be according to the value setting in 'Percent (%)' mentioned at below.

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

Time Limit(h): Choose or Input the time (hour) of the defined range of the memory to be tested;

Time Limit(m): Choose or Input the time (minute) 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 ensure 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 ensure 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:

```
=[■]======= Memory Refresh Test Param =====

 Min Parameter (uSec) :     0013         ↓

 Max Parameter (uSec)  :     0017         ↓




                    OK              Cancel
```

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.

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:

IDE HDD Test Range-- Specify the test coverage range of IDE HDD. If user chooses Total Size, it means that the whole IDE HDD will be tested. Although user can input the parameter into other select box, but the selected result is invalid. If user chooses Special Size, the test of IDE HDD will be taken according to the coverage range that user chooses or time.

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

Percent—Specify the coverage rate in percentage of the total disk.

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested.

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested.

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's seeking function.

This test item involves the following parameters:

```
=[ ]==================== IDE HDD Seek ====
  IDE HDD Test  ange:
      ( ) Total Size   ( ) Special Size

      LBA  tart:    [0           ] ↓    LBA  nd:    [123456789  ] ↓
   ercent(1-100):   [5           ] ↓
   ime Limit(h):    [0           ] ↓      ime Limit(m):   [10    ] ↓
  Op ion:
      [X] Sequential Test   [X] Random Test


                       [  OK  ]        [ Cancel ]
```
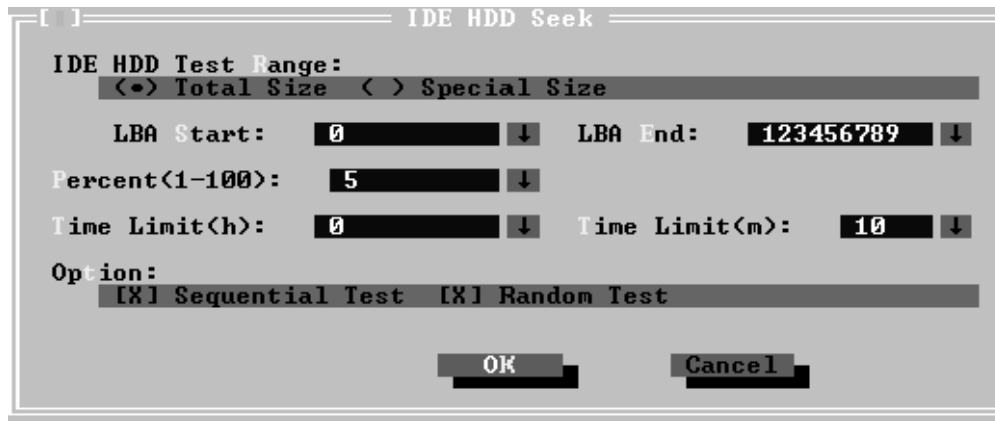
IDE HDD Test Range—is same as the description of the upper item.

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

Option-- Select sequential test or random test;

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

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested;

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested.

3. Performance

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

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.

```
=[■]==== IDE Diagnostic Read/Write =
  Precent(1-100):    100        ↓
  Time Limit(h):     0          ↓
  Time Limit(m):     0          ↓

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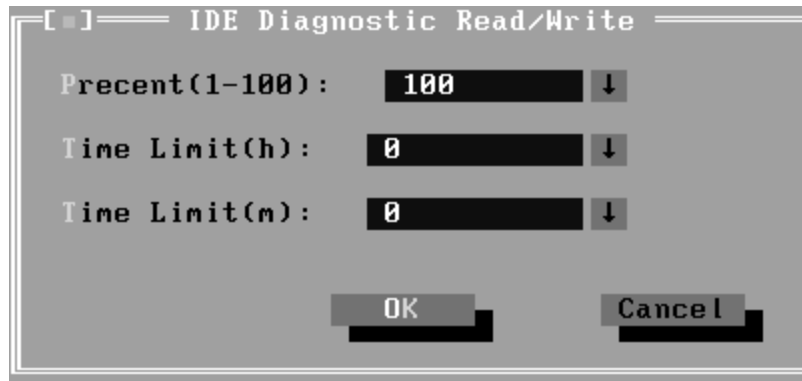
Percent (1-100)-- Specify the coverage rate in percentage of the total disk.

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested;

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested;

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 ODD

The ODD test runs on IDE CDROM/DVD-ROM & CD-RW. It will check the ODD 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 ODD drive. It will read data from the ODD disc and calculate the data transfer rate. This test needs a data CD.

3. Data CD Butterfly Seek

Check the seek function of the ODD 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.

4. Data CD Random Seek

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

5. Data CD Sequence Seek

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

6. Tray Eject Test

Check the eject function of the ODD. It will eject the ODD and ask the user to confirm if the operation succeeds.

3.8   Video

This test item tests the video by:

1.   displaying the figures in different graphic modes.
2.   displaying the property and color of the characters in different text modes.

User will confirm whether each video mode works normally by judging whether the display is correct. It checks whether the video memory works normally by writing data into the video memory, then reading it out and comparing the two value.

Subtest 01   Text Mode

> 1.   Character Test
>
>   Tests two types of font patterns.
>
>   Font 9*14
>
>   Font 9*16
>
>   It requires the user to check whether all characters of each font type displayed correctly by answering the questions prompted on screen. It will be displayed as follows:.

> 2.   Text Attribute
>
>   This test item is to check whether the text attribute of normal, hi-intensity, inverse, and blinking in VGA text mode could be correctly displayed on the screen.

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<Enter=Y>]'.

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. According to the comparison of written data with read data, the program would report PASS or FAIL.

```
4444444444444444444444444444444444444444444444444444444444444444444444444
4444444444444444444444444444444444444444444444444444444444444444444444444
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4444444444444444444444444444444444444444444444444444444444444444444444444
```

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 according to the instruction in the screen.

   ```
   Background Attribute Test




                Color Attribute ,15




        Is this display OK ? [Y/N<Enter=Y>]
   ```

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 according to 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 according to the instruction in the screen.
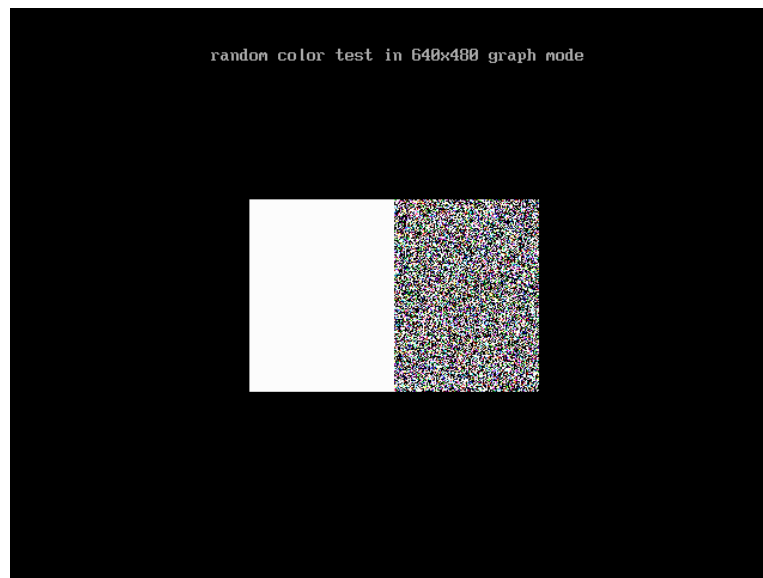
Subtest 03   VESA Video Modes

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

p
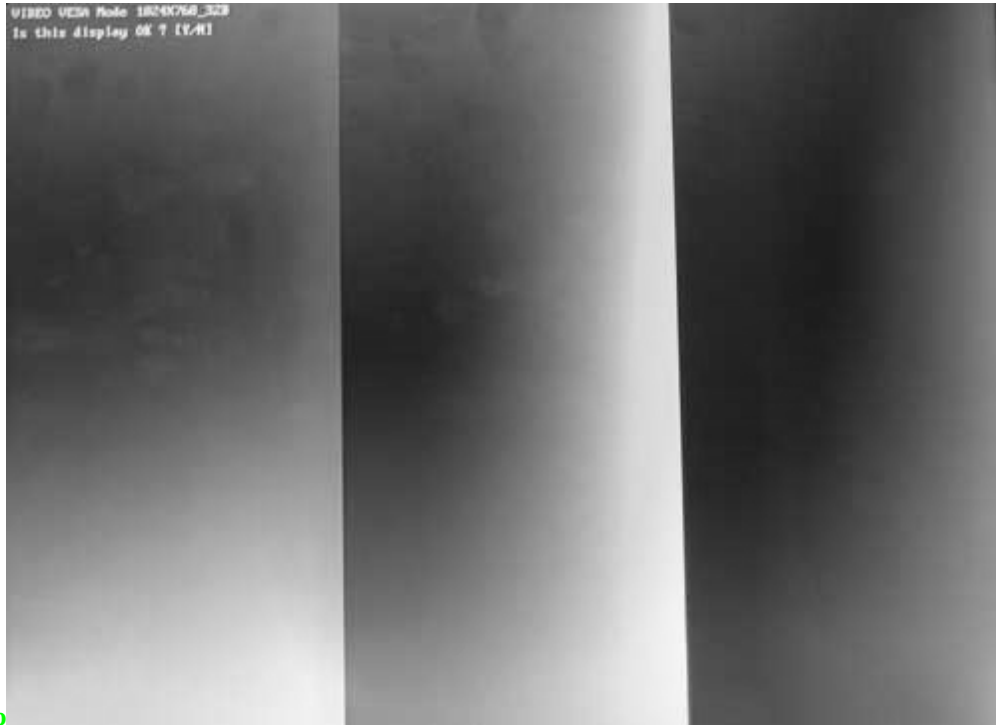
2. 800X600 Video Modes Test

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:

```
┌[■]═══════════ VESA Video Memory Param ═════
║
║   VESA Video Memory Size Comparison :
║        (•) No  ( ) Yes
║
║   Expected VESA Video Memory(MB):    [ 63    ] ↓
║
║   Percent(%):    [ 100    ] ↓
║
║   Time Limit(h):    [ 0    ] ↓
║
║   Time Limit(m):    [ 5    ] ↓
║
║
║                  [  OK  ]        [ Cancel ]
║
```
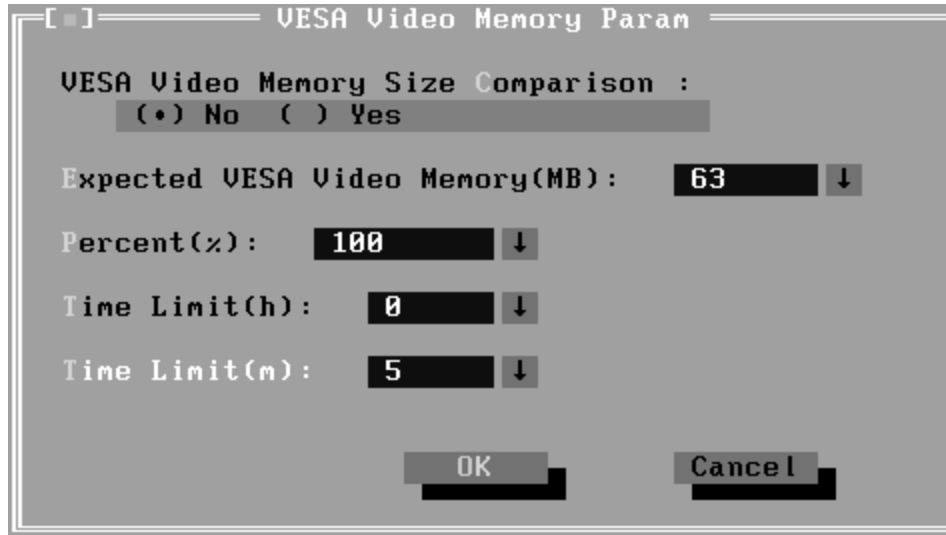
Subtest 05   DDC Test

This test item is to check whether the video card and the video display support DDC (Display Data Channel).

Subtest 06   AGP Test

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

Subtest 07   LCD Panel Test

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

Is this display OK ? (Y/N)

Subtest 08   Register Test

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

Subtest 09   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 according to the instruction in the screen.

Subtest 10   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 according to the instruction in the screen.

Subtest 11   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 according to the instruction in the screen.
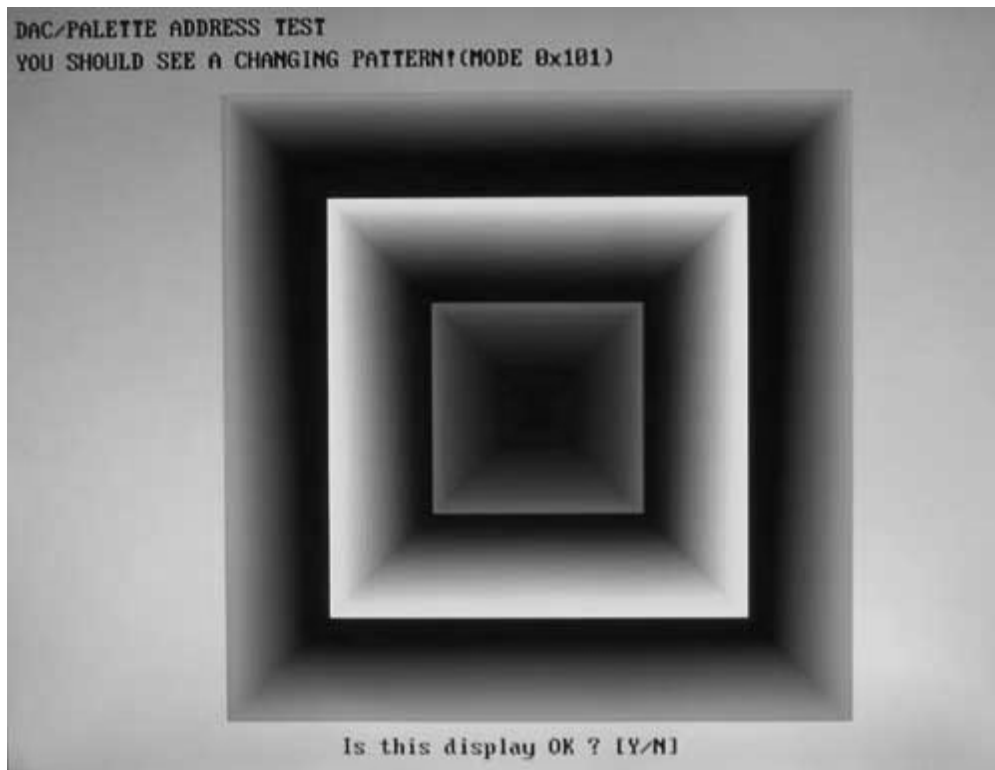
Subtest 12   BitBlt Engine Test

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.

Subtest 02   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. It 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.

```
┌─[■]────────────── IrDA Test Param ──────────┐
│                                             │
│ ConnectTimeout :   60              ↓        │
│                                             │
│ Test Timeout :   20              ↓          │
│                                             │
│ Sir Test:                                   │
│     [ ] Sir2400 Test  [ ] Sir19200 Test  [X] Sir115200 Test │
│     [ ] Sir4800 Test  [ ] Sir38400 Test     │
│     [ ] Sir9600 Test  [ ] Sir57600 Test     │
│                                             │
│ Fir Test:                                   │
│     [ ] Fir0.576M Test  [X] Fir4.000M Test  │
│     [ ] Fir1.152M Test                      │
│                                             │
│              OK              Cancel         │
└─────────────────────────────────────────────┘
```
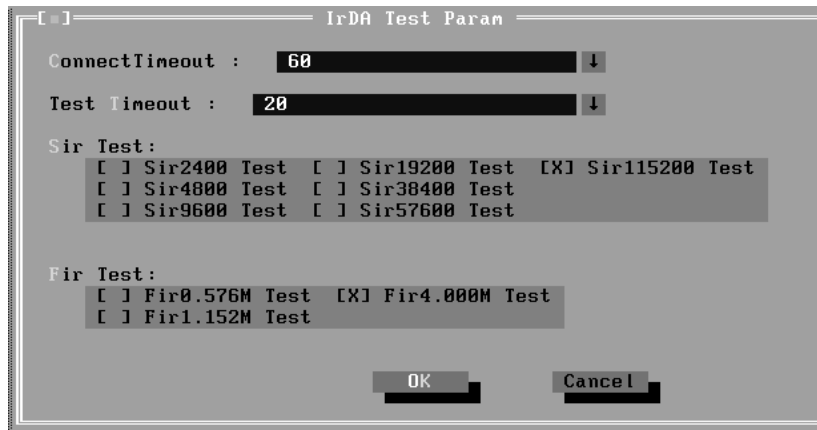
Connect Timeout: Define the time that slave connecting to master (in seconds);

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.

```
Service Diagnostic Ver 2.0        CPU Test    Build Date 2004.7.23

                IrSlave Testing

    Sir 2400BPS                    :PASS
    Sir 4800BPS                    :PASS
    Sir 9600BPS                    :PASS
    Sir 19200BPS                   :PASS             TEST
    Sir 38400BPS                   :PASS
    Sir 57600BPS                   :PASS
    Sir 115200BPS                  :PASS
    Fir 0.576MBPS                  :PASS
    Fir 1.152MBPS                  :PASS
    Fir 4.000MBPS                  :             Total Fail List

                                              Error   Description

    Fir Slave 4.000MBPS            :
    Initialing FIR ............: Testing
                                              Fails Found: 0

LOOPBOUND            C.TIME:2004-04-12 15:37:17 COUNT: 01/01  CPU:56C BAT:99%
ORDER:SEQ   Custom.log S.TIME:2004-04-12 15:35:35 HALT WAIT PAUSE  ¦ Esc: Break
```

Below is the Master Testing window:

```
Service Diagnostic Ver 2.0 ..... IrDA Tester Build Date 2004.7.23

                IrMaster Testing

    IrMaster                       :

    ab   ac   ad   ae   af   02   b1   b1   b2   b2
    b3   b4   b5   b6   b7   b8   b9   ba   bb   bc        TEST
    bd   be   bf   c0   c1   c2   c3   c4   c5   c6
    c7   c8   c9   ca   cb   cc   cd   81   82   82
    83   83   84   84   85   85   86   86   87   87
    88   88   89   89   8a   8a   8b   8b   8c   8c     Total Fail List
    8d   8e   8f   90   91   92   93   94   95   96
    97   98   99   9a   9b   9c   9d   9e   9f   a0   Error   Description
    a1   a2   a3   a4   a5   a6   a7   a8   a9   aa

     1   20 176
    SIR Master 2400BPS            :
    Get Data Head                 :
                                              Fails Found: 0

LOOPBOUND            C.TIME:2004-04-12 15:35:03 COUNT: 01/01  CPU:55C BAT:99%
ORDER:SEQ   Custom.log S.TIME:2004-04-12 15:34:43 HALT WAIT PAUSE  ¦ Esc: Break
```

Subtest 03   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.

Subtest 04   1394

GUID Detection

This test item is used to read and display GUID from 1394 register.

3.10 Peripheral

Subtest 01   Keyboard

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

1. Keyboard Data Line Test

    Check whether the keyboard data line works normally.

2. Keyboard Led Test

    Check whether the keyboard led works normally.
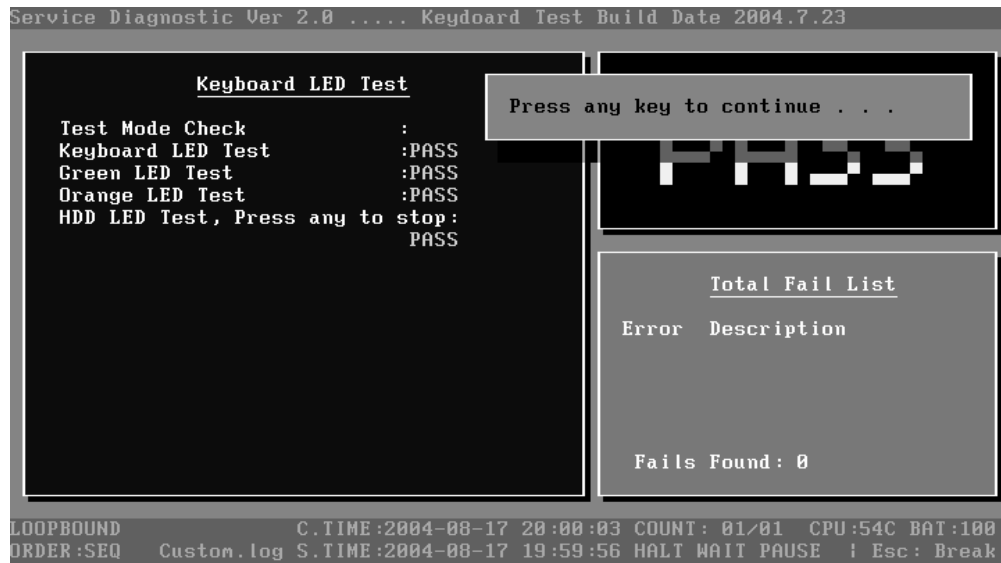
3. Keyboard Clock Line Test

    Check whether the keyboard clock line works normally.

Subtest 02   Mouse Test

Check whether the point devices work normally.

1. Touch Pad

    Before test Touch Pad's function, user should set a timeout time at below screen:

At the below screen of Touch Pad test, user can press the left button, right button, and move the mouse to verify its functions for times, and the test will end either by user break or test time is out.
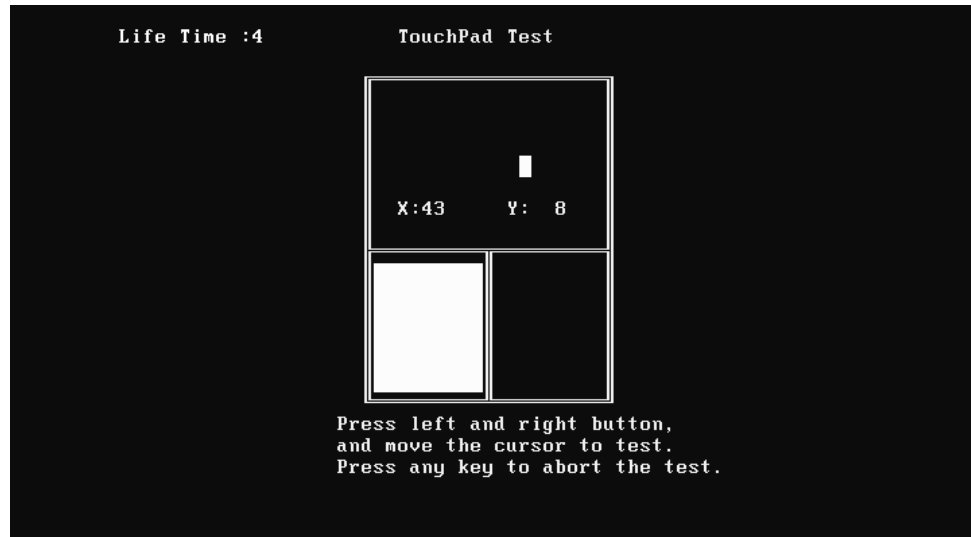
3.11 Error Codes and description

The format of 'Error Code' is 'ddxxee', 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
ddxx	**ee**	**Common Error**		
	94	Interactive Mode Needed	The test is not under interactive mode.	Check whether the interactive test mode is adopted.
01xx		**CPU**		
	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 cannot 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 cannot 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.
02xx		**Memory**		
	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.
03xx		**Board**		
	01	DMA Test Error	DMA channel cannot 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 cannot produce corresponding timing signal.	As above.
	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.
	53	ACPI Table Test Error	Errors with the ACPI table test.	As above.
34xx		**FAN**		
	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.
04xx		**Video**		
	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 Error	As above.	As above.
	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.
31xx		**Audio**		
	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.
11xx		**LPT**		
	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 FIF0 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.
08xx		**LAN Card**		
	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 net card or use other method
09xx		**Keyboard**		
	01	Keyboard Map & Stroke Test Fail	Keyboard Map & Stroke Test fails.	Check the KBD connection and repeat the test.
	03	Clock Line Test Fail	Clock Line Test fails.	As above.

	04	Data Line Test Fail	Data Line Test fails.	As above.
05xx		**Mouse**		
	01	Touch Pad Test Fail	Touch Pad Test Fail	Check the mouse connection and repeat the test.
14xx		**IrDA Test**		
	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.
30xx		**MemoryCard**		
	08	Check PCI Device Fail	No Memory Card is inserted or the Memory Card is damaged.	Replace the Memory Card and repeat the test.
	09	Start Flash Media Tests Fail	As above.	As above.
	10	Verifying Firmware loaded Fail	As above.	As above.
	11	MMC or SD Media Card Present Fail	As above.	As above.

28xx		**1394**		
	01		Can not find IEEE1394 controller	Don't support 1394.
20xx		**IDE-HDD**		
	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.
21xx		**ODD**		
	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.
	07	CD Seek Error	Either the disk or the CD-ROM is damaged.	Replace the disk 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% or 3 minutes
	Bit Stuck Low Test	10% or 3 minutes
	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	10% or 3 minutes
	Color Purity Test	
	Direct Color Test	
	LCD Panel	
HDD	Sequential/Random R/W	25% or 3 minutes
	SMART Check	
LAN Card	Device ID Detection	
	Vendor ID Detection	
	Mac Address Detection	

Chapter 4

Replacement Procedures

Chapter 4   Contents

Figures

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
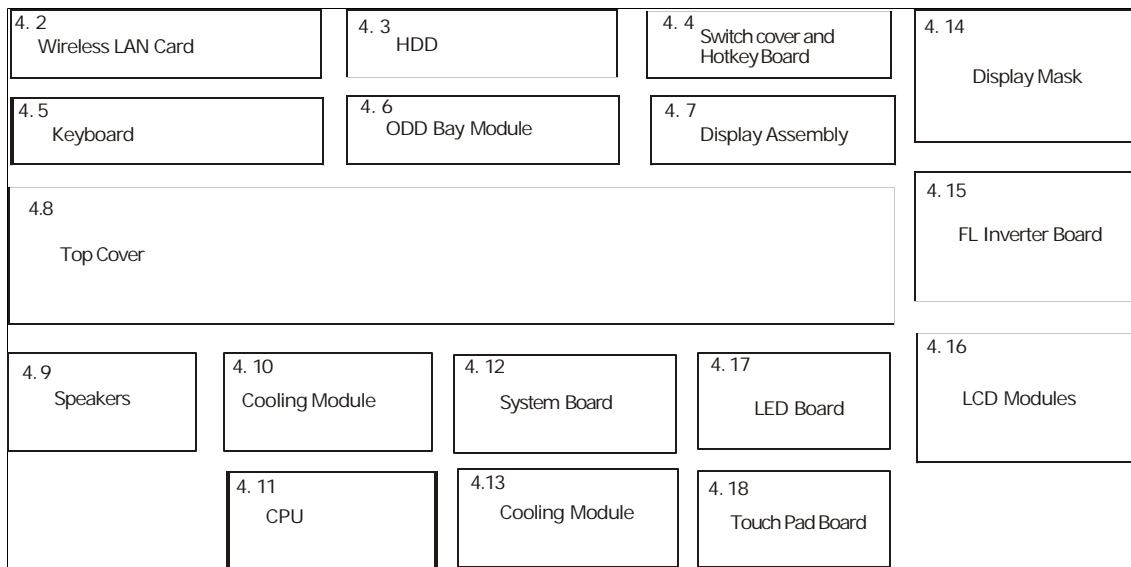
How to use the chart (two examples):

? For removing the System Board

First, remove the top cover with the display assembly. Then, remove the HDD, selectable bay module, Bluetooth card, 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.
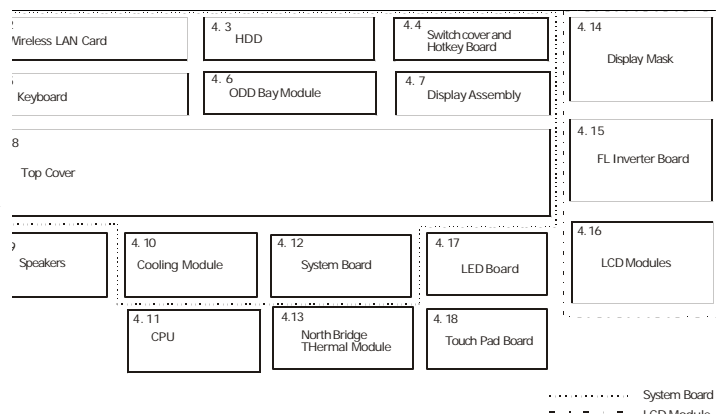
Safety Precautions

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
- ? Torx 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.

- ? M2 (2 mm)   0.22 N?m (2.2 kgf?cm)
- ? M2.5 (2.5 mm)   0.36 N?m (3.5 kgf?cm)
- ? M3 (3 mm)   0.51 N?m (5.0 kgf?cm)
- ? M2.5x4 PSP TITE screws   0.204 N?m (2.0 kgf?cm)
- ? 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   Black
  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.

- ✍ Screw type   Letter
- ✍ Bind screw   B   (stands for bind)
- ✍ Flat-head screw   F   (stands for flat-head)
- ✍ Super flat-head screw   S   (stands for super flat-head)
- ✍ Tapping screw   T   (stands for tapping)
- ✍ 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, 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 1 and 2.

3. Slide the battery release latch 3 and remove the battery pack from the computer.
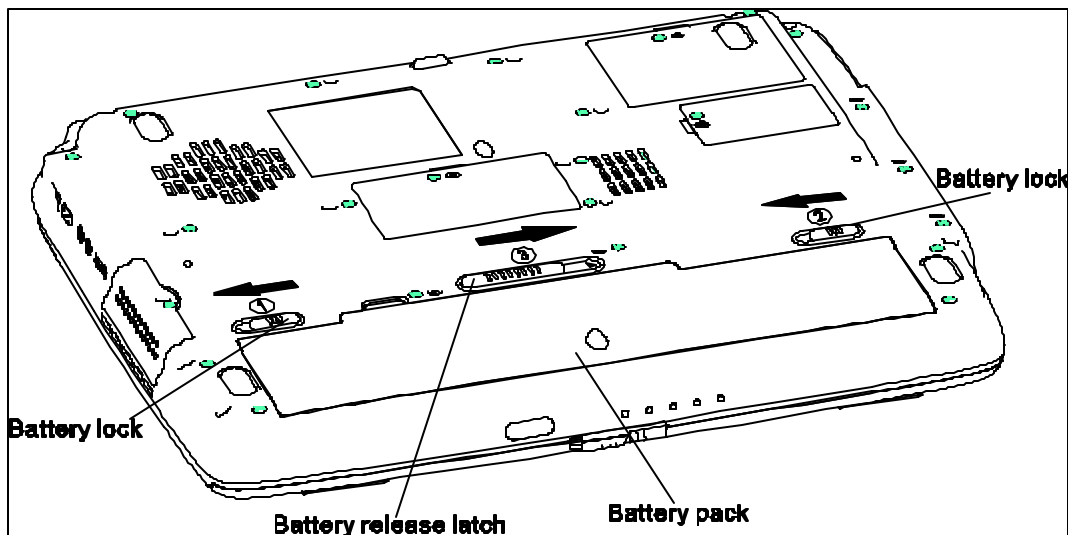
Figure 4-1 Removing the battery pack

NOTE: Dispose of the used battery packs as required by local ordinances or regulations.
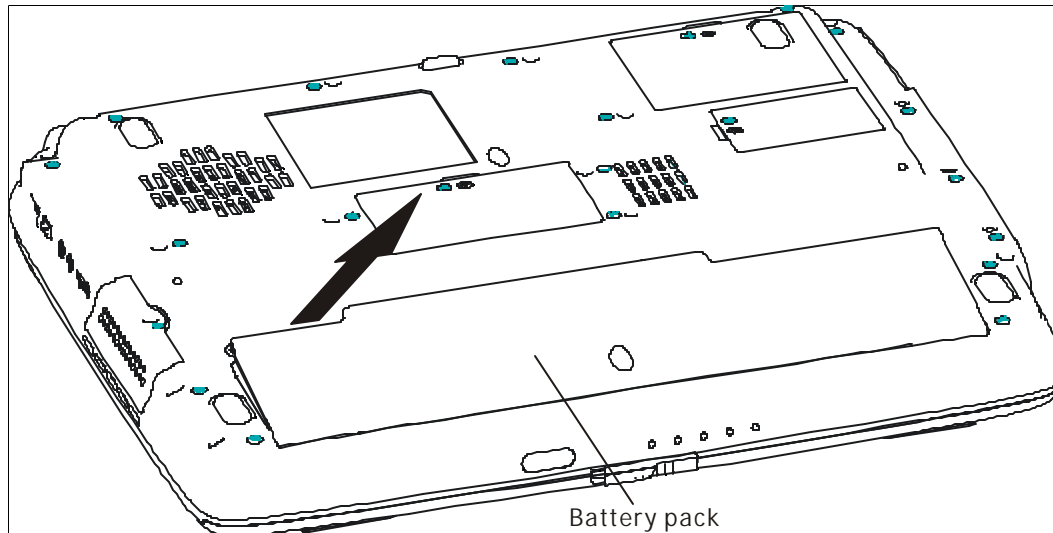
Figure 4-2 Removing the battery pack

Installing the Battery Pack

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

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. Push the eject button for the PC card to be removed until it stops and release the button.

2. When the eject button popped out slightly, push it again.

3. When the PC card popped out, grasp it and pull it out.
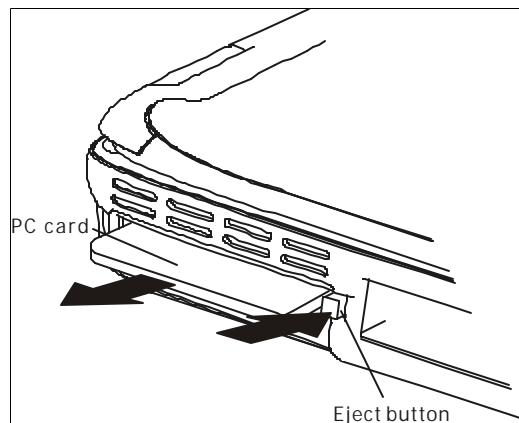
Figure 4-3 Removing the PC card

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.

After the PC card is installed, check the hardware configuration in the Hardware Setup or TSETUP program to make sure that the PC card in 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. Release one M2.5x4 black bind screw.

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.
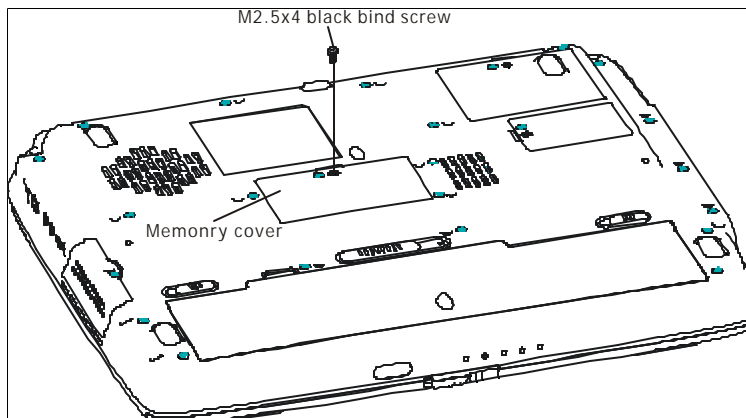
Figure 4-4 Removing the memory cover

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.
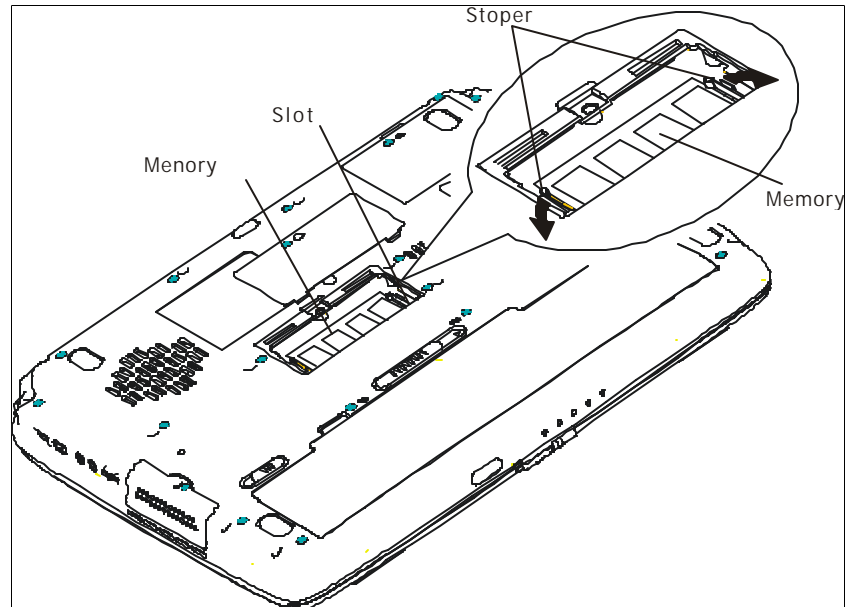
Figure 4-5 Removing the optional memory

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. Secure the cover with the M2.5x4 black 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 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 4-7, 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. Release the M2.5x4 black bind screws.

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.
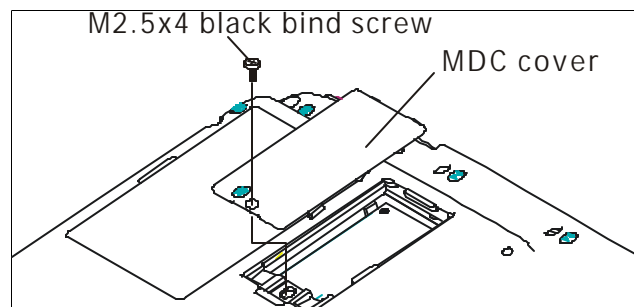
Figure 4-6 Removing the MDC cover

4. Remove the two M2x3 white bind screws for securing the MDC card.

5. Raise the MDC card and disconnect it from CN502 on the system board.

6. Disconnect the MDC cable from the connector JP1 on the MDC card.
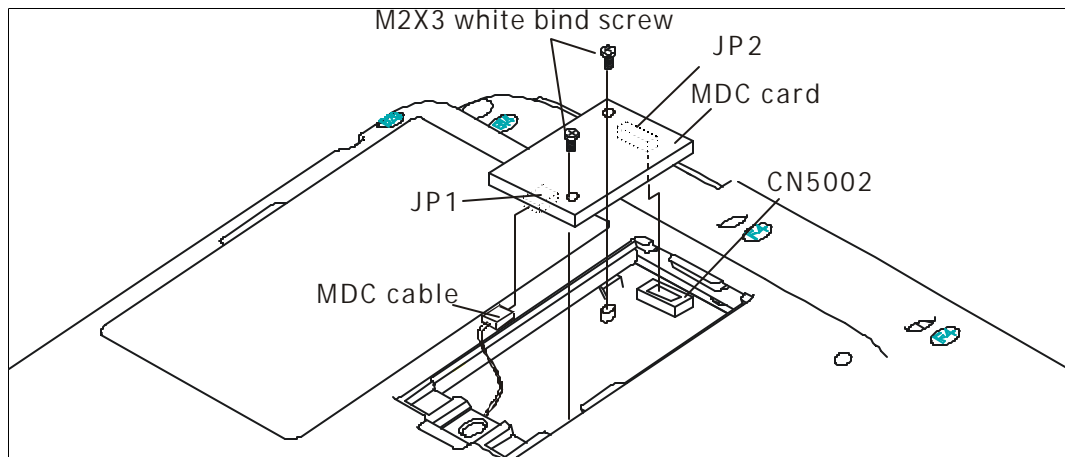
Figure 4-7 Removing the MDC card

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 JP1 on the MDC card.

2. Connect the MDC card to CN502 on the system board.

3. Securing the MDC card with the two M2x3 white bind screws.

4. Install the MDC cover.

5. Securing the MDC cover by one M2.5x4 black 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 Wireless LAN Card

Removing the Wireless LAN Card

Remove the wireless LAN card according to the following procedures and Figures 4-8 and 4-9.

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.

---

1. Turn the computer upside down.

2. Release the M2.5x4 black LHSTIX screws.

3. Remove the Wireless LAN cover.

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.

6. Pull the wireless LAN card up and out at an angle.
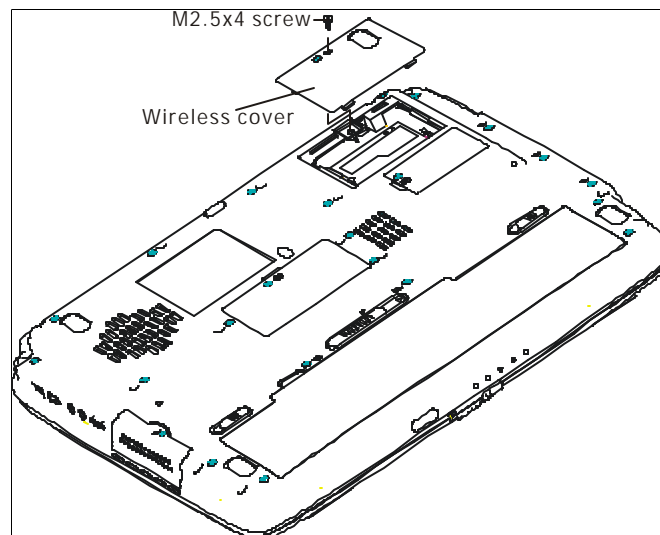
Figure 4-8 Removing the wireless LAN card cover
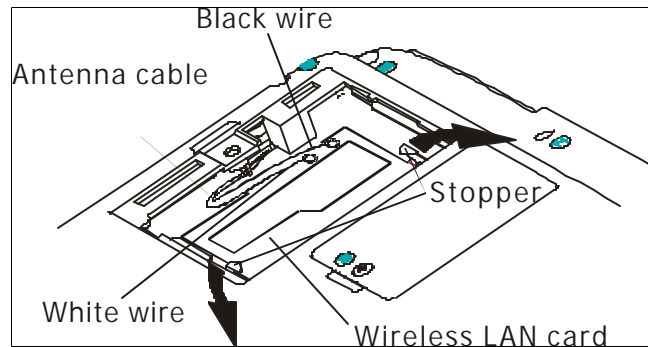
Figure 4-9 Removing the wireless LAN card

Installing the Wireless LAN Card

Install the wireless LAN card according to the following procedures and Figures 4-22.

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.

4. Install the wireless LAN cover.

5. Securing the wireless LAN cover by one M2.5x4 black LHSTIX screw.

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.

4.3   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.*
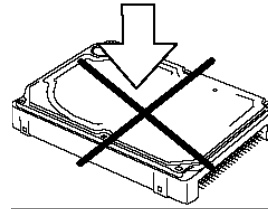
Remove the HDD (hard disk drive) according to the following procedures and Figures 4-10, 4-11 and 4-12.

1.   Remove one M2.5x6 black flat-head screw for fixing the HDD cover.

2.   Remove the HDD cover.

3.   Remove the HDD pack sliding it in the direction of the arrows.
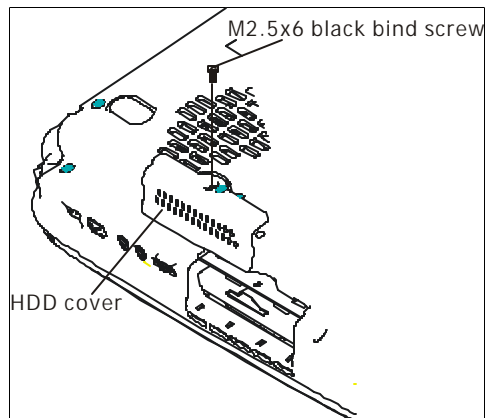
Figure 4-10 Removing the HDD pack cover
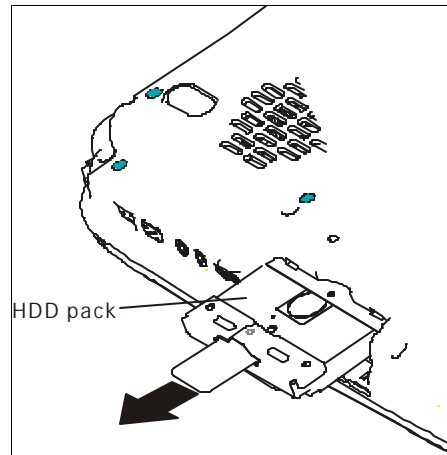
Figure 4-11 Removing the HDD pack

4. Remove the HDD pack by pulling the HDD tap attached to 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.

---

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

6. Remove the HDD bracket.
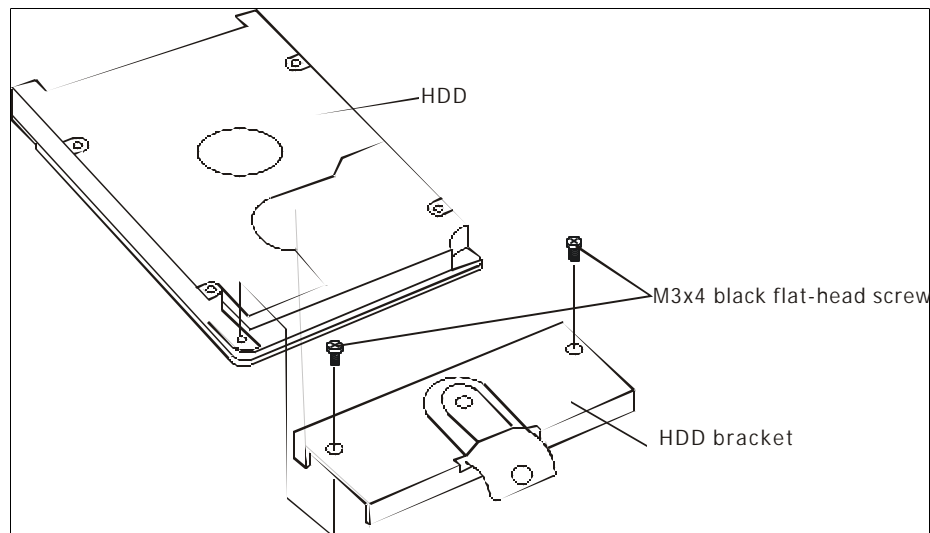
Figure 4-12 Removing the HDD chassis

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 4-10, 4-11 and 4-12.

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

---

1. Secure 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.

---

2. 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.

3. Insert the HDD pack.

4. Secure the HDD cover with one M2.5x6 black flat-head screw.

4.4   Switch Cover and Hotkey Board

Removing the Switcher

Remove the switch cover and hotkey board according to the following procedures and Figures 4-13, 4-14.

1. Open the display panel.

2. Release the following 11 latches on the switch cover, in that order:
    - Six bottom latches
    - One latch on the left and right sides
    - Three front latches

3. Remove the switch cover.

4. Disconnect the SUMI-card (flat cable) from CN2001 on hotkey board.
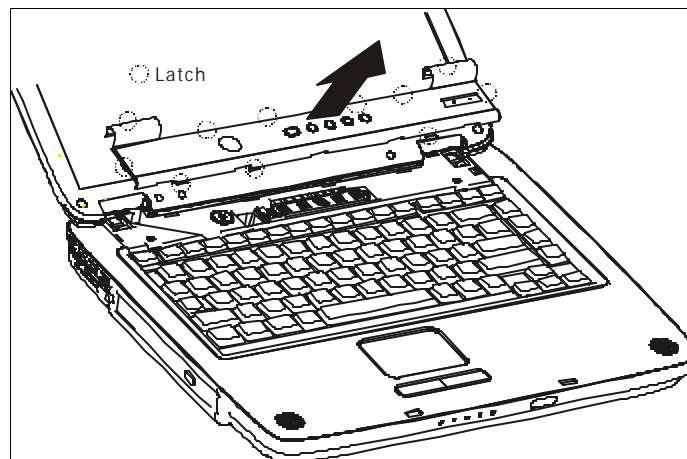
Figure 4-13 Removing the switch cover screw

5.   Remove the two M2.5 x4 black flat-head screws for securing the hotkey board.

6.   Remove the hotkey board.
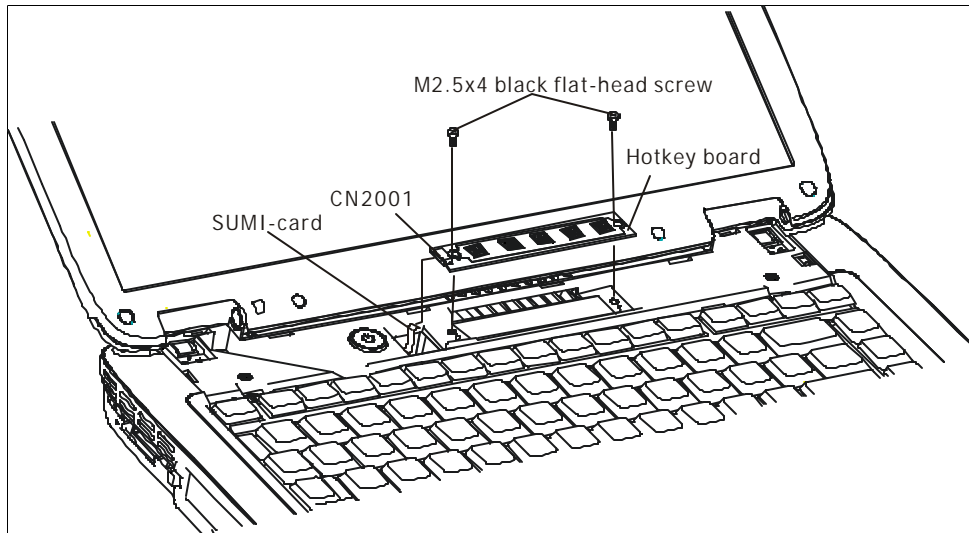
Figure 4-14 Removing the hotkey board

Installing the Switch Cover and Hotkey Board

Install the switch cover and hotkey board according to the following procedures and Figures 4-13, 4-14.

1. Connect the SUMI-card to CN2000 on the hotkey board.

2. Place the hotkey board in the correct position.

3. Secure the hotkey board with the two M2.5x4 black flat-head screws.

4. Place the switch cover in the correct position and fasten the following 11 latches, in that order:
   - Six bottom latches
   - One latch on the left and right sides
   - Three front latch

4.5　Keyboard

Removing the Keyboard

Remove the keyboard according to the following procedures and Figures 4-15.

1. Remove two M2.5x2.6 black bind screws.
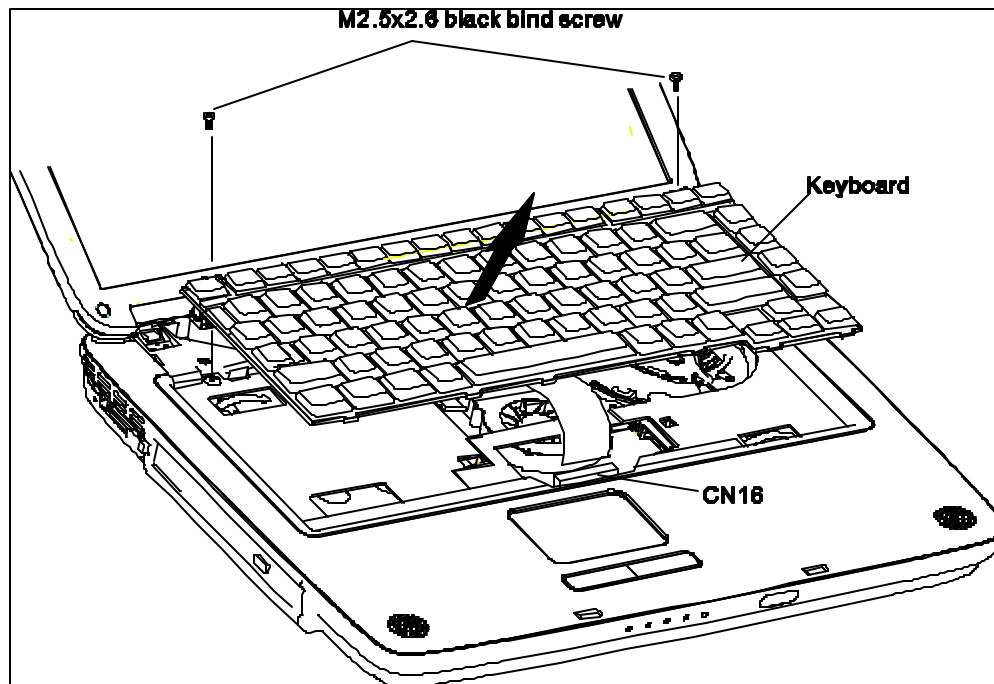
Figure 4-15　Removing the keyboard

2. Move the keyboard in the direction of the arrow until the keyboard connector appears.

3. Turn the keyboard upside down.

4. Disconnect the keyboard cable from CN16 on the system board and remove the keyboard.

Installing the Keyboard

Install the keyboard according to the following procedures and Figures 4-15.

1. Connect the keyboard cable to CN16 on the system board.

2. Align the latches on the rear of the keyboard with the latch holes on the top cover.

3. Secure the keyboard with the two M2.5x2.6 black bind screws.

4.6 ODD Bay Modules

Removing the ODD Bay Module

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

Remove the ODD bay module according to the following procedures and Figure 4-16, 4-17.

1. Turn the computer upside down.

2. Remove the M2x8 black bind screw.

3. Turn the computer over and open the display.

4. Push out the ODD bay module in the direction of the arrow.

CAUTION: Handle the ODD bay module carefully, because it becomes hot during operation.
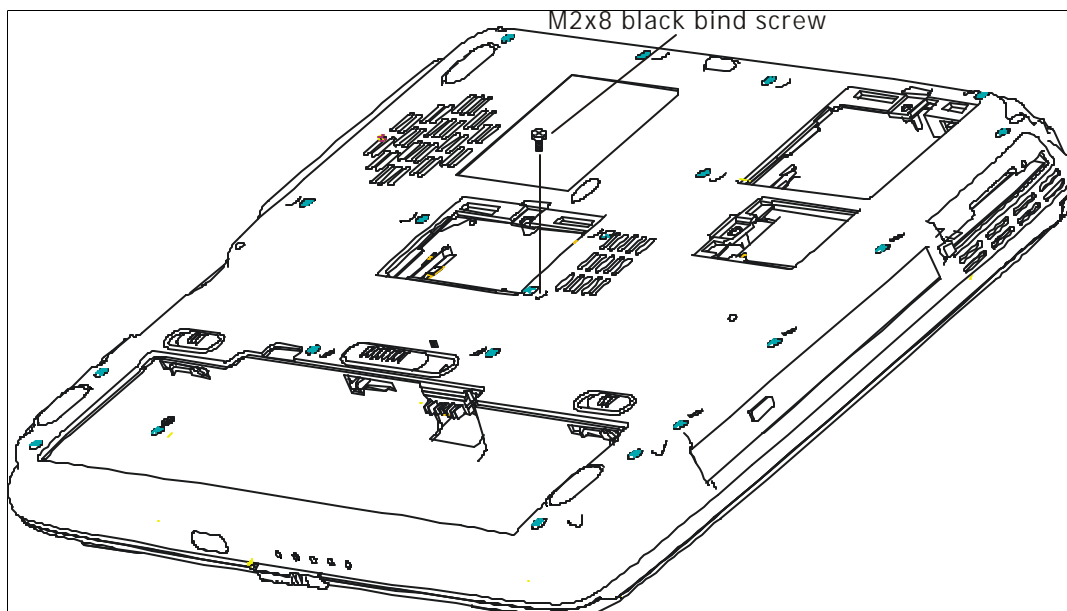
Figure 4-16 Removing the ODD bay module
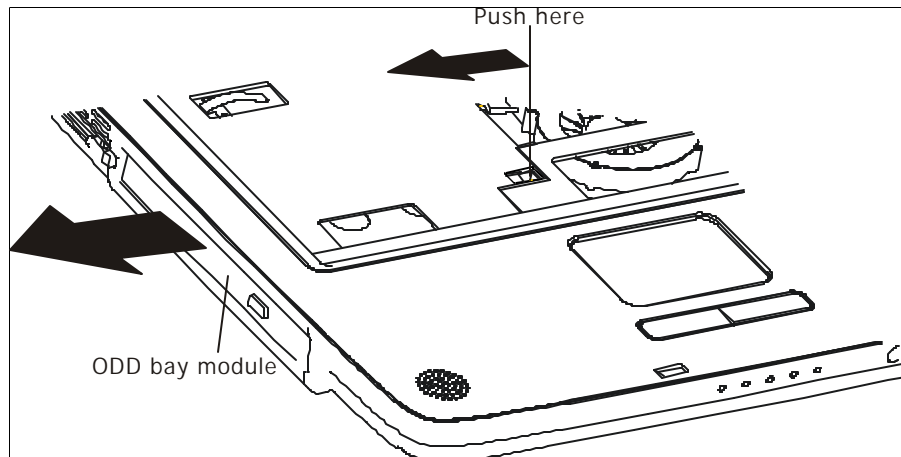
Figure 4-16 Removing the ODD bay module

Installing the ODD Bay Module

Install the ODD bay module according to the following procedures and Figure 4-16, 4-17.

1. Place the ODD bay module in the correct position and slide it in.

2. Push it until it clicks into place.

3. Close the display and turn the computer over.

4. Fix the ODD bay module with one M2x8 black bind screw.

Disassembling the ODD Drive

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

Disassemble the ODD drive according to the following procedures and Figures 4-18.

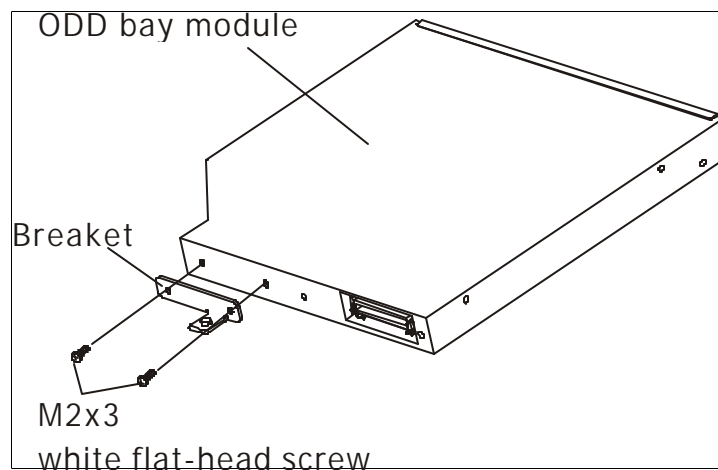1. Remove the two M2x3 white flat-head screws.

2. Remove the bracket.

Figure 4-18 Removing the bracket from the ODD drive

Assembling the ODD Drive

Assemble the ODD drive according to the following procedures and Figures 4-18.

1. Secure the bracket with the two M2x3 white flat-head screws.

4.7   Display Assembly

Removing the Display Assembly

CAUTION: Use care to avoid that the antenna cable for antenna is caught between the display assembly and computer.

Remove the display assembly with the top cover according to the following procedures and Figures 4-19, 4-20.

1.   Turn the computer upside down, and remove two M2.5x20 black bind screws.

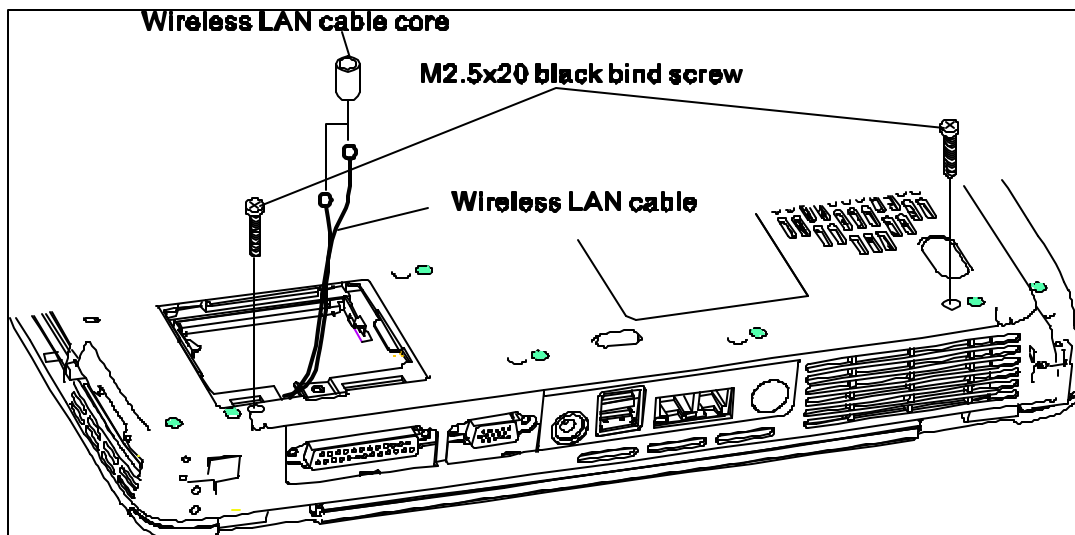2.   Remove the wireless LAN cable core.

Figure 4-19 Removing the screws from the bottom of the computer

3.   Restore the normal computer placement and open the display panel.

4.   Remove four M2.5x5 black flat-head screws and M2x3 white flat-head screw .

5.   Disconnect the LCD/FL cable from CN13 on the system board.

6.   Remove the wireless antenna cables from the hole.
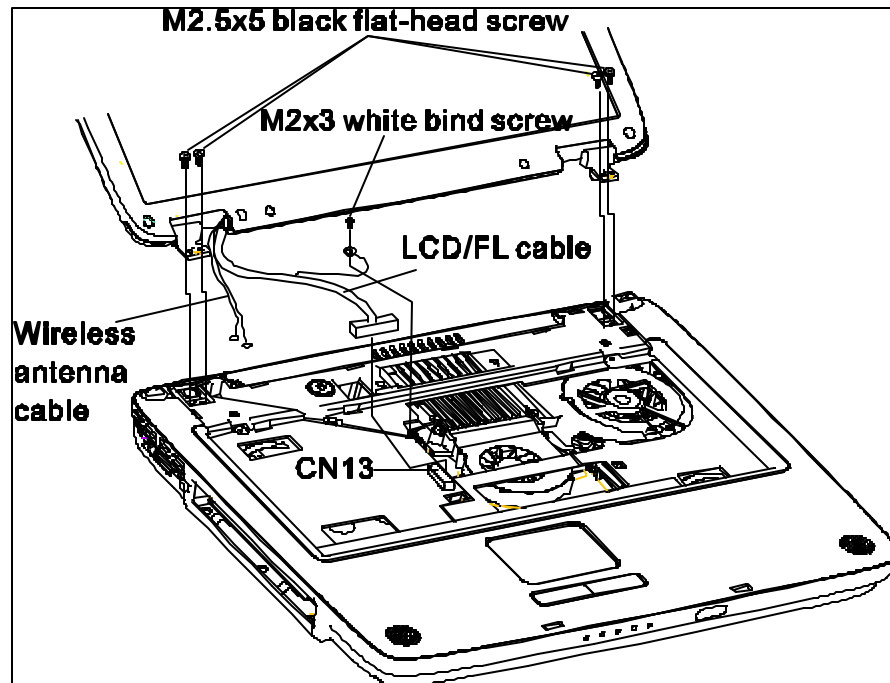
7.   Remove the display module.

Figure 4-20 Removing the display assembly

Installing the Display Assembly

Install the display assembly according to the following procedures and Figures 4-19, 4-20.

1. Place the display panel in the correct position and push the wireless antenna cable into the hole.

2. Connect the LCD/FL cable to CN13 on the system board and fix it with one M2x3 white flat-head screw.

3. Securing display assembly with four M2.5x5 black flat-head screws.

4. Close the display panel and turn the computer upside down and fix it with two M2.5x20 black bind screws.

5. Push the wireless LAN cable through the core and place the core in the correct position.

4.8 Top Cover

Removing the Top Cover

Remove the top cover according to the following procedures and Figures 4-21 and 4-22.

1. Turn the computer upside down, and remove the following 25 screws:
   - Two M2.5x14 black bind screws
   - Twelve M2.5x8 black bind screws
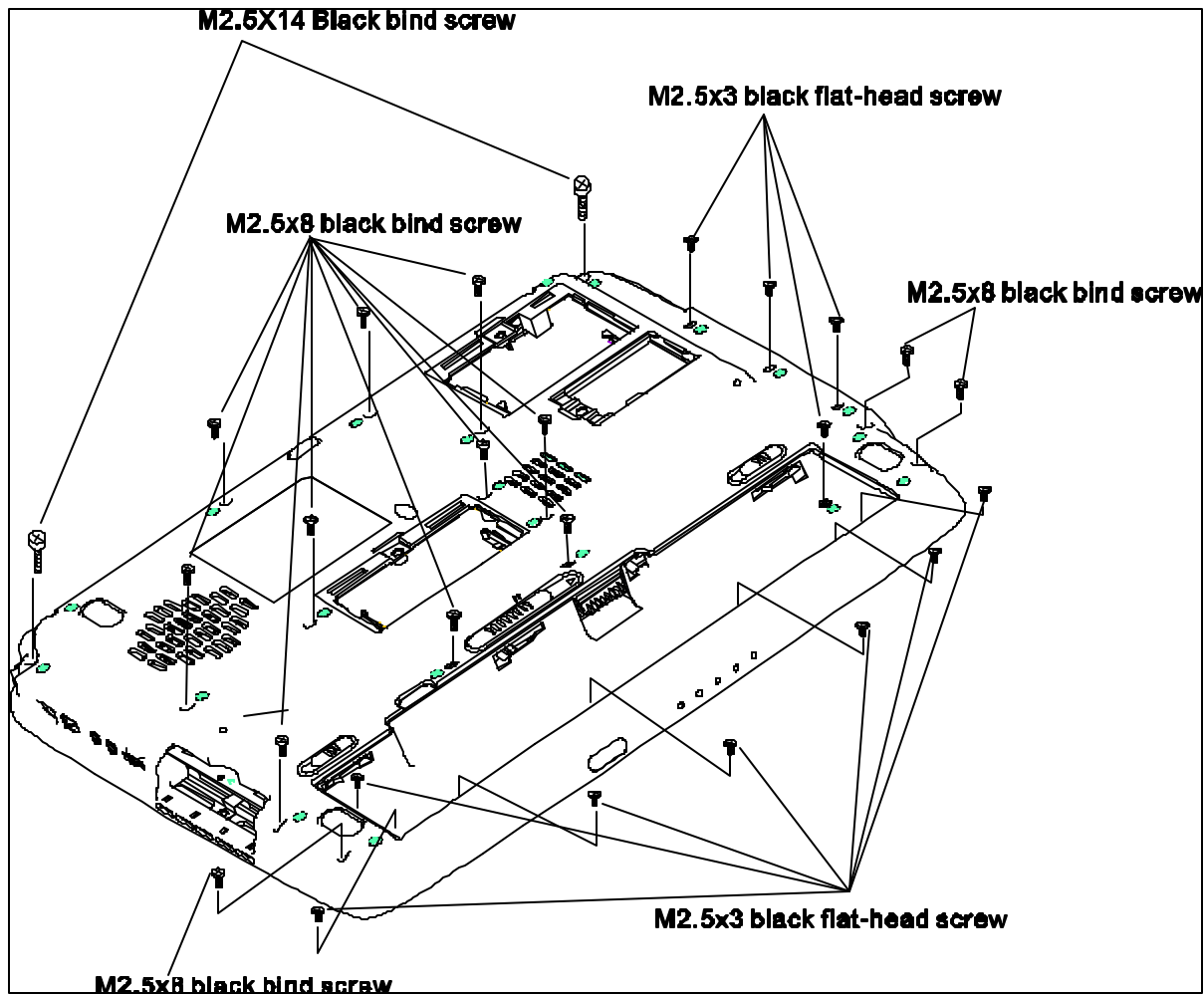   - Eleven M2.5x3 black flat-head screws

Figure 4-21 Removing the screws from the bottom of the computer

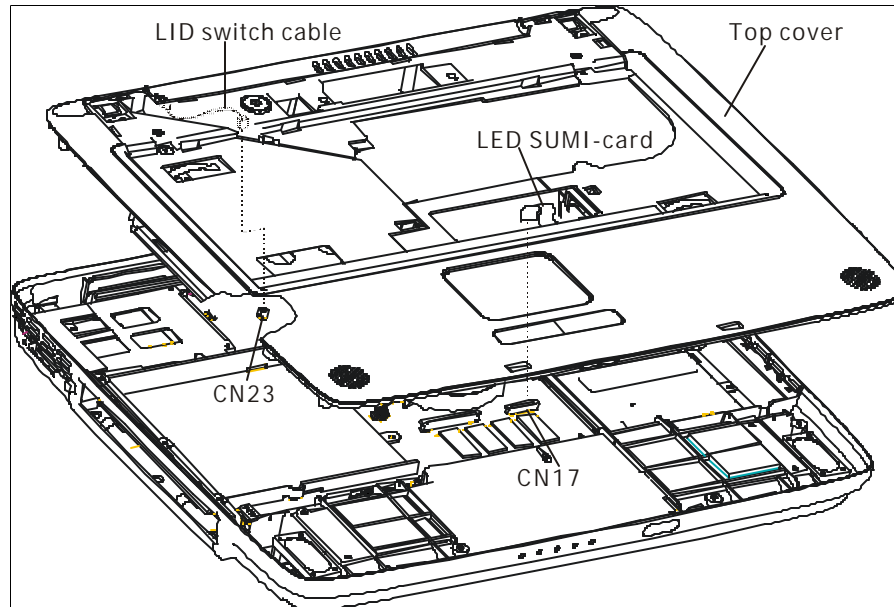2. Restore the normal computer placement.

Figure 4-22 Removing the top cover

3. Disconnect the LED board flat cable from CN17.

4. Lift up the top cover.

5. Disconnect the lid switch cable from CN23.

Installing the Top cover

Install the top cover with the display assembly according to the following procedures and Figures 4-21, 4-22.

1. Connect the lid switch flat cables to CN23 on the system board.

2. Place the top cover, adjusting its position.

CAUTION: Use care to avoid that the lid switch cable for lid switch is caught between the top cover and base body.

3. Connect the LED board flat cable to CN17 on the system board.

4. Turn the computer upside down and fix it with the following 25 screws:
    - Two M2.5x14 black bind screws
    - Twelve M2.5x8 black bind screws
    - Eleven M2.5x3 black flat-head screws

4.9 Speakers

Removing the Speakers

Remove the speakers according to the following procedures and Figure 4-23.

1. Remove the speaker cables fix tape.

2. Remove the speaker cables from the guides (grooves) on the bottom cover.

3. Disconnect the speaker cables from CN20 on the system board.

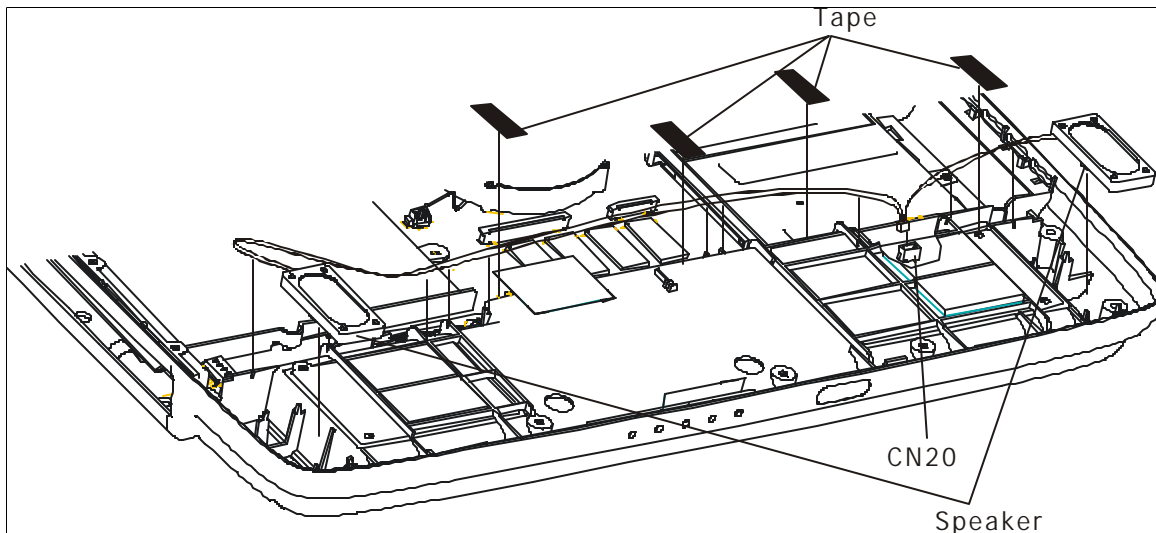4. Remove the left and right speakers.

Figure 4-23 Removing the speakers

Installing the Speakers

Install the speakers according to the following procedures and Figure 4-23.

1. Connect the speaker cables to CN20 on the system board.

2. Place the left and right speakers in their correct position and push the speaker cables into the guides on the top cover.

3. Stick the speaker cables by the tape.

4.10 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.

NOTE: The screws for Steps 2 and 3 cannot be removed, only loosened.

Removing the Cooling Module

Remove the cooling module according to the following procedures and Figure 4-24.

1. Disconnect the cable of the cooling module from CN14 on the system board.

2. Release the one screw next to the fan.

3. Release the four screws on the cooling module using the numbered order shown to the screw.
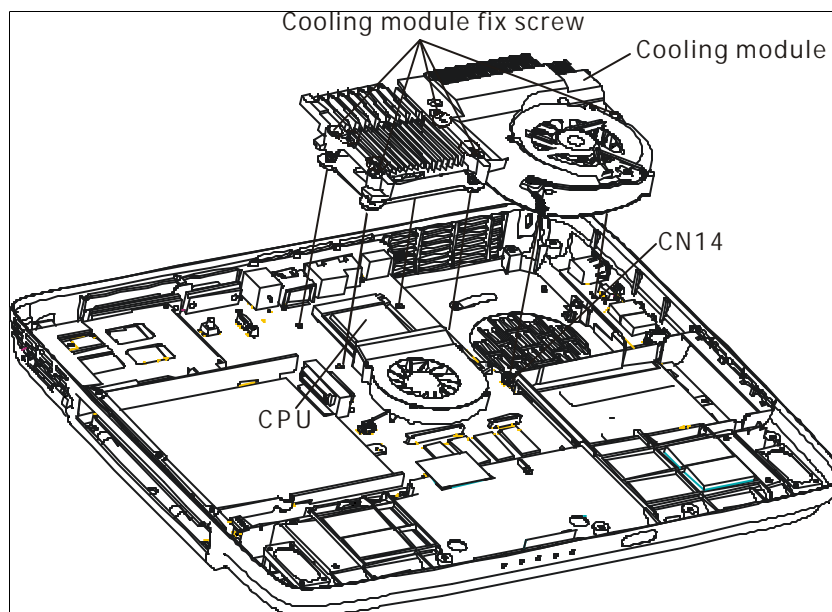
4. Remove the cooling module.

Figure 4-24 Removing the cooling module

Installing the Cooling Module

Install the cooling module according to the following procedures and Figures 4-24, 4-25.

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

1.　*Be sure to confirm the correct position for the module.*

2.　*Route the cooling module cable between the module and MDC card.*

3.　*Please according to the number sequence sealed on heat sink module and secures the relevant screws on the main board.*

NOTE: *Apply silicon greases with a special syringe to cover the surface of the CPU chip completely.*
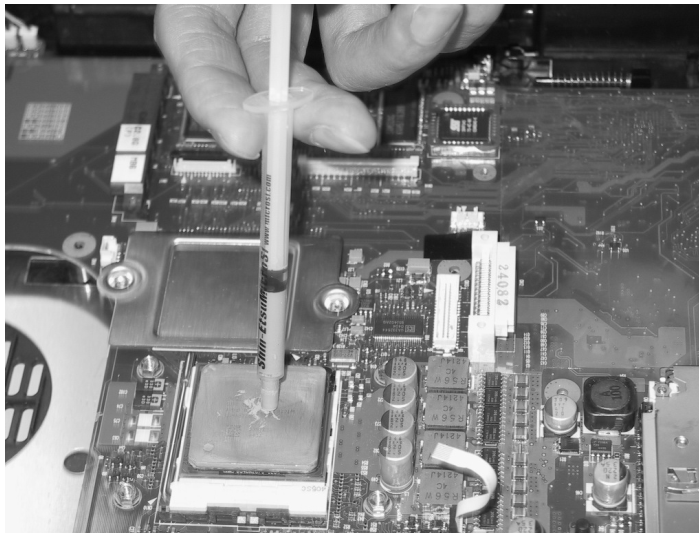
Figure 4-25 Applying silicon greases

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1. If 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 center so that the entire CPU chip can be covered with the greases.

2. Place the cooling module in the correct position.

3. Secure the four screws on the cooling module using the numbered order shown on the screws.

4. Secure one screw next to the fan.

5. Connect the cooling module cable to CN14 on the system board.

4.11   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 4-26.

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

---

1. Unlock the CPU by rotating the bar on the CPU socket 90 degrees to the up with hand (in the order shown in the figure below).

2. Remove the CPU.

NOTE: After the CPU is removed, should lower the bar before proceeding to prevent damage.
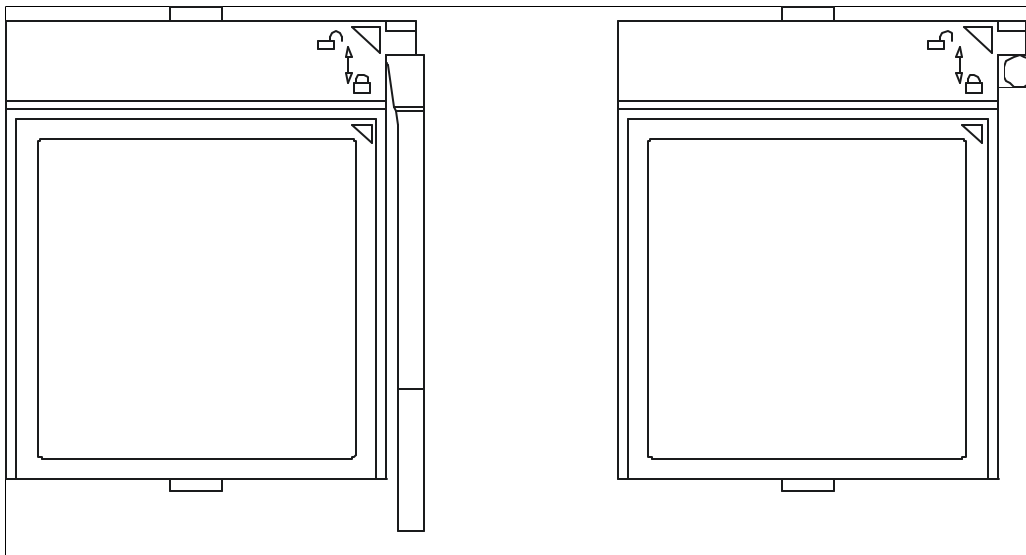
Figure 4-26 Removing the CPU

Installing the CPU

Install the CPU according to the following procedures and Figures 4-26, 4-27 and 4-28.

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.
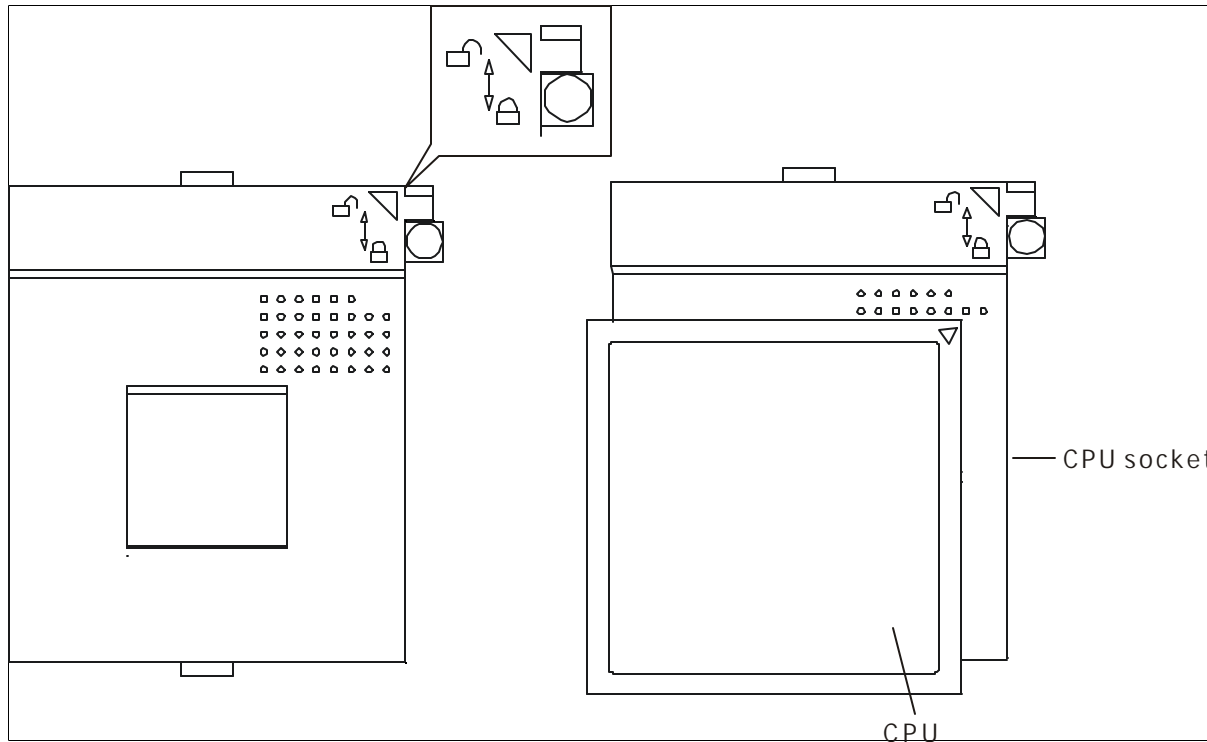
Figure 4-27 Installing the CPU

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

---

3. Secure the CPU by rotating the bar 90 degrees to the down with hand.
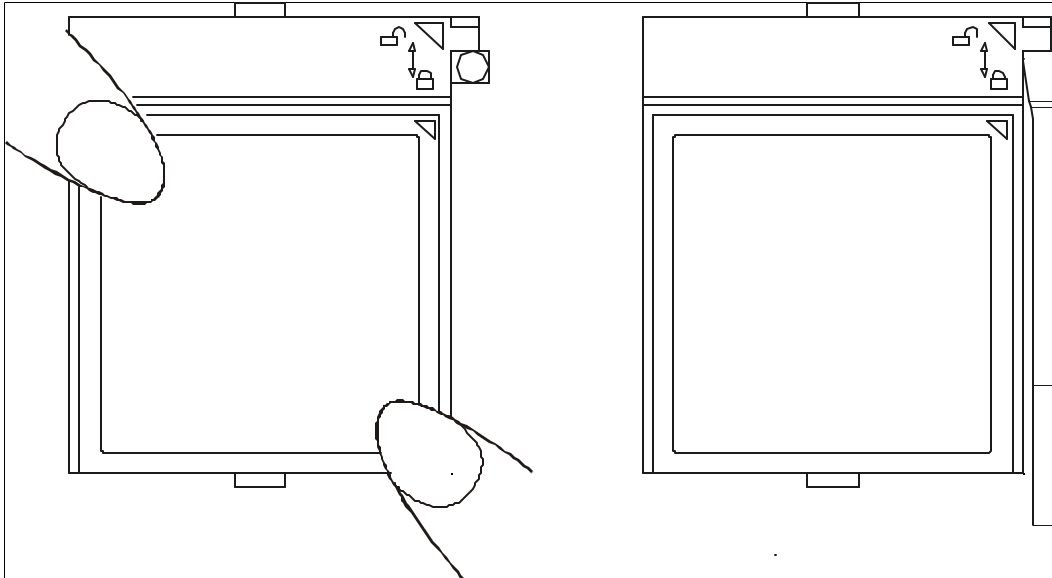
Figure 4-28 Securing the CPU

4.12 System Board

Removing the System Board

> **NOTE:** *Be careful of the eject button for the PC card. It can be damage when removing the board. Make sure it is pushed in.*

Remove the system board according to the following procedures and Figures 4-29.

1. Remove the M2.5x5 black flat-head screws for securing the HDD tray.

2. Remove the HDD tray.

3. Remove the hotkey board SUMI-card from CN8.

> **NOTE:** *The switch can be easily removed if you tweeze the prongs on the button together.*

4. Remove the lever of the wireless kill switch.

5. Remove two M2.5x4 black flat-head screws for securing the system board.

6. Remove the system board.
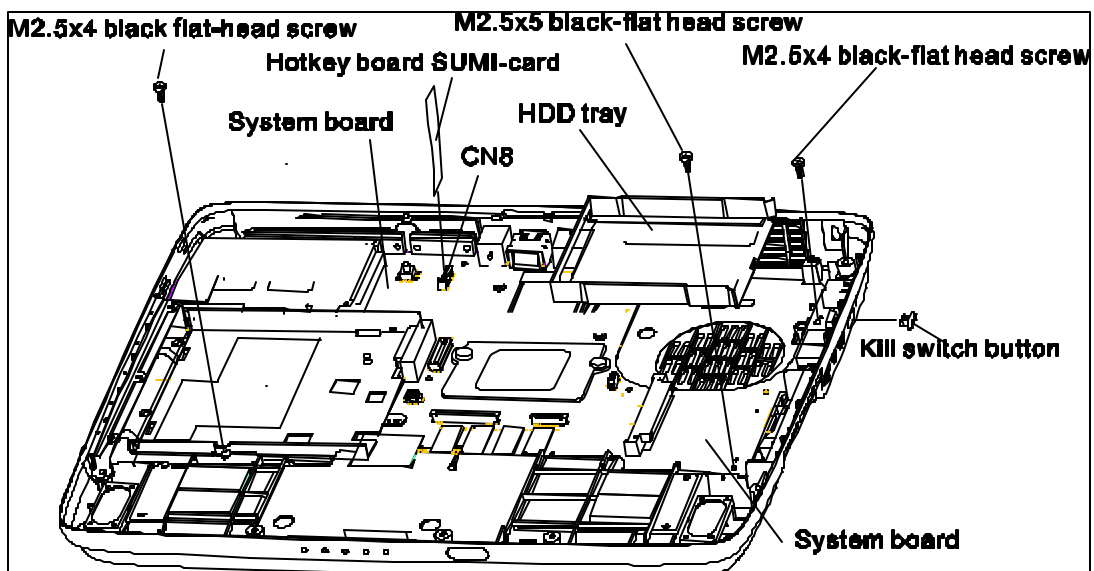
Figure 4-29 Removing the system board

Installing the System Board

Install the touch pad according to the following procedures and figure 4-29.

1. Place the slider for the kill switch on the system board.

2. Seat the system board and secure it with two M2.5x4 black flat-head screws.

3. Connect the hotkey board SUMI-card to CN8 on the system board.

4. Seat the HDD tray and secure it with one M2.5x5 black flat-head screw.

5. Press the kill switch button through the opening in the side. Be sure the prongs are fully engaged.

4.13   North Bridge thermal module and MDC cable

Removing North Bridge thermal module and MDC cable

Remove the North Bridge thermal module according to the following procedures and Figure 4-30, 4-31.

1. Disconnect the cable of the North Bridge thermal module from CN15 on the system board.

2. Turn the system board upside down.

3. Remove two M2x3 black bind screws and washers.

4. Remove North Bridge thermal module.

5. Remove the black sheet.

6. Remove one M2.5x2.5 white bind screws.

7. Removing the CD tray.
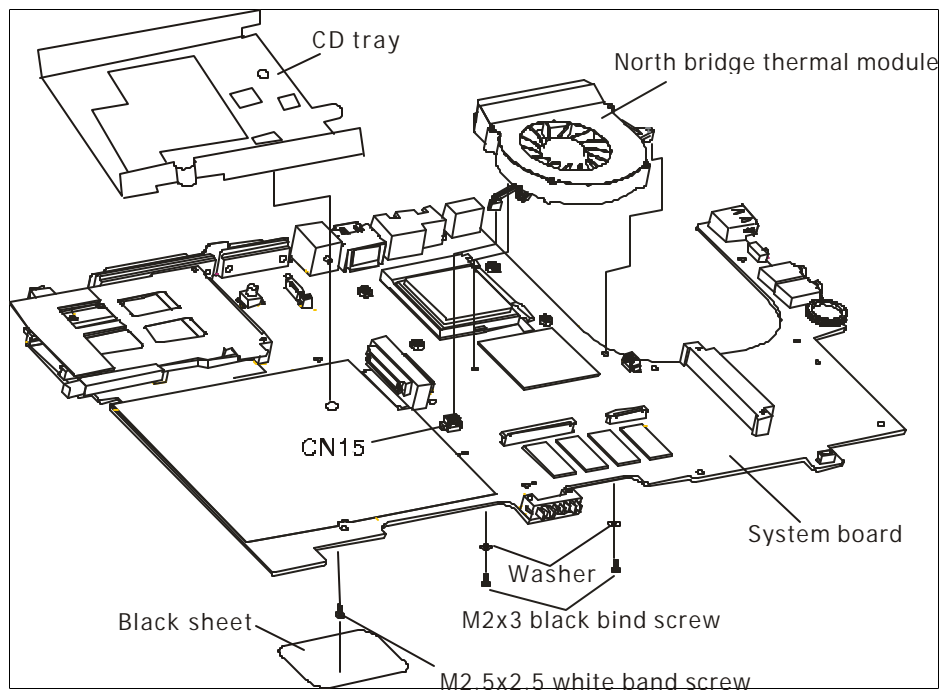
Figure 4 -30 Removing the North Bridge thermal module

8. Remove two pieces of sticky Mylar securing the MDC cable.

9. Disconnect the MDC cable from CN500 on the system board.

10. Remove the MDC cable.
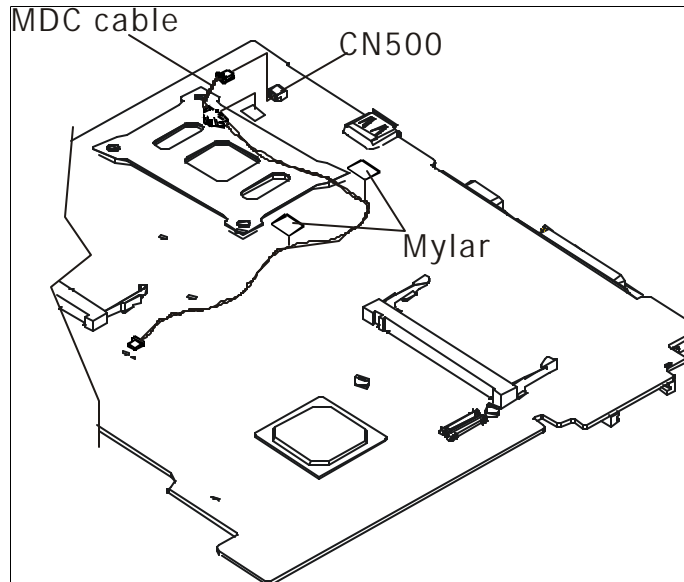
Figure 4-31 Removing the MDC cable

Installing the Removing North Bridge thermal module and MDC cable

Install the Removing North Bridge thermal module according to the following procedures and Figure 4-30, 4-31.

1. Place the MDC cable in the correct position...

2. Connect the MDC cable from CN500 on the system board.

3. Stick two pieces of sticky Mylar securing the MDC cable.

4. Connect the North Bridge thermal module cable to the CN15 on the system board.

5. Place the North Bridge thermal module in the correct position.

6. Secure the two washers and M2x3 black bind screws.

7. Place the CD tray in the correct position.

8. Secure the one M2.5x2.5 white bind screws.

9. Stick the black sheet in the correct position.

4.14   Display Mask

Removing the Display Mask

Remove the display mask according to the following procedures and Figure 4-32.

1. Remove the following 8 seals on the display module in that order:
   - Four black seals on the bottom
   - Four black seals on the top

2. Remove the following 8 screw on the display module, in that order:
   - Four M2.5x7 black flat-head screws on the top and bottom
   - Four M2.5x7 black flat-head screws on each of the top and bottom of left and right sides

3. Release the following 18 latches on the display mask, in that order:
   - Four bottom latches
   - Five latches on each of the left and right sides
   - Six top latches
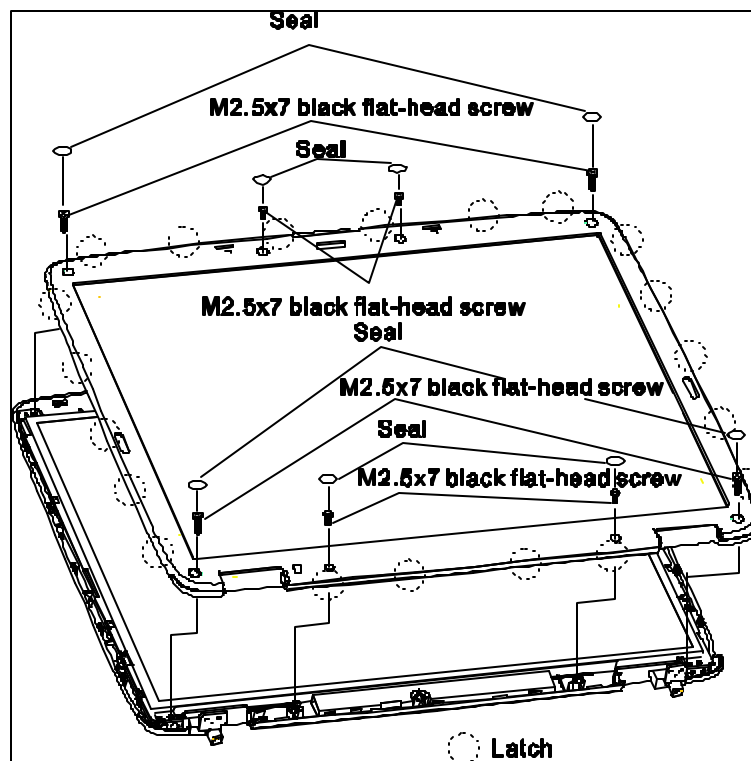
Figure 4-32 Removing the display mask

Installing the Display Mask

Install the display mask according to the following procedures and Figure 4-32.

1. Place the display mask in the correct position and fasten the following 18 latches, in that order:
   - Six top latches
   - Five latches on each of the left and right sides
   - Four bottom latches

2. Place the display module in the correct position and fasten the following 8 screws, in that order:
   - Two M2.5x7 black flat-head screws on the top
   - Four M2.5x7 black flat-head screws on each of the top and bottom of left and right sides

3. Place the display mask in the correct position and fasten the following 8 seals, in that order:
   - Four black seals on the bottom
   - Four black seals on the top

4.15   FL Inverter Board

Removing the FL Inverter Board

Remove the FL inverter board according to the following procedures and Figures 4-33 and 4-34.

1. Remove the M2.5x4.5 black flat-head screw.

M2.5x4.5 black flat-head screw
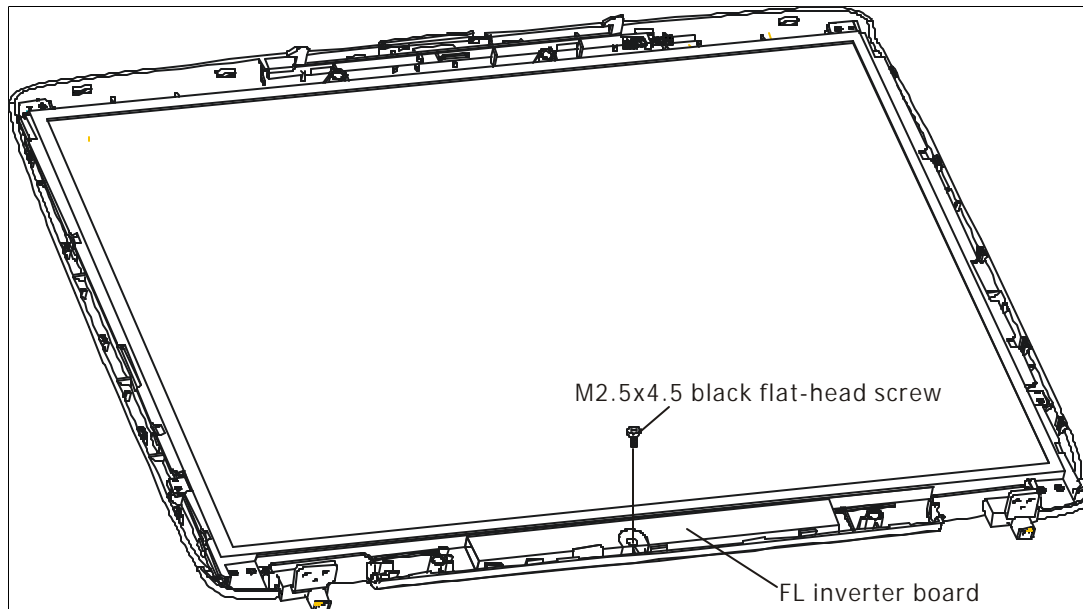
FL inverter board

Figure 4-33 Removing the FL inverter board

2. Raise the FL inverter board and disconnect the LCD/FL cable from LCD/FL connecter.

3. Disconnect the HV cable from HV connecter and remove the FL inverter board.
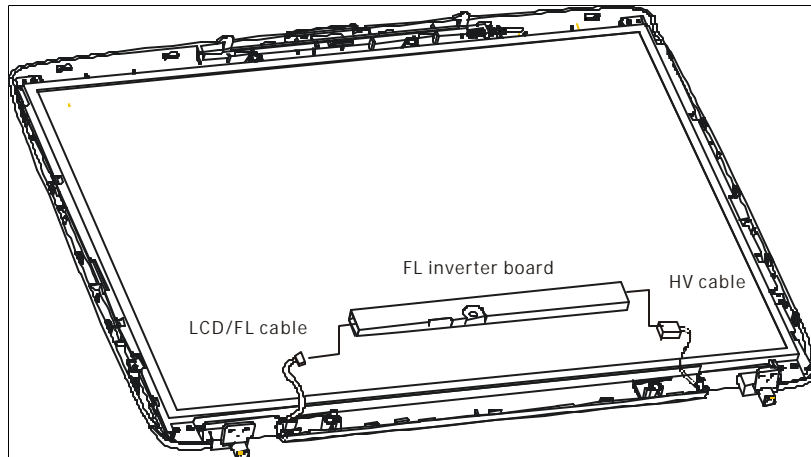
Figure 4-34 disconnecting the cables

Installing the FL Inverter Board

Install the FL inverter board according to the following procedures and Figures 4-33 and 4-34.

1. Connect the LCD/FL cable to LCD/FL connecter, and connect the HV cable to HV connecter.

2. Place the FL inverter board in the correct position.

3. Fasten the M2.5x4.5 black flat-head screw to secure the FL inverter board.

4.16   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.

NOTE: LCD/FL cable must be carefully peeled away before disconnecting it from the module.

Removing the 15.0-inch LCD module

Remove the 15.0-inch LCD module according to the following procedures and Figures 4-35, 4-36 and 4-37.

1. Remove the two M2.5x4.5 black flat-head screws and two M2x5 white bind screws for fixing the LCD module.

2. Carefully tilt the LCD module toward you.

3. Remove the three M2x3 black bind screws on each of the left and right sides for fixing the LCD bracket.
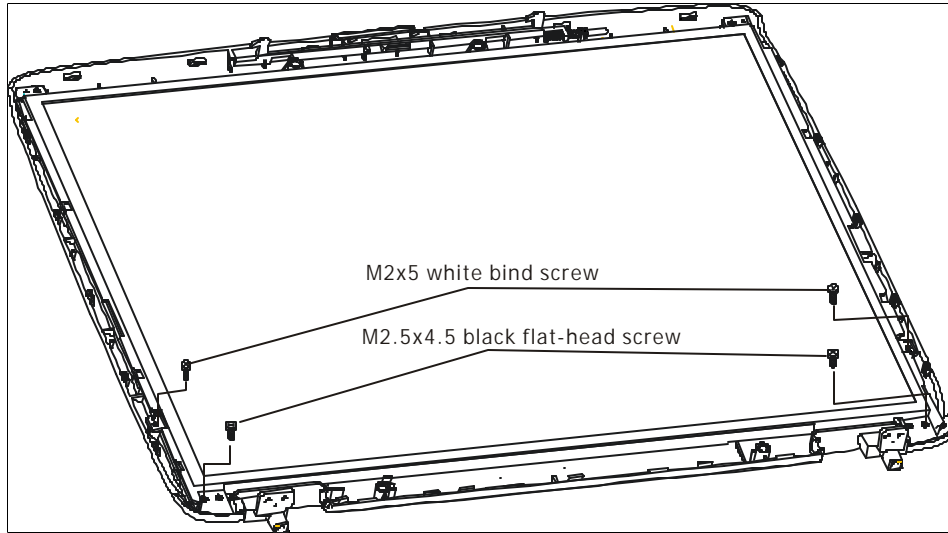
Figure 4-35 Removing the 15.0-inch LCD module and screws

4. Remove the LCD brackets.

5. Turn the LCD upside down.

6. Remove the tape and LCD/FL cable connector. Then disconnect the LCD/FL cable.
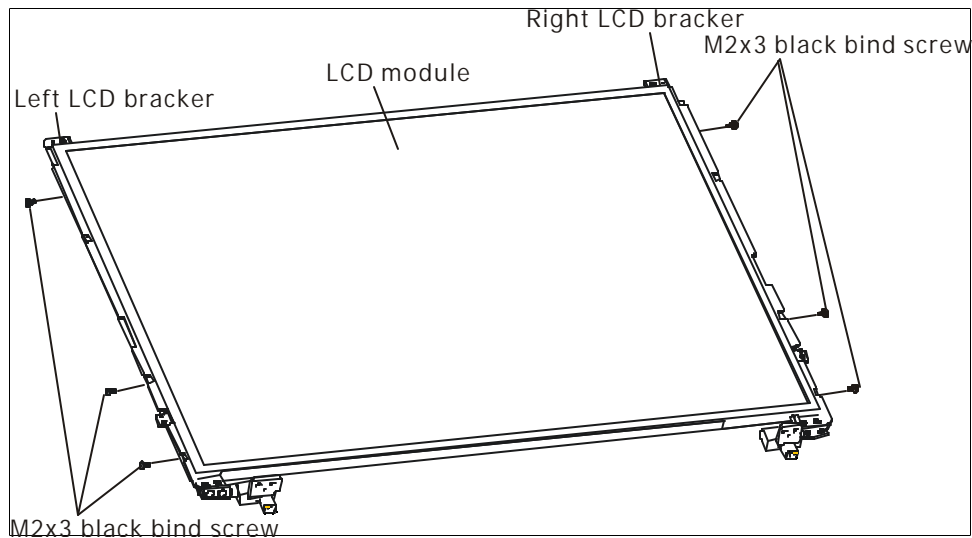
Figure 4-36 Removing the 15.0-inch LCD module
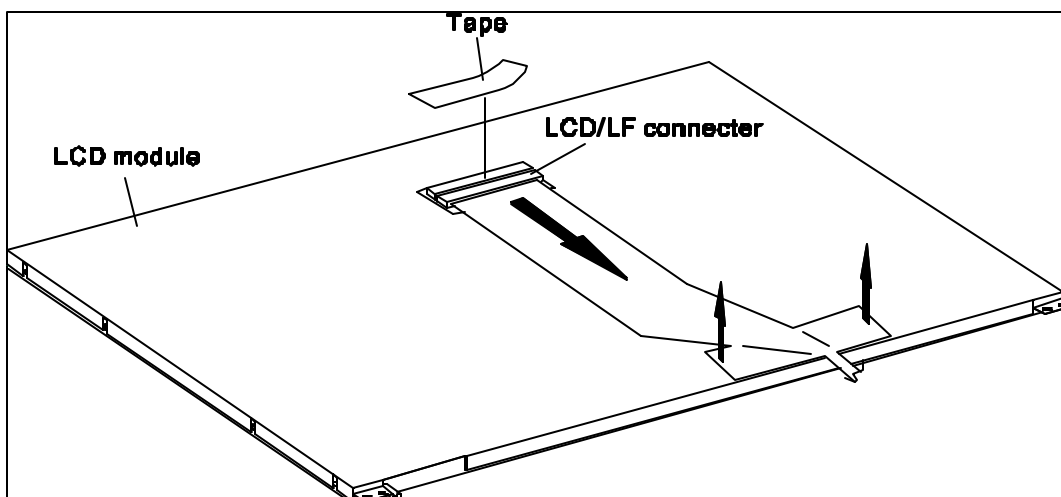
Figure 4-37 Removing the 15.0-inch LCD module

Installing the 15.0-inch LCD Module

NOTE: LCD/FL cable must be carefully peeled away before disconnecting it from the module.

Install the 15.0-inch LCD module according to the following procedures and Figures 4-35, 4-36 and 4-37.

1. Turn the LCD upside down.

2. Connect the LCD/FL cable to the LCD module then stick tape for securing the LCD connector.

3. Return the normal LCD placement.

4. Place the LCD bracket in the correct position and secure it with the three M2x3 black bind screws on each of the left and right sides.

5. Place the LCD module in the correct position and secure it with the two M2.5x4.5 black flat-head screws and two M2x5 white bind screws.

Removing the 14.1-inch LCD Module

NOTE: LCD/FL cable must be carefully peeled away before disconnecting it from the module.

Remove the 14.1-inch LCD module according to the following procedures and Figures 4-38, 4-39 and 4-40.

1. Remove the two M2.5x4.5 black flat-head screws and two M2x5 white bind screws for fixing the LCD module.

2. Carefully tilt the LCD module toward you.

3. Remove the three M2x3 black bind screws on each of the left and right sides for fixing the LCD bracket.
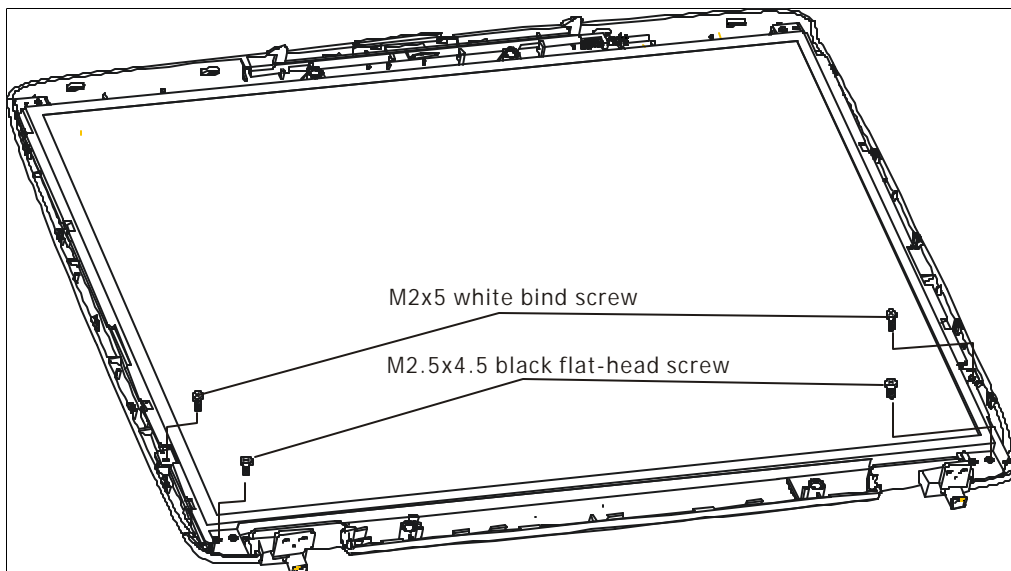
Figure 4-38 Removing the 14.0-inch LCD module and screws

4. Remove the tape and LCD/FL cable connector. Then disconnect the LCD/FL cable.
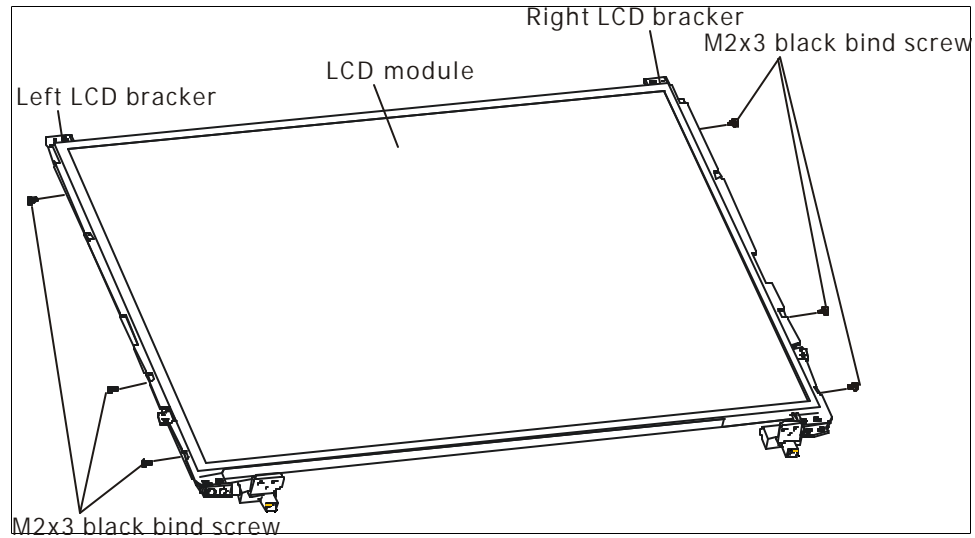
Figure 4-39 Removing the 14.0-inch LCD module
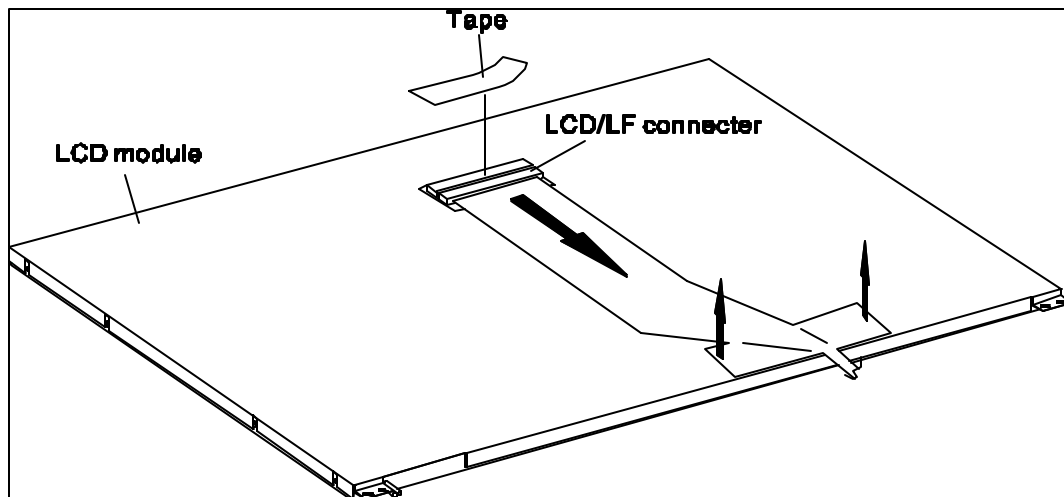
Figure 4-40 Removing the 14.0-inch LCD module

Installing the 14.0-inch LCD Module

> *NOTE: LCD/FL cable must be carefully peeled away before disconnecting it from the module.*

Install the 14.0-inch LCD module according to the following procedures and Figures 4-38, 4-39 and 4-40.

1. Turn the LCD upside down.

2. Connect the LCD/FL cable to the LCD module then stick tape for securing the LCD connector.

3. Return the normal LCD placement.

4. Place the LCD bracket in the correct position and secure it with the three M2x3 black bind screws on each of the left and right sides.

5. Place the LCD module in the correct position and secure it with the two M2.5x4.5 black flat-head screws and two M2x5 white bind screws.

4.17 LED Board

Removing the LED Board

Remove the LED board according to the following procedures and Figure 4-41.

NOTE: *Be carefully peel away the 3 tapes securing the board before you can remove it.*

1. Remove the ESD tape for fix LED flat cable.

2. Remove the left and right sides fix touch pad ESD tape.

3. Remove the two M2.5x3 flat round head screws.

4. Disconnect the touch pad flat cables from J1 on the touch pad and remove the LED board.

5. Disconnect the touch pad flat cables from CN2000 and LED board flat cable from CN2002 on the LED board.
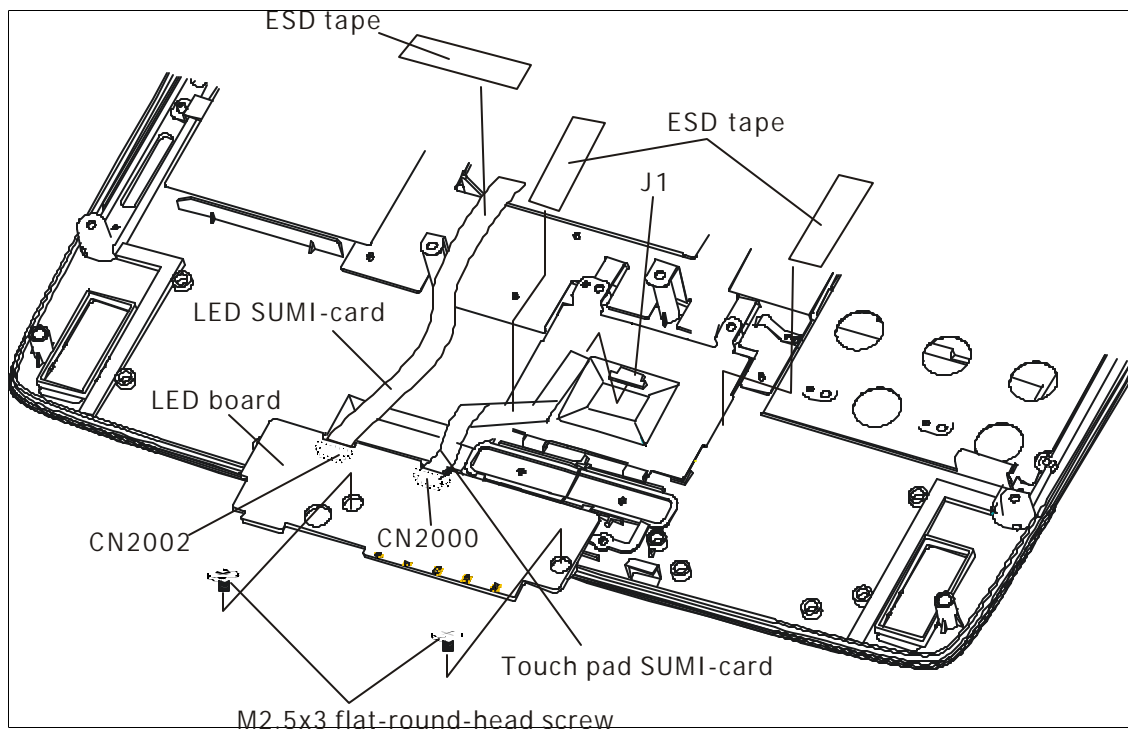
Figure 4-41 Removing the LED board

Installing the LED Board

Install the LED board according to the following procedures and Figure 4-41.

1. Connect the touch pad flat cables to CN2000 and LED board flat cable to CN2002 on the LED board.

2. Connect the touch pad flat cables to J1 on the touch pad.

3. Secure LED board to top cover with two M2.5x3 black flat round bind screws.

4. Stick touch pad flat cable by ESD tape on touch pad left side.

5. Stick LED board flat cable by ESD tape.

4.18 Touch Pad Board

Removing the Touch Pad Board

Remove the s Touch Pad Board according to the following procedures and Figure 4-42.

1. Remove the two M2.5x4 black flat-head screws for securing the touch pad board.

2. Remove the Touch Pad Board.
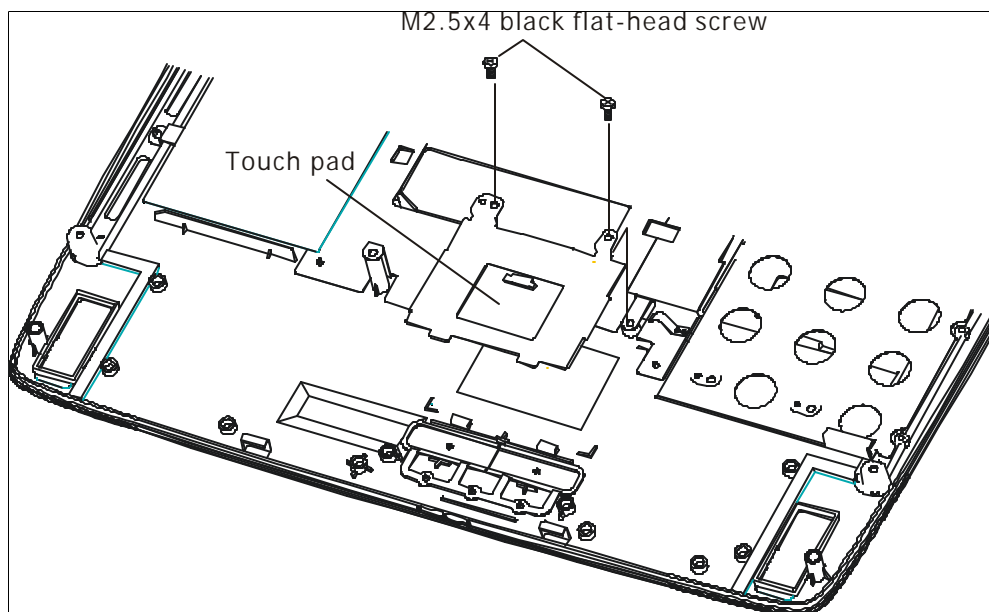
Figure 4-42 Removing the touch pad board

Installing the Touch Pad Board

Install the Touch Pad Board according to the following procedures and Figure 4-42.

1. Place the touch pad board in the correct position.

2. Secure the touch pad board with the two M2.5x4 black flat-head screws.

Appendices

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Appendix A   Handling the LCD Module

Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling the LCD module:

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.
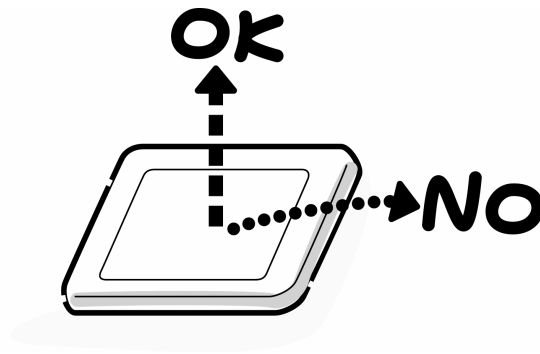
2. Be careful to align the four holes at the right side and left side of the LCD module with the corresponding holes in the LCD cover before securing the module with four screws. Do not force the module into place, because stress can affect its performance. Also, the panel's polarized surface is easily scarred, so be carefully when handling it.
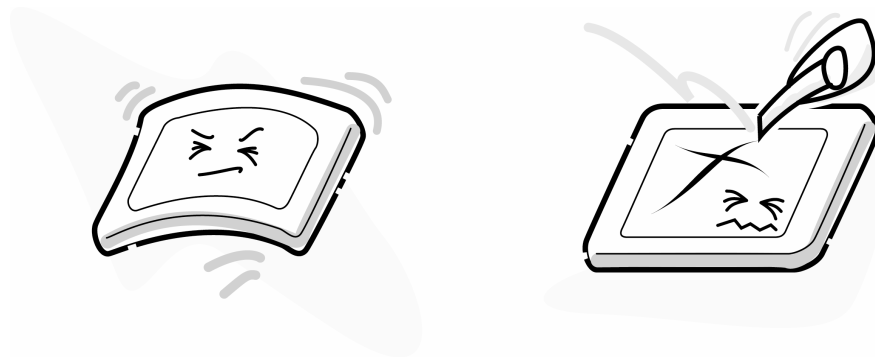
3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

    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.
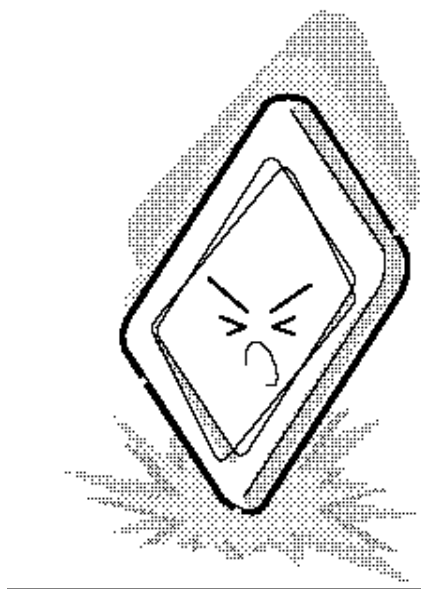
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic
    discharge. Be sure to wear a wrist or ankle ground when handling the module.
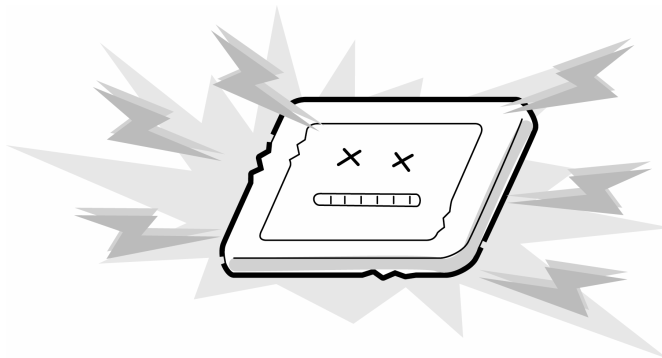
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
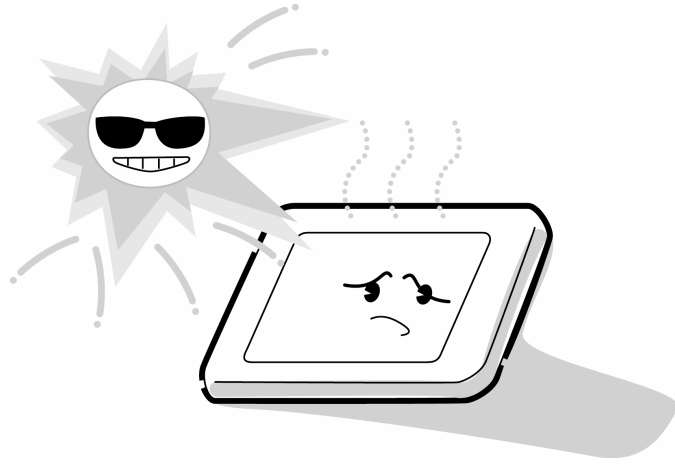
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
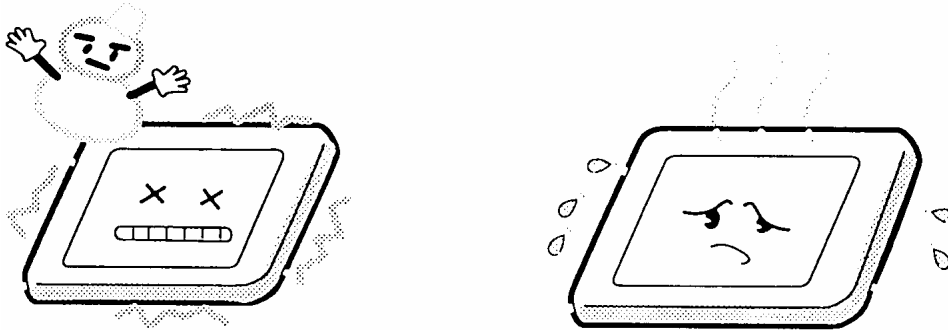
9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
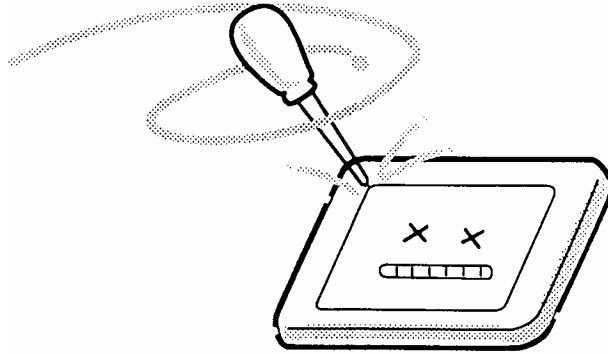
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.
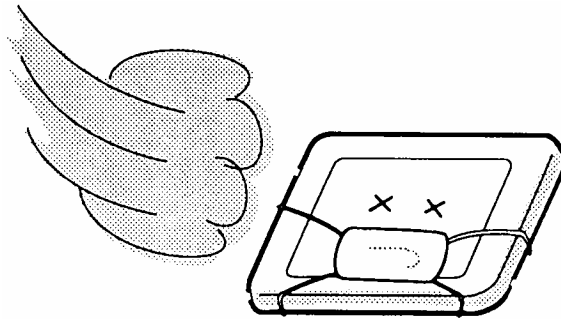
Appendix B   Board Layout

B.1   System Board Front View

Figure B-1   Board layout (front)
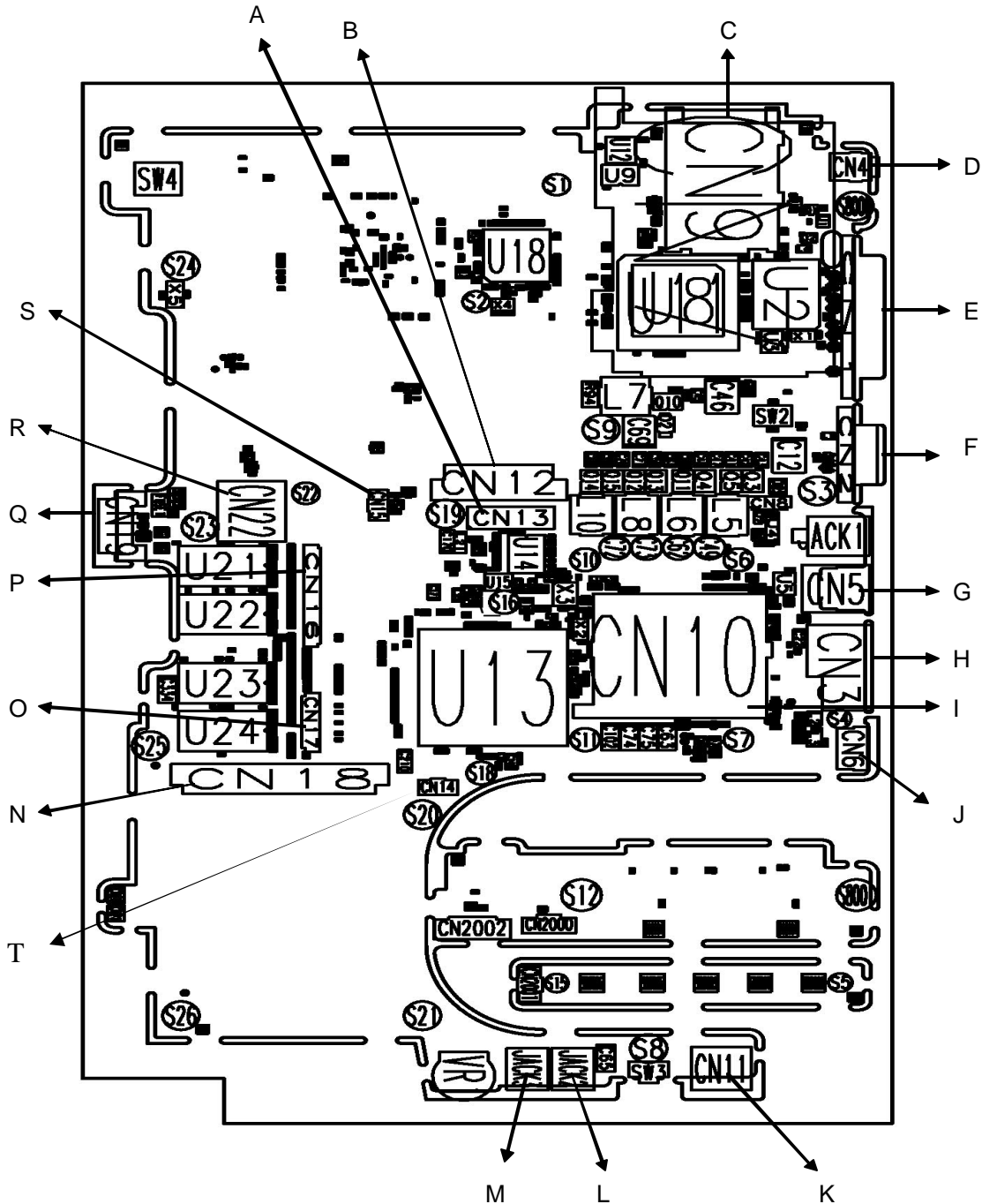
Table B-1   System board connectors (front)

Mark	Number	Name
A'	CN13	LCD/FL Inverter Connector
B'	CN12	ODD Bay Connector
C'	CN9	SD/MS Connector
D'	CN4	IEEE 1394 Connector
E'	CN1	Parallel Connector
F'	CN2	External Monitor Connector
G'	CN5	USB I/F Connector B
H'	CN3	RJ45 (LAN)/RJ11 Connector
I'	CN10	CPU Connector
J'	CN6	S-Video Connector
K'	CN11	USB I/F Connector C
L	JACK2	Ext_Microphone Connector
M	JACK3	Headphone Connector
N	CN8	HDD Connector
O	CN17	LED Status and IR Connector
P	CN16	Internal Keyboard Connector
Q	CN19	Battery Bay Connector
R	CN22	BIOS Chip Connector
S	CN15	FAN 2
T	CN14	FAN 1

Figure B-2   Board layout (back)

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

Mark	Number	Name
A'	CN501	MINI PCI Connector
B'	CN502	MDC Connector
C'	CN504	Serial Connector
D'	CN503	Memory Slot A Connector
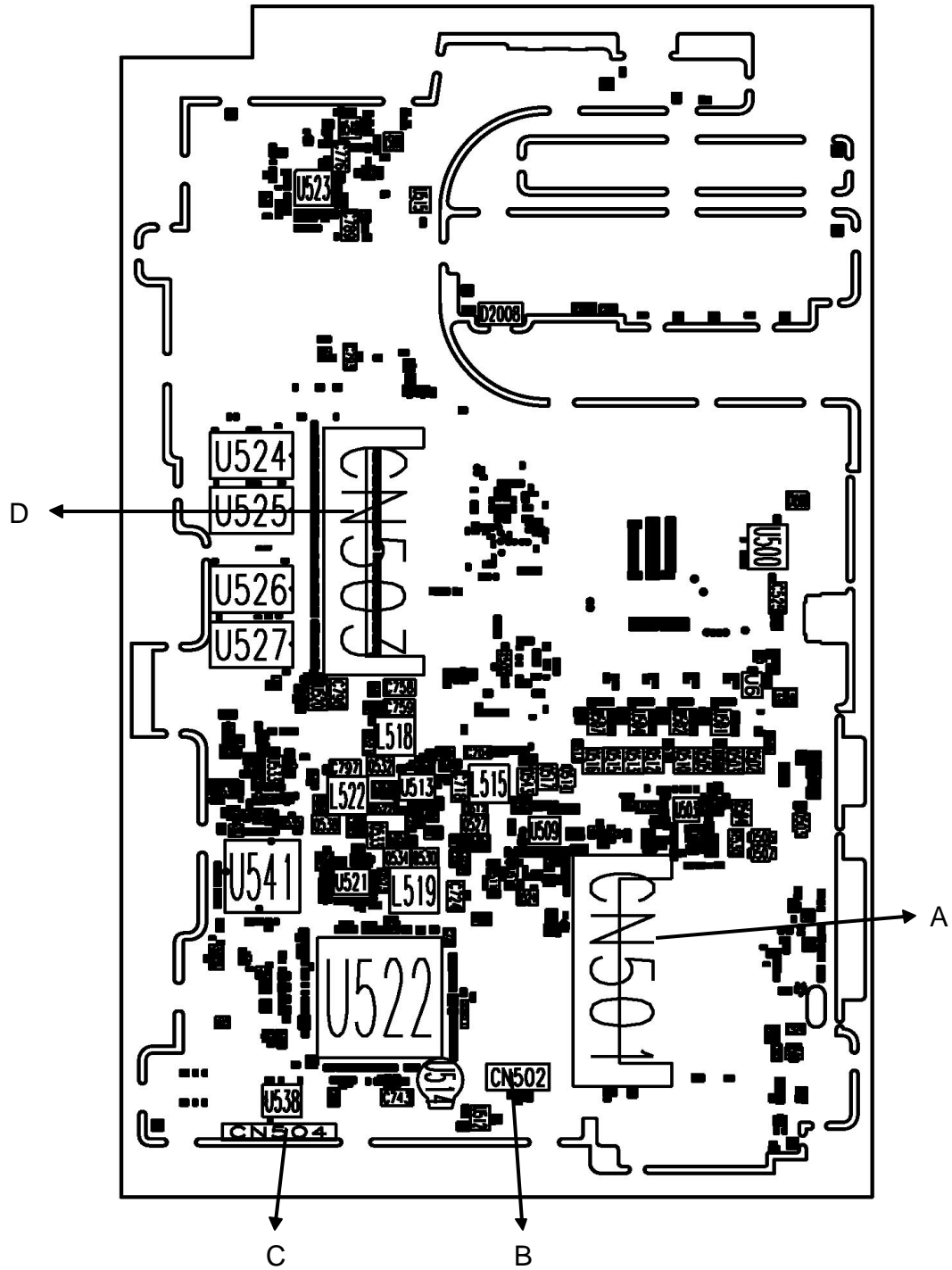
Appendix C   Pin Assignments

System Board

C.1   CN1 Parallel Connector (25-Pin)

Table C-1   Parallel connector pin assignments (25-PIN)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/STRB#_5R	O	2	/PDATA(0)_R	I/O
3	/PDATA(1)_R	I/O	4	/PDATA(2)_R	I/O
5	/PDATA(3)_R	I/O	6	/PDATA(4)_R	I/O
7	/PDATA(5)_R	I/O	8	/PDATA(6)_R	I/O
9	/PDATA(7)_R	I/O	10	/ACK#_5R	I
11	/BUSY#_5R	I	12	/PE_5R	I
13	/SLCT_5R	I	14	/ALF#_5R	O
15	/ERROR#_5R	I	16	/PINIT#_5R	O
17	/SLCTIN#_5R	O	18	DGND	-
19	DGND	-	20	DGND	-
21	DGND	-	22	DGND	-
23	DGND	-	24	DGND	-
25	DGND	-			

C.2   CN2 External Monitor Connector (15-Pin)

Table C-2 External monitor connector pin assignments (15-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	RED	O	2	GREEN	O
3	BLUE	O	4	NC	
5	VGA GND	-	6	VGA GND	
7	VGA GND	-	8	VGA GND	
9	+V5S	-	10	VGA GND	
11	NC	-	12	DDC DATA	I/O
13	CRT_HSYNC	O	14	CRT_VSYNC	O
15	DDCCLK	I/O			

C.3 CN3 RJ45 (12-Pin+4LED)

Table C-3 RJ45 (12-Pin+4LED)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	G	-	2	G	-
A1	/TX+_TRAN	O	A2	/TX-_TRAN	O
A3	/RX+_TRAN	I	A4	NC 0	I
A5	NC 1	-	A6	/RX-_TRAN	I
A7	NC 2	-	A8	NC 3	-
A9	LED_LAN#	I	A10	LED GP	I
A11	LED_LANACT#	I	A12	+V3_LAN	I
B1	/MDMTIP	I/O	B2	/MDMRNG	I/O

C.4 CN5 USB I/F Connector-A+B (8-Pin)

Table C-4 USB I/F connector pin assignments (8-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	USBVCC1	-	2	/USB_PN1_L	I/O
3	/USB_PP1_L	I/O	4	DGND	-
5	USBVCC1	-	6	/USB_PN0_L	I/O
7	/USB_PP0_L	I/O	8	DGND	-
G1	DGND	-	G2	DGND	-
G3	DGND	-	G4	DGND	-

C.5 CN6 TV OUT Connector (4-Pin)

Table C-5 TV OUT connector pin assignments (4-pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	DGND	-	2	DGND	-
3	LUMA_Y	I	4	CHROMA_C	I
G1	DGND	-	G2	DGND	-

C.6   CN7 PC Card Slot Connector (68-Pin)

Table C-6   PC card slot connector pin assignments (68-pin) (1/2)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	DGND	-	2	/A_CDAT(3)	I/O
3	/A_CDAT(4)	I/O	4	/A_CDAT(5)	I/O
5	/A_CDAT(6)	I/O	6	/A_CDAT(7)	I/O
7	/A_CE1#	I	8	/A_CADR(10)	I/O
9	/A_OE#	I	10	/A_CADR(11)	I/O
11	/A_CADR(9)	I/O	12	/A_CADR(8)	I/O
13	/A_CADR(13)	I/O	14	/A_CADR(14)	I/O
15	/A_WE#	I	16	/A_RDY_IREQ	O
17	ACARDVCC	-	18	ACARDVPP	-
19	/A_CADR(16)_R	I/O	20	/A_CADR(15)	I/O
21	/A_CADR(12)	I/O	22	/A_CADR(7)	I/O
23	/A_CADR(6)	I/O	24	/A_CADR(5)	I/O
25	/A_CADR(4)	I/O	26	/A_CADR(3)	I/O
27	/A_CADR(2)	I/O	28	/A_CADR(1)	I/O
29	/A_CADR(0)	I/O	30	/A_CDAT(0)	I/O
31	/A_CDAT(1)	I/O	32	/A_CDAT(2)	I/O
33	/A_WP_IO16#	O	34	DGND	-
35	DGND	-	36	/A_CD1#	I/O
37	/A_CDAT(11)	I/O	38	/A_CDAT(12)	I/O
39	/A_CDAT(13)	I/O	40	/A_CDAT(14)	I/O
41	/A_CDAT(15)	I/O	42	/A_CE2#	I
43	/A_VS1	I/O	44	/A_IORD#	I
45	/A_IOWR#	I	46	/A_CADR(17)	I/O
47	/A_CADR(18)	I/O	48	/A_CADR(19)	I/O
49	/A_CADR(20)	I/O	50	/A_CADR(21)	I/O
51	ACARDVCC	-	52	ACARDVPP	I/O
53	/A_CADR(22)	I/O	54	/A_CADR(23)	I/O
55	/A_CADR(24)	I/O	56	/A_CADR(25)	I/O
57	/A_VS2	I/O	58	/A_RESET	I
59	/A_WAIT#	O	60	/A_INPACK#	O
61	/A_REG#	I	62	/A_BVD2_SPKR	O
63	/A_BVD1_STSCHG_RI	O	64	/A_CDAT(8)	I/O
65	/A_CDAT(9)	I/O	66	/A_CDAT(10)	I/O
67	/A_CD2#	O	68	DGND	-

Table C-6   PC card slot connector pin assignments (68-pin) (2/2)

G1	DGND	-	G10	DGND	-
G11	DGND	-	G12	DGND	-
G13	DGND	-	G14	DGND	-
G15	DGND	-	G16	DGND	-
G17	DGND	-	G18	DGND	-
G19	DGND	-	G2	DGND	-
G20	DGND	-	G3	DGND	-
G4	DGND	-	G5	DGND	-
G6	DGND	-	G7	DGND	-
G8	DGND	-	G9	DGND	-

C.7   CN9 SD/MS Connector (23-Pin)

Table C-7   SD/MS connector pin assignments (23-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/SD_DAT3	I/O	2	/SD_CMD	O
3	DGND	-	4	VCC_SD	-
5	/SD_MS_CLK	I	6	DGND	-
7	/SD_DAT0	I/O	8	/SD_DAT1	I/O
9	/SD_DAT2	I/O	10	/SD_CD#	O
11	DGND	-	12	/SD_WP	O
13	DGND	-	14	DGND	-
15	/MS_BS	I/O	16	MS_DATA1	I
17	/MS_DATA0	I/O	18	MS_DATA2	I
19	/MS_INS#	I	20	MS_DATA3	I
21	/MS_CLK	I	22	VCC_SD	-
23	DGND	-			

C.8   CN11 USB I/F Connector-C (4-Pin)

Table C-8   USB I/F connector pin assignments (4-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	USBVCC2	-	2	/USB_PN2_L	I/O
3	/USB_PP2_L	I/O	4	DGND	-
G1	DGND	-	G2	DGND	-

C.9   CN12 ODD Bay Connector (52-Pin)

Table C-9   ODD bay connector pin assignments (52-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/A_CD_L	O	2	/A_CD_R	O
3	/A_CD_GND	-	4	NC	-
5	NB_RST#	I	6	/SDD_R(8)	I/O
7	/SDD_R(7)	I/O	8	/SDD_R(9)	I/O
9	/SDD_R(6)	I/O	10	/SDD_R(10)	I/O
11	/SDD_R(5)	I/O	12	/SDD_R(11)	I/O
13	/SDD_R(4)	I/O	14	/SDD_R(12)	I/O
15	/SDD_R(3)	I/O	16	/SDD_R(13)	I/O
17	/SDD_R(2)	I/O	18	/SDD_R(14)	I/O
19	/SDD_R(1)	I/O	20	/SDD_R(15)	I/O
21	/SDD_R(0)	I/O	22	/SDDRQ_35_R	O
23	DGND	-	24	/SDIOR#_3_R	I/O
25	/SDIOW#_3_R	I/O	26	DGND	-
27	/SDIORDY_35_R	I/O	28	/SDDACK#_35_R	I
29	/IRQ15_3_R	O	30	NC	-
31	/SDA_R(1)	I	32	NC	-
33	/SDA_R(0)	I	34	/SDA_R(2)	I
35	/SDCS1#_3_R	I	36	/SDCS3#_3_R	I
37	/MBDASP#_5	I	38	+V5S	-
39	+V5S	-	40	+V5S	-
41	+V5S	-	42	+V5S	-
43	DGND	-	44	DGND	-
45	DGND	-	46	DGND	-
47	DGND	-	48	DGND	-
49	NC	-	50	NC	-
51	DGND	-	52	DGND	-

C.10   CN13 LCD/FL Inverter Connector (42-Pin)

Table C-10   LCD/FL Inverter connector pin assignments (42-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/LCM_ID0	I	2	+V3SLCM	-
3	/LCM_ID1	I	4	+V3SLCM	-
5	/LCM_ID2	I	6	+V3S	-
7	DGND	-	8	/LCM_DDCCLK	O
9	DGND	-	10	/LCM_DDCDATA	I/O
11	/TXOUTL0-	O	12	/TXOUTL0+	O
13	/TXOUTL1-	O	14	/TXOUTL1+	O
15	/TXOUTL2-	O	16	/TXOUTL2+	O
17	/TXCLKOUTL-	O	18	/TXCLKOUTL+	O
19	DGND	-	20	DGND	-
21	/TXOUTU0-	O	22	/TXOUTU0+	O
23	/TXOUTU1-	O	24	/TXOUTU1+	O
25	/TXOUTU2-	O	26	/TXOUTU2+	O
27	/TXCLKOUTU-	O	28	/TXCLKOUTU+	O
29	DGND	-	30	DGND	-
33	+V5S	-	34	+V5S	-
35	+V5S	-	36	/INV_PWM_3	O
37	/BLON#	O	38	DGND	-
39	DGND	-	40	DGND	-
41	DGND	-	42	DGND	-

C.11   CN14 Cooling Module Connector (1) (3-Pin)

Table C-11   Cooling Module connector (1) pin assignments (3-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V5S	-	2	DGND	-
3	/FAN_TACH1	I			

C.12   CN15 Cooling Module Connector (2) (3-Pin)

Table C-12   Cooling Module connector (2) pin assignments (3-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V5S	-	2	DGND	-
3	/FAN_TACH2	I			

C.13   CN16 Internal KEY Board Connector (34-Pin)

Table C-13   Key Board I/F connector pin assignments (34-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V5S	-	2	NC	-
3	NC	-	4	NC	-
5	NC	-	6	+V5S	-
7	/SCAN_OUT(4)	O	8	/SCAN_OUT(2)	O
9	/SCAN_IN(2)	I	10	/SCAN_IN(1)	I
11	/SCAN_OUT(1)	O	12	/SCAN_OUT(0)	O
13	/SCAN_IN(0)	I	14	/SCAN_IN(3)	I
15	/SCAN_OUT(5)	O	16	/SCAN_OUT(6)	O
17	/SCAN_IN(5)	I	18	/SCAN_IN(6)	I
19	/SCAN_IN(4)	I	20	/SCAN_OUT(12)	O
21	/SCAN_OUT(7)	O	22	/SCAN_OUT(3)	O
23	/SCAN_IN(7)	I	24	/SCAN_OUT(13)	O
25	/SCAN_OUT(9)	O	26	/SCAN_OUT(8)	O
27	/SCAN_OUT(11)	O	28	/SCAN_OUT(10)	O
29	/SCAN_OUT(14)	O	30	/SCAN_OUT(15)	O
31	+V5S	-	32	/CAPS_LED#_3	O
33	/SCROLL_LED#_3	O	34	/NUM_LED#_3	O

C.14   CN18 HDD Connector (44-Pin)

Table C-14   HDD connector pin assignments (44-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	NB_RST#	I	2	DGND	-
3	/PDD_R(7)	I/O	4	/PDD_R(8)	I/O
5	/PDD_R(6)	I/O	6	/PDD_R(9)	I/O
7	/PDD_R(5)	I/O	8	/PDD_R(10)	I/O
9	/PDD_R(4)	I/O	10	/PDD_R(11)	I/O
11	/PDD_R(3)	I/O	12	/PDD_R(12)	I/O
13	/PDD_R(2)	I/O	14	/PDD_R(13)	I/O
15	/PDD_R(1)	I/O	16	/PDD_R(14)	I/O
17	/PDD_R(0)	I/O	18	/PDD_R(15)	I/O
19	DGND	-	20	NC	-
21	/PDDRQ_35_R	O	22	DGND	-
23	/PDIOW#_3_R	I/O	24	DGND	-
25	/PDIOR#_3_R	I/O	26	DGND	-
27	/PDIORDY_35_R	I/O	28	NC	-
29	/PDDACK#_35_R	O	30	DGND	-
31	/IRQ14_3_R	I	32	NC	-
33	/PDA_R(1)	I	34	DGND	-
35	/PDA_R(0)	I	36	/PDA_R(2)	I
37	/PDCS1#_3_R	I	38	/PDCS3#_3_R	I
39	/HDDASP#_5	I	40	DGND	-
41	+V5S	-	42	+V5S	-
43	DGND	-	44	NC	-
G1	DGND	-	G2	DGND	-

C.15   CN19 Main Battery Connector (7-Pin)

Table C-15   Main battery connector pin assignments (7-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+VBAT	-	2	+VBAT	-
3	BATT_SCL	I/O	4	BATT_SDA	I/O
5	BATT_THRM	O	6	DGND	-
7	DGND	-			

C.16   CN20 Internal Speaker Connector (6-Pin)

Table C-16   Internal speaker connector pin assignments (6-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/SPK_OUT_L-	O	2	/SPK_OUT_L+	O
3	/SPK_OUT_R-	O	4	/SPK_OUT_R+	O
5	DGND	-	6	DGND	-

C.17   CN501 MINI PCI Connector (126-Pin)

Table C-17   MINI PCI connector pin assignments (126-Pin) (1/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	NC	-
3	NC	-	4	NC	-
5	NC	-	6	NC	-
7	NC	-	8	NC	-
9	NC	-	10	NC	-
11	NC	-	12	NC	-
13	WLON_LED#	O	14	NC	-
15	DGND	-	16	NC	-
17	/PIRQB#_3			18	+V5S	-
19	+V3	-	20	/PIRQB#_3	I
21	NC	-	22	NC	-
23	DGND	-	24	+V3	-
25	/CLK_MINIPCI_EXTR	O	26	/PCI_RESET#_3	O
27	DGND	-	28	+V3	-
29	/MPCIREQ0#_3	I	30	/MPCIGNT0#_3	O
31	+V3	-	32	DGND	-
33	/PCI_AD(31)	I/O	34	/PCI_PME#_3	I
35	/PCI_AD(29)	I/O	36	NC	-

Table C-17   MINI PCI connector pin assignments (126-Pin) (2/3)

37	GND	-	38	/PCI_AD(30)	I/O
39	/PCI_AD(27)	I/O	40	+V3	-
41	/PCI_AD(25)	I/O	42	/PCI_AD(28)	I/O
43	NC	-	44	/PCI_AD(26)	I/O
45	/PCI_CBE#(3)	O	46	/PCI_AD(24)	I/O
47	/PCI_AD(23)	I/O	48	/PCI_AD(20)	I/O
49	DGND	-	50	DGND	-
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	DGND	-	56	/PCI_PAR_3	I/O
57	/PCI_AD(17)	I/O	58	/PCI_AD(18)	I/O
59	/PCI_CBE#(2)	I/O	60	/PCI_AD(16)	I/O
61	/PCI_IRDY#_3	I/O	62	DGND	-
63	+V3	-	64	/PCI_FRAME#_3	I/O
65	/CLKRUN#_3	I/O	66	/PCI_TRDY#_3	I/O
67	/PCI_SERR#_3	O	68	/PCI_STOP#_3	I/O
69	DGND	-	70	+V3	-
71	/PCI_PERR#_3	O	72	/PCI_DEVSEL#_3	O
73	/PCI_CBE#(1)	O	74	DGND	-
75	/PCI_AD(14)	I/O	76	/PCI_AD(15)	I/O
77	DGND	-	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	DGND	-
83	DGND	-	84	/PCI_AD(9)	I/O
85	/PCI_AD(8)	I/O	86	/PCI_CBE#(0)	I/O
87	/PCI_AD(7)	I/O	88	+V3	-
89	+V3	-	90	/PCI_AD(6)	I/O
91	/PCI_AD(5)	I/O	92	/PCI_AD(4)	I/O
93	NC	-	94	/PCI_AD(2)	I/O
95	/PCI_AD(3)	I/O	96	/PCI_AD(0)	I/O
97	+V5S	-	98	NC	-
99	/PCI_AD(1)	I/O	100	NC	-
101	DGND	-	102	DGND	-
103	NC	-	104	DGND	-

Table C-17   MINI PCI connector pin assignments (126-Pin) (3/3)

105	NC	-	106	NC	-
107	NC	-	108	NC	-
109	NC	-	110	NC	-
111	NC	-	112	NC	-
113	DGND	-	114	DGND	-
115	NC	-	116	NC	-
117	DGND	-	118	DGND	-
119	DGND	-	120	DGND	-
121	NC	-	122	NC	-
123	NC	-	124	+V3	-
125	DGND	-	126	DGND	-

C.18   CN502 MDC I/F Connector (30-Pin)

Table C-18   MDC I/F connector pin assignments (30-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	GND	-
3	GND	-	4	/PHONE	I/O
5	NC	-	6	NC	-
7	NC	-	8	GND	-
9	NC	-	10	NC	-
11	NC	-	12	NC	-
13	NC	-	14	NC	-
15	GND	-	16	MDC	I/O
17	MDC	I/O	18	NC	-
19	GND	-	20	GND	-
21	NC	-	22	/A97SYC	I/O
23	/A97SDO	I/O	24	/A97DI1	I/O
25	/A97RST#	I/O	26	/A97DI1	I/O
27	GND	-	28	GND	-
29	GND	-	30	/BITCLK_3_MDC	I/O

C.19 CN503 Memory Slot Connector (202-Pin)

Table C-19   Memory slot connector pin assignments (202-PIN) (1/3)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/SM_VREF	I	2	/SM_VREF	I
3	DGND	-	4	DGND	-
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)	I
13	/M_DATA_R(2)	I/O	14	/M_DATA_R(6)	I/O
15	DGND	-	16	DGND	-
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)	I
27	DGND	-	28	DGND	-
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	DGND	-
39	DGND	-	40	DGND	-
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)	I
49	/M_DATA_R(18)	I/O	50	/M_DATA_R(22)	I/O
51	DGND	-	52	DGND	-
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
61	/M_DQS_R(3)	I/O	62	/M_DM_R(3)	I
63	DGND	-	64	DGND	-
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

Table C-19   Memory slot connector pin assignments (202-PIN) (2/3)

69	+V2.5'	-	70	+V2.5'	-
71	DGND	-	72	DGND	-
73	DGND	-	74	DGND	-
75	DGND	-	76	DGND	-
77	DGND	-	78	NC	-
79	DGND	-	80	DGND	-
81	+V2.5'	-	82	+V2.5'	-
83	DGND	-	84	DGND	-
85	NC	-	86	NC	-
87	DGND	-	88	DGND	-
89	+V2.5'	-	90	DGND	-
91	DGND	-	92	+V2.5'	-
93	+V2.5'	-	94	+V2.5'	-
95	/M_CKE1_R#	I/O	96	/M_CKE0_R#	I/O
97	NC	-	98	DGND	-
99	/M_A(12)	I/O	100	/M_A(11)	I/O
101	/M_A(9)	I/O	102	/M_A(8)	I/O
103	DGND	-	104	DGND	-
105	/M_A(7)	I/O	106	/M_A(6)	I/O
107	/M_A(5)	I/O	108	/M_A(4)	I/O
109	/M_A(3)	I/O	110	/M_A(2)	I/O
111	/M_A(1)	I/O	112	/M_A(0)	I/O
113	+V2.5'	-	114	+V2.5'	-
115	/M_A(10)	I/O	116	/M_A(14)	I/O
117	/M_A(13)	I/O	118	/M_RAS_R#	I/O
119	/M_WE_R#	I/O	120	/M_CAS_R#	I/O
121	/M_CS0_R#	I/O	122	/M_CS1_R#	I/O
123	/M_A(15)	I/O	124	NC	-
125	DGND	-	126	DGND	-
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'	-
133	/M_DQS_R(4)	I/O	134	/M_DM_R(4)	I
135	/M_DATA_R(34)	I/O	136	/M_DATA_R(38)	I/O

Table C-19   Memory slot connector pin assignments (202-PIN) (3/3)

137	DGND	-	138	DGND	-
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)	I
149	DGND	-	150	DGND	-
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	DGND	-	160	/M_CLK_DDR1	I/O
161	DGND	-	162	DGND	-
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)	I	170	/M_DM_R(6)	I
171	/M_DATA_R(50)	I/O	172	/M_DATA_R(54)	I/O
173	DGND	-	174	DGND	-
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)	I
185	DGND	-	186	DGND	-
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	/SMBDATA_3	I/O	194	DGND	-
195	/SMBCLK_3	I/O	196	DGND	-
197	+V3S'	-	198	DGND	-
199	+V2.5'	-	200	NC	-
201	DGND	-	202	DGND	-

C.20   CN2000 Touch Pad Connector (12-Pin)

Table C-20   Touch Pad connector pin assignments (12-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/IM_CLK_CN	I/O	2	/IM_CLK_CN	I/O
3	/IM_DAT_CN	I/O	4	/IM_DAT_CN	I/O
5	/LEFT_CN	I	6	/LEFT_CN	I
7	/RIGHT_CN	I	8	/RIGHT_CN	I
9	PGND	-	10	PGND	-
11	NC	-	12	+V5S_CN	-
G1	PGND	-	G2	PGND	-

C.21   CN2002 LED Connector (24-Pin)

Table C-21   LED connector pin assignments (24-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	+V3A_CN	-	2	/DCIN_OLED#_CN	O
3	/DCIN_GLED#_CN	O	4	/BAT0_OLED#_CN	O
5	/BAT0_GLED#_CN	O	6	+V5S_CN	-
7	+V5S_CN	-	8	/IDELED#_CN	O
9	+V3S_CN	-	10	+V3S_CN	-
11	/WLON_LED#_CN	O	12	+V3_CN	-
13	/PWR_OLED#_CN	O	14	/PWR_GLED#_CN	O
15	/IM_CLK_CN	I/O	16	/IM_DAT_CN	I/O
17	/IR_TX_CN	O	18	/IR_RX_CN	I
19	/IR_SD_CN	I	20	PGND	-
21	PGND	-	22	PGND	-
23	PGND	-	24	PGND	-
G1	PGND	-	G2	PGND	-

C.22   JACK1 DC_IN Connector (2-Pin)

Table C-22   DC_IN connector pin assignments (2-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	/+VADPTR	-	2	DGND	-
G1	DGND	-	G2	DGND	-
G3	DGND	-	G4	DGND	-

C.23   JACK2 Ext_Microphone Connector (6-Pin)

Table C-23   Ext_microphone connector pin assignments (6-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	MIC	I/O	2	AREF	I/O
3	ANAGND	-	4	ANAGND	-
5	ANAGND	-	6	AREF	I/O
G1	ANAGND	-	G2	ANAGND	-

C.24   JACK3 Headphone Connector (6-Pin)

Table C-24   Headphone connector pin assignments (6-Pin)

Pin No.	Signal Name	I/O	Pin No.	Signal Name	I/O
1	ANAGND	-	2	SPK_OUT_L+	O
3	SPK_OUT_R+	O	4	ANAGND	-
5	ANAGND	-	6	HPS	O
G1	ANAGND	-	G2	ANAGND	-

Appendix D   Keyboard Scan/Character Codes

Table D-1 Scan codes (set 1 and set 2) (1/4)

Cap No.	Keytop	Code set 1 Make	Code set 1 Break	Code set 2 Make	Code set 2 Break		Note
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	
14				7D	F0	7D	
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
56	_			73	F0	73	
57	Shift (R)	36	B6	59	F0	59	

Table D-1 Scan codes (set 1 and set 2) (3/4)

Cap No.	Keytop	Code set 1 Make		Code set 1 Break		Code set 2 Make		Code set 2 Break			Note
58	Ctrl	1D		9D		14		F0		14	*3
60	Alt (L)	38		B8		11		F0		11	*3
61	Space	39		B9		29		F0		29	
62	ALT (R)	E0	38	E0	B8	E0	11	E0	F0	11	
75	Ins	E0	52	E0	D2	E0	70	E0	F0	70	*1
76	Del	E0	53	E0	D3	E0	71	E0	F0	71	*1
79	? ?	E0	4B	E0	CB	E0	6B	E0	F0	6B	*1
80	Home	E0	47	E0	C7	E0	6C	E0	F0	6C	*1
81	End	E0	4F	E0	CF	E0	69	E0	F0	69	*1
83	??	E0	48	E0	C8	E0	75	E0	F0	75	*1
84	??	E0	50	E0	D0	E0	72	E0	F0	72	*1
85	PgUp	E0	49	E0	C9	E0	7D	E0	F0	7D	*1
86	PgDn	E0	51	E0	D1	E0	7A	E0	F0	7A	*1
89	? ? ?	E0	4D	E0	CD	E0	74	E0	F0	74	*1
110	Esc	01		81		76		F0		76	
112	F1	3B		BB		05		F0		05	
113	F2	3C		BC		06		F0		06	
114	F3	3D		BD		04		F0		04	
115	F4	3E		BE		0C		F0		0C	
116	F5	3F		BF		03		F0		03	
117	F6	40		C0		0B		F0		0B	
118	F7	41		C1		83		F0		83	
119	F8	42		C2		0A		F0		0A	
120	F9	43		C3		01		F0		01	
121	F10	44		C4		09		F0		09	*3

Table D-1 Scan codes (set 1 and set 2) (4/4)

Cap No.	Keytop	Code set 1 Make		Code set 1 Break		Code set 2 Make		Code set 2 Break			Note
122	F11	57		D7		78		F0		78	*3
123	F12	58		D8		7		F0		7	*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	
205	Kat/Hir					70		F0	70		*8
206	Hen					79		F0	79		*8
207	Muh					7B		F0	7B		*8

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.
8.   *   205~207 are for JAPAN keyboard only

Table D-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1								Code set 2								
		Make				Break				Make					Break			
55	/	E0	AA	E0	35	E0	B5	E0	2A	E0	F0	12	E0	4A	E0	F0	4A	E0	12
75	INS	E0	AA	E0	52	E0	D2	E0	2A	E0	F0	12	E0	70	E0	F0	70	E0	12
76	DEL	E0	AA	E0	53	E0	D3	E0	2A	E0	F0	12	E0	71	E0	F0	71	E0	12
79	? ?	E0	AA	E0	4B	E0	CB	E0	2A	E0	F0	12	E0	6B	E0	F0	6B	E0	12
80	Home	E0	AA	E0	47	E0	C7	E0	2A	E0	F0	12	E0	6C	E0	F0	6C	E0	12
81	End	E0	AA	E0	4F	E0	CF	E0	2A	E0	F0	12	E0	69	E0	F0	69	E0	12
83	??	E0	AA	E0	48	E0	C8	E0	2A	E0	F0	12	E0	75	E0	F0	75	E0	12
84	??	E0	AA	E0	50	E0	D0	E0	2A	E0	F0	12	E0	72	E0	F0	72	E0	12
85	PgUp	E0	AA	E0	49	E0	C9	E0	2A	E0	F0	12	E0	7D	E0	F0	7D	E0	12
86	PgDn	E0	AA	E0	51	E0	D1	E0	2A	E0	F0	12	E0	7A	E0	F0	7A	E0	12
89	? ?	E0	AA	E0	4D	E0	CD	E0	2A	E0	F0	12	E0	74	E0	F0	74	E0	12
203	Win	E0	AA	E0	5B	E0	DB	E0	2A	E0	F0	12	E0	1F	E0	F0	1F	E0	12
204	App	E0	AA	E0	5D	E0	DD	E0	2A	E0	F0	12	E0	2F	E0	F0	2F	E0	12

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

	With left **Shift**	With right **Shift**
Set 1	E0 AA _____	E0 B6
	E0 2A _____	E0 36
Set 2	E0 F0 12 _____	E0 F0 59
	E0 12 _____	E0 59

Table D-3 Scan codes in Numlock mode

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

Table D-4 Scan codes with Fn key

Cap No.	Keytop	Code set 1				Code set 2				
		Make		Break		Make		Break		
43	ENT	E0	1C	E0	9C	E0	5A	E0	F0	5A
58	CTRL	E0	1D	E0	9D	E0	14	E0	F0	14
60	LALT	E0	38	E0	B8	E0	11	E0	F0	11
121	ARROW	45		C5		77		F0	77	
122	NUMERIC	45		C5		77		F0	77	
123	Scrl	46		C5		7E		F0	7E	

Table D-5 Scan codes in overlay mode

Cap No.	Keytop		Code set 1		Code set 2		
			Make	Break	Make	Break	
08	7	(7)	47	C7	6C	F0	6C
09	8	(8)	48	C8	75	F0	75
10	9	(9)	49	C9	7D	F0	7D
11	0	(*)	37	B7	7C	F0	7C
23	U	(4)	4B	CB	6B	F0	6B
24	I	(5)	4C	CC	73	F0	73
25	O	(6)	4D	CD	74	F0	74
26	P	(–)	4A	CA	7B	F0	7B
37	J	(1)	4F	CF	69	F0	69
38	K	(2)	50	D0	72	F0	72
39	L	(3)	51	D1	7A	F0	7A
40	;	(+)	4E	CE	79	F0	79
52	M	(0)	52	D2	70	F0	70
54	.	(.)	53	D3	71	F0	71
55	/	(/)	E0 35	E0 B5	40 4A	E0 F0 4A	

Table D-6 No.124 key scan code

Key top	Shift	Code set 1				Code set 2				
		Make		Break		Make		Break		
Prt Sc	Common	E0 2A E0 37		E0 B7 E0 AA		E0 12 E0 7C		E0 F0 7C E0 F0 12		
	Ctrl ?	E0 37		E0 B7		E0 7C		E0 F0 7C		
	Shift ?	E0 37		E0 B7		E0 7C		E0 F0 7C		
	Alt ?	54		D4		84		F0 B4		

Table D-7 No.126 key scan code

Key top	Shift	Code set 1						Code set 2						
		Make						**Make**						
Pause	Common*	E1	1D	45	E1	9D	C5	E1	14	77	E1	F0	14	F0	77
	Ctrl*	E0	46	E0	C6			E0	7E	E0	F0	7E		

*: This key generates only make codes.

Appendix E　　Key Layout

E.1　　United States (US) Keyboard

Figure E-1 US keyboard

E.2　　Japan (JP) Keyboard

Figure E-2 JP keyboard

E.3   Spanish (SP) Keyboard

Figure E-3 SP keyboard

E.4   Korean (KR) Keyboard

Figure E-4 KR keyboard

E.5   Canadian-French (CF) Keyboard

Figure E-5 CF keyboard

E.6   French (FR) Keyboard

Figure E-6 FR keyboard

E.7   German (GR) Keyboard

Figure E-7 GR keyboard

E.8   Italian (IT) Keyboard

Figure E-8 IT keyboard

E.9 Taiwan (TC) Keyboard

Figure E-9 TC keyboard

E.10 Portuguese (PT) Keyboard

Figure E-11 PT keyboard

E.11 DU, UE, US International (USE) Keyboard

Figure E-12 USE keyboard

E.12 Arabic (AR) Keyboard

Figure E-13 AR keyboard

E.13 Belgian (BE) Keyboard

Figure E-14 BE keyboard

E.14 Russian (RU) Keyboard

Figure E-15 RU keyboard

E.15 Swiss/Switzerland (SL) Keyboard

Figure E-16 SL keyboard

E.16 Swedish (SW) Keyboard

Figure E-17 SW keyboard

E.17 Norwegian (NO) Keyboard

Figure E-18 NO keyboard

E.18 Danish (DK) Keyboard

Figure E-19 DK keyboard

E.19 Turkey (TR) Keyboard

Figure E-18 TR keyboard

E.20 Greek (GK) Keyboard

Figure E-19 GK keyboard

E.21 Estonia (ES) Keyboard
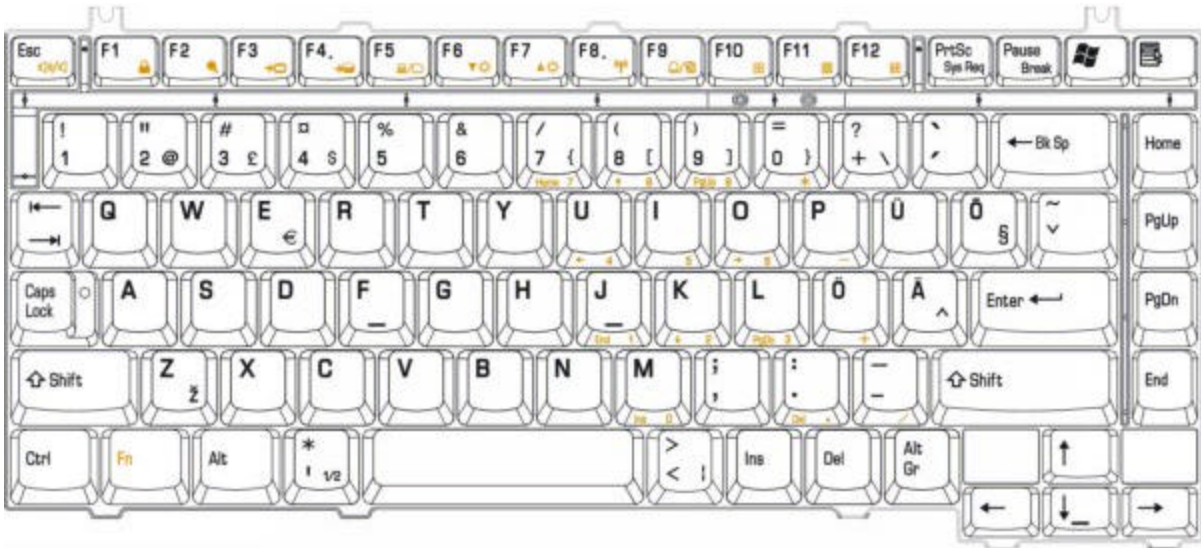
Figure E-19 ES keyboard

E.22 Herbrew (HE) Keyboard

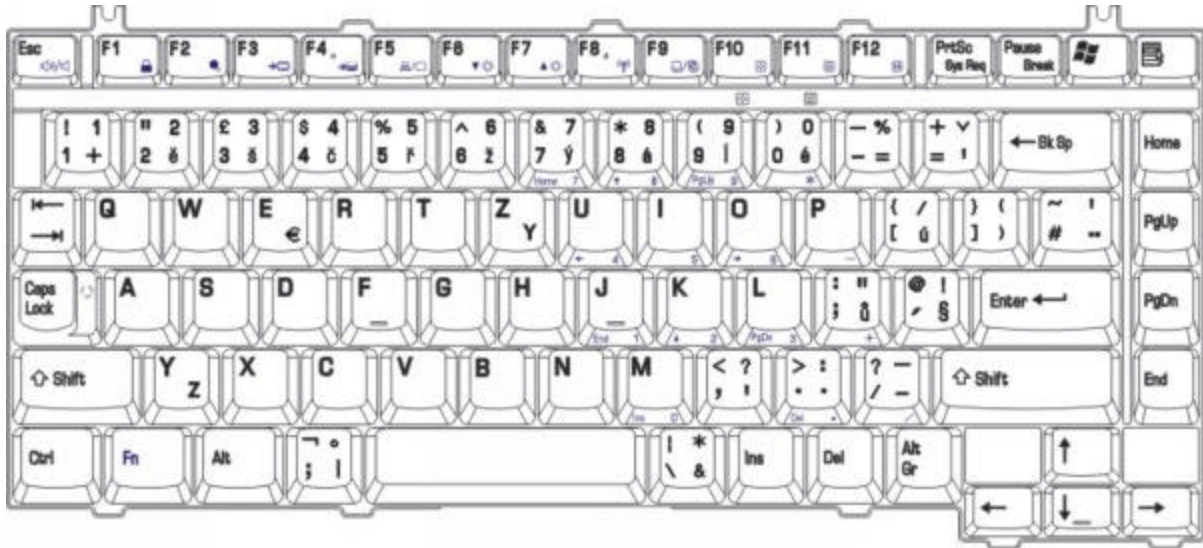*Figure E-19 HE keyboard*

E.23 Czech (CZ) Keyboard

Figure E-18 CZ keyboard

E.24 Lithuanian (LI) Keyboard

Figure E-18 LI keyboard

E.25 Hungary (HU) Keyboard

Figure E-18 HU keyboard

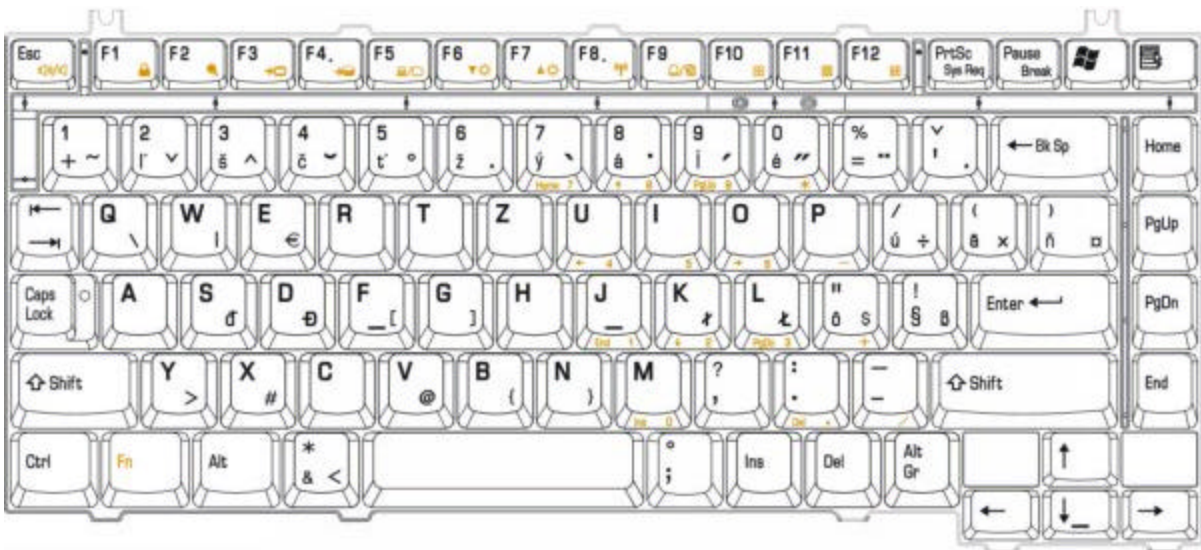## E.26 Slovakia (SA) Keyboard

Figure E-18 SA keyboard
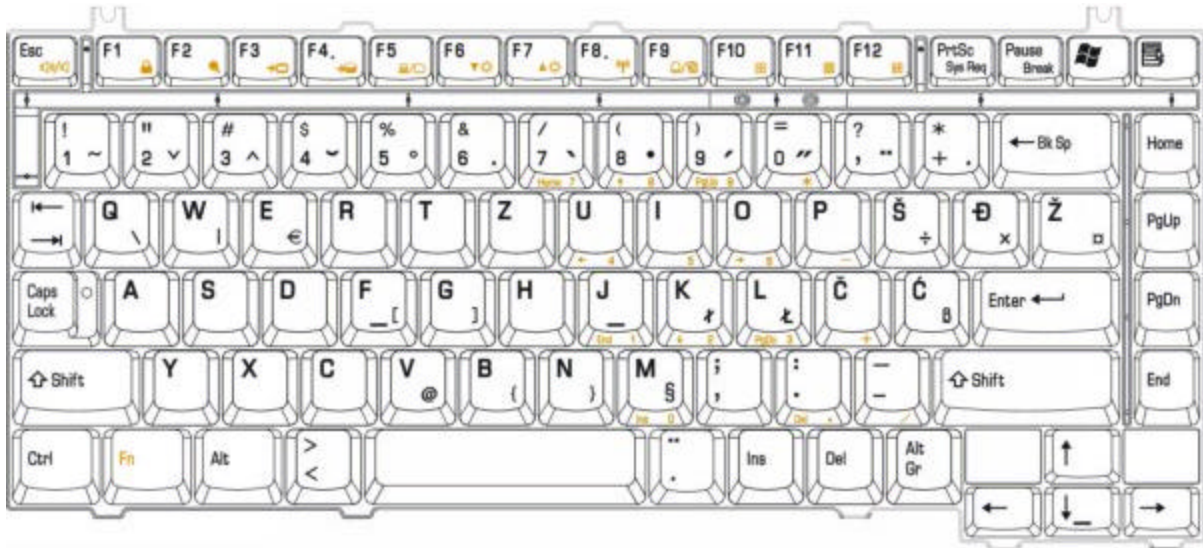
E.27 Yugoslavia (YU) Keyboard

Figure E-19 YU keyboard

Appendix F   BIOS Rewrite Procedures

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

Tools

To rewrite the BIOS, you need the following tool:

  ☺ BIOS/EC/KBC rewriting disk for the computer that has renewed BIOS data.

Rewriting the BIOS

1. Set the system to boot mode.

2. Turn off the power to the computer.

3. Remove the external cable and PC card.

4. Connect an 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.

Appendix G   EC/KBC Rewrite Procedures

This Appendix explains how to rewrite the EC/KBC system program when you update the EC/KBC system.

Tools

To rewrite the EC/KBC, you need the following tool:

     ? BIOS/EC/KBC rewriting disk for the computer

Rewriting the EC/KBC

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.

Note: 1. *Rewrite the EC/KBS only when instructed by a diagnostic disk release* ***1***
            notice.

            2. *Connect the AC adapter to the computer when you rewrite the EC/KBC.*

            3. *Do not turn off the power while you are rewriting the EC/KBC. If the*
            rewrite fails, it might be impossible to start up the computer.

            4. *If you fail to rewrite EC/KBC, then when you next turn on the power, a*
            message may be displayed that the contents of the EC/KBC have been
            erased. In this case, insert the BIOS/EC/KBC rewriting disk, and the
            EC/KBC will be rewritten.

            5. *Normally it takes about 30 seconds to rewrite the EC/KBC. It may take 3*
            minutes (maximum), depending on the conditions of the computer or ICs.
            The computer is not hung up. Allow sufficient time. Never reboot or turn
            off the power to the computer before the rewriting is completed.