Toshiba Personal Computer

Satellite M50

Maintenance Manual

TOSHIBA CORPORATION

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Toshiba Personal Computer Satellite M50 Maintenance Manual

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite M50, referred to as the Satellite M50 Series 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 or RTC battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

The manual is divided into the following parts:

Chapter 1 Hardware Overview describes the Satellite M50 Series system unit and each FRU.

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

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

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

Appendices The appendices describe the following:

❑ Handling the LCD module
❑ Board layout
❑ Pin assignments
❑ Keyboard scan/character codes
❑ Key layout
❑ Screw torque list
❑ Reliability

Conventions

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

Acronyms

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

Read Only Memory (ROM)

Keys

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

Key operation

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

User input

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

DISKCOPY A: B:

The display

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

```
Format complete
System transferred
```

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Chapter 1

Hardware Overview

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1.1 Features

The Satellite M50 Series Personal Computer uses extensive Large Scale Integration (LSI), and Complementary Metal-Oxide Semiconductor (CMOS) technology extensively to provide compact size, minimum weight and high reliability. This computer incorporates the following features and benefits:

❑ CPU

- Intel Pentium-M Dothan 1.6GHz, 1.73GHz, 1.86GHz, 2.0GHz, 2.13GHz
- Intel Celeron-M Dothan 1.3GHz, 1.4GHz, and 1.5GHz
- FCPGA CPU

❑ Chipset

- Intel 915PM/915GM/910GML chipset for system memory controller
- ATI MOBILITY RADEON X600SE GPU, HyperMemory (Built-in controller depends on the model you purchased)
- Intel ICH6-M for PCI to LPC bridge, PCI IDE controller, Power Management Logic
- ENE KB910 B4 for keyboard controller, Battery Management Unit, and RTC
- Marvell 88E8053 GIGA LAN controller
- Marvell 88E8036 10/100 LAN controller
- Marvell 88SA8040 for SATA to PATA bridge
- LPC47N207 Super IO IC for FIR
- LPC47N217 Super IO IC for Printer port
- ALC250_D for AC97 Codec
- TI PCI7411/PCI6411/PCI14510RGVF/PCI1510RGVF for PCMCIA controller
- TI PCI7411/PCI14510RGVF for 1394 controller
- TI PCI7411 for 5-in-1 card reader controller

❑ Display

- 14" (15:9) TFT screen with a resolution of 1280 horizontal x 768 vertical pixels, non-CSV normal brightness, WXGA
- 14" (15:9) TFT screen with a resolution of 1280 horizontal x 768 vertical pixels, CSV normal brightness, WXGA
- 14" (15:9) TFT screen with a resolution of 1280 horizontal x 768 vertical pixels, CSV high brightness, WXGA

❑ Memory

- DDR-I 333MHz specification compliant
- Two 200-pin (Jedec Standard) +2.5V SO-DIMM DDR sockets with 256MB/512MB/1GB DDR module
- Maximum upgradeable to 2GB by two 1GB SO-DIMM module

❑ BIOS

- 1MB Flash ROM for system BIOS
- Suspend to RAM/Disk
- Password protection (System)
- Windows 98 ready with PnP
- Various hot keys for system control
- Refreshable
- Complete ACPI 1.0B function

❑ Power

- 6 cells of Li-Ion 18650 size, smart battery pack with 4300mAH x 10.8V
- 12 cells of Li-Ion 18650 size smart battery pack with 8600mAH x 10.8V
- 4 hours charging time to 100% capacity on 4300mAH Li-Ion battery (System off or Suspend)
- 4 hours charging time to 100% capacity on 8600mAH Li-Ion battery (System off or Suspend)

❑ HDD

- 9.5mm, 2.5" HDD up to 120 GB
- Bus Master IDE
- 9.5m/m, 2.5"HDD Support
- Support Ultra 100 synchronous DMA

❑ Fixed Device Drivers

- 5.25" 12.7mm height, DVD-ROM & CD-RW combo device
- 5.25" 12.7mm height, DVD-ROM device
- 5.25" 12.7mm height, DVD Super-multi device

❑ Optional Devices

- 128MB/256MB/512MB/1024MB SO-DIMM DDR modules

- VGA controller M24C with 64MB/128MB VRAM

- MINI PCI wireless module (802.11g: Atheros MB43/MB51, Intel Calexico2; 802.11a/g: Atheros MB44, Intel Calexico2)

- Dual-band built-in antenna for wireless LAN communication

- MDC Modem

- Mini PCI module (Analog TV tuner)

- External USB remote control devices

❑ Keyboard
The computer's keyboard layouts are compatible with a 101/102-key enhanced keyboard. There are five types of keys: typewriter keys, keypad overlay, function keys, soft keys and cursor control keys. The typewriter keys and keypad overlay keys are gray. The other keys are dark gray.

❑ Touch Pad
This pointing control device, located in the center of the keyboard palm-rest, provides convenient control of the cursor without requiring desk space for a mouse. The Touch Pad incorporates two mouse (left and right) buttons for universal usage.

❑ I/O Ports
- Four USB (V2.) ports
- One DDC2b compliant 15-pin VGA port
- One S-Video port
- One microphone/mono-in port
- One headphone-out jack
- VR volume control
- Wireless communication switch
- FIR
- One DC-in jack
- One RJ-11 jack for 56kbps V.90/V.92 modem
- One RJ-45 jack with LED indicator
- Kensington lock
- One IEEE 1394 port
- One 5-in-1 push-push type flash card connector
- One type II PCMCIA slot with shutter door
- One infrared (IrDA 1.1) port
- One TV out video port (4-pin), compatible with PAL or NTSC TV standard

❏ PCMCIA Card Organization
- One type II card socket
- SRAM, OTPROM, FLASH ROM, mask ROM memory card up to 64MB
- Modem/LAN card
- CardBus card
- ACPI 1.0B compliant
- Supports SD/MMC/MS/MS Pro/xD formats
- High speed SD support
- SD-IO supported
- 1.8" 10.5mm removable ATA device
- CardBus card or PC card with hot insertion and removal
- Support 5V/3.3V PC Cards and 3.3V Cardbus cards
- Supports PCMCIA-ATA Specification

❏ Multiple Digital Media Card Slot
- TI PCI4510R Card Bus PCMCIA control or TI PCI7411 Card Bus PCMCIA control
- Supports xD, SD, MS, MS Pro and MMC

❏ Universal Serial Bus (USB)
The computer has four Universal Serial Bus (USB) ports that comply with the USB 2.0 standard, which enable data transfer speeds more than 40 times faster than USB 1.1 (which this computer also supports.) The USB drives may be used to transfer data at low, full, and high speeds.

❏ External monitor port
A 15-pin CRT port supporting DDC 2B enables connection of an external monitor, which is recognized automatically by Video Electronics Standards Association (VESA) Display Data Channel (DDC) compatible functions.

❏ Sound system
Windows® compatible sound system provides internal speakers as well as jacks for an external microphone and headphone.

❏ LAN port
The computer comes with an RJ-45 Local Area Network (LAN) port. The LAN port provides connectivity for LAN.

❏ Switches
- Power button
- Presto or Vivace from power off, WMP9 (programmable) on Windows

- Internet Explorer (programmable)
- Play/Pause
- Stop
- Fast forward
- Fast rewind

❑ Excellent power management function

- Standby mode, Suspend to RAM or Suspend to disk mode, using time out or hot key
- HDD local standby mode by time out
- LCD local standby mode by time out
- Low battery alarm by beep
- Auto-backlight off when LCD cover closed
- Full ACPI 1.0B supported
- LCD auto-dim mode by time out

1.2   System Unit

The system unit is composed of the following major components:

❑ Processor (depending on the model you purchased)
- Mobile Intel® Celeron® M Processor 350J/360J/370 or
- Intel® Pentium® M Processor 725A/730/740/750/760/770

❑ System Logic
- Intel 915PM/915GM and 910GML host bridge/controller processor with host bus support
- Integrated DRAM controller
- Integrated VGA controller
- Intel ICH6-M for PCI to LPC Bridge, PCI IDE controller, Power Management Logic.
- PCI bus interface
- Power management functions
- Supports DMI

❑ Keyboard Controller
- ENE KB910 B4 is used for keyboard controller, battery management unit, and RTC.

❑ Memory
- System DRAM
- Two JEDEC standard 200-pin, 2.5V DDR I SO-DIMM memory support for 256MB/512MB/1024MB/2048MB.
- ROM BIOS for system
- 1MB Flash ROM
- Slot: 2 SO-DIMM up to 1GB can be upgraded through memory expansion slot. You need to remove existing SO-DIMM if SO-DIMM is installed in memory expansion slot. Maximum upgradeable system memory depends on the model.
- Cache: 1MB L2 Cache (Intel® Celeron® M Processor), 2MB L2 Cache (Intel® Pentium® M Processor)
- Video RAM: Depending on the model. Up to128 MB integrated solution and shared with main memory for Intel® 915GM/ 910GML Express External 64/128MB VGA DDR RAM for ATI MOBILITY™ RADEON® X300/X600/X600SE GPU with HyperMemory

❑ Audio subsystem

- Realtek ALC250D for AC97 codec

    – AC 97 2.2 compatible

    – Leading mixed-digital technology

    – 20-bit stereo digital-to-analog converters

    – 18-bit stereo analog-to-digital converters

    – Sample rate converters.

    – Four analog line-level stereo inputs for LIN_IN, CD, VIDEO, and AUX

    – Two analog line-level mono inputs for modem and internal PC beep

    – Dual stereo line-level outputs for LINE_OUT and ALT_LINE _OUT

    – Dual microphone inputs

    – High quality differential CD input

    – Extensive power management support

    – Meets or exceeds the Microsoft® PC 99/2001 Audio & WHQL/QLP 2.0 audio

    – Built-in 7-band digital hardware equalizer for optimizing speaker response

    – Single chip with high S/N ratio (>100dB)

    – Support of S/PDIF digital audio output is fully compliant with AC 97 2.2 specifications

    – 3D stereo enhancement

    – Supports double sampling rate (96KHz) of DVD audio playback

1.3 2.5-inch Hard Disk Drive

The internal HDD is a random access non-volatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-Winchester type magnetic heads. The computer supports up to100G HDD. 120GB is design ready.

The HDD is shown in Figure 1-1. Specifications are listed in Table 1-1.
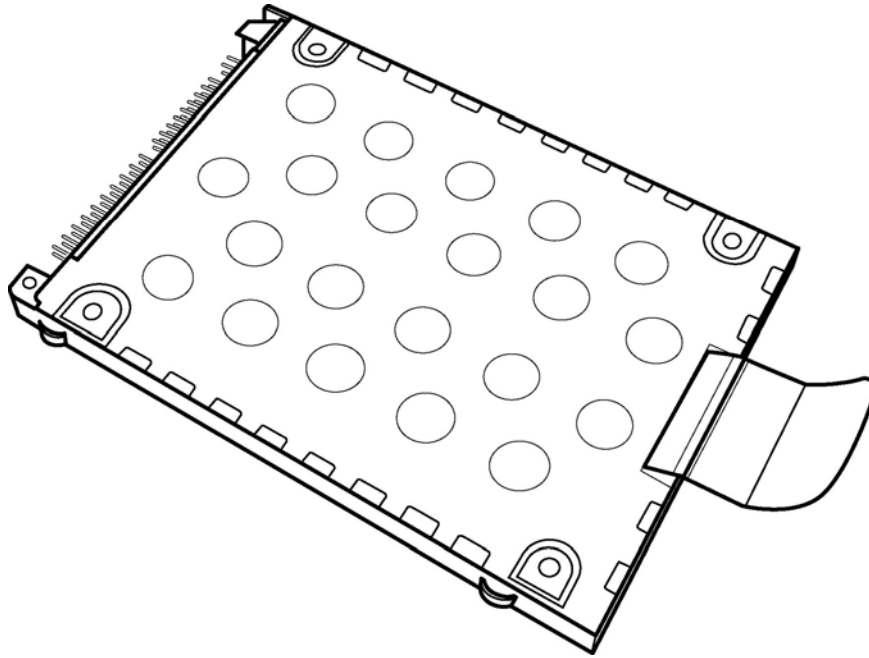
Figure 1-1   2.5-inch HDD

Items	40GB	60GB	80GB	100GB
Formatted capacity (GB)	37.26	55.89	74.52	93.15
Logical Blocks (LBA)	78,125,000	117,187,500	156,301,488	195,371,568
Rotational speed (rpm)	4,200/5400	4,200/5400	4200/5400	4200/5400
Toshiba HDD Buffer (MB)	8/16	8/16	8/16	8/16
Hitachi HDD Buffer (MB)	2/8	8/8	8/8	NA/8
Bytes per sector	512	512	512	512

Table 1-1   2.5-inch HDD specifications

1.4   Optical device Drives

1.4.1 DVD-ROM & CD-RW

The DVD-ROM and CD-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 24x speed and CD-RW at 4x speed or High speed CD-RW at 10X or Ultra speed CD-RW at 24X speed.

The specifications of the DVD-ROM & CD-RW drive are listed in Table 1-2.

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)	2MB	
Formats supported	DVD: DVD-VIDEO, DVD-ROM, DVD-R (3.9G, 4.7G), DVD-RW (Ver.1.1), DVD-RAM, DVD+R, DVD+RW, DVD+R DL. CD: CD-DA, CD-ROM, CD-R, CD-RW, CD-ROMXA, PhotoCD (multi-session), Video CD, CD-Extra (CD+), CD-Text	

Table 1-2   DVD-ROM & CD-RW drive specifications

1.4.2 DVD-ROM

The 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, and read CD-ROM at 24x speed.

The specifications of the DVD-ROM drive are listed in Table 1-3

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)	256 KB	
Formats supported	DVD: DVD-VIDEO, DVD-ROM, DVD-R (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 (multi-session), Video CD, CD-Extra (CD+), CD-Text	

Table 1-3   DVD-ROM drive specifications

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1.4.3 DVD Super Multi Double Layer

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 24x speed and CD-RW at 4x speed or Ultra and High speed CD-RW at 10x speed and DVD-R at 8x speed and DVD-RW at 4x speed and DVD+R at 8x speed and DVD+RW at 4x speed and DVD-RAM at 5x speed and DVD+R DL at 2.4x speed.

The specifications of the DVD Super Multi Double Layer drive are listed in Table 1-4

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)	2MB	
Formats supported	DVD: DVD-VIDEO, DVD-ROM, DVD-R (4.7G), DVD-RW (Ver.1.1), DVD-RAM, DVD+R, DVD+RW, DVD+R DL. CD: CD-DA, CD-ROM, CD-R, CD-RW, CD-ROMXA, PhotoCD (multi-session), Video CD, CD-Extra (CD+), CD-Text	

Table 1-4   DVD Super Multi Double Layer drive specifications

1.5 Power Supply

This specification defines the performance and characteristics of the 75W AC adapter power supply. It supplies a constant voltage 15V output source for Satellite M50 series notebook computer.

❑ A/D conversion

- The EC uses 10-bit sampling for A/D conversion to determine the following values:
  - AC adaptor current
  - Battery and temperature

❑ AC adaptor and battery check

- The EC checks the following by A/D converted values:
  - Battery installed
- The EC checks the following by GPIO values:
  - AC adaptor connected

❑ Abnormal check

- The EC determines whether the condition is abnormal, and if so, stores an error code into the error register.

❑ Input port management

- The EC monitors the following input signal status:
  - System power ON/OFF status
  - Direct CD power ON/OFF status

❑ Beep and LED control

- Beep is caused by the low battery status.
- The EC controls the following two kinds of LED
  - DC IN LED (one color: green)
- Green: indicates AC adaptor is connected
  - Battery LED (two colors: orange and green)
- Green solid: The battery is fully charged.
- Orange: The computer is quick-charging the battery / the battery is low.

❑ Power ON/OFF sequence

- When power is turned on or off, the EC starts the power on or off sequence.
  - SQ0-4: power ON sequence

     –   SQ5-B: power OFF sequence

❑ Battery charging control

   • The EC controls the following.

     – The quick charging ON/OFF

     – The detection of full charge

❑ Detection of the low battery

   • The EC detects the low battery point by the gas gauge.

     – LB10M: The system will be driven by the battery for 12 more minutes.

     – LB0: The battery won't be able to drive the system after 3 minutes.

     – LB1: The battery can drive the system only during the suspend process.

     – LB2: The battery cannot drive the system.

❑ New battery installation

   • When a new battery is installed, the EC communicates with the E^2PROM in the battery to read information of the newly installed battery.

❑ Battery capacity calculation

   • The EC reads battery remaining and percentage capacity from the battery through SMBus.

1.6 Batteries

The computer has two types of battery:

❑ Main battery pack (18650 size)
❑ RTC battery

The removable main battery pack is the computer's main power source when the AC adaptor is not attached.

The battery specifications are listed in the table below.

Battery name	Material	Output voltage	Capacity
Main battery (6 cell)	Lithium-Ion	10.8V	4300mAh
Main battery (12 cell)	Lithium-Ion	10.8V	8600mAh
RTC battery	Lithium	3.0V	15mAh

1.6.1 Main Battery

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

❑ Quick Battery Charge

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

    The times required for charges are listed in the table below.

Status	Charging time
Normal charge (power on)	12 hours or longer
Quick charge (power off)	About 4 hours

NOTES

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

2. Using quick charge, the power supply microprocessor automatically stops the charge after eight hours regardless of the condition of the battery. Overcharging could cause the battery to explode.

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

        1. The battery becomes fully charged.

        2. The AC adaptor or battery is removed.

        3. The battery or output voltage is abnormal.

        4. The battery temperature is abnormal.

        5. The battery SMBus communication fails.

        6. The battery cell is bad.

❑ Detection of full charge

    A full charge is detected from the battery pack through SMBus when the battery is charging.

1.6.2 RTC battery

The RTC battery provides power to keep the current date, time and other setup information in memory while the computer is turned off. The table below lists the charging time and data preservation period of the RTC battery. The RTC battery is charged by the adaptor or main battery, while the computer is powered on.

Status	Time
Charging Time (power on)	About 24 hours
Data preservation period (full charge)	1 month

Chapter 2

Troubleshooting Procedures

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2.1   Troubleshooting Introduction

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

1. Display	6. TouchPad	11. IEEE 1394 port
2. USB Floppy Drive	7. Speaker	12. Wireless LAN system
3. Keyboard	8. Optical drive	
4. USB ports	9. Modem	
5. TV-out port	10. PCMCIA unit	

The Diagnostics Disk operations are described in Chapter 3. Detailed replacement procedures are given in Chapter 4.

The following tools are necessary for implementing the troubleshooting procedures:

1. Diagnostics Disk (Repair and Sound Repair)
2. Phillips screwdriver (2 mm)
3. 6mm nut driver (for the helix screw nuts on the rear ports for CPU door)
4. 2DD or 2HD formatted work disk for floppy disk drive testing
5. Sycard (PCMCIA test card)
6. Cleaning kit for floppy disk drive troubleshooting
7. Cleaning kit for optical drive troubleshooting
8. Multimeter
9. External monitor
10. USB compatible keyboard
11. Multimedia sound system with line-in and line-out ports
12. Headphones
13. USB test module and USB cable
14. Music CD

2.2 Troubleshooting Flowchart

If you know the location of the malfunction, turn directly to the appropriate section of this chapter. If the problem is unspecified, use the flowchart in Figure 2-1 as a guide for determining which troubleshooting procedures to execute. Before performing any troubleshooting procedures, verify the following:

- Ask the user if a password is registered and, if it is, ask him or her to enter the password.

- Verify with the customer that Toshiba Windows XP is installed on the hard disk. Operating systems that were not preinstalled by Toshiba can cause the computer to malfunction.

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

- Make sure the floppy disk drive, if installed, is empty. If no FDD module is installed, you should use an external FDD to run the diagnostics tests

Figure 2-1 Troubleshooting flowchart (1/2)

A

Does typed characters appear correctly? —No→ Perform the Keyboard Troubleshooting procedures in section 2.6

Yes ↓

Insert the diagnostics disk into the FDD. Then run the diagnostics test program.

Yes ↓

Is the diagnostics test loaded? —No→ Perform the FDD Troubleshooting procedures in section 2.5

Yes ↓

Allow each test to perform automatically

Is an error detected by any of the diagnostics tests? —Yes→ After confirming which diagnostics test has detected an error, perform the appropriate procedure as outlined below.

No ↓

System is normal

End

Figure 2-1 Troubleshooting flowchart (2/2)

If the diagnostics program cannot detect an error, the problem may be intermittent. The test program should be executed several times to isolate the problem. When a problem has been located, perform the appropriate troubleshooting procedures as follows:

1. If an error is detected by the battery test, perform the Power Supply Troubleshooting procedures in Section 2.3.

2. If an error is detected by the display test, perform the Display Troubleshooting procedures in Section 2.4.

3. If an error is detected by the keyboard test, perform the Keyboard Troubleshooting procedures in Section 2.5.

4. If an error is detected by the TouchPad test, perform the TouchPad Troubleshooting procedures in Section 2.9.

5. If an error is detected by the audio test, perform the Speaker Troubleshooting procedures in Section 2.10 and the Optical Drive Troubleshooting Procedures in Section 2.12.

6. If an error is detected by the modem test, perform the Modem Troubleshooting Procedures in Section 2.12.

Other problems that are not covered by the diagnostics program may be discovered by a user.

1. If an error is detected when using an external USB device, perform the External USB Devices Troubleshooting procedures in Section 2.6.

2. If an error is detected when using the TV-out connection, perform the TV-Out Failure Troubleshooting procedures in Section 2.7.

3. If an error is detected when using the speakers, perform the Speaker Troubleshooting procedures in Section 2.10.

4. If an error is detected when using the modem, perform the Modem Troubleshooting procedures in Section 2.12.

5. If an error is detected when using the PCMCIA unit, perform the PCMCIA Troubleshooting procedures in Section 2.13.

6. If an error is detected when using the IEEE1394 device, perform the IEEE1394 device Troubleshooting procedures in Section 2.14.

7. If an error is detected when using the Wireless LAN, perform the Wireless LAN Troubleshooting procedures in Section 2.15.

2.3   Power Supply Troubleshooting

```
                        ┌──────────────┐
                        │    START     │
                        └──────────────┘
                               │
                               ▼
                   ┌───────────────────────┐
                   │ Check Power Supply     │
                   │ Status                 │
                   │ (Procedure 1)          │
                   └───────────────────────┘
                               │
                               ▼
                        ╱──────────╲                    ┌───────────────────────┐
                     ╱ Are the DC-IN and ╲  ── No ──▶    │ Replace adaptor / battery │
                     ╲ Battery LEDs lit? ╱               │ (Procedure 2)          │
                        ╲──────────╱                     └───────────────────────┘
                           Yes │   ◀────────────────────────────────┘
                               ▼
                   ┌───────────────────────┐
                   │ Check power supply     │
                   │ connections            │
                   │ (Procedure 3)          │
                   └───────────────────────┘
                               │
                               ▼
                        ╱──────────╲                    ┌───────────────────────┐
                     ╱  Can you turn the ╲  ── Yes ──▶   │ Run diagnostic program │
                     ╲  computer on?    ╱                │ (Procedure 4)          │
                        ╲──────────╱                     └───────────────────────┘
                            No │   ◀────────────────────────────────┘
                               ▼
                        ╱──────────╲                    ┌───────────────────────┐
                     ╱ Are the internal power ╲ ─ No ─▶ │ Perform internal connection │
                     ╲ connections secure?  ╱           │ check                  │
                        ╲──────────╱                     │ (Procedure 5)          │
                           Yes │   ◀──────────────────── └───────────────────────┘
                               ▼
                   ┌───────────────────────┐
                   │ Replace system board   │
                   └───────────────────────┘
                               │
                               ▼
                        ┌──────────────┐
                        │     END      │
                        └──────────────┘
```
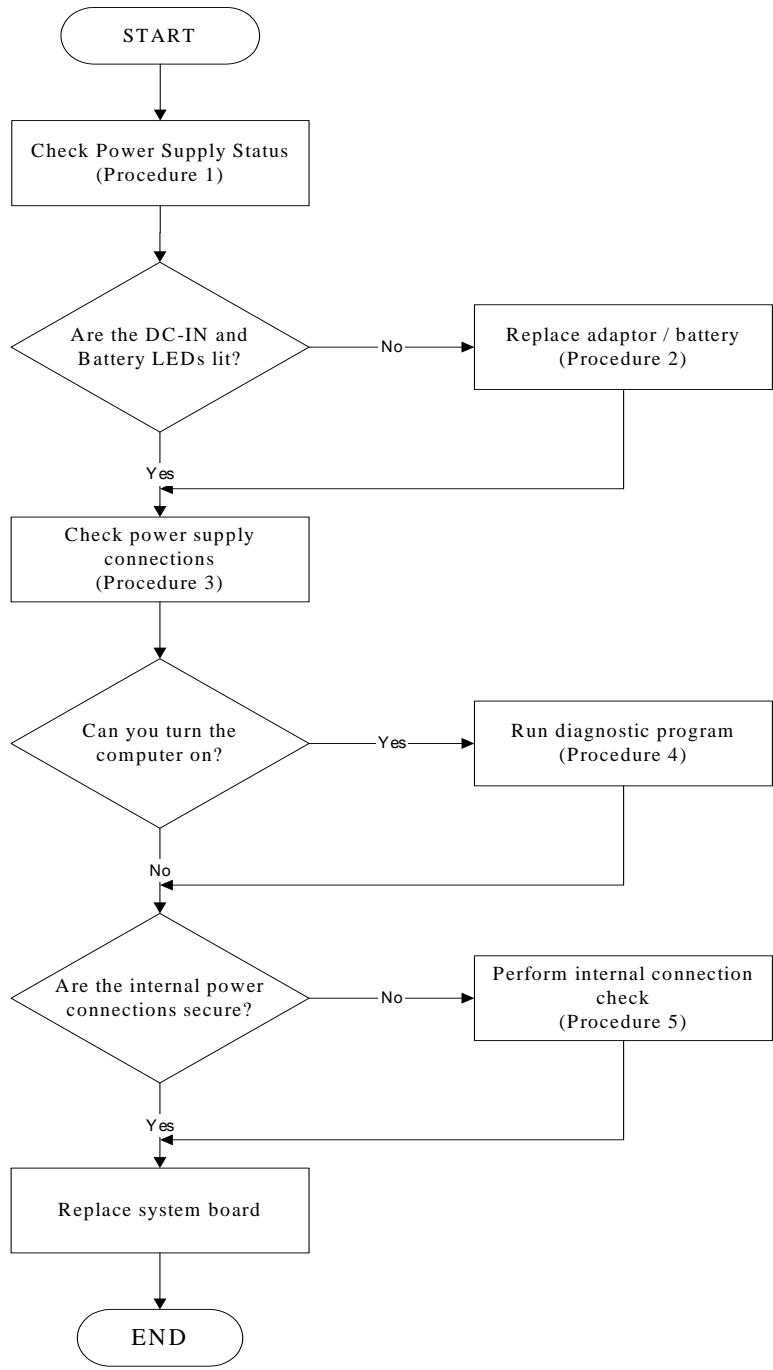
Figure 2-2 Power Supply Troubleshooting Process

The power supply controls many functions and components. To determine if the power supply is functioning properly, start with Procedure 1 and continue with the other Procedures as instructed. The flowchart in Figure 2-2 gives a summary of the process. The procedures described in this section are:

>   Procedure 1:   Power status check
>
>   Procedure 2:   Adaptor / battery replacement
>
>   Procedure 3:   Power supply connection check
>
>   Procedure 4:   Diagnostic check
>
>   Procedure 5:   Internal connection check

Procedure 1   Power Status Check

The following LEDs indicate the power supply status:

    Battery LED

    DC-IN LED

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

Table 2-1 Battery LED

Battery State	LED colors	Definition
Charging	Amber, solid on	Battery charging with AC .
	Green, solid on	Battery fully charged by AC
	Green color off	Battery abnormal stop charging with AC (Bad cell/ Overheated)
Discharging	Amber, blinking (LED on for 1 second every 4 seconds)	Battery within low state: 12 minutes remaining
	Amber, blinking (LED on for 1 second every 2 seconds)	Battery within critical low state: 3 minutes remaining. The system is protected and cannot be re-powered on without the AC power connected.
	Amber color off	Battery not in low or critical low state; It's in discharging state

Table 2-2 DC-IN LED

AC-IN LED	Power supply status
Solid on	AC power exists (LED is solid green).
Off	No AC power exists.

To check the power supply status, install a battery pack and connect an AC adaptor to the DC-IN port on the computer and to a power supply.

If the DC-IN LED or Battery LED is not lit, go to Procedure 2.

Procedure 2   Adaptor / battery replacement

A faulty adaptor may not supply power or may not charge the battery. Perform Check 1.

Check 1   Connect a new AC adaptor. If the problem is not resolved, go to Check 2.

Check 2   Insert a new battery. If the problem is still not resolved, go to Procedure 3.

Procedure 3   Power supply connection check

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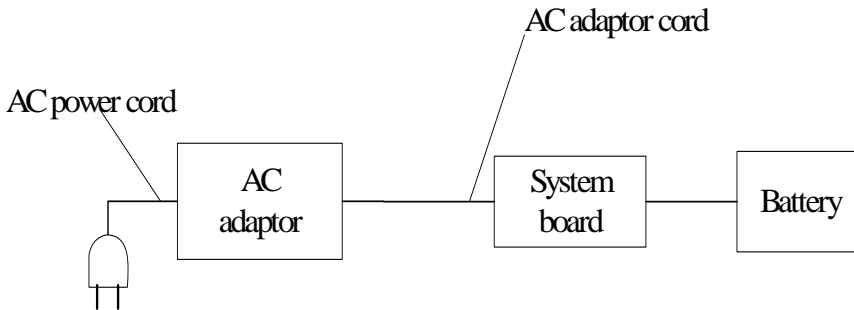
Any of the connectors may be disconnected. Perform Check 1.

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

Check 2   Make sure the AC adaptor cord and AC power cord are firmly plugged into the DC-IN socket, AC adaptor inlet and wall outlet. If these cables are connected correctly, go to Check 3.

Check 3   Make sure that the DC-IN input port socket is firmly secured to the system board of the computer.
   • If the DC-IN input socket is loose, go to Procedure 5.
   • If it is not loose, go to Check 4.

Check 4   Use a multi-meter to make sure that the AC adaptor output voltage is close to 19 V. If the output is several percent lower than 19 V, go to Check 5. If the output is close to 19 V, go to Check 6.

Check 5   Connect a new AC adaptor or AC power cord.
   • If the DC-IN LED does not light, go to Procedure 4.
   • If the battery LED does not light, go to Check 6.

Check 6   Make sure the battery pack is installed in the computer correctly. If the battery is properly installed and the battery LED still does not light, go to Procedure 4.

Procedure 4   Diagnostic check

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

1. Reinstall the battery pack.

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

3. Run the Diagnostic test following the procedures described in Chapter 3, Tests and Diagnostics. If no problem is detected, the battery is functioning normally.

Procedure 5   Replacement check

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

Check 1   Use a multi-meter to make sure that the fuses on the system board are not blown. If a fuse is not blown, go to Check 2. If a fuse is blown, go to Check 3.

Check 2   Make sure that the battery cable is firmly connected to the system board. If it is connected firmly, go to Check 3.

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

2.4 Display Troubleshooting
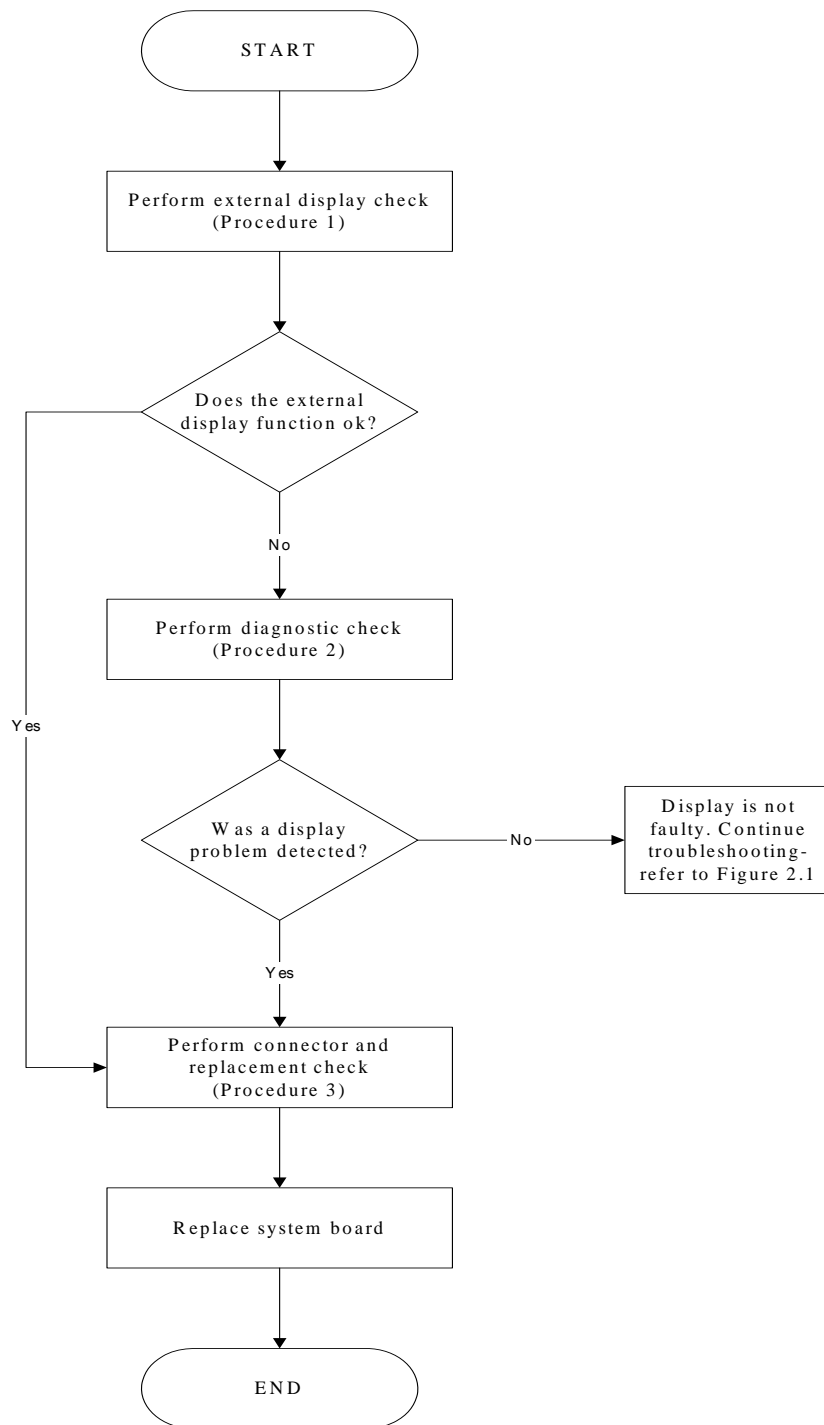
Figure 2-3 Display troubleshooting process

This section describes how to determine if the computer's display is functioning properly. The process is outlined in Figure 2-3. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1:   External display check

Procedure 2:   Diagnostic check

Procedure 3:   Connector and replacement check

Procedure 1   External display check

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

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

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

Procedure 2   Diagnostic check

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

If an error is detected, go to Procedure 3. If an error is not detected, the display is functioning properly.

Procedure 3   Connector and replacement check

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

Check 1   Make sure the DDR RAM module is seated properly. Test display again. If the problem still exits, replace the DDR RAM module. If the problem still exists, perform Check 2.

Check 2   Replace the FL inverter board with a new one and test display again. If the problem still exists, perform Check 3.

Check 3   Replace the LCD module with a new one and test display again. If the problem still exists, perform Check 4.

Check 4   Replace the LCD/FL cable with a new one and test display again. If the problem still exists, perform Check 5.

Check 5   Replace the CPU with another of the same specifications. If the problem still exists, perform Check 6.

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

2.5 Keyboard Troubleshooting


```
                    ┌──────────────┐
                    │    START     │
                    └──────────────┘
                           │
                           ▼
              ┌─────────────────────────────┐
              │ Perform external keyboard check │
              │       (Procedure 1)          │
              └─────────────────────────────┘
                           │
                           ▼
                    Does the external
                    keyboard function ok?
                           │ Yes
                           ▼
              ┌─────────────────────────────┐
              │  Perform diagnostic check    │
              │       (Procedure 2)          │
              └─────────────────────────────┘
                           │
                           ▼
                    Was a keyboard           No ──► Keyboard is not
                    problem detected?               faulty. Continue
                           │ Yes                    troubleshooting-
                           ▼                        refer to Figure 2.1
              ┌─────────────────────────────┐
              │  Perform connector and       │
              │  replacement check           │
              │       (Procedure 3)          │
              └─────────────────────────────┘
                           │
                           ▼
              ┌─────────────────────────────┐
              │    Replace system board      │
              └─────────────────────────────┘
                           │
                           ▼
                    ┌──────────────┐
                    │     END      │
                    └──────────────┘

      No branch (from "Does the external keyboard function ok?")
      leads to "Perform connector and replacement check (Procedure 3)"
```
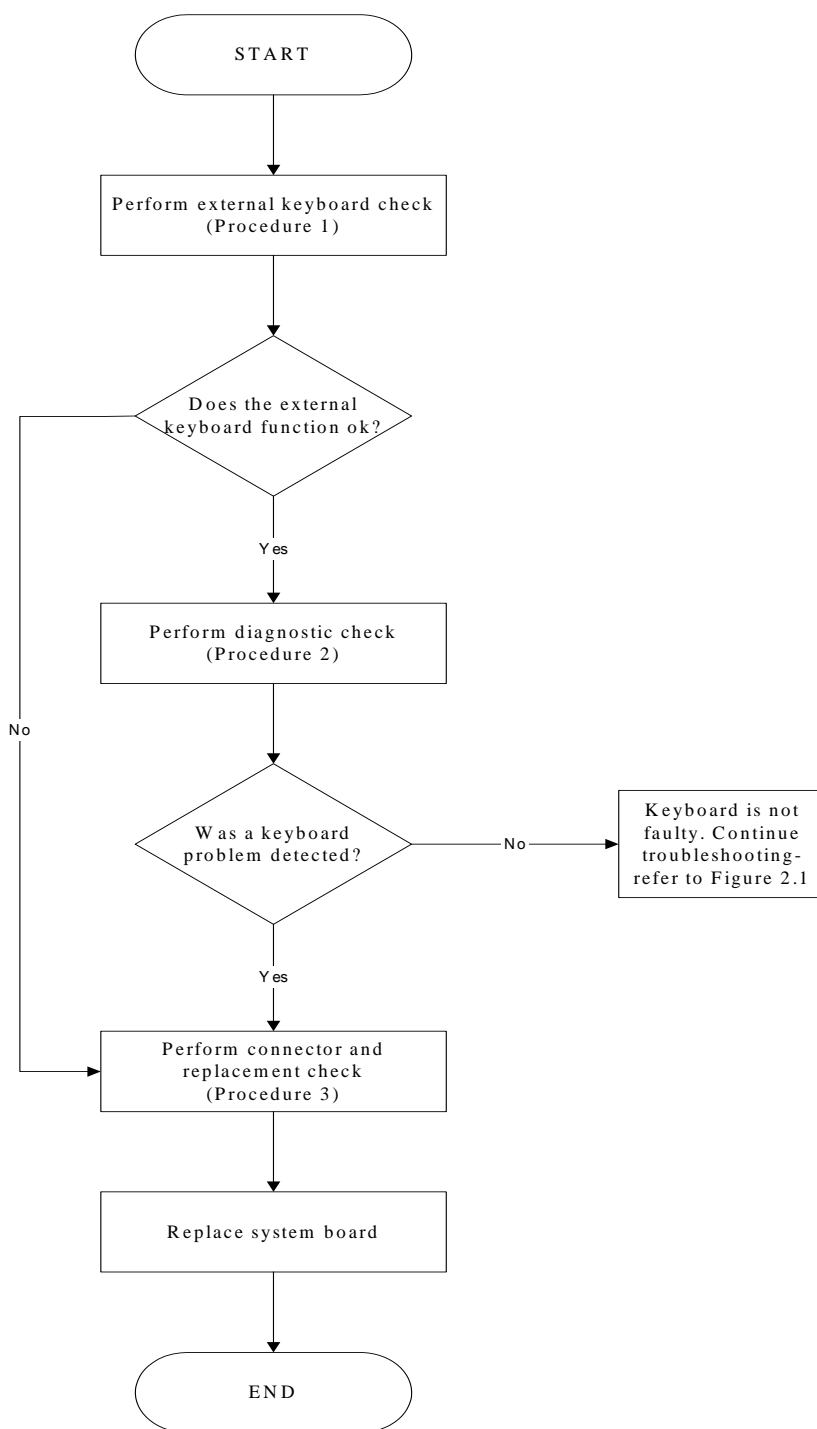
Figure 2-4 Keyboard troubleshooting process

To determine if the computer's keyboard is functioning properly, perform the following procedures. Figure 2-5 outlines the process. Start with Procedure 1 and continue with the other procedures as instructed.

> Procedure 1: External keyboard check
>
> Procedure 2: Diagnostic check
>
> Procedure 3: Connector and replacement check

Procedure 1   External keyboard check

Connect a USB keyboard to one of the computer's USB ports, then boot the computer. The computer automatically detects the external keyboard.

If the external keyboard works correctly, the internal keyboard or its connections may be faulty. Go to Procedure 2.

If the external keyboard appears to have the same problem as the internal keyboard, the system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

Procedure 2   Diagnostic check

Run the Diagnostic Program, which will automatically execute the Keyboard Test. Refer to Chapter 3, *Tests and Diagnostics* for more information on how to run the program.

If an error is located, go to Procedure 3. If an error does not occur, the keyboard is functioning properly.

Procedure 3   Connector and replacement check

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

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

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

Check 2   The keyboard may be damaged. Replace it with a new one following the instructions in Chapter 4.

     If the problem still exists, perform Check 3.

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

2.6   External USB Devices Troubleshooting

```
                          ┌─────────────┐
                          │    START    │
                          └─────────────┘
                                 │
                                 ▼
                  ┌──────────────────────────────┐
                  │   Perform external device and │
                  │      connection check         │
                  │        (Procedure 1)          │
                  └──────────────────────────────┘
                                 │
                                 ▼
  ┌──────────────┐        ╱───────────────╲
  │ Check USB port│◄─Yes─ ╱  Does the device  ╲
  │  connection   │       ╲ function when       ╱
  └──────────────┘        ╲ connected to a      ╱
                          ╲ different USB port? ╱
                           ╲─────────────────╱
                                 │
                                No
                                 │
                                 ▼
                          ╱───────────────╲          ┌──────────────┐
                         ╱ Does an alternative╲─Yes─►│  Original USB │
                         ╲ USB device function ╱      │ device is faulty│
                         ╲     correctly?      ╱      └──────────────┘
                          ╲─────────────────╱
                                 │
                                No
                                 │
                                 ▼
                  ┌──────────────────────────────┐
                  │     Replace system board      │
                  │        (Procedure 2)          │
                  └──────────────────────────────┘
                                 │
                                 ▼
                          ┌─────────────┐
                          │     END     │
                          └─────────────┘
```
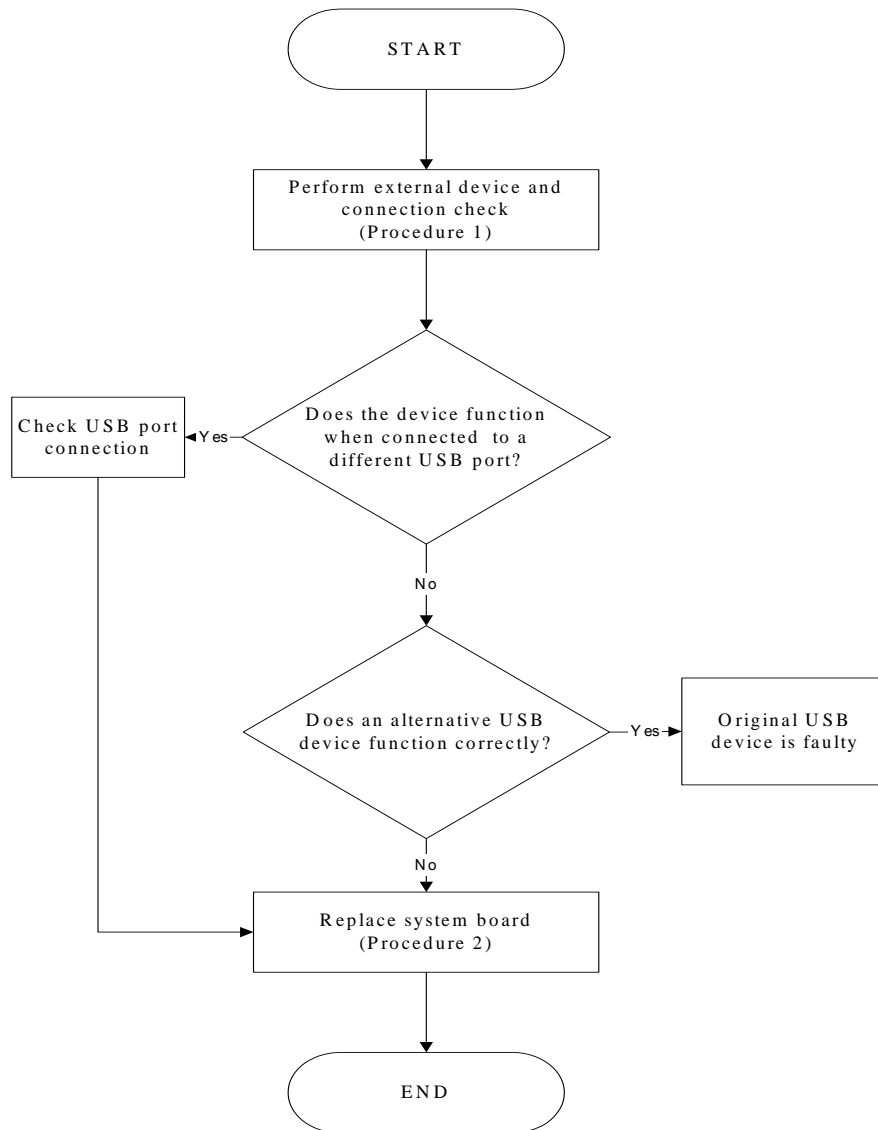
Figure 2-5 External USB device troubleshooting process

To determine if the computer's external USB devices are functioning properly, perform the following procedures. Figure 2-6 outlines the process. Start with Procedure 1 and continue as instructed.

Procedure 1:   External device and connection check

Procedure 2:   Replace system board

Procedure 1   External device and connection check

The USB device may be damaged or the connection may be faulty. Perform Check 1.

Check 1   Make sure USB device cable is firmly plugged into one of the USB sockets. If the cable is connected correctly, go to Check 2.

Check 2   Plug the USB device into another USB socket (there are three in all). If the USB device still does not work, go to Check 4.

If the device functions correctly when connected to another USB port, go to Check 3.

Check 3   Make sure that the USB socket is firmly secured to the system board of the computer. If the malfunction remains, the system board may be damaged. Go to Procedure 2.

Check 4   Connect an alternative USB device to one of the computer's USB ports, and then boot the computer. The computer automatically detects the external device.

If the alternative USB device works correctly, the original device may be damaged and should be replaced.

If the alternative USB device appears to have the same problem as the original device, the system board may be damaged. Go to Procedure 2.

Procedure 2   Replace system board

If the error persists, the system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

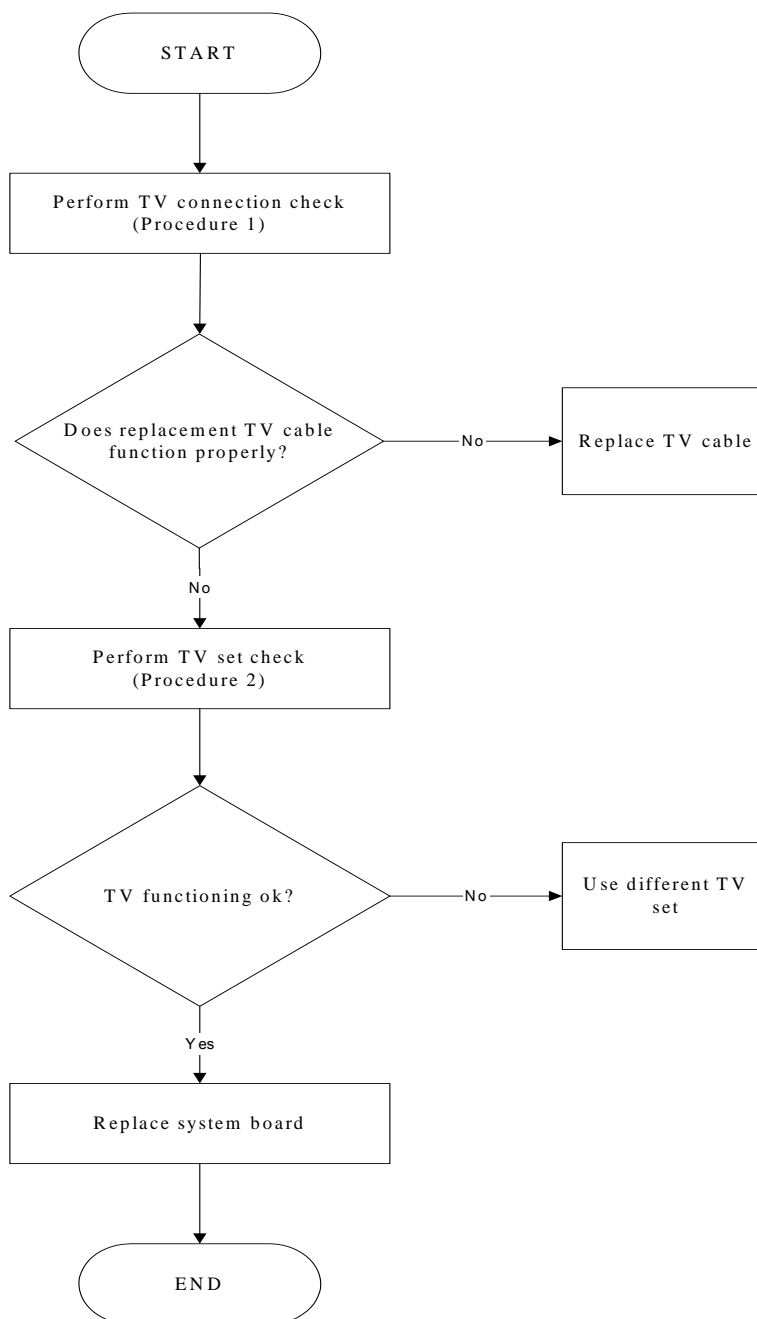## 2.7 TV-Out Failure Troubleshooting

Figure 2-6 TV-out troubleshooting process

To determine if the computer's TV-out port is functioning properly, perform the following procedures. Figure 2-7 outlines the process. Start with Procedure 1 and continue as instructed.

Procedure 1:   TV connection check

Procedure 2:   TV set check

Procedure 1   TV connection check

The TV cable may be damaged or the connections may be loose. Perform Check 1:

Check 1   Make sure TV cable is firmly plugged into both the TV set and the TV-out port of the computer. If the cable is connected correctly, go to Check 2.

Check 2   Make sure the TV-out port is firmly secured to the system board of the computer. If the malfunction remains, go to Check 3.

Check 3   The TV cable may be damaged. Replace with a good cable. If the malfunction remains, go to Procedure 2.

Procedure 2   TV set check

The TV set may be faulty. Perform Check 1:

Check 1   Try using the set for television reception. If it does not work, the set may be damaged. If the set does work, perform Check 2.

Check 2   Try connecting a different television to the computer. If the replacement television works, the original set may be damaged. If the replacement set does not work the system board may be damaged. Replace it with a new one following the instructions in Chapter 4.
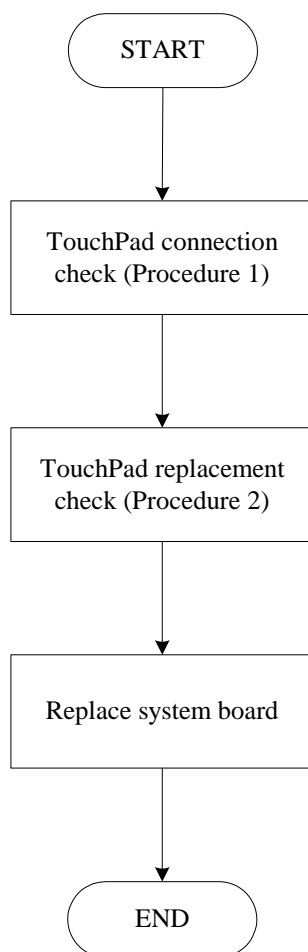
2.8   TouchPad Troubleshooting

```
                    ╭─────────────╮
                    │    START     │
                    ╰──────┬──────╯
                           │
                           ▼
            ┌──────────────────────────────┐
            │    TouchPad connection        │
            │    check (Procedure 1)        │
            └──────────────┬───────────────┘
                           │
                           ▼
            ┌──────────────────────────────┐
            │    TouchPad replacement       │
            │    check (Procedure 2)        │
            └──────────────┬───────────────┘
                           │
                           ▼
            ┌──────────────────────────────┐
            │    Replace system board       │
            └──────────────┬───────────────┘
                           │
                           ▼
                    ╭─────────────╮
                    │     END      │
                    ╰─────────────╯
```

Figure 2-8 TouchPad troubleshooting process

To determine if the computer's built-in TouchPad is functioning properly, perform the following procedures. Figure 2-9 outlines the process. Start with Procedure 1 and continue as instructed.

Procedure 1:   TouchPad connection check

Procedure 2:   TouchPad replacement check

Procedure 1   TouchPad connection check

The TouchPad is connected via the TouchPad FPC to the system board. Make sure the TouchPad FPC cable is firmly connected to the TouchPad and system board. Refer to Chapter 4, *Replacement Procedures,* for instructions on how to disassemble the computer and then perform the following checks.

If any of the connections are loose, reconnect firmly. If any of the connections is damaged, or there is still an error, go to Procedure 2.

Procedure 2   TouchPad replacement check

The TouchPad unit or FPC may be defective or damaged. Replace each with a new one following the steps in Chapter 4. If the FDD is still not functioning properly, replace the system board with a new one following the steps in Chapter 4.
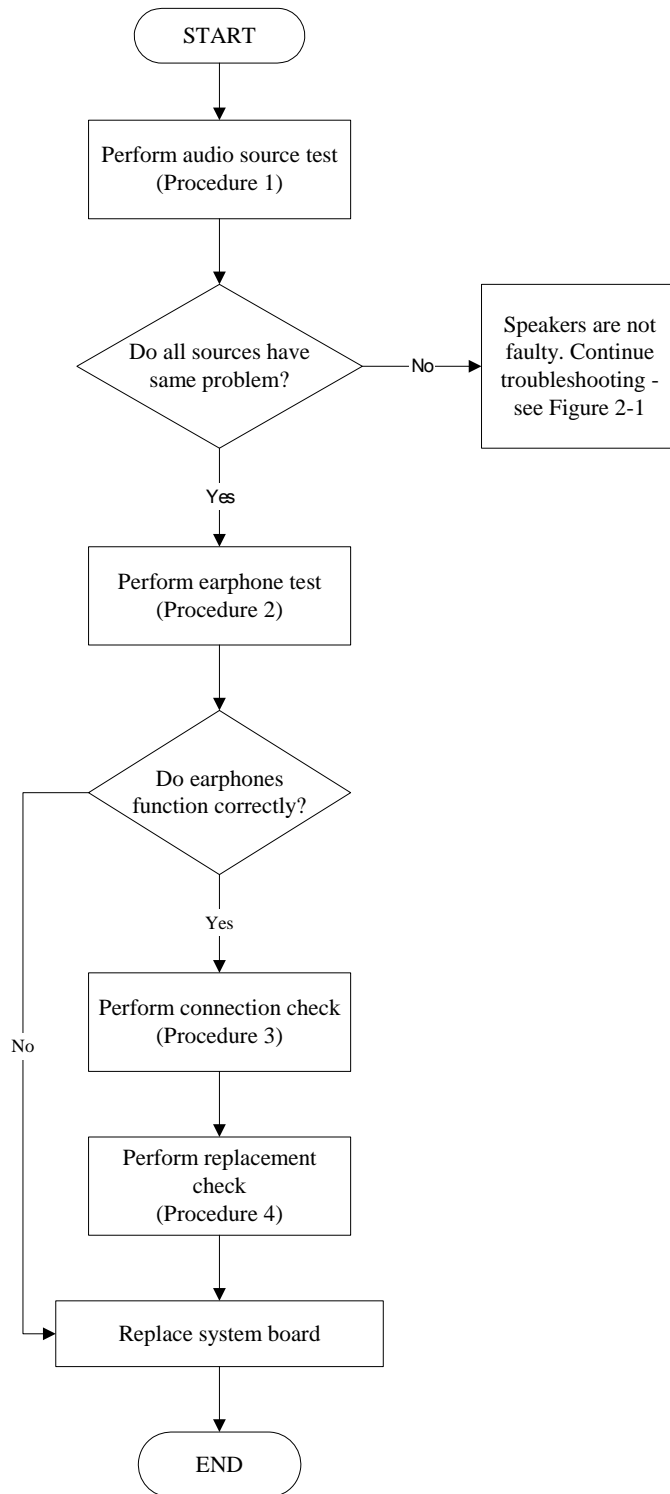
2.9 Speaker Troubleshooting

Figure 2-9 Speaker troubleshooting process

To determine if the computer's built-in speakers are functioning properly, perform the following procedures. Figure 2-10 outlines the process. First adjust the speaker volume to an appropriate level. Start with Procedure 1 and continue as instructed.

> Procedure 1: Audio source test
>
> Procedure 2: Earphone test
>
> Procedure 3: Connection check
>
> Procedure 4: Replacement check

Procedure 1   Audio source test

Try different audio sources (e.g. an audio CD and digital music file) to determine whether the fault is in the speaker system or not. If not all sources have sound problem, the problem is in the source devices. If all have the same problem, continue with Procedure 2.

Procedure 2   Earphone test

Connect a set if earphones or external speakers. If these function correctly, go to Procedure 3. If they do not function correctly, the system board may be defective or damaged. Replace it with a new one.

Procedure 3   Connection check

Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures* and make sure the speaker cable is firmly connected to the audio board. If the stereo speakers are still not functioning properly, go to Procedure 4.

Procedure 4   Replacement check

If the stereo speakers don't sound properly, the stereo speakers may be defective or damaged. Replace them with new ones. If the stereo speakers still do not work properly, try replacing in turn the audio board and system board.

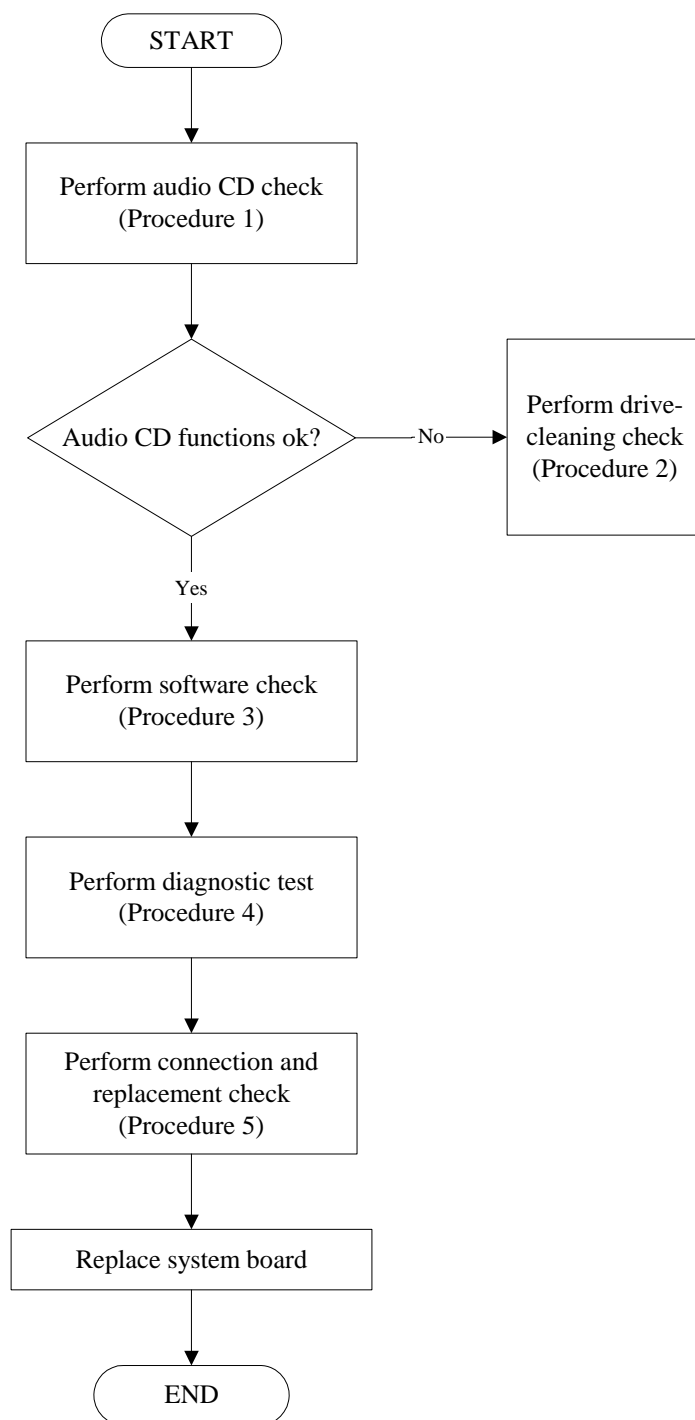## 2.10 optical Drive Troubleshooting

```
                    ┌─────────────┐
                    │    START    │
                    └──────┬──────┘
                           │
                           ▼
              ┌───────────────────────┐
              │  Perform audio CD check │
              │      (Procedure 1)      │
              └───────────┬───────────┘
                          │
                          ▼
                                              ┌───────────────┐
                                              │ Perform drive-│
              ◇ Audio CD functions ok? ──No──▶│ cleaning check│
                                              │ (Procedure 2) │
                          │                   └───────────────┘
                         Yes
                          │
                          ▼
              ┌───────────────────────┐
              │  Perform software check│
              │      (Procedure 3)     │
              └───────────┬───────────┘
                          │
                          ▼
              ┌───────────────────────┐
              │ Perform diagnostic test│
              │      (Procedure 4)     │
              └───────────┬───────────┘
                          │
                          ▼
              ┌───────────────────────┐
              │ Perform connection and │
              │   replacement check    │
              │      (Procedure 5)     │
              └───────────┬───────────┘
                          │
                          ▼
              ┌───────────────────────┐
              │  Replace system board  │
              └───────────┬───────────┘
                          │
                          ▼
                    ┌─────────────┐
                    │     END     │
                    └─────────────┘
```

Figure 2-10 Optical drive troubleshooting process

This section describes how to determine if the computer's internal optical drive is functioning properly. The Satellite P10 module bays can accommodate the following optical drives:

- DVD-R/RW device
- DVD-ROM device
- DVD Multi-drive device
- COMBO device

Figure 2-11 outlines the process. Perform the steps below starting with Procedure 1 and continue with the other procedures as required.

Procedure 1: Audio CD test

Procedure 2: Drive cleaning check

Procedure 3: Software check

Procedure 4: Diagnostic test

Procedure 5: Connection and replacement check

Procedure 1   Audio CD check

First, insert an audio CD into the CD/DVD drive. If it works, the problem is not with the drive. Go to Procedure 3. If the audio CD does not work, go to Procedure 2. If the CD/DVD LED on the front panel does not light when the disc is played and the drive gives no response, go straight to Procedure 3.

Procedure 2   Drive cleaning check

Insert a CD/DVD drive-cleaning disk into the drive clean according to the drive-cleaning product instructions. If the problem persists, go to Procedure 3.

Procedure 3   Software check

Ensure that the appropriate driver has been installed on the computer for the CD/DVD drive.

Procedure 4   Diagnostic test

The audio test program stored in the Diagnostics Disk will test the drive's ability to play an audio CD. See Chapter 3 for details.
If any errors occur while executing the diagnostic program, go to Procedure 5.

Procedure 5   Connection check and replacement check

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

Check 1   Make sure the drive is firmly connected to the system board. If the connection is good and there is still an error, go to Check 2.

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

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

2.11 modem Troubleshooting

```
                            ┌──────────┐
                            │  START   │
                            └──────────┘
                                 │
                                 ▼
                    ┌────────────────────────┐
                    │ Perform telephone line │
                    │   connection check     │
                    │    (Procedure 1)       │
                    └────────────────────────┘
                                 │
                                 ▼
                              ◇◇◇◇◇
                          ◇◇         ◇◇              ┌──────────────────┐
                      ◇◇                 ◇◇          │  Check / replace │
                   Computer unable to        ─Yes──▶ │ telephone line and│
                   detect telephone signal?          │    connections   │
                      ◇◇                 ◇◇          └──────────────────┘
                          ◇◇         ◇◇                       │
                              ◇◇◇◇◇                          │
                                 │                            │
                                 No                           │
                                 ▼                            │
                    ┌────────────────────────┐               │
                    │ Perform connection check│ ◀────────────┘
                    │    (Procedure 2)       │
                    └────────────────────────┘
                                 │
                                 ▼
                    ┌────────────────────────┐
                    │  Perform replacement   │
                    │        check           │
                    │    (Procedure 3)       │
                    └────────────────────────┘
                                 │
                                 ▼
                    ┌────────────────────────┐
                    │  Replace system board  │
                    └────────────────────────┘
                                 │
                                 ▼
                            ┌──────────┐
                            │   END    │
                            └──────────┘
```
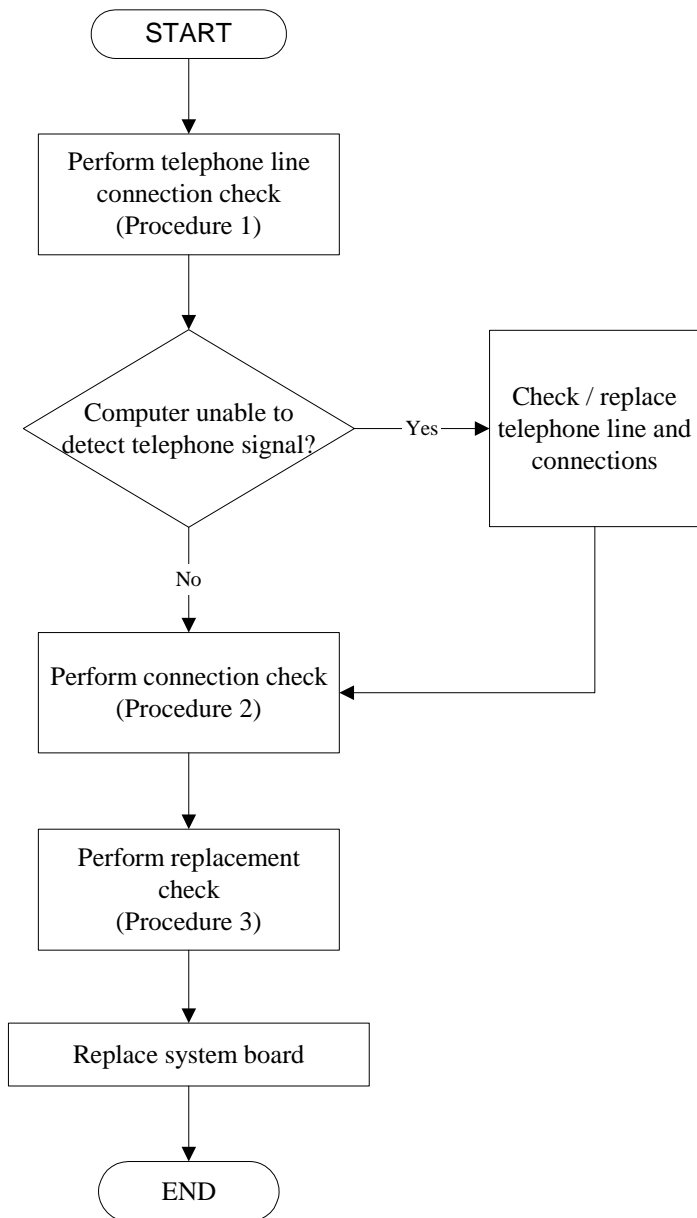
Figure 2-11 Modem troubleshooting process

This section describes how to determine if the computer's modem is functioning properly. Figure 2-12 outlines the process. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1: Telephone line connection check

Procedure 2: Modem card connection check

Procedure 3: Modem card replacement check

Procedure 1   Telephone line connection check

The telephone cable may be damaged or the connections may be loose. Attempt to connect the computer to a network through using the modem. If the modem does not function at all, go to Procedure 3. If the attempt fails because the computer detects no telephone signal, the fault may be in the telephone cable, the wall socket or the modem port. Perform Check 1:

Check 1   Make sure telephone cable is firmly plugged into both the telephone wall socket and the modem port of the computer. If the cable is connected correctly, go to Check 2.

Check 2   Make sure the modem port is firmly secured to the system board of the computer. If the malfunction remains, go to Check 3.

Check 3   The telephone cable may be damaged. Replace with a good cable. If the malfunction remains, go to Procedure 2.

Procedure 2   Modem card connection check

Disassemble the computer following the steps described in Chapter 4, *Replacement Procedures* and ensure that the modem card is well connected to the system board. If the problem persists, perform Procedure 3.

Procedure 3   Modem replacement check

The modem card or RJ-11 jack may be faulty. Try replacing them. If the problem persists, the system board may be defective or damaged. Replace the System Board with a new one following the steps in Chapter 4, *Replacement Procedures*.

2.12 PCMCIA Troubleshooting

```
                        ┌─────────────┐
                        │    START    │
                        └─────────────┘
                               │
                               ▼
                   ┌───────────────────────┐
                   │  Perform SYCARD test  │
                   │     (Procedure 1)     │
                   └───────────────────────┘
                               │
                               ▼
                          ╱────────╲                    ┌──────────────┐
                       ╱   Do errors   ╲        No       │ PCMCIA unit is│
                      ╱  occur during    ╲─────────────▶ │  not faulty.  │
                       ╲  SYCARD test?  ╱                └──────────────┘
                          ╲────────╱
                               │
                              Yes
                               │
                               ▼
                   ┌───────────────────────┐
                   │  Perform PCMCIA socket │
                   │   replacement check    │
                   │     (Procedure 2)      │
                   └───────────────────────┘
                               │
                               ▼
                   ┌───────────────────────┐
                   │  Replace system board  │
                   └───────────────────────┘
                               │
                               ▼
                        ┌─────────────┐
                        │     END     │
                        └─────────────┘
```
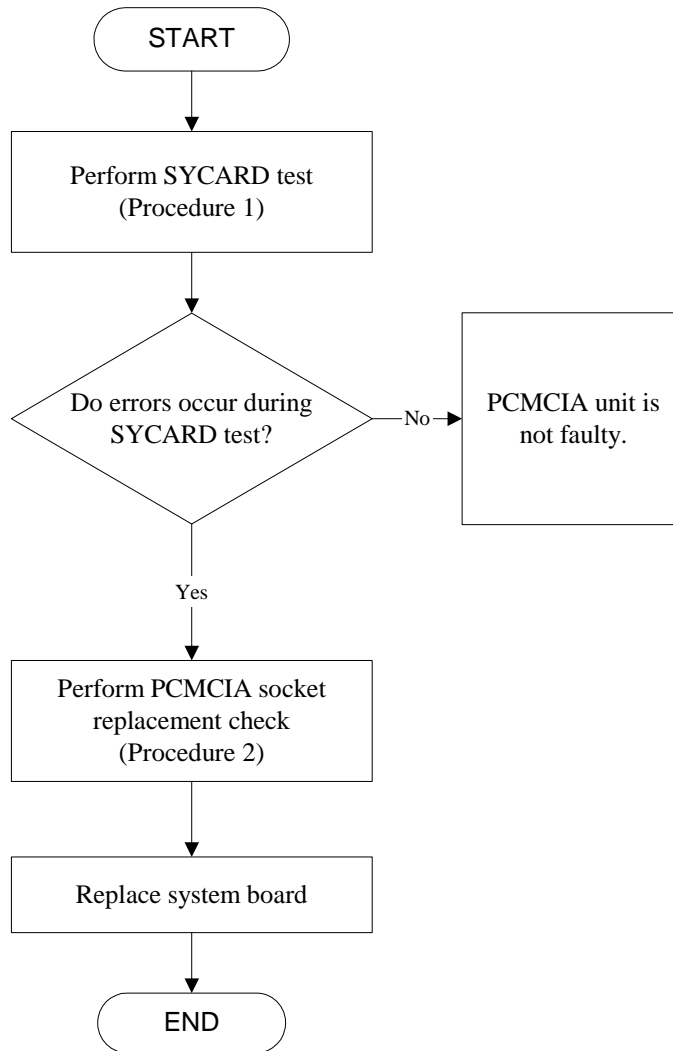
Figure 2-12 PCMCIA troubleshooting process

This section describes how to determine if the PCMCIA card player is functioning properly. The process is summarized in Figure 2-13. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1: Sycard test

Procedure 2: PCMCIA socket replacement check

Procedure 1   SYCARD test

The SYCARD test card contains a PCMCIA test program. Ensure the card in fully inserted into the socket before running the program.
If an error occurs during the SYCARD test, perform Procedure 2. If no error occurs, it is likely that the original PC card was faulty.

Procedure 2   PCMCIA socket replacement check

The PCMCIA socket may be damaged or defective, for instance the socket pins can be bent. Disassemble the computer following the steps described in Chapter 4, Replacement Procedures and replace the socket. If the problem persists, the system board may be defective or damaged. Replace the system board with a new one following the steps in Chapter 4.

2.13 IEEE 1394 Troubleshooting
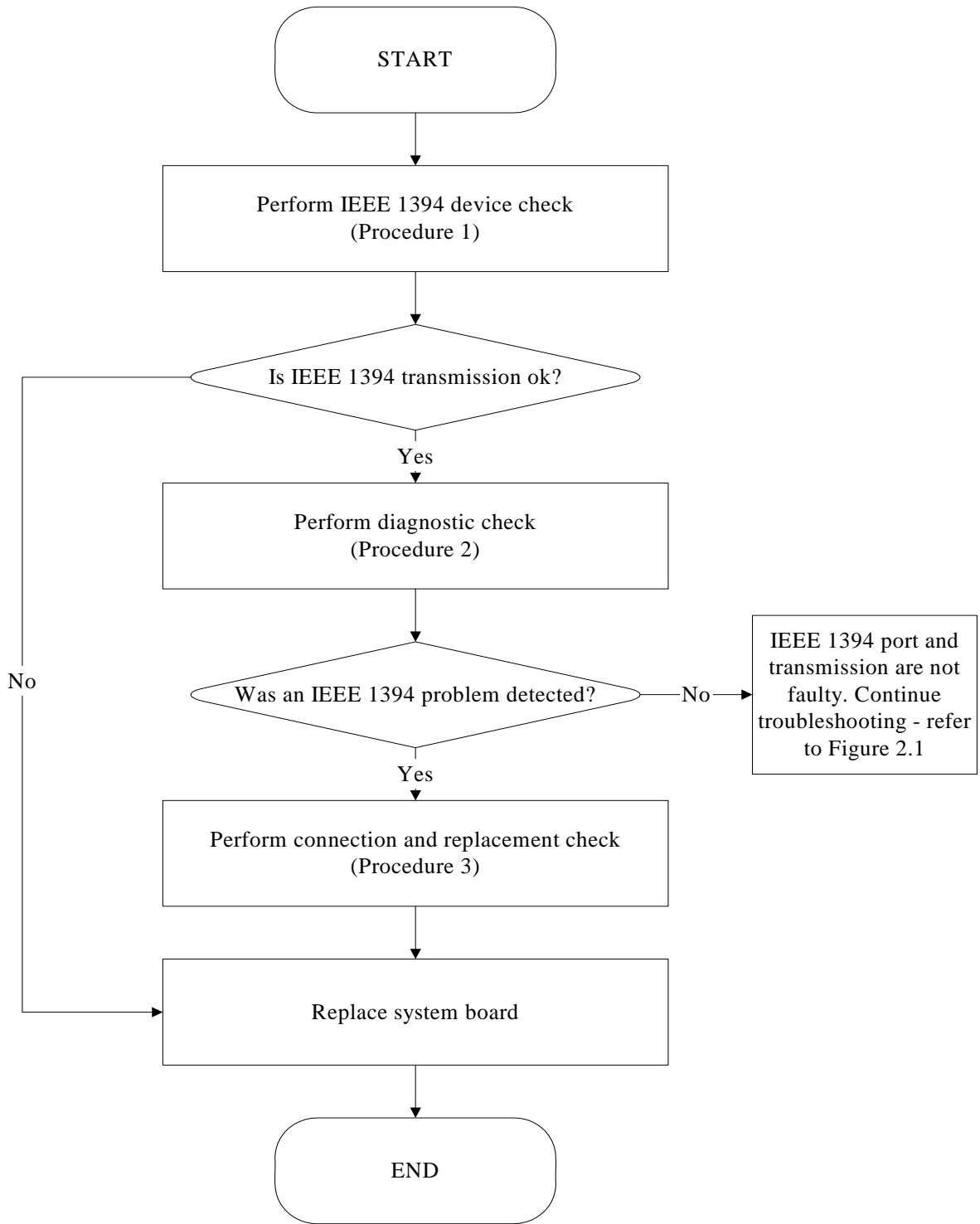
Figure 2-13 IEEE 1394 troubleshooting process

To determine if the computer's IEEE 1394 system is functioning properly, perform the following procedures. Figure 2-14 outlines the process. Start with Procedure 1 and continue with the other procedures as instructed.

> Procedure 1: IEEE 1394 device check
>
> Procedure 2: Diagnostic check
>
> Procedure 3: Connection and replacement check

Procedure 1   IEEE 1394 device check

Connect an IEEE 1394 device to the computer's IEEE 1394 port, then boot the computer for Windows XP. The computer should automatically detect the 1394 device. Check whether the device can transmit data to the computer.
If the device is able to communicate with the computer, the problem may be intermittent or connections may be faulty. Go to Procedure 2.
If communication is impaired, there may be a faulty connection. Go to Procedure 3.

Procedure 2   Diagnostic check

Run the Diagnostic Program, which will automatically execute the IEEE 1394 port test for transmission. Refer to Chapter 3, Tests and Diagnostics for more information on how to run the program.
If an error is located, go to Procedure 3. If an error does not occur, the 1394 port is functioning properly.

Procedure 3   Connection and replacement check

The transmission cable may be damaged or the connections may be loose. Perform Check 1:

Check 1   Make sure the transmission cable is firmly plugged into both the IEEE 1394-compatible device and the IEEE 1394 port of the computer. If the cable is connected correctly, go to Check 2.

Check 2   Make sure the IEEE 1394 port is firmly secured to the system board of the computer. If the malfunction persists, go to Check 3.

Check 3   The transmission cable may be damaged. Replace with a good cable. If the malfunction persists, go to Check 4

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

2.14 Wireless LAN Troubleshooting

```
        ┌─────────────────────┐
        │        START        │
        └─────────────────────┘
                   │
                   ▼
   ┌──────────────────────────────────┐
   │      Perform diagnostic test     │
   │          (Procedure 1)           │
   └──────────────────────────────────┘
                   │
                   ▼                                    ┌──────────────────────┐
   ◇──────────────────────────────────◇      No        │ Wireless LAN system  │
   ◇  Was a wireless LAN problem       ◇ ────────────▶ │ is not faulty. Continue
   ◇         delected?                 ◇                │ troubleshooting - refer
   ◇──────────────────────────────────◇                │    to Figure 2.1     │
                   │                                    └──────────────────────┘
                 Yes
                   │
                   ▼
   ┌──────────────────────────────────┐
   │ Perform connector and replacement│
   │        check (Procedure 2)       │
   └──────────────────────────────────┘
                   │
                   ▼
   ┌──────────────────────────────────┐
   │   Replace wireless LAN antenna/  │
   │              unit                │
   └──────────────────────────────────┘
                   │
                   ▼
   ┌──────────────────────────────────┐
   │       Replace system board       │
   └──────────────────────────────────┘
                   │
                   ▼
        ┌─────────────────────┐
        │        END          │
        └─────────────────────┘
```
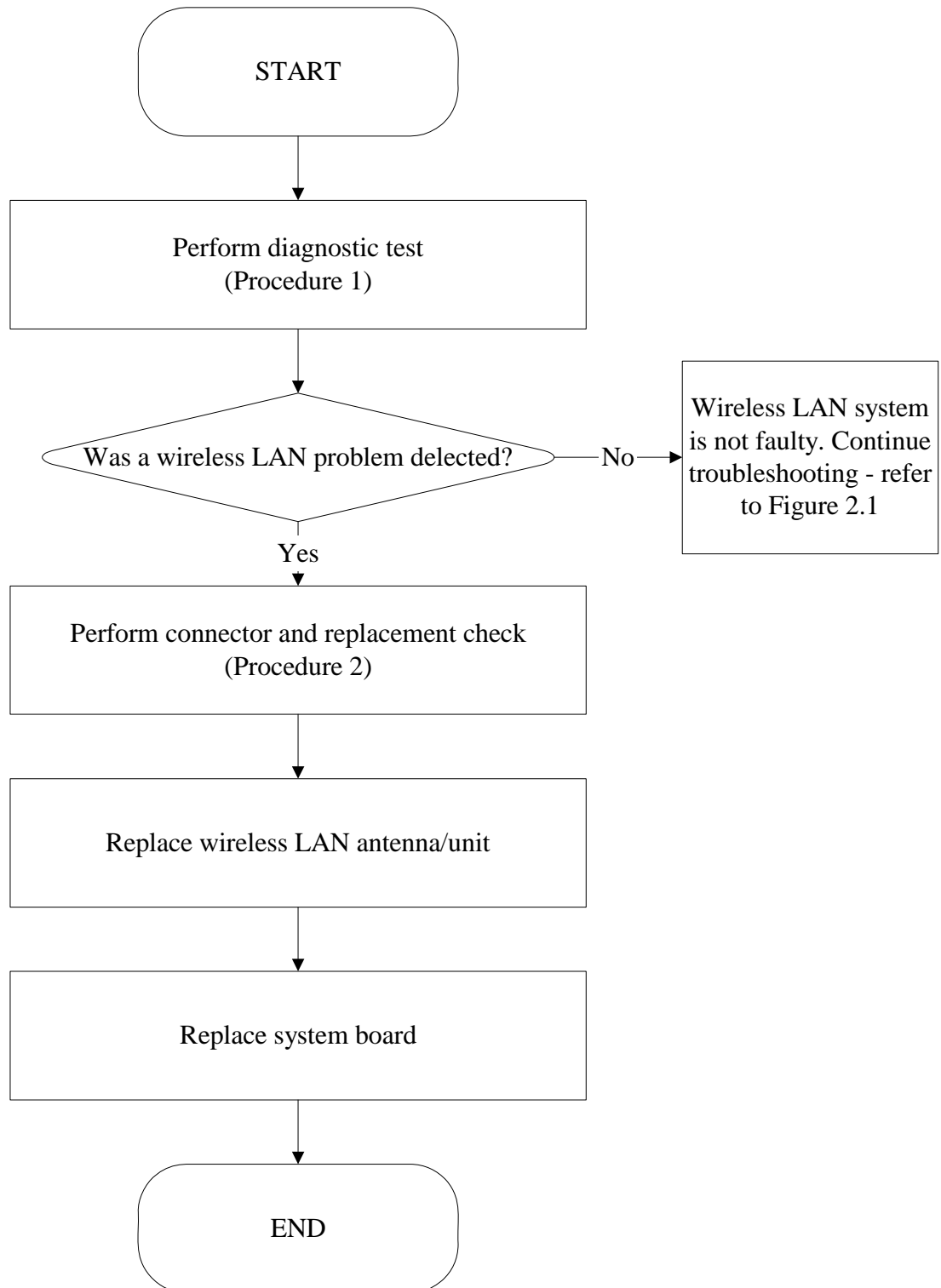
Figure 2-14 Wireless LAN troubleshooting process

The wireless LAN antenna wire, wireless LAN unit or system board may each be the source of a wireless LAN fault. Any of these components may be damaged. To determine if the computer's wireless LAN system is functioning properly, perform the following procedures. Figure 2-15 outlines the process. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1:   Diagnostic test

Procedure 2:   Connector and replacement check

Procedure 1   Diagnostic test

Run the Diagnostic Program, which will automatically execute the wireless LAN test. Refer to Chapter 3, Tests and Diagnostics for more information on the program.
If an error is located, go to Procedure 2. If an error is not located, the wireless LAN system is functioning properly.

Procedure 2   Connector and replacement check

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

Check 1   Make sure that the wireless LAN antenna is firmly connected to the wireless LAN unit (refer to Chapter 4 for instructions) and that the wireless LAN unit is securely slotted into the system board. If the problem persists, go to Check 2.

Check 2   Check that the wireless communication switch is turned to "On", then make sure that the wireless communication LED on the front panel is lit. If the LED is lit but the wireless LAN function is still faulty, the antenna may be damaged. Replace with a new antenna following the steps in Chapter 4, *Replacement Procedures*. If the problem persists, or if the wireless LAN LED is not lit when the wireless communication switch is turned to "On", go to Check 3.

Check 3   The wireless LAN unit may be damaged. Replace it with a new one following the instructions in Chapter 4. If the problem still exists, perform Check 4.

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

Chapter 3

Tests and Diagnostics

Chapter 3   Contents

3.1   The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program to test the functions of the **(Base on Boston T&D version 1.0)** hardware modules. The Test & Diagnostic Program is stored on the T&D diskettes. The program consists of a series of tests that run automatically when the Diagnostics Program items are selected and executed.

NOTES: *To start the diagnostics, follow these steps*

1.   Check all cables for loose connections.

2.   Exit this program when you are at Main Menu.

The TEST & DIAGNOSTIC PROGRAM contains the following functional tests:

- ❏ CONFIG CHECK TEST
- ❏ DMI CHECK TEST
- ❏ SPEAKER AUDIO TEST
- ❏ FAN ON/OFF TEST
- ❏ MAIN BATTERY CHARGE TEST
- ❏ FDD TEST
- ❏ CD-ROM TEST
- ❏ KEYBOARD TEST
- ❏ MOUSE(PAD) TEST
- ❏ LCD PIXELS MODE TEST
- ❏ MAGNETIC SWITCH TEST
- ❏ HDD R/W TEST
- ❏ LAN TEST
- ❏ RTC TEST
- ❏ IEEE1394 CODE TEST
- ❏ Speaker EQ Check&Rewrite
- ❏ BUTTON TEST

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

- ❏ The diagnostics diskette (2 pcs)
- ❏ A formatted working diskette for the floppy disk drive test (Floppy Disk Drive Test)
- ❏ A data CD disc (CD-ROM Test)
- ❏ A LAN loopback connector (LAN Test)

The following sections explain how to execute the Test & Diagnostic Program and detail the tests within the program.

3.2   Executing the Diagnostic Test

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

1. Insert the diagnostics diskette #1 in the floppy disk drive and turn on the computer. (The
    diagnostics diskette contains the MS-DOS boot files.) And then follow the instructions to
    swap with the diagnostics diskette #2 for T&D program installed in RAM driver.

NOTE: To execute the CD test, make sure the CD is installed in the ODD drive.

The T&D Program can run by single test item when you press corresponsive English
letter of test item, or run two or more test items what you like if you choose them by
"Arrow cursors" and "Space Bar" – the wonderful thing is you can setup test loop by
"Enter" button. And it also asks you if you like to copy test log file to diskette as
reference at the end of test(s).

The test list is as the following:

        A. CONFIG CHECK TEST
        B. DMI CHECK TEST
        C. SPEAKER AUDIO TEST
        D. FAN ON/OFF TEST
        E. MAIN BATTERY CHARGE TEST
        F. FDD TEST
        G. CD-ROM TEST
        H. KEYBOARD TEST
        I. MOUSE (PAD) TEST
        J. LCD PIXELS MODE TEST
        K. MAGNETIC SWITCH TEST
        L. HDD R/W TEST
        M. LAN TEST
        N. RTC TEST
        O. 1394 CODE TEST
        P. Speaker EQ Check&Rewrite
        Q. BUTTON TEST

R. The below display will show up at the beginning of T&D program
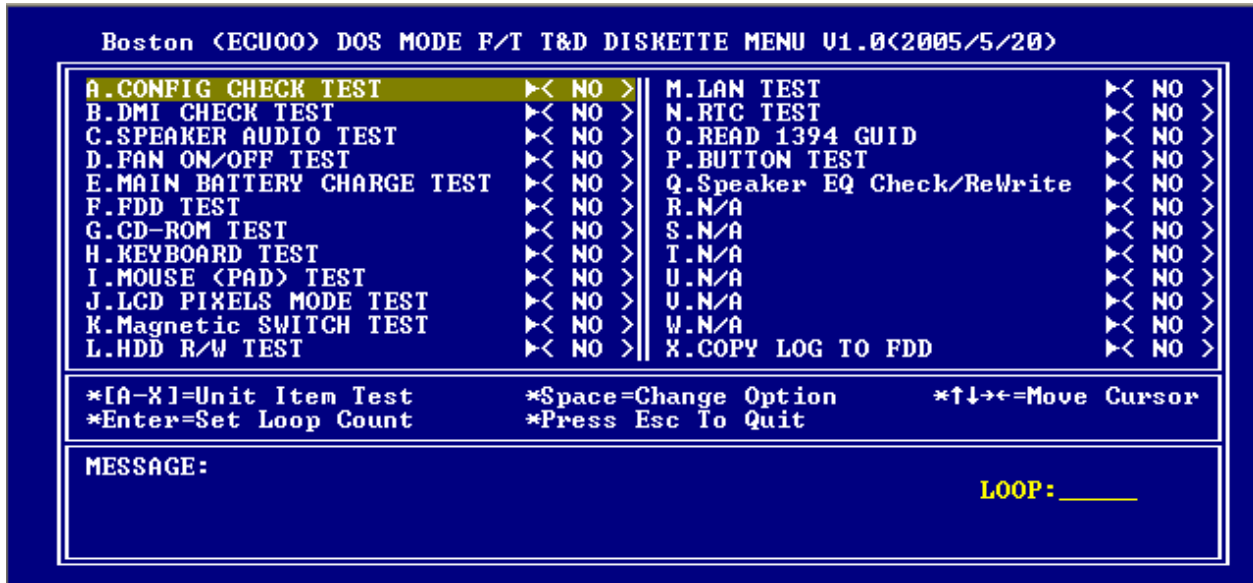
If the test result passes, the following display will show up:

If an error is detected and a test fails, the following message displays:

Then press any key for next actions – the below display presented if copying test log file onto diskette is necessary. This action will be executed when "**Y**" key pressed.

It will skip this process if "N" key pressed.

And then it will check if it's necessary to leave this program. Program will quit when "**Y**" key pressed and it will go back main menu for next test if "**N**" key pressed.

```
Boston (ECUOO) DOS MODE F/T T&D DISKETTE MENU V1.0(2005/5/20)

A.CONFIG CHECK TEST        ►< NO >║ M.LAN TEST                  ►< NO >
B.DMI CHECK TEST           ►< NO >║ N.RTC TEST                  ►< NO >
C.SPEAKER AUDIO TEST       ►< NO >║ O.READ 1394 GUID            ►< NO >
D.FAN ON/OFF TEST          ►< NO >║ P.BUTTON TEST               ►< NO >
E.MAIN BATTERY CHARGE TEST ►< NO >║ Q.Speaker EQ Check/ReWrite  ►< NO >
F.FDD TEST                 ►< NO >║ R.N/A                       ►< NO >
G.CD-ROM TEST              ►< NO >║ S.N/A                       ►< NO >
H.KEYBOARD TEST            ►< NO >║ T.N/A                       ►< NO >
I.MOUSE (PAD) TEST         ►< NO >║ U.N/A                       ►< NO >
J.LCD PIXELS MODE TEST     ►< NO >║ V.N/A                       ►< NO >
K.Magnetic SWITCH TEST     ►< NO >║ W.N/A                       ►< NO >
L.HDD R/W TEST             ►< NO >║ X.COPY LOG TO FDD           ►< NO >

*[A-X]=Unit Item Test       *Space=Change Option    *↑↓→←=Move Cursor
*Enter=Set Loop Count       *Press Esc To Quit

MESSAGE:

                                                    LOOP:_____
```

NOTE: *Press* **Pause** *to pause a test and* **Enter** *to resume.*

3.3   Config Check Test

The config check test checks unit configuration. It includes:

- ◆   CPU type

- ◆   System memory size

- ◆   ODD type

- ◆   LCD type

- ◆   HDD type & capacity

- ◆   VRAM size&VGA type

- ◆   Battery type

- ◆   Wireless type

- ◆   LAN type

- ◆   With/without Bluetooth

This test needs input unit Part Number by manual to make comparison with known SKU data.

> *NOTE: To execute this test, you must input unit **Part Number** as "**Uppercase Character**".*

Then it will show its configuration is correct (in **green** color) or failed (in **red** color).

The screen should display as below, indicating whether the test is passed or failed after comparison.

```
<Neil Fu> <2002/6/18> <Ver 1.0>
Command Line: cfgchk TabFileName SKU
Example     : cfgchk btw10tab.txt PS110E-0002S-GR


              Please input the SKU: TEST

CURRENT SPEC IS :
CEL Dothan 1024 1.50GHZ 400MHZ 256 COMBO LG14.1WXGA 60G54HDD 7MBINTEL910GML 8cel
l 128bitG+ LAN100 NO_BT
Press any key to continue . . .
```

3.4   DMI Check Test

This test will check if the computer's Desktop Management Interface (DMI) is correct.

DMI includes:

- ◆   Manufacturer
- ◆   Production Name
- ◆   Version
- ◆   Serial Number
- ◆   UUID
- ◆   OEM String

It needs to input unit Part Number by manual, then show this unit DMI information and makes comparison with SKU data.

*NOTE: To execute this test, you must input unit **Part Number** as "**Uppercase Character**".*

The screen should display as below, indicating whether the test is passed or failed after comparison.

```
■ Compal DMI String R/W Utility V3.1 ■

Manufacturer(Type1, Offset04h) : TOSHIBA
Product Name(Type1, Offset05h) : Satellite M50
Version(Type1, Offset06h)      : PSM50E-02G00HIT
Serial Number(Type1, Offset07h): SSM502G00HIT
UUID(Type1, Offset08h)         : E4D9D9A7-C155-11D9-905F-000FB083440D
OEM Strings(Part Number,SW Number)(Type11, Offset05h):
=>PSM50E-02G00HIT,SSM502G00HIT



Press any key to continue . . .
```

3.5   Speaker Audio Test

The speaker audio test allows the user to aurally confirm the speaker functions. And check both speakers if they are OK within 3 times "Beep" sound generated.

> *NOTE*:   *Remember to tune up the volume as "**Maximum**" before this test starts.*

The screen should display as below, indicating whether the test is passed or failed after the question.

```
** FATBUZER test version 1.07 **
Please listen for speaker being sound
          1.0 Sec  by   3 times

Test over, no errors found



Do you hear Beep sound ?
[Y,N]?
```

3.6   Fan ON/OFF Test

The fan test allows the user to test aurally whether the fan is working. And follow the below procedures for this test:

> ◆   The computer will let the fan be "ON" after any key pressed. Listen to check whether the fan is working.

NOTE: *Remember to approach fan outlet that is near right side of unit whether fan is "ON".*

> ◆   The computer will stop the fan working after any key pressed. Listen to check if the fan is "OFF" – it means no rotating sound.

The screen should display as below, indicating whether the test is passed or failed after the question.

```
** Fan ON/OFF Test ,Please Listen To The FAN Sound !!
 Press Any Key To Start Test ..
 FAN On Test  :

 FAN Off Test :


 Do you hear FAN rotating sound?


[Y,N]?
```

3.7 Main Battery Charge Test

*NOTE: The AC adaptor (**75W, 15V**) should be connected to successfully run this test.*

This test shows and measures the main battery:

* ◆ Battery type (Li_ion)

* ◆ Manufacturer (Sony / Sanyo/Panasonic)

* ◆ Remain charge capacity (0 ~ 100%)

* ◆ Charge function (PASS/FAIL)

    - "Battery Is Full" showed when "remain charge capacity" is 100%

The screen should display as below, indicating whether the test is passed or failed when finished.

```
ONLY FOR 87591 T&D Series Battery Test Program.[591] V1.0 2002/07/23
MAIN Battery

Battery Type: Lion
Manufacturer: Sony
Remain charge capacity : 79.3%

Charge Test-> [ PASS ]


Press any key to continue . . .
```

3.8   FDD Test

NOTE: Before running the FDD test, prepare a formatted work diskette (1.44 MB). Remove the diagnostics diskette and insert the work diskette into the FDD. The contents of the floppy diskette maybe erased.

The Floppy Disk Test includes three subtests of the:

1. Sequential seek/verify function (Range: Track 0 ~ 79)

2. Funnel code seek/verify function (Range: Track 0 ~ 79)

3. Write/Read/Compare pattern function (Range: Track 75 ~ 79)

NOTE: The write-protected device of this formatted diskette should be "Disable".

The subtests run automatically.

NOTE: Press "Esc" key can skip the current subtest.

The screen should display as below, indicating whether the subtests pass or fail when finished.

```
***** Fdd Test Program V1.3  *****
Testing Driver A: [1.44 MByte (Cyl:80, Head:2, Sec:18)]...
Testing Seq. seek/verify... Head: 01, Track: 79...  [ PASS ]
Testing Fun. seek/verify... Head: 01, Track: 06...
```

3.9   CD-ROM Test

The CD-ROM test allows a user to aurally confirm the CD-ROM functions.

NOTE: *A CD disc (including data file) must be inserted into the CD-ROM drive before this test starts.*

The CD-ROM test includes two subtests of the:

> 1.   Random read/partial sequential read function
>
> 2.   Sequential read function (for all surface)

Each item can be chosen by manual. When each test item finished, the CD-ROM tray will open. Check whether the tray can open automatically.

NOTE: *Press "**Esc**" key can skip the current subtest.*

The screen should display as below, indicating whether the subtests pass or fail when finished.

```
                    CDROM Utility (for Testing only)  Ver 1.0

---------------------------------------------------------------------
     Testing CDROM Information ..... Press [ESC] key to skip testing
---------------------------------------------------------------------
CD ROM Drive Z:, MSCDEX ver.: 2.23, Driver name: TSYCD1  , Vol.: 020329_1105
Total 198960 sectors(2352 bytes/sector) = 467953920 bytes
Testing CD ROM reset function...

        Partial sequential read ..... 198950

        Random  read ............... 95496       PASS


        Please remove CD Media, then close CD tray ...



Press any key to continue . . .
```

3.10 Keyboard Test

The keyboard test checks the all keys function.

NOTE: *The **Num Lock** and the **Overlay** mode must be off to execute the keyboard test.*

Before keyboard test starts, the keyboard matrix code should be chosen as below display:

1. **K** (UK, for Europe)

2. **S** (US, for America)

When you execute this test, the keyboard layout is drawn on the display. When any key is pressed, the corresponding key on the screen changes to black as shown below.

It will indicate whether the subtest is passed or failed after the question.

NOTE: *The "**Fn**" key cannot be tested in the keyboard test. To determine whether the "**Fn**" key is working correctly, press "**Fn+F6**   " or "**Fn**+**F7**   " keys to check if LCD display brightness change gradually.*
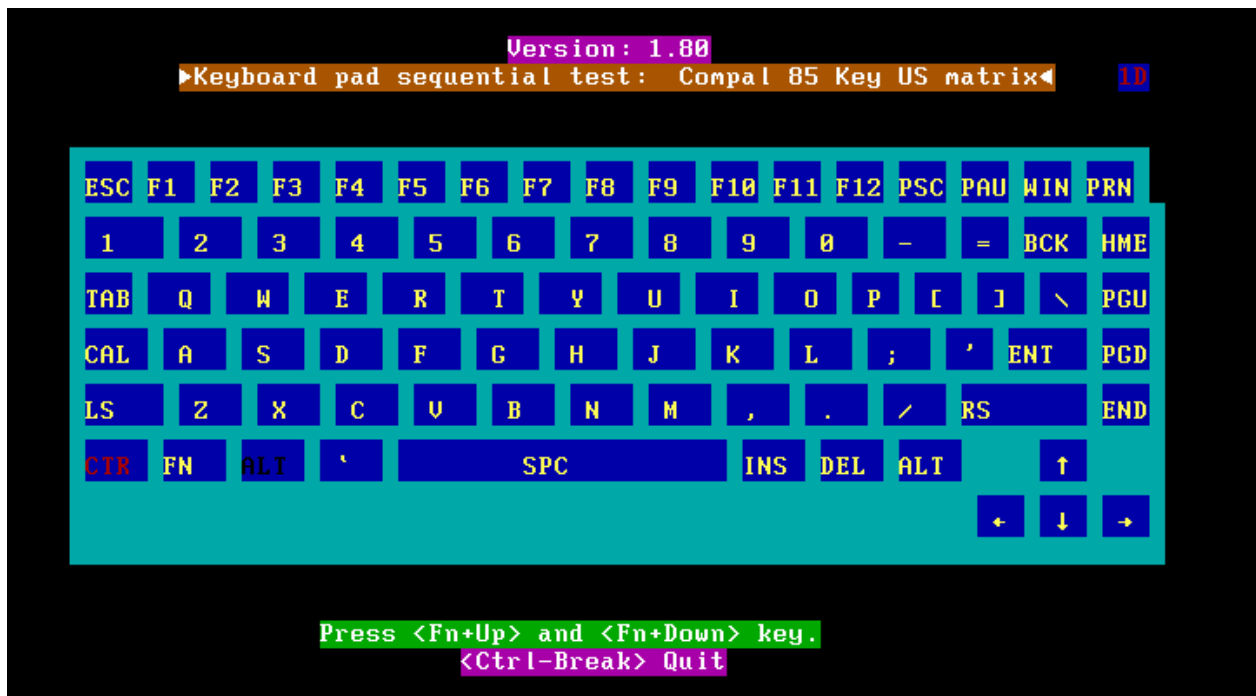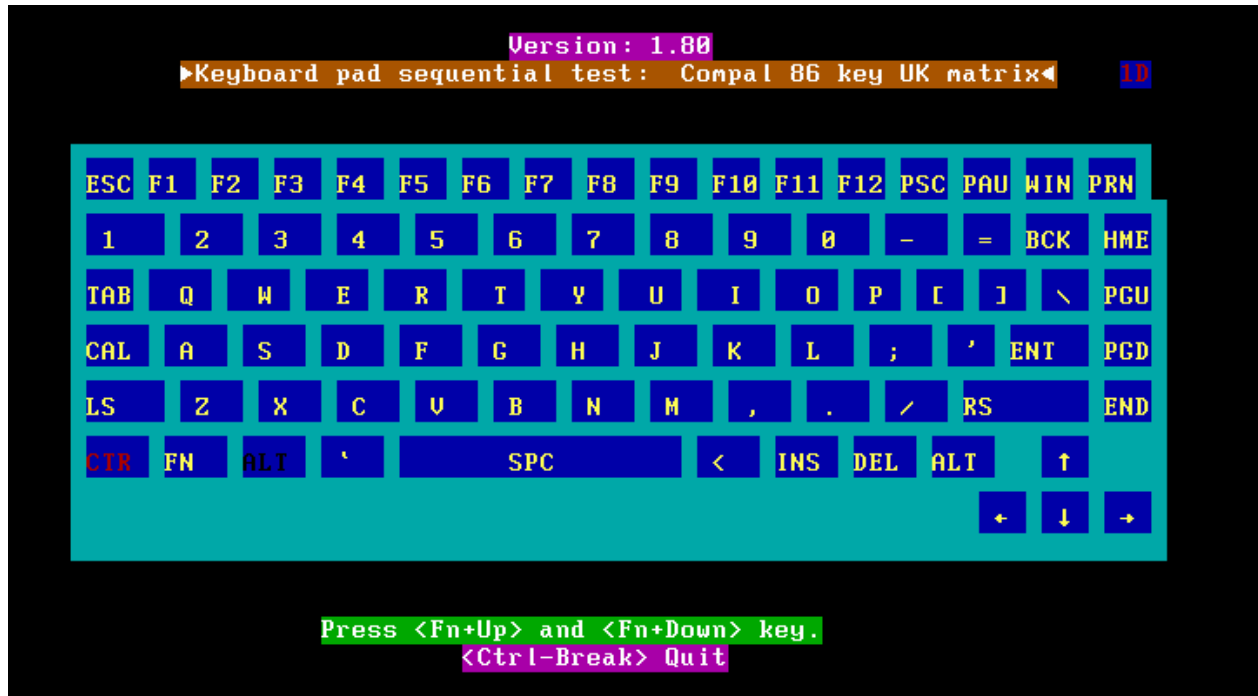
Pressing a key also reveals that key's **scan codes** in the upper right hand corner of the screen. When the key is depressed, its **make code** is displayed. When the key is released, the **break code** is shown.

3.11 Mouse (Pad) Test

The Mouse test allows the user to select and assign values to the following, using the Touch Pad or "***Tab***" key to move between selections:

1.   Mouse Speed (on a scale from slow to fast)

2.   Acceleration (Off, Low, Medium, High)

3.   Button Assignments (Left + Right / Right button, either Unassigned or Drag Lock)

4.   Swap Buttons (Left /Right)

> ***NOTE:*** *The Touch Pad test cannot be used to test an external USB mouse.*

The Touch Pad button subtest allows users to test their Touch Pad buttons. If the buttons are clicked, the cursors should appear in the corresponding box of the button figure that is displayed on the screen as below.
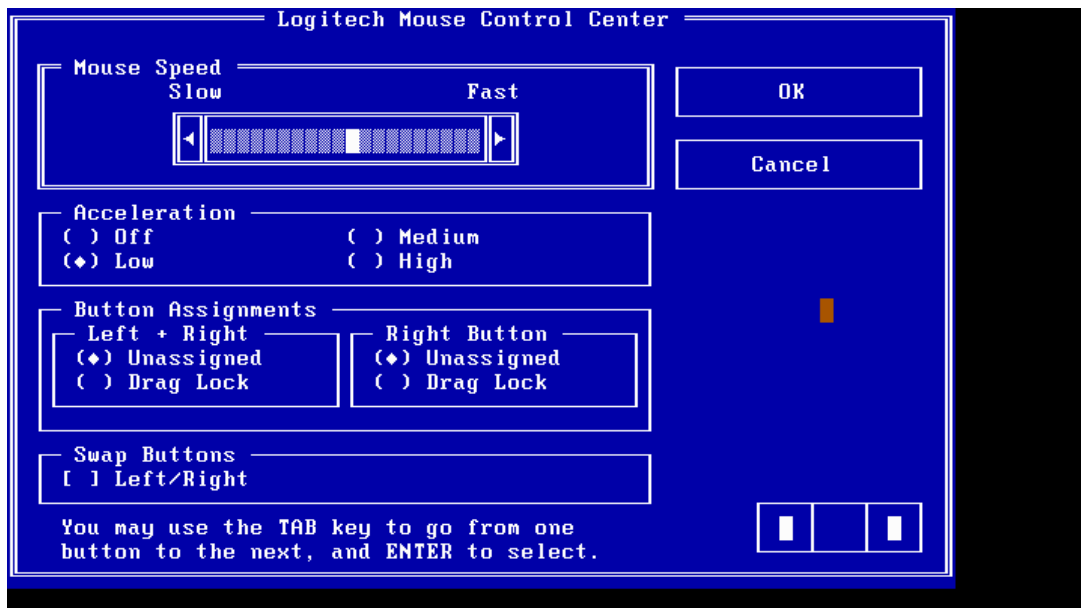
After checking T/Pad buttons and cursor's function, use "Tab" key or use T/Pad cursor to click the "OK" column will end this test.

It will indicate whether the subtests pass or fail after three questions.

> *NOTE:* *The above figure has three compartments although the Touch Pad installed may only have two buttons. In this case, the central compartment in the figure does not correspond to any button.*

3.12 LCD Pixels Mode Test

This LCD pixels mode test checks whether video display is fine.

This test includes two modes of the test:

1. Text Mode

   - including 40*25 (16 colors) and 80*25 (2/16colors).

2. VGA Mode

   - including 320*200 (4/16/256 colors), 640*200 (2/16 colors), 640*350 (2/16 colors), 640*480 (2/16/256 colors), 800*600 (256 colors) and 1024*768 (256 colors).

The screen should display as below, indicating whether the test is passed or failed after the question.
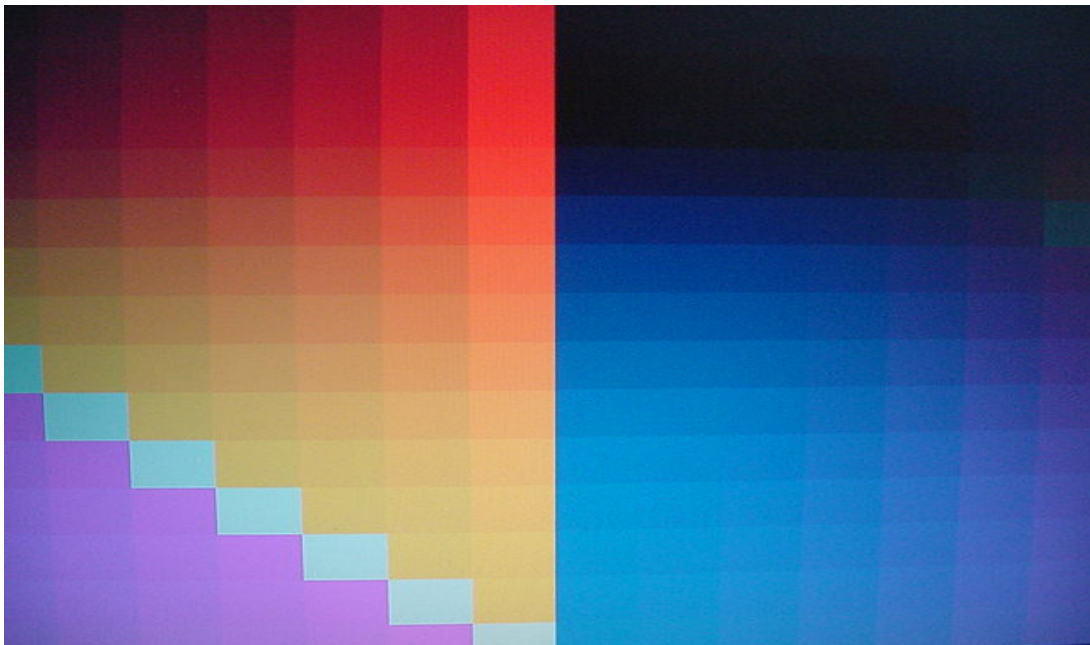
3.13 Magnetic Switch Test

The lid switch test checks the lid function of the unit. When LCD cover closed, the lid should enable to turn off the display.

NOTE: *Remember to tune up the volume as "**Maximum**" before this test starts.*

Follow below steps to run this test:

1. Close the LCD cover.

2. Heard 3 "Beep" sound happened during LCD closed.

3. Open the LCD.

Then it will indicate whether the test is passed or failed.

```
Compal Lid switch test program Ver 1.01
    Please Close LCD Panel to Test Magnetic OR Press Ctrl+Q to quit the test!
```

3.14 HDD R/W Test

The HDD R/W test allows the user to test aurally HDD read/write function. For data security concern, it is necessary to input password - "**hard disk**" before HDD write test starts.

The HDD test includes three subtests of the:

1. Sequential read (all surface)

2. Sequential write (all surface)

3. Partial W/R + Random W/R

After the choice is made, HDD information will show as below:

◆   Model name

◆   Firmware revision

◆   Serial number

◆   CHR (Cylinder High Register) mode – including cylinders, heads, sectors and sizes.

◆   LBA (Logical Block Addressing) mode – including sectors and sizes.

◆   Support Ultra DMA Mode

◆   Support PIO Mode

```
                         HDD Utility (for Testing only)  Ver 1.0

--------------------------------------------------------------------------------
     Testing HDD Information ..... Press Ctrl+Break keys to stop testing
--------------------------------------------------------------------------------
       Model name               = IC25N030ATCS04-0
       Firmware revision        = CA30A71A
       Serial number            =       CSL304D5CARPWA
       CHR Mode cylinders       = 16383
       CHR Mode heads           = 16
       CHR Mode sectors         = 63
       CHR Mode sizes           = 8063 MB
       LBA Mode sectors         = 58605120
       LBA Mode sizes           = 28615 MB
       Support Ultra DMA Mode = 3f
       Support PIO Mode         = 1f
--------------------------------------------------------------------------------

       Begin Testing ..... Sequential read (all surface)
       ---> Testing of Sectors = 13300947
```

NOTE: *Press "Ctrl + Break" keys can terminate the current subtest.*

The screen should display as previous picture, indicating whether the subtest is passed or failed when finished.

NOTE: *The AC adaptor should be connected to successfully run this test.*

3.15 LAN Test

The LAN test checks the Marvell chip.

NOTE: *Don't plug in LAN loopback while test.*

And LAN information will show on the test screen:

- ◆ ASIC register Check:
- ◆ MAC register check:
- ◆ .PHY register check:
- ◆ .PHY IRQ(PCI) check:
- ◆ Check buffer RAM over register access:
- ◆ Test Rate Control .

The LAN test includes three subtests of the:

1. Speed1000

    - including ASIC Loopback (Speed=1000)

2. Speed100

    - including ASIC Loopback (speed=100)

3. Speed 10

    - including ASIC Loopback (Speed=10)

The subtests run automatically.

The screen should display as below, indicating pass will go on to next test

FAIL as below

3.16 RTC Test

Checks the computer's RTC (Real Time Clock) and calendar functions by comparing the DOS and CMOS values.

The test runs automatically.

The screen should display as below, indicating whether the test is passed or failed when finished.

```
======RTC TEST======


Please Check the result after test.


Press any key to continue . . .



Wait for zero counter...
Testing...
DOS TIME = 22:33:48.04(8122804), CMOS TIME = 22:33:48(8122800)
DOS DATE: 09/19/2002, CMOS DATE: 09/19/2002
DATE & TIME test [ PASS ]



Press any key to continue . . .
```
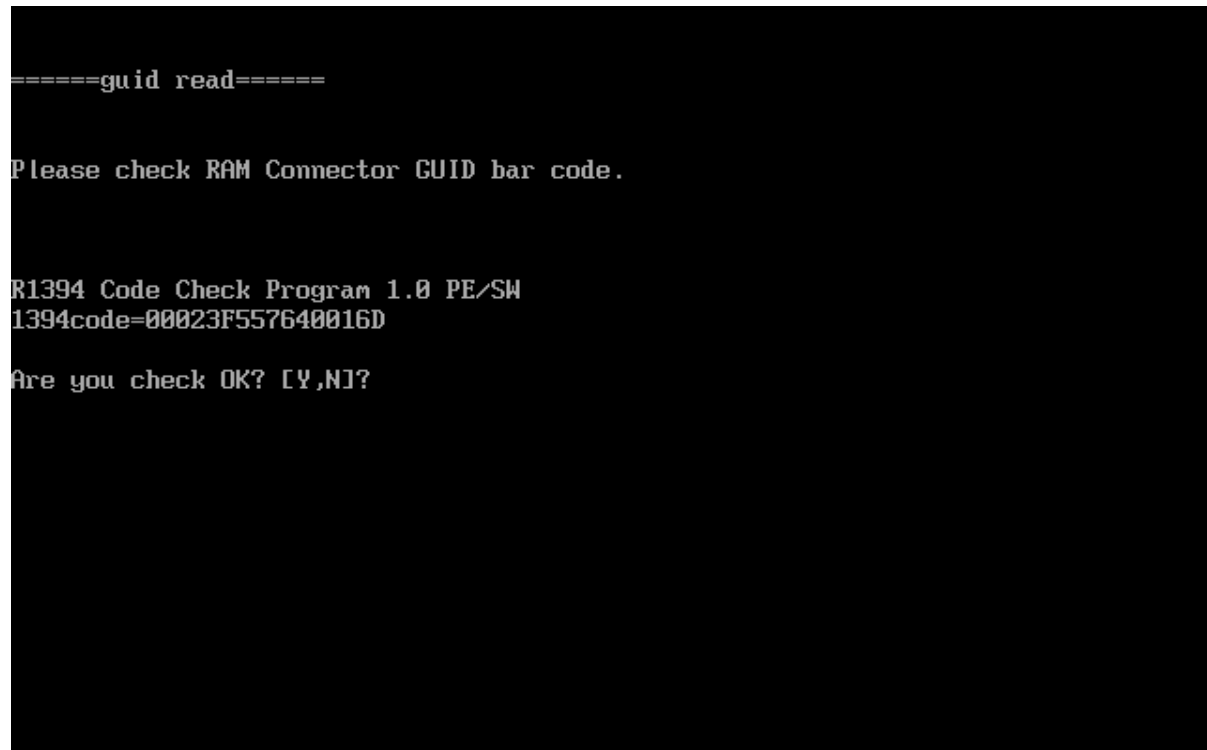
3.17 Read 1394 GUID

This test will check if the computer's EEPROM 1394GUID code is correct.

NOTE: Must open the RAM Door to see RAM connector GUID bar code before test item begins.

The figure below will be displayed:

```
======guid read======


Please check RAM Connector GUID bar code.



R1394 Code Check Program 1.0 PE/SW
1394code=00023F557640016D

Are you check OK? [Y,N]?
```

3.18 CD Control Button Test

The CD control button test allows the user to manually test each of the five CD control buttons.

Key "WWW" need to press first. One will hear one "bi" sound when press "WWW" or "Audio"

Sound, and continuously "bi" sound for another key test.

The CD control button type test includes three subtests of the:

1. 7 buttons (use 7 buttons test program)

2. 3 buttons (use 7 buttons test program)

3. 1 button (don't test the item)

For 7 button, The figure below will be displayed:

Press each of the buttons on the front panel in turn. A yellow bar will appear on the relevant section of the figure if the button passes the test.

For 3 button,The figure below will be displayed:
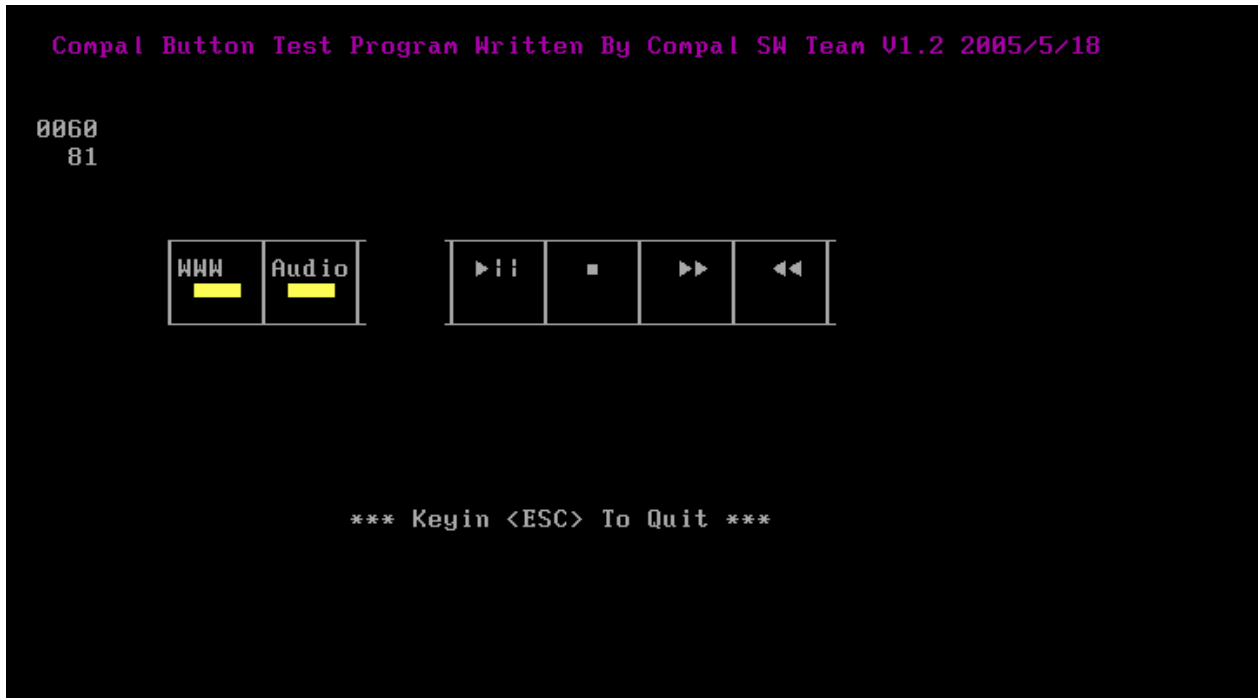
```
Compal Button Test Program Written By Compal SW Team V1.2 2005/5/18

0060
  81




      WWW   Audio        ▶ ¦ ¦    ▪     ▶▶    ◀◀




                *** Keyin <ESC> To Quit ***
```

Press each of the buttons on the front panel in turn. A yellow bar will appear on the relevant section of the figure if the button passes the test.

3.19 Speaker EQ Type Check&Re-Write

This test will check if the computer's EEPROM EQ type is correct.

The EQ Type test includes two subtests of the:

    1.   Read EQ Type from EEPROM

    2.   Re-Write EQ Type to EEPROM

NOTE: To execute this test, you must select speaker type (Harman or No brand).

The figure below will be displayed:

```
Please select read or write EQ

1. Read EQ Type from EEPROM
2. Write EQ Type to EEPROM


[1,2]?1


======EQ CHECK TEST======


Please check LCD Bezel Right side mark then Select Speaker type
1: Harman/kardon
2: No brand
[1,2]?
```

The Item2 figure below will be displayed:

```
Please select read or write EQ

1. Read EQ Type from EEPROM
2. Write EQ Type to EEPROM


[1,2]?2


======Write EQ to EEPROM ======


Please Select Speaker type (1=Harman;2=No brand)
[1,2]?
```

NOTE: Write speaker EQ must reboot to enable EQ.

```
1. Read EQ Type from EEPROM
2. Write EQ Type to EEPROM


[1,2]?2



======Write EQ to EEPROM ======


Please Select Speaker type (1=Harman;2=No brand)
[1,2]?1

         0 uS: C 4D
       900 uS: D EF
      1200 uS: D 01
      3600 uS: I 00
    114900 uS: I 82

Harman EQ Type Re-Write OK
Need remove AC-adapter firstly then reboot to enable EQ.


Press any key to continue . . .
```

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). It may not be necessary to remove all the FRUs in order to replace one. The chart below is a guide to which FRUs need to be removed in order to remove others. Always start by removing the battery pack, next, optional items such as the optional PC Card, then follow the chart downward removing only those FRUs necessary to reach the one you think is causing the computer to operate improperly. Refer to the example on the following page.

Battery pack									
HDD	Expansion Memory Module		Modem	Wireless LAN	Keyboard				
ODD			Display Assembly		Bluetooth Module				
Top Cover									Display Mask
Memory						Touch Pad	Direct Play Button Module	Speakers	
System Board								FL Inverter Board	
VGA Module	USB Module	Memory	Fan	Heat Sink				LCD Module	
				CPU					

The example below shows FRUs to be removed before the CPU can be removed. The CPU is located on the system board, which is under the top cover. The keyboard is on top of the top cover and must be removed. The removable HDD, wireless LAN card, expansion memory module, ODD, modem, and display assembly in turn need to be removed. Always start the disassembly process by removing the battery pack and optional devices and then move downwards through the table to access the required component.

Battery pack							
HDD	Expansion Memory Module		Modem	Wireless LAN	Keyboard		
ODD			Display Assembly		Bluetooth Module		
Top Cover							Display Mask
Memory				Touch Pad	Direct Play Button Module	Speakers	
System Board						FL Inverter Board	
VGA Module	USB Module	Memory	Fan	Heat Sink			LCD Module
				CPU			

Safety Precautions

Before you begin disassembly, read the following safety precautions and observe them carefully as you work.

DANGER:

1. *Always use the lithium ion battery pack or a backup battery that is authorized by Toshiba or is compatible with the unit. Since other battery packs have different specifications, they may be incompatible with the unit, and may burst or explode. Heating or disassembling the battery pack could cause leakage of alkaline solution. Throwing the battery pack into a fire could cause the battery pack to explode.*

2. *The power supply, FL inverter and other components carry high voltages. To avoid the risk of electric shock when you need to turn on the power of a partially disassembled computer to check its operation, be very careful not to touch connectors or components. Also, do not disassemble individual components for first-level maintenance.*

WARNING: To avoid the risk of electric shock or other injury:

1. *Always turn the power off and disconnect the AC adaptor from the power source.*

2. *Remove any metal jewelry or accessories such as watches, necklaces, bracelets, or rings. Batteries in the computer retain an electrical charge so there is a danger of electrical shock even when the computer is disconnected from an AC power source.*

3. *Never work with wet or damp hands.*

4. *The computer contains sharp edges and corners. Be careful not to injure yourself.*

5. *Make sure that all replacement components meet the specifications for the computer and that all cables and connectors are securely fastened.*

CAUTION: To avoid damage to the computer:

1. *When you change a component, make sure that the replacement component meets the required specifications. Never use foreign or incompatible parts.*

2. *Metal objects such as screws or paper clips which fall into the unit can cause a short-circuit, fire, or other internal damage.*

3. *When assembling the computer, make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in their corresponding figure. Make sure all screws are securely fastened. Loose screws can cause short circuits, resulting in heat, smoke, or fire.*

4. *Before removing an FRU or other component, make sure all cables to the component have been disconnected.*

5. *If you use AC power, be sure to use the cable that came with the computer or one recommended by Toshiba.*

Before You Begin

Look over the procedures in this section before you begin disassembling the computer. Familiarize yourself with the disassembly and reassembly steps. Begin each procedure by removing the AC adaptor and the battery pack as instructed in section 4.2.

1. Do not disassemble the computer unless it is operating abnormally.

2. Use only the correct and approved tools.

3. Make sure the working environment is free from the following elements whether you are using or storing the computer.

   ❑ Dust and contaminates

   ❑ Static electricity

   ❑ Extreme heat, cold and humidity

4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary troubleshooting and diagnostics tests described in chapters 2 and 3 of this manual.

5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the computer.

6. After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and will not interfere with your work.

7. You will remove and replace many screws when you disassemble the computer. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.

8. When assembling the computer make sure you use the correct screws to secure the various pieces. Screw sizes are listed in their corresponding figures.

9. The computer contains many sharp edges and corners, so be careful not to injure yourself.

10. After you have replaced an FRU, make sure the computer is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The computer has two basic types of cable connectors:

❑   Pressure Plate Connectors

❑   Standard Pin Connectors

To disconnect a Pressure Plate connector, lift up the tabs on either side of the connector's plastic pressure plate and slide the cable out of the connector. To connect the cable to a Pressure Plate connector, make sure the pressure plate is fully lifted and slide the cable into the connector. Secure the cable in place by pushing the sides of the pressure plate down so the plate is flush with the sides of the connector. Gently pull on the cable to make sure the cable is secure. If you pull out the connector, connect it again making sure the connector's pressure plate is fully lifted when you insert the cable.

Standard pin connectors are used with all other cables. These connectors can be connected and disconnected by simply pulling them apart or pushing them together.

Assembly Procedures

After you have disassembled the computer and fixed or repaired the problem that was causing the computer to operate abnormally, you will need to reassemble the computer.

Install all the removed FRUs following the steps described in the corresponding sections in this chapter.

While assembling the computer, remember the following general points:

❑   Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the computer.

❑   Make sure all cables and connectors are securely fastened.

❑   Before securing the FRU or other parts, make sure that no cables are pinched by screws or the FRUs.

❑   Check that all latches are closed securely.

❑   Make sure all the correct screws are used to secure all FRUs. Using the wrong screw can either damage the threads on the screw or the head of the screw and may prevent proper seating of an FRU.

After installing an FRU in the computer, confirm that the FRU and the computer are functioning properly.

Tools and Equipment

The use of Electrostatic Discharge (ESD) equipment is very important for your safety and the safety of those around you. Proper use of these devices will increase the success rate of your repairs and lower the cost for damaged or destroyed parts. The following equipment is necessary to disassemble and reassemble the computer:

❑ One M2 Phillips screwdriver to remove and replace screws.

❑ One T5 security screwdriver.

❑ Tweezers, to lift out screws that you cannot grasp with your fingers.

❑ ESD mats for the floor and the table you are working on.

❑ ESD wrist strap or heel grounder.

❑ Anti-static carpeting or flooring.

❑ Air-ionizers in highly static sensitive areas.

4.2 Battery

Removing the Battery Pack

To remove the battery pack from the battery bay, follow these steps:

1. Turn the computer upside down.

2. Unlock the battery compartment lock.
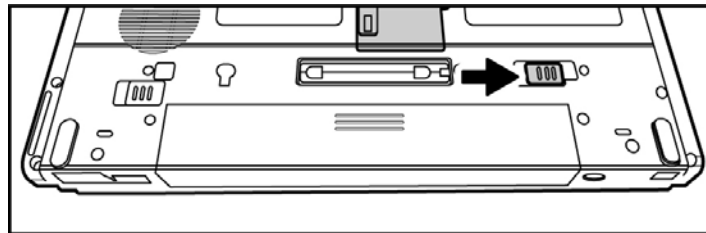
Figure 4-1   Unlocking the battery lock

3. Slide the battery bay latch to release the battery pack and then remove the battery pack from the bay.
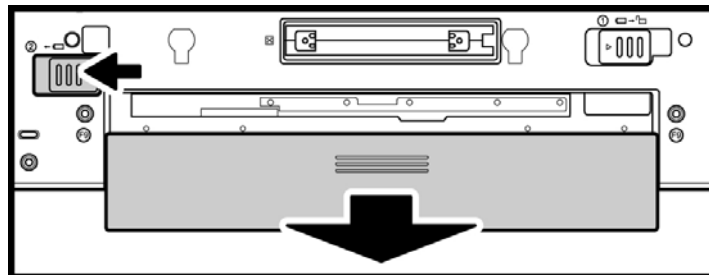
Figure 4-2   Removing the battery pack

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

Installing the Battery Pack

To install the battery pack in the battery bay, follow these steps and refer to the figures in the preceding section.

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

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1. Slide the battery pack into the battery bay. The battery bay latch will click automatically.

2. Lock the battery double lock to secure the battery pack in position.

4.3   PC Card

Removing a PC Card

To remove a PC Card, follow the steps below.

1. Push the PC Card's eject button. The button pops out when you release it.

2. Push the eject button again to pop the PC Card out slightly.

3. Grasp the PC Card and remove it.
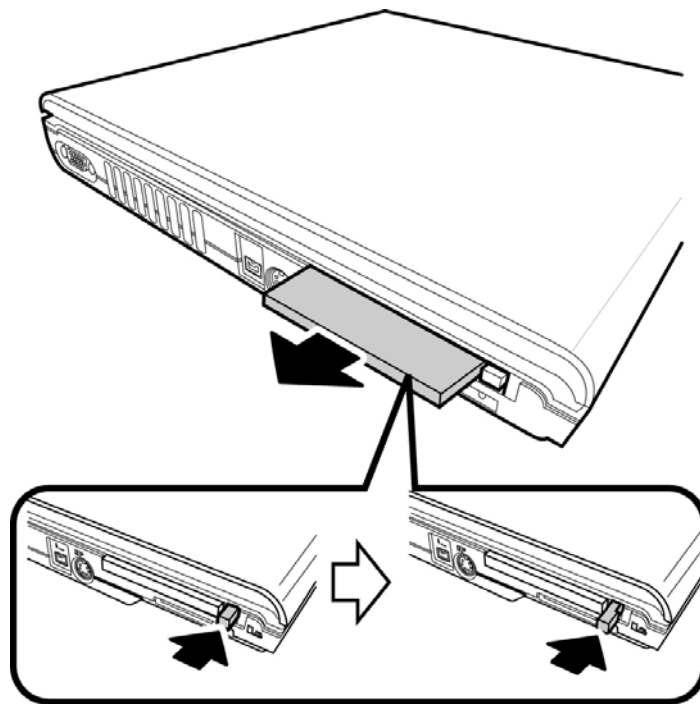
Figure 4-3   Removing the PC card

4. Push the eject button back into place, if necessary.

Inserting the PC Card

To insert the PC Card, follow these steps and refer to the figures in the preceding section.

1.   Make sure the eject button does not stick out. Push it back into place if required.

2.   Insert the PC Card in the slot and press gently to ensure a firm connection.
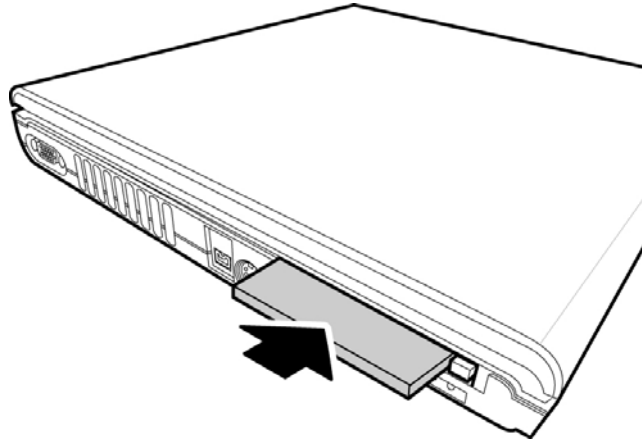
Figure 4-4   Installing the PC card

4.4   HDD

CAUTION: When handling the HDD, do not press the top surface. Hold the disk by the sides to prevent damage and loss of data.
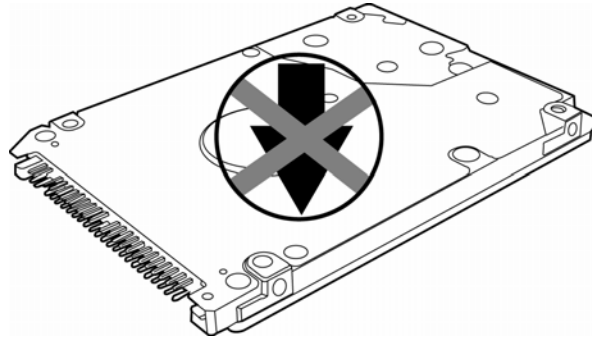
Figure 4-5   HDD

Removing the HDD Module

Follow the steps below to remove HDD module:

1. Turn the computer upside down.

2. Remove the black M2.5x3 screw to release the HDD door.
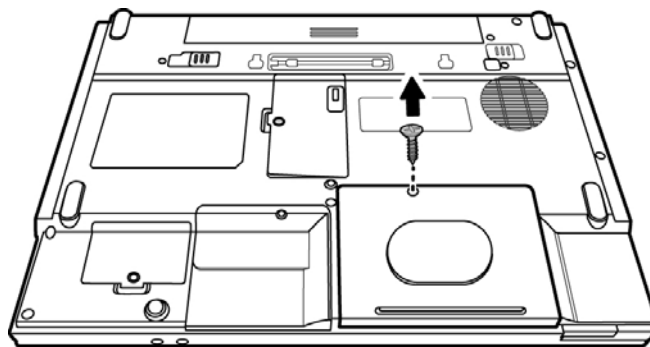
Figure 4-6   Removing the HDD door screw

3. Pull up and lift the HDD door to remove it.
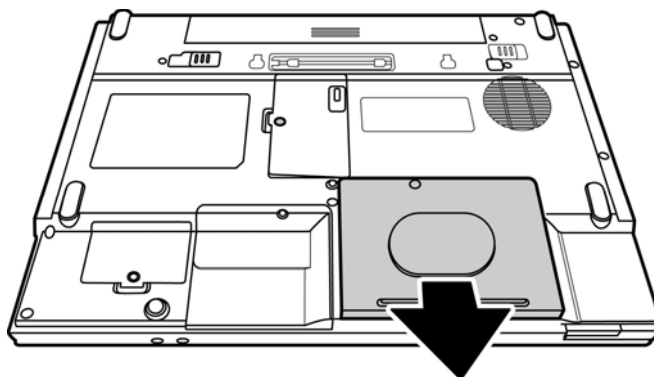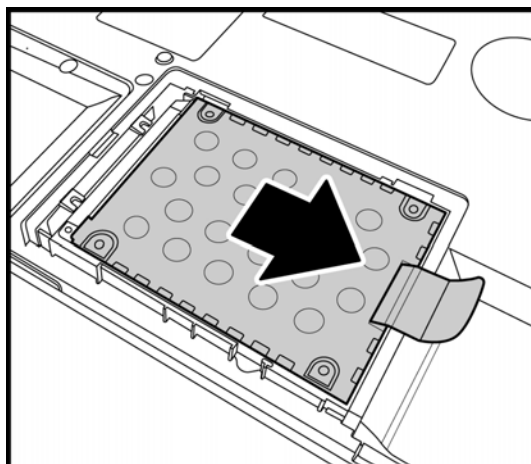

Figure 4-7   Removing the HDD door

4. Pull out the tab to remove the HDD unit.

Figure 4-8   Removing the HDD

5. Remove the four M3x3 black screws that secure the HDD case and bracket to the HDD.

6. Remove the HDD from the HDD case.

Installing the HDD

To install the HDD, follow these steps and refer to the figures in the preceding section.

1. Seat the HDD in the HDD case and bracket, and secure it with four M3×3 black screws.

2. Insert the HDD unit into the HDD slot.

3. Secure the HDD door with a black M2.5x3 screw.

4.5   Expansion Memory

Removing the Expansion Memory Module

To remove the memory module, make sure the computer is in boot mode before removing the memory module. Remove the battery pack, cables and any optional devices before you start and then follow these steps:

1.   Loosen the embedded safety screw securing the memory module socket cover.
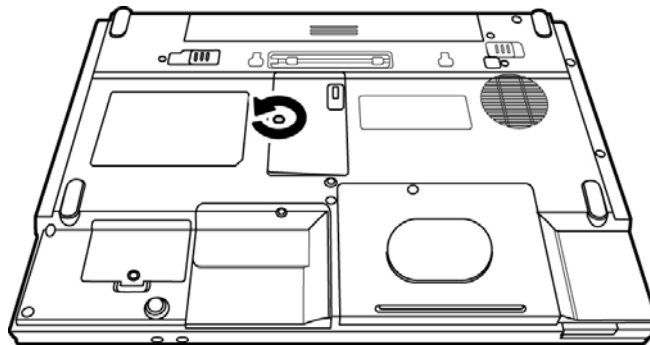

Figure 4-9   Removing the cover screw

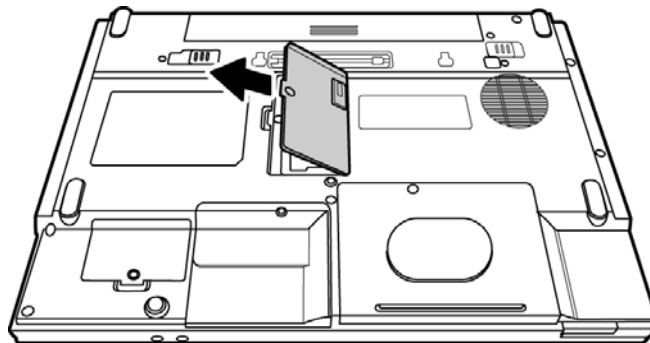2.   Slide your fingernail or a thin object under the cover and lift it off.

Figure 4-10   Removing the expansion memory module cover

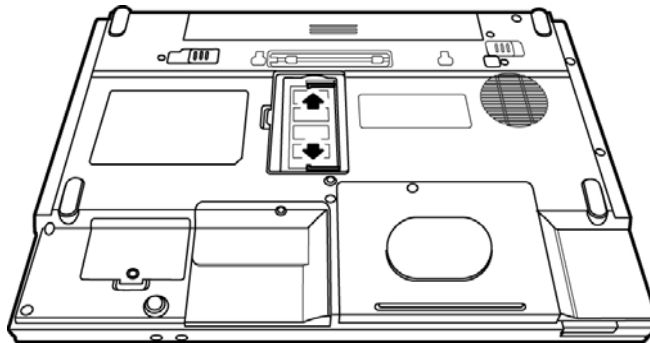3.   Push the latches to release the memory module. A spring will force one end of the module up.

Figure 4-11   Releasing the memory module
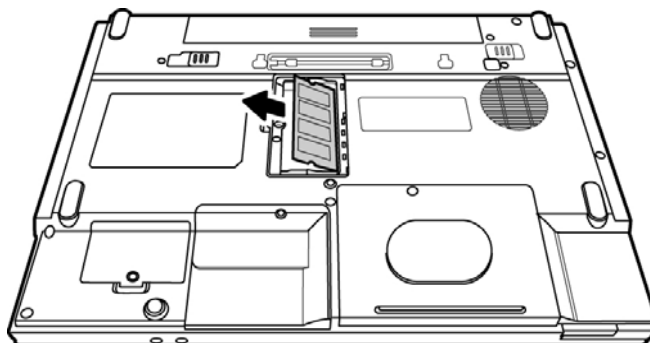
4.   Grasp the module and pull it out.

Figure 4-12   Removing the expansion memory module

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

Installing the Expansion Memory Module

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

Follow these steps to install a memory module:

1.   Set the computer to boot mode and turn off the power.

2.   Loosen the embedded safety screw securing the memory module socket cover.

3.   Slide your fingernail or a thin object under the cover and lift it off.

4.   Fit the module's connectors into the computer's connectors at about a 45-degree angle and press the module carefully to ensure a firm connection.

5.   Push the module down so it lies flat. The latches on either side will click into place to secure the module.

4.6 Optical Drive Module

Removing the Optical Drive Module

To remove the optical drive module, you need to remove the expansion memory module cover first as described in the previous section. Follow the steps below:

1. Turn the computer upside down.

2. Remove the battery and the expansion memory module cover.

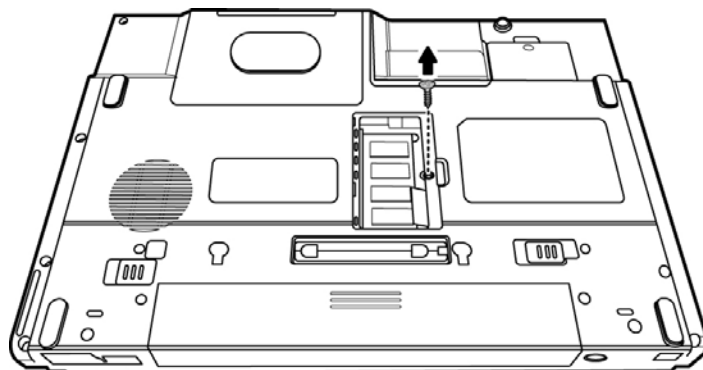3. Remove the M2.5x6 screw securing the optical drive module.

Figure 4-13   Removing the optical drive screw

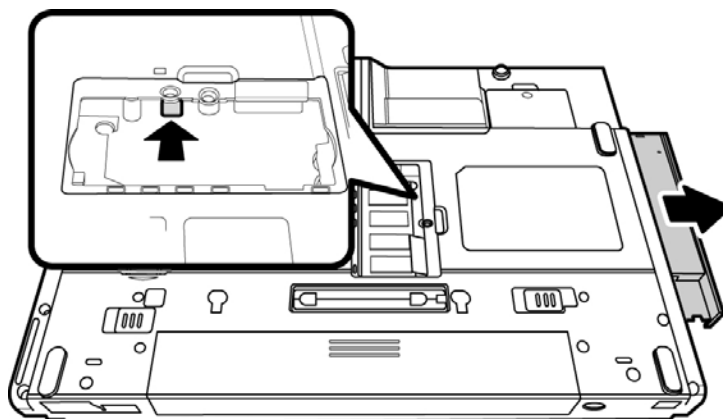4. Use your hand to push the module and then slide the module from the bay.

Figure 4-14   Removing the optical drive module

Installing the Optical Drive Module

To install a device in the optical drive module bay, follow the steps below and refer to the figure in the preceding section.

1. Make sure that the expansion memory door is opened and the ODD screw (M2.5x6) is removed.

2. Slide the device into the optical drive module bay.

3. Use the M2.5x6 screw to secure the optical drive module.

4. Replace the expansion memory module cover.

4.7　Optical Drive

This computer may be fitted with a:　　CD-RW/DVD-ROM device
　　　　　　　　　　　　　　　　　　DVD dual device
　　　　　　　　　　　　　　　　　　DVD Super Multi device

Disassembling the Optical Drive

To disassemble the optical drive, first remove the drive from its module bay as described in the previous section, and then follow the steps below.

1.　Remove the two M2x3 screws from the bracket plate. Remove the bracket plate.
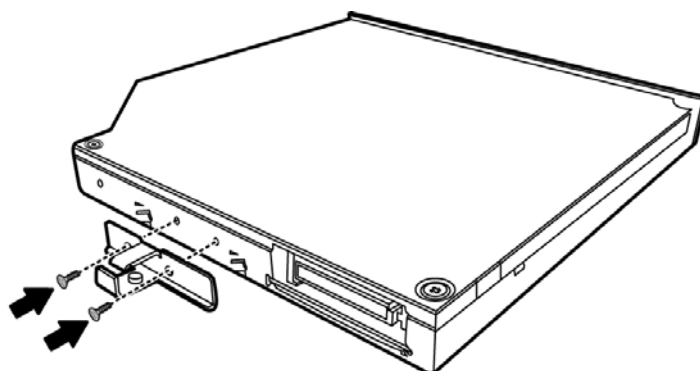
Figure 4-15　　Removing the optical drive bracket

Reassembling the Optical Drive

To reassemble an optical drive, follow the steps below and refer to the figure in the preceding section.

1. Position the optical drive bracket plate so that it is aligned with the rear panel of optical drive.

2. Secure the optical drive bracket plate with two black M2×3 screws.

3. Install the optical drive module into the bay as described in the preceding section.

4.8 Keyboard

Removing the Keyboard

Before removing the keyboard, remove the battery and any optional devices. Follow the steps below to remove the keyboard:

1. Open the display panel.

2. Insert a thin tool such as a flat screwdriver into the gap between the strip cover and keyboard to lever the strip cover up.

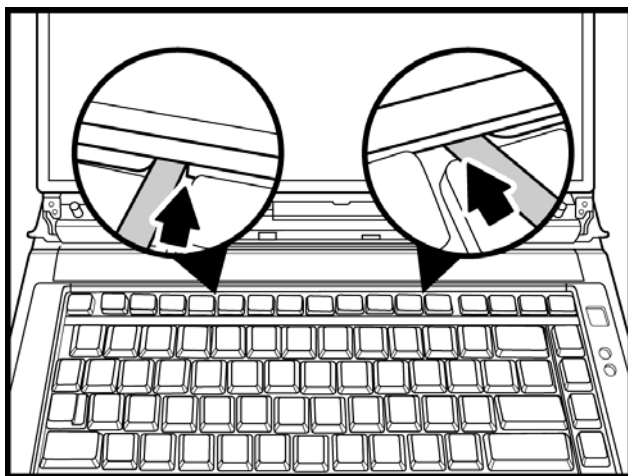*Figure 4-16   Removing the strip cover*

3. Remove the strip cover.
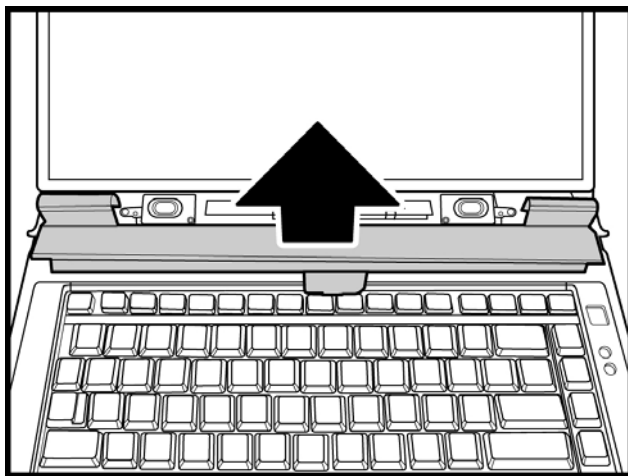
Figure 4-17   Removing the strip cover

4. Remove the M2.5x3 black screws securing the keyboard.
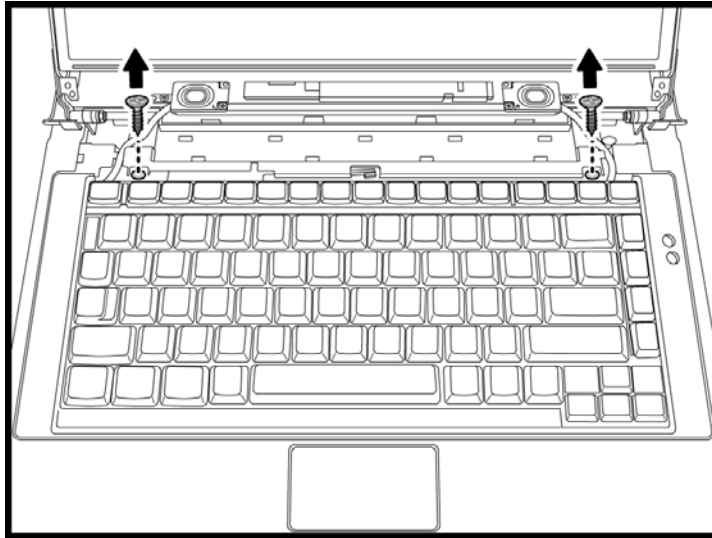
Figure 4-18   Removing the keyboard screws

5. Push the center of the strip cover and lift the keyboard out, revealing the keyboard cable underneath. Disconnect the cable.
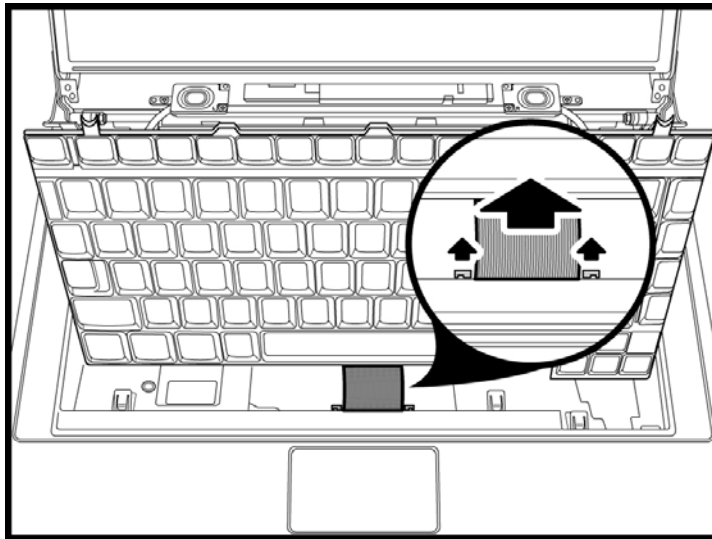
Figure 4-19   Removing the keyboard cable

6. Lift and remove the keyboard.
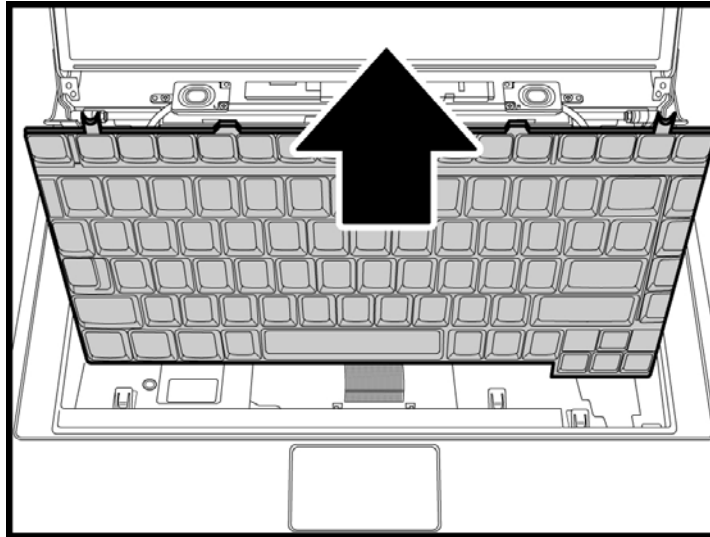
Figure 4-20   Disconnecting the keyboard cable

Installing the Keyboard

To install the keyboard, follow the steps below and refer to the figures in the preceding section.

1. Connect the keyboard cable to the system board.

2. Place the keyboard on the top cover and secure it with two black M2.5x3 screws.

3. Set the strip cover and press down to secure the strip cover until the latches engage.

4.9   Bluetooth module

Removing the Bluetooth Module

Remove the battery and any optional devices before removing the wireless LAN unit. In addition, you have to remove the keyboard as described in the previous section to access the Bluetooth module. Follow these instructions:

1.   Remove the black M2.5x3 screw securing the Bluetooth module to the system board.
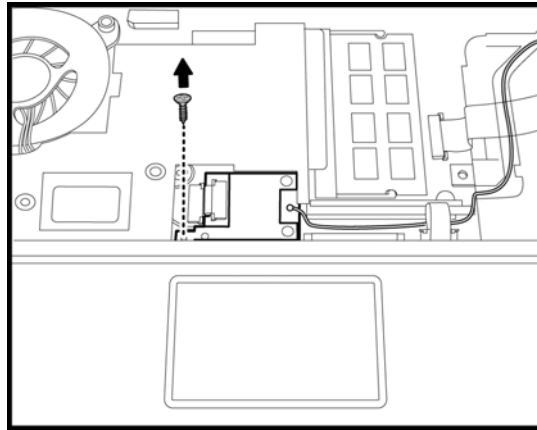
Figure 4-21   Removing the Bluetooth module screw

2.   Disconnect the Bluetooth FFC cable from the system board.
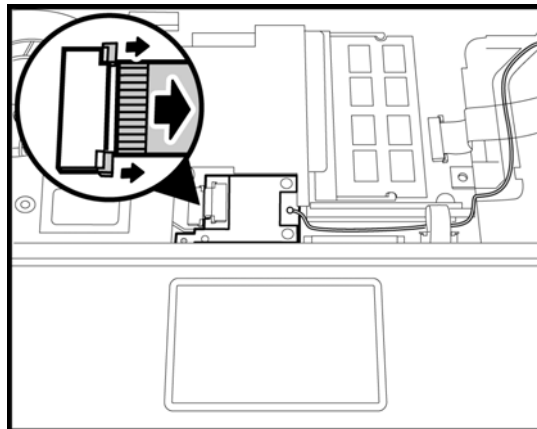
Figure 4-22   Disconnecting the FFC cable

3.   Insert a screwdriver to gently lift the Bluetooth module.
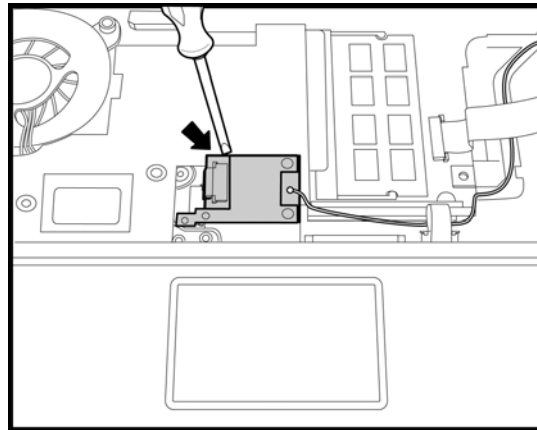
Figure 4-23   Lifting the Bluetooth module

4.   Remove the Bluetooth module.
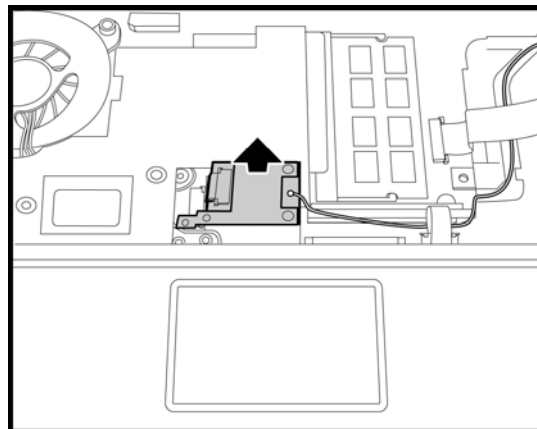
Figure 4-24   Removing the Bluetooth module

5.   Disconnect the Bluetooth connector (brown) from the module.
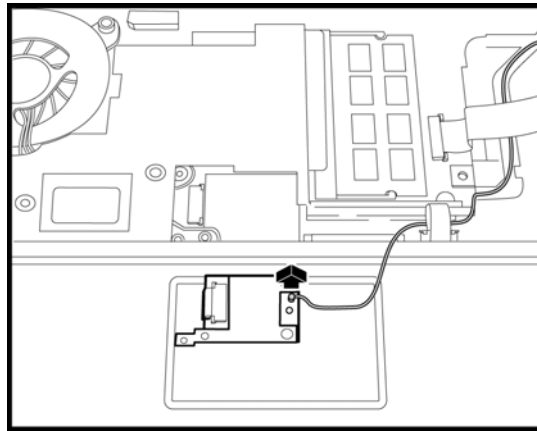
Figure 4-25   Disconnecting the Bluetooth connector

6.   Remove the two M2x3 screws to remove the bracket holding the Bluetooth module.
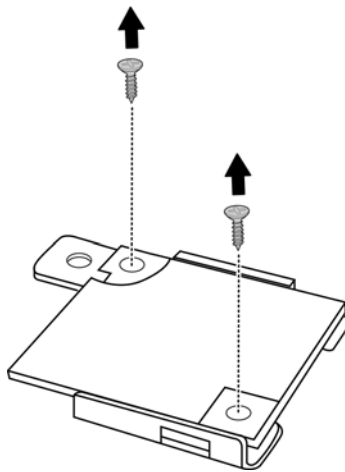
Figure 4-26   Removing the Bluetooth module bracket

7.   Separate the Bluetooth module components.
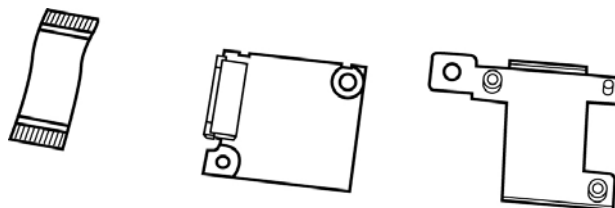
Figure 4-27   Separating the components

Installing the Bluetooth Module

To install the Bluetooth module, follow the steps below and refer to the figures in the preceding section.

1.   Place the bracket around the Bluetooth module and secure it with two M2x3 screws.

2.   Secure the module to the system board using one black M2.5x3 screw.

3.   Connect the FFC cable to the module to connect to the system board.

4.   Connect the Bluetooth connector (brown) to the module.

4.10 Wireless LAN Unit

Removing the Wireless LAN Unit

Remove the battery and any optional devices before removing the wireless LAN unit as described in the following instructions.

1. Remove the black M2x4 screw securing the wireless LAN door.
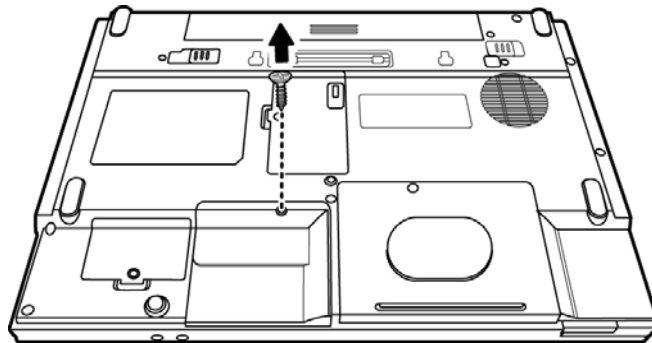
Figure 4-28   Removing the wireless LAN unit screw

2. Remove the wireless LAN door.
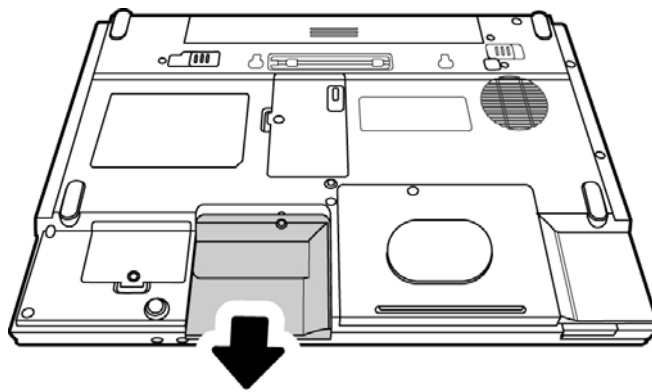
Figure 4-29   Removing the wireless LAN door

3. Detach the two ends of the LAN antenna (black and white).
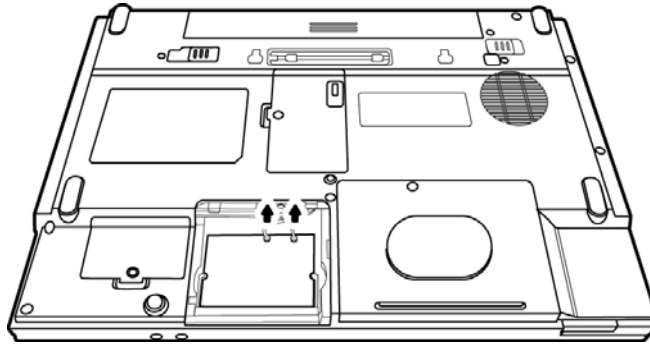
Figure 4-30   Removing the wireless LAN antenna connectors

4. Use your fingers to press the two latches of the LAN unit holder. The LAN unit pops up.
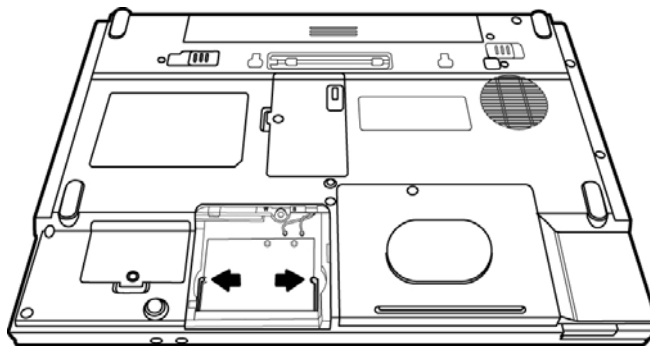
Figure 4-31   Releasing the wireless LAN unit

5. Grasp the wireless LAN unit and pull it out.
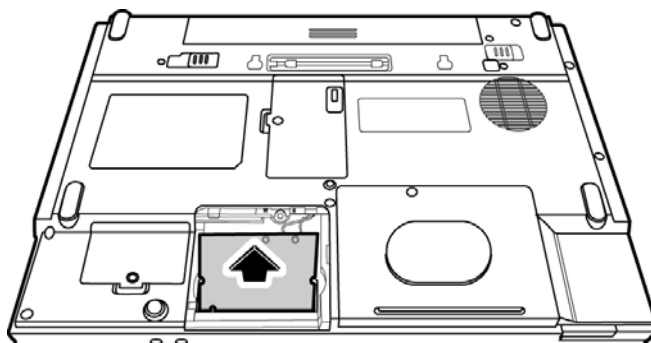
Figure 4-32   Removing the wireless LAN unit

> *CAUTION*: *Do not touch the connectors on the wireless LAN unit or on the computer. Debris on the connectors may cause malfunction.*

Installing the Wireless LAN Unit

To install the wireless LAN unit, follow the steps below and refer to the figures in the preceding section.

1. Remove the black M2x4 screw securing the wireless LAN door, and then remove the wireless LAN door as described previously.

    > *CAUTION: Do not touch the connectors on the wireless LAN unit or on the computer. Debris on the connectors may cause malfunction.*

2. Place the wireless LAN unit in the wireless LAN holder and gently press down. The two latches of the holder will snap close to hold the unit.

3. Attach the white antenna to the main connector, and the black antenna to the Aux connector.

4. Use the black M2x4 screw to secure the wireless LAN door.

4.11 Modem

Removing the Modem

Remove the battery and any optional devices before removing the modem as described in the following instructions:

1. Remove the M2.5x3 screw to release the modem cover.
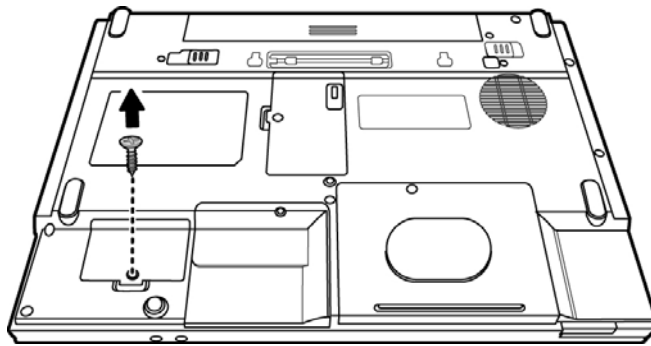
Figure 4-33   Removing the modem cover screw

2. Remove the modem cover.
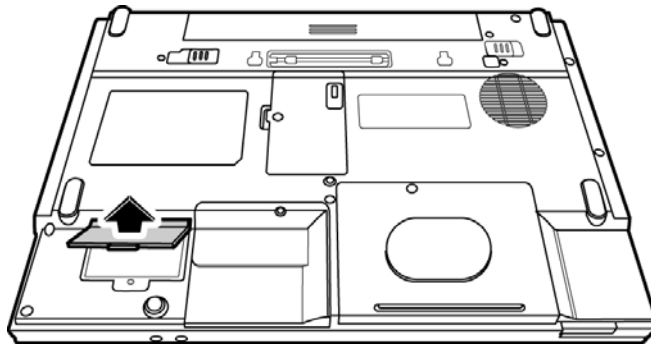
Figure 4-34   Removing the modem cover

3. Remove two M2.5x3 screws securing the modem module.
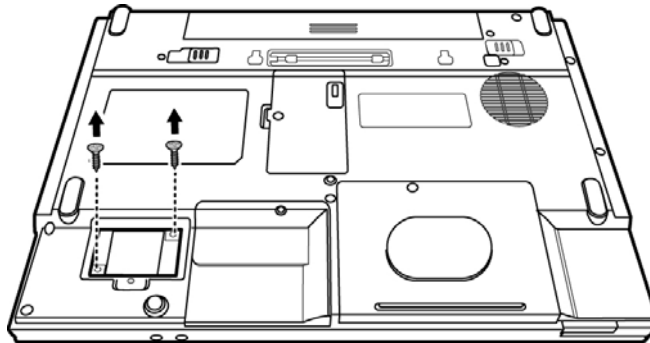
Figure 4-35   Removing the modem module screws

4. Disconnect the modem cable from the modem module and carefully lift the unit from its connector.
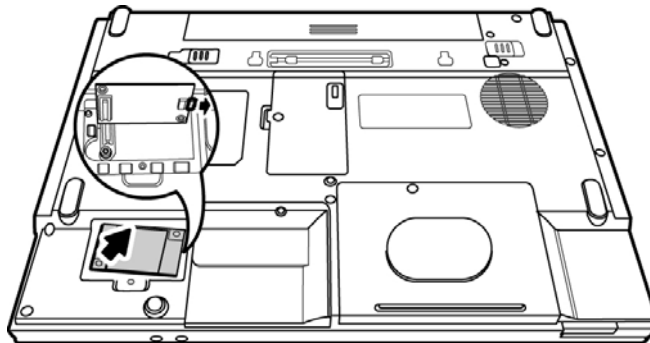
Figure 4-36   Removing the modem module

Installing the Modem

To install a modem, follow the steps below and refer to the figures in the preceding section.

1. Connect the modem cable to the modem module.

2. Fit the modem onto its connector and secure it with two black M2.5x3 screws.

3. Replace the M2.5x3 screw to fix the modem cover.

4.12 Display Assembly

Removing the Display Assembly

To remove the display assembly, first remove the battery and any optional devices. Also remove the keyboard, and the wireless LAN unit as described in the previous sections. Then follow the steps below:

1. Remove the keyboard and the wireless LAN unit. Separate the wireless LAN antenna connectors from the top cover and place them on a side out of the way. Also remove the Bluetooth connector from the module.

2. Disconnect the LCD power cable and speaker cable from the top cover.
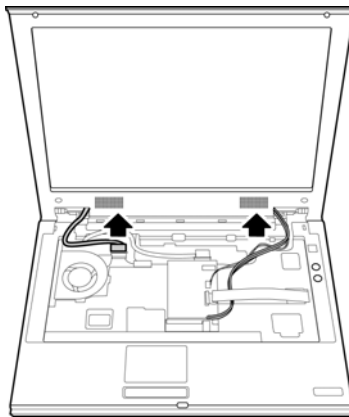
Figure 4-37   Disconnecting all cables

3. Remove two M2.5x6 screws securing the LCD assembly from the rear side.
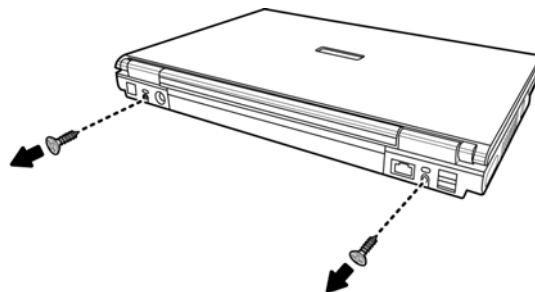
Figure 4-38   Disconnecting the rear screws

4. Remove two M2.5x6 screws securing the LCD assembly to the top cover.
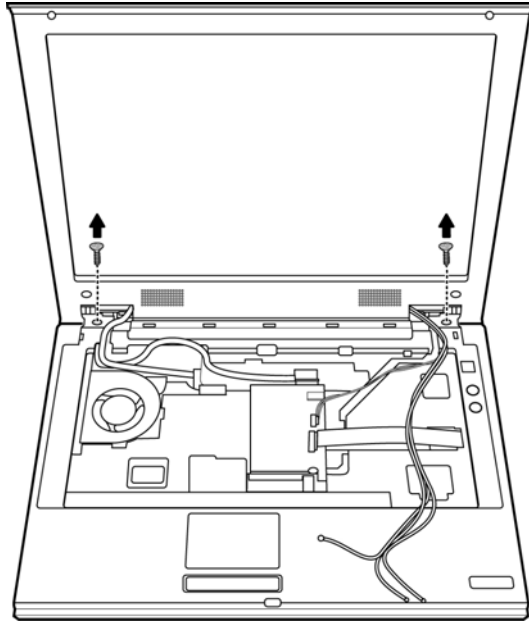
Figure 4-39   Removing the front screws

5. Remove the LCD assembly.
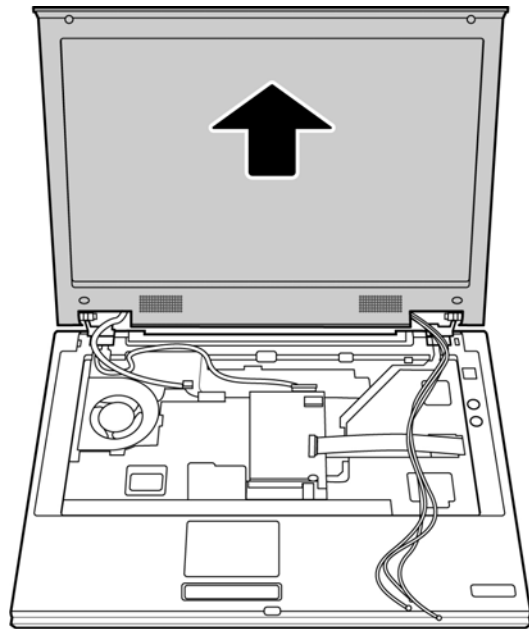
Figure 4-40   Removing the display assembly

Installing the Display Assembly

To install the display assembly, follow the steps below and refer to the figures in the preceding section.

1. Seat the display assembly taking care not to crush to the LCD display cable, the LCD power cable, the wireless LAN antenna connector, or the Bluetooth connector.

2. Secure two M2.5x6 black screws to each hinge to connect the assembly to the top cover.

3. Secure two black M2.5x6 black screws to the computer's rear side. They hold the display assembly in place.

4. Feed the wireless LAN module's antennae wires through the small hole on the system board towards the rear side.

5. Connect the Bluetooth connector to the Bluetooth module.

6. Connect the LCD power cable to the top chassis.

7. Reinstall the keyboard and wireless LAN module.

4.13 Top Cover

Removing the Cover

To remove the top cover, first remove the battery pack, HDD, expansion memory module, ODD, modem, wireless LAN unit, keyboard, Bluetooth module, and display assembly, as described in the preceding sections. Follow the steps below to remove the top cover.

1. Remove three M2.5x6 screws and one M2.5x3 screw securing the top cover.
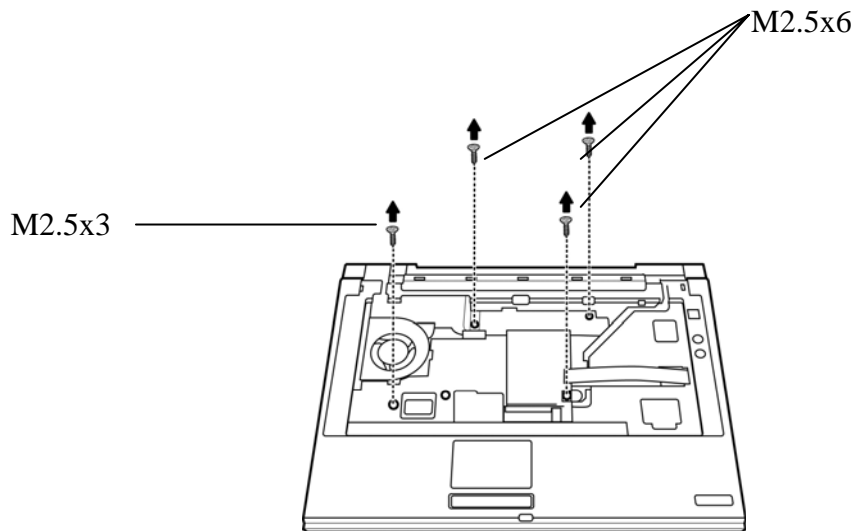
Figure 4-41   Removing the top cover (front panel screws)

2. Detach the upper FFC cable (from direct play button module) and touch pad FPC cable from the top cover.

3. Detach the USB and LAN cables.
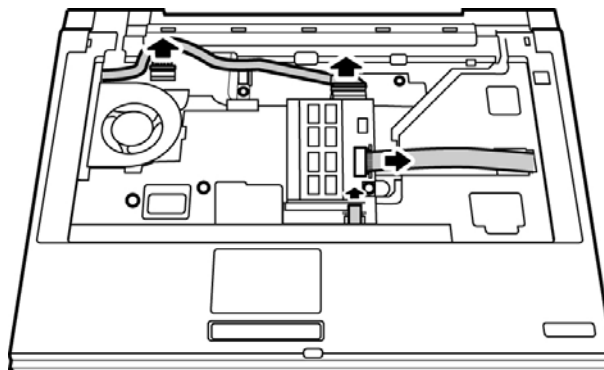
Figure 4-42   Removing the cables

4. Turn the computer upside down and remove the following screws:

- M2.5X6: five screws, two from the battery compartment, and three from the HDD compartment

- M2.5X9: eleven screws from the back panel
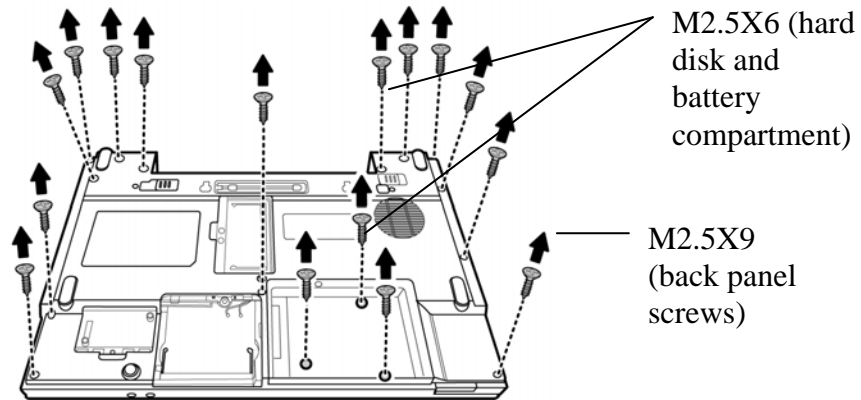
Figure 4-43   Removing the top cover (back panel screws)

5. Turn the computer over and lift off the top cover.

Figure 4-44   Removing the top cover

Installing the Top Cover

To install the top cover, follow the steps below and refer to the figures in the preceding section.

1. Seat the top cover and secure the upper FFC cable (from direct play button module) and Touch pad FFC cable to the computer's top chassis.

2. Attach the USB and LAN cables.

3. Secure the top cover with three M2.5x6 screws.

4. Turn the computer upside down and secure the following screws:

    -   M2.5X6: five screws, two from the battery compartment, and three from the HDD compartment

    -   M2.5X9: eleven screws from the back panel

4.14 Touch Pad

Removing the Touch Pad

To remove the Touch Pad, first remove the battery pack, keyboard, and top cover, and then follow the steps below:

1. Disconnect the Touch Pad FFC cable from the Touch Pad.

2. Remove one M2.5x3 screw securing the Touch Pad Bracket to the rear side of the top cover.
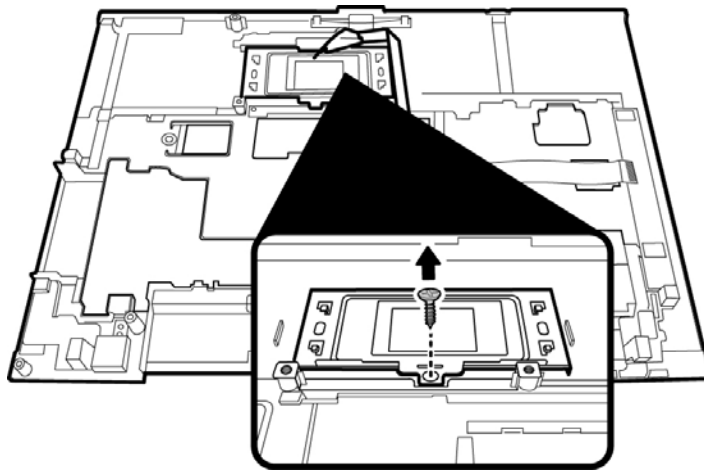
Figure 4-45   Removing the touch pad screw

3. Remove the bracket.
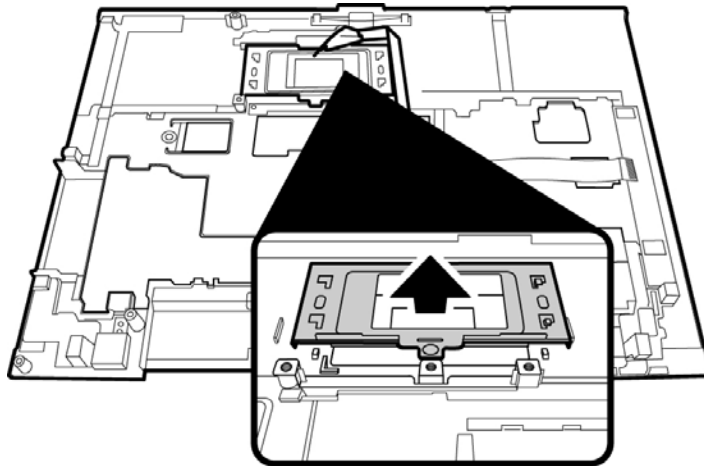
Figure 4-46   Removing the touch pad bracket

4. Remove the Touch Pad by lifting it gently.
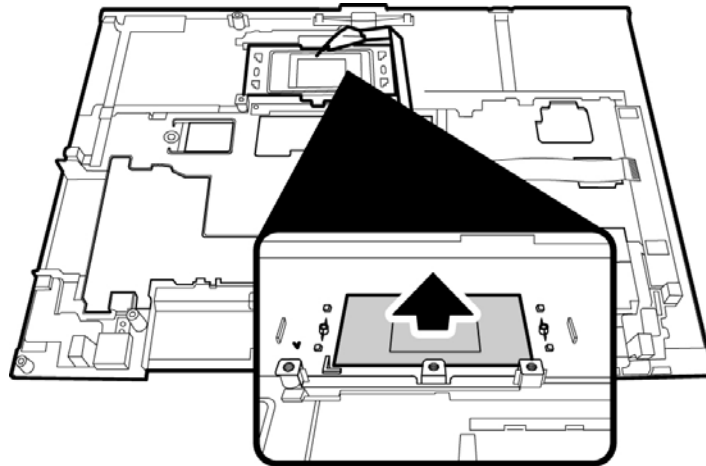
Figure 4-47   Removing the touch pad

Installing the Touch Pad

To install the Touch Pad, follow the steps below and refer to the figures in the preceding section:

1. Turn the top cover upside down and place the Touch Pad, and the Touch Pad Bracket, in position on top.

2. Secure the Touch Pad bracket with one M2.5x3 screw.

3. Connect the Touch Pad FFC cable to the Touch Pad.

4.15 Direct Play Button Module

Removing the Direct Play Button Module

To remove the module, first remove the battery pack, keyboard, and top cover, and then follow the steps below:

1. Turn over the top cover and remove three M2.5x3 screws securing the direct play button module to the rear of the top cover.
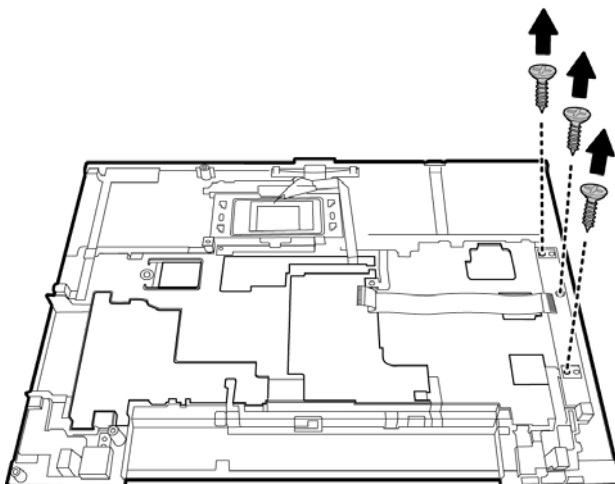
Figure 4-48   Removing the direct play button module screws

2. Disconnect the FCC cable from the system board. Lift and remove the module.
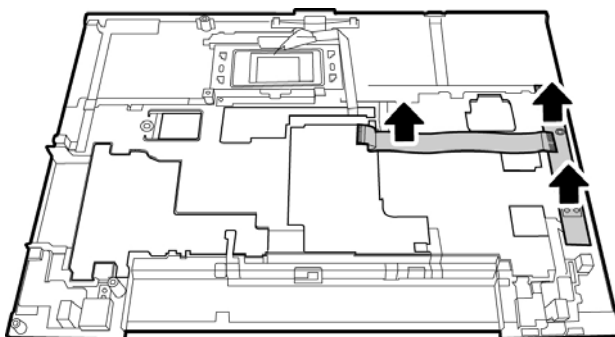
Figure 4-49   Removing the direct play button module

Installing the Direct Play Button Module

To install the module, follow the steps below and refer to the figures in the preceding section:

1. Turn the top cover upside down and place the direct play button module.

2. Secure the module to the top cover with three M2.5x3 screws.

3. Feed the upper FFC through the opening on the top cover so that it may be connected to the system board.

4.16 Memory

Removing the Memory Module

To remove the memory module, first remove the battery pack, keyboard, and top cover. Follow these steps to remove the memory module:

1. Remove the aluminum foil covering the memory module.
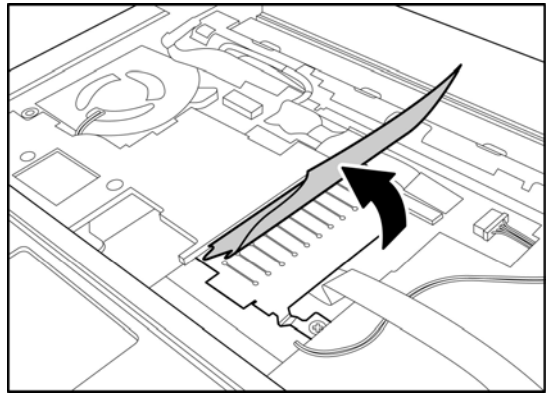
Figure 4-50   Removing the aluminum foil

2. Remove one M2.5x6 screw attached to the metallic strip.
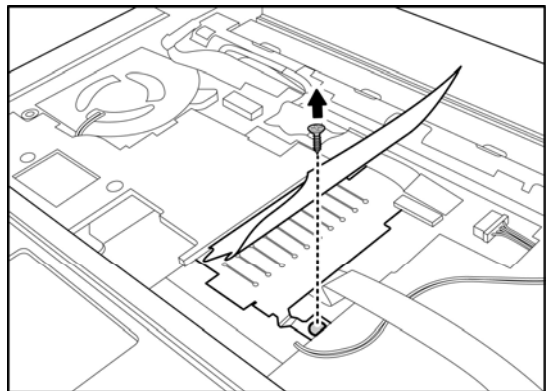
Figure 4-51   Removing the screw

3. Gently lift the metallic strip on top of the memory module.
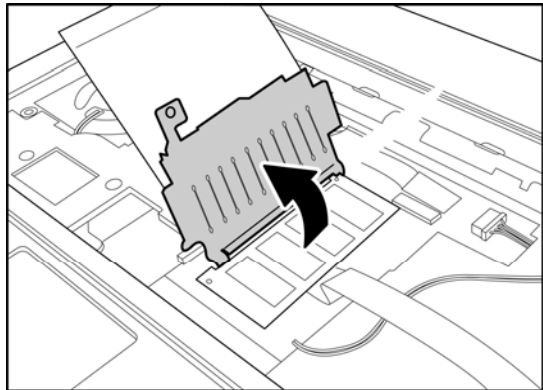
Figure 4-52   Lifting the metal strip

4. Remove the metallic strip.
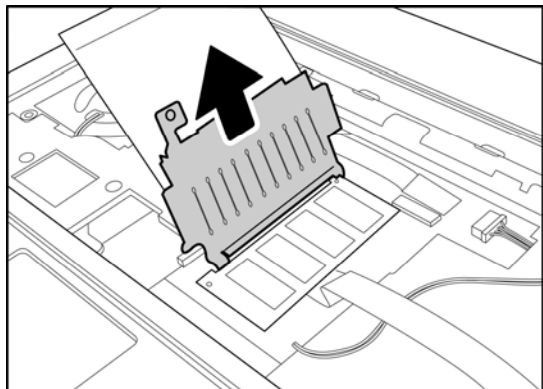
Figure 4-53   Removing the metal strip

5. Press the two latches holding the memory module and hold them apart. The memory module pops out.
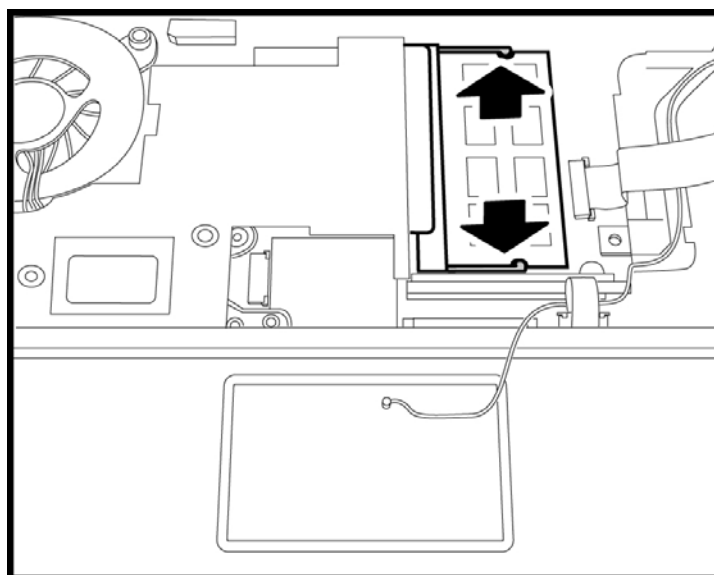
Figure 4-54   Releasing the memory module

6. Remove the memory module from the slot by sliding it out gently.
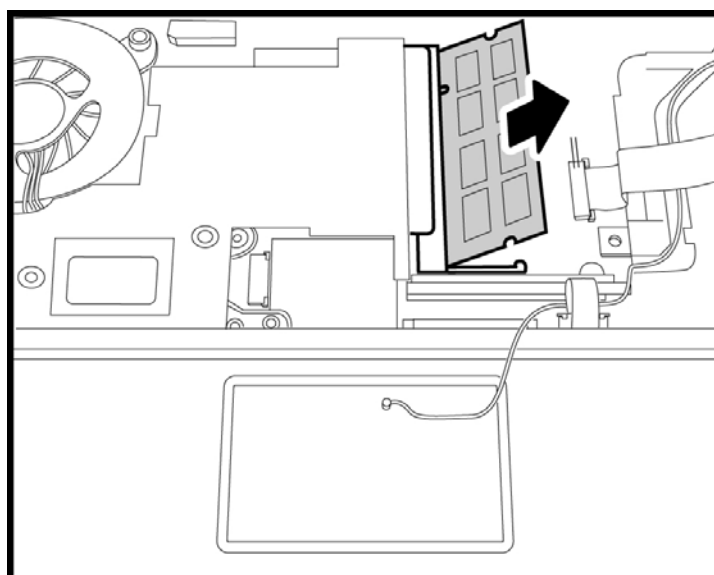
Figure 4-55   Removing the memory module

Installing the Memory Module

To install the memory module, follow the steps below and refer to the figure in the preceding section:

1. Place the memory module in the slot at an angle of 45 degrees with the horizontal.

2. Press the module gently in place till the latches snap into place to secure the module.

3. Replace the metallic strip and the M2.5x6 screw.

4. Replace the aluminum cover.

4.17 System Board

Removing the System Board

To remove the system board, first remove the LCD assembly, keyboard, and top cover, and then follow the steps below:

1. Disconnect the CRT cable from the system board.

2. Remove the USB cables from the system board.

3. Remove the modem cable from the system board.
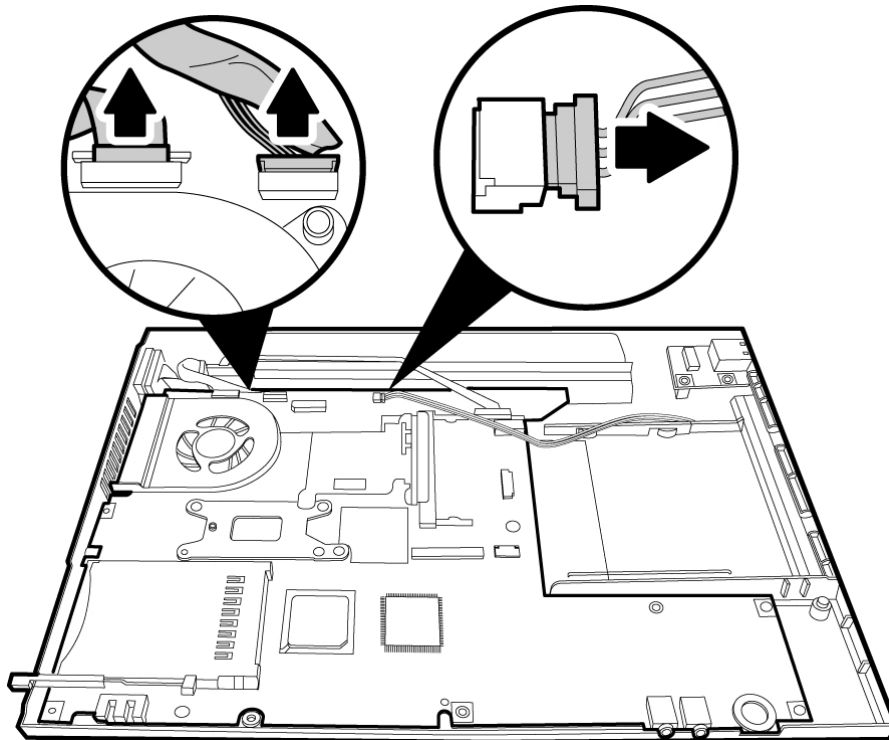
Figure 4-56   Removing the connectors

4. Remove the power connector.

5. Remove any tape that might be securing other connectors.

6. Remove three M2.5x6 screws securing the system board.
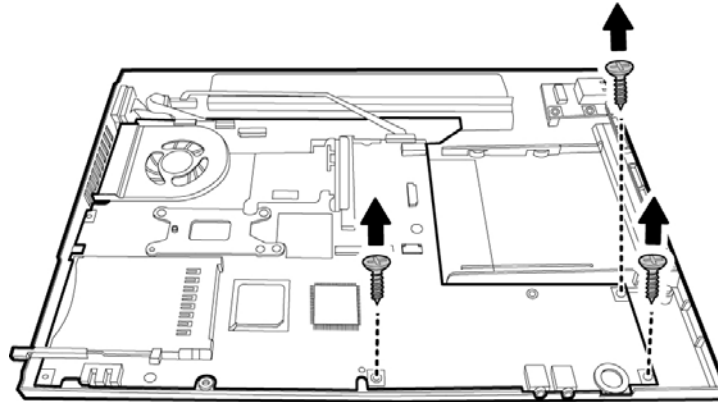
Figure 4-57   Removing the system board screws

7. Remove the system board from the chassis. Take care to dislodge the various ports on the board from their openings in the chassis to avoid damage to the ports. You may have to use your fingers to expand the chassis so as to release the system board.
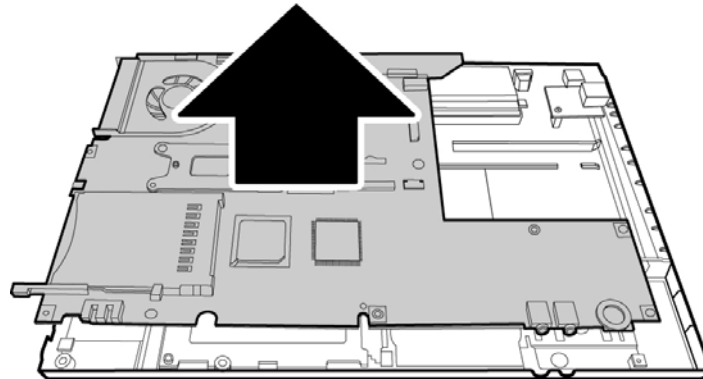
Figure 4-58   Removing the system board

Installing the System Board

To install the system board, follow the steps below and refer to the figures in the preceding section.

1. Seat the system board in the chassis. Take care to align all the ports and connectors in their respective openings on the chassis.

2. Replace the three M2.5x6 screws to secure the system board.

3. Connect the CRT, USB, and modem cables.

4. Connect the power connector.

4.18 Fan & CPU

Removing the Fan & CPU

To remove the Fan, Heat Sink, and CPU, you must first remove the display assembly, keyboard, top cover and system board, and then follow the steps below:

1.   Remove two M2.5x3 screws securing the fan from the top side of the system board.
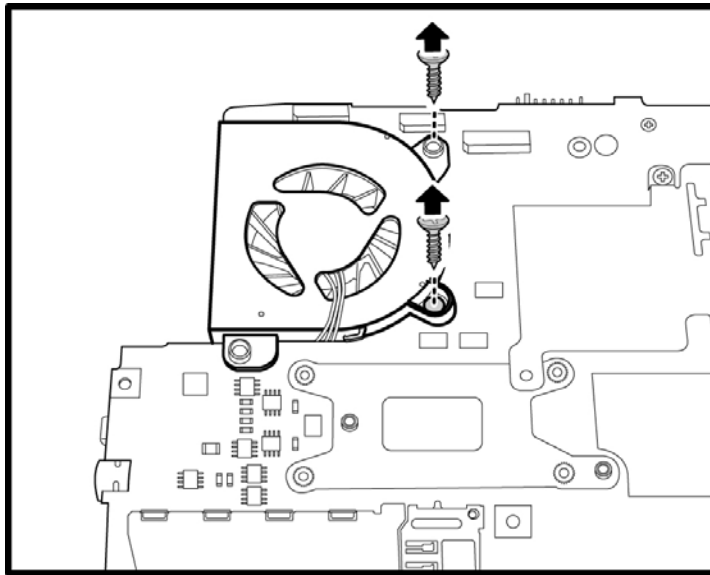
Figure 4-59   Removing the fan screws from the top of the system board

2.   Turn the system board upside down. Remove the four M2.5x6 screws from the heat sink.
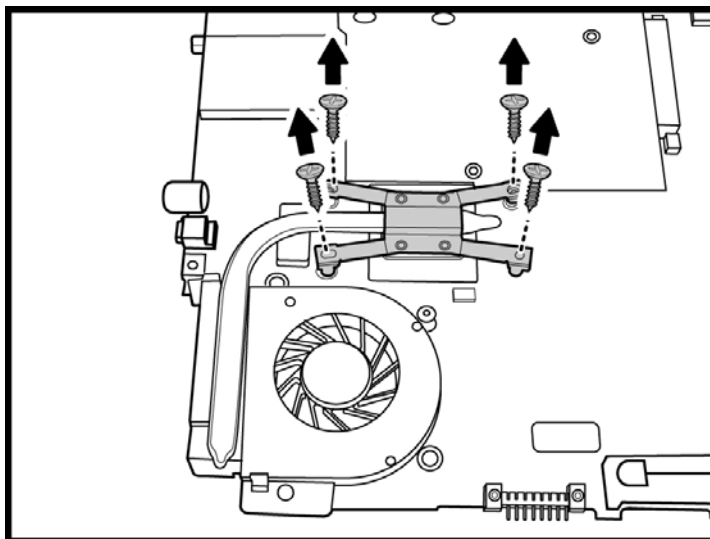
Figure 4-60   Removing the heat sink screws

3. Remove the heat sink.
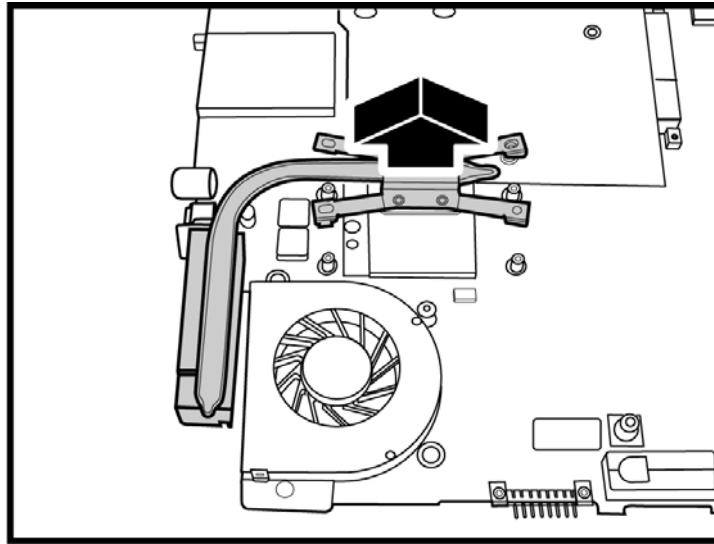
Figure 4-61   Removing the heat sink

4. Remove the M2.5x3 screw securing the fan.
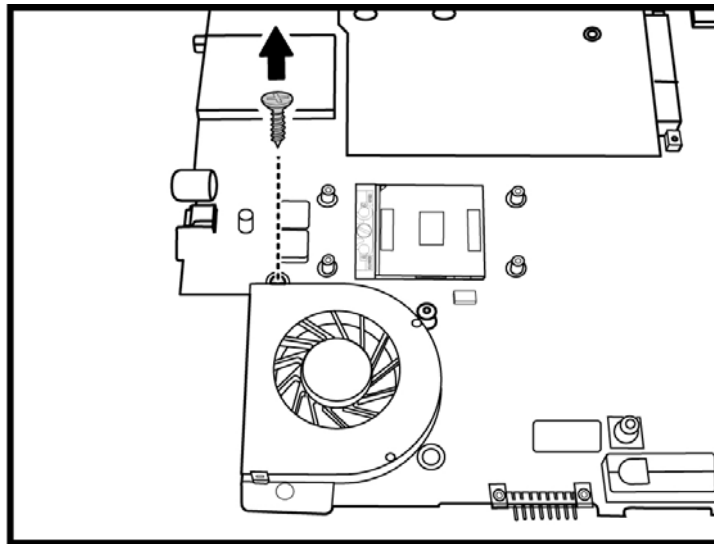
Figure 4-62   Removing the fan screw

5. Remove the fan connector from the system board.

6.   Remove the fan module.
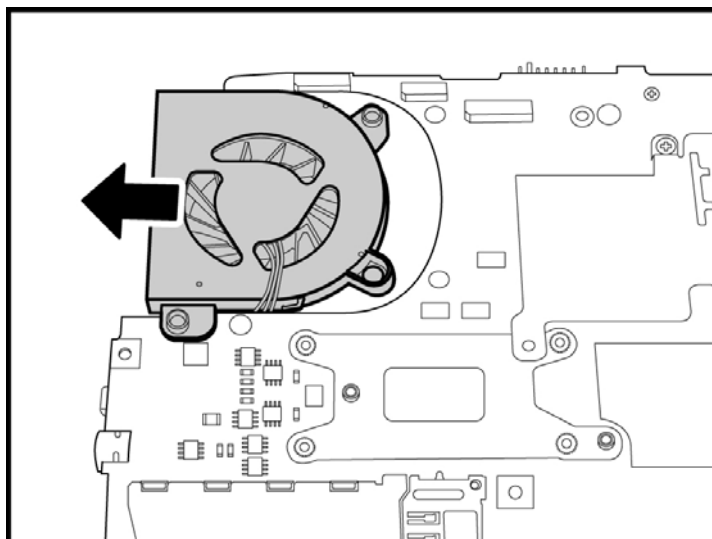
Figure 4-63   Removing the fan

7.   Turn the cam on the CPU socket with a flat-blade screwdriver so that the notch on the cam is aligned with the *open* side of the CPU socket to unlock the CPU.
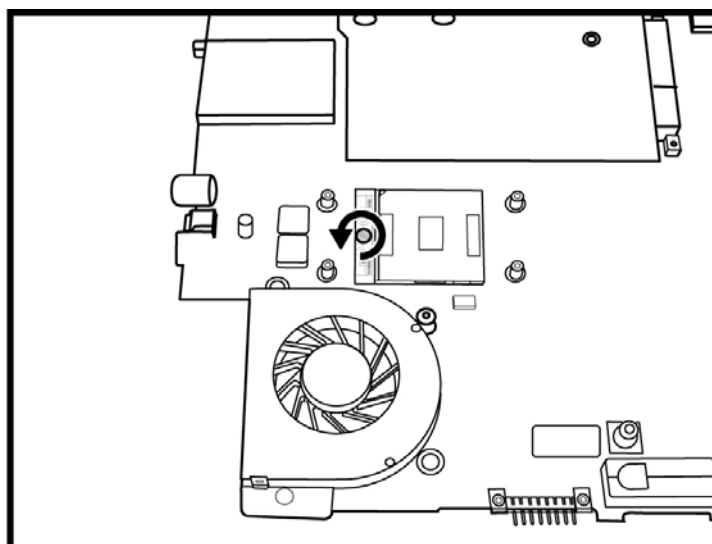
Figure 4-64   Turning the CPU cam

8.   Gently lift out the CPU.

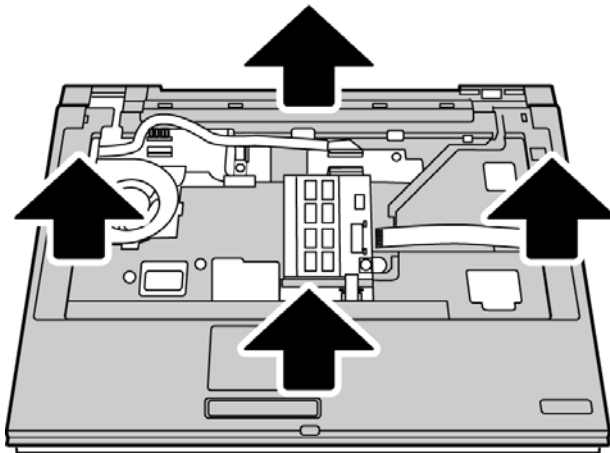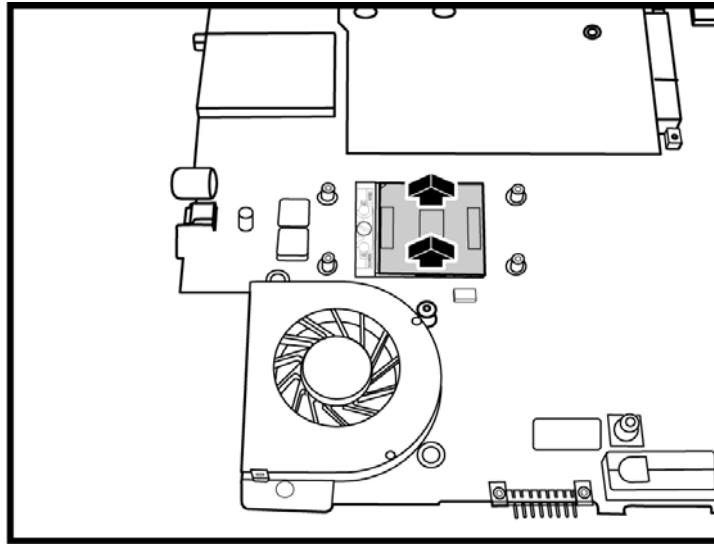*Figure 4-65   Removing the CPU*

Installing the CPU

To install the CPU, follow the steps below and refer to the figures in the preceding section.

> *CAUTION:* *If you remove the heat sink, use the CPU grease tool to remove the grease on the CPU and heat sink. Reapply fresh grease before installing the heat sink.*

1. Make sure that the notch on the cam is aligned with the *open* position of the CPU slot.

2. Seat the CPU aligning the triangle mark on the CPU with the one on the CPU socket. Make sure the alignment is exact to avoid damaging pins on the CPU.

3. Press the CPU softly with your fingers to insert into the socket and turn the cam on the CPU socket to the *closed* position with a flat-blade screwdriver to secure the CPU.

4. Seat the fan module and secure with the three screws.

5. Attach the fan connector.

6. Seat the heat sink over the CPU and secure with four screws in the order indicated on the heat sink.

4.19 USB Module

Removing the USB Module

To remove the USB module, you have to first remove the keyboard, top cover, and system board. Then follow the steps below:

1. Remove the M2.5x6 screw securing the USB module to the chassis.
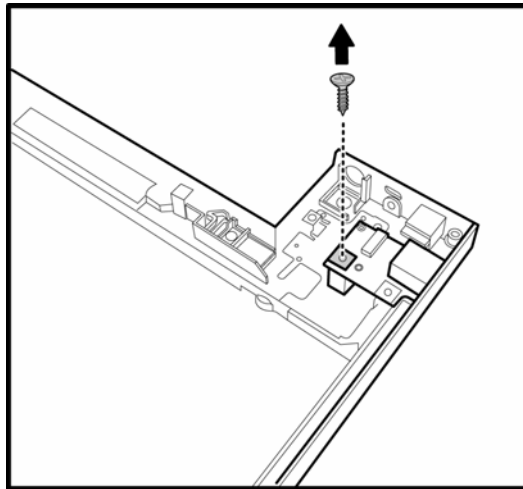
Figure 4-66   Removing the USB module screw

2. Remove the USB module while taking care to remove the USB port connectors from their openings on the chassis.
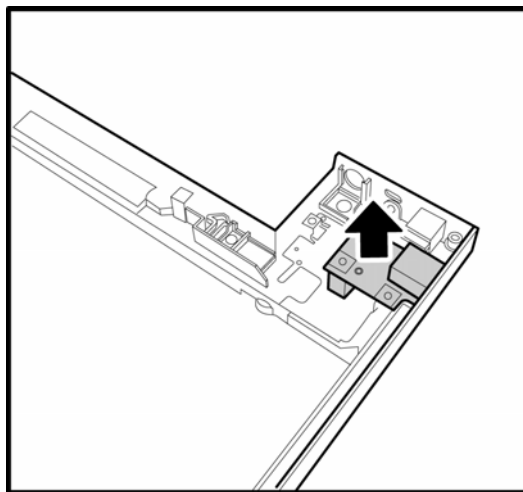
Figure 4-67   Removing the USB module

Installing the USB Module

To install the USB module, follow the steps below and refer to the figure in the preceding section:

1. Seat the USB module while aligning the USB port connectors with their openings on the chassis.

2. Secure the module by placing the M2.5x6 screw and tightening it.

4.20 VGA Module

Removing the VGA Module

To remove the VGA module, you have to first remove the keyboard, top cover, and system board. Then follow the steps below:

1. Remove the two hexagonal screws securing the VGA port connector to the chassis.

2. Remove the M2.5x6 screw securing the VGA module to the chassis.
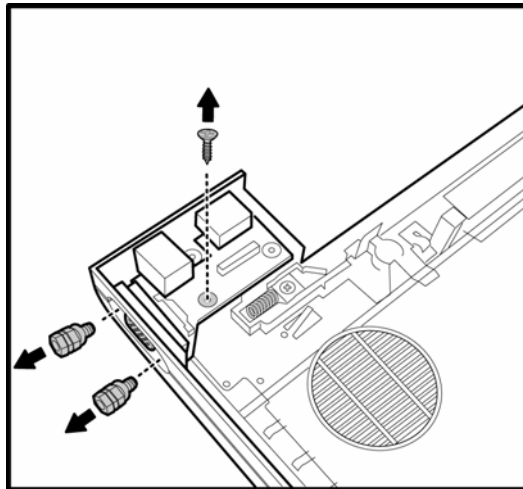
Figure 4-68   Removing the VGA module screw

3. Remove the VGA module while taking care to remove the VGA and USB port connectors from their openings on the chassis.
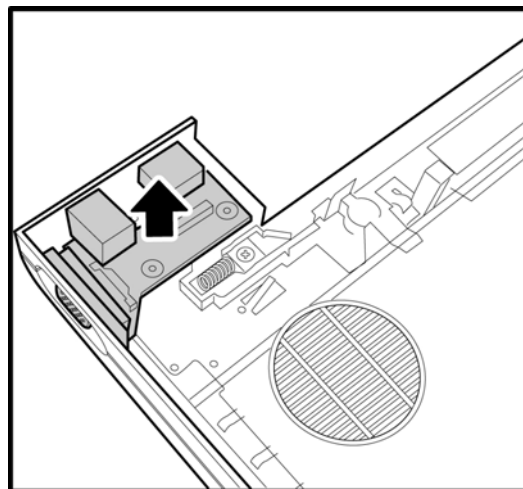
Figure 4-69   Removing the VGA module

Installing the VGA Module

To install the VGA module, follow the steps below and refer to the figure in the preceding section:

1. Seat the VGA module while aligning the VGA and USB port connectors with their openings on the chassis.

2. Secure the module by placing the M2.5x6 screw and tightening it.

4.21 Display Mask

Removing the Display Mask

To remove the display mask, first remove the display assembly as described earlier, and then follow the steps below:

1. Remove four M2.5x6 screws securing the display mask to the LCD module.
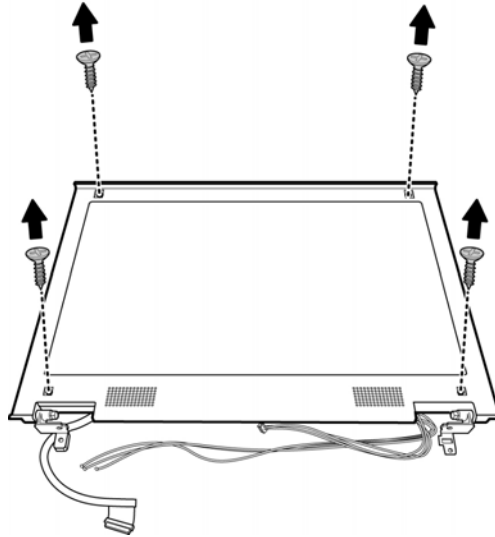
Figure 4-70   Removing the display mask screws

2. Carefully insert your fingers between the display mask and the LCD panel, and pry open the snaps. Start with the four snaps at the top of the display mask. Continue unsnapping the display mask along the two sides and the bottom edge to remove the display mask.
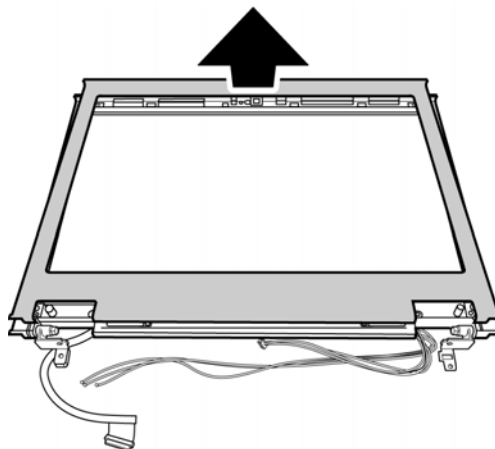
Figure 4-71   Removing the display mask

Installing the Display Mask

To install the display mask, follow the steps below and refer to the figures in the preceding section.

1. Seat the display mask and secure the snaps on each side.

2. Secure the display mask with four M2.5x6 screws.

4.22 Speakers

Removing the Speakers

To remove the speakers, first remove the display assembly and the display mask, and then follow the steps below:

1. Remove the two M2.5x6 screws from the speaker assembly.
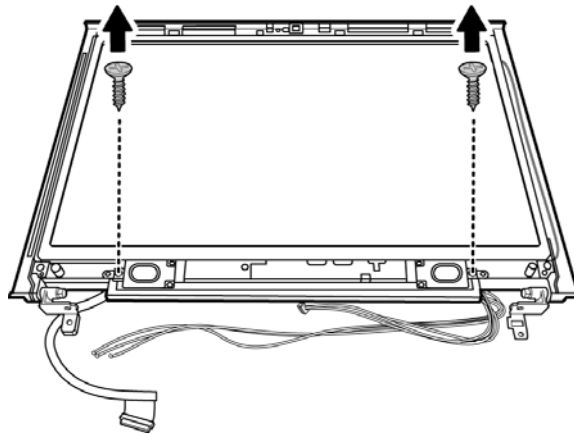
Figure 4-72   Removing the speaker screws

2. Remove the speaker strip.
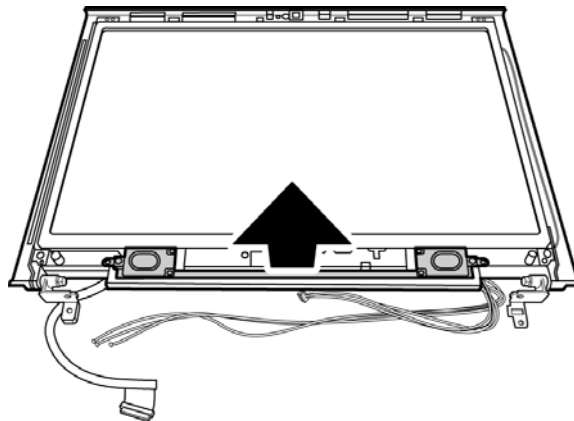
Figure 4-73   Removing the speaker strip

3. Remove the screws attaching each speaker to the metallic strip to separate the speakers

Installing the Speakers

To install the speakers, follow the steps below and refer to the figure in the preceding section:

1. Sear the speakers on the metal strip and secure each of them with a screw.

2. Seat the speaker strip on the LCD module.

3. Secure the speaker strip with two M2.5x6 screws.

4.23 FL Inverter Board

Removing the FL Inverter Board

To remove the FL inverter board, first remove the battery pack, the display assembly, display mask, and speaker strip, then follow the steps below.

1.   Remove one M2x5 silver screw securing the FL inverter board to the LCD display assembly.
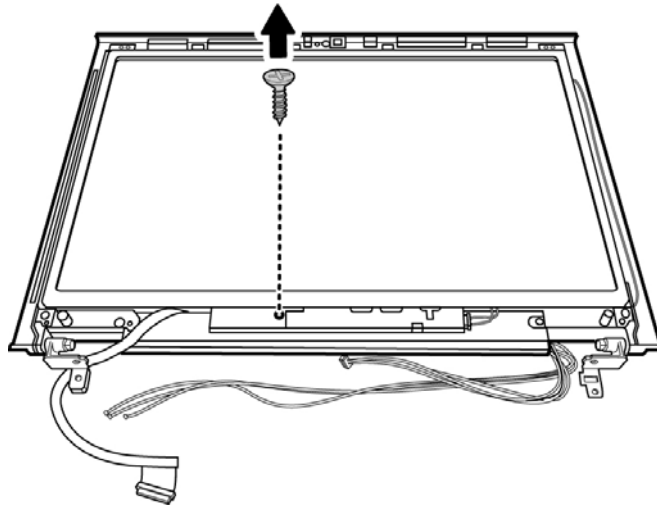
Figure 4-74   Removing the screws

2.   Disconnect the two connectors on either side of the board.
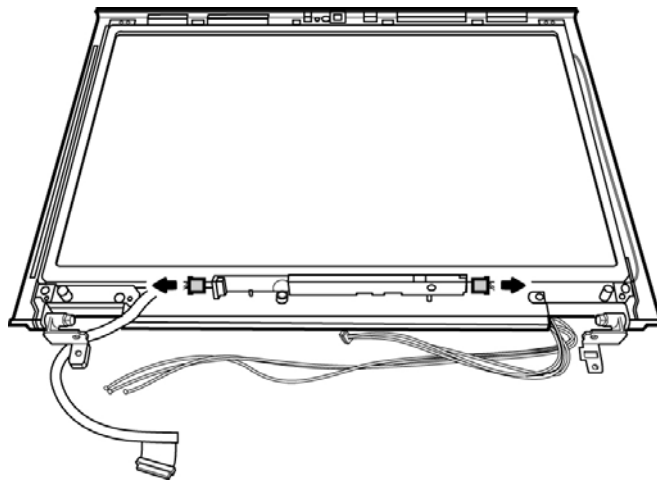
Figure 4-75   Removing the connectors

3.   Remove the FL inverter board.
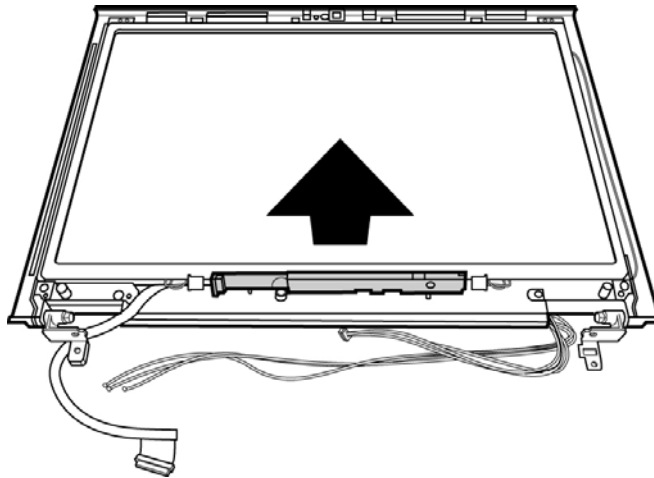
Figure 4-76   Removing the FL inverter board

Installing the FL Inverter Board

To install the FL inverter board, follow the steps below and refer to the figure in the preceding section.

1.   Place the FL inverter board on the LCD module.

2.   Secure one M2x5 black screw connecting the FL inverter board to the LCD display assembly.

4.24 LCD Module

Removing the LCD Module

To remove the LCD module, first remove the display assembly, display mask, speaker assembly, and FL inverter board and then follow the steps below.

1. Remove two M2.5x6 black screws securing the LCD module bracket to the chassis.
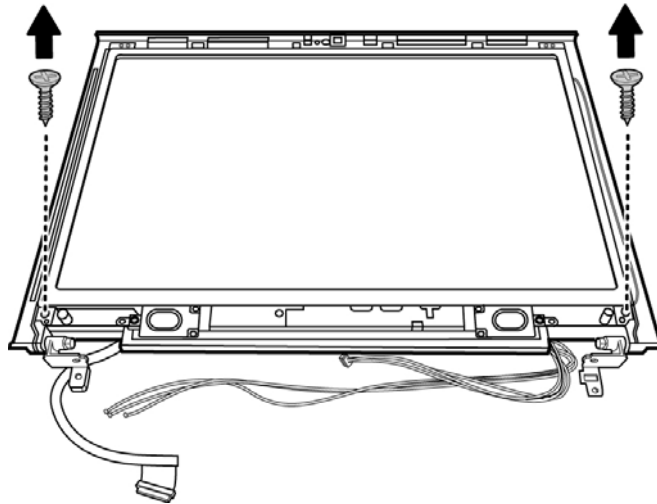
Figure 4-77   Removing the screws

2. Remove six M2x3 screws securing the LCD module bracket to the LCD module.
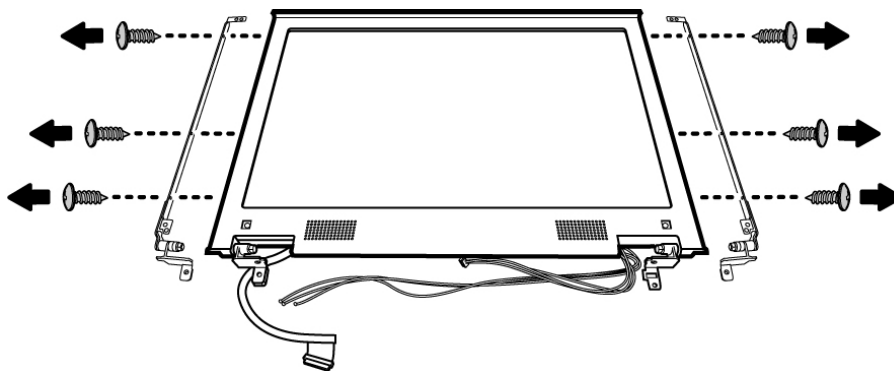
Figure 4-78   Removing the screws

3. Remove the LCD module.
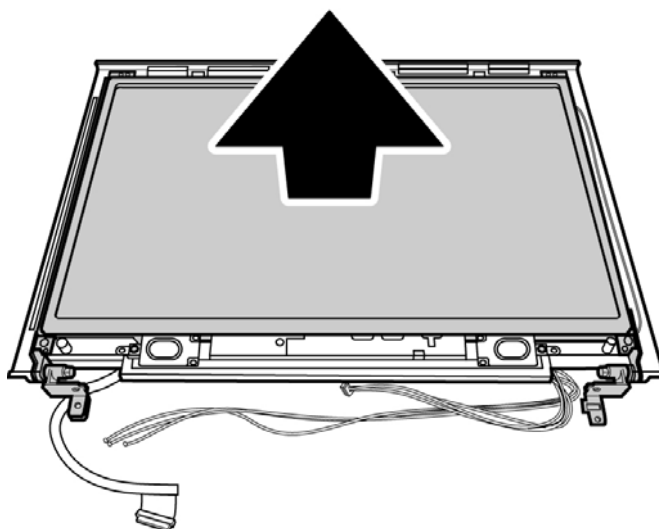
Figure 4-79   Removing the LCD module

NOTE: If the LCD module malfunctions, remove the LCD cable and LCD bracket. Then replace the whole LCD module unit.

Installing the LCD Module

To install the LCD module, follow the steps below and refer to the figures in the preceding section.

1. Seat the LCD module in the display assembly with the LCD module bracket and secure it with six M2x3 black screws.

2. Use two M2x3 black screws to secure the LCD module to the chassis.

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 it to prevent damaging it.

1. When installing the LCD module in the display assembly, make sure that you seat it so that it is properly aligned and maximum visibility of the display is maintained.
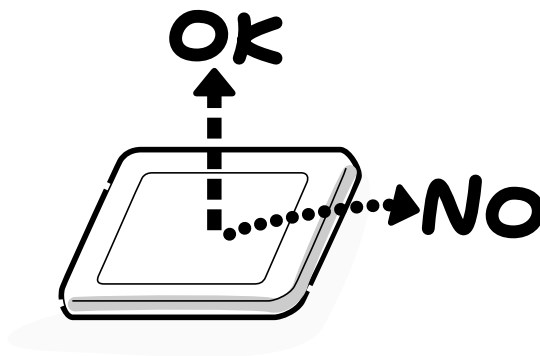
2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws. Do not force the module into place, because stress can affect its performance.

    Note: The panel's polarized surface is easily scratched and damaged, so handle it carefully.
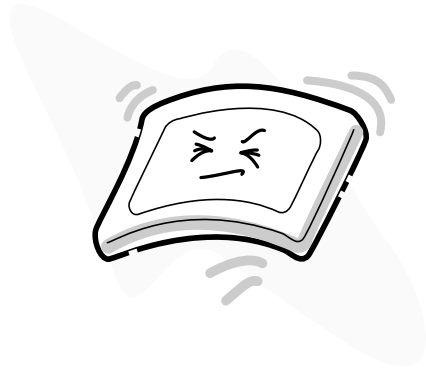
3. If the panel's surface gets dirty or moist, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

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

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

5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
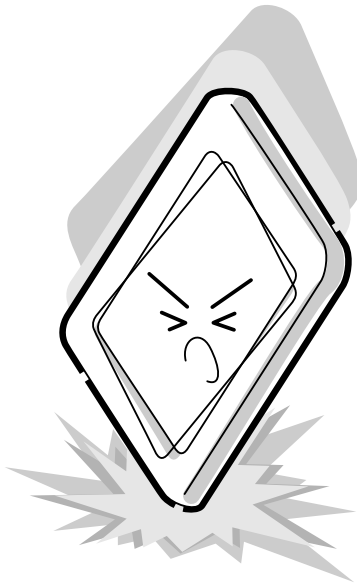
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle grounding device when handling the module.
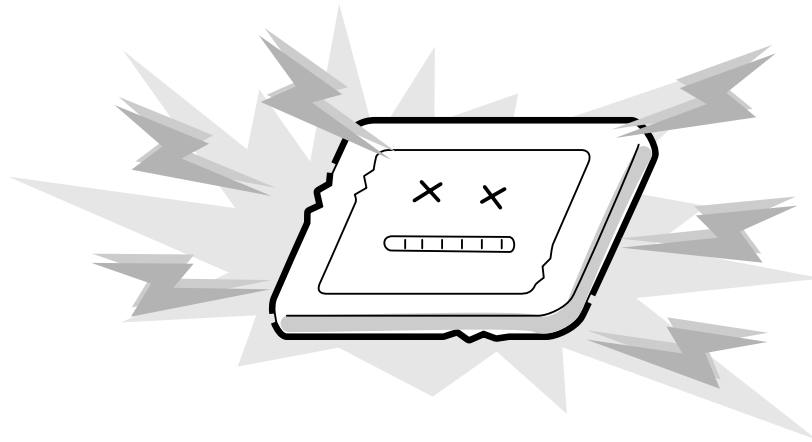
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
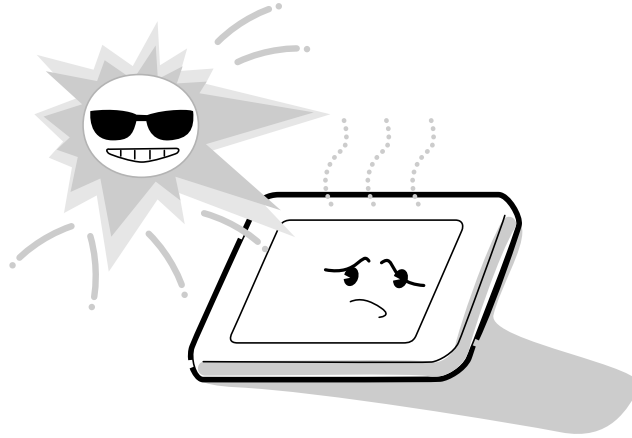
8. Do not store the module at temperatures below its specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.

9. Do not disassemble the LCD module. Disassembly can cause malfunctions.
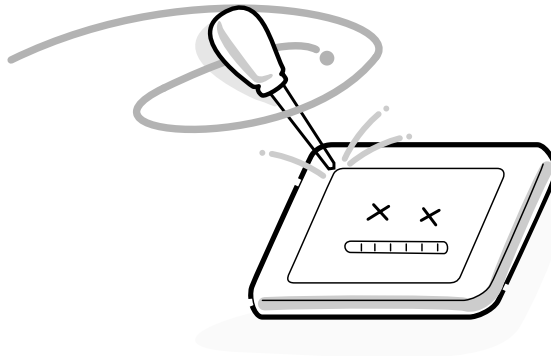
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.
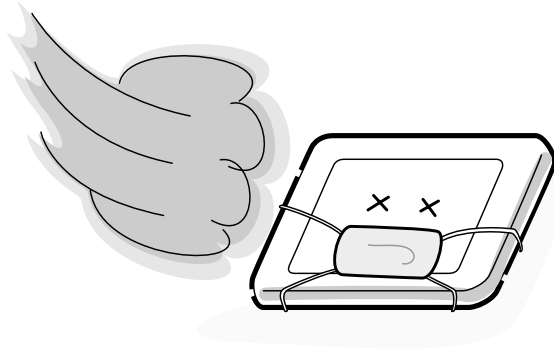
Appendix B   Board Layout

B.1   System Board (FRDSY*) Top View
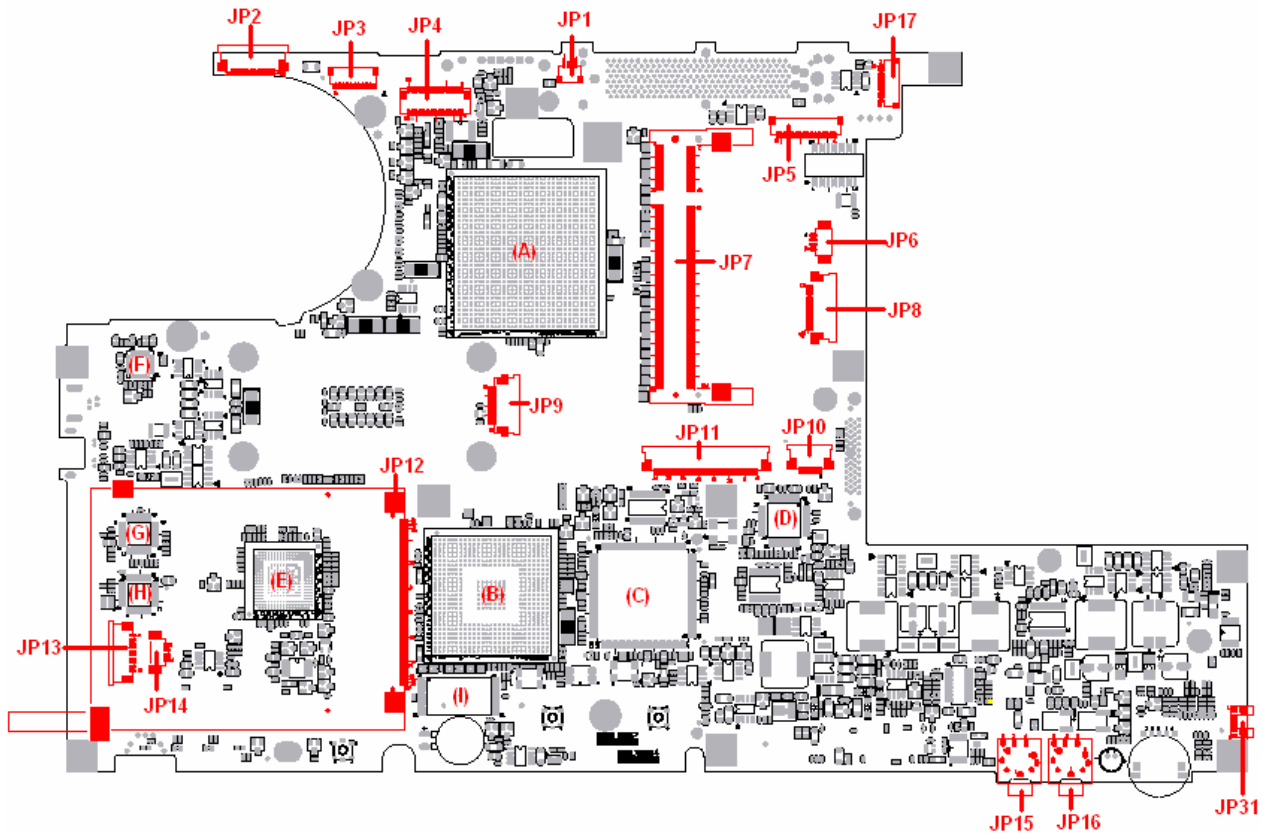
Figure B-1 System board (FRDSY) layout (Top)*

B.2 System Board (FRDSY*) Button View
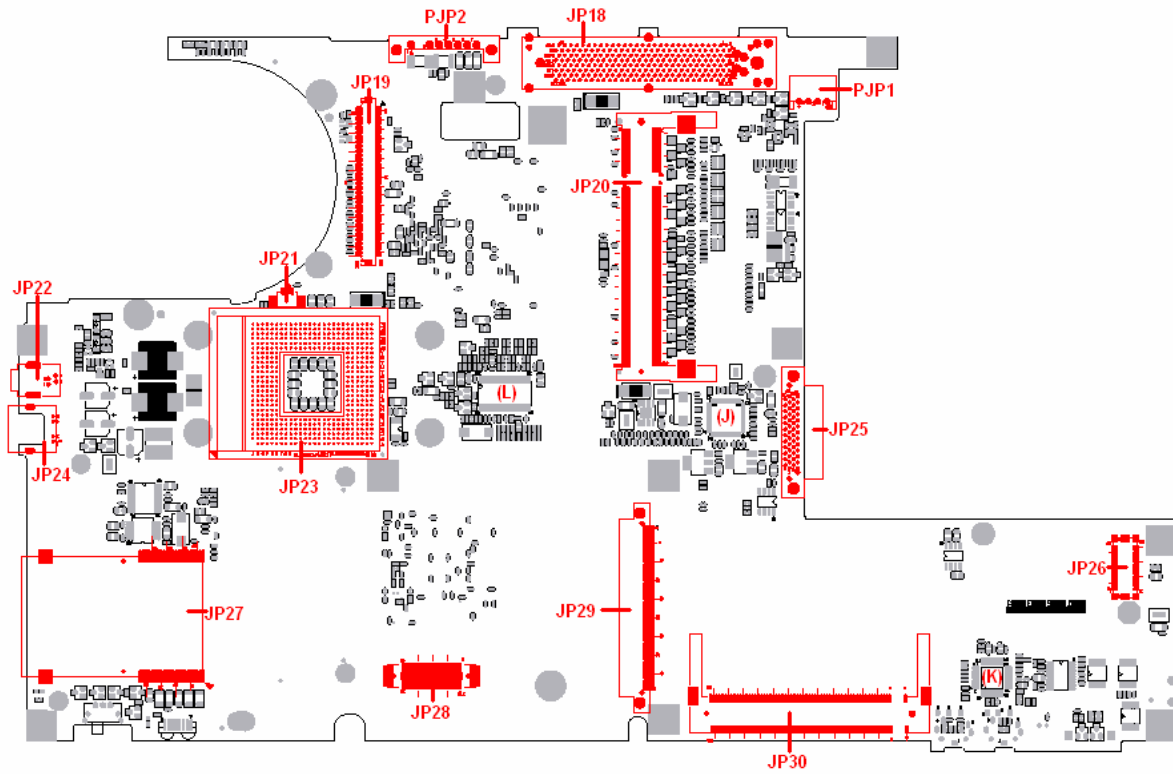
Figure B-2 System board (FRDSY) layout (Button)*

Table B-1 System board ICs (top and bottom)

Mark	Number	Name
(A)	U4	Intel Alviso Chip
(B)	U13	Intel ICH6-M
(C)	U14	ENE KB910Q
(D)	U8	Marvell 88SA8040
(E)	U12	TI PCI7411
(F)	PU11	MAX1532AEL
(G)	U39	LPC47N217
(H)	U40	LPC47N207
(I)	U24	BIOS ROM
(J)	U36	Marvell 8036/8053
(K)	U27	RealTEK ALC250VD
(L)	U35	ICS954226AG

Table B-2 System board connectors (top and bottom)

Number	Name
JP1	Docking modem conn.
JP2	CRT (CRT/B) conn.
JP3	USB (CRT/B) conn
JP4	LVDS conn
JP5	LAN (CRT/B) conn.
JP6	Speaker conn
JP7, JP20	DDR conn
JP8	Switch board conn
JP9	Bluetooth conn
JP10	TP conn
JP11	KB conn
JP12	PCMCIA Conn
JP13	Serial port conn
JP14	EC Tool conn
JP15, JP16	Audio jack
JP17	USB/B conn
JP18	Docking conn
JP19	VGA/B conn
JP21	Fan conn
JP22	1394 conn
JP23,	CPU Stocket
JP24	TV-Out
JP25	ODD conn
JP26	MDC conn
JP27	5 in 1 conn
JP28	ROM Socket
JP29	HDD conn
JP30	Mini-PCI conn
JP31	Hardware EQ conn
PJP1	Power core conn
PJP2	Battery conn

Appendix C   Pin Assignments

System Board

C.1   JP1

Table C-1 Docking modem Connector pin assignments (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	MDC2_DIP	I/O	2	MDC1_RING	I/O
3	MDC3_RING	I/O	4	MDC2_DIP	I/O

C.2   JP2

Table C-2 CRT (CRT/B) Connector pin assignments (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VS	-	2	+3VS	-
3	DSUB_12_DATA	I/O	4	DSUB_15_CLK	I/O
5	HSYNC	O	6	VSYNC	O
7	GND	-	8	CRT_R_L	O
9	GND	-	10	CRT_G_L	O
11	GND	-	12	CRT_B_L	O

C.3   JP3

Table C-3 USB(CRT/B) Connector pin assignments (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VALW	-	2	+5VALW	-
3	SYSON#	O	4	GND	-
5	USB20_N1	I/O	6	USB20_P1	I/O
7	GND	-	8	USB20_N3	I/O
9	USB20_P3	I/O	10	GND	-

C.4   JP4

Table C-4 LVDS I/F pin assignments (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	GMCH_TXOUT0-	O	4	GND	-
5	GMCH_TXOUT+	O	6	NC	-
7	GND	-	8	+LCDVDD	O
9	GMCH_TXOUT1-	O	10	+LCDVDD	O
11	GMCH_TXOUT1+	O	12	+3VS	O
13	GND	-	14	NC	-
15	GMCH_TXOUT2+	O	16	GMCH_LCD_CLK	O
17	GMCH_TXOUT2-	O	18	GMCH_LCD_DATA	O
19	GND	-	20	DAC_BRIG	I
21	GMCH_TXCLK-	O	22	INVT_PWM	O
23	GMCH_TXCLK+	O	24	DISPOFF#	O
25	GND	-	26	NC	-
27	GND	-	28	B+	-
29	GND	-	30	B+	-

C.5 JP5

Table C-5 LAN (CRT/B) pin assignments (16-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	LAN_LINK	O	2	LAN_ACT	O
3	NC	-	4	NC	-
5	RJ45_GND	-	6	RJ45_MDI3-	I/O
7	RJ45_MDI3+	I/O	8	RJ45_GND	-
9	RJ45_MDI2-	I/O	10	RJ45_MDI2+	I/O
11	RJ45_GND	-	12	RJ45_MDI1-	I/O
13	RJ45_MDI1+	I/O	14	RJ45_GND	-
15	RJ45_MDI0-	I/O	16	RJ45_MDI0+	I/O

C.6 JP6

Table C-6 Speaker connector pin assignments (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	SPKR-	O	2	SPKR+	O
3	SPKL-	O	4	SPKL+	O

C.7 JP7, JP20

Table C-7 SODIMM I/F pin assignments (200-pin) (1/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	VREF	O	2	VREF	O
3	VSS	-	4	VSS	-
5	DDR_DQ1	I/O	6	DDR_DQ0	I/O
7	DDR_DQ6	I/O	8	DDR_DQ4	I/O
9	+2.5V	O	10	+2.5V	O
11	DDR_DQS0	I/O	12	DDR_DM0	O
13	DDR_DQ7	I/O	14	DDR_DQ6	I/O
15	VSS	-	16	VSS	-

Table C-7 SODIMM I/F pin assignments (200-pin) (1/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
17	DDR_DQ3	I/O	18	DDR_DQ2	I/O
19	DDR_DQ13	I/O	20	DDR_DQ6	I/O
21	+2.5V	O	22	+2.5V	O
23	DDR_DQ9	I/O	24	DDR_DQ12	I/O
25	DDR_DQS1	I/O	26	DDR_DM1	O
27	VSS	-	28	VSS	-
29	DDR_DQ15	I/O	30	DDR_DQ14	I/O
31	DDR_DQ11	I/O	32	DDR_DQ10	I/O
33	+2.5V	O	34	+2.5V	O
A35	DDR_CLK1	O	36	+2.5V	O
A37	DDR_CLK1#	O	38	VSS	-
39	VSS	-	40	VSS	-
41	DDR_DQ16	I/O	42	DDR_DQ17	I/O
43	DDR_DQ20	I/O	44	DDR_DQ21	I/O
45	+2.5V	O	46	+2.5V	O
47	DDR_DQS2	I/O	48	DDR_DM2	O
49	DDR_DQ18	I/O	50	DDR_DQ19	I/O
51	VSS	-	52	VSS	-
53	DDR_DQ22	I/O	54	DDR_DQ23	I/O
55	DDR_DQ25	I/O	56	DDR_DQ24	I/O
57	+2.5V	O	58	+2.5V	O
59	DDR_DQ20	I/O	60	DDR_DQ28	I/O
61	DDR_DQS3	I/O	62	DDR_DM3	O
63	VSS	-	64	VSS	-
65	DDR_DQ27	I/O	66	DDR_DQ36	I/O
67	DDR_DQ30	I/O	68	DDR_DQ31	I/O
69	+2.5V	O	70	+2.5V	O
71	NC	-	72	NC	-
73	NC	-	74	NC	-
75	VSS	-	76	VSS	-
77	NC	-	78	NC	-
79	NC	-	80	NC	-
81	+2.5V	O	82	+2.5V	O
83	NC	-	84	NC	-
85	NC	-	86	NC	-

Table C-7 SODIMM I/F pin assignments (200-pin) (2/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
87	VSS	-	88	VSS	-
A89	NC	-	90	VSS	-
A91	NC	-	92	+2.5V	O
93	+2.5V	O	94	+2.5V	O
A95	DDR_CKE1	-	A96	DDR_CKE0	O
A97	NC	-	98	NC	-
A99	DDR_SMA12	-	A100	DDR_SMA11	O
A101	DDR_F_SMA9	O	A102	DDR_SMA8	O
103	VSS	-	104	VSS	-
A105	DDR_SMA7	O	A106	DDR_SMA6	O
A107	DDR_SMA5	O	A108	DDR_SMA4	O
A109	DDR_SMA3	O	A110	DDR_SMA2	O
A111	DDR_SMA1	O	A112	DDR_SMA0	O
113	+2.5V	O	114	+2.5V	O
A115	DDR_SMA10	O	A116	DDR_SBS1	O
A117	DDR_SBS0	O	A118	DDR_SRAS#	O
A119	DDR_SWE#	O	A120	DDR_SCAS#	O
A121	DDR_SCS#0	O	A122	DDR_SCS#1	-
123	DDR_SMA13	-	124	NC	-
125	VSS	-	126	VSS	-
127	DDR_DQ36	I/O	128	DDR_DQ37	I/O
129	DDR_DQ33	I/O	130	DDR_DQ32	I/O
131	+2.5V	O	132	+2.5V	O
133	DDR_DQS4	I/O	134	DDR_DM4	O
135	DDR_DQ38	I/O	136	DDR_DQ39	I/O
137	VSS	-	138	VSS	-
139	DDR_DQ35	I/O	140	DDR_DQ34	I/O
141	DDR_DQ41	I/O	142	DDR_DQ45	I/O
143	+2.5V	O	144	+2.5V	O
145	DDR_DQ44	I/O	146	DDR_DQ40	I/O
147	DDR_DQS5	I/O	148	DDR_DM5	O
149	VSS	-	150	VSS	-
151	DDR_DQ46	I/O	152	DDR_DQ42	I/O
153	DDR_DQ47	I/O	154	DDR_DQ43	I/O
155	+2.5V	O	156	+2.5V	O

Table C-7 SODIMM I/F pin assignments (200-pin) (3/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
157	+2.5V	O	A158	DDR_CLK2#	O
159	VSS	-	A160	DDR_CLK2	O
161	VSS	-	162	VSS	-
163	DDR_DQ52	I/O	164	DDR_DQ49	I/O
165	DDR_DQ53	I/O	166	DDR_DQ48	I/O
167	+2.5V	O	168	+2.5V	O
169	DDR_DQS6	I/O	170	DDR_DM6	O
171	DDR_DQ54	I/O	172	DDR_DQ55	I/O
173	VSS	-	174	VSS	-
175	DDR_DQ50	I/O	176	DDR_DQ51	I/O
177	DDR_DQ60	I/O	178	DDR_DQ61	I/O
179	+2.5V	O	180	+2.5V	O
181	DDR_DQ56	I/O	182	DDR_DQ58	I/O
183	DDR_DQS7	I/O	184	DDR_DM7	O
185	VSS	-	186	VSS	-
187	DDR_DQ57	I/O	188	DDR_DQ63	I/O
189	DDR_DQ62	I/O	190	DDR_DQ59	I/O
191	+2.5V	O	192	+2.5V	O
193	D_CK_SDATA	I/O	A194	VSS	O
195	D_CK_SCLK	O	A196	VSS	O
197	+3.3VS	O	A198	VSS	O
199	NC	-	200	NC	-

C.8   JP8

Table C-8 Switch board connector pin assignments (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	PWR_LED_1#	O	2	PWR_SUSPLED#	O
3	SKU_ID1	I	4	KSO17	I
5	ON/OFFBTN#	I	6	IEBTN#	I
7	MODEBTN#	I	8	EC_PLAYBTN#	I
9	EC_STOPBTN#	I	10	EC_FRDBTN#	I

| 11 | Ec_REVBTN# | I | 12 | GND | - |

C.9　　JP9

Table C-9 Bluetooth I/F pin assignments (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	NC	-
3	BT_DET#	I	4	NC	-
5	NC	-	6	NC	-
7	NC	-	8	BT_RESET#	O
9	BT_WAKE_UP	I	10	NC	-
11	GND	-	12	NC	-
13	BT_DETACH		14	CH_CLK	I/O
15	NC	-	16	USB20_P5	I/O
17	USB20_N5	I/O	18	CH_DATA	I/O
19	NC	-	20	+BT_VCC	O

C.10　　JP10

Table C-10 T/P connector pin assignments (12-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	SW_R	O
3	SW_L	O	4	NC	-
5	NC	-	6	NC	-
7	GND	-	8	GND	-
9	TP_CLK	I	10	TP_DATA	I
11	+5VS	O	12	+5VS	O

C.11 JP11

Table C-10 K/B connector pin assignments (38-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+3VS	I	2	NC	-
3	NC	-	4	NC	-
5	NC	-	6	+3VS	I
7	KSO4	O	8	KSO2	O
9	KSI2	O	10	KSI1	O
11	KSO1	O	12	KSO0	O
13	KSI0	O	14	KSI3	O
15	KSO5	O	16	KSO6	O
17	KSI5	O	18	KSI6	O
19	KSI4	O	20	KSO12	O
21	KSO7	O	22	KSO3	O
23	KSI7	O	24	KSO13	O
25	KSO9	O	26	KSO8	O
27	KSO11	O	28	KSO10	O
29	KSO14	O	30	KSO15	O
31	+3VS	I	32	CAPS_LED#	I
33	PADS_LED#	I	34	NUM_LED#	I
35	NC	-	36	NC	-
37	NC	-	38	NC	-

C.12 JP12

Table C-11 PCMCIA I/F pin assignments (68-pin) (2/1)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	D3	I/O
3	D4	I/O	4	D5	I/O
5	D6	I/O	6	D7	I/O
7	CE1#	I	8	A10	I
9	OE#	I	10	A11	I
11	A9	I	12	A8	I

| 13 | A13 | I | 14 | A14 | I |

Table C-11 PCMCIA I/F pin assignments (68-pin) (2/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
15	WE#	I	16	READY	O
17	VCC	-	18	VPP1	-
19	A16	I	20	A15	I
21	A12	I	22	A7	I
23	A6	I	24	A5	I
25	A4	I	26	A3	I
27	A2	I	28	A1	I
29	A0	I	30	D0	I/O
31	D1	I/O	32	D2	I/O
33	WP	O	34	GND	-
A35	GND	-	36	CD1#	O
A37	D11	I/O	38	D12	I/O
39	D13	I/O	40	D14	I/O
41	D15	I/O	42	CE2#	I
43	VS1#	O	44	RFU	1
45	RFU	O	46	A17	I
47	A18	I	48	A19	I
49	A20	I	50	A21	I
51	VCC	-	52	VPP2	-
53	A22	I	54	A23	I
55	A24	I	56	A25	I
57	VS2#	O	58	RESET	I
59	WAIT#	O	60	RFU	1
61	REG#	I	62	BVD2	O
63	BVD1	O	64	D8	I/O
65	D9	I/O	66	D10	I/O
67	CD2#	O	68	GND	-

C.13 JP13

Table C-13 Serial port pin assignments (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VS	-	2	GND	-
3	RXD1	I	4	TXD1	O
5	DSR#1	I	6	RTS#1	O
7	CTS#1	I	8	DTR#1	O
9	RI#1	I	10	DCD#1	I

C.14 JP14

Table C-14EC tool pin assignments (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VALW	-	2	E51_RXD	I
3	E51_TXD	O	4	GND	-

C.15 JP15

Table Audio jack (headphone) pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	SPEAK OUT L	O
3	SPEAK OUT R	O	4	NBA_PLUG	I
5	GND	-	6	NC	-

C.16 JP16

Table Audio jack (microphone) pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	MIC IN	I
3	+AUD_REF	I	4	NC	-
5	NC-	I	6	MIC1	I

C.17 JP17

Table C-3 USB(USB/B) Connector pin assignments (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VALW	-	2	+5VALW	-
3	SYSON#	O	4	GND	-
5	USB20_N2	I/O	6	USB20_P2	I/O
7	GND	-	8	USB20_N4	I/O
9	USB20_P4	I/O	10	GND	-

C.18 JP18

Table C-18 Docking I/F pin assignments (240-pin) (1/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	DKN_B+	-	2	DKN_B+	-
3	DCOCT1#		4	+5VS	
5	PS_CLK		6	KB_CLK	
7	GND		8	1394_PHYRST_S3P	
9	DPCONF_S5P		10	NC	
11	GND		12	D_DDC_CLK	
13	D_CRT_R		14	D_CRT_G	
15	D_CRT_B		16	D_CRT_VSYNC	
17	DVI_SCLK		18	NC	
19	GND		20	NC	
21	NC		22	DVI_TXD2+	
23	DVI_TXD2-		24	DVI_TXD1+	
25	DVI_TXD1-		26	DVI_TXD0+	
27	DVI_TXD0-		28	GND	
29	GND		30	DVI_TXC+	
31	DVI_TXC-		32	DVI_DET	
33	NC		34	NC	
35	NC		36	NC	
37	GND		38	NC	

Table C-18 Docking I/F pin assignments (240-pin) (2/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
39	NC		40	NC	
41	GND		42	NC	
43	NC		44	NC	
45	GND		46	NC	
47	NC		48	NC	
49	GND		50	NC	
51	NC		52	NC	
53	NC		54	NC	
55	RJ45_MDI3+		56	RJ45_MDI3-	
57	NC		58	NC	
59	MDC1_RING		60	MDC2_TIP	
61	DKN_B+		62	DKN_B+	
63	EJCTSW#		64	+5VS	
65	PS_DATA		66	KB_DATA	
67	GND		68	NC	
69	1394_DILSON_S3P		70	NC	
71	GND		72	D_DDC_DATA	
73	GND		74	GND	
75	GND		76	D_CRT_HSYNC	
77	DVI_SDATA		78	NC	
79	GND		80	NC	
81	NC		82	NC	
83	NC		84	NC	
85	NC		86	NC	
87	NC		88	GND	
89	GND		90	NC	
91	NC		92	NC	
93	NC		94	NC	
95	NC		96	NC	
97	GND		98	NC	
99	NC		100	NC	
101	GND		102	NC	
103	NC		104	NC	

Pin No.	Signal name		
105	GND		106	NC	

Table C-18 Docking I/F pin assignments (240-pin) (3/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
107	NC		108	NC	
109	GND		110	NC	
111	NC		112	NC	
113	NC		114	NC	
115	NC		116	NC	
117	NC		118	NC	
119	NC		120	NC	
121	DKN_B+		122	DKN_B+	
123	D_EC_SMB_CK2		124	+5VS	
125	+5VALW		126	TPA1+	
127	GND		128	TPB1+	
129	NC		130	NC	
131	GND		132	NC	
133	NC		134	AUD_SUDMUT_P3#	
135	NC		136	LINEOL	
137	LINEIL		138	LINEIR#	
139	GND		140	DOCK_ON/OFFBTN#	
141	DCD#		142	DSR#	
143	TXD		144	RI#	
145	LPTPE		146	FD7	
147	FD6		148	GND	
149	GND		150	FD4	
151	FD1		152	FD2	
153	FD0		154	R_LPTSTB#	
155	NC		156	NC	
157	GND		158	NC	
159	NC		160	NC	
161	GND		162	NC	
163	NC		164	NC	
165	GND		166	NC	

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
167	NC		168	NC	
169	GND		170	NC	

Table C-18 Docking I/F pin assignments (240-pin) (4/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
171	NC		172	NC	
173	GND		174	+3VALW	
175	NC		176	NC	
177	NC		178	RJ45_GND	
179	RJ45_MDI0+		180	RJ45_MDI0-	
181	DKN_B+		182	DKN_B+	
183	D_EC_SMB_DA2		184	+5VS	
185	NC		186	TPA1-	
187	GND		188	TPB1-	
189	USB20_P0		190	USB20_N0	
191	GND		192	NC	
193	NC		194	LINEOR	
195	LINEOR#		196	LINEOL#	
197	LINEIL#		198	LINEIR	
199	GND		200	RXD	
201	RTS#		202	CTS#	
203	DTR#		204	LPTSLCT	
205	LPTBUSY		206	LPTACK#	
207	FD5		208	GND	
209	GND		210	FD3	
211	LPTSLCTIN#		212	LPTINIT#	
213	LPTERR#		214	AFD#/3M#	
215	NC		216	NC	
217	GND		218	NC	
219	NC		220	NC	
221	GND		222	NC	
223	NC		224	NC	
225	GND		226	NC	
227	NC		228	NC	
229	GND		230	NC	
231	NC		232	NC	
233	GND		234	LAN_ACTIVITY#	
235	LAN_LINK#		236	DCOCT2#	

Pin No.	Signal name		Pin No.	Signal Name	
237	NC		238	NC	
239	RJ45_MDI1+		240	RJ45_MDI1-	

C.19 JP19

Table C-19 VGA I/F pin assignments (160-pin) (1/3)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	B+	-	2	B+	-
3	B+	-	4	B+	-
5	B+	-	6	B+	-
7	NC	-	8	NC	-
9	DAC_BRIG	-	10	VGA_DDC_CLK	I
11	DISPOFF#	O	12	VGA_DDC_DATA	I
13	INVT_PWM	I	14	GND	-
15	GND	-	16	VGA_TV_LUMA	I
17	VGA_CRT_R	I	18	GND	-
19	GND	-	20	VGA_TV_CRMA	I
21	VGA_CRT_G	I	22	GND	-
23	GND	-	24	VGA_CRT_VSYNC	I
25	VGA_CRT_B	I	26	VGA_CRT_HSYNC	I
27	GND	-	28	SUSP#	I
29	+3VALW	-	30	GMCH_ENBKL	O
31	+2.5VS	-	32	+1.5VS	-
33	+2.5VS	-	34	+1.5VS	-
35	GND	-	36	DVI_DET	I
37	DVI_TXC+	I	38	DVI_SCLK	I/O
39	DVI_TXC-	I	40	DVI_SDATA	I/O
41	GND	-	42	+3VS	-
43	DVI_TXD0+	I	44	+3VS	-
45	DVI_TXD0-	I	46	+3VS	-
47	GND	-	48	+3VS	-
49	DVI_TXD1+	I	50	+5VS	-

Pin No.	Signal name	I/O	Pin No.	Signal name	I/O
51	DVI_TXD1-	I	52	+5VALW	-
53	GND	-	54	+5VALW	-
55	DVI_TXD2+	I	56	+5VALW	-
57	DVI_TXD2-	I	58	+5VALW	-

Table VGA I/F pin assignments (160-pin) (2/3)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
59	GND	-	60	NC	-
61	PLT_RST_VGA#	O	62	CLK_PCIE_VGA	O
63	NC	-	64	CLK_PCIE_VGA#	O
71	GND	-	72	GND	-
73	PCEI_GTX_C_MRX_P1	I/O	74	PCIE_MTX_C_GRX_P1	I/O
75	PCEI_GTX_C_MRX_N1	I/O	76	PCIE_MTX_C_GRX_N1	I/O
77	GND	-	78	GND	-
79	PCEI_GTX_C_MRX_P2	I/O	80	PCIE_MTX_C_GRX_P2	I/O
81	PCEI_GTX_C_MRX_N2	I/O	82	PCIE_MTX_C_GRX_N2	I/O
83	GND	-	84	GND	-
85	PCEI_GTX_C_MRX_P3	I/O	86	PCIE_MTX_C_GRX_P3	I/O
87	PCEI_GTX_C_MRX_N3	I/O	88	PCIE_MTX_C_GRX_N3	I/O
89	GND	-	90	GND	-
91	PCEI_GTX_C_MRX_P4	I/O	92	PCIE_MTX_C_GRX_P4	I/O
93	PCEI_GTX_C_MRX_N4	I/O	94	PCIE_MTX_C_GRX_N4	I/O
95	GND	-	96	GND	-
97	PCEI_GTX_C_MRX_P5	I/O	98	PCIE_MTX_C_GRX_P5	I/O
99	PCEI_GTX_C_MRX_N5	I/O	100	PCIE_MTX_C_GRX_N5	I/O
101	GND	-	102	GND	-
103	PCEI_GTX_C_MRX_P6	I/O	104	PCIE_MTX_C_GRX_P6	I/O

105	PCEI_GTX_C_MRX_N6	I/O	106	PCIE_MTX_C_GRX_N6	I/O
107	GND	-	108	GND	-
109	PCEI_GTX_C_MRX_P7	I/O	110	PCIE_MTX_C_GRX_P7	I/O

Table VGA I/F pin assignments (160-pin) (2/3)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
111	PCEI_GTX_C_MRX_N7	I/O	112	PCIE_MTX_C_GRX_N7	I/O
113	GND	-	114	GND	-
115	PCEI_GTX_C_MRX_P8	I/O	116	PCIE_MTX_C_GRX_P8	I/O
117	PCEI_GTX_C_MRX_N8	I/O	118	PCIE_MTX_C_GRX_N8	I/O
119	GND	-	120	GND	-
121	PCEI_GTX_C_MRX_P9	I/O	122	PCIE_MTX_C_GRX_P9	I/O
123	PCEI_GTX_C_MRX_N9	I/O	124	PCIE_MTX_C_GRX_N9	I/O
125	GND	-	126	GND	-
127	PCEI_GTX_C_MRX_P10	I/O	128	PCIE_MTX_C_GRX_P10	I/O
129	PCEI_GTX_C_MRX_N10	I/O	130	PCIE_MTX_C_GRX_N10	I/O
131	GND	-	132	GND	-
133	PCEI_GTX_C_MRX_P11	I/O	134	PCIE_MTX_C_GRX_P11	I/O
135	PCEI_GTX_C_MRX_N11	I/O	136	PCIE_MTX_C_GRX_N11	I/O
137	GND	-	138	GND	-
139	PCEI_GTX_C_MRX_P12	I/O	140	PCIE_MTX_C_GRX_P12	I/O
141	PCEI_GTX_C_MRX_N12	I/O	142	PCIE_MTX_C_GRX_N12	I/O
143	GND	-	144	GND	-
145	PCEI_GTX_C_MRX_P13	I/O	146	PCIE_MTX_C_GRX_P13	I/O
147	PCEI_GTX_C_MRX_N13	I/O	148	PCIE_MTX_C_GRX_N13	I/O
149	GND	I/O	150	GND	I/O
151	PCEI_GTX_C_MRX_P14	-	152	PCIE_MTX_C_GRX_P14	-
153	PCEI_GTX_C_MRX_N14	I/O	154	PCIE_MTX_C_GRX_N14	I/O
155	GND	I/O	156	GND	I/O

Table VGA I/F pin assignments (160-pin) (3/3)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
157	PCEI_GTX_C_MRX_P15	-	158	PCIE_MTX_C_GRX_P15	-
159	PCEI_GTX_C_MRX_N15	I/O	160	PCIE_MTX_C_GRX_N15	I/O

C.20   JP21

Table C-20 JP7 Fan I/F pin assignments (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	FAN1_VOUT	I	2	FAN-SPEED1	O
3	GND	-			

C.21   JP22

Table C-21 1394 Connector pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	TPB0-	I/O	2	TPB0+	I/O
3	TPA0-	I/O	4	TPA0+	I/O
5	GND	-	6	GND	-

C.22   JP24

Table C-22 TV-OUT Connector pin assignments (4-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	LUMA	O	4	CRMA	O

C.23   JP25

Table C-23 ODD I/F pin assignments (52-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	INT_CD_L	I	2	INT_CD_R	I
3	CD_AGND	-	4	GND	-
5	SIDE_RST#	O	6	SD_D8	I/O
7	SD_D7	I/O	8	SD_D9	I/O
9	SD_D6	I/O	10	SD_D10	I/O
11	SD_D5	I/O	12	SD_D11	I/O
13	SD_D4	I/O	14	SD_D12	I/O
15	SD_D3	I/O	16	SD_D13	I/O
17	SD_D2	I/O	18	SD_D14	I/O
19	SD_D1	I/O	20	SD_D15	I/O
21	SD_D0	I/O	22	SD_DREQ	I
23	GND	-	24	SD_IOR#	O
25	IDE_DIOW#	O	26	GND	O
27	IDE_DIORDY	I	28	IDE_DDACK#	O
29	IDE_IRQ	I	30	NC	O
31	IDE_DA1	O	32	+5VCD	I
33	IDE_DA0	O	34	IDE_DA2	I
35	SW_SD_CS#1	O	36	SW_SD_CS#3	-
37	SHDD_LED#	I	38	+5VCD	O
39	+5VCD	-	40	+5VCD	-
41	+5VCD	-	42	+5VCD	-
43	GND	-	44	GND	-
45	GND	-	46	GND	-
47	GND	-	48	GND	-
49	NC	-	50	+5VCD	-
51	GND		52	GND	

C.24   JP26

Table C-24 MDC Connector pin assignments (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	NC	-
3	GND	-	4	NC	I
5	NC	-	6	NC	-
7	NC	-	8	GND	-
9	NC	-	10	+5VS_MDC	I
11	NC	-	12	NC	-
13	NC	-	14	NC	-
15	GND	-	16	+3VS_MDC_R	I
17	+3V_MDC	I	18	NC	-
19	GND	-	20	GND	-
21	+3VS_MDC	I	22	AC97_SYNC	O
23	AC97_SDOUT	O	24	AC97_SDIN1	O
25	AC97_RST#	O	26	AC97_SDIN1	I
27	GND	-	28	GND	-
29	GND	-	30	AC97_BITCLK	I

C.25   JP27

Table C-27 5-IN-1 Card readerI/F pin assignments (40-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	MSBS_SDCMD_SMWE2	I/O
3	MSDATA1_SDDATA1_SMD1	I/O	4	MSDATA0_SDDATA0_SMD0	I/O
5	MSDATA2_SDDATA2_SMD2	I/O	6	MSCD#	I
7	MSDATA3_SDATA3_SMD3	I/O	8	MSCLK_SDCLK	I/O
9	+VCC_5IN1	-	10	GND	-
11	MSDATA2_SDDAT2_SMD2	I/O	12	MSDATA3_SDDAT3_SMD3	I/O
13	MSBS_SDCMD_SMWE2	O	14	GND	-
15	+VCC_5IN1	-	16	MSCLK_SDCLK	O
17	GND	-	18	NC	-
19	MSDATA0_SDDAT0_SMD0	I/O	20	MSDATA1_SDDATA1_SMD1	I/O
21	SDCD#	I	22	GND	-
23	SMCD#	I	24	GND	-
25	SMRB#	I	26	SMRE#	O
27	SDWP_SMCD#	I	28	SMCLE	O
29	SMALE	O	30	MSBS_SDCMD_SMWE2	I/O
31	SMELWP#	I/O	32	GND	-
33	MSDATA0_SDDAT0_SMD0	I/O	34	MSDATA1_SDDATA1_SMD1	I/O
35	MSDATA2_SDDAT2_SMD2	I/O	36	MSDATA3_SDDAT3_SMD3	I/O
37	SMD4	I/O	38	SMD5	I/O
39	SMD6	I/O	40	SMD7	I/O
41	+VCC_5IN1	-	42	NC	-
43	SDWP_SMCE#	O	44	GND	-

C.26 JP28

Table C-27 Flash ROM socket pin assignments (40-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	KBA16	O	2	KBA17	O
3	KBA15	O	4	GND	-
5	KBA14	O	6	NC	-
7	KBA13	O	8	KBA19	O
9	KBA12	O	10	KBA10	O
11	KBA11	O	12	ADB7	I/O
13	KBA9	O	14	ADB6	I/O
15	KBA8	O	16	ADB5	I/O
17	FWE#	O	18	ADB4	I/O
19	RESET#	O	20	+3VALW	-
21	INT_FLASH_EN#	O	22	+3VALW	-
23	INT_FLASH_SEL	O	24	NC	-
25	KBA18	O	26	ADB3	I/O
27	KBA7	O	28	ADB2	I/O
29	KBA6	O	30	ADB1	I/O
31	KBA5	O	32	ADB0	I/O
33	KBA4	O	34	FRD#	O
35	KBA3	O	36	GND	-
37	KBA2	O	38	FSEL#	O
39	KBA1	O	40	KBA0	O

C.27 JP29

Table C-27 HDD I/F pin assignments (44-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	PIDE_HRESET#	O	2	GND	-
3	PIDE_HDD7	I/O	4	PIDE_HDD8	I/O
5	PIDE_HDD6	I/O	6	PIDE_HDD9	I/O
7	PIDE_HDD5	I/O	8	PIDE_HDD10	I/O
9	PIDE_HDD4	I/O	10	PIDE_HDD11	I/O
11	PIDE_HDD3	I/O	12	PIDE_HDD12	I/O
13	PIDE_HDD2	I/O	14	PIDE_HDD13	I/O
15	PIDE_HDD1	I/O	16	PIDE_HDD14	I/O
17	PIDE_HDD0	I/O	18	PIDE_HDD15	I/O
19	GND	-	20	NC	-
21	PIDE_HDREQ	I	22	GND	-
23	PIDE_HDIOW#	O	24	GND	-
25	PIDE_HDIOR#	O	26	GND	-
27	PIDE_HIORDY	I	28	SEC_CSEL	O
29	PD_DACK#	O	30	GND	-
31	PIDE_HINTRQ	I	32	GND	-
33	PIDE_HDA1	O	34	GND	-
35	PIDE_HDA0	O	36	PIDE_HDA2	O
37	PIDE_HCS0#	O	38	PIDE_HCS1#	O
39	+5VS	-	40	GND	-
41	+5VS	-	42	+5VS	-
43	GND	-	44	NC	-

C.28 JP30

Table C-28 Mini PCI I/F pin assignments (124-pin) (1/2)

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	SWITCH	O	14	NC	-
15	NC	-	16	NC	-
17	PCI_PIRQH#	I	18	+5VS	-
19	+3VS	O	20	PCI_PIRQG#	I
21	NC	-	22	NC	-
23	GND	-	24	+3V	O
25	CLK_PCI_MINI	O	26	PCI_RST#	O
27	GND	-	28	+3VS	O
29	PCI_REQ#1	I	30	PCI_GNT#1	O
31	+3.3V	O	32	GND	-
33	AD31	I/O	34	WLANME#	I
35	AD29	I/O	36	NC	-
37	GND	-	38	AD30	I/O
39	AD27	I/O	40	+3.3V	O
41	AD25	I/O	42	AD28	I/O
43	NC	-	44	AD26	I/O
45	CBE3#	I/O	46	AD24	I/O
47	AD23	I/O	48	MINI_IDSEL	I/O
49	GND	-	50	GND	-
51	AD21	I/O	52	AD22	I/O
53	AD19	I/O	54	AD20	I/O
55	GND	-	56	PAR	I/O
57	AD17	I/O	58	AD18	I/O
59	CBE2#	I/O	60	AD16	I/O

Table C-7 Mini PCI I/F pin assignments (124-pin)(2/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
61	IRDY#	I/O	62	GND	-
63	+3.3V	O	64	FRAME#	I/O
65	PM_CLKRUN#	I/O	66	TRDY#	I/O
67	PCI_SERR#	I/O	68	STOP#	I/O
69	GND	-	70	+3.3V	O
71	PCI_PERR#	O	72	DEVSEL#	I/O
73	C/BE1#	I/O	74	GND	-
75	AD14	I/O	76	AD15	I/O
77	GND	-	78	AD13	I/O
79	AD12	I/O	80	AD11	I/O
81	AD10	I/O	82	GND	-
83	GND	-	84	AD09	I/O
85	AD08	I/O	86	C/BE0#	I/O
87	AD07	I/O	88	+3.3V	O
89	+3.3V	O	90	AD06	I/O
91	AD05	I/O	92	AD04	I/O
93	NC	-	94	AD02	I/O
95	AD03	I/O	96	AD00	I/O
97	+5VS_MINIPCI	O	98	NC	-
99	AD01	I/O	100	NC	-
101	GND	-	102	GND	-
103	NC	-	104	NC	-
105	NC	-	106	NC	-
107	NC	-	108	NC	-
109	NC	-	110	NC	-
111	NC	I	112	NC	-
113	GND	-	114	GND	-
115	NC	-	116	NC	-
117	GND	-	118	GND	-
119	GND	-	120	GND	-
121	NC	-	122	NC	-
123	+5VS_MINIPCI	-	124	+3.3V	-

C.29   PJP1

Table C29 AC Adaptor Connector pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	DC_IN_S2	I	2	DC_IN_S2	I
3	GND	-	4	GND	-

C.30   PJP2

Table C-30 BATT Connector pin assignments (7-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	BATT_S1	I	2	ALI/NIMH#	I
3	AB/I	I	4	TS_A	O
5	EC_SMDA	O	6	EC_SMCA	O
7	GND	-			

Appendix D   Keyboard Scan/Character Codes

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

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	**Break**	**Make**	**Break**		
01	' ~	29	A9	0E	F0	0E	
02	1 !	02	82	16	F0	16	
03	2 @	03	83	1E	F0	1E	
04	3 #	04	84	26	F0	26	
05	4 $	05	85	25	F0	25	
06	5 %	06	86	2E	F0	2E	
07	6 ^	07	87	36	F0	36	
08	7 &	08	88	3D	F0	3D	*2
09	8 *	09	89	3E	F0	3E	*2
10	9 (	0A	8A	46	F0	46	*2
11	0)	0B	8B	45	F0	45	
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	18	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[{	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	**Break**	**Make**	**Break**		
29	\ |	2B	AB	5D	F0	5D	*5
30	Caps Lock	3A	BA	58	F0	58	
31	A	1E	9E	1C	F0	1C	
32	S	1F	9F	1B	F0	1B	
33	D	20	A0	23	F0	23	
34	F	21	A1	2B	F0	2B	
35	G	22	A2	34	F0	34	
36	H	23	A3	33	F0	33	
37	J	24	A4	3B	F0	3B	*2
38	K	25	A5	42	F0	42	*2
39	L	26	A6	4B	F0	4B	*2
40	; :	27	A7	4C	F0	4C	*2
41	' "	28	A8	52	F0	52	
43	Enter	1C	9C	5A	F0	5A	*3
44	Shift (L)	2A	AA	12	F0	12	
45	No.102 key	56	D6	61	F0	61	
46	Z	2C	AC	1A	F0	1A	
47	X	2D	AD	22	F0	22	
48	C	2E	AE	21	F0	21	
49	V	2F	AF	2A	F0	2A	
50	B	30	B0	32	F0	32	
51	N	31	B1	31	F0	31	
52	M	32	B2	3A	F0	3A	*2
53	, <	33	B3	41	F0	41	*2
54	. >	34	B4	49	F0	49	*2
55	/ ?	35	B5	4A	F0	4A	*2
57	Shift (R)	36	B6	59	F0	59	

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

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

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

Cap No.	Keytop	Code set 1				Code set 2						Note
		Make		**Break**		**Make**		**Break**				
122	F11	57		D7		78		F0	78			*3
123	F12	58		D8		07		F0	07			*3
124	PrintSc	*6		*6		*6		*6				*6
126	Pause	*7		*7		*7		*7				*7
X	Fn	—		—		—		—				*4
X	Win	E0	5B	E0	DB	E0	1F	E0	F0	1F		
x	App	E0	5D	E0	DD	E0	2F	E0	F0	2F		

Notes:

1. *   Scan codes differ by mode.
2. *   Scan codes differ by overlay function.
3. *   Combination with the **Fn** key gives different codes.
4. *   The **Fn** key does not generate a code by itself.
5. *   This key corresponds to key No. 42 in a 102-key model.
6. *   Refer to Table D-6, No. 124 key scan code.
7. *   Refer to Table D-7, No. 126 key scan code.

Table D-2 Scan codes with left Shift key

Cap No.	Key top	Code set 1								Code set 2							
		Make				Break				Make				Break			
55	/	E0	AA	E0	35	E0	B5	E0	2A	E0	F0	12	E0	4A	E0	F0	4A E0 12
75	INS	E0	AA	E0	52	E0	D2	E0	2A	E0	F0	12	E0	70	E0	F0	70 E0 12
76	DEL	E0	AA	E0	53	E0	D3	E0	2A	E0	F0	12	E0	71	E0	F0	71 E0 12
79	←	E0	AA	E0	4B	E0	CB	E0	2A	E0	F0	12	E0	6B	E0	F0	6B E0 12
80	Home	E0	AA	E0	47	E0	C7	E0	2A	E0	F0	12	E0	6C	E0	F0	6C E0 12
81	End	E0	AA	E0	4F	E0	CF	E0	2A	E0	F0	12	E0	69	E0	F0	69 E0 12
83	↑	E0	AA	E0	48	E0	C8	E0	2A	E0	F0	12	E0	75	E0	F0	75 E0 12
84	↓	E0	AA	E0	50	E0	D0	E0	2A	E0	F0	12	E0	72	E0	F0	72 E0 12
85	PgUp	E0	AA	E0	49	E0	C9	E0	2A	E0	F0	12	E0	7D	E0	F0	7D E0 12
86	PgDn	E0	AA	E0	51	E0	D1	E0	2A	E0	F0	12	E0	7A	E0	F0	7A E0 12
89	→	E0	AA	E0	4D	E0	CD	E0	2A	E0	F0	12	E0	74	E0	F0	74 E0 12
X	Win	E0	AA	E0	5B	E0	DB	E0	2A	E0	F0	12	E0	1F	E0	F0	1F E0 12
X	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 | Key | Code set 1 | | | | | | | | Code set 2 | | | | | | | |
No.	top	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
X	Win	E0	2A	E0	5B	E0	DB	E0	AA	E0	12	E0	1F	E0	F0	1F	E0	F0	12
X	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 | | Code set 1 | | | | Code set 2 | | | | |
No.	Keytop	Make		Break		Make		Break		
43	ENT	E0	1C	E0	9C	E0	5A	E0	F0	5A
58	L-CTRL	E0	1D	E0	9D	E0	14	E0	F0	14
60	L-ALT	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		C6		7E		F0	7E	

Table D-5 Scan codes in overlay mode

Cap No.	Keytop		Code set 1		Code set 2		
			Make	**Break**	**Make**	**Break**	
09	8	(8)	48	C8	75	F0	75
10	9	(9)	49	C9	7D	F0	7D
11	0	(*)	37	B7	7C	F0	7C
23	U	(4)	4B	CB	6B	F0	6B
24	I	(5)	4C	CC	73	F0	73
25	O	(6)	4D	CD	74	F0	74
26	P	(−)	4A	CA	7B	F0	7B
37	J	(1)	4F	CF	69	F0	69
38	K	(2)	50	D0	72	F0	72
39	L	(3)	51	D1	7A	F0	7A
40	;	(+)	4E	CE	79	F0	79
52	M	(0)	52	D2	70	F0	70
54	.	(.)	53	D3	71	F0	71
55	/	(/)	E0 35	E0 B5	E0 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 84	

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
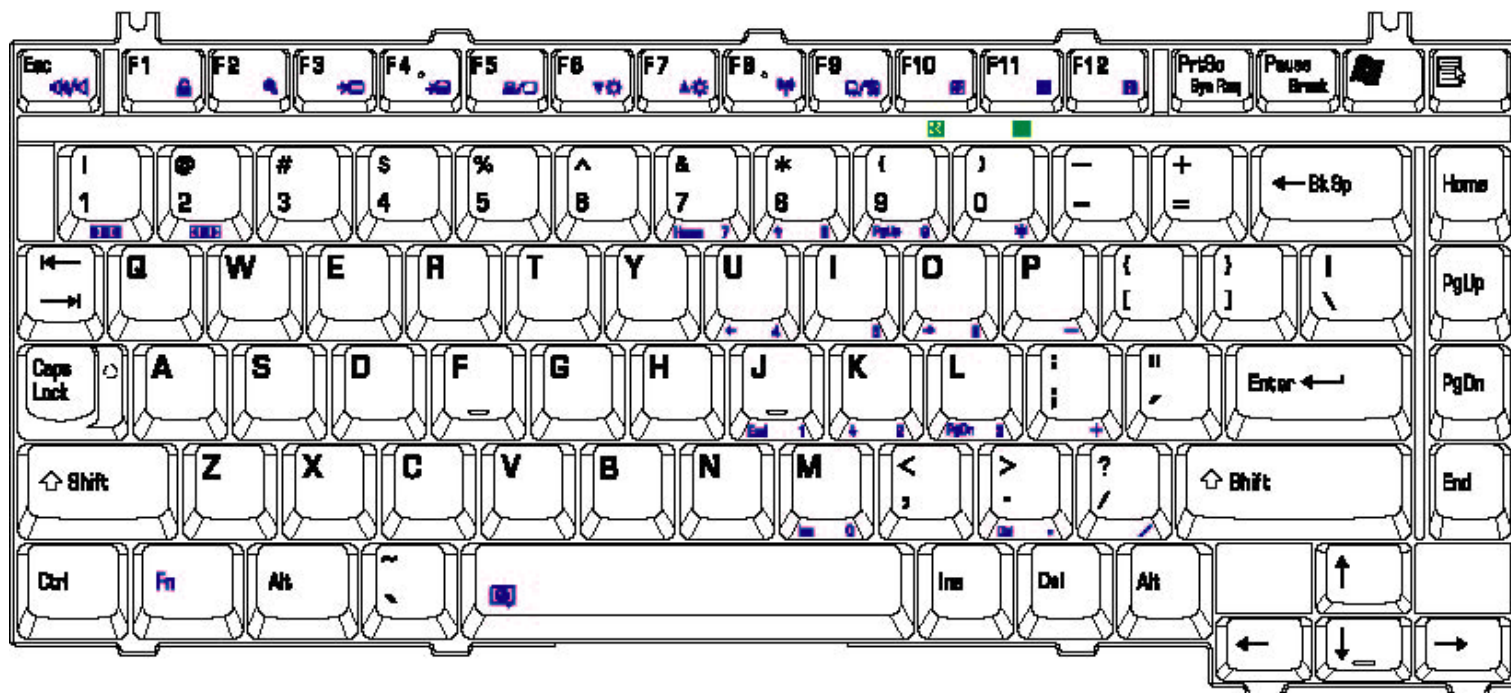
Figure E-1 US keyboard

E.2   United Kingdom (UK) Keyboard
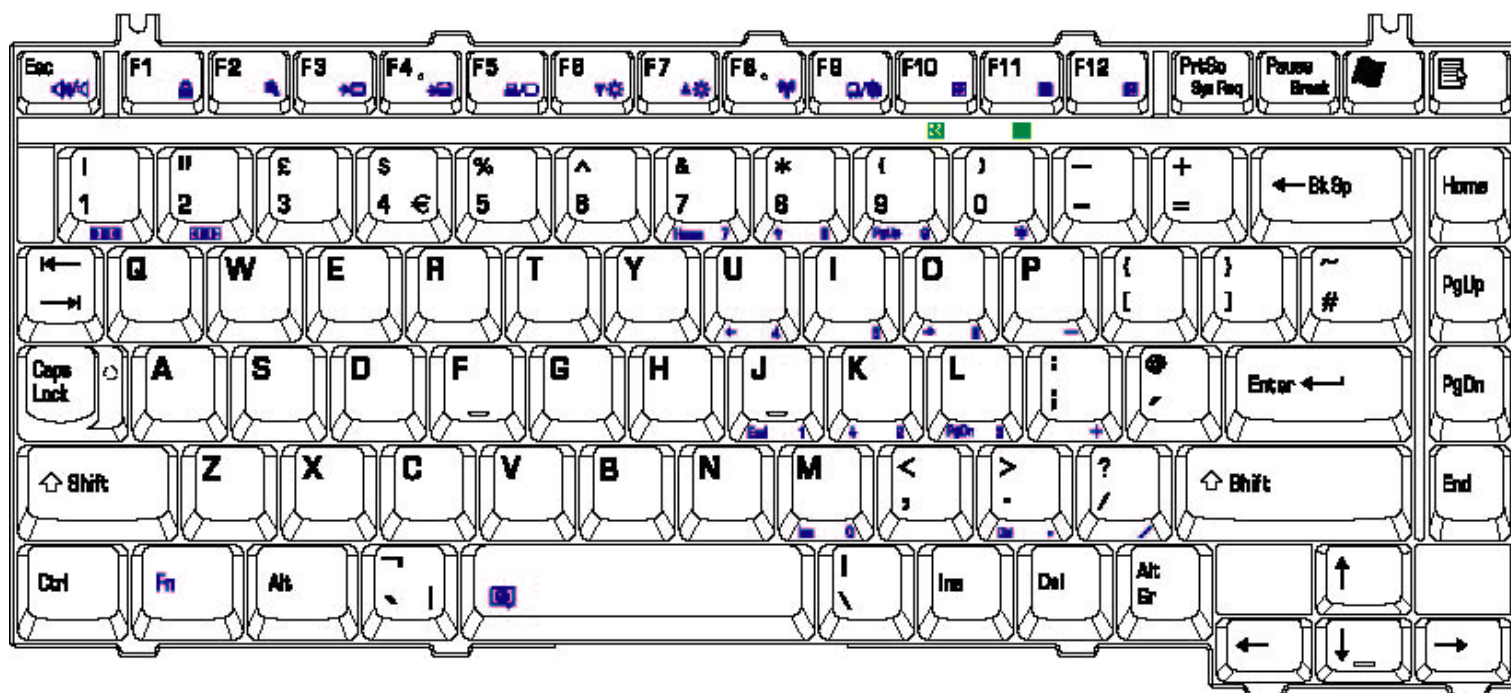
Figure E-2 UK keyboard

E.3 Spanish (SP) Keyboard
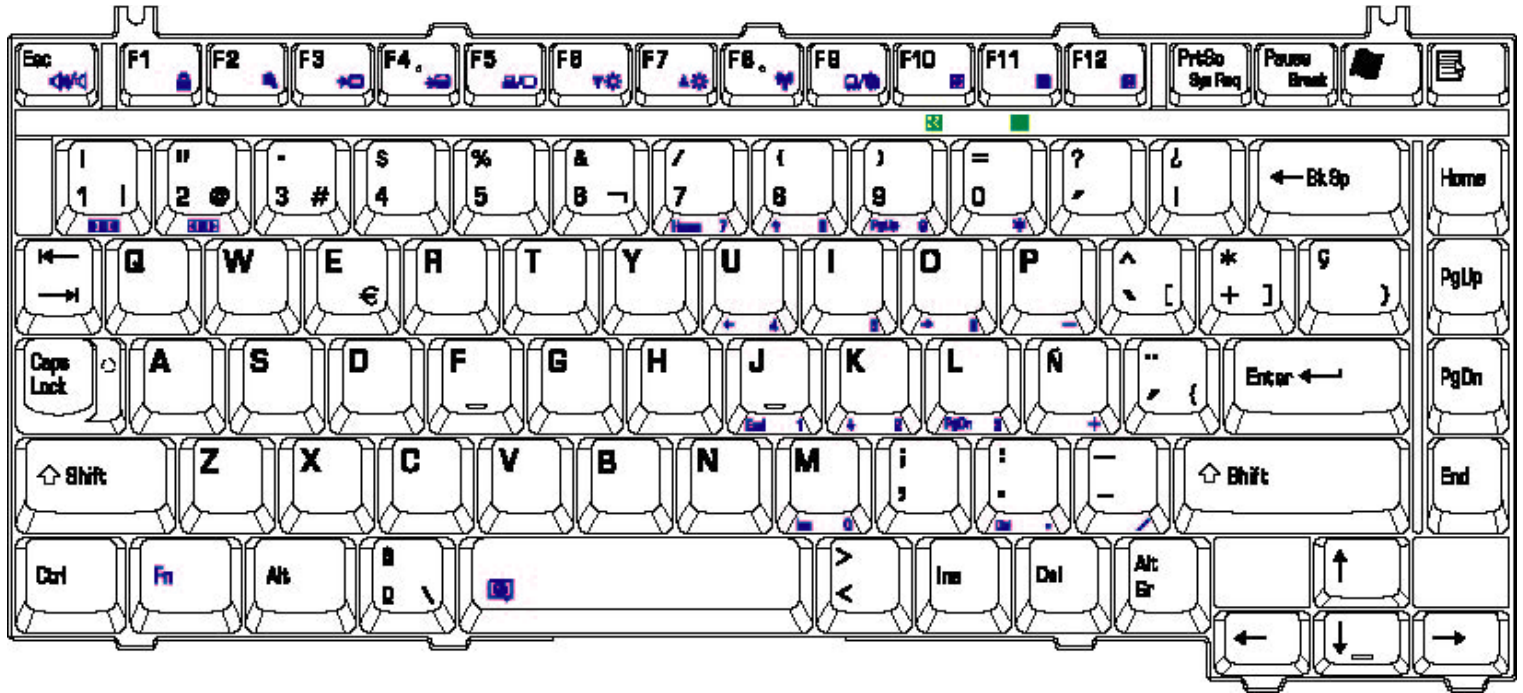
Figure E-3 SP keyboard

E.4 Japanese (JA) Keyboard
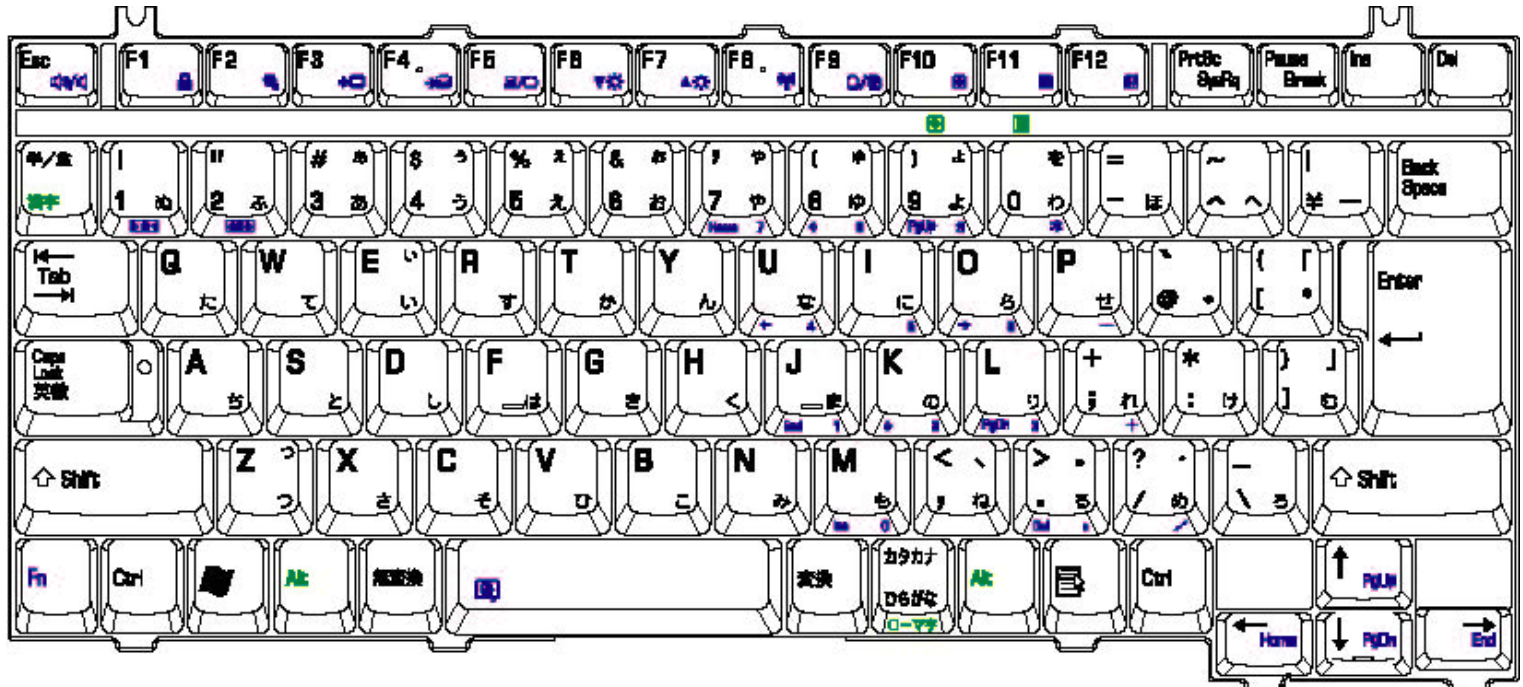
Figure E-4 JA keyboard

E.5 Korean (KO) Keyboard
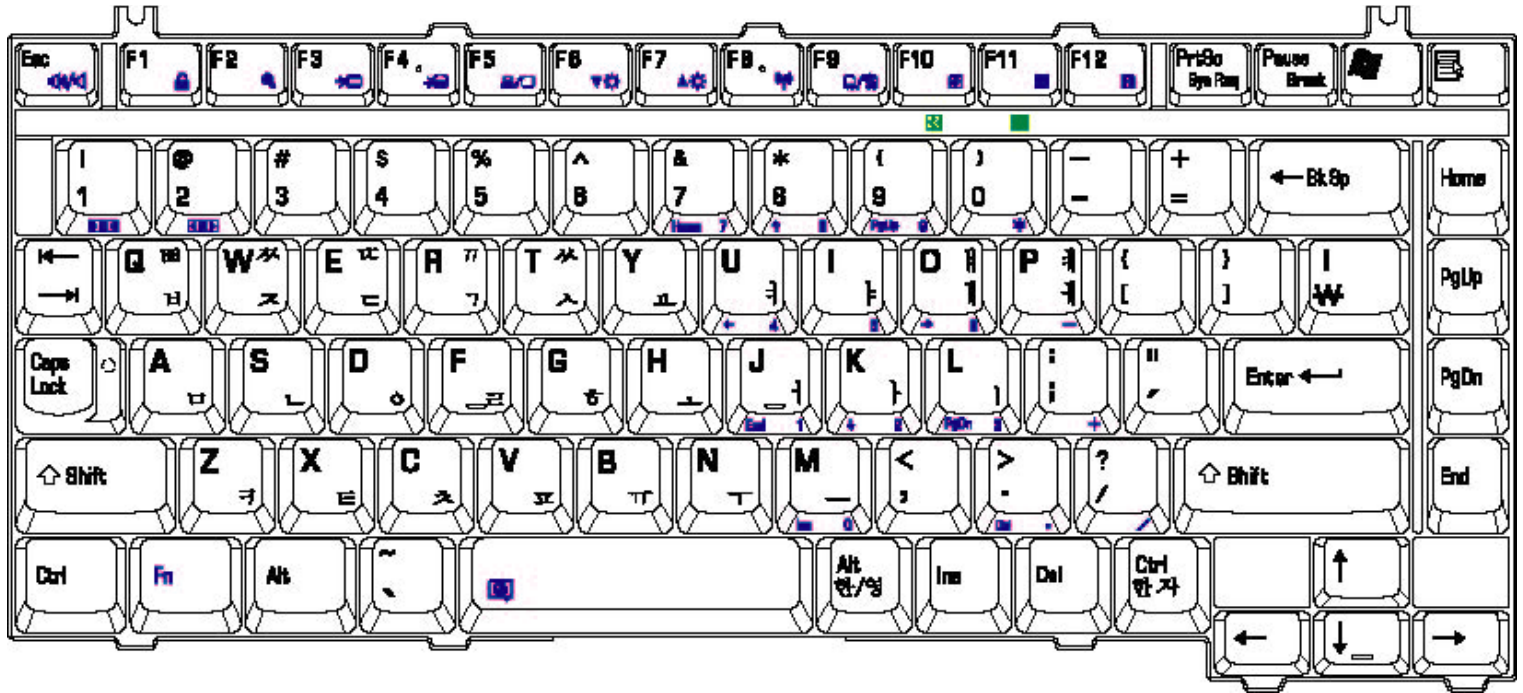
Figure E-5 KO keyboard

E.6 Canada France (CF) Keyboard

Figure E-6 CF keyboard
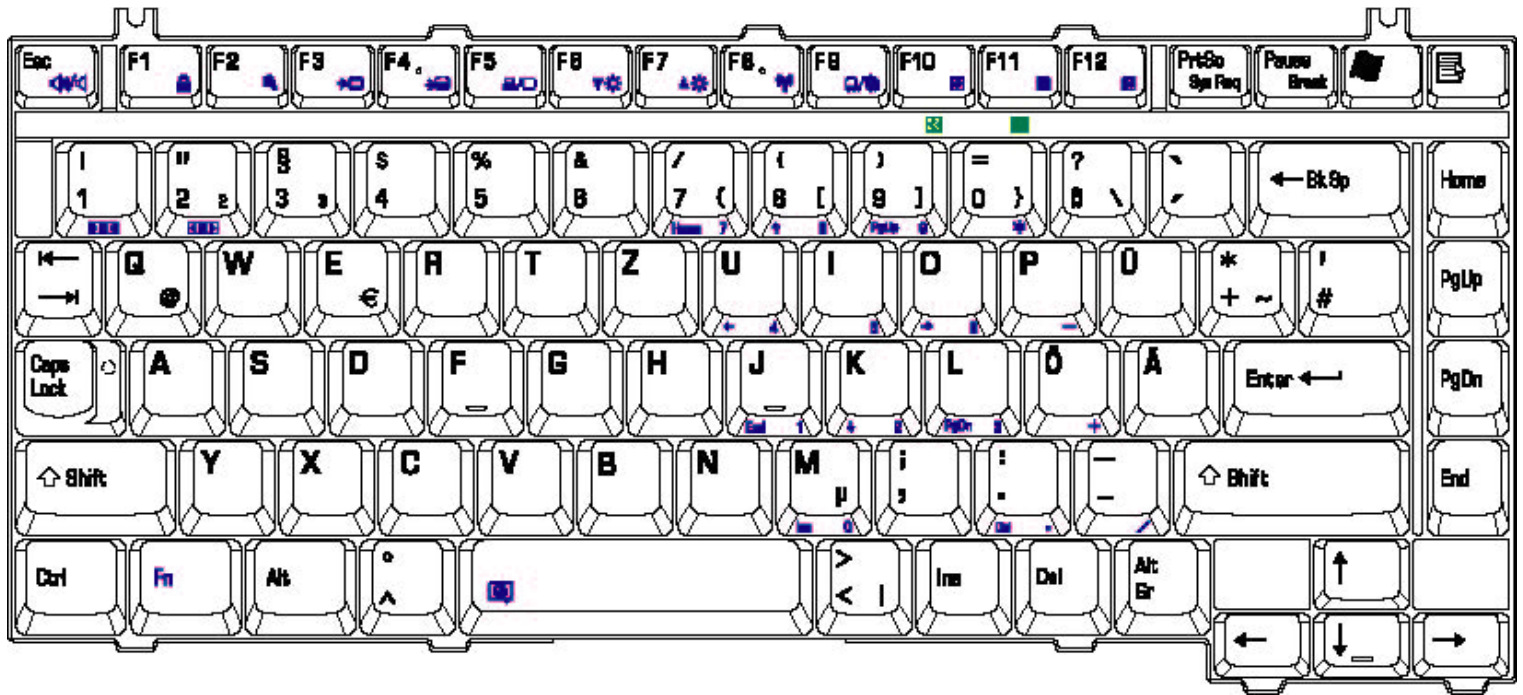
E.7 Portuguese (PO) Keyboard

Figure E-7 PO keyboard

E.8 US-INTE (UI/INTE) Keyboard

Figure E-8 US-INTE Keyboard
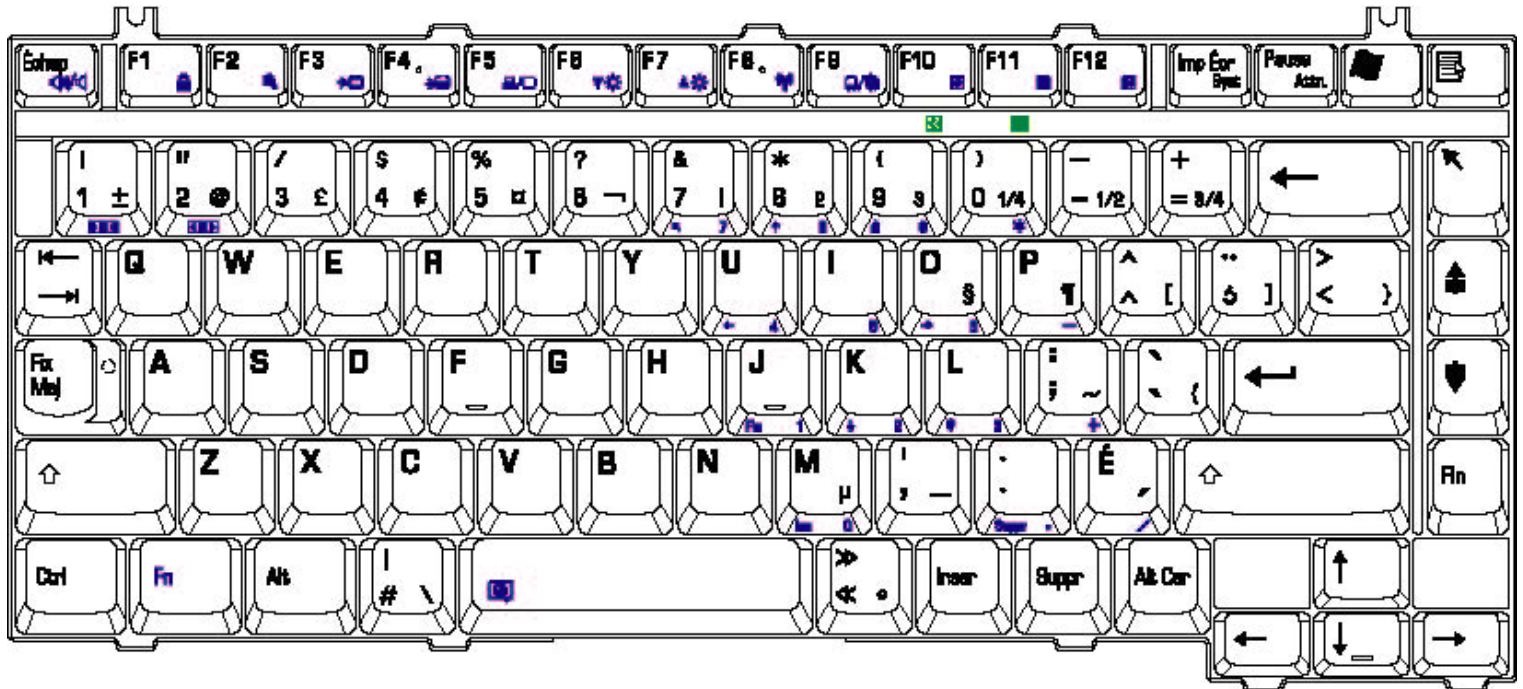
E.9 Germanic (GR) Keyboard

Figure E-9 GR keyboard

E.10 France (FR) Keyboard
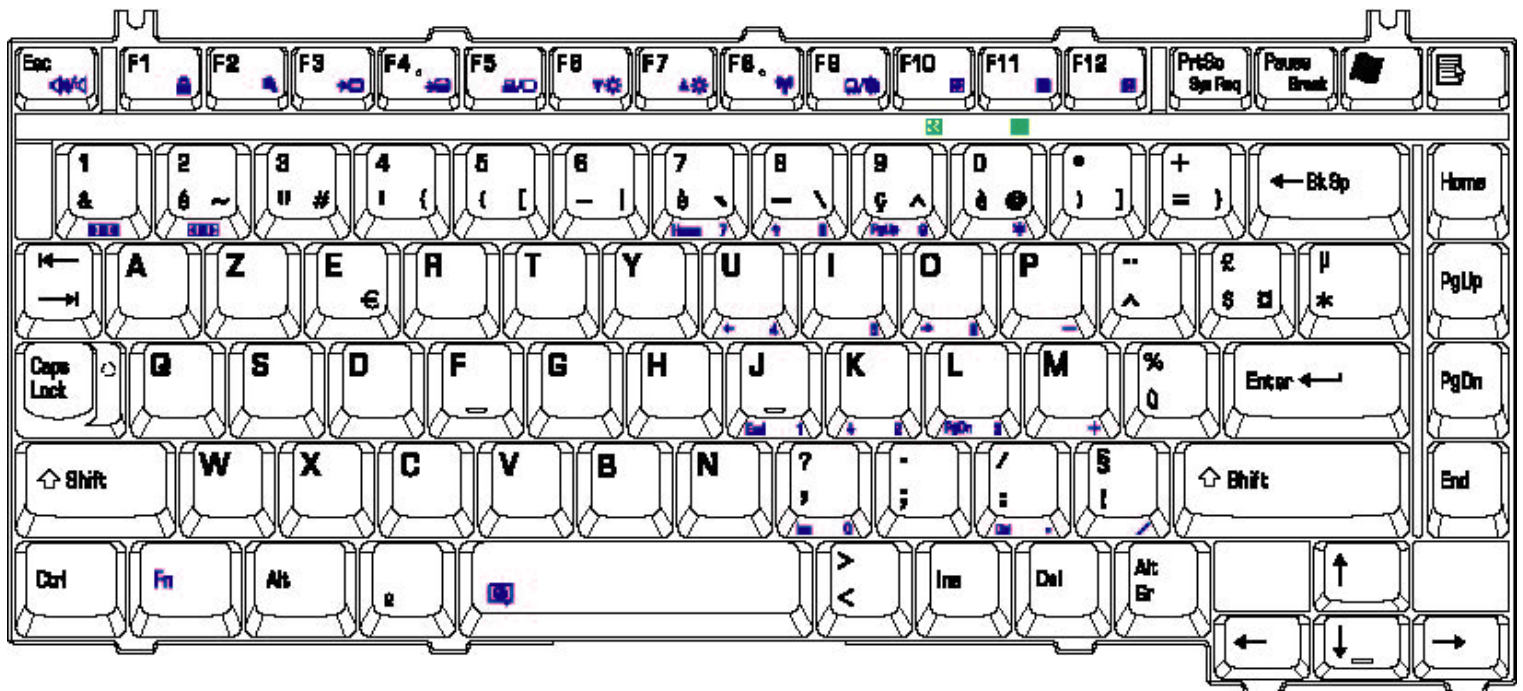
Figure E-10 FR keyboard

E.11 Chinese (CH) Keyboard
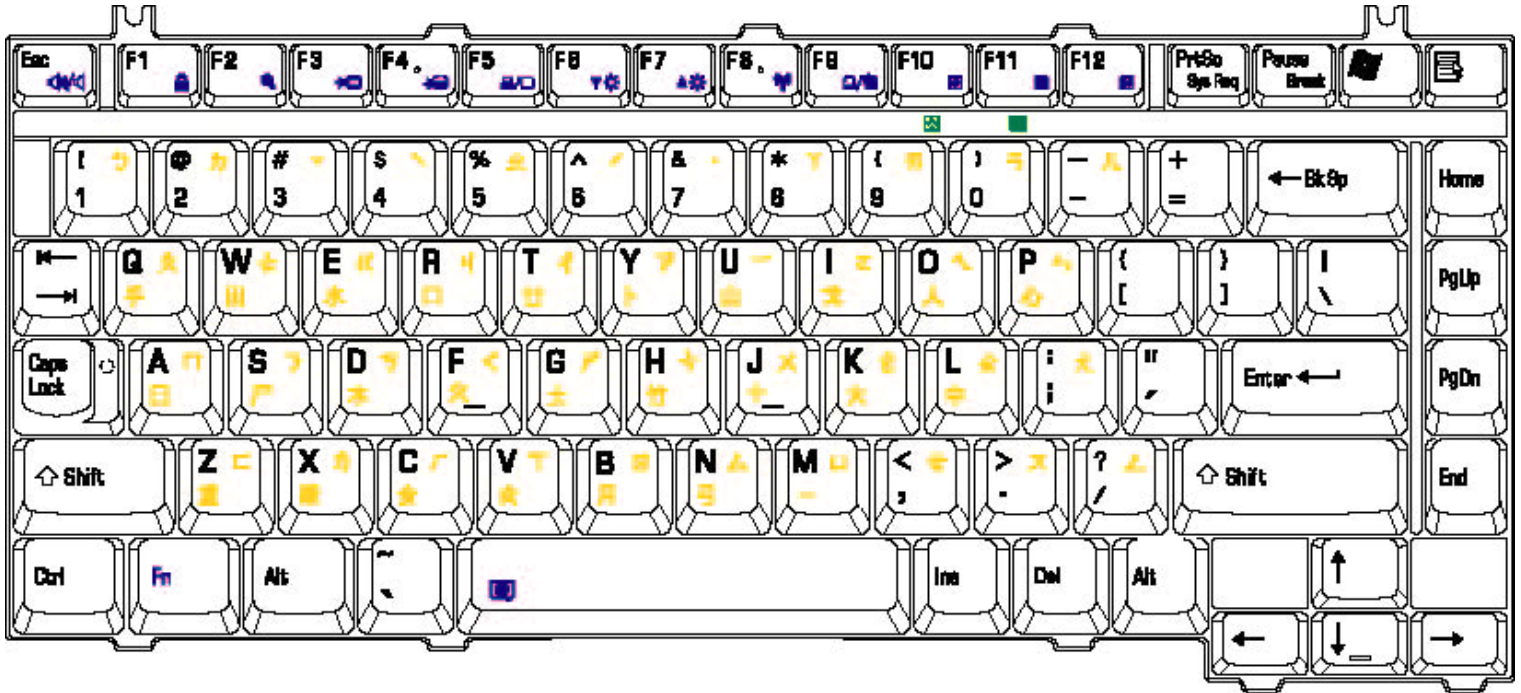
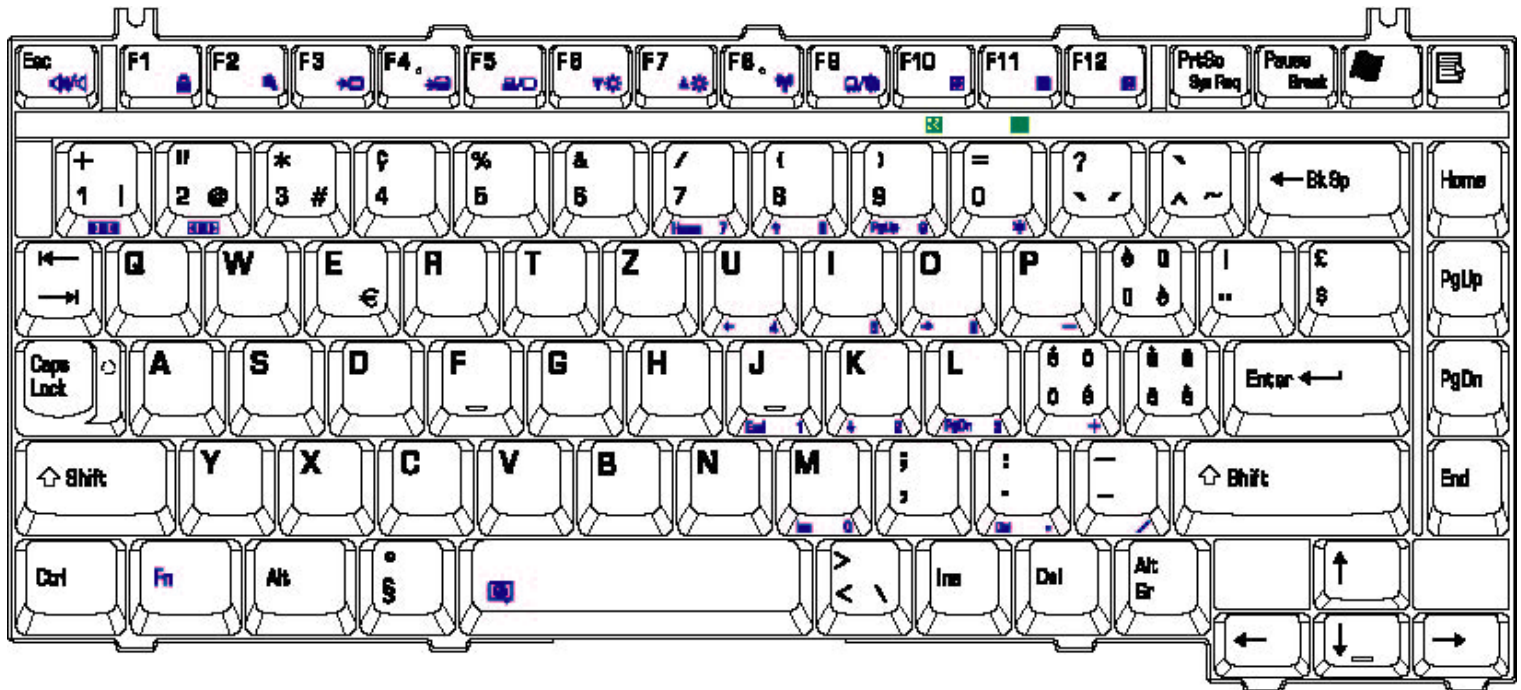Figure E-11 CH keyboard

E.12 Swissc-Darfon(SW) Keyboard

Figure E-12 Swiss keyboard

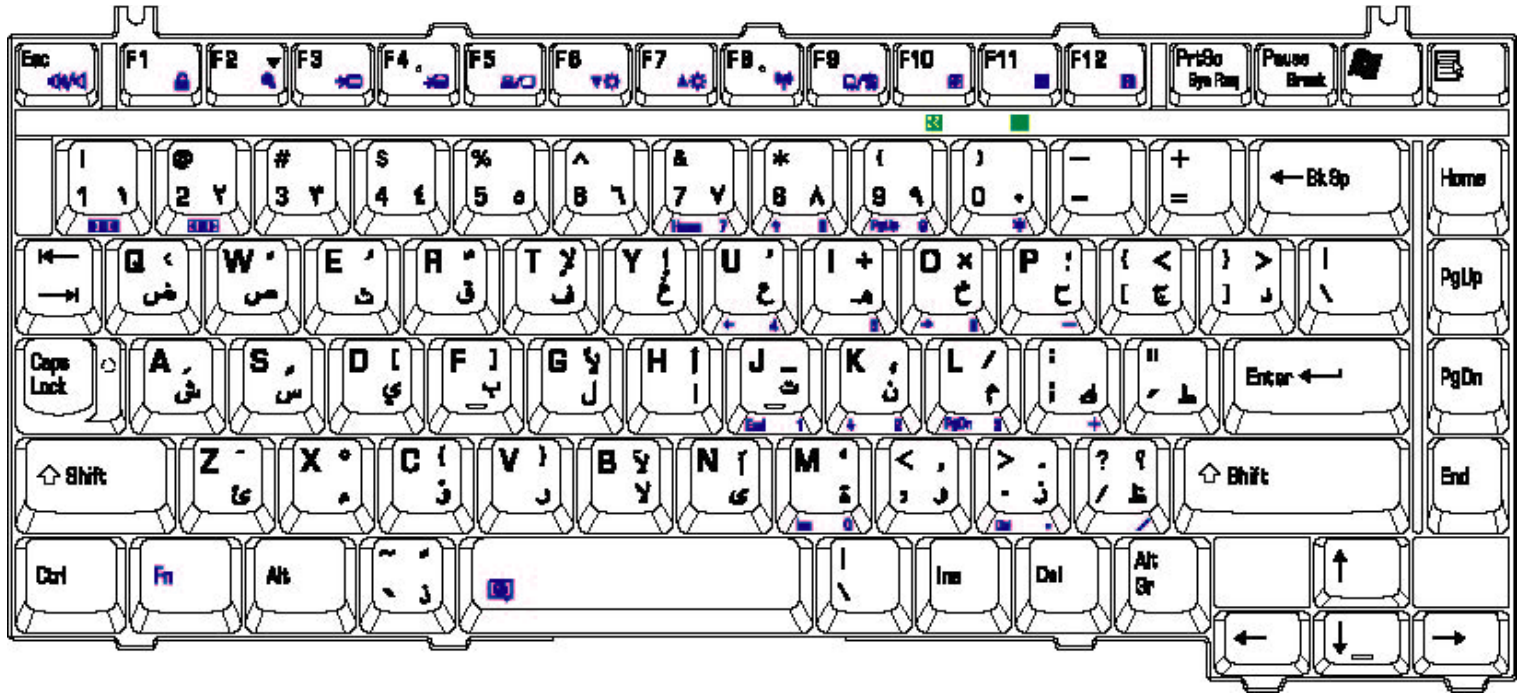# E.13 Italian (IT) Keyboard

Figure E-13 IT keyboard

E.14 Belgiun (BE) Keyboard

Figure E-14 BE keyboard

E.15 Arabic (AR-E) Keyboard

Figure E-15 AR-E keyboard

E.16 Czech (CZ) Keyboard

Figure E-16 CZ keyboard

E.17 Estonian (ES) Keyboard

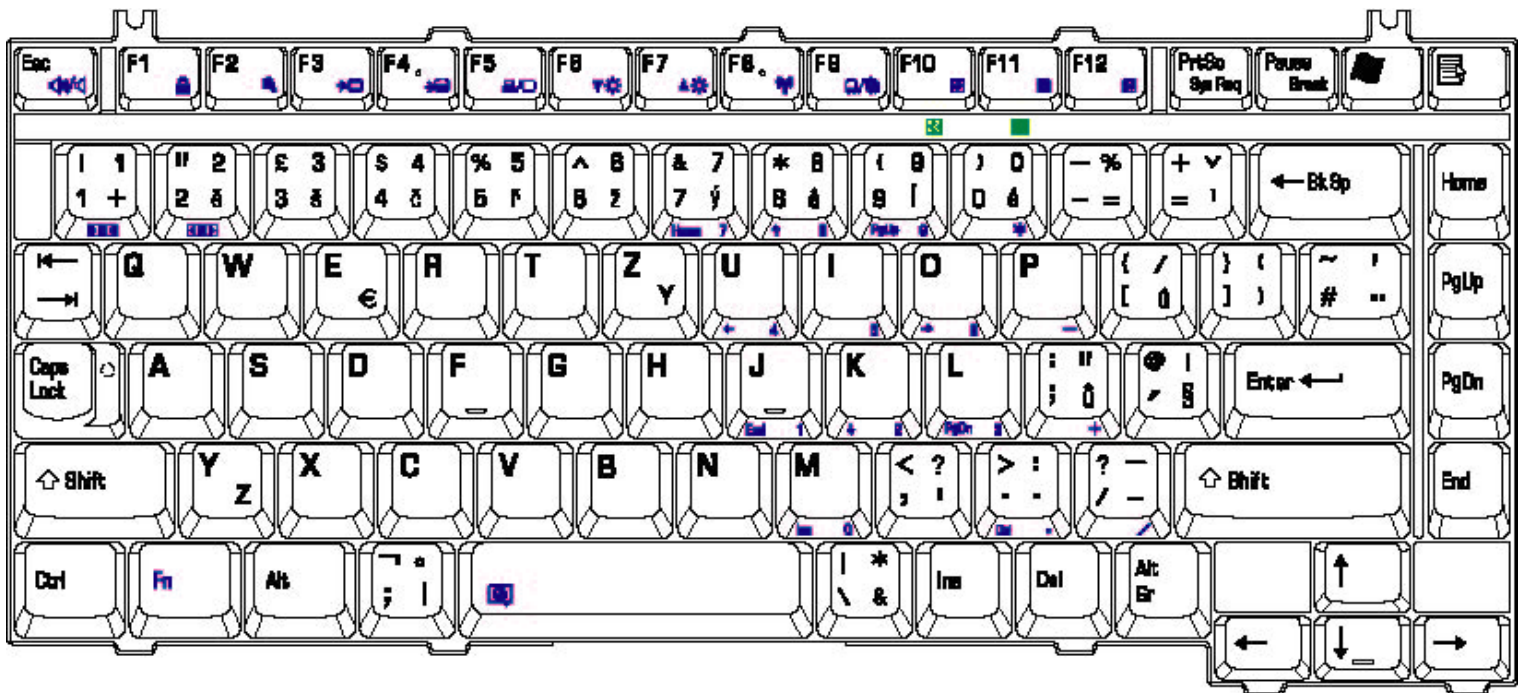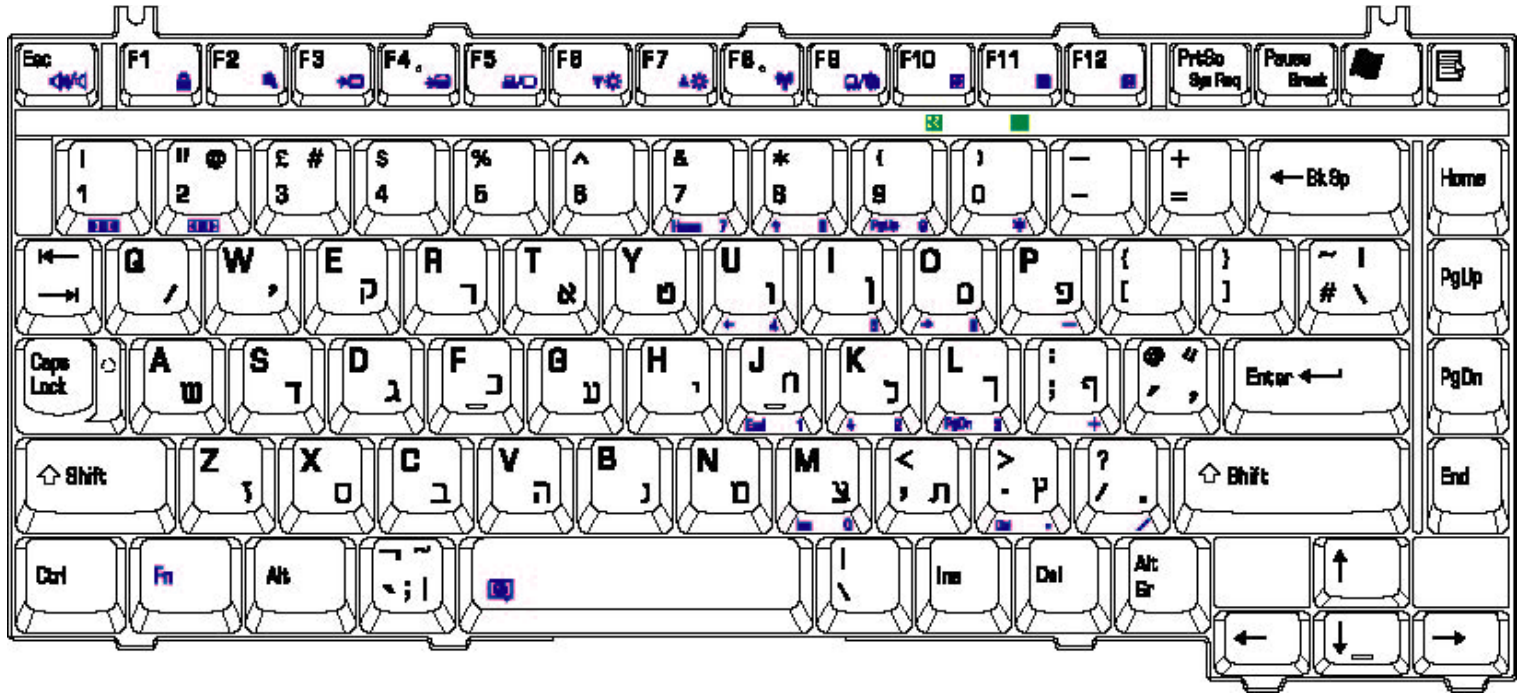*Figure E-17 ES keyboard*

E.18 Greek (GK) Keyboard

Figure E-18 GK keyboard

E.19 Hebrew (HB) Keyboard

Figure E-19 HB keyboard

E.20 Hungary (HG) Keyboard

Figure E-20 HG Keyboard

E.21 Norwegian (NW) Keyboard

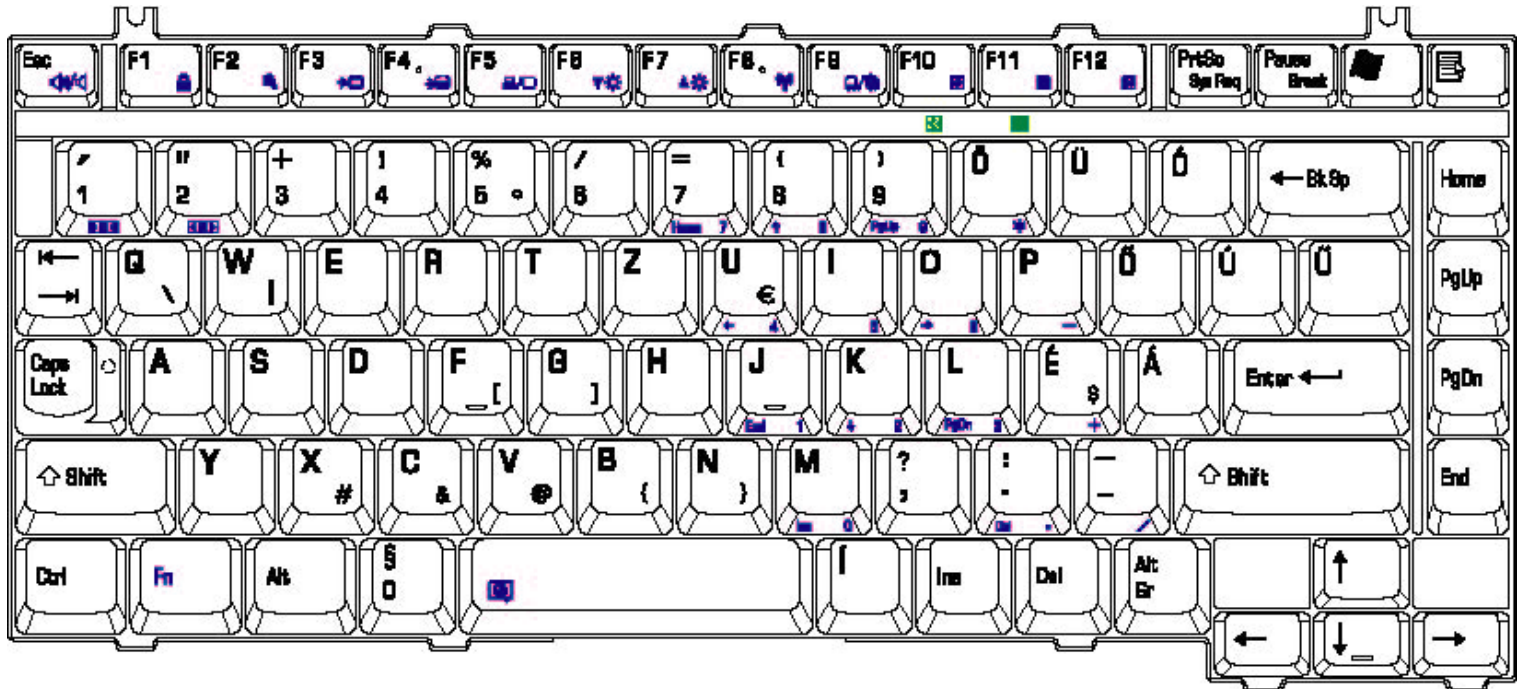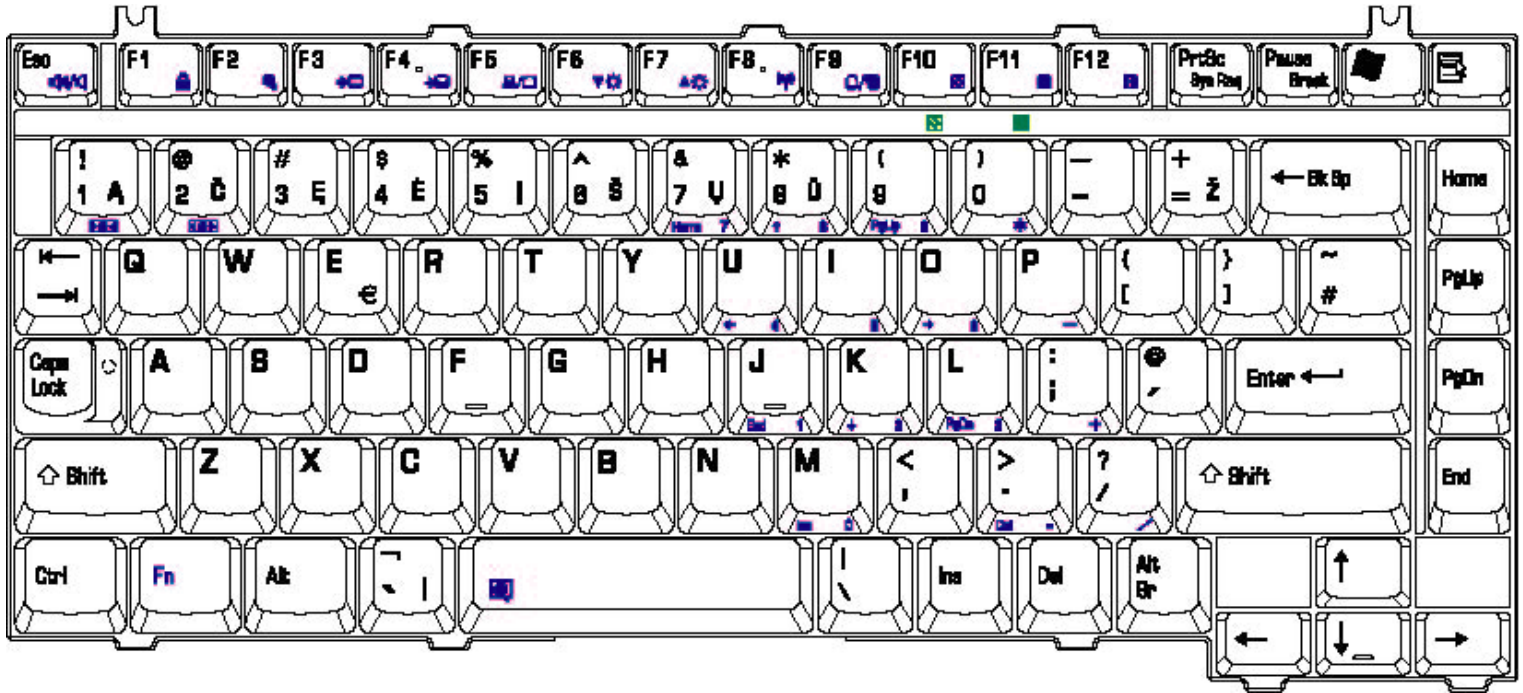*Figure E-21 NW keyboard*

E.22 Dutch (DU) Keyboard

Figure E-22 DU keyboard

E.23 Lithuanian (LI) Keyboard

Figure E-23 LI keyboard

E.24 Russian (RU) Keyboard

Figure E-24 RU keyboard

E.25 Turkish (TR) Keyboard

Figure E-25 TR keyboard

E.26 Yugoslavian (YU) Keyboad
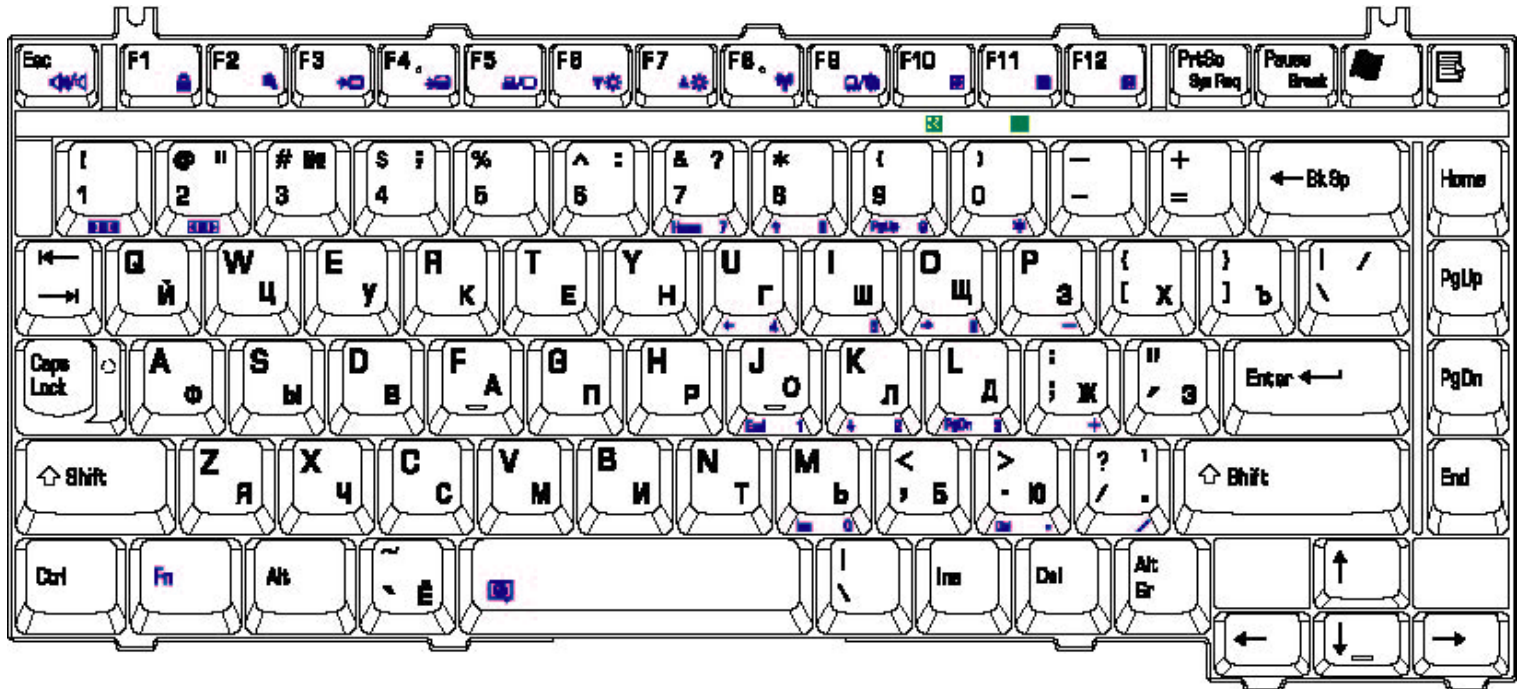

Figure E-26 YU keyboard
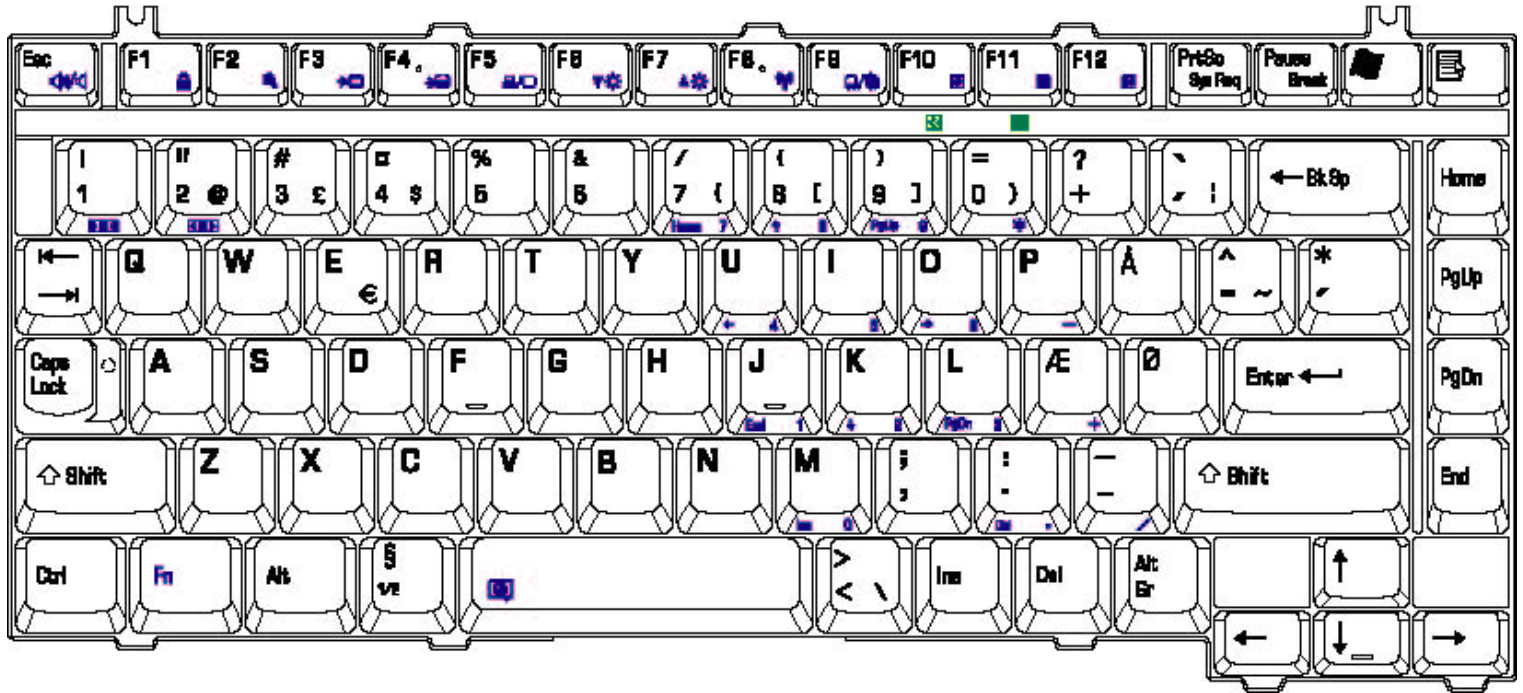
E.27 Danish (DM) Keyboard

Figure E-27 DM keyboard
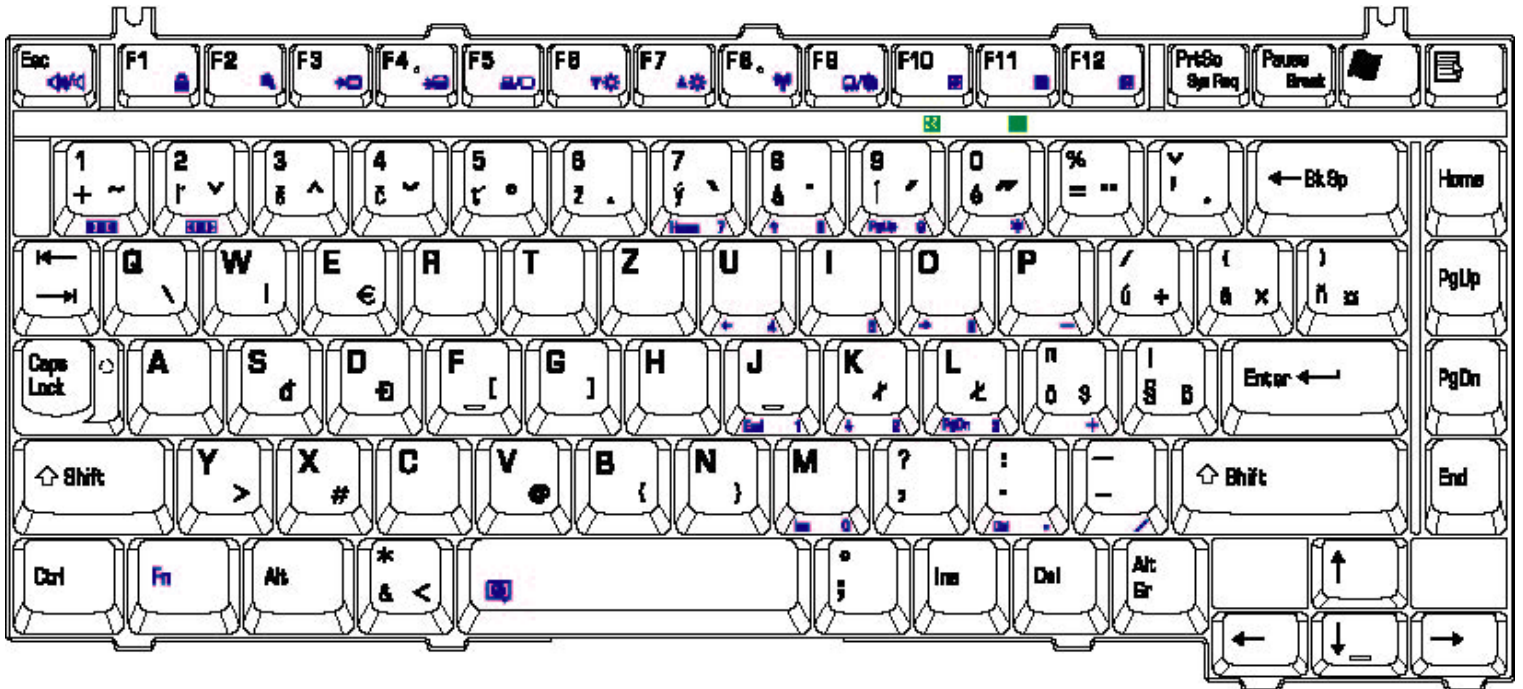
E.28 Slovak (SA) Keyboard

Figure E-28 SA keyboard
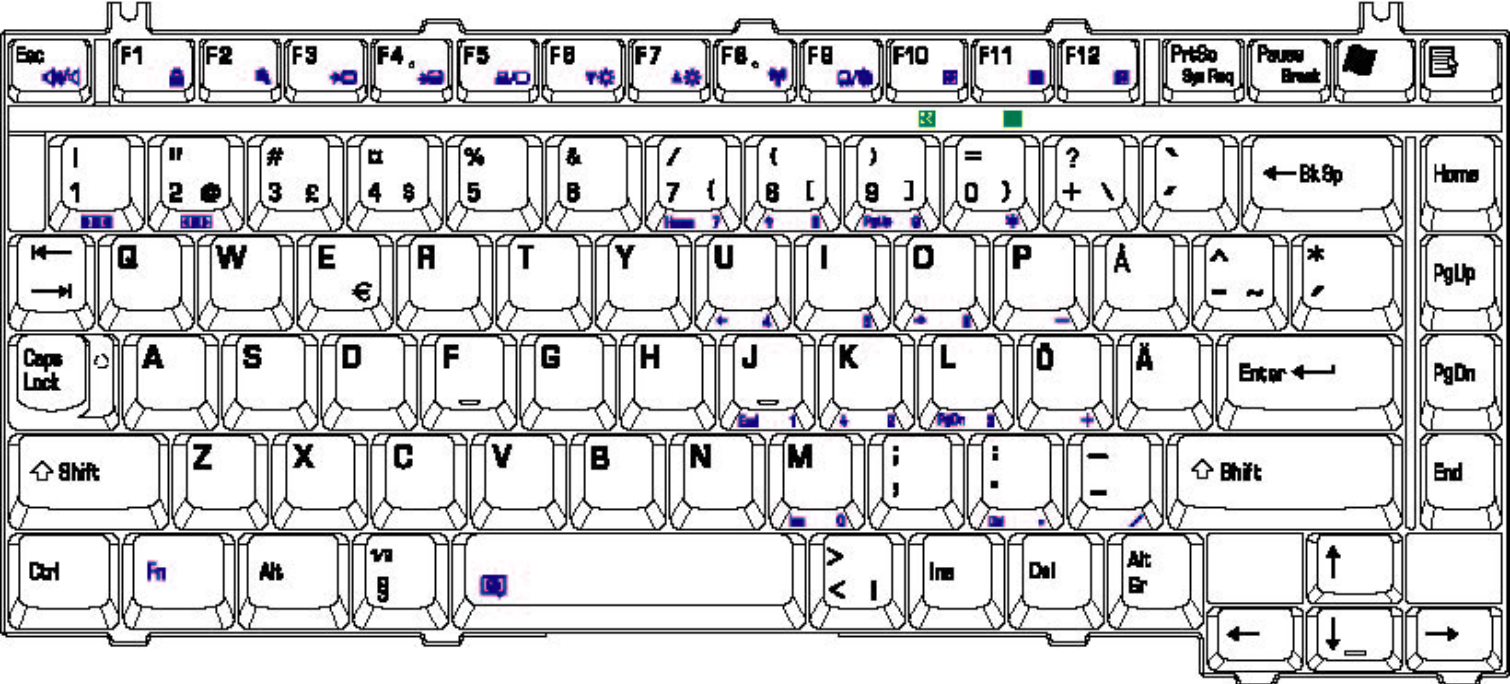
E.29 Swedish (SD) Keyboard

Figure E-29 SD keyboard

Appendix F   Series Screw Torque List

Table F-1 Series Screw Torque List

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MMCK25030N0	M2.5*3 (silver)	1	THERMAL PLATE TO THERMAL MODULE	2.0~2.5kgfcm
MMCK25030N0	M2.5*3 (silver)	2	NB SUPPORT PLATE TO MB	2.0~2.5kgfcm
MMCK25030N0	M2.5*3 (silver)	1	TP TO TP BREAKET TO LOG UP	2.5~3.0kgfcm
MMCK25030N0	M2.5*3 (silver)	2	TP PCB TO LOG UP	2.5~3.0kgfcm
MAC9250030Z0	M2.5*3	1	BATT LATCH TO LATCH KNOB	1.8~2.2kgfcm
MMCK25030N0	M2.5*3 (silver)	3	LOG LOW-LOG UP (BATTERY)	2.5~3.0kgfcm
MMCK25030N0	M2.5*3 (silver)	1	KILL S/W PCB-LOG LOW	2.0~2.5kgfcm
MMCK25050Z0	M2.5*5	2	LCD BRK (L/R)-LCD COVER	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	LCD BEZEL-LCD BRK (L/R)-LCD COVER	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	MDC TO MB	2.0~2.5kgfcm

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MMCK25050Z0	M2.5*5	1	SADDLE(R) TO UP SHIELD UP TO LOG UP	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	SADDLE (L) TO UP SHIELD LOW TO LOG UP	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	3	TP LED PCB TO LOG UP	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	HINGE TO SADDLE(R/L)	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	3	POWER PCB TO LOG UP	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	LOWER - SADDLE (BOTTOM SIDE)	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	LOWER - SHIELD - SADDLE - UPPER	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	LOWER - SADDLE - UPPER	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	1	LOWER - SPK - SADDLE - UPPER	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	LOG LOW-LOG UP	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	4	LOW -MB - UPSHD - UPPER	2.5~3.0kgfcm

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MMCK25050Z0	M2.5*5	1	LOGLOW - ODD	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	2	SPEAKER (R/L)-LOG LOW	2.5~3.0kgfcm
MMCK25050Z0	M2.5*5	1	HDD DOOR-LOG LOW	2.5~3.0kgfcm
MACA0012304	M2.5*10	1	LOWER - SHIELD - MB - SADDLE- UPPER	2.5~3.0kgfcm
MACA0012304	M2.5*10	1	LOWER - SPK - SADDLE - UPPER	2.5~3.0kgfcm
MACA0012304	M2.5*10	1	LOWER - AUDIO/B - SADDLE - UPPER	2.5~3.0kgfcm
MACA0012304	M2.5*10	1	UPPER - THERMAL PLATE- THERMAL PLATE STAND OFF-MB- LOWSHD- LOWER	2.0~2.5kgfcm
MACA0012304	M2.5*10	1	LOG LOW-LOG UP	2.5~3.0kgfcm
MAAA0015320	2.0*3 ZBL (Black nickel)	6	LCD BRK (L/R) - LCD PANEL	1.2~1.5kgfcm
MAAA0015320	2.0*3 ZBL (Black nickel)	1	INVERTER - LCD COVER	1.5~2.0kgfcm

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MAAA0015320	2.0*3 ZBL (Black nickel)	1	LCD CABLE TO COVER	1.5~2.0kgfcm
MAAA0015320	2.0*3 ZBL (Black nickel)	4	CPU PLATE TO MB STANDOFF	1.5~2.0kgfcm
MMCK20094Z0	M2.0*2_BLACK_ZN	2	KEYBOARD TO SHIELD UP TO LOG UP	1.5~2.0kgfcm
ECAL202V000	M2.5*12	1	LOG UP-MINIPCI DOOR NORMA - MINIPCI STAND OFF-MB-LOG LOW SHIELD-LOG LOW	2.0~2.5kgfcm
ECAL202V000	M2.5*12	1	LOG UP-MDC DOOR-MINIPCI STAND OFF-MB-LOG LOW SHIELD-LOG LOW	2.0~2.5kgfcm
MAAA0004308	3.0*4-ZK	2	HDD DOOR - HDD	2.0~2.5kgfcm
AMAL202Y000	(M2*4.2+4 (Screw+Spring) IMS)	4	CPU THERMAL SINK TO CPU BRK STANDOFF	2.0~2.5kgfcm
MAFA94001N0	(D-SUB NUT WS 4.75*9.6 NI Zinc plated)	4	I/O PORT NUT – LOG_LOW_MB	2.0~2.5kgfcm
MAA20100302	(M2.0X12 silver)	2	PCMCIA SLOT TO MB	1.5~2.0kgfcm
MACK25080Z0	M2.5X8	2	LCD HINGE - HINGE SADDLE	4.0~4.5kgfcm

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MACK25080Z0	M2.5X8	2	LOGIC LOWER - HINGE SADLE L/R (BACK SIDE)	2.5~3.0kgfcm
MMCK25400Z0	M2.5*4	2	HDD BREAKET- MB- LOG LOW	2.5~3.0kgfcm
MMCK25400Z0	M2.5*4	2	HDD BREAKET- LOG LOW	2.5~3.0kgfcm
ELAL203C000	M2.5*3.9 (Half thread)	1	RAM DOOR SCREW	2.5~3.0kgfcm
MMCK20050N0	M2*5	2	PCMCIA TO MB	1.5~2.0kgfcm
MMCK20050N0	M2*5	2	ODD CONN TO MB	1.5~2.0kgfcm
MMCK20050N0	M2*5	2	HDD CONN TO MB	1.5~2.0kgfcm
AMZKM000400	(M2*4.2+4 (Screw+Spring) IMS)	2	THERMAL PLATE TO MB	2.0~2.5kgfcm

Appendix G   Reliability

The following table shows MTBF (Mean Time Between Failures) for each component.

Table G-1 MTBF

Component	Time (hours)
LCD	50,000
Keyboard	40,000
HDD	300,000
Removable FDD	30,000
Optical (DVD/CD) drive	60,000
AC adaptor	60,000

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