# Toshiba Personal Computer

# Satellite A70

# Maintenance Manual

**TOSHIBA CORPORATION**

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Toshiba Personal Computer Satellite SATELLITE A70 Maintenance Manual

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# Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite SATELLITE A70/A75, referred to as the A70 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 A70 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 type face below:

```
Format complete
System transferred
```

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**Chapter 2    Troubleshooting Procedures**

# Chapter 3    Tests and Diagnostics

## Chapter 4  Replacement Procedures

## Appendices

# Chapter 1

# Hardware Overview

# **Chapter 1      Contents**

## 1.1   Features

The Satellite A70 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$^®$ Celeron$^®$ Processor up to 2.8 GHz

  - ? Mobile Intel$^®$ Pentium$^®$ 4 Processor up to 3.06GHz

  - ? Mobile Intel$^®$ Pentium$^®$ 4 Processor up to 3.2GHz supporting HT Technology

  - ? Mobile Intel$^®$ Pentium$^®$ 4 Processor up to 538 or higher supporting HT Technology

  - ? Micro FC-PGA package CPU

- ✎ Chipset

  - ? ATI Mobility Radeon$^{TM}$ 9000IGP

  - ? ATI IXP150

  - ? ENE KB910 for Keyboard Controller, Battery management Unit, and RTC.

  - ? ENE CB1410 for Card Bus PCMCIA controller or CB714 for Card Bus PCMCIA controller with Multiple Digital Media Card Slot

  - ? ALC250 for AC97 CODEC.

  - ? TI TSB43AB21A for IEEE 1394 controller.

  - ? Realtek RTL8100CL on board LAN.

- ✎ Memory

  - ? On board memory with 256MB or 512 MB supporting.

  - ? Maximum system memory up to 1.5GB (one 1GB SO-DIMM module and 512MB on board RAM).

  - ? 128KB L2 Cache (Intel$^®$ Celeron$^®$ Processor up to 2.8GHz)

  - ? 512KB L2 Cache (Mobile Intel$^®$ Pentium$^®$ 4 Processor up to 3.2GHz)

  - ? 1MB L2 Cache (Mobile Intel$^®$Pentium$^®$ 4 Processor up to 538 or higher)

  - ? 16, 32, 64 or 128 MB of system memory is provided for video display

? BIOS

> ? 512KB Flash ROM for system BIOS.
>
> ? Suspend to RAM/Disk.
>
> ? Password protection (System).
>
> ? Various hot key for system control.
>
> ? Refreshable
>
> ? Complete ACPI 1.0b Function

? Power

> ? 12-cell Li-Ion smart battery pack with 14.8V*6450mAh capacity or 8-cell Li-Ion smart battery pack with 14.8V*4300mAh capacity (depending on the models)
>
> ? Approximately 12 hours or longer charging time to 100% battery capacity (system on).
>
> ? Approximately 4 hours charge time to 100% battery capacity (system off)
>
> ? Approximately 2.6 days discharge time in standby mode for 12-cell battery and 1.7 days for 8-cell battery.
>
> ? Discharge time in shutdown mode is approximately 1 month.

? HDD

> ? One 2.5", 9.5mm hard disk with capacity 30GB/40GB/60GB/80GB
> ? Bus Master IDE
> ? 9.5mm, 2.5"HDD Support
> ? Support Ultra 100 synchronous DMA

? ODD Devices

One of the following:

> ? 5.25" 12.7mm height DVD-ROM drive
> ? 5.25" 12.7mm height CD-RW/DVD-ROM drive
> ? 5.25" 12.7mm height DVD-R/-RW drive
> ? 5.25" 12.7mm height DVD±R/±RW drive
> ? 5.25" 12.7mm height DVD Super Multi drive

? Optional Devices

> ? PC2700 256MB/512MB/1GB SO-DIMM modules
> ? MINI PCI module(802.11g,802.11a+g wireless LAN module)

? Keyboard

An easy-to-use 87-key keyboard provides a numeric keypad overlay for fast numeric data entry or for cursor and page control. It supports software that uses a 101- or 102-key enhanced keyboard. Includes one Windows® key and one Application key.

❧ TouchPad

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 TouchPad incorporates two mouse buttons.

❧ Display

? 15.4-inch WXGA TFT screen, 1280?800 pixels, Response time 50ms (typ.); For Normal LCD-Contrast ratio 300:1 (typ.); Brightness 168 Nit (typ.)

? 15.4-inch WXGA TFT screen, 1280?800 pixels, Response time 50ms (typ.); For Hight brightness CSV-Contrast ratio 600:1 (typ.); Brigntness 220 Nit(typ.)

❧ I/O Ports

? One 25 pins Parallel port, EPP/ECP Capability
? One 15 pins CRT port, Support DDC 2B
? One TV-out connector
? One MIC In port
? One headphone-out
? One 2pins AC Adapter Jack
? One type II PCMCIA Card Bus slots
? Three 4 pins USB ports
? One RJ11/RJ45 Port
? VR for volume control
? IrDA Port
? 1394 Port
? Multiple Digital Media Card Slot (SD/MMC/SM/MS/MS Pro/xD)
? One 10/100T Ethernet Port

❧ PCMCIA Card Organization

? One type II card socket only
? SRAM, OTPROM, FLASH ROM
? Mask ROM memory card
? MODEM/LAN card
? Card bus card
? PC Card 8.0 Compliant, supports 3V and 5V cards

❧ Multiple Digital Media Card

? Supports SD/MMC/SM/MS/MS Pro/xD card
? SD memory capacity support from 8MB to 512MB
? MMC memory capacity support from 8MB to 256MB
? SM memory capacity support from 4MB to 128MB
? MS memory capacity support from 8MB to 256MB
? MS Pro memory capacity support from 256MB to 1GB
? xD memory capacity support from 4MB to 512MB

❧ Universal Serial Bus (USB)

The computer comes with three USB ports that comply with Universal Host Controller Interface (UHCI). The USB enables daisy-chain connection of up to 127 USB-equipped devices.  It is designed for easy configuration by a Plug-and-Play operating system and provides hot insertion/ejection capability.

? Parallel port

A 25-pin parallel port enables connection of a printer or other parallel device. The port supports Extended Capabilities Port (ECP) conforming to IEEE-1284 and is Enhanced Parallel Port (IEEE 1284) compliant. It features ChiProtect circuitry for protection against damage due to printer power-on.

? 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

A Cirrus logic ALC250 for AC97 codec audio subsystem offers industry leading mixed signal technology to enhance the computer's multimedia capability.  The sound system is equipped with stereo speakers and jacks for headphone and external microphone.

? TV-out port

This video-out mini-jack enables transfer of NTSC or PAL data (video and right/left audio) to external devices such as a TV.

? LAN port

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

? Programmable button

When system is off, pressing this button will turn on CD Playback mode.  Pressing this button again will turn off CD Playback mode.  When system is turned on, pressing this button will launch the program which you defined with Programmable Button utility.(The default setting is Windows Media Player)

## 1.2   System Unit

The system unit is composed of the following major components:

? Processor

  ? Intel® Celeron® Processor up to 2.8 GHz

  ? Mobile Intel® Pentium® 4 Processor up to 3.06GHz

  ? Mobile Intel® Pentium® 4 Processor up to 3.2GHz supporting HT Technology

  ? Mobile Intel® Pentium® 4 Processor up to 538 or higher supporting HT Technology

  ? Micro FC-PGA package CPU

? System Logic

  ? ATI Mobility RADEON™ 9000IGP/216CLS3BGA21H
  ? Integrated DRAM controller
  ? Hub Interface to ATI IXP150/218S2EBNA43
  ? Power Management Functions


? Keyboard Controller

  ? KB910 is use as keyboard controller and battery management unit


? Memory

  ? System DRAM
  ? One JEDEC standard 200-pins DDR SO-DIMM memory support +2.5V
    PC2700 128/256/512MB/1024MB.
  ? System & KB Combine ROM BIOS
  ? 512KB Flash ROM


? Video Subsystem (ATI Mobility RADEON™)

  ? UMA VGA Memory up to 128MB
  ? Display Core Frequency of 200/250/266/333MHZ
  ? 3D Graphics Engine
  ? Analog Display support
  ? Digital Video out port(DVOB and DVOC)support
  ? DVOB With 165-MHZ clot clock support for 12 bit interface.
  ? Dedicated 2FP(local flat panel) interface
  ? Single or dual channel LVDS panel support up to WXGA panel, resolution with
    frequency range from 25MHZ to 112MHZ per channel.


? SMsC LPC 47N217 Super I/O with LPC Interface

  ? PC99a, PC2001
  ? ACPI 2.0 Compliant

- ? Serial Ports
- ? One Full Function Serial Port
- ? High Speed NS 16C550A Compatible UARTs with Send/Receive 16-Byte FIFO
- ? Supports 230k and 460k Baud
- ? Programmable Baud Rate Generator
- ? Modem Control Circuitry
- ? Infrared Communications Controller
- ? IrDA v1.2 (4Mbps), HPSIR, ASKIR, Consumer IR Support
- ? 1 IR Ports
- ? 96 Base I/O Address, 15 IRQ Options and 3 DMA Options
- ? Multi-Mode Parallel Port with ChiProtect
- ? Standard Mode IBM PC/XT , PC/AT, and PS/2 Compatible Bidirectional Parallel Port
- ? Enhanced Parallel Port (EPP)
  Compatible – EPP 1.7 and EPP 1.9 (IEEE 1284 Comp liant)
- ? IEEE 1284 Compliant Enhanced Capabilities Port (ECP)
- ? ChiProtect Circuitry for Protection Against Damage Due to Printer Power-On
- ? 192 Base I/O Address, 15 IRQ and 3 DMA Options
- ? LPC Bus Host Interface
- ? Multiplexed Command, Address and Data Bus
- ? 8-Bit I/O Transfers
- ? 8-Bit DMA Transfers
- ? 16-Bit Address Qualifiation
- ? Serial IRQ Interface Compatible with Serialized Serial IRQ Interface Compatible with Serialized IRQ Support for PCI Systems
- ? PCI CLKRUN# Support
- ? Power Management Event (IO_PME#) Interface Pin

- ? Audio subsystem
  - ? Realtek ALC250 for AC97 codec

    - ? AC 97 2.2 Compatible.

    - ? Industry Leading Mixed Signal 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 Audio & WLP2.0 audio Requirements.

? S/PDIF Digital Audio Output.

? 3D Stereo Enhancement.

? Support double sampling rate (96KHz) of DVD audio playback.

? ENE CB714 Card Bus Host Adapter

? 3.3V Operation with I/O 5V Tolerance

? LFBGA 169-ball Package

? Pinout Compatible with CB1410.

? PCI Interface

? Compliant with PCI Local Bus Specification Revision 2.3

? Compliant with PCI Bus Power Management Interface Specification Revision 1.1

? Compliant with PCI Mobile Design Guide Version 1.1

? Compliant with Advanced Configuration and Power Interface Specification Revision 1.0

? CardBus Interface

? Compliant with PC Card Standard 8.0

? Support Standardized Zoomed Video Register Model

? Support SPKROUT CAUDIO and RIOUT#

? Secure Digital Interface

? Compliant with SD Host Controller Standard Specification Version 1.0

?  Support SD Suspend/Resume Functionality

? Support DMA Mode to Minimize CPU Overhead

? Support High Speed with the SD Clock Frequency Up to 50Mhz

? Contain two 512-byte buffer to maximize the transfer speed

? Support Traffic LED Light

? Support Over Current Protection

? Secure Digital Interface

? Compliant with SD Host Controller Standard Specification Version 1.0

? Support SD Suspend/Resume Functionality

? Support DMA Mode to Minimize CPU Overhead

? Support High Speed with the SD Clock Frequency Up to 50Mhz

? – Contain two 512-byte buffer to maximize the transfer speed

? – Support Traffic LED Light

? – Support Over Current Protection

## 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 a 30 / 40 / 60 / 80GB HDD.

## 1.4    Removable Drives

The module compartment s can accommodate the following removable modules:

- ?   DVD-R/-RW drive
- ?   DVD-ROM drive
- ?   CD-RW/DVD-ROM drive
- ?   DVD+-R/+-RW drive
- ?   DVD Super Multi ddrive

### 1.4.1   DVD-R/-RW Drive

The DVD-R/-RW drive (Toshiba SD-R6112) accommodates either 12cm (4.72-inch) or 8cm (3.15-inch) CDs or DVDs.

**Read speeds**

| | |
|---|---|
| DVD-ROM | Maximum 8 times faster rotational speed |
| DVD-RAM | Standard rotational speed |
| CD-ROM | Maximum 24 times faster rotational speed |

**Write speeds**

| | |
|---|---|
| CD-R | 4,16 times faster rotational speed |
| CD-RW | 4 times faster rotational speed |
| High-Speed CD-RW | 4,10 times faster rotational speed |
| DVD-R | 1, 2 times rotational speed |
| DVD-RW disc | 1 times rotational speed |

**Access Speed**

| | | |
|---|---|---|
| Average Random Access Time | DVD-ROM: | 115 ms (3.3-8X) |
| | CD-ROM: | 105 ms (10.3-24X) |
| | DVD-RAM: | 170 ms (4.7GB 1X) |
| | | |
| Average Random Seek Time | DVD-ROM: | 105 ms (3.3-8X) |
| | CD-ROM: | 100 ms (10.3-24X) |
| | DVD-RAM: | 120 ms (4.7GB 1X) |
| | | |
| Average Full Stroke Access Time | DVD-ROM: | 195 ms (3.3-8X) |
| | CD-ROM: | 180 ms (10.3-24X) |
| | DVD-RAM: | 350 ms (4.7GB 1X) |

**Buffer capacity**          2 Mbytes (Max)

**Supported formats**

| | | |
|---|---|---|
| Applicable Write Formats: | CD | CD-R/RW |
| | DVD | DVD-R<br>DVD-RW |
| Applicable Write Disc: | CD | CD-R/RW [CD-DA, CD+(E)G, CD-MIDI, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)] |
| | DVD | DVD-RW<br>DVD-R |
| Applicable Read Disc: | CD | CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, CD-I, CD-I Bridge (Photo-CD, Video-CD) Multisession CD (Phto-CD, CD-EXTRA, CD-R, CD-RW, Portfolio), CD-R, CD-RW |
| | DVD | DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18]<br>DVD-R<br>DVD-RW<br>DVD-RAM |

## 1.4.2  DVD-ROM Drive

The DVD-ROM drive (Toshiba SD-C2612 or Matsushita SR-8177) accommodates either 12cm (4.72-inch) or 8cm (3.15-inch) CDs or DVDs.

**Transfer rates**

Matsushita SR-8177:  The DVD-ROM drive is able to read CD-ROM, CD-R data at 10.3X to 24X CAV mode speed and CD-RW data at 5.1X to 12X CAV mode speed. The drive has a transfer rate of max. 3 600 kbyte/s for CD-ROM data, CD-R and max. 1 800 kbyte/s for CD-RW data. The drive is able to read DVD disc at CAV mode speed. The drive has a transfer rate of max. 11.08 Mbyte/s for DVD data.

Toshiba SD-C2612:  Max.8X (DVD-ROM) / Max. 24X (CD-ROM)/2X (DVD-RAM Ver.1.0)/1X (DVD-RAM Ver.2.1)
Max. 10,820 KByte/s (DVD-ROM)/Max. 3,600KByte/s (CD-ROM) Sustained Transfer Rate

**Buffer capacity**

Matsushita SR-8177:  256 Kbytes (Max)
Toshiba SD-C2612    192 Kbytes (Max)

**Supported formats**

CD:

| | | |
|---|---|---|
| CD-Audio | CD-ROM (mode 1 and mode 2) | CD-ROM XA (mode 2, form 1 and form 2) |
| CD-I Bridge | CD-I (mode 2, form 1 and form 2) | CD-TEXT |
| Video CD | CD-RW | Photo CD |
| CD-WO** | Enhanced Music CD (CD Plus)** | CD-I Ready** |
| CD+(E)G* | CD-MIDI* | CD-R* |

DVD:

| | | |
|---|---|---|
| DVD-5 | DVD-9 | DVD-10 |
| DVD-18* | DVD-RAM (2.6G/4.7G) | DVD-R (3.95G/4.7G) |
| DVD-RW | | |

\*    Toshiba SD-C2612 only
\**   Matsushita SR-8177only

CD-RW/DVD-ROM Drive

The CD-RW/DVD-ROM combo drive (Toshiba SD-R2412 or TEAC DW-224E-85) is capable of driving either 12cm (4.72-inch) or 8cm (3.15-inch) DVDs and CDs without using an adaptor.

**Read speeds**

| | |
|---|---|
| DVD-ROM | Maximum 8 times faster rotational speed |
| DVD-RAM | Standard rotational speed |
| CD-ROM | Maximum 24 times faster rotational speed |

**Write speeds**

| | |
|---|---|
| CD-R | 4,8,16,24 times faster rotational speed |
| CD-RW | 4 times faster rotational speed |
| High-Speed CD-RW | 4,10 times faster rotational speed |

**Access Speed**

| | | |
|---|---|---|
| Average Random Access Time | DVD: | 100 ms typ (Toshiba SD-R2412) |
| | | 110 ms typ (TEAC DW-224E-85) |
| | CD: | 90 ms typ (10.3-24X) |
| | DVD-RAM: | 170 ms* |
| Average Random Seek Time | DVD: | 85 ms typ* |
| | CD: | 80 ms typ (10.3-24X)* |
| | DVD-RAM: | 130 ms typ* |
| Average Full Stroke Access Time | DVD: | 170 ms typ* |
| | CD: | 160 ms typ (10.3-24X)* |
| | DVD-RAM: | 300 ms* |

&lowast; Toshiba SD-R2412

**Buffer capacity**          2 Mbytes (Max)

**Supported formats**

| | | |
|---|---|---|
| Applicable Write Formats: | CD | CD-R |
| | | CD-RW |
| Applicable Write Disc: | CD | CD-R |
| | | CD-RW [CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)] |
| Applicable Read Disc: | CD | CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW |
| | DVD | DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18] |
| | | DVD-R |
| | | DVD-RW |
| | | DVD-RAM |

### 1.4.3  DVD+-R/DVD+-RW Drive

The CD-RW/DVD-ROM combo drive (Toshiba SD-R2412 or TEAC DW-224E-85) is capable of driving either 12cm (4.72-inch) or 8cm (3.15-inch) DVDs and CDs without using an adaptor.

**Read speeds**

| | |
|---|---|
| DVD-ROM | Maximum 8 times faster rotational speed |
| DVD-RAM | Standard rotational speed |
| CD-ROM | Maximum 24 times faster rotational speed |

**Write speeds**

| | |
|---|---|
| CD-R | 4,8,16,24 times faster rotational speed |
| CD-RW | 4 times faster rotational speed |
| High-Speed CD-RW | 4,10 times faster rotational speed |

**Access Speed**

| | | |
|---|---|---|
| Average Random Access Time | DVD: | 100 ms typ (Toshiba SD-R2412) |
| | | 110 ms typ (TEAC DW-224E-85) |
| | CD: | 90 ms typ (10.3-24X) |
| | DVD-RAM: | 170 ms* |
| Average Random Seek Time | DVD: | 85 ms typ* |
| | CD: | 80 ms typ (10.3-24X)* |
| | DVD-RAM: | 130 ms typ* |
| Average Full Stroke Access Time | DVD: | 170 ms typ* |
| | CD: | 160 ms typ (10.3-24X)* |
| | DVD-RAM: | 300 ms* |

∗ Toshiba SD-R2412

**Buffer capacity**                2 Mbytes (Max)

**Supported formats**

| | | |
|---|---|---|
| Applicable Write Formats: | CD | CD-R<br>CD-RW |
| Applicable Write Disc: | CD | CD-R<br>CD-RW  [CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)] |
| Applicable Read Disc: | CD | CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW |
| | DVD | DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18]<br>DVD-R<br>DVD-RW<br>DVD-RAM |

### 1.4.4  DVD Super Multi Drive

The CD-RW/DVD-ROM combo drive (Toshiba SD-R2412 or TEAC DW-224E-85) is capable of driving either 12cm (4.72-inch) or 8cm (3.15-inch) DVDs and CDs without using an adaptor.

**Read speeds**

| | |
|---|---|
| DVD-ROM | Maximum 8 times faster rotational speed |
| DVD-RAM | Standard rotational speed |
| CD-ROM | Maximum 24 times faster rotational speed |

**Write speeds**

| | |
|---|---|
| CD-R | 4,8,16,24 times faster rotational speed |
| CD-RW | 4 times faster rotational speed |
| High-Speed CD-RW | 4,10 times faster rotational speed |

**Access Speed**

| | | |
|---|---|---|
| Average Random Access Time | DVD: | 100 ms typ (Toshiba SD-R2412) |
| | | 110 ms typ (TEAC DW-224E-85) |
| | CD: | 90 ms typ (10.3-24X) |
| | DVD-RAM: | 170 ms* |
| Average Random Seek Time | DVD: | 85 ms typ* |
| | CD: | 80 ms typ (10.3-24X)* |
| | DVD-RAM: | 130 ms typ* |
| Average Full Stroke Access Time | DVD: | 170 ms typ* |
| | CD: | 160 ms typ (10.3-24X)* |
| | DVD-RAM: | 300 ms* |

∗ Toshiba SD-R2412

**Buffer capacity**            2 Mbytes (Max)

**Supported formats**

| | | |
|---|---|---|
| Applicable Write Formats: | CD | CD-R<br>CD-RW |
| Applicable Write Disc: | CD | CD-R<br>CD-RW  [CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio)] |
| Applicable Read Disc: | CD | CD-DA, CD+(E)G, CD-MIDI, CD-TEXT, CD-ROM, CD-ROM XA, MIXED MODE CD, CD-I, CD-I Bridge (Photo-CD, Video-CD), Multisession CD (Photo-CD, CD-EXTRA, Portfolio, CD-R, CD-RW), CD-R, CD-RW |
| | DVD | DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18]<br>DVD-R<br>DVD-RW<br>DVD-RAM |

## 1.5  Power Supply

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

1.  A/D conversion

    The EC uses 10-bit sampling for A/D conversion to determine the following values:

    - ?  AC adaptor current
    - ?  Battery and temperature

2.  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

3.  Abnormal check

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

4.  Input port management

    The EC monitors the following input signal status:

    - ?  System power ON/OFF status
    - ?  Direct CD power ON/OFF status

5.  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.

6.  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

7.  Battery charging control

The EC controls the following.

    ?    The quick charging ON/OFF
    ?    The detection of full charge

8.  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.

9.  New battery installation

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

10. 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 | Lithium-Ion | 14.8 V | 6450mAH/<br>4300mAH |
| RTC battery | Lithium | 3.3 V | 15 mAh |

### 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 charge: 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 48 hours |
| Data preservation period (full charge) | 2 month |

# Chapter 2

# Troubleshooting Procedures

# Chapter 2      Contents

**Figures**

**Tables**

## 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.  Printer (parallel) port | 11. PCMCIA unit |
| 2.  USB Floppy Drive | 7.  TouchPad | 12. IEEE 1394 port |
| 3.  Keyboard | 8.  Speaker | 13. Wireless LAN system |
| 4.  USB ports | 9.  Optical drive | |
| 5.  TV-out port | 10. Modem | |

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. Printer port loopback connector
6. Sycard (PCMCIA test card)
7. Cleaning kit for floppy disk drive troubleshooting
8. Cleaning kit for optical drive troubleshooting
9. Multimeter
10. External monitor
11. USB compatible keyboard
12. Multimedia sound system with line-in and line-out ports
13. Headphones
14. USB test module and USB cable
15. 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 printer (parallel) port test, perform the Printer Port Troubleshooting procedures in Section 2.8.

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

6.  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.

7.  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
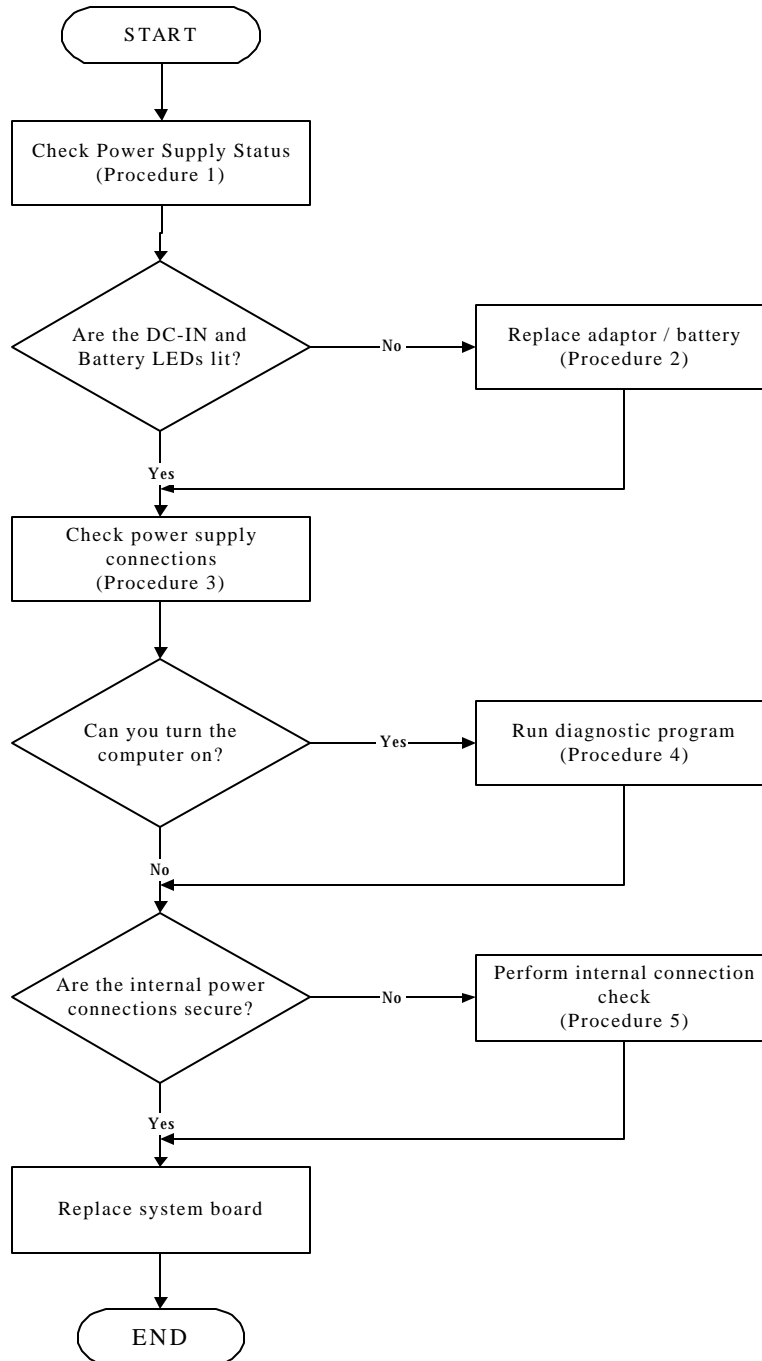


*Figure 2-2 Power Supply Troubleshooting Process*

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:

AC adaptor cord

AC power cord

| AC adaptor | | System board | | Battery |
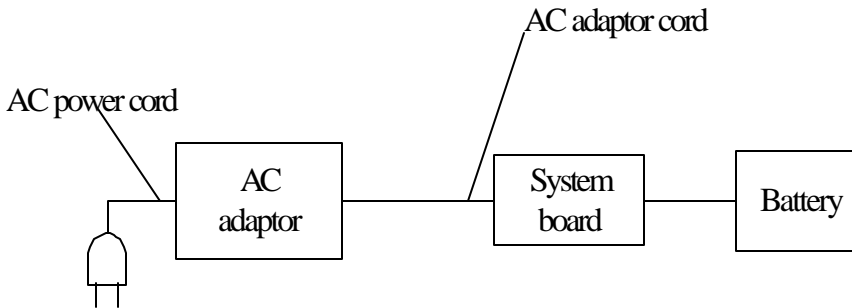
Any of the connectors may be disconnected.  Perform Check 1.

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

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

Yes (from "Does the external display function ok?" branch leads to "Perform connector and replacement check (Procedure 3)")

*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
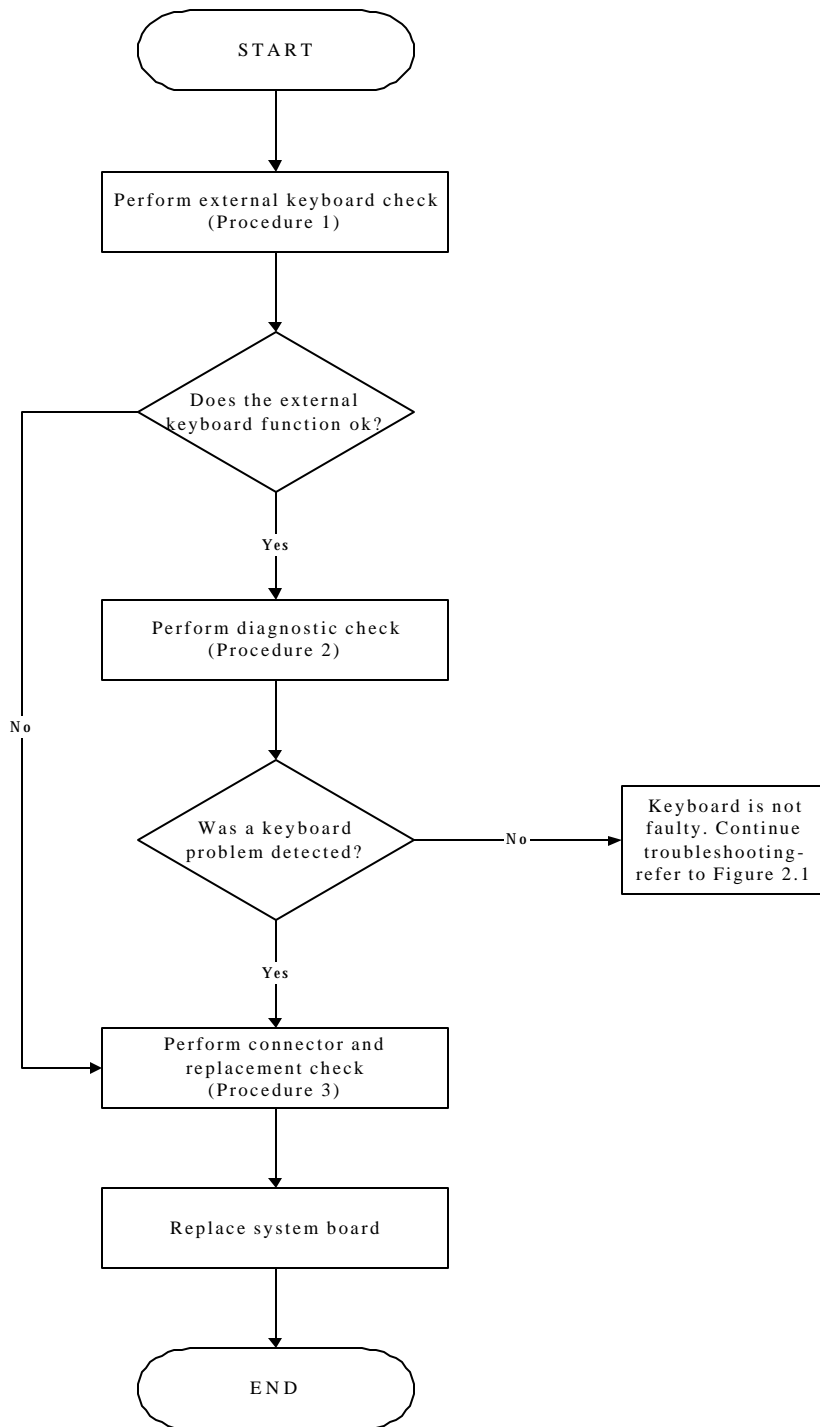


*Figure 2-4  Keyboard troubleshooting process*

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 function
   │   connection     │       when connected  to a
   └──────────────────┘        different USB port?
            │                         │
            │                        No
            │                         ▼
            │                  ◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇◇      ┌──────────────────┐
            │                 Does an alternative USB ─Yes→│  Original USB    │
            │                 device function correctly?   │  device is faulty│
            │                         │                └──────────────────┘
            │                        No
            │                         ▼
            │            ┌──────────────────────────┐
            └──────────▶ │  Replace system board     │
                         │      (Procedure 2)         │
                         └──────────────────────────┘
                                     │
                                     ▼
                              ┌─────────────┐
                              │    END      │
                              └─────────────┘
```
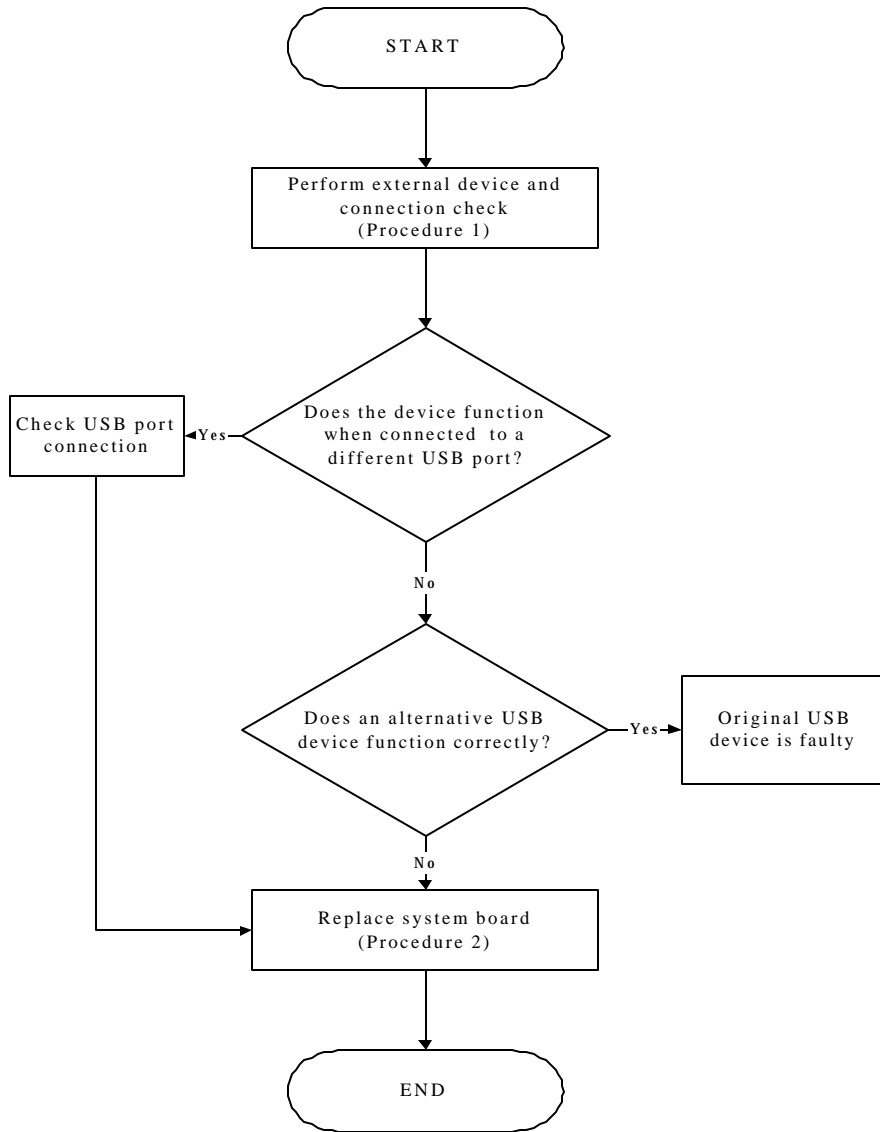
*Figure 2-5 External USB device troubleshooting process*

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

```
                        ┌──────────────┐
                        │    START     │
                        └──────┬───────┘
                               │
                               ▼
                    ┌─────────────────────────┐
                    │ Perform TV connection   │
                    │   check (Procedure 1)   │
                    └───────────┬─────────────┘
                                │
                                ▼
                         ◇ Does replacement ◇        No    ┌──────────────────┐
                         ◇ TV cable function ◇ ──────────▶ │ Replace TV cable │
                         ◇   properly?       ◇             └──────────────────┘
                                │
                                │ No
                                ▼
                    ┌─────────────────────────┐
                    │   Perform TV set check  │
                    │     (Procedure 2)       │
                    └───────────┬─────────────┘
                                │
                                ▼
                         ◇ TV functioning ◇          No    ┌──────────────────┐
                         ◇     ok?        ◇ ──────────────▶│ Use different TV │
                                                           │       set        │
                                │
                                │ Yes
                                ▼
                    ┌─────────────────────────┐
                    │  Replace system board   │
                    └───────────┬─────────────┘
                                │
                                ▼
                        ┌──────────────┐
                        │     END      │
                        └──────────────┘
```
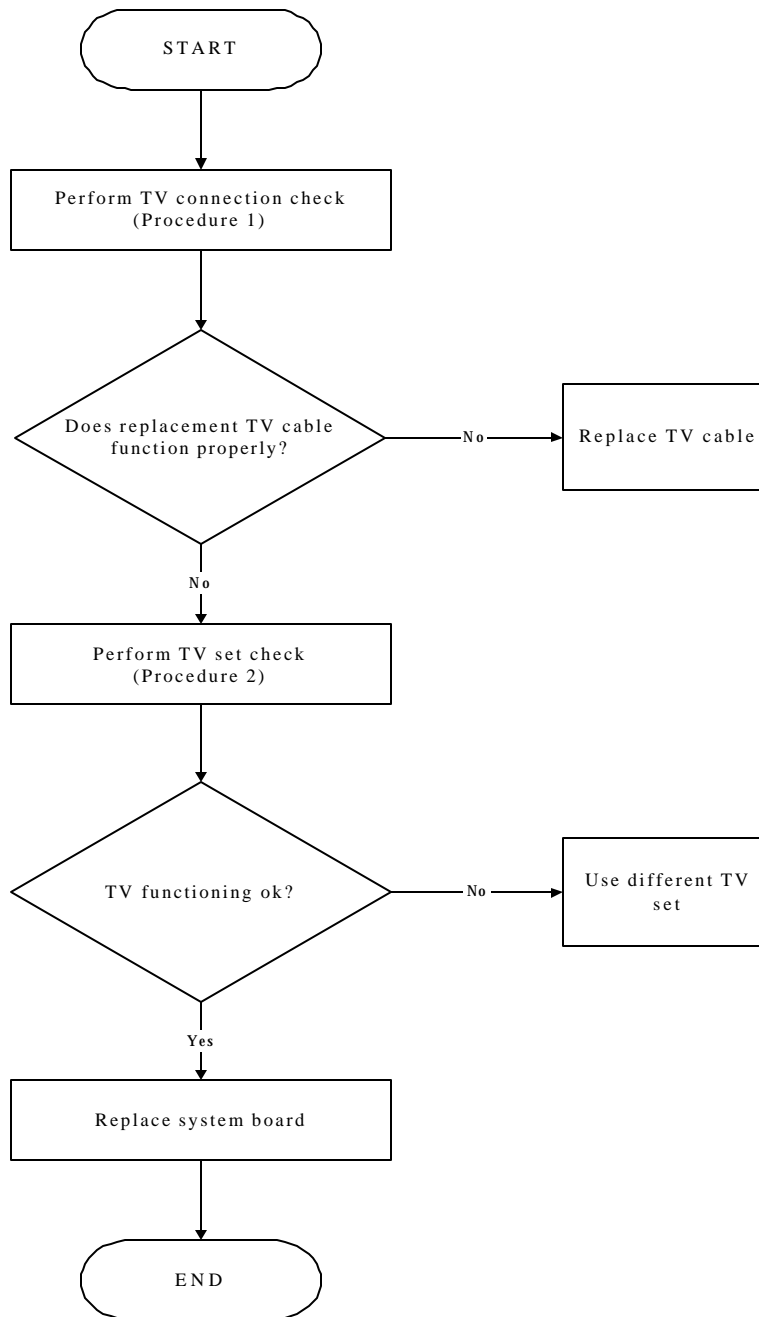
*Figure 2-6  TV-out troubleshooting process*

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.
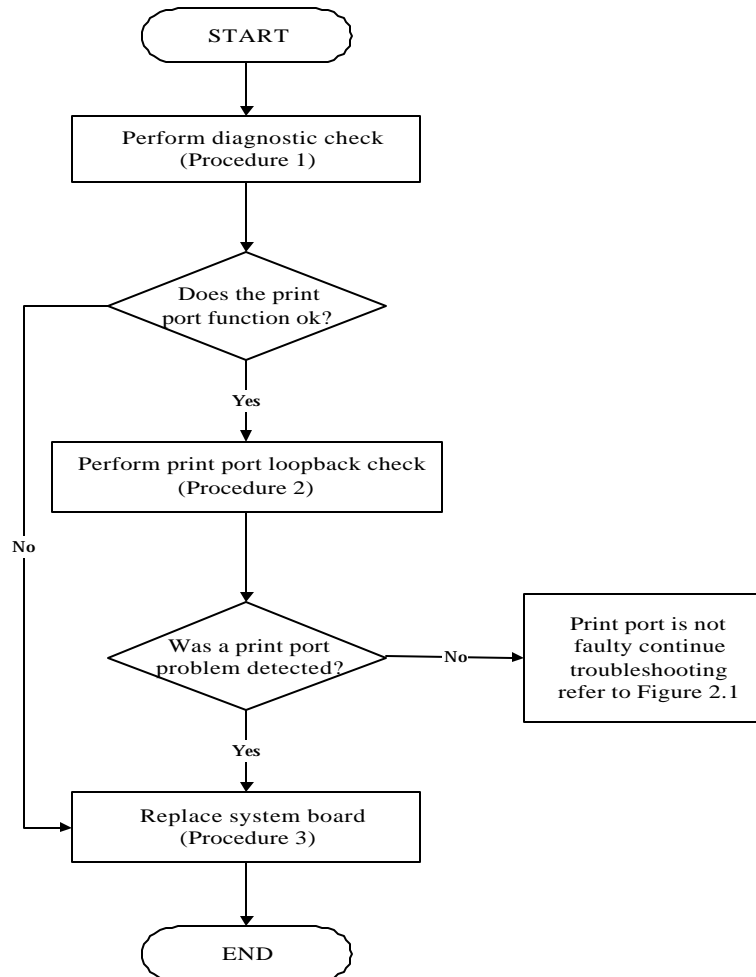
## 2.8    Printer Port Troubleshooting



*Figure 2-7  Printer port troubleshooting process*

To determine if the computer's printer (parallel) port is functioning properly, perform the following procedures. Figure 2-8 outlines the process. Start with Procedure 1 and continue as instructed.

> Procedure 1: Diagnostic check
>
> Procedure 2: Printer port loopback check
>
> Procedure 3: Replace system board

## Procedure 1   Diagnostic check

Attach the printer port loopback connector firmly to the printer port and run the Diagnostic Program. See Chapter 3 for details. If the printer port test passes, there may be a problem with the printer. Go to Procedure 2. If the printer port test fails, go to Procedure 3.

## Procedure 2   Printer port loopback check

The printer may be faulty or not connected properly. Perform Check 1.

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

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

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

Check 4   The printer may be faulty. Replace it with a good printer or connect it to a different computer.

If the replacement printer works or the original printer does not work on a different computer, the printer should be replaced.

If the replacement printer does not work either, or the original printer functions normally on a different computer, go to Procedure 3.

## Procedure 3   Replace system board

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

## 2.9   TouchPad Troubleshooting

```
                      ╭─────────────╮
                      │    START    │
                      ╰─────────────╯
                             │
                             ▼
                    ┌──────────────────┐
                    │ TouchPad connection│
                    │ check (Procedure 1)│
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │ TouchPad replacement│
                    │ check (Procedure 2)│
                    └──────────────────┘
                             │
                             ▼
                    ┌──────────────────┐
                    │Replace system board│
                    └──────────────────┘
                             │
                             ▼
                      ╭─────────────╮
                      │     END     │
                      ╰─────────────╯
```
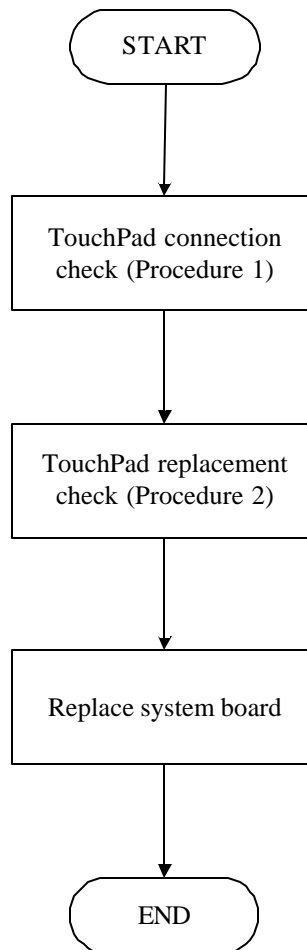
*Figure 2-8   TouchPad troubleshooting process*

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.
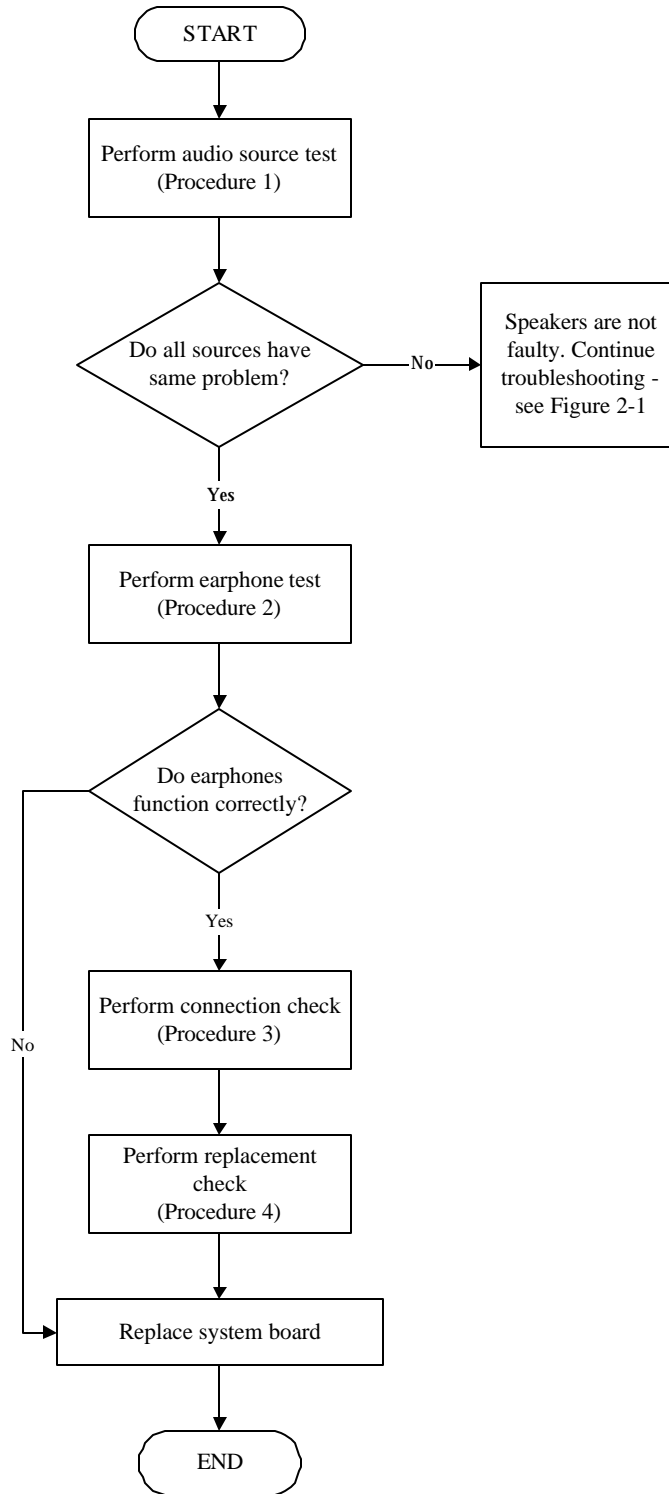
## 2.10  Speaker Troubleshooting

```
                        ┌─────────────┐
                        │    START    │
                        └─────────────┘
                               │
                               ▼
                   ┌───────────────────────┐
                   │ Perform audio source  │
                   │  test (Procedure 1)   │
                   └───────────────────────┘
                               │
                               ▼
                          ◇─────────◇              ┌──────────────────┐
                         ╱           ╲             │ Speakers are not │
                        ╱ Do all sources╲    No    │ faulty. Continue │
                       ◇  have same       ◇───────▶│ troubleshooting -│
                        ╲  problem?      ╱         │ see Figure 2-1   │
                         ╲             ╱            └──────────────────┘
                          ◇─────────◇
                               │ Yes
                               ▼
                   ┌───────────────────────┐
                   │ Perform earphone test │
                   │     (Procedure 2)     │
                   └───────────────────────┘
                               │
                               ▼
                          ◇─────────◇
                         ╱           ╲
                        ╱ Do earphones ╲
                       ◇  function       ◇
                        ╲  correctly?   ╱
                         ╲             ╱
                          ◇─────────◇
                    No         │ Yes
                    │          ▼
                    │  ┌───────────────────────┐
                    │  │Perform connection check│
                    │  │     (Procedure 3)     │
                    │  └───────────────────────┘
                    │          │
                    │          ▼
                    │  ┌───────────────────────┐
                    │  │ Perform replacement   │
                    │  │ check (Procedure 4)   │
                    │  └───────────────────────┘
                    │          │
                    ▼          ▼
                   ┌───────────────────────┐
                   │  Replace system board │
                   └───────────────────────┘
                               │
                               ▼
                        ┌─────────────┐
                        │     END     │
                        └─────────────┘
```

*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.

# Chapter 3

# Tests and Diagnostics

# Contents

## 3.1 The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program to test the functions of the computer's 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
- ? PIO LOOPBACK TEST
- ? IEEE1394 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
- ? LID SWITCH TEST
- ? HDD R/W TEST
- ? LAN TEST
- ? RTC TEST

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

- ? The diagnostics diskette (2 pcs)
- ? A printer loopback connector (PIO Loopback Test)
- ? 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)
- ? IEEE1394 Link Cable

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 CD/DVD-ROM 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.  PIO LOOPBACK TEST
> D.  RTC TEST
> E.  LAN TEST
> F.  SPEAKER AUDIO TEST
> G.  FAN ON/OFF TEST
> H.  MAIN BATTERY CHARGE TEST
> I.  FDD TEST
> J.  CD-ROM TEST
> K.  KEYBOARD TEST
> L.  MOUSE (PAD) TEST
> M.  LCD PIXELS MODE TEST
> N.  LID SWITCH TEST
> O.  HDD R/W TEST
> P.  D1 STEPPING TEST

The below display will show up at the beginning of T&D program

```
Fortworth20(EDW10) DOS MODE F/T T&D DISKETTE MENU V1.0(2004/05/17)

A.CONFIG CHECK TEST      ►< NO >   M.LCD PIXELS MODE TEST   ►< NO >
B.DMI CHECK TEST         ►< NO >   N.LID SWITCH TEST        ►< NO >
C.PIO LOOPBACK TEST      ►< NO >   O.HDD R/W TEST           ►< NO >
D.RTC TEST               ►< NO >   P.CPU D1 STEPPING TEST   ►< NO >
E.LAN TEST               ►< NO >   Q.N/A                    ►< NO >
F.SPEAKER AUDIO TEST     ►< NO >   R.N/A                    ►< NO >
G.FAN ON/OFF TEST        ►< NO >   S.N/A                    ►< NO >
H.MAIN BATTERY CHARGE TEST ►< NO > T.N/A                    ►< NO >
I.FDD TEST               ►< NO >   U.N/A                    ►< NO >
J.CD-ROM TEST            ►< NO >   V.N/A                    ►< NO >
K.KEYBOARD TEST          ►< NO >   W.N/A                    ►< NO >
L.MOUSE (PAD) 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:_____
```

If the test result passes, the following display will show up:



```
Press any key to continue . . .
```

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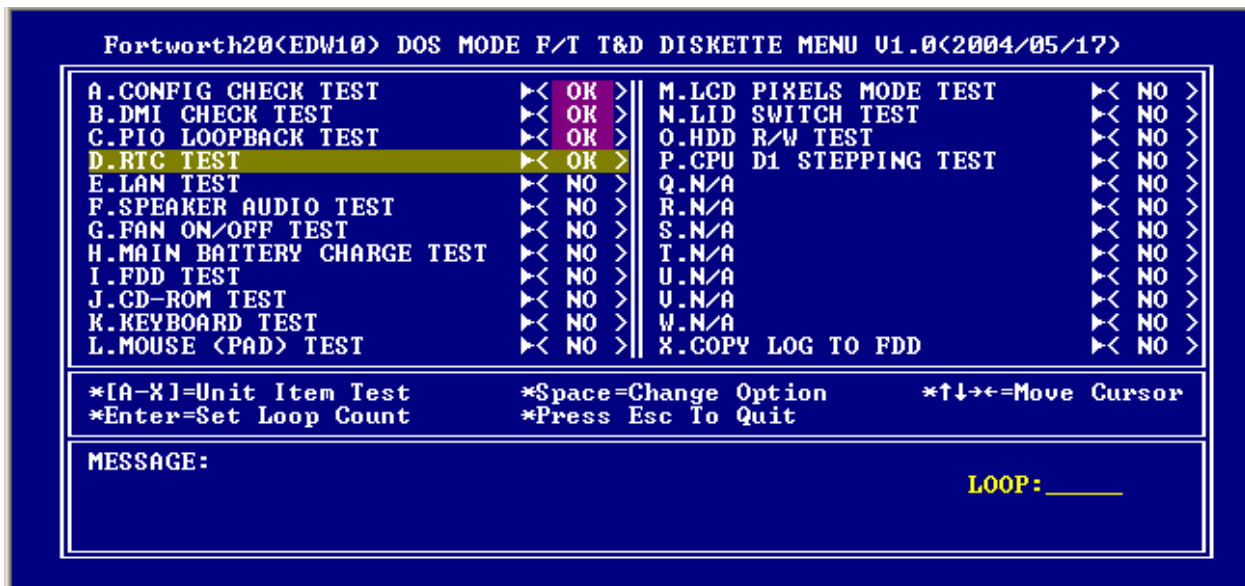
It will skip this process if "N" key pressed.

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.

```
 Fortworth20(EDW10) DOS MODE F/T T&D DISKETTE MENU V1.0(2004/05/17)
┌──────────────────────────────────────────────────────────────────────┐
│A.CONFIG CHECK TEST      ►< NO >║M.LCD PIXELS MODE TEST    ►< NO >│
│B.DMI  CHECK TEST        ►< NO >║N.LID SWITCH TEST         ►< NO >│
│C.PIO LOOPBACK TEST      ►< NO >║O.HDD R/W TEST            ►< NO >│
│D.RTC TEST               ►< NO >║P.CPU D1 STEPPING TEST    ►< NO >│
│E.LAN TEST               ►< NO >║Q.N/A                     ►< NO >│
│F.SPEAKER AUDIO TEST     ►< NO >║R.N/A                     ►< NO >│
│G.FAN ON/OFF TEST        ►< NO >║S.N/A                     ►< NO >│
│H.MAIN BATTERY CHARGE TEST ►< NO >║T.N/A                   ►< NO >│
│I.FDD TEST               ►< NO >║U.N/A                     ►< NO >│
│J.CD-ROM TEST            ►< NO >║U.N/A                     ►< NO >│
│K.KEYBOARD TEST          ►< NO >║W.N/A                     ►< NO >│
│L.MOUSE (PAD) 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:                                                              │
│              Do you copy log to floppy ? (y/n)    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

- ✍  HDD type & capacity

- ✍  BIOS version

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: PSP20UFZ000F

CURRENT SPEC IS :
P4800 2800 1.00A ID7 32MB 256 DVDR/RW HDD 60010 MODEM_LAN NoWEP NO_BT FIR 12cell

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 V2.4.7 ■

Manufacturer(Type1, Offset04h) : TOSHIBA
Product Name(Type1, Offset05h) : Satellite P20
Version(Type1, Offset06h)       : PSP20UFZ000F
Serial Number(Type1, Offset07h): 63015307CU
UUID(Type1, Offset08h)          : 9659BE79-8FB6-11D7-B9ED-00023F81102Z
OEM Strings(Part Number,SW Number)(Type11, Offset05h):
=>PSP20UFZ000F,PSP20UFZ000F




Press any key to continue . . .
```

## 3.5   PIO Loopback Test

The PIO loopback test will check below items through PIO loopback connector.

   &#9734;  External Interrupt

   &#9734;  External Loopback

     - including Pattern test, Data Pin test, Control register test & Control pin/ Status pin test.

---

*NOTE*:  *Remember to connect a PIO loopback connector to the computer's printer port before test begins.*

---

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

```
***** Parallel Port Test Program !! *** V1.0 10/16/00 **

Testing LPT1 Internal Loopback: Testing patterns...FF FF [ PASS ]
Testing LPT1 External Interrupt...[ PASS ]
Testing LPT1 External Loopback...
  1. Data Pin (p2~p9) & Err Pin (p15) Test ..[ PASS ]
  2. Control Register Test ..[ PASS ]
  3. Control Pin & Status Pin Test ..[ PASS ] [ PASS ]


Press any key to continue . . .
```
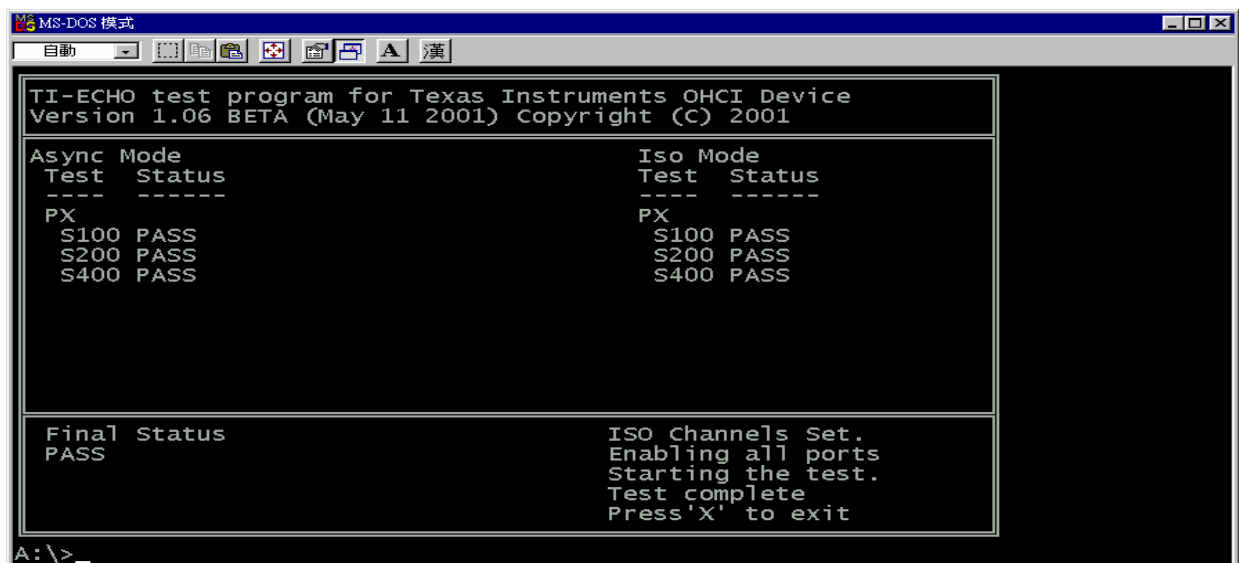
## 3.6    IEEE 1394 Test

The IEEE 1394 port test checks transmission between the computer and a secondary device along an IEEE 1394 line. An IEEE 1394 transmission line must be firmly connected between the computer and the device before the test is started. The test requires:

1.  An IEEE 1394-compatible device

2.  An IEEE 1394 transmission line

To perform the test:

1.  Copy the following files from the BTR20.RAR file on the diagnostics disk to a bootable diskette

    ?  1394M.bat

    ?  TI.exe

    ?  TI1394.exe

2.  Insert the disk, then boot the computer

3.  Make sure the machines are firmly connected by the IEEE 1394 transmission line

4.  Execute 1394M.bat on the computer

5.  Select the IEEE 1394 transmission test for the test device

6.  Start data transmission and complete check

```
MS-DOS 模式                                                        _ □ ×
自動        ▦ 🗎🗎 🗎 🗎🗎 A 漢

TI-ECHO test program for Texas Instruments OHCI Device
Version 1.06 BETA (May 11 2001) Copyright (C) 2001

Async Mode                            Iso Mode
 Test   Status                         Test   Status
 ----   ------                         ----   ------
PX                                    PX
 S100 PASS                             S100 PASS
 S200 PASS                             S200 PASS
 S400 PASS                             S400 PASS




 Final Status                         ISO Channels Set.
 PASS                                 Enabling all ports
                                      Starting the test.
                                      Test complete
                                      Press'X' to exit

A:\>_
```

## 3.7    **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]?
```

## 3.8    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]?
```

## 3.9    Main Battery Charge Test

---

*NOTE*:  *The AC adaptor (**120W/90W, 19V**) should be connected to successfully run this test.*

---

This test shows and measures the main battery:

    ✍  Battery type (Ni-MH / Lion)

    ✍  Manufacturer (Sony / Sanyo)

    ✍  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: Ni-MH
Manufacturer: Panasonic
Remain charge capacity : 91.8%

Charge Test-> [ PASS ]


Press any key to continue . . .
```

## 3.10 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...
```

## 3.11 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 2:, 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 . . .
```

## 3.12  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)

3.  **J** (JP, for Japan)

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.*
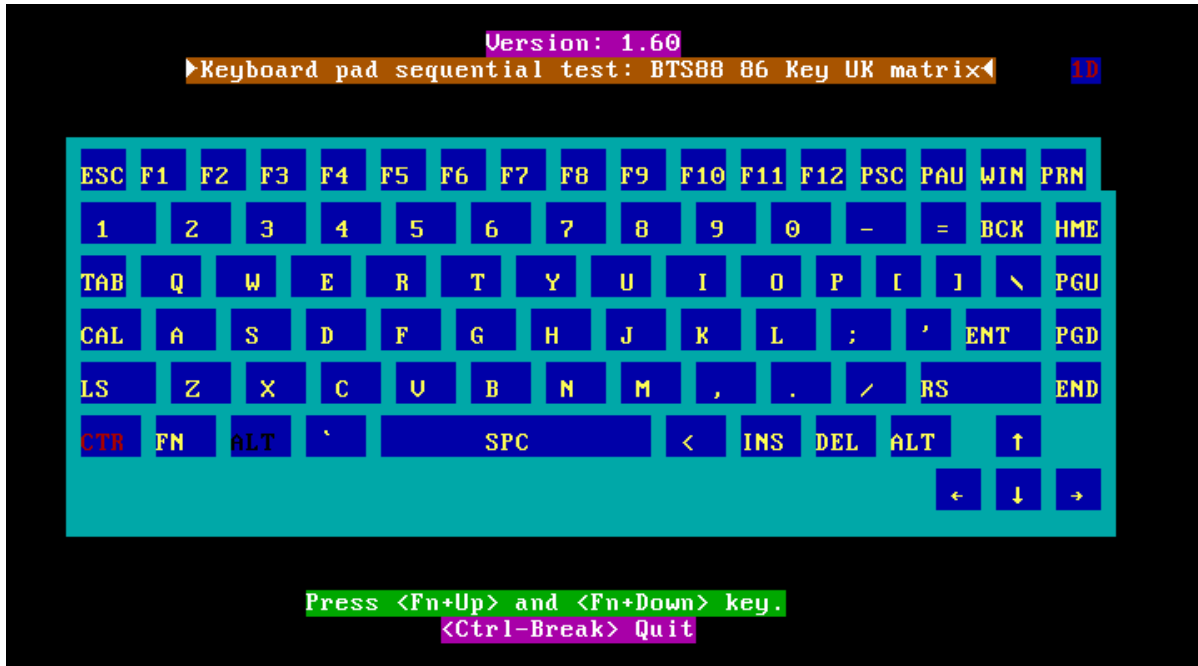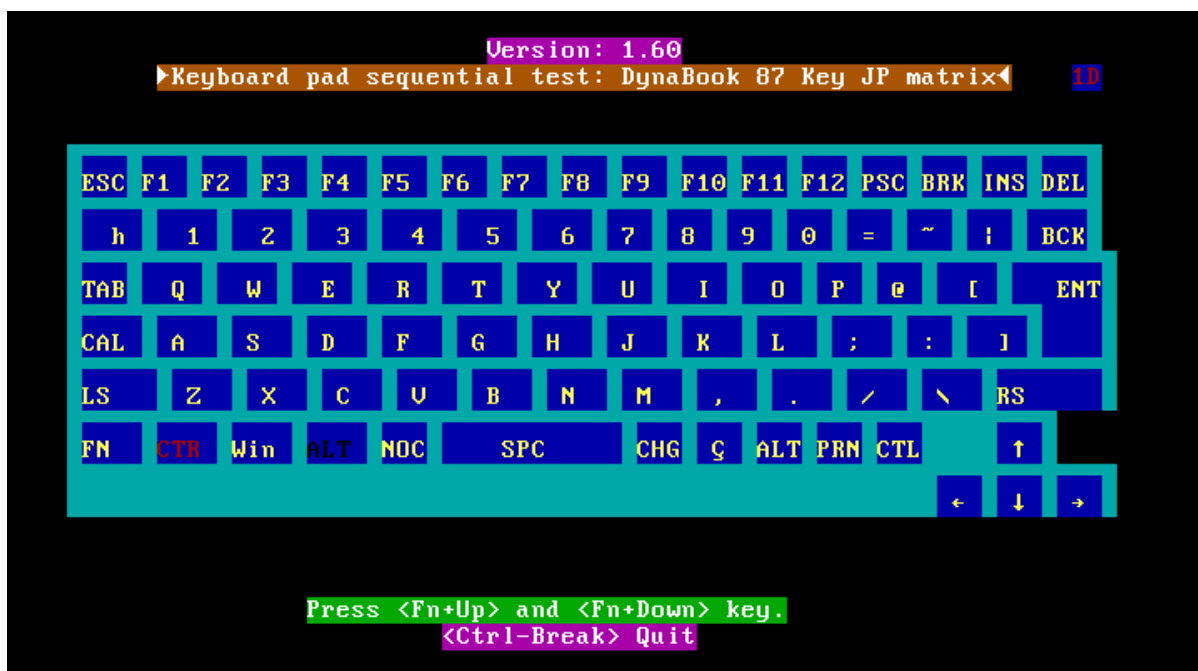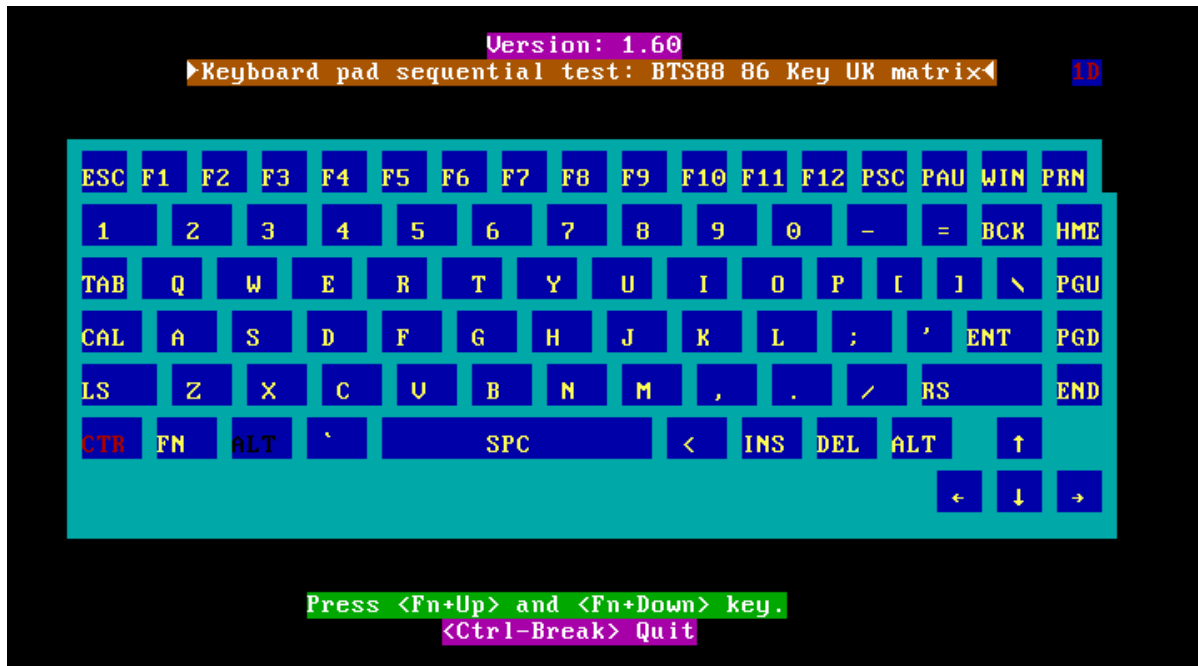
Pressing a key also reveals that key's **scan codes** in the upper right hand corner of the screen. When the key is depressed, its **make code** is displayed. When the key is released, the **break code** is shown.

## 3.13 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.

```
╒════════════ Logitech Mouse Control Center ════════════╕
│ ┌─ Mouse Speed ───────────────────┐   ┌────────────┐  │
│ │    Slow            Fast          │   │     OK     │  │
│ │   ┌─┬──────────────────────┬─┐   │   └────────────┘  │
│ │   │◄│▓▓▓▓▓▓▓▓▓ ▓▓▓▓▓▓▓▓▓▓▓│►│   │   ┌────────────┐  │
│ │   └─┴──────────────────────┴─┘   │   │   Cancel   │  │
│ └─────────────────────────────────┘   └────────────┘  │
│ ┌─ Acceleration ────────────────┐                      │
│ │ ( ) Off          ( ) Medium   │                      │
│ │ (♦) Low          ( ) High     │                      │
│ └───────────────────────────────┘                      │
│ ┌─ Button Assignments ──────────────────┐      ▐█▌     │
│ │ ┌─ Left + Right ─┐ ┌─ Right Button ─┐ │              │
│ │ │ (♦) Unassigned │ │ (♦) Unassigned │ │              │
│ │ │ ( ) Drag Lock  │ │ ( ) Drag Lock  │ │              │
│ │ └────────────────┘ └────────────────┘ │              │
│ └───────────────────────────────────────┘              │
│ ┌─ Swap Buttons ────────────────────────┐              │
│ │ [ ] Left/Right                        │   ┌──┬──┬──┐ │
│ └───────────────────────────────────────┘   │█ │  │ █│ │
│  You may use the TAB key to go from one      └──┴──┴──┘ │
│  button to the next, and ENTER to select.               │
╘═══════════════════════════════════════════════════════╛
```

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.*

---

## 3.14  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.
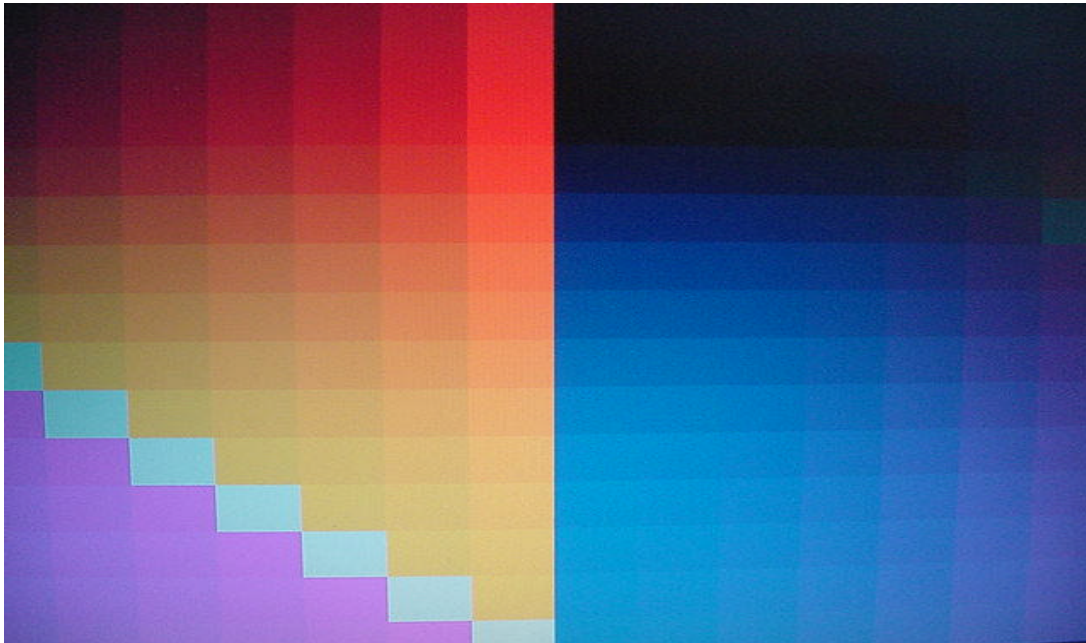
## 3.15  Lid Switch Test

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.

```
***** Lid Switch Test Program V1.1 2002/08/15 *****
Please Close LCD,Continue 3 Sec ,Or keyin <ESC> To Quit !!
```

## 3.16  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 - "**TOSHIBA**" 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.*

## 3.17  LAN Test

The LAN test checks the LAN full-duplex environment.

---

*NOTE:  LAN loopback needs to plug in before test begins.*

---

And LAN information will show on the test screen:

     ? IO Base – Port: 3000H

     ? IRQ – AH, it's "IRQ 10".

     ? Node – it is "MAC Address".

     ? Line Frame – 1514 Bytes.

     ? Line Speed – 100Mbps or 10 Mbps.

     ? Bus ID – it's "4".

The LAN test includes two subtests of the:

1. Speed100

   - including Ethernet_802.2, Ethernet_II, Ethernet_SNAP and Ethernet_802.3. All test items are in LSB mode.

2. Speed10

   - including Ethernet_802.2 in LSB mode.

The subtests run automatically.

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

```
2.N_Way_Test=false            none
3.Boot_Rom=false              none
4.Speed100=true               testing
5.Speed10=true                testing




                                              Press any key to exit


Realtek RTL8139(A/B) Fast Ethernet MLID  v3.62 (000112)
(c) Copyright 1999, by Realtek Semiconductor Corp. All rights reserved.

Fullduplex environment,  IRQ 10, Port 3000, Node Address 23F7993AA L
Max Frame 1514 bytes, Line Speed 100 Mbps, Bus ID 4
Board 1, Frame ETHERNET_802.2, LSB Mode
Board 2, Frame ETHERNET_II, LSB Mode
Board 3, Frame ETHERNET_SNAP, LSB Mode
Board 4, Frame ETHERNET_802.3, LSB Mode
```

## 3.18 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 . . .
```

## 3.19  CD Control Button Test

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

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.

Press *Esc* to quit the test.

# 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 | | | | | |
|---|---|---|---|---|---|
| Expansion Memory Module | HDD | Keyboard | | Wireless LAN | |
| | ODD | Modem | | Display Assembly | |
| | Top Cover | | | | Display Mask |
| System Board | Direct Play Button Board | Speakers | Touch Pad | LCD Module | |
| Fan & Heat Sink | | | | FL Inverter Board | |
| CPU | | | | | |

The example below shows FRUs to be removed before the Direct Play button board can be removed and repaired or replaced. The Direct Play button board is overlapped by the top cover which must be removed before the Direct Play button board can be reached. The removable HDD, keyboard, wireless LAN, ODD, modem, and display assembly in turn overlap the top cover. Always starts the disassembly process by removing the battery pack.

| Battery pack | | | | | | |
|---|---|---|---|---|---|---|
| Expansion Memory Module | HDD | | Keyboard | | Wireless LAN | |
| | ODD | | Modem | | Display Assembly | |
| | Top Cover | | | | | Display Mask |
| System Board | Direct Play Button Board | Speakers | Touch Pad | | LCD Module | |
| Fan & Heat Sink | | | | | FL Inverter Board | |
| 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 backup battery that is authorized by Toshiba or compatible with the unit. Since other battery packs have different specifications, they may be incompatible with the unit, and may burst or explode. 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 in 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 necklaces, bracelets, or rings. Batteries in the computer retain an electrical charge so there is danger of electrical shock even when the computer is disconnected from an AC power source.*

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, be sure the replacement component meets the required specifications. Never use foreign 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 will be pinched by screws or the FRU.

- ? 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 the steps below.

1.  Turn the computer upside down.

2.  Unlock the battery double lock and slide the battery bay latch to release the battery pack. Then you can remove it from the bay.
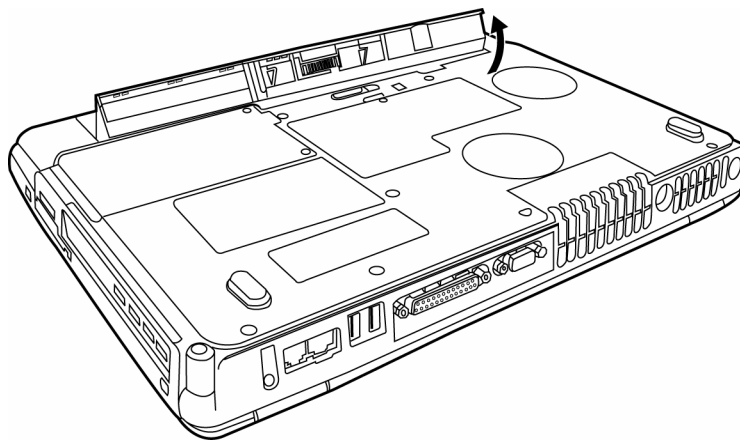


*Figure 4-1 Removing the battery pack*

*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 the steps below and refer to the figure 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.*

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 once more to pop the PC Card out slightly.

3. Grasp the PC Card and remove it.

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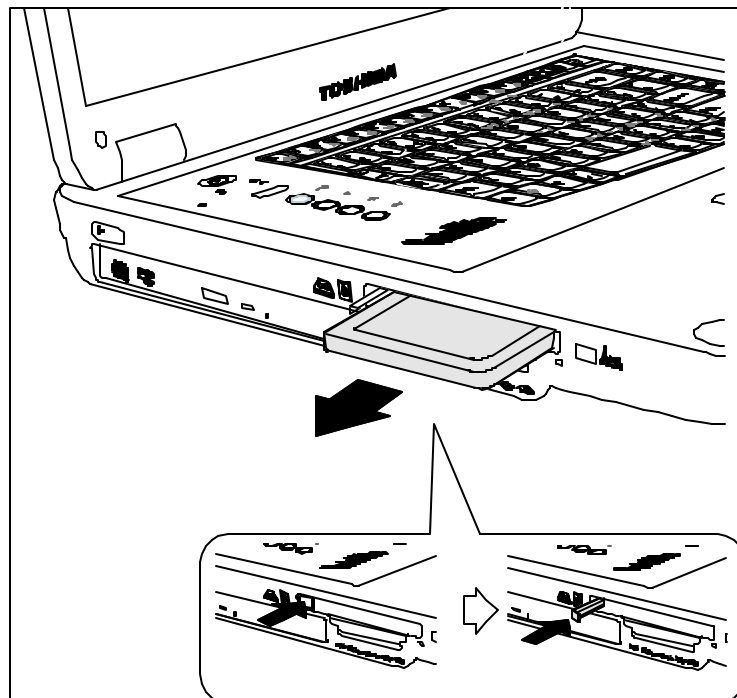


*Figure 4-2 Pressing the eject button*

**Installing the PC Card**

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

1.    Make sure the eject button does not stick out.

2.    Insert the PC Card and press gently to ensure a firm connection.
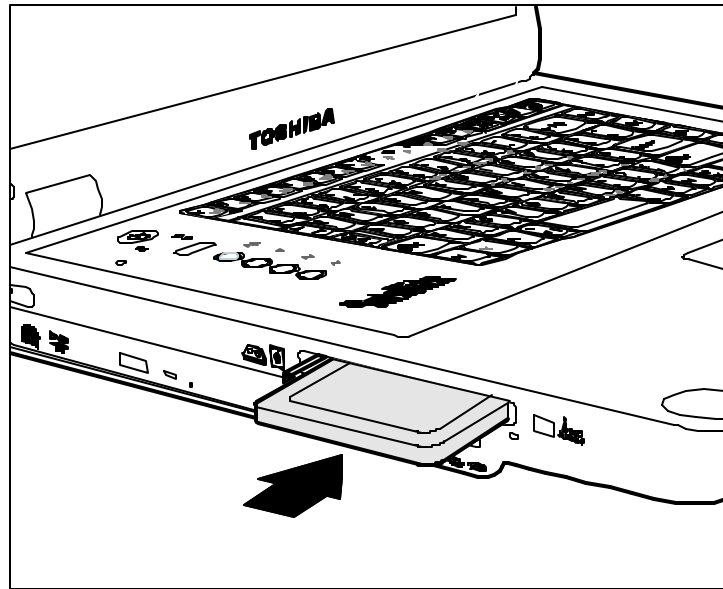


*Figure 4-3 Installing the PC card*

## 4.4 HDD

*CAUTION: When handling the HDD, do not press the top surface as shown by the arrow. Hold it by the sides.*
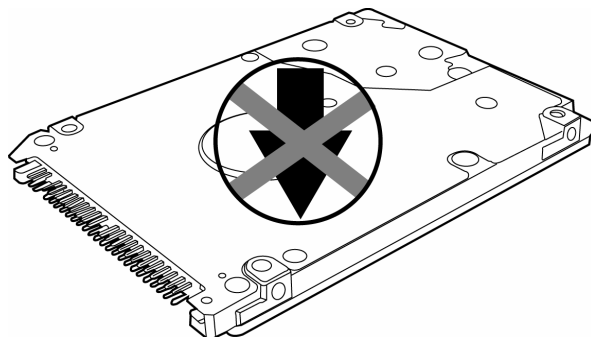


*Figure 4-4 HDD*

### Removing the HDD Module

Follow the steps below to remove HDD module:

1. Turn the computer upside down

2. Remove two black M2.5x5 screws to release the HDD door.

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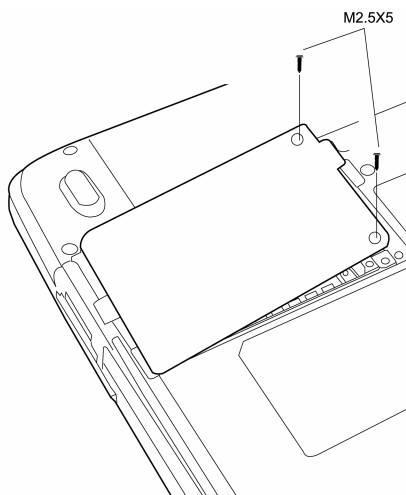


*Figure 4-5 Removing the HDD door*

4. Remove the four M3x3 silver screws that secure the HDD case and bracket to the HDD.

5. Remove the HDD from the HDD case.

## Installing the HDD

To install the HDD, follow the steps below 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 silver screws.

2. Insert the HDD unit into the HDD slot.

3. Secure the HDD door with two black M2.5x5 screws.

## 4.5   Optical Drive Module

### Removing the Optical Drive Module

To remove the optical drive module, you need to remove the HDD unit first.  Follow the steps below:

1.   Turn the computer upside down.

2.   Follow the steps above to remove the HDD unit.

3.   Remove one M2.5x8 screw and slide the optical drive module from the bay.

M2.5X8
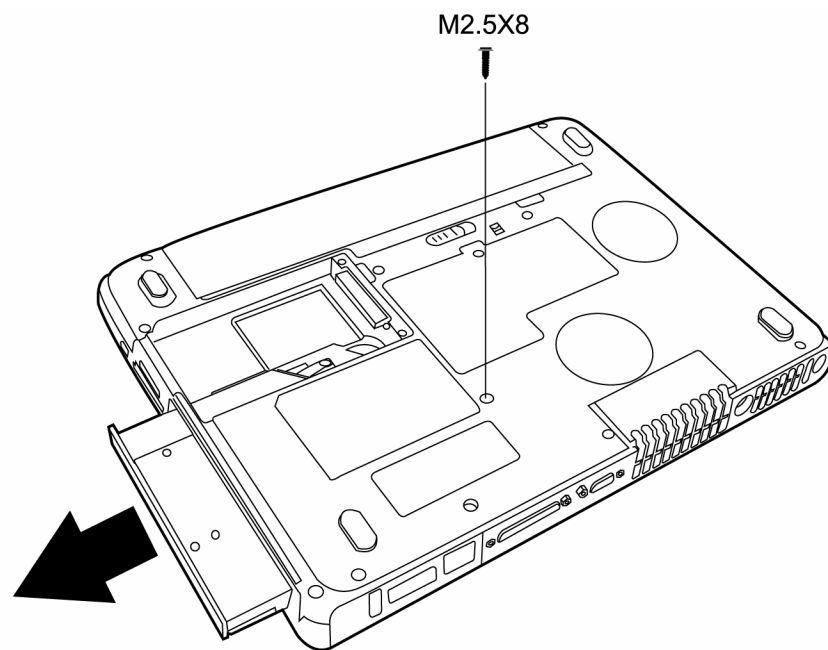
*Figure 4-6 Removing the optical drive module*

**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.  Slide the device into the optical drive module bay.  Use one M2.5x8 screw to secure it in position.

2.  Slide HDD into the HDD bay.

3.  Replace the HDD door and use two black M2.5x5 screws to secure it in position.

## 4.6   Optical Drive

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

### Disassembling the Optical Drive

To disassemble the optical drive, first remove the drive from its module bay, then follow the steps below.

1.    Remove one M2.5x8 screw and slide the optical drive module from the bay.

2.    Remove two M2x3 screws from the bracket plate.  Remove the bracket plate.

M2X3
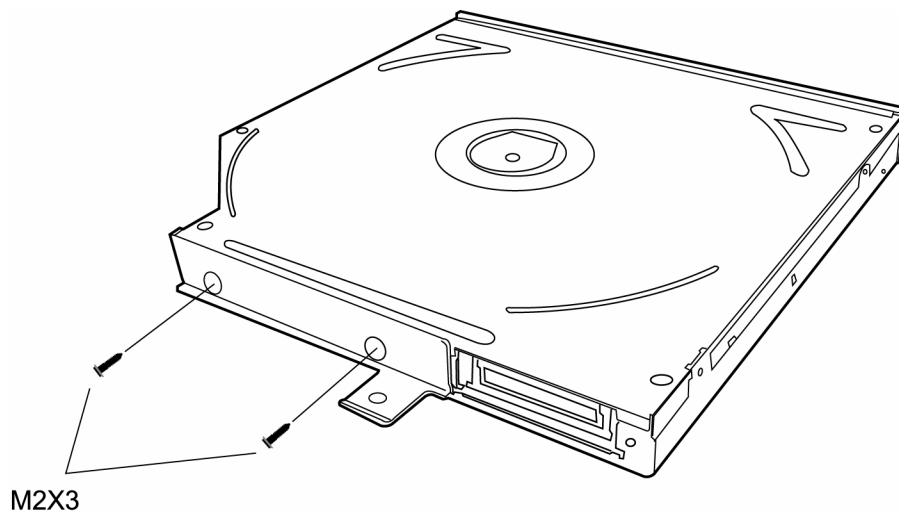
*Figure 4-7Removing the optical drive bracket*

## 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 to 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 and secure with one M2.5x8 screw.

## 4.7   Wireless LAN Unit

### Removing the Wireless LAN Unit

1.   Turn the computer upside down and loosen the screw securing the wireless LAN compartment cover.

2.   Lift off the wireless LAN compartment cover.

3.   Remove the embedded screw M2.5x5 securing Mini PCI bracket.

4.   Detach the two ends of the wireless LAN antenna.
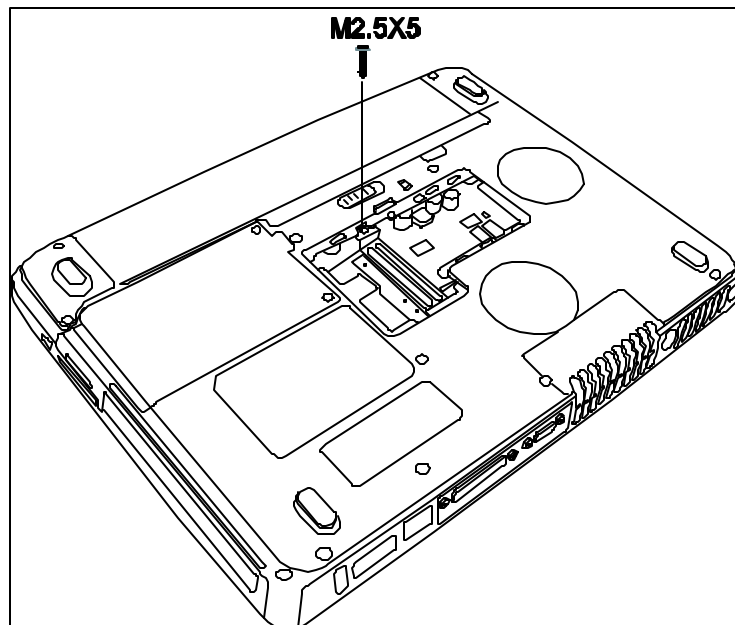


*Figure 4-8 Removing the mini PCI bracket*

5.    Gently press out on the latches. One end of the wireless LAN unit will pop up.

6.    Grasp the wireless LAN unit and pull it out.
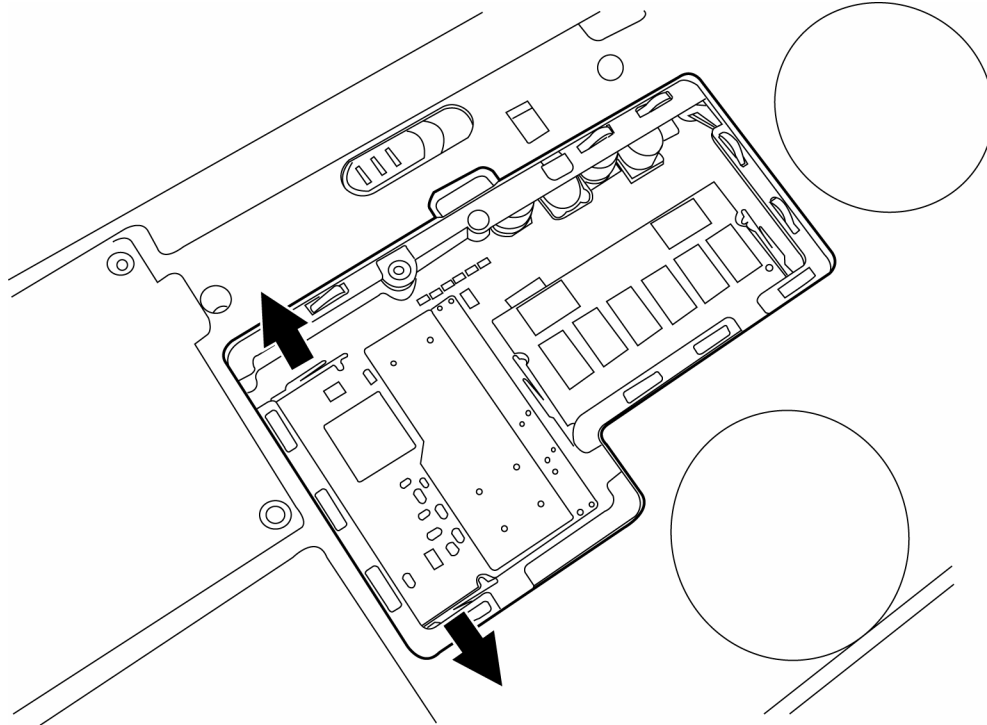


*Figure 4-9 Removing the wireless LAN unit*

**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.   Turn the computer upside down and loosen the screw securing the wireless LAN compartment cover.

2.   Lift off the wireless LAN compartment cover.

3.   Fit the wireless LAN unit's connector to the computer's connectors and press carefully to ensure firm contact.

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

4.   Gently, push the wireless LAN unit down until the latches engage the unit to hold it in place.

5.   Attach the ends of the wireless LAN antenna. The black antenna cable should be attached to the connector near the rear side of the computer, the white antenna cable to the connector closer to the front panel.

6.   Use the screw M2.5x5 to secure the Mini PCI bracket.

7.   Seat the wireless LAN compartment cover and secure it with the embedded security screw.

## 4.8 Expansion Memory

### Removing the Expansion Memory

To remove the memory module, make sure the computer is in boot mode then:

1.  Be sure the power is off and all cables are disconnected from the computer.

2.  Turn the computer upside down and remove the battery and the screw securing the memory module socket cover.

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

4.  Push the latches to the outside to release the module. A spring will force one end of the module up.

5.  Grasp the module and pull it out.

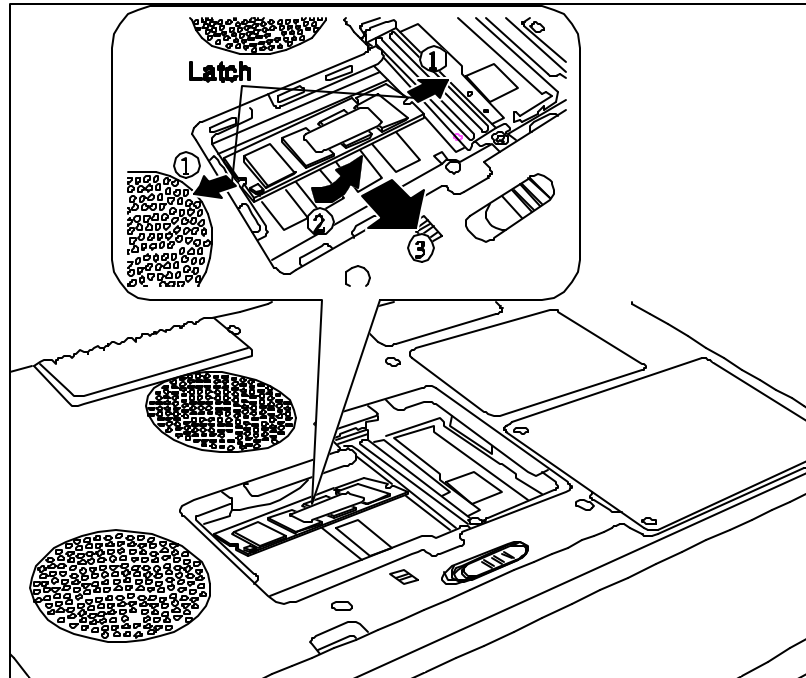6.  Seat the cover and secure its screws.

7.  Replace the battery.



*Figure 4-10 Removing the expansion memory*

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

## Installing the Expansion Memory

> *CAUTION:  Do not touch the connectors on the expansion memory 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.

    *a.  The computer is turned on.*
    *b.  The computer was shut down using the Stand by mode.*
    *c.  Power to the optical media drive has been turned on by the CD Power switch.*

2.  Remove all cables connected to the computer.

3.  Turn the computer upside down and remove the battery.

4.  Remove the screw securing the memory module socket cover.

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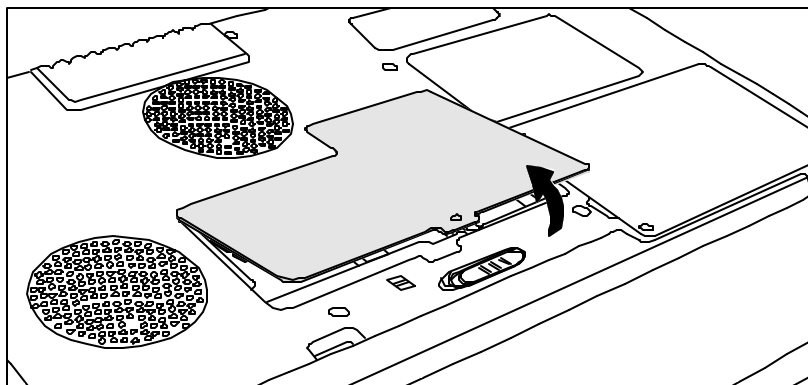


*Figure 4-11 Removing the expansion memory cover*

6.  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.

7.     Push the module down so it lies flat. Latches on either side will click into place to secure the module.
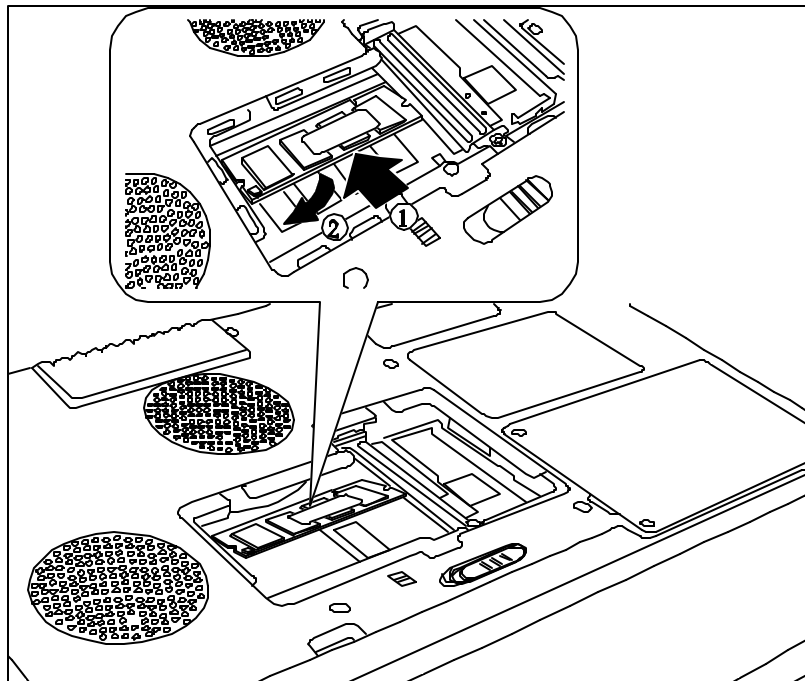


*Figure 4-12 Installing the expansion memory*

# 4.9   Keyboard

## Removing the Keyboard

Follow the steps below to remove the keyboard:

1.   Open the display panel.

2.   Insert a thin tool into the gap between the strip cover and keyboard to lever the strip cover up and
     then release the strip cover.

*Figure 4-13 Removing the strip cover*

\

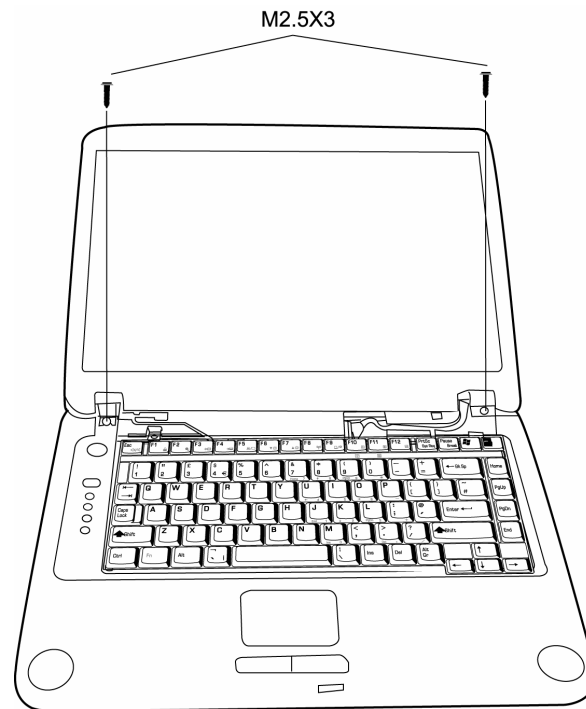3. Remove two M2.5?3 black screws securing the keyboard.

M2.5X3



*Figure 4-14 Removing the keyboard*

4. Lift the keyboard out and place over the display hinges, revealing the keyboard cable.

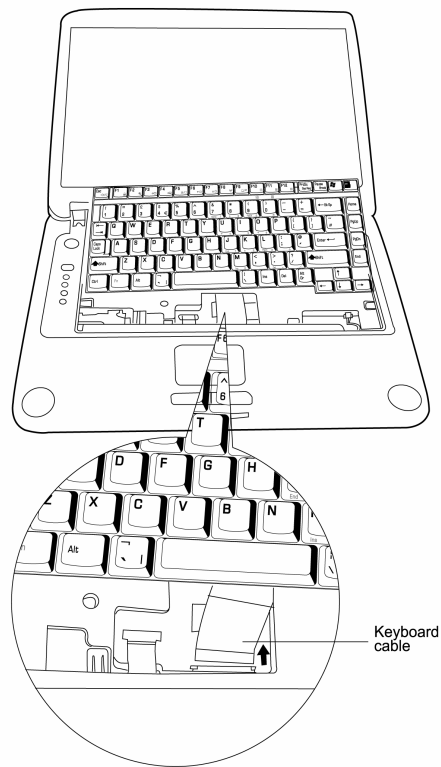5. Disconnect the keyboard cable and remove the keyboard.

*Figure 4-15 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.  Set the keyboard in place and secure it with two M2.5x3 black screws.

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

## 4.10  Modem

### Removing the Modem

To remove the installed modem, first remove the strip cover and keyboard, then follow the steps below:

1.  Remove two black M2.5x3 screws securing the modem module

2.  Carefully lift the unit off its connector

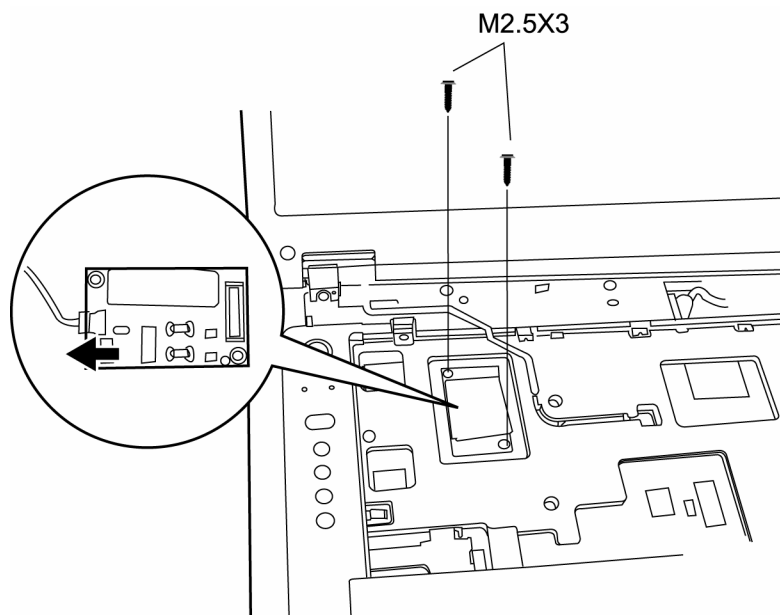3.  Disconnect the modem cable from the modem module.



*Figure 4-16 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.  Fit the modem onto its connector and secure it with two black M2.5x3 screws.

2.  Connect the modem cable to the modem module.

3.  Replace the keyboard and strip cover as mentioned in 4.9 *Keyboard*.

## 4.11 Display Assembly

### Removing the Display Assembly

To remove the display assembly, first remove the keyboard and wireless LAN, then follow the steps below:

1. Remove the strip cover and then remove the two black screws M2.5x3 securing the keyboard.
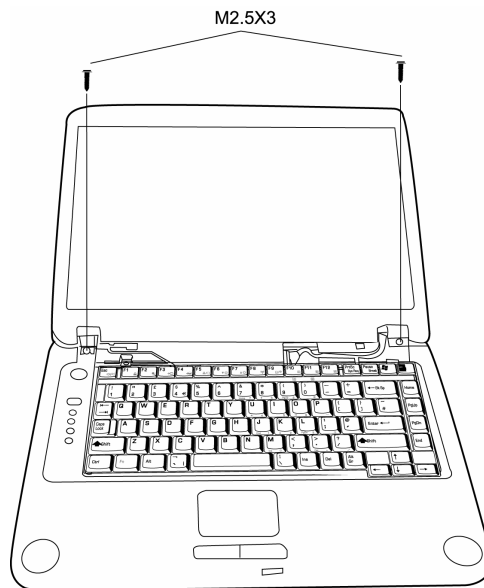


2. Disconnect the LCD power cable from the top chassis.

3. Remove one M2.5x3 black screw securing LCD display cable then unplug the cable.

M2.5X3
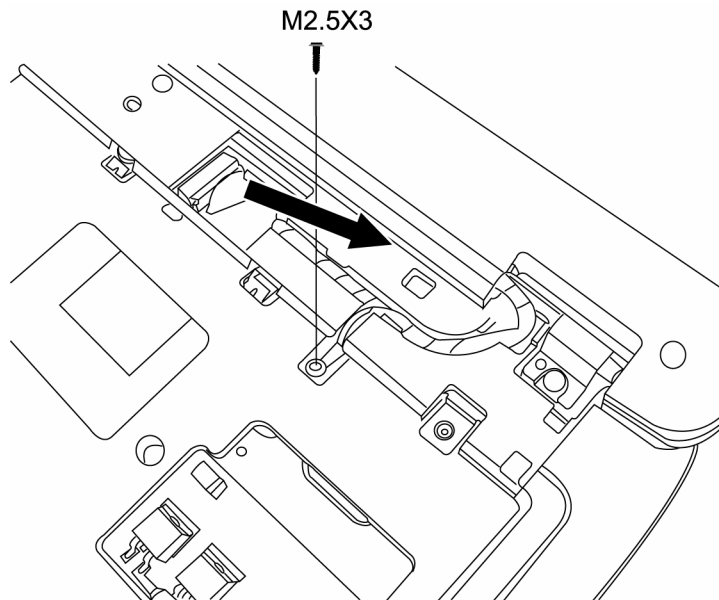
*Figure 4-17 Removing the LCD display cable*

4.  Pull the wireless LAN module's antenna wires through the small hole beside the LCD display cable connector.

LCD cable
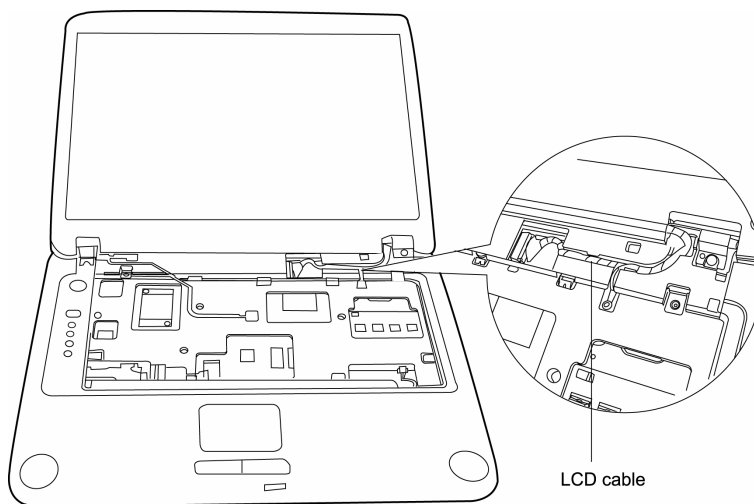
*Figure 4-18 Pulling the wireless LAN antenna wires*

5.  Remove two M2.5x8 black screws from each hinge and two black M2.5x8 black screws from the computer's back side which help hold the display assembly in place.

6.  Lift the display assembly from the computer's chassis.

**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, or wireless LAN antenna.

2.  Secure two M2.5x8 black screws to each hinge and two black M2.5x8 black screws to the computer's back side (which help hold the display assembly in place).

3.  Feed the wireless LAN module's antennae wires through the small hole beside the LCD display cable connector.

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

5.  Connect the LCD display cable and secure it with one M2.5x3 black screw.

6.  Reinstall the keyboard and wireless LAN module.

## 4.12 Top Cover

### Removing the Cover

To remove the top cover, first remove the battery pack, display assembly, optical drive module, HDD, memory module and wireless LAN as described in the preceding sections, then follow the steps below:

1. Remove five black M2.5x8 black screws and one black M2.5x3 screw securing the top cover.
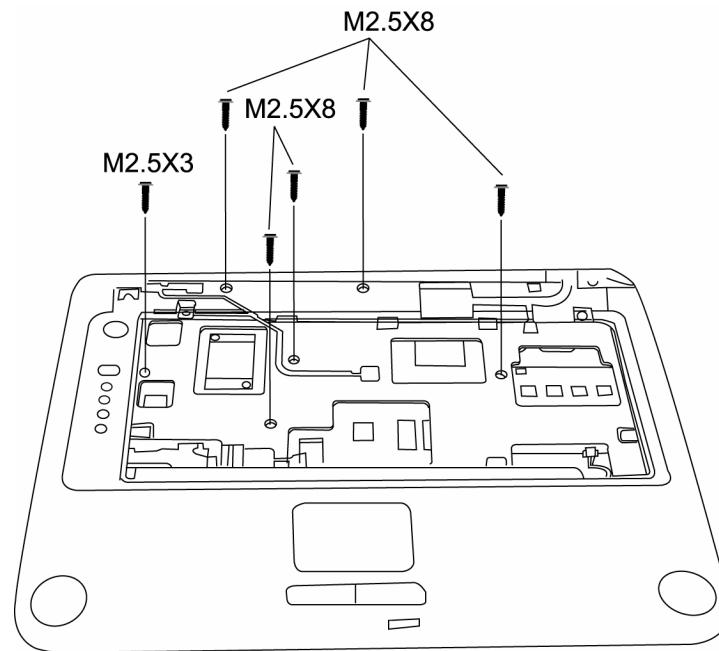


*Figure 4-19 Removing the top cover-1*

2. Detach the upper FFC cable and two speaker cables on the top chassis.

3. Remove the two black M2.5x8 screws securing the system board.

4. Turn the computer upside down and remove the following sixteen screws:
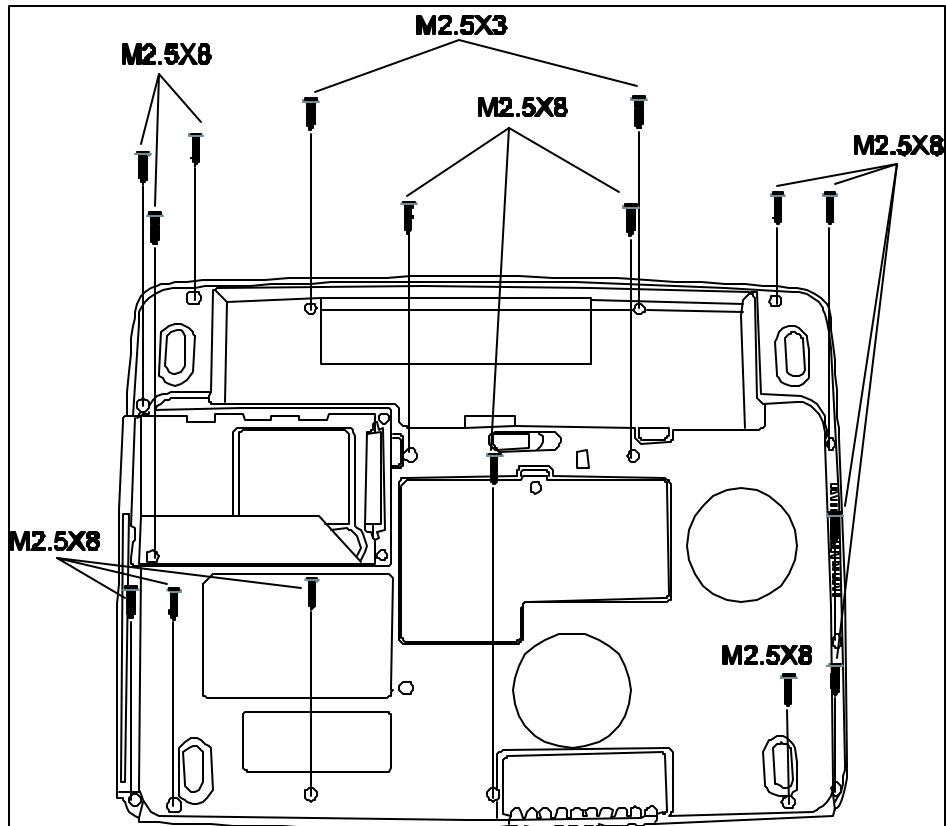
*Figure 4-20 Removing the top cover-2*

5.  Turn the computer upright to lift off 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 and two speaker cables to the computer's top chassis.

2.  Secure the top cover with five black M2.5x8 and one M2.5x3 black screws.

3.  Turn the computer upside down and secure the sixteen screws.

# 4.13 Touch Pad

## Removing the Cover

To remove the Touch Pad, first remove the top cover, then follow the steps below:

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

2. Remove one M2.5x3 screw securing the Track Pad Bracket.  Lift out the Track Pad Bracket.

3. Remove twoM2.5x3 silver screws securing the LED PCB board.  Lift it out.
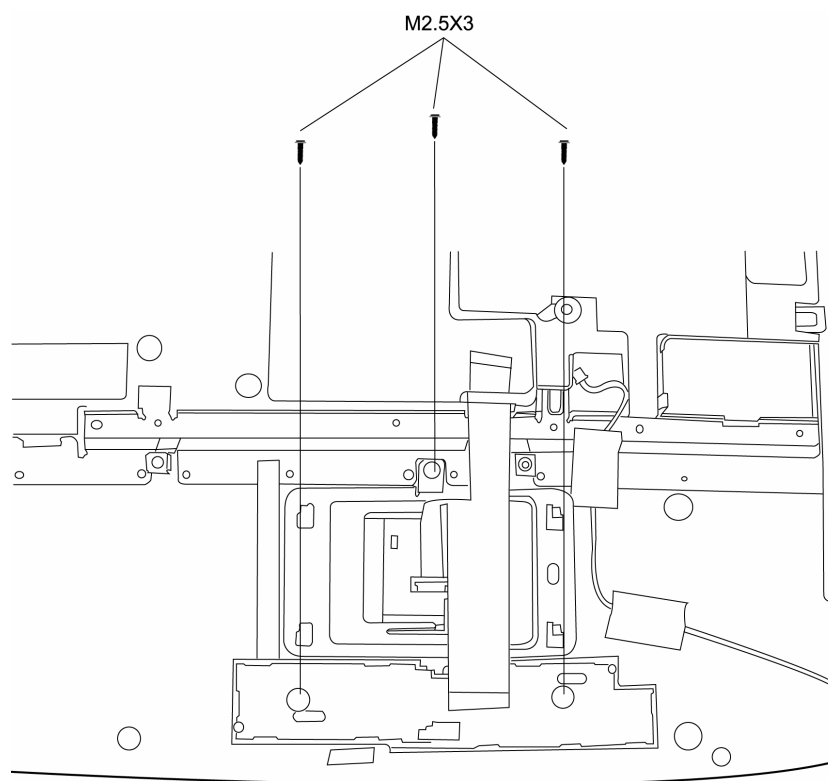


*Figure 4-21 Removing the touch pad*

**Installing the Touch Pad**

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

1.  With the top cover upside down, place the Touch Pad, the Track Pad Bracket, and LED PCB board in position.

2.  Secure the LED PCB board with two M2.5x3 silver screws.

3.  Secure Track Pad Bracket with one M2.5x3 screw.

4.  Connect the Touch Pad LED board FFC cable to the Touch Pad.

## 4.14 Speakers

### Removing the Speakers

To remove the speakers, first remove the top cover, then follow the steps below:

1.  Remove the four M2x3 screws and then disconnect the speaker cables from the right and left speakers.



Speaker
Wire cable
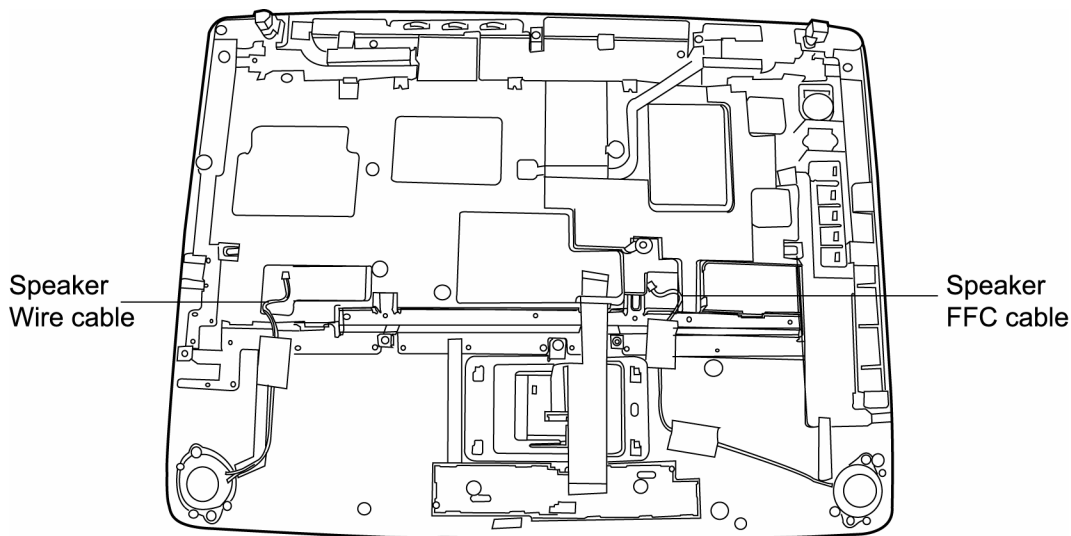
Speaker
FFC cable

*Figure 4-22 Removing the speakers*

2.  Lift out the speakers.

### Installing the Speakers

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

1.  Seat each speaker.  The speaker cases are marked with L (left) and R (right).

2.  Secure each speaker with two M2x3 screws.

3.  Attached the left- and right-side speaker cables to the system board.

4.  Reassemble the rest of the computer.

# 4.15 System Board

## Removing the System Board

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

1. Remove the two black M2.5x8 screws securing the system board to the bottom cover.
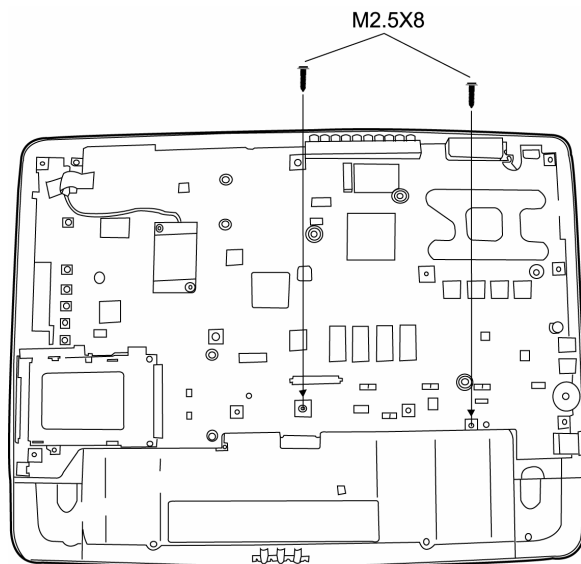


*Figure 4-23 Removing the system board-1*

2. Remove the two or four silver screws securing the system board to the backside.
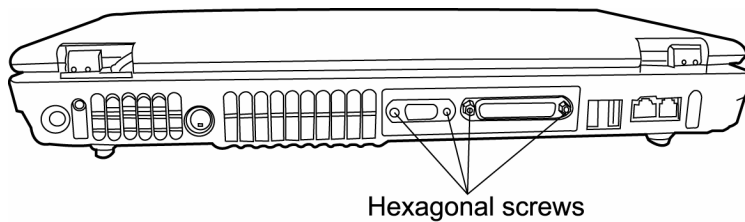


*Figure 4-24 Removing the system board-2*

3. Remove the system board from the chassis.

**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 and secure it with two black M2.5x8 screws.

2.  Reassemble the computer.

## 4.16  Fan, Heat Sink, & CPU

### Removing the Fan, Heat Sink & CPU

To remove the Fan, Heat Sink, and CPU, you must first remove the panel, keyboard, top cover and bottom chassis to reveal the system board, then follow the steps below:

1.    Turn the system board upside down and remove the four embedded security screws securing the fan module.  Remove the two fan connectors from the system board.  Then you can remove the fan module.
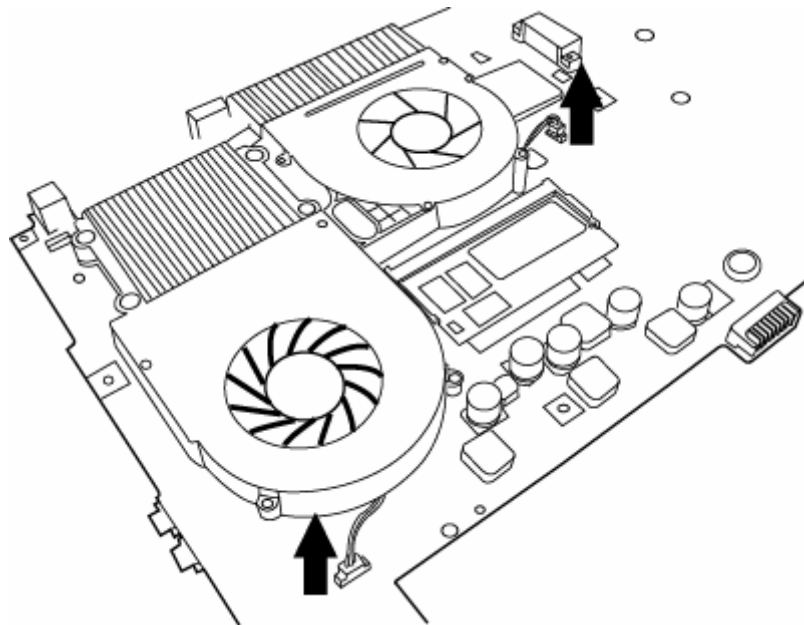


*Figure 4-25 Removing the fan module*

2.     Remove the four embedded screws securing the heat sink in the order indicated on the heat sink. Then Lift out the heat sink while preventing the stress on the CPU below.
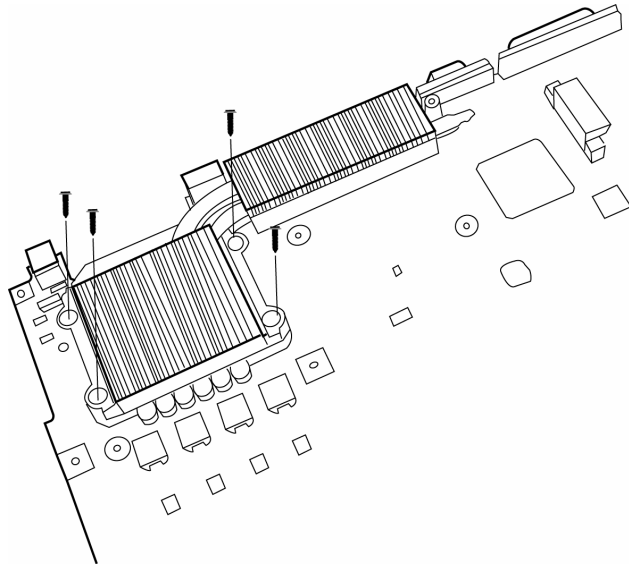


*Figure 4-26 Removing the heat sink*

3.     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.

4.     Gently lift out the CPU.
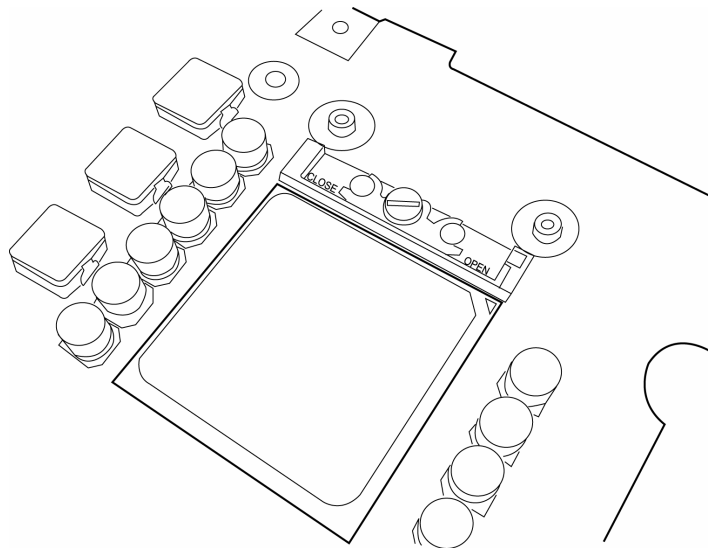


*Figure 4-27 Removing the CPU*

## 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, you should 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.

2.  Seat the CPU to align 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 and turn the cam on the CPU socket to the *closed* position with a flat-blade screwdriver to secure the CPU.

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

5.  Seat the fan module and secure with four embedded screws.

6.  Attach the two fan connectors.

## 4.17 Display Mask

### Removing the Display Mask

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

1. Remove the mask seals to expose two lower inner corner screws securing the display mask.

2. Remove two M2.5?5 black screws from the corners that were previously covered by the mask seals.

3. Carefully insert your fingers between the 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 display.
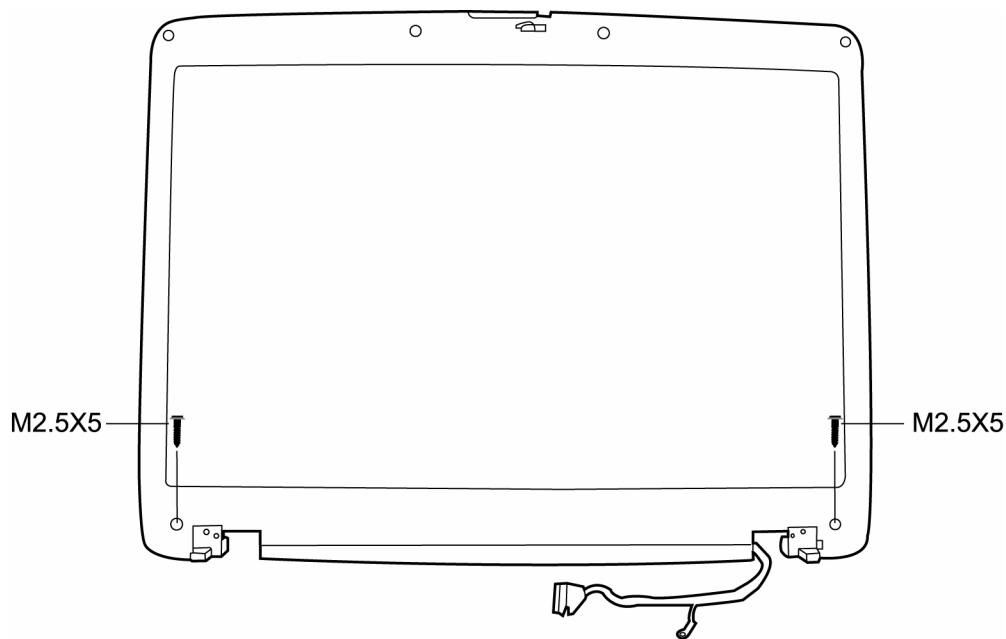
*Figure 4-28 Removing the display mask*

**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 two M2.5x5 screws at the bottom inner corner.

3.   Cover the secured screws with mask seals.

## 4.18 LCD Module

### Removing the LCD Module

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

1. Remove two M2x3 black screws securing the LCD cable and FL inverter board.

2. Disconnect the LCD cable from the FL inverter board.

3. Remove two M2.5x5 black screws securing the LCD module bracket to LCD cover.
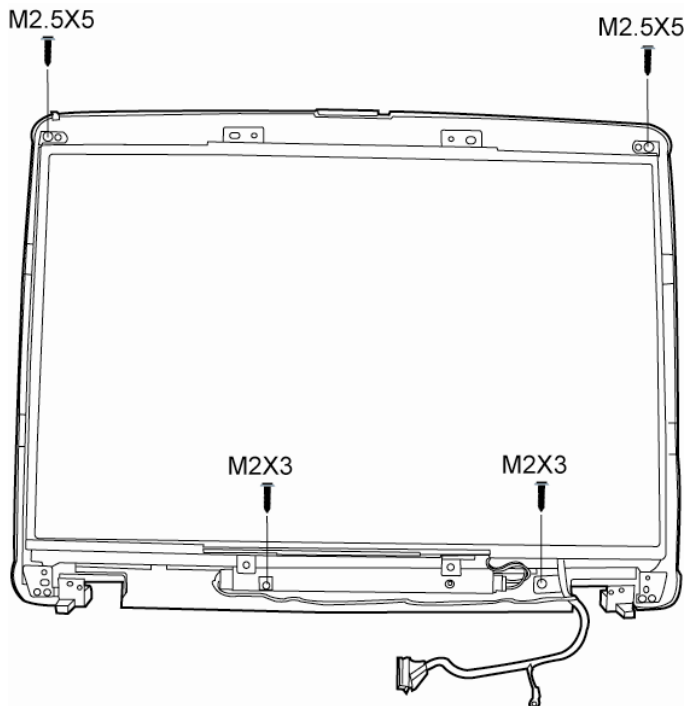


*Figure 4-29 Removing the LCD module-1*

4.    Remove six M2x3 screws securing LCD module bracket to LCD module.  Remove LCD cable.
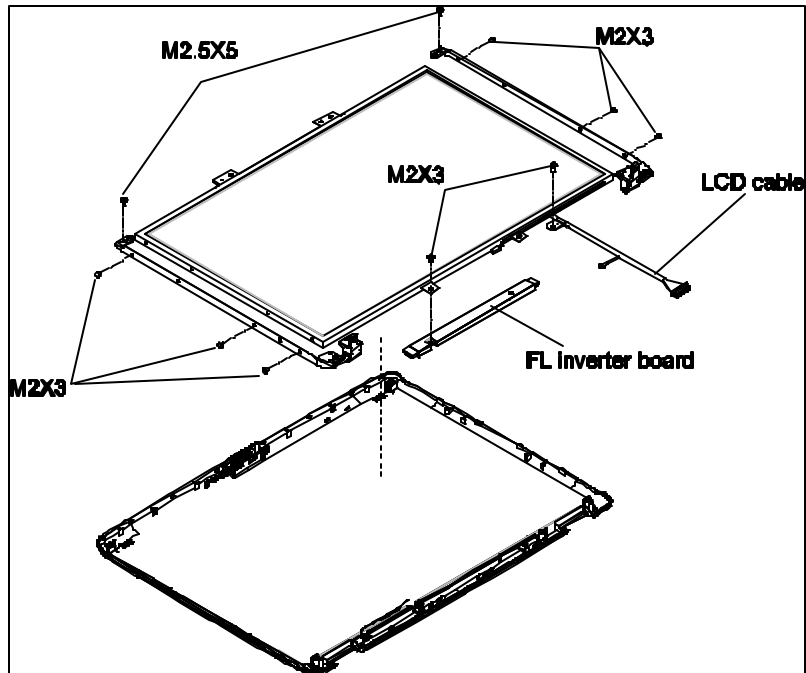


*Figure 4-30 Removing the LCD module-2*

**5.**    Remove 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.  Set the LCD module in the display assembly.

2.  Connect the FL cable and the HV cable to the FL inverter board.

3.  Seat the LCD module in the display assembly with the LCD module bracket and six M2x3 black screws.  Secure the LCD module with M2.5x5 black screws.

4.  Secure two M2x3 black screws holding the left HV cable and FL inverter board in place.

## 4.19  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 LCD module, then follow the steps below.

1. Remove one M2x3 black screw securing the FL invert board to the LCD display assembly.
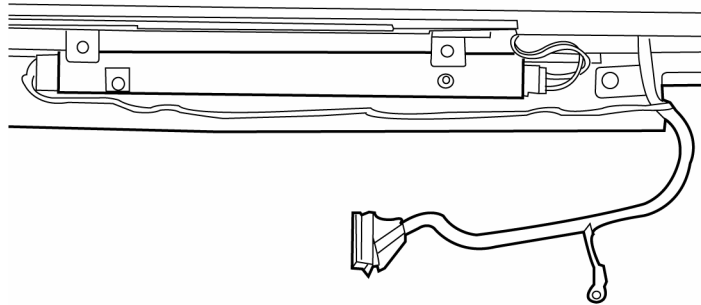


*Figure 4-31 Removing the FL inverter board*

**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.    Secure one M2x3 black screw connecting the FL inverter board to the LCD display assembly.

2.    Reassemble the computer.

# Appendices

# Appendix    Contents

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## Tables

# Appendix A    Handling the LCD Module

## Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. Therefore, please observe the following precautions when handling it:

1. When installing the LCD module in the LCD cover, be sure to seat it so that it is properly aligned and maximum visibility of the display is maintained.
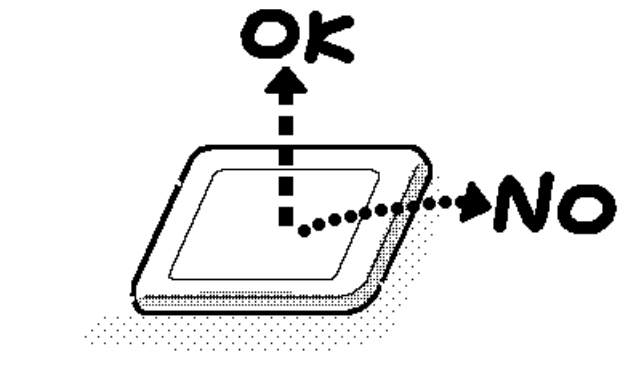


2. Be careful to align the holes at the four corners of the LCD module with the corresponding holes in the LCD cover before securing the module with screws.
   Do not force the module into place, because stress can affect its performance.

   Note: The panel's polarized surface is easily scarred, so handle it carefully.

3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

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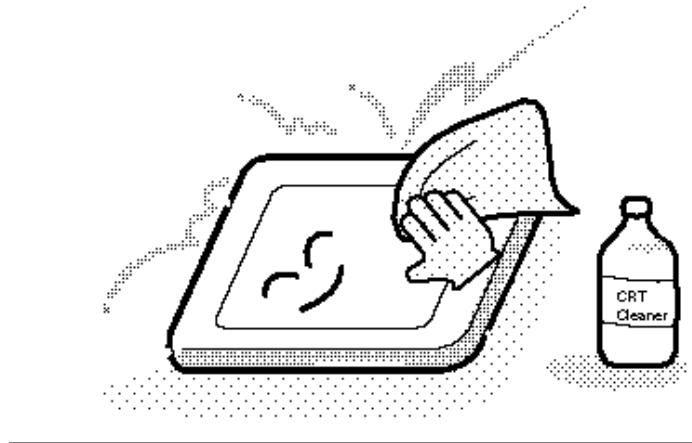


4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.
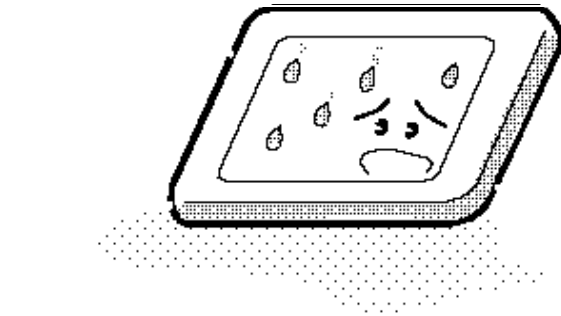
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.
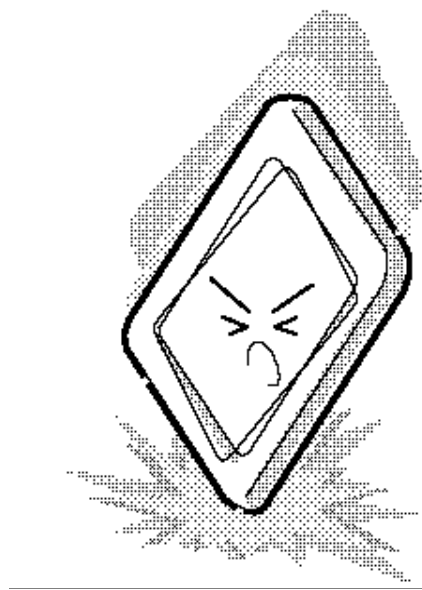


6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.
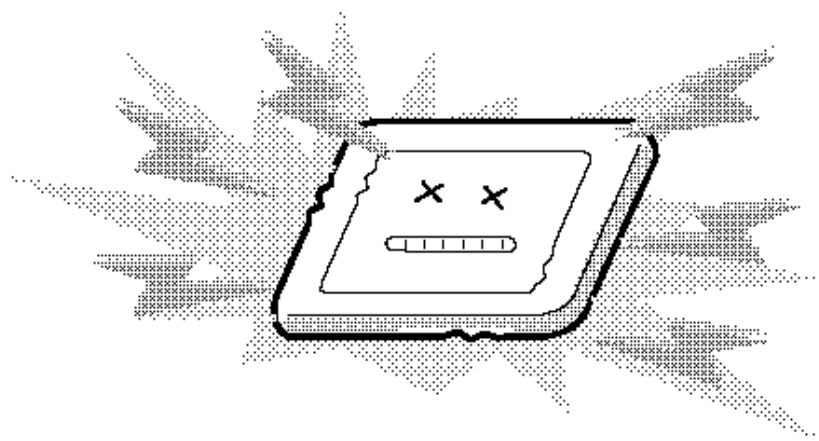
7.  Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.
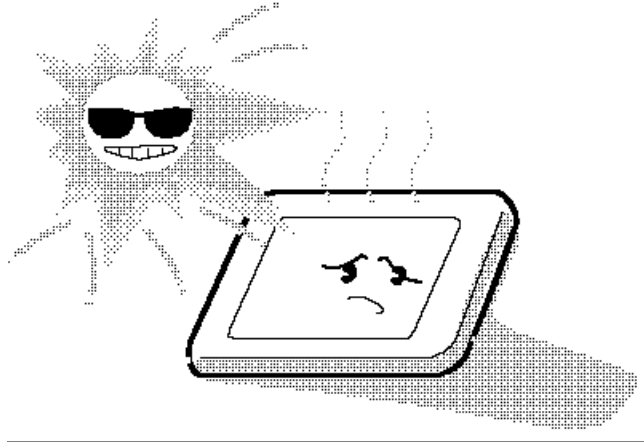
8.  Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.
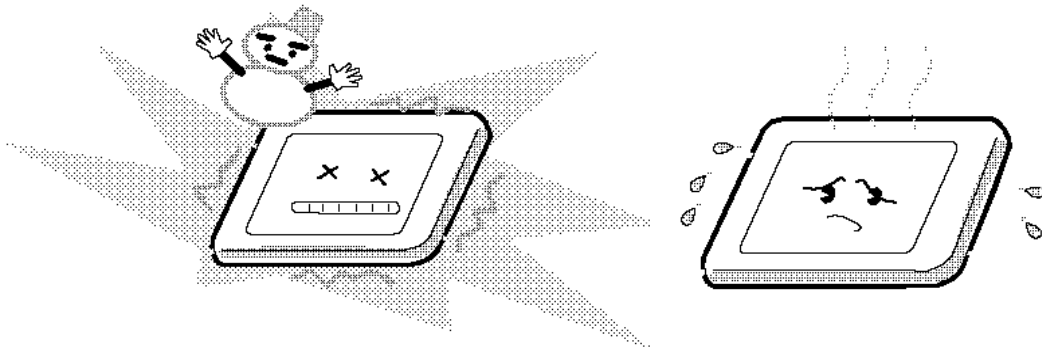
9.  Do not disassemble the LCD module. Disassembly can cause malfunctions.
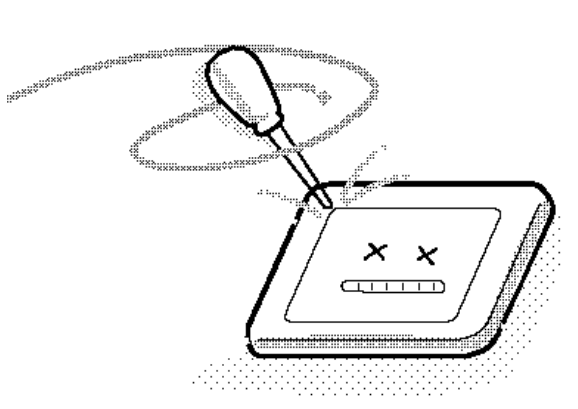
10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.
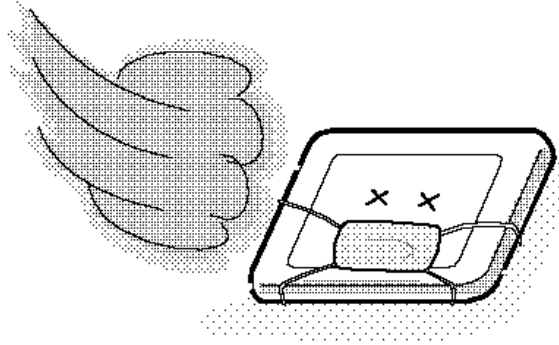
## B.1    System Board (FRDSY*) Bottom View
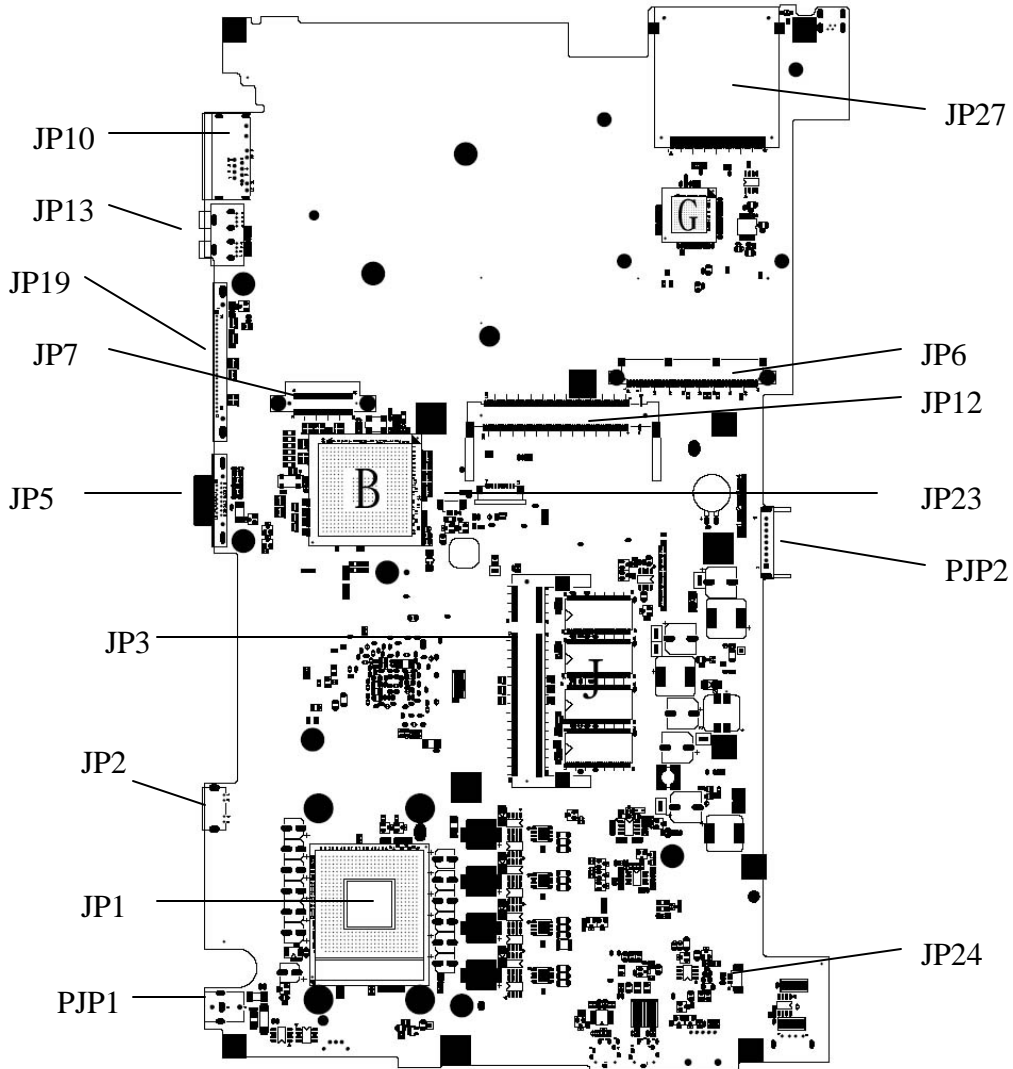


*Figure B-1  System board (FRDSY*) layout (Bottom)*

# B.2  System Board (FRDSY*) Top View
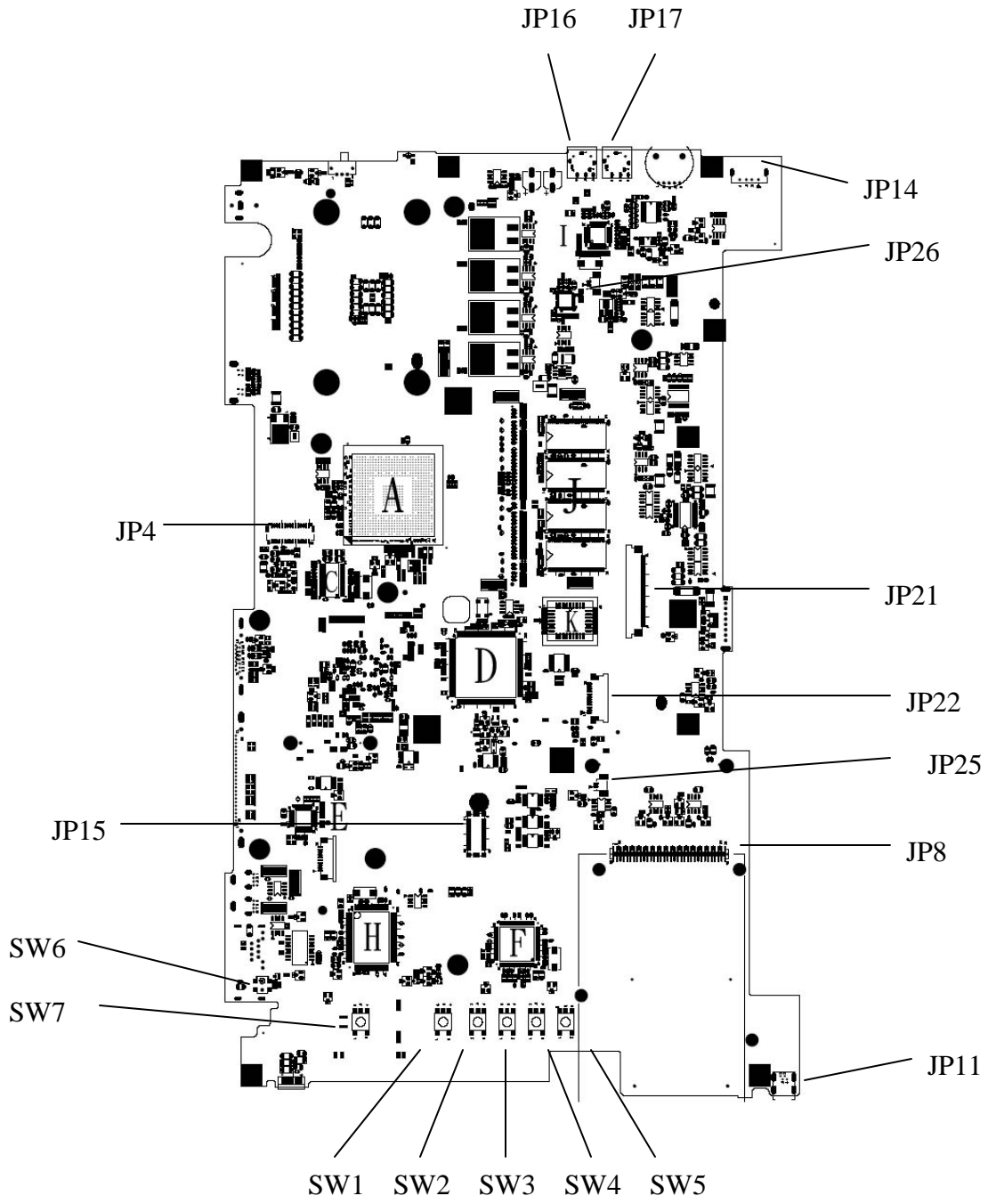


*Figure B-2  System board (FRDSY*) layout (Top)*

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

| Mark | Number | Name |
|---|---|---|
| A | U51 | ATI RC300ML |
| B | U14 | ATI IXP150 |
| C | U11 | CLK GEN ICS951402AGT |
| D | U39 | KB/EC KB910Q |
| E | U37 | I/O Controller (LPC47N217-JN) |
| F | U27 | IEEE1394A_TSB43AB21A |
| G | U21 | Cardbus & 5-in-1 Card Reader ENE CB714 |
| H | U24 | LAN controller RTL8100CL |
| I | U32 | AC97 CODEC ALC250 |
| J | U3,U4,U5,U6,U7,U8,U9,U10 | On Board RAM |
| K | U41 | BIOS ROM512K8-90 |

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

| Number | Name |
| --- | --- |
| JP1 | CPU Socket |
| JP2 | TV-OUT Connector |
| JP3 | SODIMM Socket |
| JP4 | LVDS Connector |
| JP5 | CRT Connector |
| JP6 | HDD Connector |
| JP7 | ODD Connector |
| JP8 | CARDBUS Socket |
| JP10 | RJ11/RJ45 Connector |
| JP11 | 1394 Connector |
| JP12 | MINI PCI |
| JP13, JP14 | USB Connector |
| JP15 | MDC Connector |
| JP16 | MICROPHONE IN JACK Connector |
| JP17 | HEADPHONE OUT JACK Connector |
| JP19 | Parallel Connector |
| JP21 | Keyboard Connector |
| JP22 | Touch Pad Connector |
| JP23,JP24 | FAN Connector |
| JP25,JP26 | Speaker Connector |
| JP27 | 5-IN-1 Cardreader Connector |
| SW1 | CD-PLAY Button |

| | |
|---|---|
| SW2 | Reverse Button |
| SW3 | Forward Button |
| SW4 | Play Button |
| SW5 | Stop Button |
| SW6 | LID Switch |
| SW7 | Power Button |
| PJP1 | DC-in Connector |
| PJP2 | Battery Connector |

# Appendix C    Pin Assignments

## System Board

## C.1      JP3

*Table C-1  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 | DQ0 | I/O | 6 | DQ4 | I/O |
| 7 | DQ1 | I/O | 8 | DQ5 | I/O |
| 9 | 25VDD | O | 10 | 2.5VDD | O |
| 11 | DQS0 | I/O | 12 | DM0 | O |
| 13 | DQ2 | I/O | 14 | DQ6 | I/O |
| 15 | VSS | - | 16 | VSS | - |
| 17 | DQ3 | I/O | 18 | DQ7 | I/O |
| 19 | DQ8 | I/O | 20 | DQ12 | I/O |
| 21 | 2.5VDD | O | 22 | 2.5VDD | O |
| 23 | DQ9 | I/O | 24 | DQ13 | I/O |
| 25 | DQS1 | I/O | 26 | DM1 | O |
| 27 | VSS | - | 28 | VSS | - |
| 29 | DQ10 | I/O | 30 | DQ14 | I/O |
| 31 | DQ11 | I/O | 32 | DQ15 | I/O |
| 33 | 2.5VDD | O | 34 | 2.5VDD | O |
| 35 | CK0 | O | 36 | 2.5VDD | O |
| 37 | CK0# | O | 38 | VSS | - |
| 39 | VSS | - | 40 | VSS | - |
| 41 | DQ16 | I/O | 42 | DQ20 | I/O |
| 43 | DQ17 | I/O | 44 | DQ21 | I/O |
| 45 | 2.5VDD | O | 46 | 2.5VDD | O |
| 47 | DQS2 | I/O | 48 | DM2 | O |
| 49 | DQ18 | I/O | 50v | DQ22 | I/O |

*Table C-1  SODIMM I/F pin assignments (200-PIN) (2/4)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 51 | VSS | - | 52 | VSS | - |
| 53 | DQ19 | I/O | 54 | DQ23 | I/O |
| 55 | DQ24 | I/O | 56 | DQ28 | I/O |
| 57 | 2.5VDD | O | 58 | 2.5VDD | O |
| 59 | DQ25 | I/O | 60 | DQ29 | I/O |
| 61 | DQS3 | I/O | 62 | DM3 | O |
| 63 | VSS | - | 64 | VSS | - |
| 65 | DQ26 | I/O | 66 | DQ30 | I/O |
| 67 | DQ27 | I/O | 68 | DQ31 | I/O |
| 69 | 2.5VDD | O | 70 | 2.5VDD | O |
| 71 | CB0 | - | 72 | CB4 | - |
| 73 | CB1 | - | 74 | CB5 | - |
| 75 | VSS | - | 76 | VSS | - |
| 77 | DQS8 | - | 78 | DM8 | - |
| 79 | CB2 | - | 80 | CB6 | - |
| 81 | 2.5VDD | O | 82 | 2.5VDD | O |
| 83 | CB3 | - | 84 | CB7 | - |
| 85 | DU | - | 86 | DU/RESET# | - |
| 87 | VSS | - | 88 | VSS | - |
| 89 | CK2 | - | 90 | VSS | - |
| 91 | CK2# | - | 92 | 2.5VDD | O |
| 93 | 2.5VDD | O | 94 | 2.5VDD | O |
| 95 | CKE1 | - | 96 | CKE0 | O |
| 97 | DU/A13 | - | 98 | DU/BA2 | - |
| 99 | A12 | - | 100 | A11 | O |
| 101 | A9 | O | 102 | A8 | O |
| 103 | VSS | - | 104 | VSS | - |
| 105 | A7 | O | 106 | A6 | O |
| 107 | A5 | O | 108 | A4 | O |
| 109 | A3 | O | 110 | A2 | O |
| 111 | A1 | O | 112 | A0 | O |
| 113 | 2.5VDD | O | 114 | 2.5VDD | O |

*Table C-1  SODIMM I/F pin assignments (200-PIN) (3/4)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 115 | A10/AP | O | 116 | BA1 | O |
| 117 | BA0 | O | 118 | RAS# | O |
| 119 | WE# | O | 120 | CAS# | O |
| 121 | SO# | O | 122 | S1# | - |
| 123 | DU | - | 124 | DU | - |
| 125 | VSS | - | 126 | VSS | - |
| 127 | DQ32 | I/O | 128 | DQ36 | I/O |
| 129 | DQ33 | I/O | 130 | DQ37 | I/O |
| 131 | 2.5VDD | O | 132 | 2.5VDD | O |
| 133 | DQS4 | I/O | 134 | DM4 | O |
| 135 | DQ34 | I/O | 136 | DQ38 | I/O |
| 137 | VSS | - | 138 | VSS | - |
| 139 | DQ35 | I/O | 140 | DQ39 | I/O |
| 141 | DQ40 | I/O | 142 | DQ44 | I/O |
| 143 | 2.5VDD | O | 144 | 2.5VDD | O |
| 145 | DQ41 | I/O | 146 | DQ45 | I/O |
| 147 | DQS5 | I/O | 148 | DM5 | O |
| 149 | VSS | - | 150 | VSS | - |
| 151 | DQ42 | I/O | 152 | DQ46 | I/O |
| 153 | DQ43 | I/O | 154 | DQ47 | I/O |
| 155 | 2.5VDD | O | 156 | 2.5VDD | O |
| 157 | 2.5VDD | O | 158 | CK1# | O |
| 159 | VSS | - | 160 | CK1 | O |
| 161 | VSS | - | 162 | VSS | - |
| 163 | DQ48 | I/O | 164 | DQ52 | I/O |
| 165 | DQ49 | I/O | 166 | DQ53 | I/O |
| 167 | 2.5VDD | O | 168 | 2.5VDD | O |
| 169 | DQS6 | I/O | 170 | DM6 | O |
| 171 | DQ50 | I/O | 172 | DQ54 | I/O |
| 173 | VSS | - | 174 | VSS | - |
| 175 | DQ51 | I/O | 176 | DQ55 | I/O |
| 177 | DQ56 | I/O | 178 | DQ60 | I/O |
| 179 | 2.5VDD | O | 180 | 2.5VDD | O |

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

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 181 | DQ57 | I/O | 182 | DQ61 | I/O |
| 183 | DQS7 | I/O | 184 | DM7 | O |
| 185 | VSS | - | 186 | VSS | - |
| 187 | DQ58 | I/O | 188 | DQ62 | I/O |
| 189 | DQ59 | I/O | 190 | DQ63 | I/O |
| 191 | 2.5VDD | O | 192 | 2.5VDD | O |
| 193 | SDA | I/O | 194 | SA0 | O |
| 195 | SCL | O | 196 | SA1 | O |
| 197 | 3.3VDD_SPD | O | 198 | SA2 | O |
| 199 | VDD_ID | O | 200 | DU | - |

# C.2 JP5

*Table C-3  RGB I/F pin assignments (15-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | CRT_R | O | 2 | CRT_G | O |
| 3 | CRT_B | O | 4 | NC | - |
| 5 | GND | - | 6 | GND | - |
| 7 | GND | - | 8 | GND | - |
| 9 | +CRT_VCC | - | 10 | GND | - |
| 11 | NC | - | 12 | DDC_DATA | I/O |
| 13 | DACA_HSYNC | O | 14 | DACA_VSYNC | O |
| 15 | DDC_CLK | I/O | | | |

## C.3 JP6

*Table C-4  HDD I/F pin assignments (44-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | PIDE-RST# | O | 2 | GND | - |
| 3 | PDD7 | I/O | 4 | PDD8 | I/O |
| 5 | PDD6 | I/O | 6 | PDD9 | I/O |
| 7 | PDD5 | I/O | 8 | PDD10 | I/O |
| 9 | PDD4 | I/O | 10 | PDD11 | I/O |
| 11 | PDD3 | I/O | 12 | PDD12 | I/O |
| 13 | PDD2 | I/O | 14 | PDD13 | I/O |
| 15 | PDD1 | I/O | 16 | PDD14 | I/O |
| 17 | PDD0 | I/O | 18 | PDD15 | I/O |
| 19 | GND | - | 20 | NC | - |
| 21 | PDDREQ | I | 22 | NC | - |
| 23 | PDIOW# | O | 24 | GND | - |
| 25 | PDIOR# | O | 26 | GND | - |
| 27 | PDIORDY | I | 28 | PCSEL | O |
| 29 | PDDACK# | O | 30 | GND | - |
| 31 | IRQ14 | I | 32 | NC | - |
| 33 | PDA1 | O | 34 | NC | - |
| 35 | PDA0 | O | 36 | PDA2 | O |
| 37 | PDCS1# | O | 38 | PDCS3# | O |
| 39 | PHDD_LED# | I | 40 | GND | - |
| 41 | +5VS | - | 42 | +5VS | - |
| 43 | GND | - | 44 | NC | - |

# C.4 JP7

*Table C-5  ODD I/F pin assignments (50-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 | SDD8 | I/O |
| 7 | SDD7 | I/O | 8 | SDD9 | I/O |
| 9 | SDD6 | I/O | 10 | SDD10 | I/O |
| 11 | SDD5 | I/O | 12 | SDD11 | I/O |
| 13 | SDD4 | I/O | 14 | SDD12 | I/O |
| 15 | SDD3 | I/O | 16 | SDD13 | I/O |
| 17 | SDD2 | I/O | 18 | SDD14 | I/O |
| 19 | SDD1 | I/O | 20 | SDD15 | I/O |
| 21 | SDD0 | I/O | 22 | SDDREQ | I |
| 23 | GND | - | 24 | SDIOR# | O |
| 25 | SDIOW# | O | 26 | GND | O |
| 27 | SIORDY | I | 28 | SDDACK# | O |
| 29 | IRQ15 | I | 30 | NC | O |
| 31 | SDA1 | O | 32 | +5VCD | I |
| 33 | SDA0 | O | 34 | SDA2 | I |
| 35 | SDCS1# | O | 36 | SDCS3# | - |
| 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 | NC | - |

# C.5 JP19

*Table C-6  Parallel I/F pin assignments (25-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | STROB | O | 2 | PDB00 | I/O |
| 3 | PDB01 | I/O | 4 | PDB02 | I/O |
| 5 | PDB03 | I/O | 6 | PDB04 | I/O |
| 7 | PDB05 | I/O | 8 | PDB06 | I/O |
| 9 | PDB07 | I/O | 10 | ACK | I |
| 11 | BUSY | I | 12 | PE | I |
| 13 | SELCT | I | 14 | AUTFD | O |
| 15 | ERROR | I | 16 | PINIT | O |
| 17 | SLIN | O | 18 | GND | - |
| 19 | GND | - | 20 | GND | - |
| 21 | GND | - | 22 | GND | - |
| 23 | GND | - | 24 | GND | - |
| 25 | GND | - | | | |

## C.6 JP8

*Table C-7  PC Card I/F pin assignments (84-pin) (1/2)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | GND | - | 2 | GND | - |
| 3 | S1_D3 | I/O | 4 | S1_CD1# | O |
| 5 | S1_D4 | I/O | 6 | S1_D11 | I/O |
| 7 | S1_D5 | I/O | 8 | S1_D12 | I/O |
| 9 | S1_D6 | I/O | 10 | S1_D13 | I/O |
| 11 | S1_D7 | I/O | 12 | S1_D14 | I/O |
| 13 | S1_CE1# | I/O | 14 | S1_D15 | I/O |
| 15 | S1_A10 | I | 16 | S1_CE2# | I/O |
| 17 | S1_OE# | I/O | 18 | S1_VS1 | I |
| 19 | S1_A11 | I | 20 | S1_IORD# | I/O |
| 21 | S1_A9 | I | 22 | S1_IOWR# | I |
| 23 | S1_A8 | I | 24 | S1_A17 | I |
| 25 | S1_A13 | I | 26 | S1_A18 | I |
| 27 | S1_A14 | I | 28 | S1_A19 | I |
| 29 | S1_WE# | I | 30 | S1_A20 | I |
| 31 | S1_RDY# | O | 32 | S1_A21 | I |
| 33 | +S1_VCC | - | 34 | +S1_VCC | - |
| 35 | +S1_VPP | - | 36 | +S1_VPP | - |
| 37 | S1_A16 | I | 38 | S1_A22 | I |
| 39 | S1_A15 | I | 40 | S1_A23 | I |
| 41 | S1_A12 | I | 42 | S1_A24 | I |
| 43 | S1_A7 | I | 44 | S1_A25 | I |
| 45 | S1_A6 | I | 46 | S1_VS2 | I |
| 47 | S1_A5 | I | 48 | S1_RST | I |
| 49 | S1_A4 | I | 50 | S1_WAIT# | I |
| 51 | S1_A3 | I | 52 | S1_INPACK# | O |
| 53 | S1_A2 | I | 54 | S1_REG# | I |
| 55 | S1_A1 | I | 56 | S1_BVD2 | O |
| 57 | S1_A0 | I | 58 | S1_BVD1 | I |
| 59 | S1_D0 | I | 60 | S1_D8 | I/O |

*Table C-7  PC Card I/F pin assignments (84-pin) (2/2)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 61 | S1_D1 | I/O | 62 | S1_D9 | I/O |
| 63 | S1_D2 | I/O | 64 | S1_D10 | I/O |
| 65 | S1_WP | I/O | 66 | S1_CD2# | I |
| 67 | GND | - | 68 | GND | - |
| 69 | GND | - | 70 | GND | - |
| 71 | GND | - | 72 | GND | - |
| 73 | GND | - | 74 | GND | - |
| 75 | GND | - | 76 | GND | - |
| 77 | GND | - | 78 | GND | - |
| 79 | GND | - | 80 | GND | - |
| 81 | GND | - | 82 | GND | - |
| 83 | GND | - | 84 | GND | - |

# C.7 JP12

*Table C-8 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 | PIRQH# | I | 18 | +5VS_MINIPCI | - |
| 19 | +3.3V | O | 20 | PIRQG# | I |
| 21 | NC | - | 22 | NC | - |
| 23 | GND | - | 24 | +3.3V | O |
| 25 | PCICLK | O | 26 | PCIRST# | O |
| 27 | GND | - | 28 | +3.3V | O |
| 29 | REQ1# | I | 30 | GNT1# | 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-8 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.8     JP4

| Terminal No. | Symbol | Function |
|---|---|---|
| 1 | $V_{SS}$ | GND |
| 2 | $V_{DD}$ | POWER SUPPLY   : +3.3V |
| 3 | $V_{DD}$ | POWER SUPPLY   : +3.3V |
| 4 | $V_{EDID}$ | DDC 3.3V POWER SUPPLY : +3.3V |
| 5 | NC | Non-Connection |
| 6 | $CLK_{EDID}$ | DDC Clock |
| 7 | $DATA_{EDID}$ | DDC Data |
| 8 | RxOIN0- | Negative LVDS differential data input (Odd), [R0-R5, G0] |
| 9 | RxOIN0+ | Positive LVDS differential data input (Odd), [R0-R5, G0] |
| 10 | $V_{SS}$ | GND |
| 11 | RxOIN1- | Negative LVDS differential data input (Odd), [G1-G5, B0-B1] |
| 12 | RxOIN1+ | Positive LVDS differential data input (Odd), [G1-G5, B0-B1] |
| 13 | $V_{SS}$ | GND |
| 14 | RxOIN2- | Negative LVDS differential data input (Odd), [B2-B5, HS, VS, DE] |
| 15 | RxOIN2+ | Positive LVDS differential data input (Odd), [B2-B5, HS, VS, DE] |
| 16 | $V_{SS}$ | GND |
| 17 | RxOCLKIN- | Negative LVDS differential clock input (Odd) |
| 18 | RxOCLKIN+ | Positive LVDS differential clock input (Odd) |
| 19 | $V_{SS}$ | GND |
| 20 | RxEIN0- | Negative LVDS differential data input (Even), [R0-R5, G0] |
| 21 | RxEIN0+ | Positive LVDS differential data input (Even),    [R0-R5, G0] |
| 22 | $V_{SS}$ | GND |
| 23 | RxEIN1- | Negative LVDS differential data input (Even), [G1-G5, B0-B1] |
| 24 | RxEIN1+ | Positive LVDS differential data input (Even), [G1-G5, B0-B1] |
| 25 | $V_{SS}$ | GND |
| 26 | RxEIN2- | Negative LVDS differential data input (Even), [B2-B5, HS, VS, DE] |
| 27 | RxEIN2+ | Positive LVDS differential data input (Even), [B2-B5, HS, VS, DE] |
| 28 | $V_{SS}$ | GND |
| 29 | RxECLKIN- | Negative LVDS differential clock input (Even) |
| 30 | RxECLKIN+ | Positive LVDS differential clock input (Even) |

## C.9        JP27

| | Pin No. |
|------|------------|
| P1 | 5in1-GND |
| P2 | SM-CD-COM |
| P3 | SM-CD-SW |
| P4 | |
| P5 | SD-WP-SW |
| P6 | SD-DAT1 |
| P7 | SD-DAT0 |
| P8 | SD-CLK |
| P9 | SD-VCC |
| P10 | SD-CMD |
| P11 | SD-DAT3 |
| P12 | SD-DAT2 |
| P13 | MS-BS |
| P14 | MS-DATA1 |
| P15 | MS-DATA0 |
| P16 | MS-DATA2 |
| P17 | MS-INS |
| P18 | MS-DATA3 |
| P19 | MS-SCLK |
| P20 | MS-VCC |
| P21 | S.M/xD-D4 |
| P22 | S.M/xD-D5 |
| P23 | S.M/xD-D6 |
| P24 | S.M/xD-D7 |
| P25 | S.M-LVD |
| P26 | #S.M/xD-R/B |
| P27 | #S.M/xD-RE |
| P28 | #S.M/xD-CE |
| P29 | S.M/xD-VCC |
| P30 | #S.M-CD |
| P31 | S.M/xD-D3 |
| P32 | S.M/xD-D2 |
| P33 | S.M/xD-D1 |
| P34 | S.M-D0 |
| P35 | S.M/xD-WP-IN |
| P36 | #S.M/xD-WE |
| P37 | #S.M/xD-ALE |
| P38 | #S.M/xD-CLE |
| P39 | xD-CD |
| P40 | xD-VCC |
| P41 | SD-CD-COM |
| P42 | SD-CD-SW |
| P43 | SM-WP-SW |
| P44 | 5in1-GND |

# C.10 JP23 JP24

*Table C-9-1 JP18 Fan I/F pin assignments (3-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | FAN1 | I | 2 | FAN-SPEED1 | O |
| 3 | GND | - | | | |

*Table C-9-2 JP21 Fan I/F pin assignments (3-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | FAN2 | I | 2 | FAN-SPEED2 | O |
| 3 | GND | - | | | |

# C.11 PJP1

*Table C-10 AC Adaptor Connector pin assignments (3-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | VIN | I | 2 | GND | - |
| 3 | GND | - | 4 | GND | - |
| 5 | GND | - | 6 | GND | - |

## C.12 JP16

*Table C-12  Microphone I/F pin assignments (6-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | ANGND | - | 2 | MIC | I |
| 3 | BIAS | I | 4 | NC | - |
| 5 | NC | - | 6 | ANGND | - |

## C.13 JP17

*Table C-14  Headphone Connector pin assignments (6-pin)*

| Pin No. | Signal name | I/O | Pin No. | Signal Name | I/O |
|---------|-------------|-----|---------|-------------|-----|
| 1 | ANGND | - | 2 | INTSPK_L1 | O |
| 3 | INTSPK_R1 | O | 4 | NBA_PLUG | I |
| 5 | ANGND | - | 6 | NC | - |

# 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 | | C5 | | 7E | | F0 | 7E | |

*Table D-5  Scan codes in overlay mode*

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

*Table D-6  No.124 key scan code*

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

*Table D-7  No.126 key scan code*

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

*:  This key generates only make codes.

# Appendix E    Key Layout

## E.1    United 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 Korean (CF) Keyboard



*Figure E-6  CF keyboard*

## E.7    Portuguese-ALPS Keyboard



*Figure E-7  Portuguese-ALPS keyboard*

## E.8    US-INTE_ALPS Keyboard



*Figure E-8  US-INTE_ALPS Keyboard*

# E.9 Greece(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*
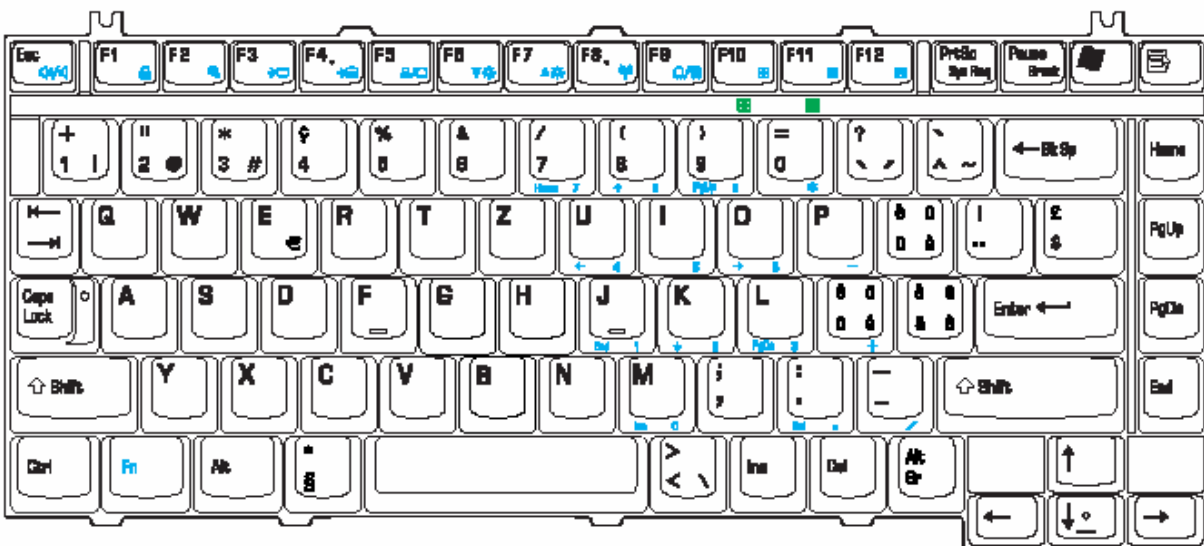
# E.12 Swissc-Darfon Keyboard

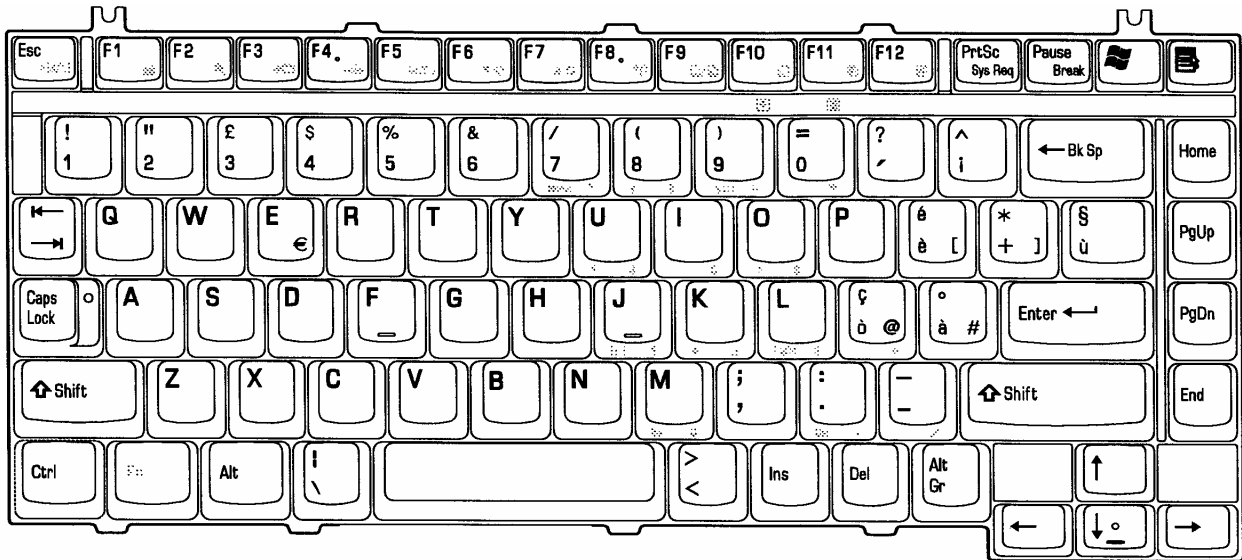

*Figure E-12  Swissc-Darfon keyboard*

# E.13 IT new Keyboard



*Figure E-13  IT new keyboard*

# Appendix F    Series Screw Torque List

*Table F-1  Series Screw Torque List*

| SCREW P/N | SCREW SPEC | Q'ty | LOCATION | SCREW TORQUE |
|---|---|---|---|---|
| MAAA0015320 | M2*3 | 6 | LCD BRK TO LCDPANEL | 1.2~1.5kg |
| MAAA0015320 | M2*3 | 1 | INVERTER TO COVER SUB ASSY | 1.5~2.0kg |
| MAAA0015320 | M2*3 | 1 | LCD CABLE TO COVER SUB ASSY | 1.5~2.0kg |
| MAC925003Z0 | M2.5*3 | 1 | LCD CABLE TO LOG UP | 2.5~3.0kg |
| MMCK25050Z0 | M2.5*5 | 2 | LCD BRK ASSY TO COVER SUB ASSY(R+L) | 2.5~3kg |
| MMCK25050Z0 | M2.5*5 | 2 | LCD BEZEL ASSY TO COVER SUB ASSY | 2.5~3kg |
| MAC925003Z0 | M2.5*3 | 2 | KEYBOARD TO LOGIC ASSY | 2.5~3.0kg |
| MMCK20050N0 | M2*5 | 2 | CARD BUS TO MB | 1.5~2.0kg |
| MAAA0051400 | M2*7 | 2 | Card Bus to MB | 1.5~2.0kg |
| MACK20003Z0 | M2*13 | 2 | HDD CONNT TO MB | 1.5~2.0kg |
| MMCK20050N0 | M2*5 | 2 | CD ROM CONN TO MB | 1.5~2.0kg |
| MAC925003Z0 | M2.5*3 | 2 | MDC TO MB | 2.5~3kg |
| MACK25080Z0 | M2.5*8 | 2 | MB TO LOG LOWER | 2.5~3kg |
| MAC925003Z0 | M2.5X3 | 1 | TRACK PAD BRK TO LOGIC UPPER | 2.5~3kg |
| MMCK25030N0 | M2.5X3 | 2 | LED BOARD TO LOG UP | 2.5~3kg |
| MMCK25050Z0 | M2.5*5 | 2 | SADDLE(R/L) TO LOG UP SHIELD TO LOG UP | 2.5~3kg |
| MAAA0015320 | M2.0X3 | 4 | SPEAKER L/R TO LOGIC UPPER | 1.5~2kg |
| MAC925003Z0 | M2.5*3 | 1 | LOGIC UPPER TO STANDOFF TO MB | 2.5~3kg |
| MACK25080Z0 | M2.5*8 | 5 | LOGIC UPPER TO LOG LOWER | 2.5~3kg |
| MACK25080Z0 | M2.5*8 | 2 | LOG LOW-TO HINGE SADDLE R(L) | 2.5~3kg |
| MACK25080Z0 | M2.5*8 | 14 | LOGIC LOWER TO LOGIC UPPER | 2.5~3kg |
| MAC925003Z0 | M2.5*3 | 2 | LOGIC LOWER TO LOGIC UPPER | 2.5~3kg |

| SCREW P/N | SCREW SPEC | Q'ty | LOCATION | SCREW TORQUE |
|---|---|---|---|---|
| MMCK25080Z0 | M2.5*8 | 1 | LOG LOW TO ODD MODULE | 2.5~3kg |
| MACK25080Z0 | M2.5*8 | 2 | LCD HINGE BRK R(L)-TO-HINGE SADDLE R(L) | 4~4.5kg |
| ECBL104M000 | M2.5*5？？ | 1 | RAM DOOR TO LOGIC LOWER | 2.5~3kg |
| MMCK25050Z0 | M2.5*5 | 2 | HDD DOOR TO LOGIC LOWER | 2.5~3kg |
| ECBL104M000 or ECTQ007L000 | M2.5*5？？ or M2.5*5？？(？？) | 1 | MINIPCI BRACKET TO LOGIC LOWER | 2.5~3kg |
| MAFA94001N0 | 4.75*9.6 | 2 | VGA PORT TO LOGIC ASSY | 2.5~3kg |
| MAFA94001N0 | 4.75*9.6 | 2 | PRINT PORT TO LOGIC ASSY | 2.5~3kg |
| MMCK20050N0 | M2*5 | 4 | THERMAL-FAN | 1.5~2.0kg |
| MACW108H000 | SPECIAL SCREW | 4 | THERMAL MODULE | 2.0~2.5kg |
| MMCK25050Z0 | M2.5*5 | 1 | BATTERY LATCH TO LOG LOW | 2.5~3kg |
| MAAA4303000 | M3*3 | 4 | HDD BRACKET L/R TO HDD MODULE | 2.0~2.5kg |
| MAAA0015320 | M2*3 | 2 | MODULE LOCK BRACKET TO XDROM MODULE | 1.5~2.0kg |

# 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 |