

Toshiba Personal Computer
Satellite P30
Maintenance Manual

TOSHIBA CORPORATION

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Toshiba Personal Computer Satellite SATELLITE P30 Maintenance Manual

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite SATELLITE P30, referred to as the P30 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 P30 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 1

Hardware Overview

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1.1 Features

The Satellite P30 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 up to 2.8GHZ(W/O HT)
- Intel Prescott Celeron up to 3.2GHz
- Intel Northwood P4 up to 3.2GHZ(W/ HT)
- Intel Prescott P4 up to 3.6GHz
- Micro FC-PGA package CPU

❑ Chipset

- ATI Mobility 216NLS3BGA21H RX300ML
- ATI IXP150/218S2EBNA46
- ATI_216PBCGA15F M11P
- ENE KB910 for keyboard controller, battery management unit, and RTC.
- ENE CB1410 or CB714 for Card Bus PCMCIA controller with 5 in 1 card Reader.
- ALC250 for AC97 CODEC.
- VIA VT6301S for 1394 controller.
- Realtek RTL8100CL on board LAN.

❑ Memory

- DDR333 specification compliant
- No on-board memory
- Two DDR SODIMM with 256MB/512MB/1GB
- Max upgrade to 2GB with 2 SODIMM socket
- 128KB/256 KB/512KB/1MB L2 Cache on CPU.
- Adjustable 64/128MB VGA DDR RAM share from North Bridge.

BIOS

- 1MB Flash ROM for system BIOS.
 - a) Suspend to RAM/Disk.
 - b) Password protection (System).
 - c) Windows 98 ready with PnP
 - d) Various hot key for system control.
 - e) Refreshable
 - f) Complete ACPI 1.0B Function

 Power

- 8 cell Li-Ion 18650 size smart battery pack with 63Wh capacity (95W Design) or 12 cells Li-Ion 18650 size smart battery pack with 95Wh capacity (145W Design).
- Approximately 12 hours or longer charge time to 100% battery capacity with the system on.
- Approximately 4 hours or longer charge time to 100% battery capacity with the 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/80/100GB/120GB
- 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 COMBO device
- 5.25" 12.7mm height DVD Dual device
- 5.25" 12.7mm height DVD Super Multi device
- 5.25" 12.7mm height DVD-ROM device

 Optional Devices

- 128MB/256MB/512MB/1024MB SO-DIMM modules
- MINI PCI module (802.11a+b+g Askey wireless LAN module/802.11b+g Askey wireless LAN module)
- MDC Modem
- Dual-Band build in Antenna for Wireless LAN Communication.

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

- 17-inch WXGA TFT screen, 1400×900 pixels, Response time 25-40ms (typ.); For Normal LCD-Contrast ratio 200-400:1 (typ.); Brightness 170-200 Nit (typ.)
- 17-inch WXGA WSXGA+CSV TFT screen, 1680×1050 pixels, Response time 40ms (typ.); For Normal LCD-Contrast ratio 400:1 (typ.); Brightness 170 Nit (typ.)

 I/O Ports

- One optional 25-pin parallel port, EPP/ECP capability
- One 15-pin CRT port, supports DDC 2B
- One optional TV-out connector
- One MIC-In port
- One Headphone-Out
- One 2-pin AC adapter jack
- One type II PCMCIA card bus slot
- Three 4-pin USB 2.0 ports
- One RJ11/RJ45 Port
- VR for volume control
- One optional IEEE 1394 port
- One optional 5-in-1 port, support SD/MMC/SM/MS/XD

 PCMCIA Card Organization

- One type II card socket only
- SRAM, OTPROM, FLASH ROM, mask ROM memory card up to 64MB
- MODEM/LAN card
- Card bus card
- ACPI 1.0 Compliant

 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 buttons

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 CPU w/0.13μ ,128KL2, 400MHz up to 2.8GHZ(W/O HT)
 - Intel Prescott Celeron CPU w/0.09μ ,256KL2, 533MHz up to 3.33GHz
 - Intel Northwood P4 CPU w/0.13μ , 512KL2, 533MHz up to 3.2GHZ(W/ HT)
 - Intel Prescott P4 CPU w/0.09μ , 1ML2, 533MHz up to 3.6GHz
 - Micro FC-PGA package CPU
- ❑ System Logic
 - ATI Mobility Radeon 9000IGP/216NLS3BGA21H RX300ML
 - Integrated DRAM controller
 - Hub Interface to ATI IXP150/218S2EBNA46
 - ATI_216PBCGA15F M11P

 - Power Management Functions
- ❑ Keyboard Controller
 - ENE KB910 is use as keyboard controller and battery management unit
- ❑ Memory
 - System DRAM
 - Two JEDEC standard 200-pin DDR SO-DIMM memory support +2.5V 128/256/512MB/1024MB.
 - System & KB Combine ROM BIOS
 - 1MB 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, WSXGA+; 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,
 - PS/2 Compatible Bidirectional Parallel Port
 - Enhanced Parallel Port (EPP)
Compatible – EPP 1.7 and EPP 1.9 (IEEE 1284 Compliant)
 - IEEE 1394 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 Qualification
 - 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
- AC97 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
- 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
- Card Bus Interface
- Compliant with PC Card Standard 8.0
- Supports Standardized Zoomed Video Register Model
- Supports SPKROUT CADIO and RIOUT#
- Secure Digital Interface
- Compliant with SD Host Controller Standard Specification Version 1.0
- Supports SD Suspend/Resume Functionality
- Supports DMA Mode to Minimize CPU Overhead
- Supports High Speed with the SD Clock Frequency UP to 50Mhz
- Contain two 512-byte buffer to maximize the transfer speed
- Supports Traffic LED Light
- Supports Over Current Protection
- Memory Stick Interface
- Compliant with Memory Stick PRO Format Specification Version 1.0
- Supports 4-bit Parallel Data Transfer Mode
- Memory Stick Clock Frequency UP to 40Mhz
- Supports DMA Mode to Minimize CPU Overhaed
- Supports Traffic LED Light
- Supports Over Current Protection
- Smart Media Interface
- Compliant with SmartMedia Standard 2003
- Supports Hardware EDD (1-bit correction and 2- bits detection) Generation
- Supports DMA Mode to Minimize CPU Overhead
- Supports Traffic LED Light
- Interrupt Configuration
- Supports Parallel PCI Interrupts
- Supports Parallel IRQ and Paralle PCI Interrupts
- Supports Serialized IRQ and Parallel PCI Interrupts
- Supports Serialized IRQ and PCI Interrupts
- Power Management Control Logic
- Supports CLKRUN# protocol
- Supports SUSPEND#
- Supports PCI PME# from D3, D2, D1 and D0
- Supports PCI PME# from D3Cold
- Supports Zoomed Video Port
- Supports Parallel 4-wire Power Switch Interface

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 / 80 / 100GB/120GB HDD.

1.4 Removable Drives

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

1.4.3 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*

* Toshiba SD-R2412

Buffer capacity 2 Mbytes (Max)

Supported formats

Applicable	CD	CD-R
Write Formats:		CD-RW
Applicable	CD	CD-R
Write Disc:		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	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
Read Disc:	DVD	DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18] DVD-R DVD-RW DVD-RAM

1.4.4 DVD±R/±RW Drive

The DVD±R/±RW 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	CD	CD-R
Write Formats:		CD-RW
Applicable	CD	CD-R
Write Disc:		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	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
Read Disc:	DVD	DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18] DVD-R DVD-RW DVD-RAM

1.4.5 DVD Super Multi Drive

The DVD Super Multi 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	CD	CD-R
Write Formats:		CD-RW
Applicable	CD	CD-R
Write Disc:		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	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
Read Disc:	DVD	DVD-ROM [DVD-5, DVD-9, DVD-10, DVD-18] DVD-R DVD-RW 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 E²PROM 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/ 4300mAH
RTC battery	Lithium	3 V	14 mAH/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

Version 1.0

Aug. 13 2004 released

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2.1 Troubleshooting

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

- | | | |
|----------------------|----------------------|-------------------------|
| 1. Display | 6. 5 IN 1 card | 11. PCMCIA unit |
| 2. Floppy Disk Drive | 7. Touch Pad | 12. IEEE 1394 port |
| 3. Keyboard | 8. Speaker | 13. Wireless LAN system |
| 4. USB ports | 9. DVD-ROM and CD-RW | |
| 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. Sycard (PCMCIA test card)
6. Cleaning kit for floppy disk drive troubleshooting
7. Cleaning kit for DVD-ROM / Multi-Drive troubleshooting
8. Multimeter
9. External monitor
10. USB compatible keyboard
11. Multimedia sound system with line-in and line-out ports
12. Headphones
13. USB test module and USB cable
14. Music CD
15. 5 IN 1 (SD, XD, SM, MS, MMC) card

2.2 Troubleshooting Flowchart

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

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

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 is empty.

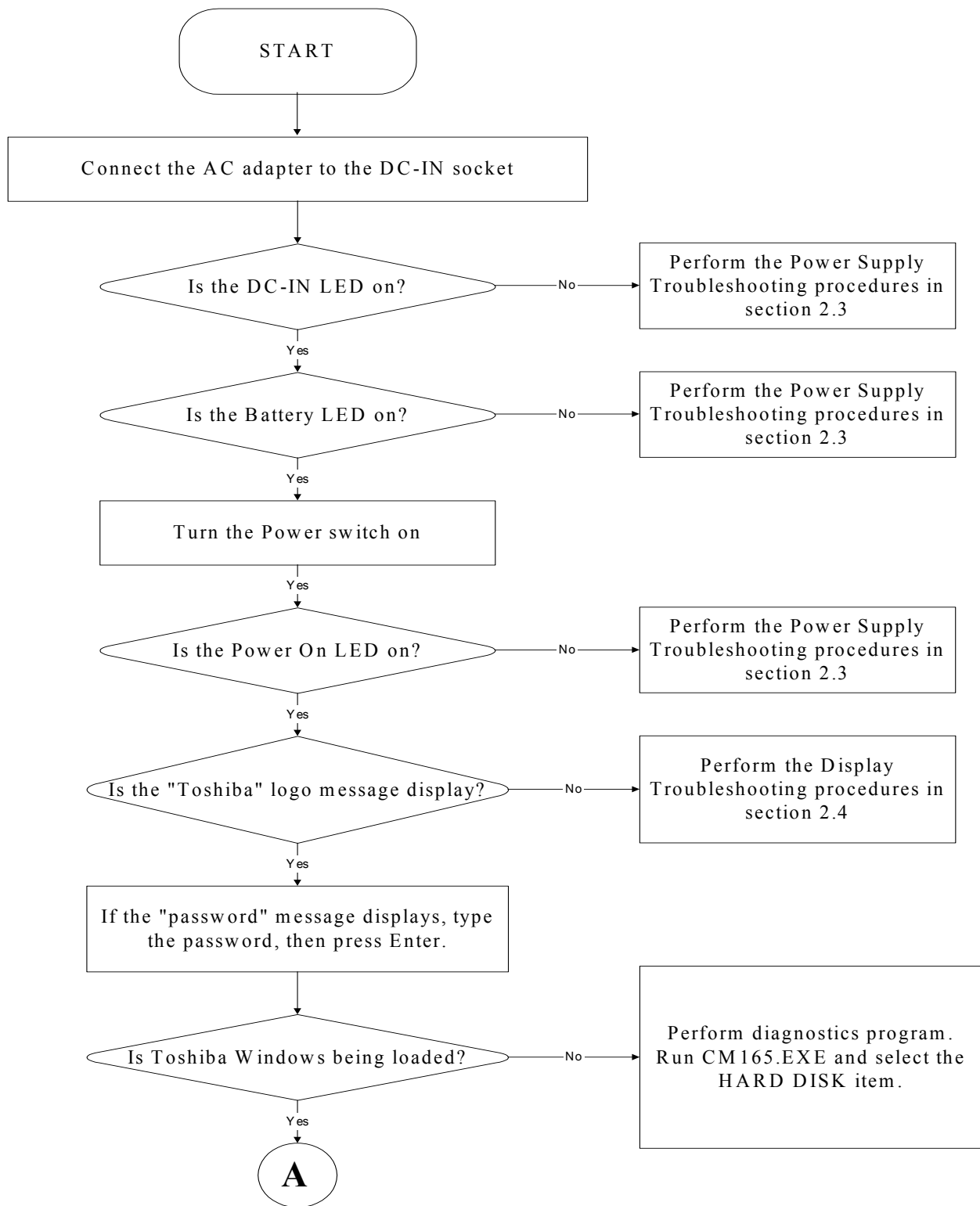


Figure 2-1 Troubleshooting flowchart (1/2)

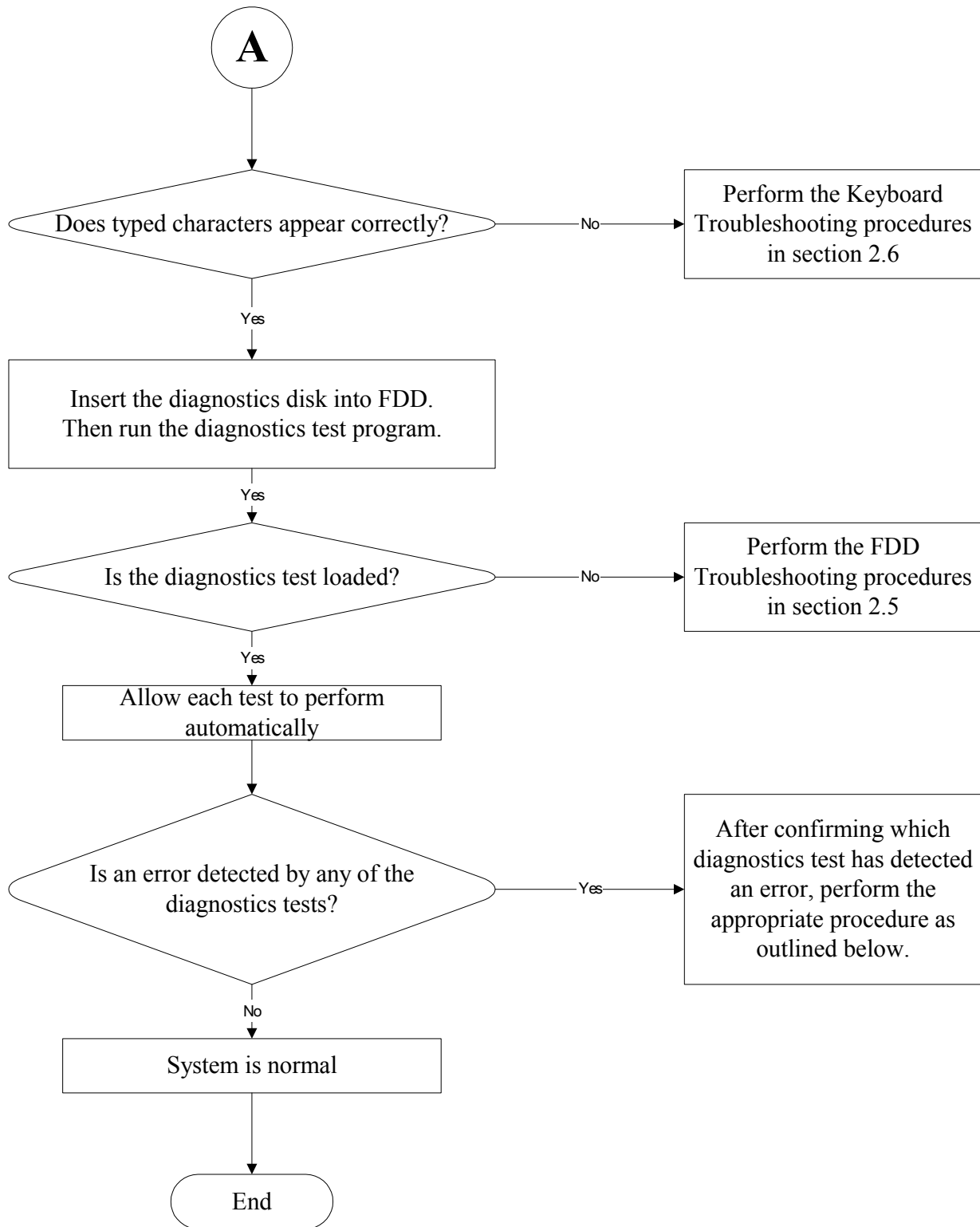


Figure 2-1 Troubleshooting flowchart (2/2)

If the diagnostics program cannot detect an error, the problem may be intermittent. The 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 floppy disk test, perform the FDD Troubleshooting procedures in Section 2.5.
4. If an error is detected by the keyboard test, perform the Keyboard Troubleshooting procedures in Section 2.6.
5. If an error is detected by the 5IN1 (XD, SD, MS, SM, MMC) test, perform the 5IN1 Troubleshooting procedures in Section 2.9.
6. If an error is detected by the audio test, perform the DVD-ROM / Multi-Drive Troubleshooting Procedures in Section 2.12 and the Speaker Troubleshooting procedures in Section 2.11.
7. If an error is detected by the modem test, perform the Modem Troubleshooting Procedures in Section 2.13.
8. If an error is detected by the Touch Pad test, perform the Touch Pad Troubleshooting procedures in Section 2.10.

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 2.7.
2. If an error is detected when using the TV-out connection, perform the TV-Out Failure Troubleshooting procedures in Section 2.8.
3. If an error is detected when using the speakers, perform the Speaker Troubleshooting procedures in Section 2.11.
4. If an error is detected when using the modem, perform the Modem Troubleshooting procedures in Section 2.13.
5. If an error is detected when using the PCMCIA unit, perform the PCMCIA Troubleshooting procedures in Section 2.14.
6. If an error is detected when using the IEEE1394 device, perform the IEEE1394 device Troubleshooting procedures in Section 2.15.
7. If an error is detected when using the Wireless LAN, perform the Wireless LAN Troubleshooting procedures in Section 2.16.

2.3 Power Supply Troubleshooting

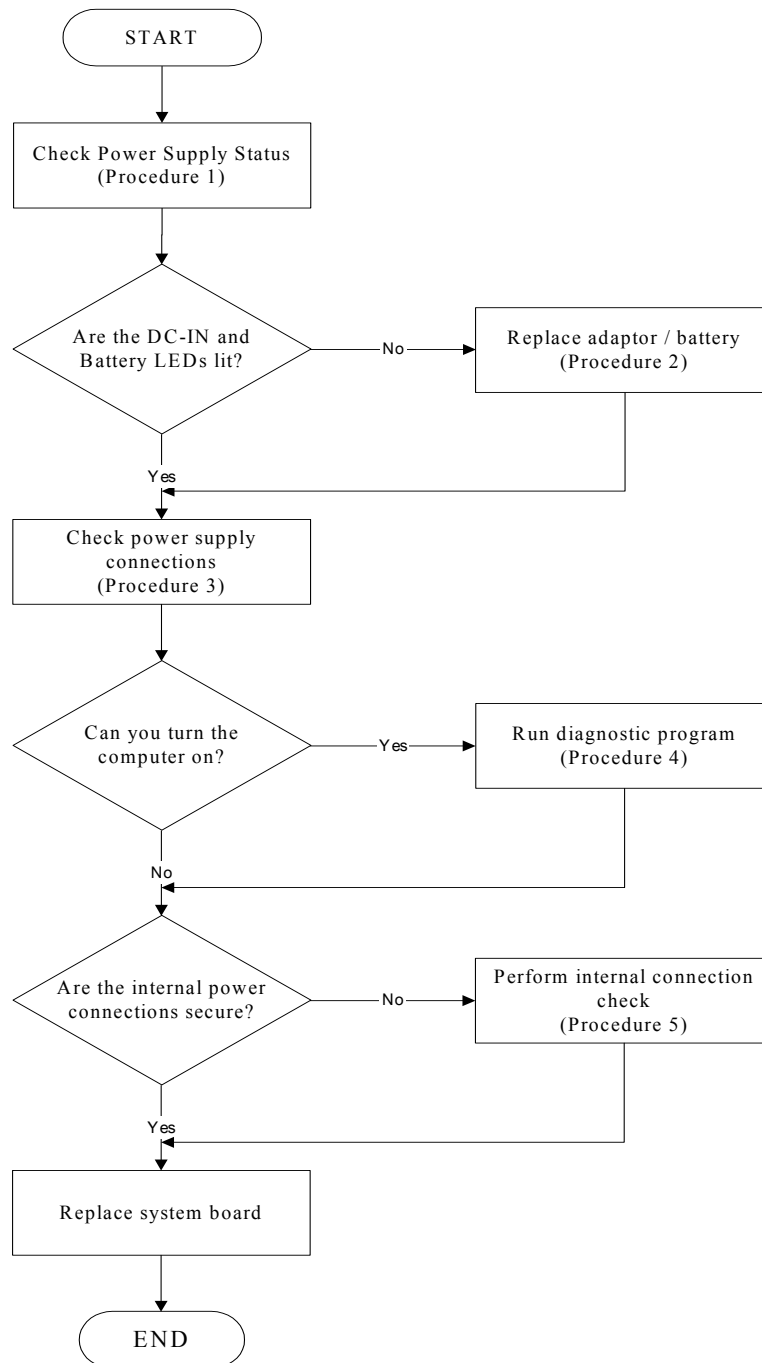


Figure 2-2 Power Supply Troubleshooting Process

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

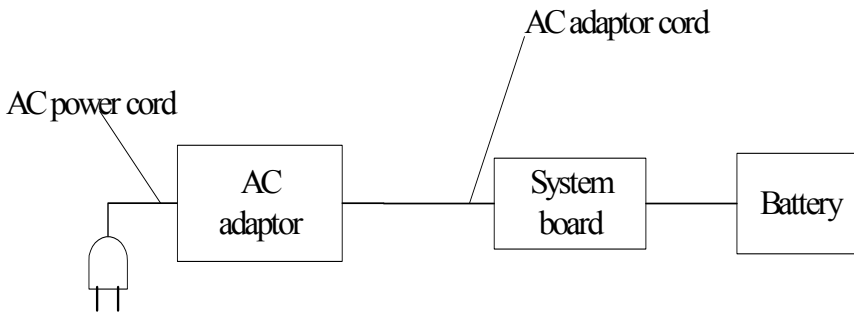
A faulty adaptor may not supply power or may not charge the battery. Perform Check 1.

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:



Any of the connectors may be disconnected. Perform Check 1.

- Check 1 Disconnect the AC power cord from wall outlet. Check the power cable for breaks. If the power cord is damaged, connect a new AC power cord. If there is no damage, go to Check 2.
- Check 2 Make sure the AC adaptor cord and AC power cord are firmly plugged into the DC-IN socket, AC adaptor inlet and wall outlet. If these cables are connected correctly, go to Check 3.
- Check 3 Make sure that the DC-IN input port socket is firmly secured to the system board of the computer.
- If the DC-IN input socket is loose, go to Procedure 5.
 - If it is not loose, go to Check 4.
- Check 4 Use a multi-meter to make sure that the AC adaptor output voltage is close to 19 V. If the output is several percent lower than 19 V, go to Check 5. If the output is close to 19 V, go to Check 6.
- Check 5 Connect a new AC adaptor or AC power cord.
- If the DC-IN LED does not light, go to Procedure 4.
 - If the battery LED does not light, go to Check 6.
- Check 6 Make sure the battery pack is installed in the computer correctly. If the battery is properly installed and the battery LED still does not light, go to Procedure 4.

Procedure 4 Diagnostic check

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

1. Reinstall the battery pack.
2. Attach the AC adaptor and turn on the power. If you cannot turn on the power, go to Procedure 5.
3. Run the Diagnostic test following the procedures described in Chapter 3, Tests and Diagnostics. If no problem is detected, the battery is functioning normally.

Procedure 5 Replacement check

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

- Check 1 Use a multi-meter to make sure that the fuses on the system board are not blown. If a fuse is not blown, go to Check 2. If a fuse is blown, go to Check 3.
- Check 2 Make sure that the battery cable is firmly connected to the system board. If it is connected firmly, go to Check 3.
- Check 3 The system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

2.4 Display Troubleshooting

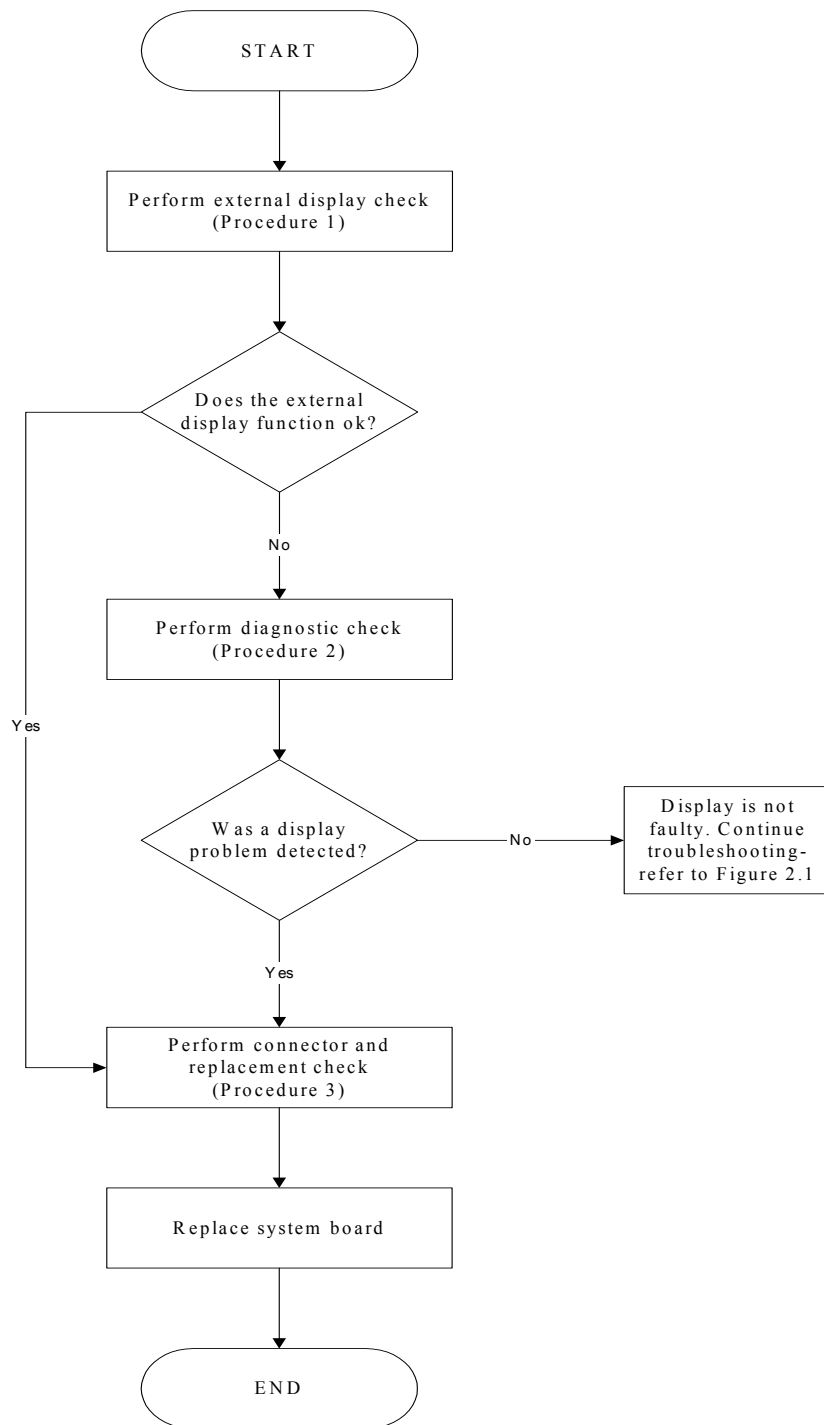


Figure 2-3 Display troubleshooting process

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

Procedure 1: External display check

Procedure 2: Diagnostic check

Procedure 3: Connector and replacement check

Procedure 1 External display check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connector and replacement check

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

- Check 1 Make sure the DDR RAM module is seated properly. Test display again. If the problem still exists, 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 FDD Troubleshooting

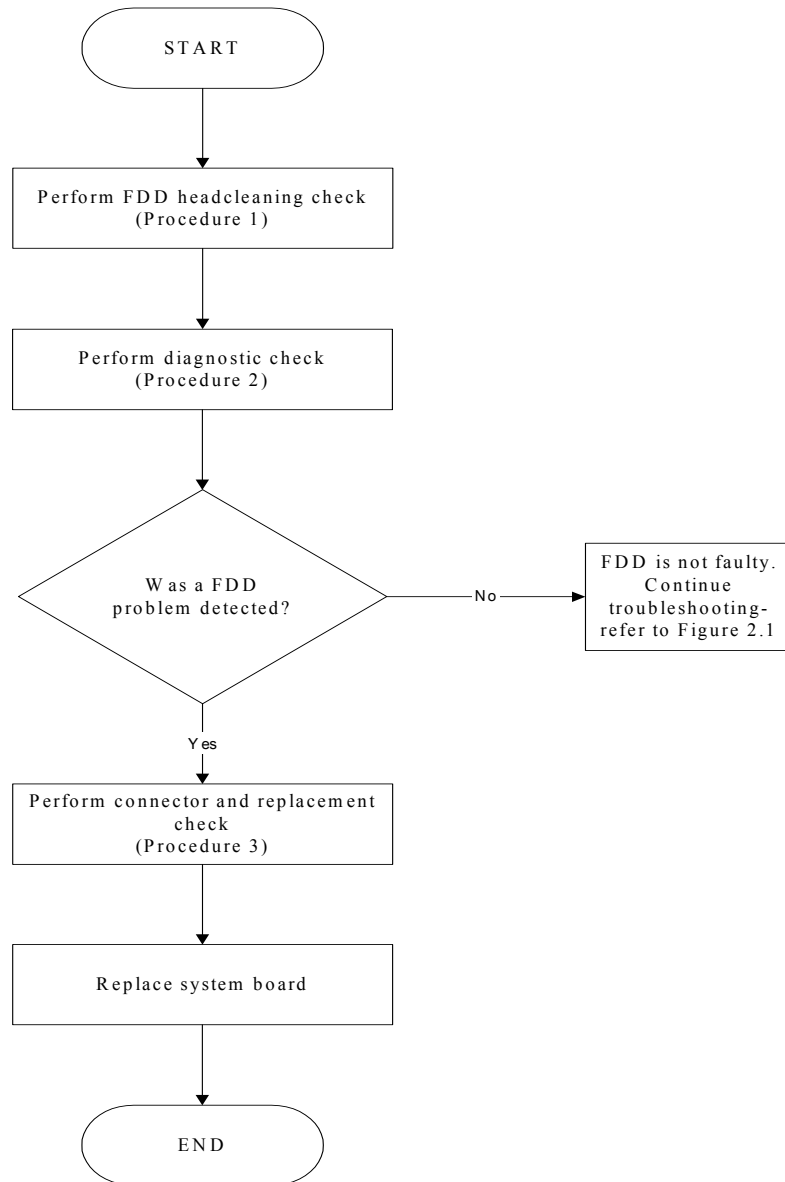


Figure 2-4 FDD troubleshooting process

This section describes how to determine if the FDD is functioning properly. Perform the steps below starting with Procedure 1 and continuing as required. Figure 2-4 gives an outline of the process.

Procedure 1: FDD head cleaning check

Procedure 2: Diagnostic check

Procedure 3: Connector check and replacement check

Procedure 1 FDD head cleaning check

The FDD heads can become dirty over time, affecting their performance. Use an FDD cleaning kit to clean the heads. If the FDD still does not function properly after cleaning, go to Procedure 2.

Procedure 2 Diagnostic check

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

If no FDD problem is detected by the diagnostic test, the FDD is functioning normally. If an error occurs, go to Procedure 3.

Procedure 3 Connector check and replacement check

The 3.5-inch FDD is connected to the system board. 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 FDD flexible cable is firmly connected to the FDD and system board.

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

Check 2 The FDD unit or FDD flexible cable 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, perform Check 3.

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

2.6 Keyboard Troubleshooting

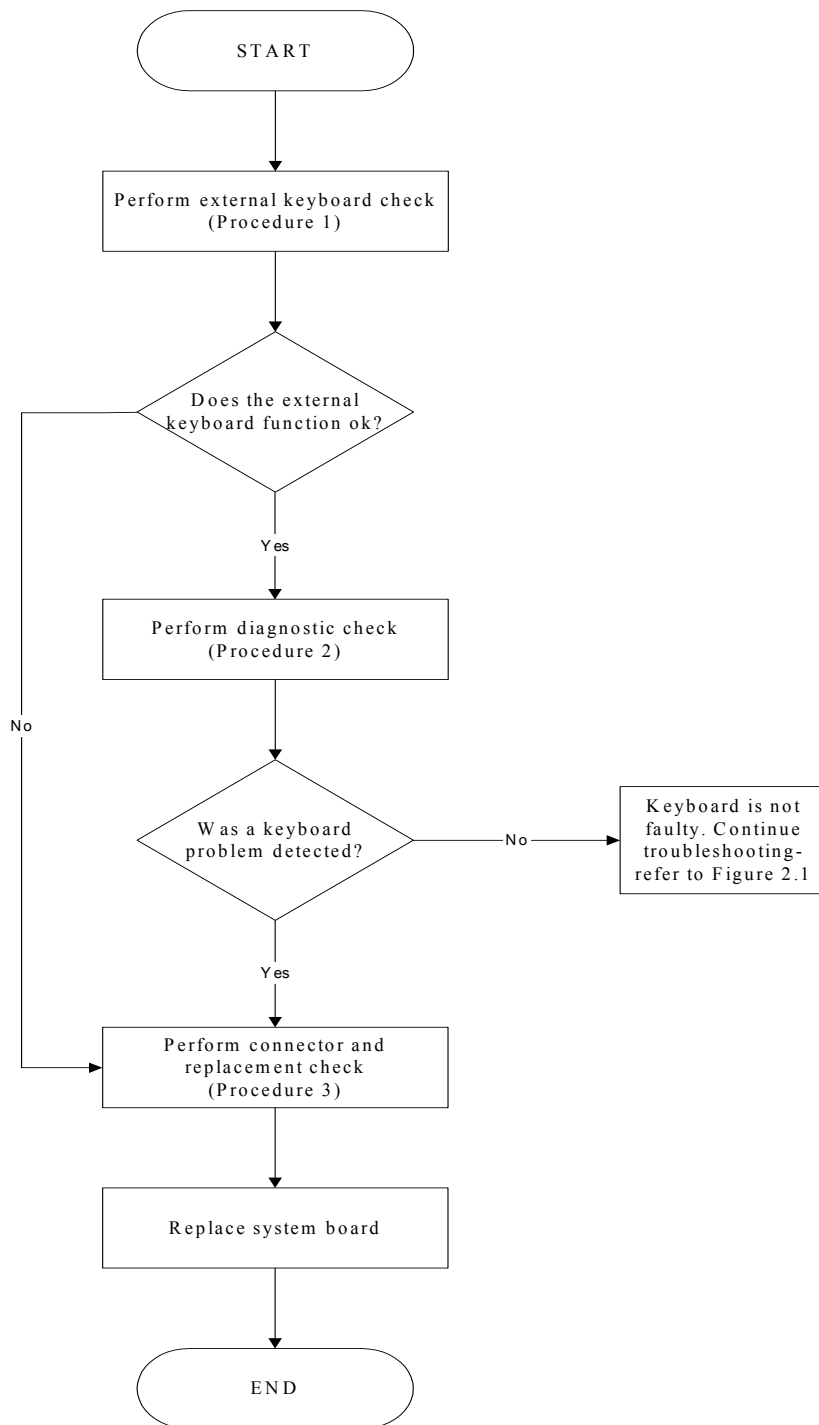


Figure 2-5 Keyboard troubleshooting process

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.

2.7 External USB Devices Troubleshooting

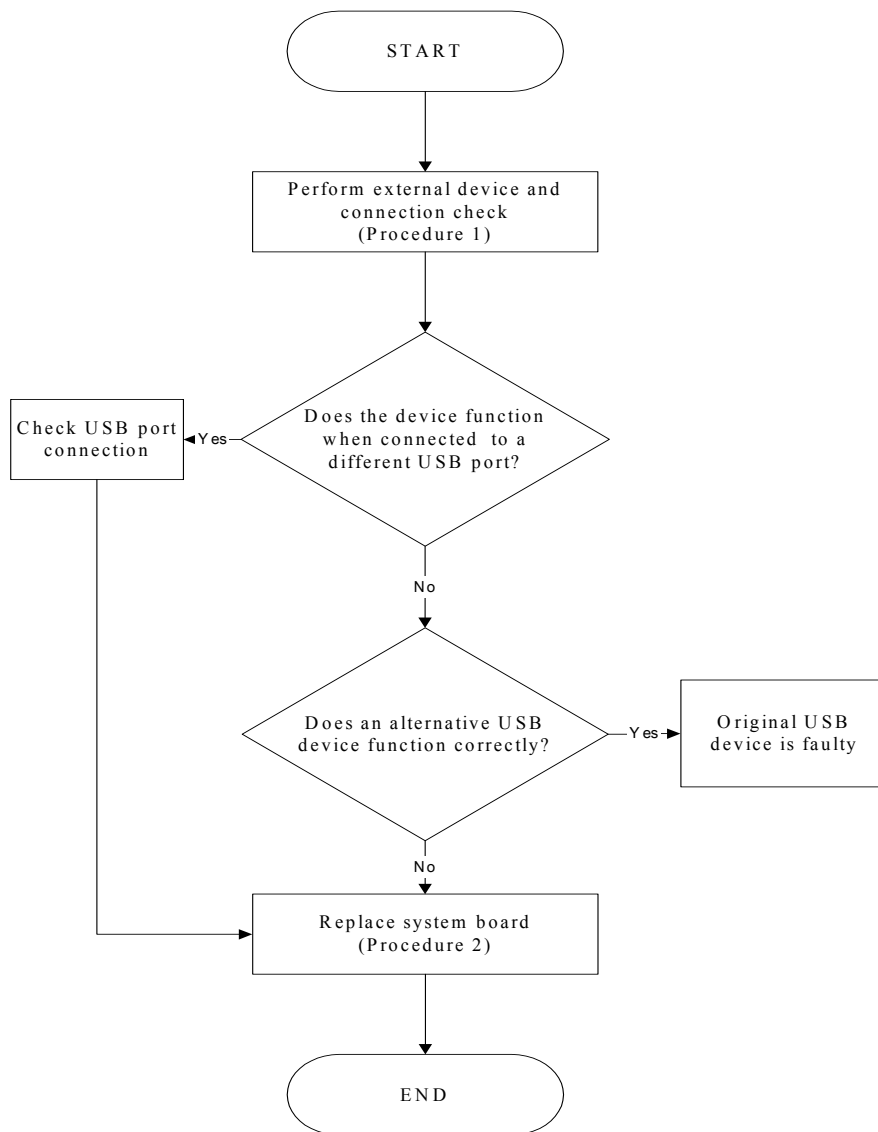


Figure 2-6 External USB device troubleshooting process

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.

2.8 TV-Out Failure Troubleshooting

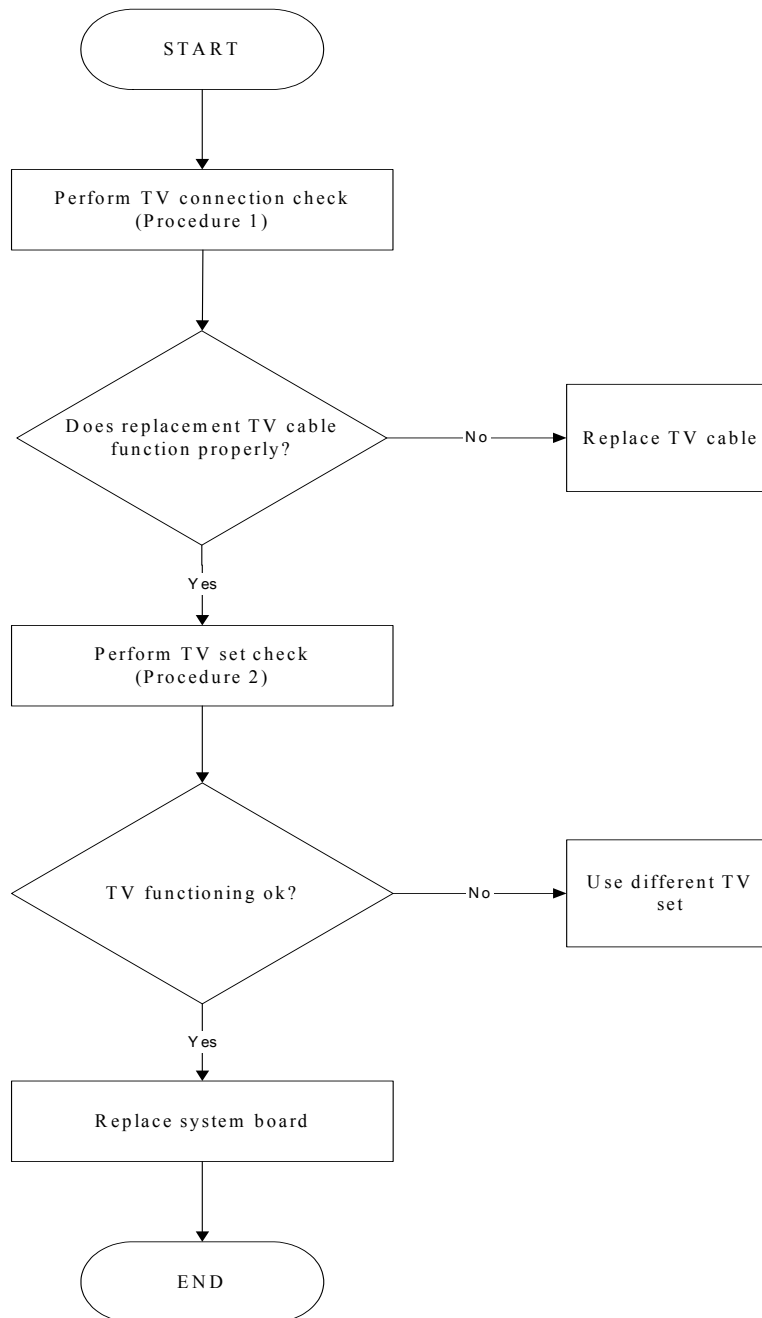


Figure 2-7 TV-out troubleshooting process

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.

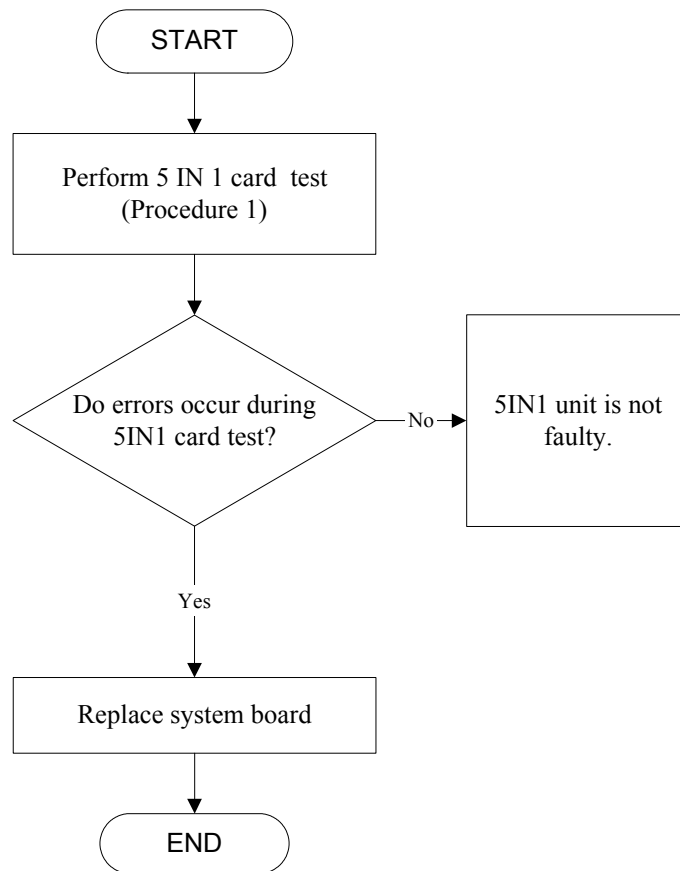
2.9 5IN1 (XD, SD, MS, SM, MMC) Failure Troubleshooting

Figure 2-8 5 IN 1 card troubleshooting process

This section describes how to determine if the 5IN1 (XD, SD, SM, MS, MMC) card player is functioning properly. The process is summarized in Figure 2-18. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1: 5IN1 (XD, SD, MS, SM, MMC) card test

Procedure 1 5IN1 (XD, SD, MS, SM, MMC) test

The 5IN1 (XD, SD, MS, SM, MMC) test card contains a 5IN1 test program. Ensure the card is fully inserted into the socket before running the program.

If an error occurs during the 5IN1 (XD, SD, MS, SM, MMC) card test, Replace the system board with a new one following the steps in Chapter 4. If no error occurs, it is likely that the original 5IN1 card was faulty.

2.10 Touch Pad Troubleshooting

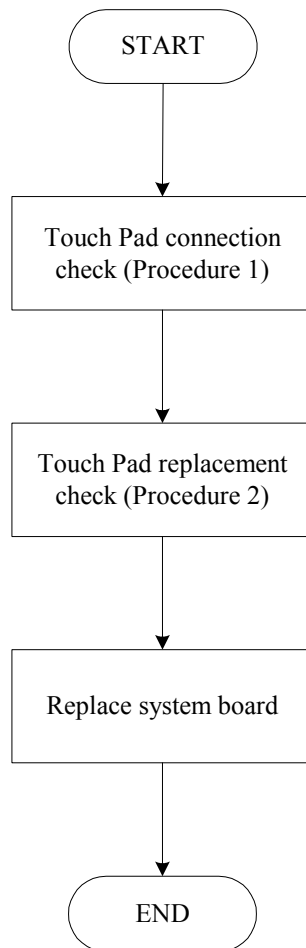


Figure 2-9 Touch Pad troubleshooting process

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

Procedure 1: Touch Pad connection check

Procedure 2: Touch Pad replacement check

Procedure 1 Touch Pad connection check

The Touch Pad is connected via the Touch Pad FPC to the system board. Make sure the Touch Pad FPC cable is firmly connected to the Touch Pad 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 Touch Pad replacement check

The Touch Pad 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.

2.11 Speaker Troubleshooting

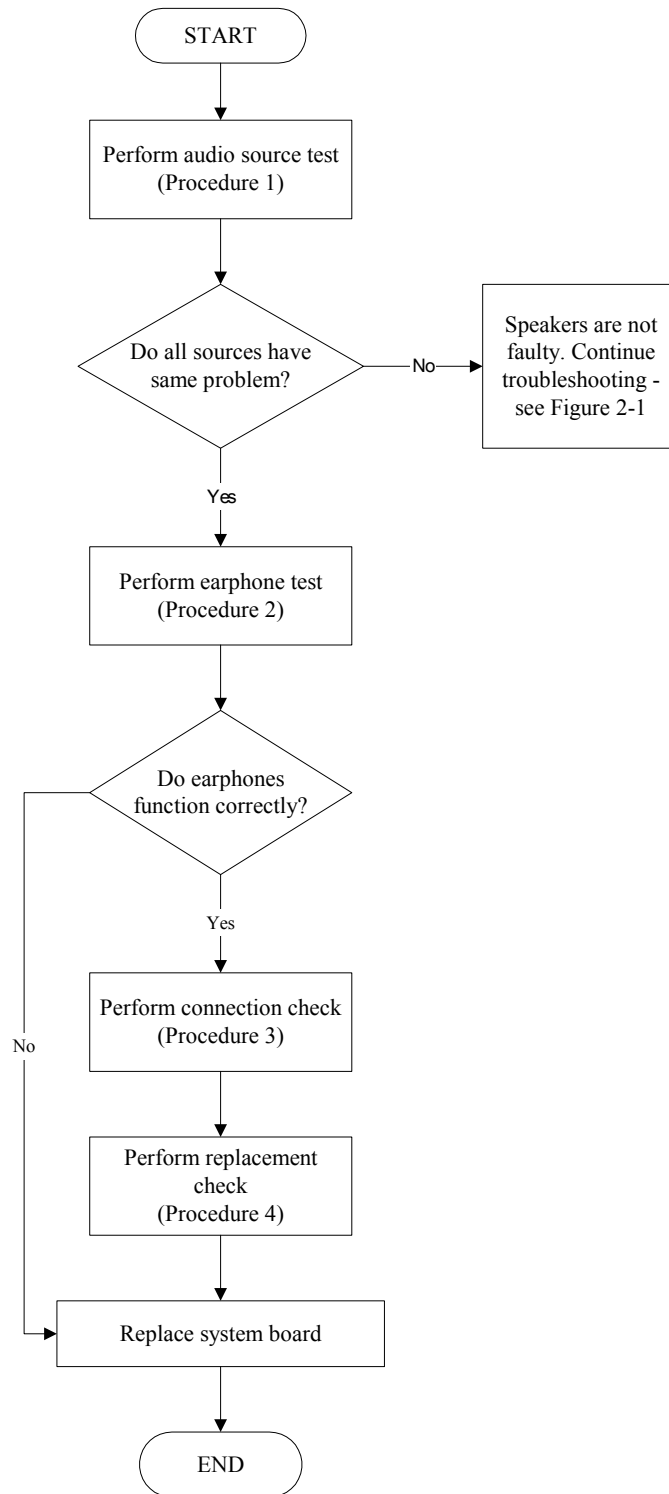


Figure 2-10 Speaker troubleshooting process

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

Procedure 3 Connection check

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

Procedure 4 Replacement check

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

2.12 DVD-ROM and Multi-Drive Troubleshooting

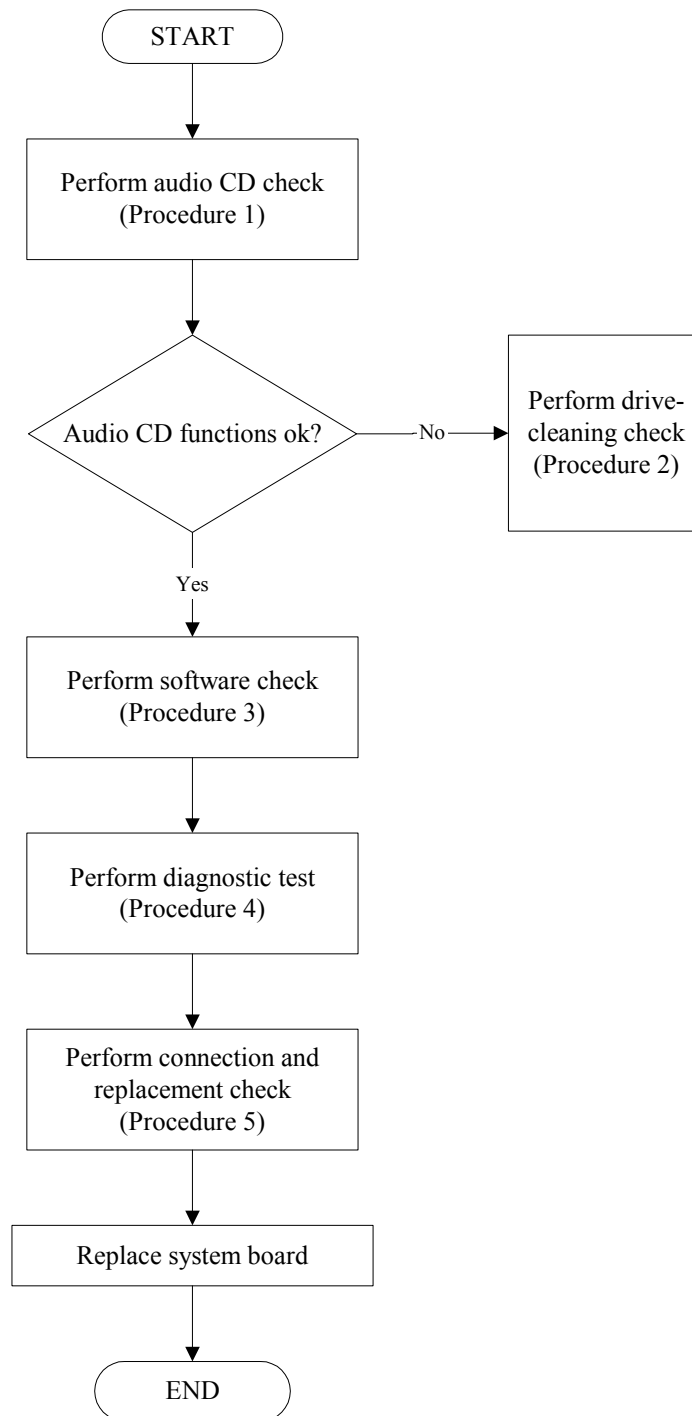


Figure 2-11 DVD-ROM / Multi-Drive troubleshooting process

This section describes how to determine if the computer's internal DVD-ROM drive or multi-drive is functioning properly. Figure 2-11 outlines the process. Perform the steps below starting with Procedure 1 and continue with the other procedures as required.

Procedure 1: Audio CD test

Procedure 2: Drive cleaning check

Procedure 3: Software check

Procedure 4: Diagnostic test

Procedure 5: Connection and replacement check

Procedure 1 Audio CD check

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

Procedure 2 Drive cleaning check

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

Procedure 3 Software check

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

Procedure 4 Diagnostic test

The audio test program stored in the Diagnostics Disk will test the drive's ability to play an audio CD. See Chapter 3 for details.

If any errors occur while executing the diagnostic program, go to Procedure 5.

Procedure 5 Connection check and replacement check

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

- Check 1 Make sure the drive is firmly connected to the system board. If the connection is good and there is still an error, go to Check 2.
- Check 2 The drive or drive cable may be defective or damaged. Replace each with a new one following the steps in Chapter 4, *Replacement Procedures*. If the drive is still not functioning properly, perform Check 3.
- Check 3 The system board may be damaged. Replace it with new one following the instructions in Chapter 4, *Replacement Procedures*.

2.13 Modem Troubleshooting

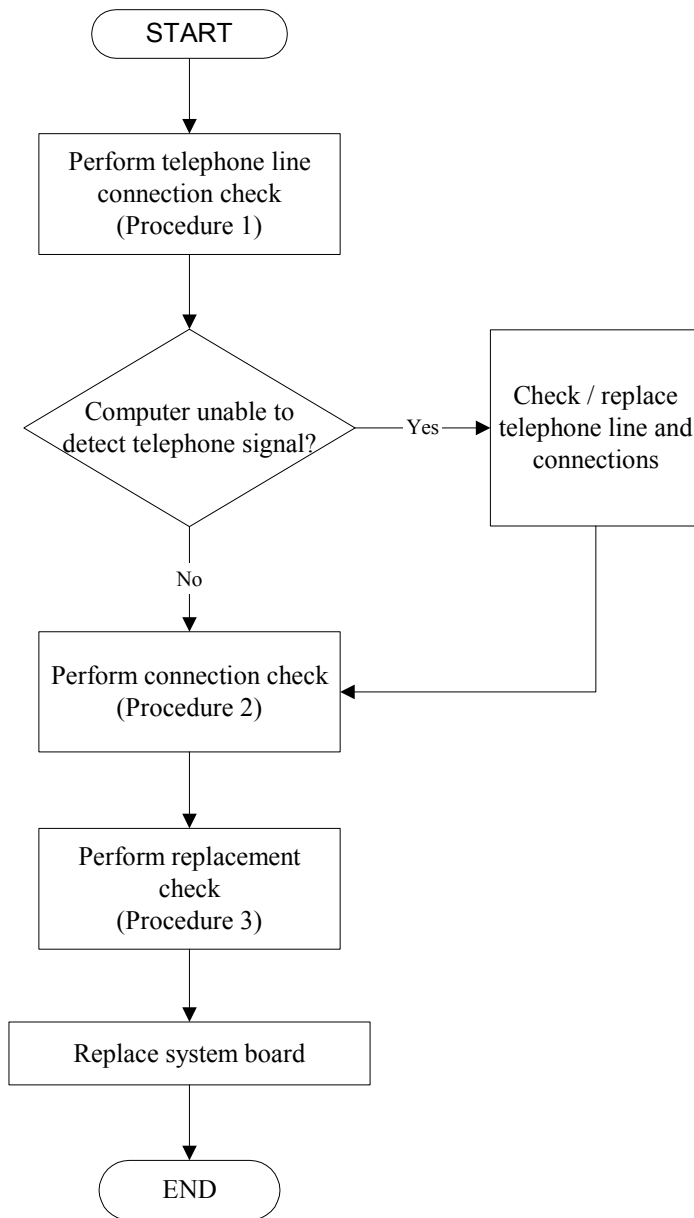


Figure 2-12 Modem troubleshooting process

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

Procedure 1: Telephone line connection check

Procedure 2: Modem card connection check

Procedure 3: Modem card replacement check

Procedure 1 Telephone line connection check

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

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

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

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

Procedure 2 Modem card connection check

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

Procedure 3 Modem replacement check

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

2.14 PCMCIA Troubleshooting

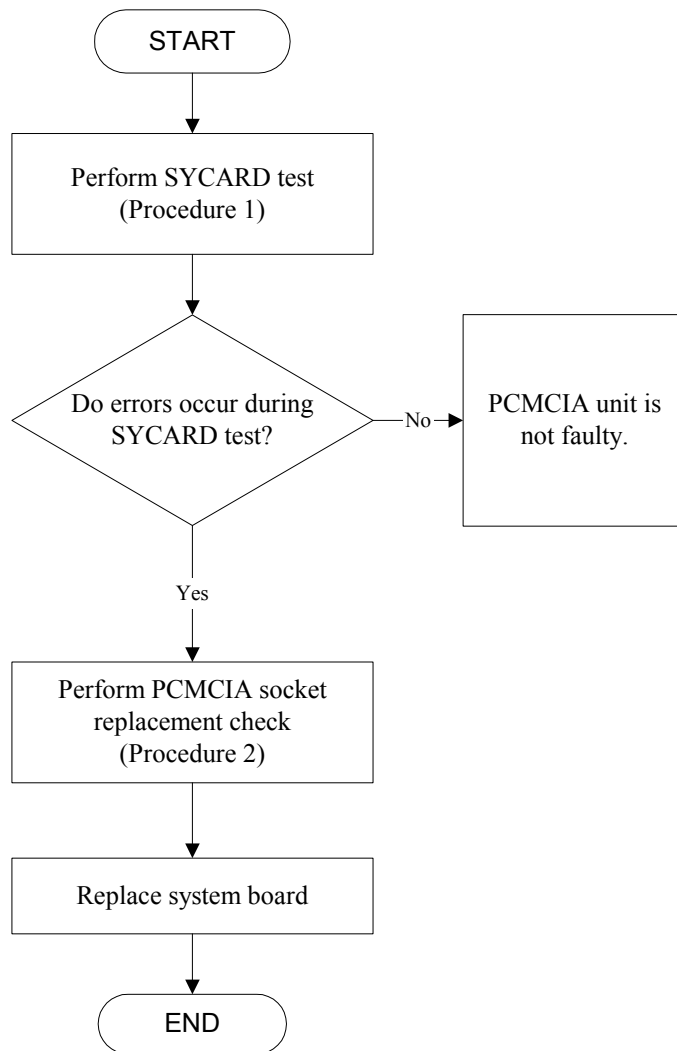


Figure 2-13 PCMCIA troubleshooting process

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

Procedure 1: Sycard test

Procedure 2: PCMCIA socket replacement check

Procedure 1 SYCARD test

The SYCARD test card contains a PCMCIA test program. Ensure the card is fully inserted into the socket before running the program.

If an error occurs during the SYCARD test, perform Procedure 2. If no error occurs, it is likely that the original PC card was faulty.

Procedure 2 PCMCIA socket replacement check

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

2.15 IEEE 1394 Troubleshooting

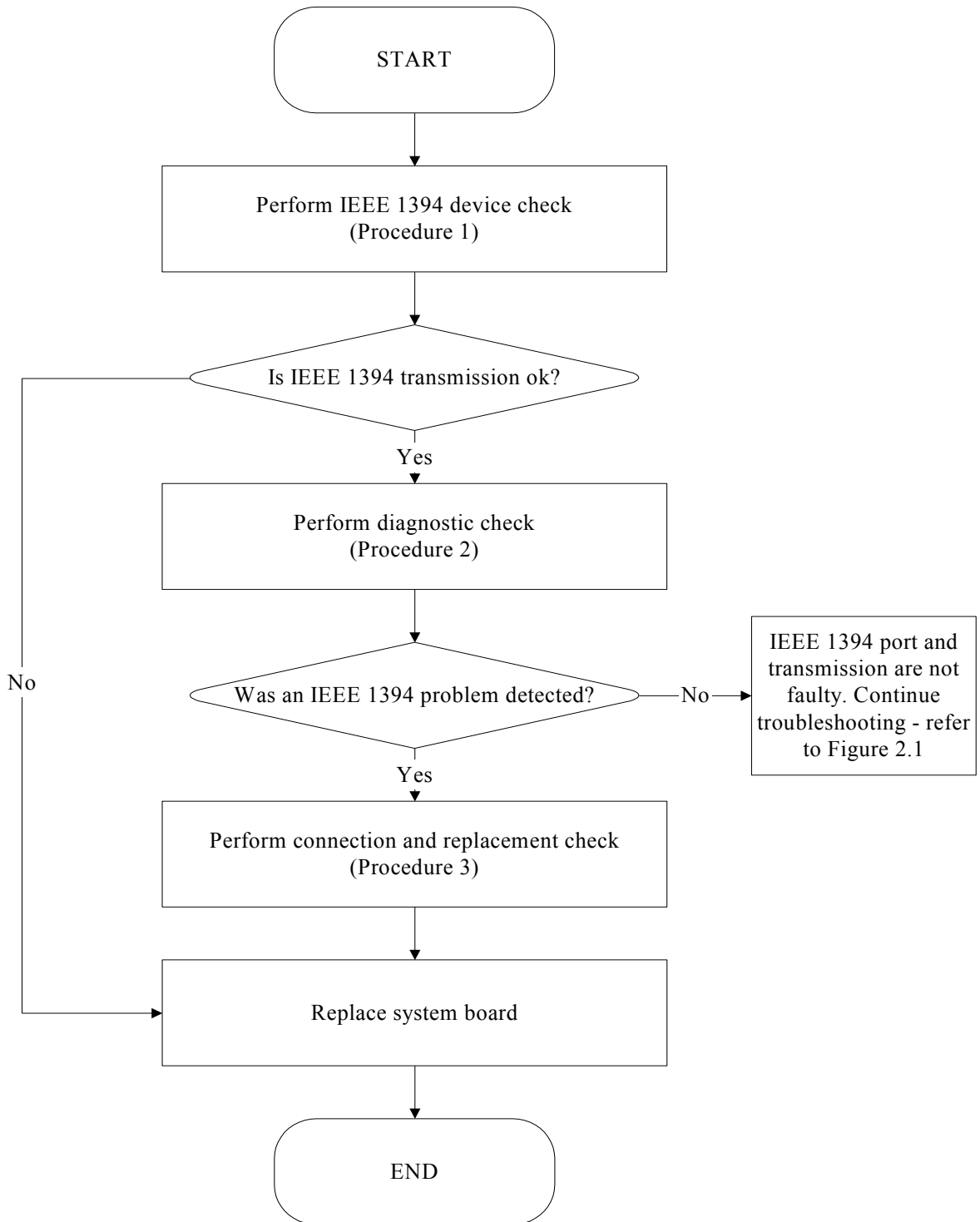


Figure 2-14 IEEE 1394 troubleshooting process

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

Procedure 1: IEEE 1394 device check

Procedure 2: Diagnostic check

Procedure 3: Connection and replacement check

Procedure 1 IEEE 1394 device check

Connect an IEEE 1394 device to the computer's IEEE 1394 port, then boot the computer for Windows XP. The computer should automatically detect the 1394 device. Check whether the device can transmit data to the computer.

If the device is able to communicate with the computer, the problem may be intermittent or connections may be faulty. Go to Procedure 2.

If communication is impaired, there may be a faulty connection. Go to Procedure 3.

Procedure 2 Diagnostic check

Run the Diagnostic Program, which will automatically execute the IEEE 1394 port test for transmission. Refer to Chapter 3, Tests and Diagnostics for more information on how to run the program.

If an error is located, go to Procedure 3. If an error does not occur, the 1394 port is functioning properly.

Procedure 3 Connection and replacement check

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

- Check 1 Make sure the transmission cable is firmly plugged into both the IEEE 1394-compatible device and the IEEE 1394 port of the computer. If the cable is connected correctly, go to Check 2.
- Check 2 Make sure the IEEE 1394 port is firmly secured to the system board of the computer. If the malfunction persists, go to Check 3.
- Check 3 The transmission cable may be damaged. Replace with a good cable. If the malfunction persists, go to Check 4.
- Check 4 The system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

2.16 Wireless LAN Troubleshooting

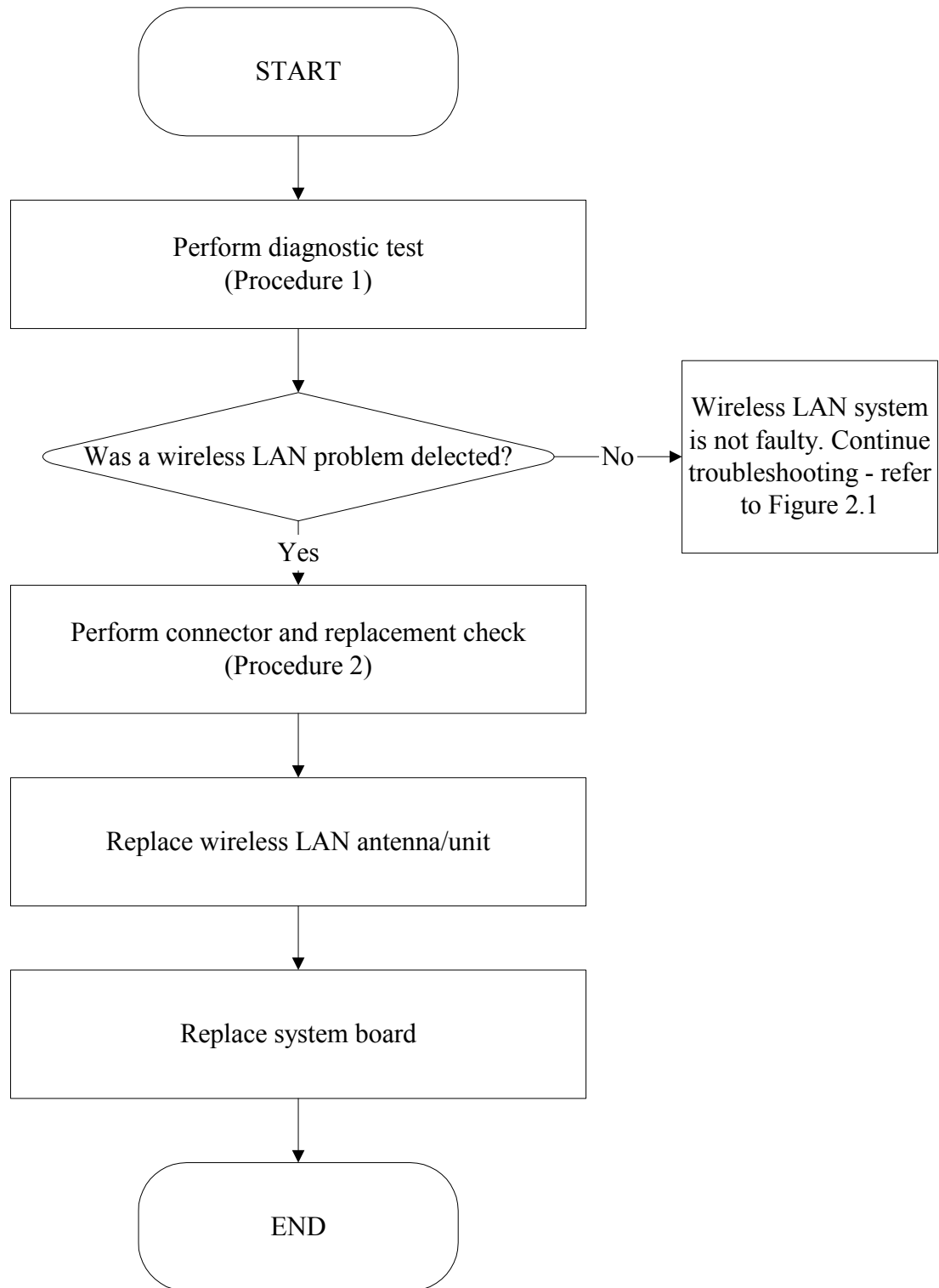


Figure 2-15 Wireless LAN troubleshooting process

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

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

Procedure 1 Diagnostic test

Run the Diagnostic Program, which will automatically execute the wireless LAN test. Refer to Chapter 3, Tests and Diagnostics for more information on the program.

If an error is located, go to Procedure 2. If an error is not located, the wireless LAN system is functioning properly.

Procedure 2 Connector and replacement check

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

- Check 1 Make sure that the wireless LAN antenna is firmly connected to the wireless LAN unit (refer to Chapter 4 for instructions) and that the wireless LAN unit is securely slotted into the system board. If the problem persists, go to Check 2.
- Check 2 Check that the wireless communication switch is turned to "On", then make sure that the wireless communication LED on the front panel is lit. If the LED is lit but the wireless LAN function is still faulty, the antenna may be damaged. Replace with a new antenna following the steps in Chapter 4, *Replacement Procedures*. If the problem persists, or if the wireless LAN LED is not lit when the wireless communication switch is turned to "On", go to Check 3.
- Check 3 The wireless LAN unit may be damaged. Replace it with a new one following the instructions in Chapter 4. If the problem still exists, perform Check 4.
- Check 4 The system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

2.17 Bluetooth Troubleshooting

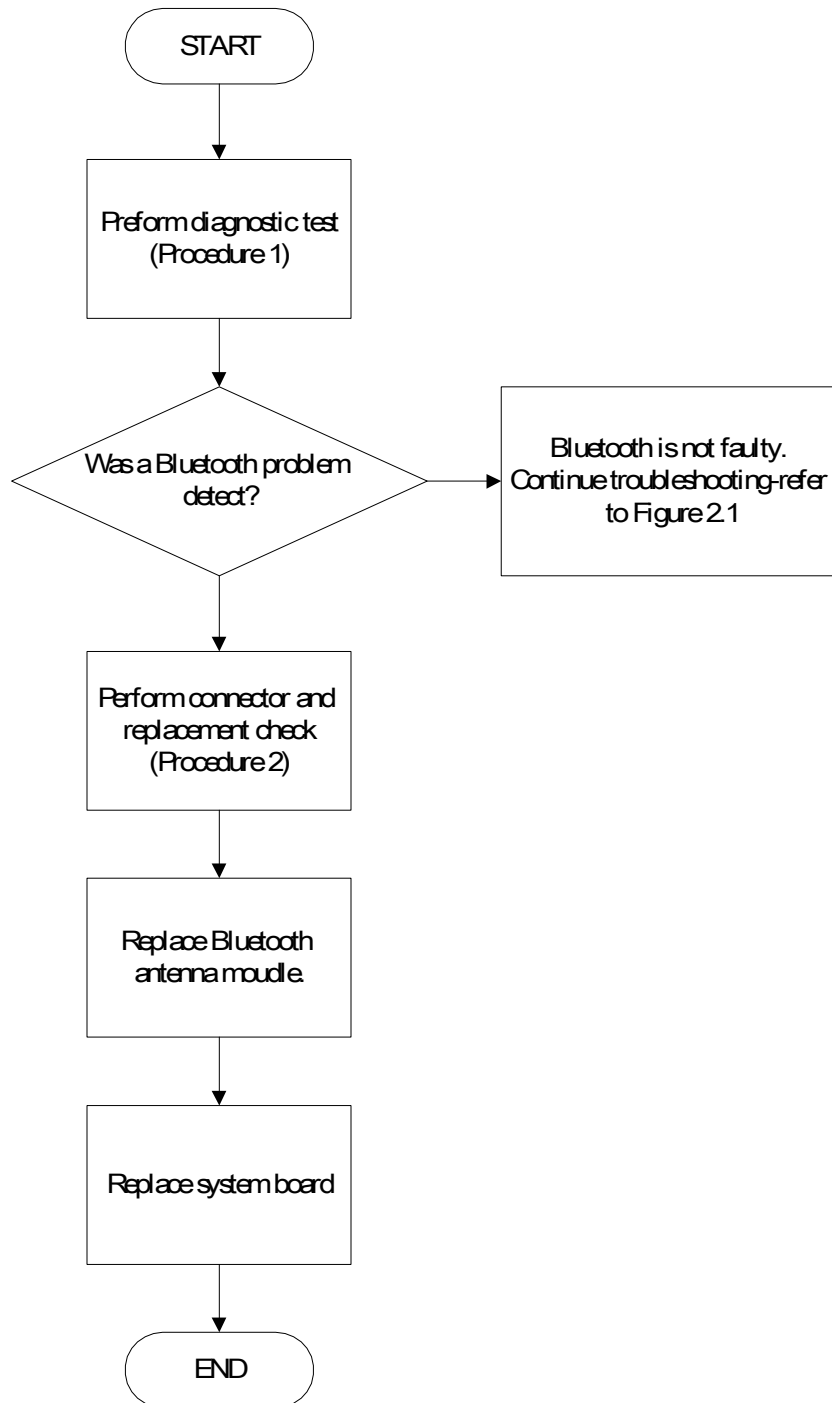


Figure 2-16 Bluetooth troubleshooting process

The Bluetooth antenna wire, Bluetooth module or system board may be the reason of a Bluetooth fault. Any of these components may be damaged. To determine if the computer's Bluetooth is functioning properly, perform the following procedures. Figure 2-16 outlines the process. Start with Procedure 1 and continue with the other procedures as instructed.

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

Procedure 1 Diagnostic test

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

Procedure 2 Connector and replacement check

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

- Check 1 Make sure that the Bluetooth antenna is firmly connected to the Bluetooth module (refer to Chapter 4 for instructions) and that the Bluetooth FFC is securely slotted into the system board. If the problem persists, go to Check 2.
- Check 2 Check that the Bluetooth communication switch is turned to "On", then make sure that the communication LED on the left panel is lit. If the LED is lit but the Bluetooth function is still faulty, the antenna module may be damaged. Replace with a new antenna following the steps in Chapter 4, *Replacement Procedures*. If the problem persists, or if the Bluetooth communication LED is not lit when the Bluetooth communication switch is turned to "On", go to Check 3.
- Check 3 The Bluetooth module may be damaged. Replace it with a new one following the instructions in Chapter 4. If the problem still exists, perform Check 4.
- Check 4 The system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

Chapter 3

Test and Diagnostic Operation Handbook

Version 1.0

Aug. 13 2004 released

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1. The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program (**based on LongBeach10J/10G T&D Version: 1.0**) 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
- 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
- BUTTON TEST

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

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

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

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.

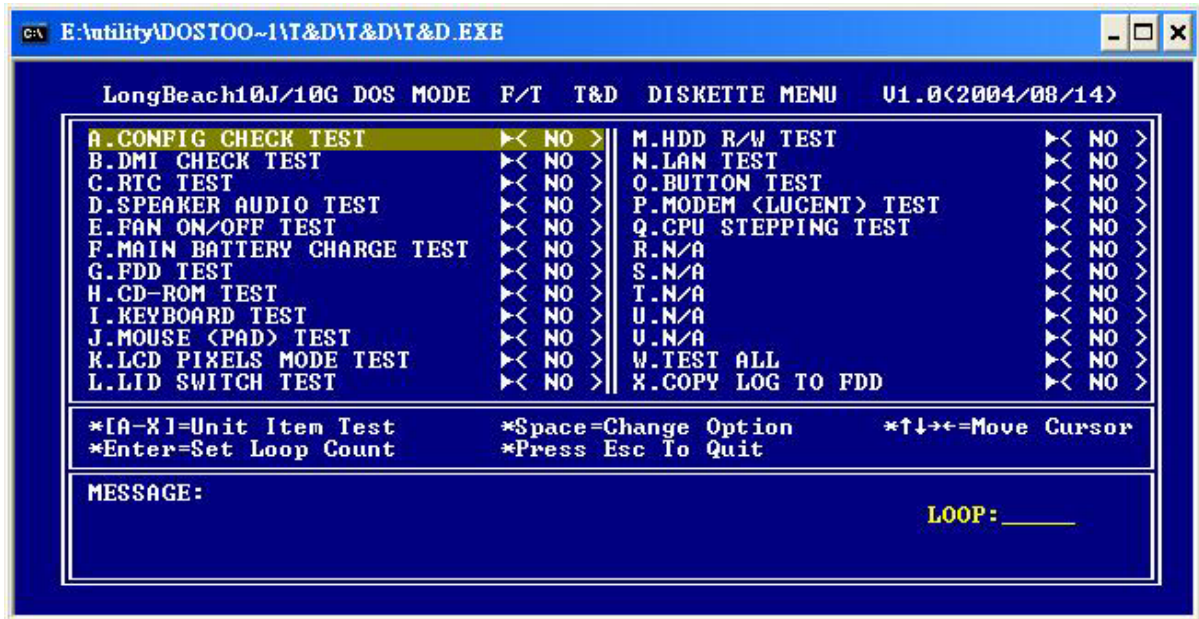
NOTE: *To execute the CD test, make sure the CD is installed in the CD/DVD-ROM drive.*

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

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



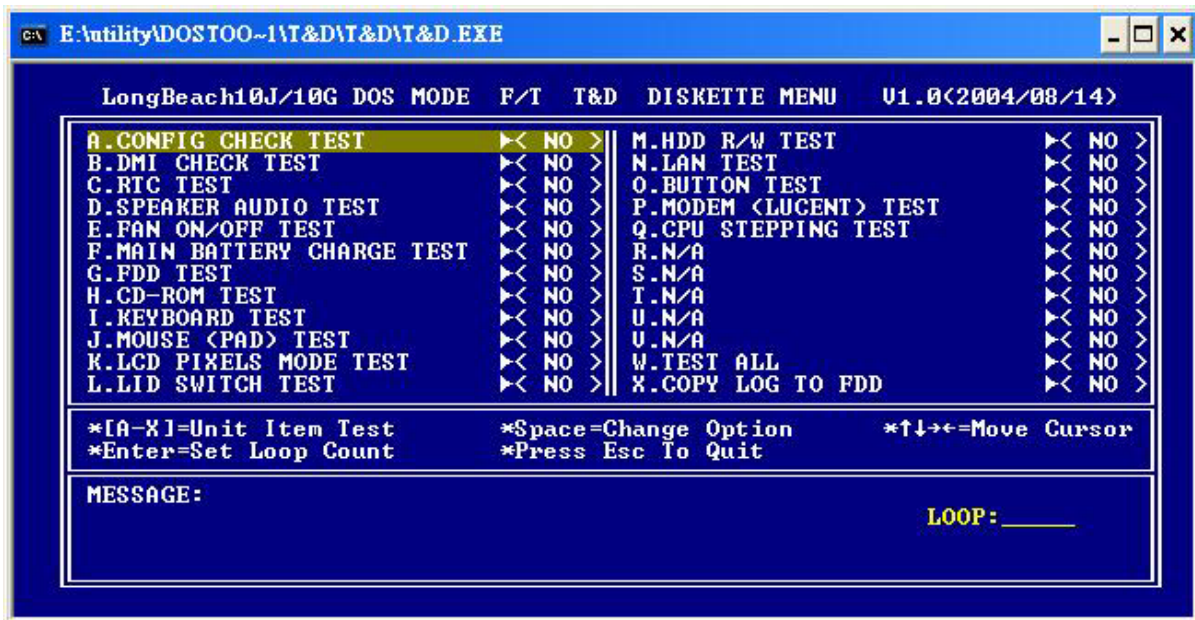
If the test result passes, the following display will show up:



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

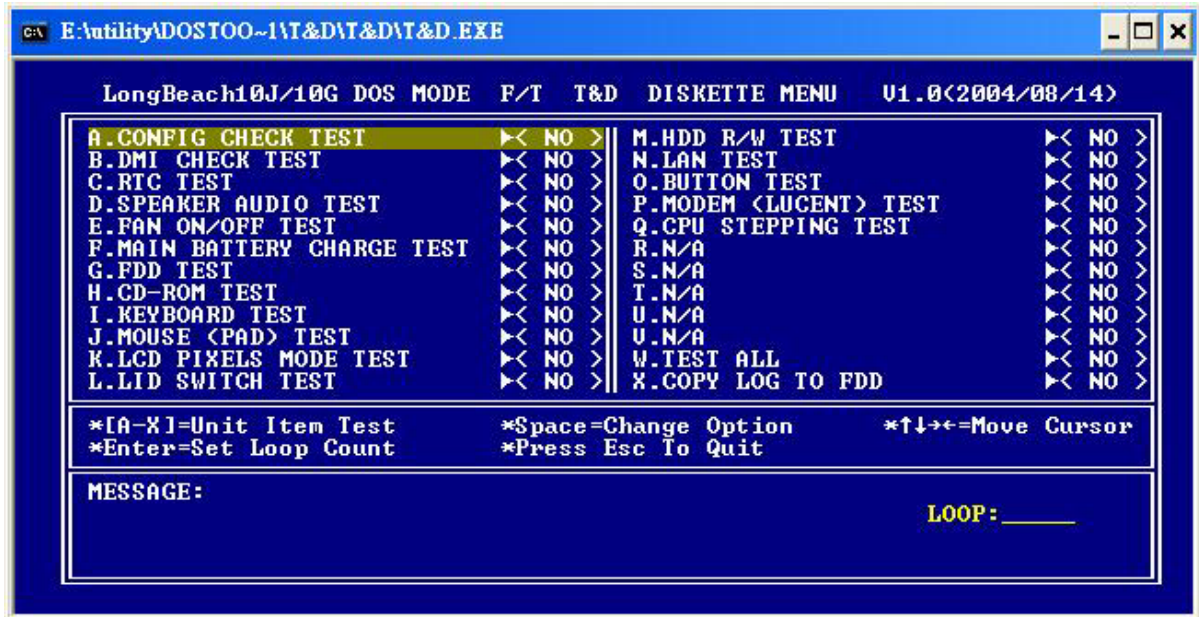


Then press any key for next actions – the below display presented if copying test log file onto diskette is necessary. This action will be executed when “Y” key pressed.



It will skip this process if “N” key pressed.

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



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

2.1. 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 . . .
```


2.2. 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-00023F811022
DEM Strings(Part Number,SW Number)(Type11, Offset05h):
=>PSP20UFZ000F,PSP20UFZ000F

Press any key to continue . . .

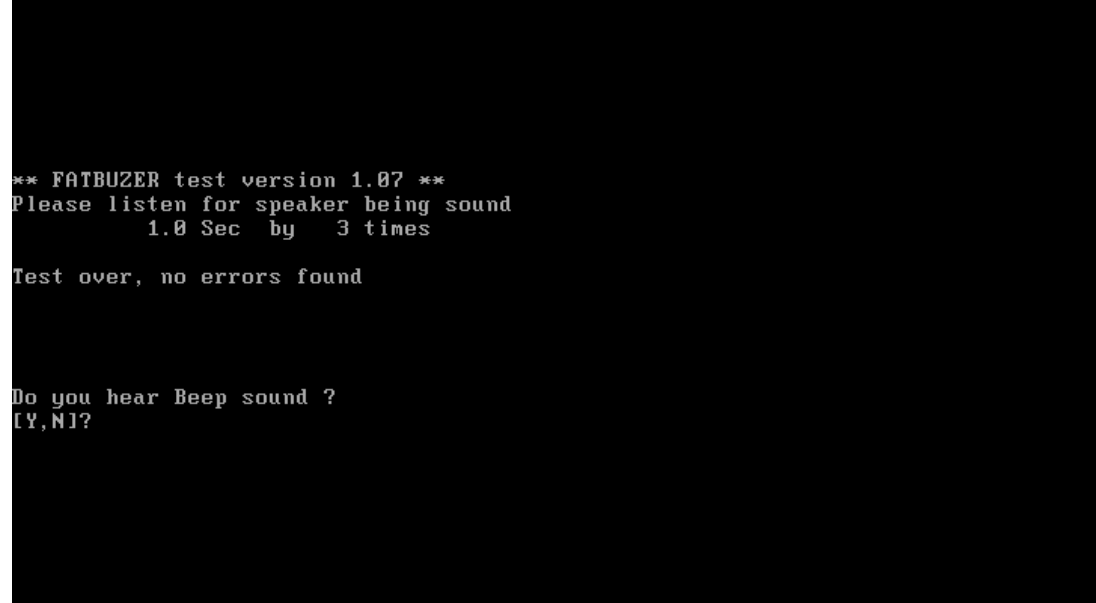
```

2.3. 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]?
```

2.4. 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]?
```

2.5. Main Battery Charge Test

NOTE: The AC adaptor (120W, 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] U1.0 2002/07/23
MAIN Battery
Battery Type: Ni-MH
Manufacturer: Panasonic
Remain charge capacity : 91.8%
Charge Test-> [ PASS ]
Press any key to continue . . .
```

2.6. 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...
```

2. 7. CD-ROM Test

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

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

The CD-ROM test includes two subtests of the:

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

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

NOTE: Press “Esc” key can skip the current subtest.

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

```
CDROM Utility (for Testing only) Ver 1.0
-----
Testing CDROM Information ..... Press [ESC] key to skip testing
-----
CD ROM Drive Z:, MSCDEX ver.: 2.23, Driver name: TSYCD1 , Vol.: 020329_1105
Total 198960 sectors(2352 bytes/sector) = 467953920 bytes
Testing CD ROM reset function...

Partial sequential read ..... 198950

Random read ..... 95496      PASS

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

Press any key to continue . . .
```

2. 8. 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.

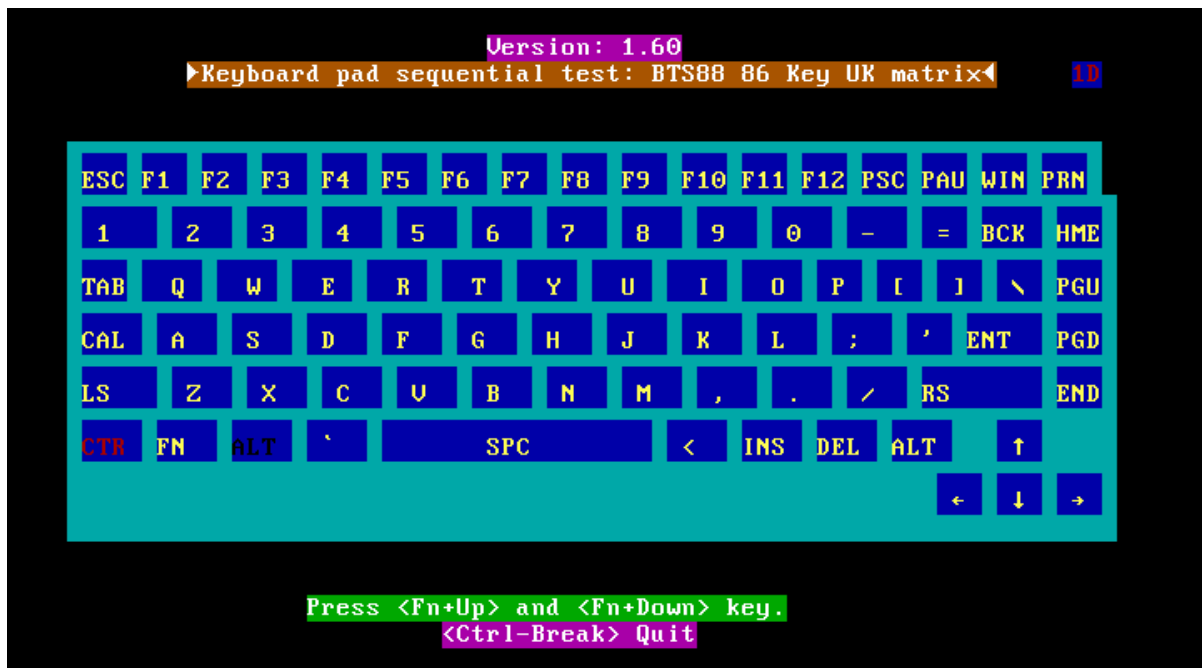
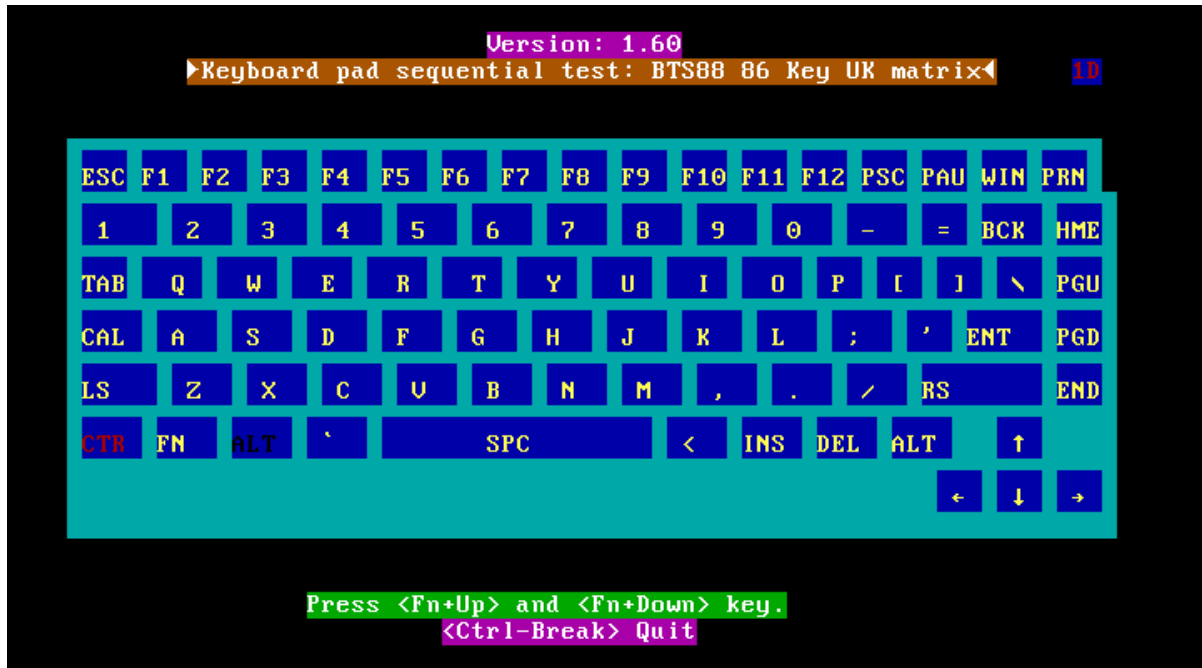
Before keyboard test starts, the keyboard matrix code should be chosen as below display:

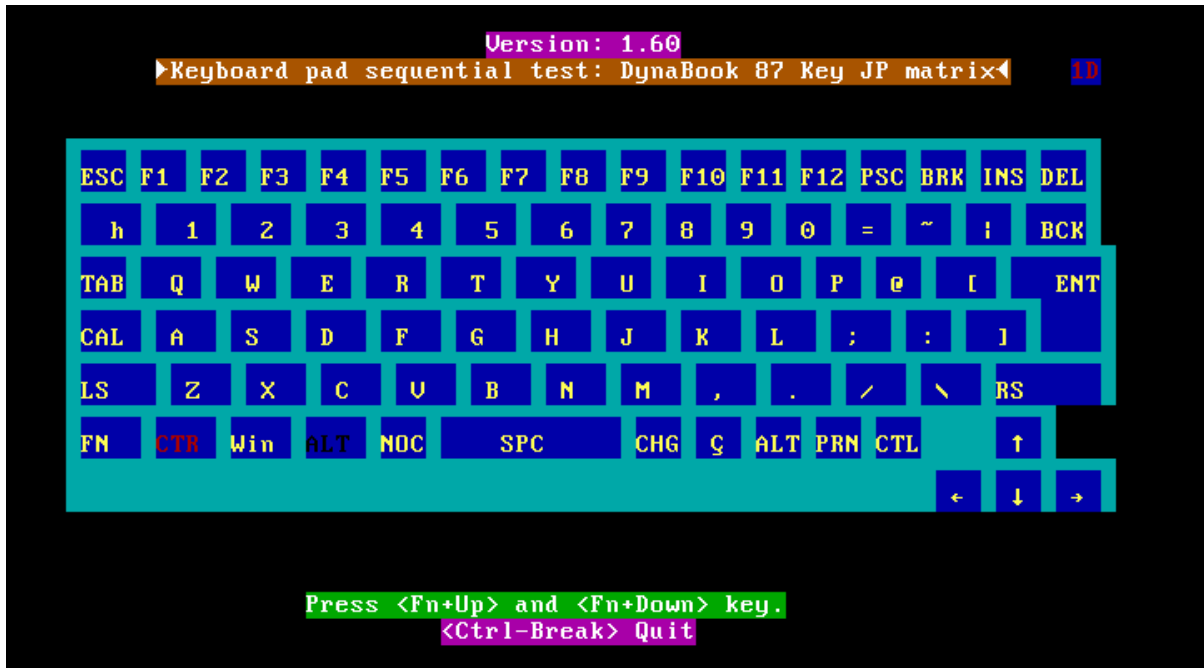
1. **K** (UK, for Europe)
2. **S** (US, for America)
3. **J** (JP, for Japan)

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.

2. 9. Mouse (Pad) Test

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

1. Mouse Speed (on a scale from slow to fast)
2. Acceleration (Off, Low, Medium, High)
3. Button Assignments (Left + Right / Right button, either Unassigned or Drag Lock)
4. Swap Buttons (Left /Right)

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

The Touch Pad button subtest allows users to test their Touch Pad buttons. If the buttons are clicked, the cursors should appear in the corresponding box of the button figure that is displayed on the screen as below.



After checking T/Pad buttons and cursor’s function, use “Tab” key or use T/Pad cursor to click the “OK” column will end this test.

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

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

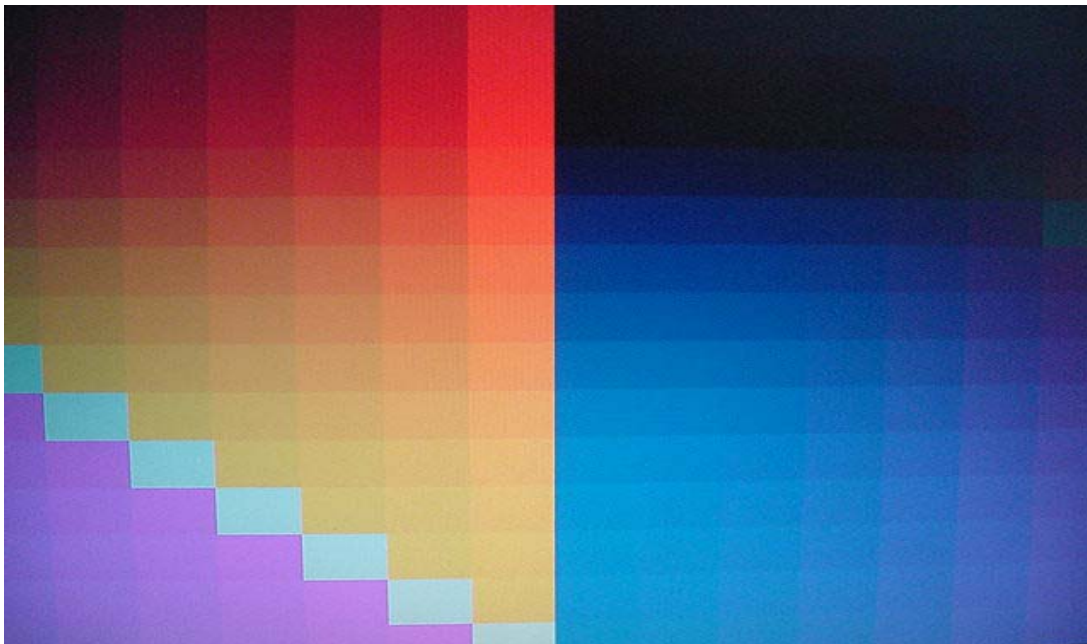
2. 10. LCD Pixels Mode Test

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.



2. 11. 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 !!
```

2. 12. 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.

2. 13. 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_Hay_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)
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Full duplex 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
```

2. 14. 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 . . .
```

.2. 15. 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

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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				

4 Replacement Procedures

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.

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 contaminants
 - 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. Disengage the safety lock (1).
3. Release the battery latch (2).
4. Remove the battery from the bay (3).

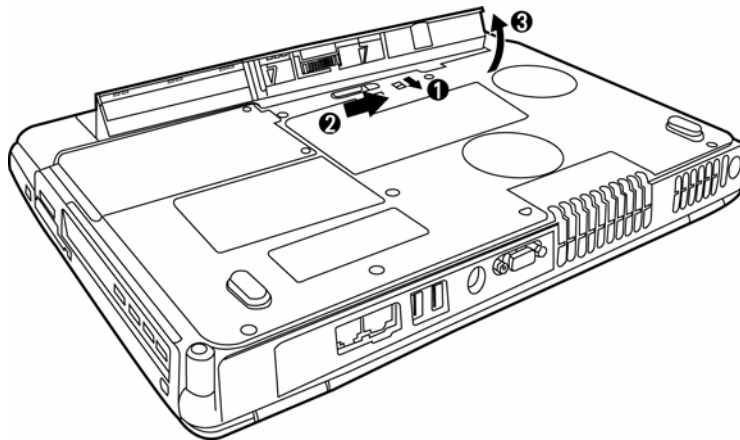


Figure 4-1 Removing the battery pack

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. Engage the safety lock.

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.

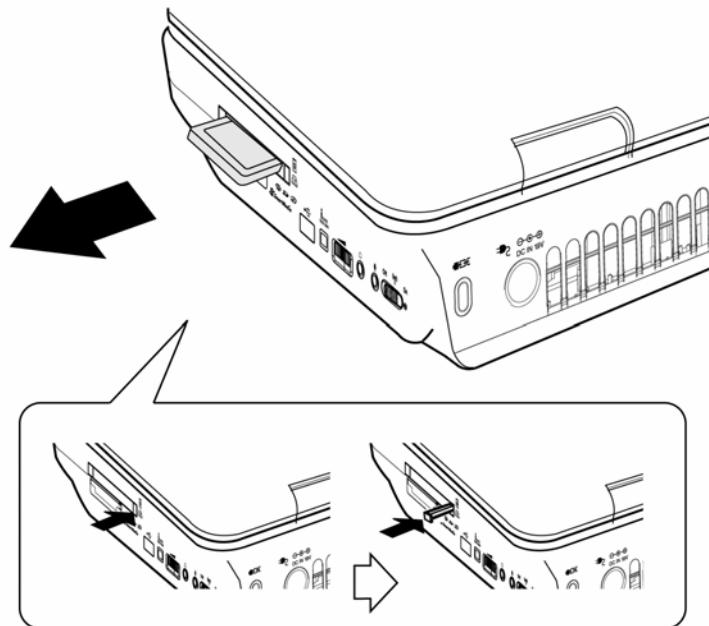


Figure 4-2 Pressing the eject button

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.

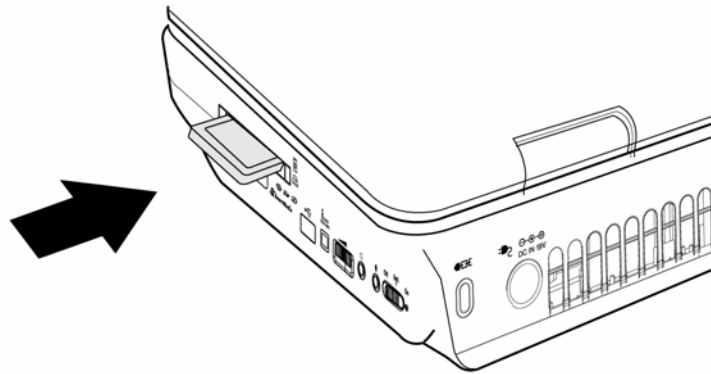


Figure 4-3 Installing the PC card

4.4 HDD

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

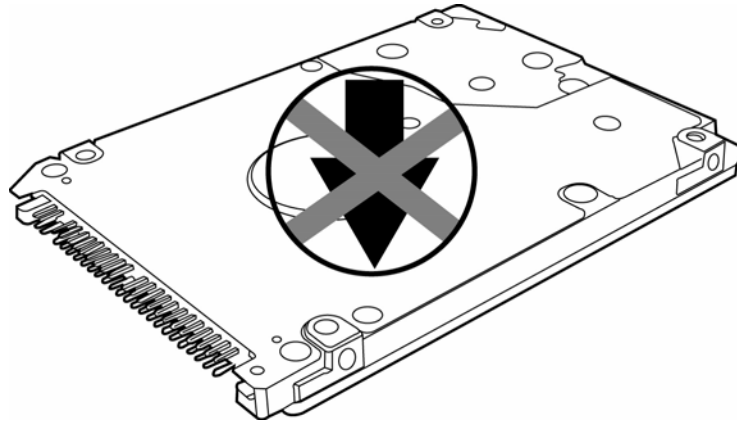


Figure 4-4 HDD

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 on the tab to remove the HDD unit.

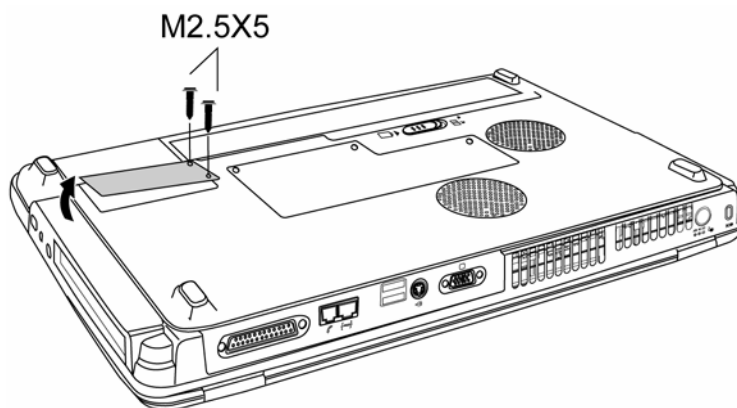


Figure 4-5 Removing the HDD door

4. 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. Insert the HDD unit into the HDD slot.
2. Secure the HDD door with two black M2.5x5 screws.

Disassembling the HDD

To take apart the HDD, first remove it from the computer as described earlier.

1. Remove four M2.5x3 screws securing the HDD mounting brackets to the HDD. There are two on each side.

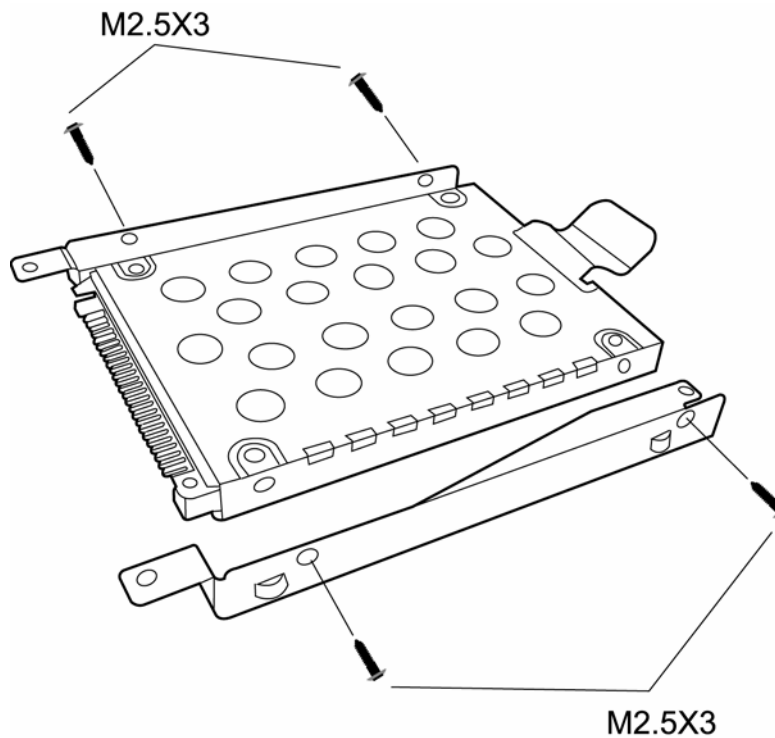


Figure 4-6 Removing the HDD bracket

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. Remove one M2.5x5 screw securing the optical drive module into place.
3. Slide the optical drive module from the bay, if necessary inserting your finger through the HDD slot and pushing it out.

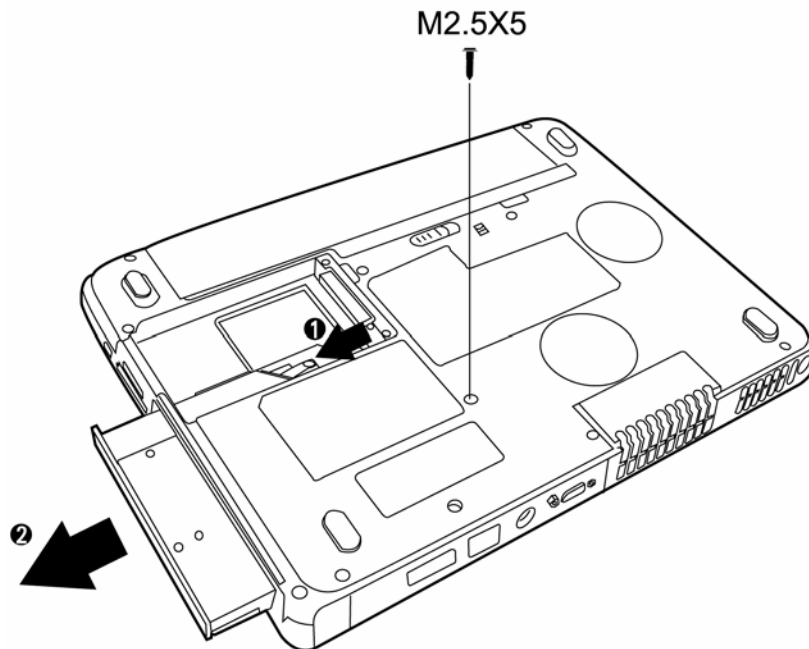


Figure 4-7 Removing the optical drive module

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.
2. Use one M2.5x5 screw 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, then follow the steps below.

1. Remove one M2.5x5 screw and slide the optical drive module from the bay.
2. Remove two M2x3 screws from the bracket plate. Remove the bracket plate.

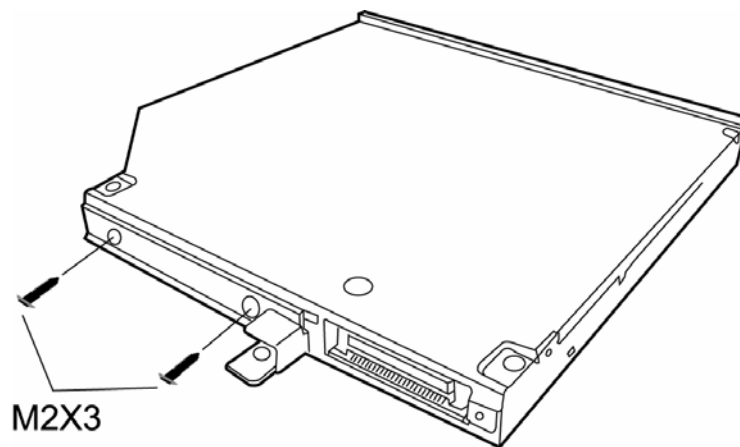


Figure 4-8 Removing the optical drive bracket

Reassembling the Optical Drive

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

1. Position the optical drive bracket plate to the rear panel of optical drive.
2. Secure the optical drive bracket plate with two black M2x3 screws.
3. Install the optical drive module into the bay and secure with one M2.5x5 screw.

4.7 Wireless LAN Unit

Removing the Wireless LAN Unit

1. Turn the computer upside down and loosen the three embedded M2.5x6 screws securing the wireless LAN compartment cover.

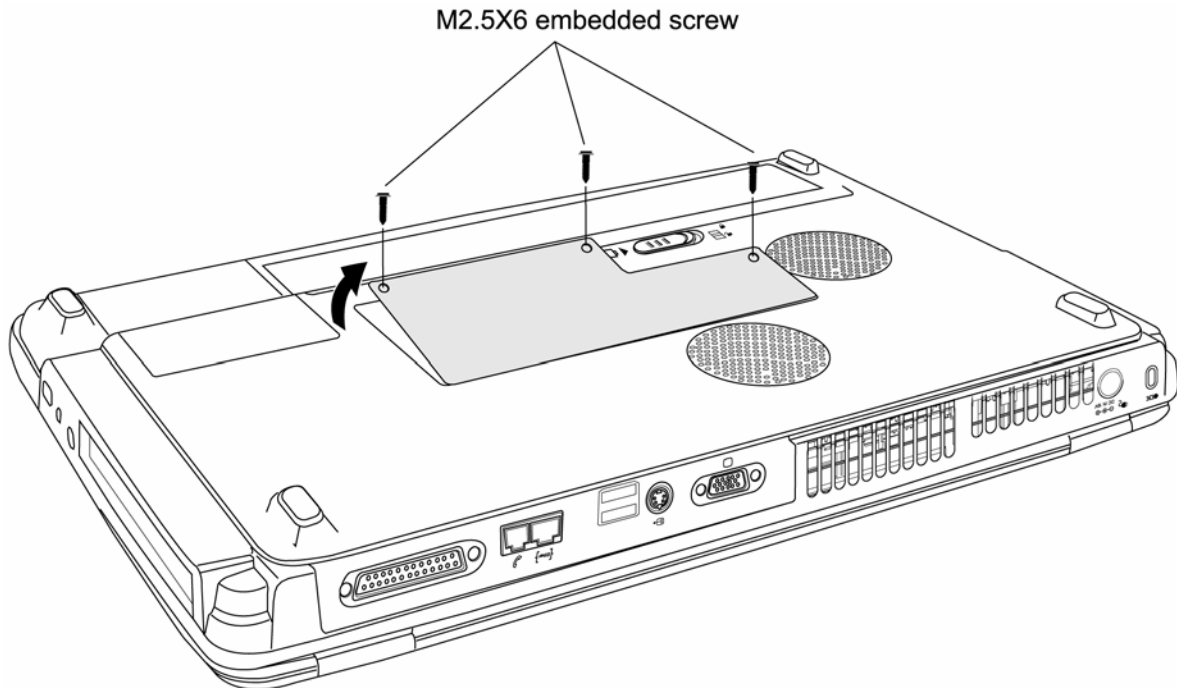


Figure 4-9 Removing the mini PCI bracket

2. Lift off the wireless LAN compartment cover.
3. Remove the embedded screw M2.5x6 securing the Mini PCI bracket.

Note: If your wireless LAN unit is an 'A' type card, then the screw will be a safety screw.

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

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.

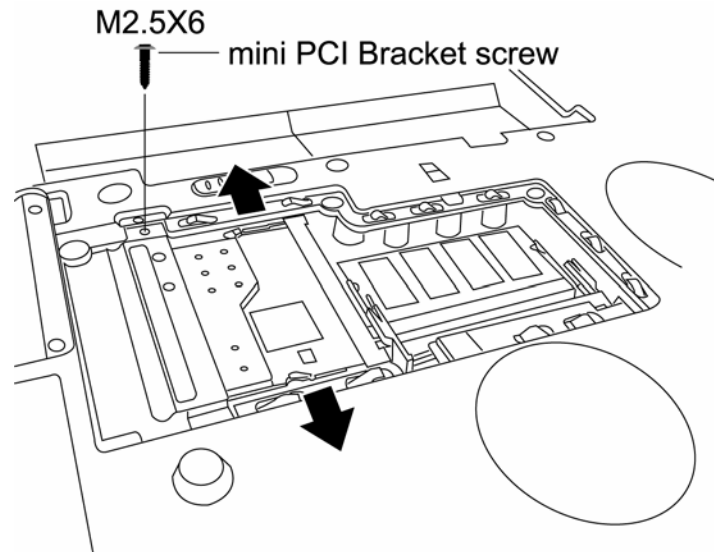


Figure 4-10 Removing the wireless LAN unit

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 three embedded M2.5x6 screws 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 M2.5x6 to secure the Mini PCI bracket.

Note: If your wireless LAN unit is an 'A' type card, then the screw will be a safety screw.

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 loosen the three embedded M2.5x6 screws 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.

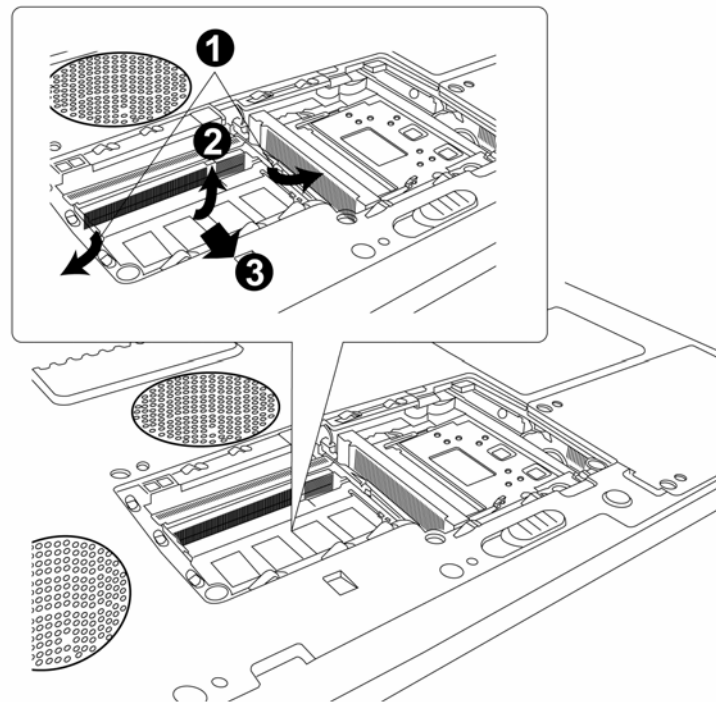


Figure 4-11 Removing the expansion memory

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.
2. Remove all cables connected to the computer.
3. Turn the computer upside down and remove the battery.
4. Loosen the three embedded M2.5x6 screws securing the memory module socket cover.
5. Slide your fingernail or a thin object under the cover and lift it off.

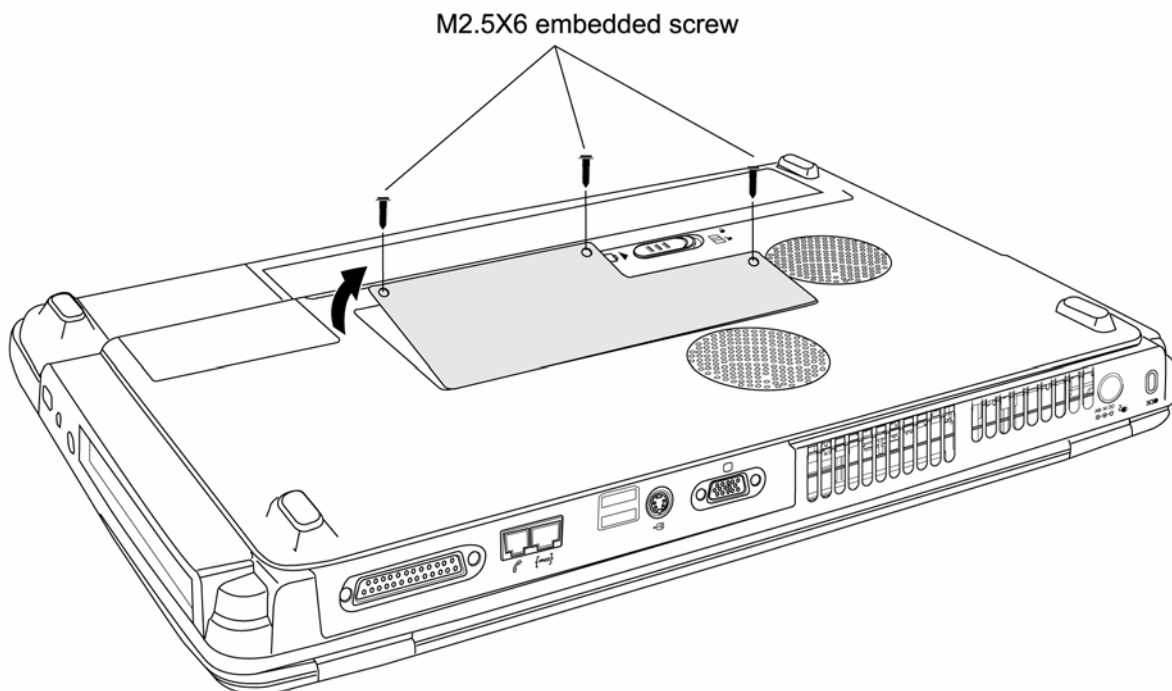


Figure 4-12 Removing the expansion memory cover

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.

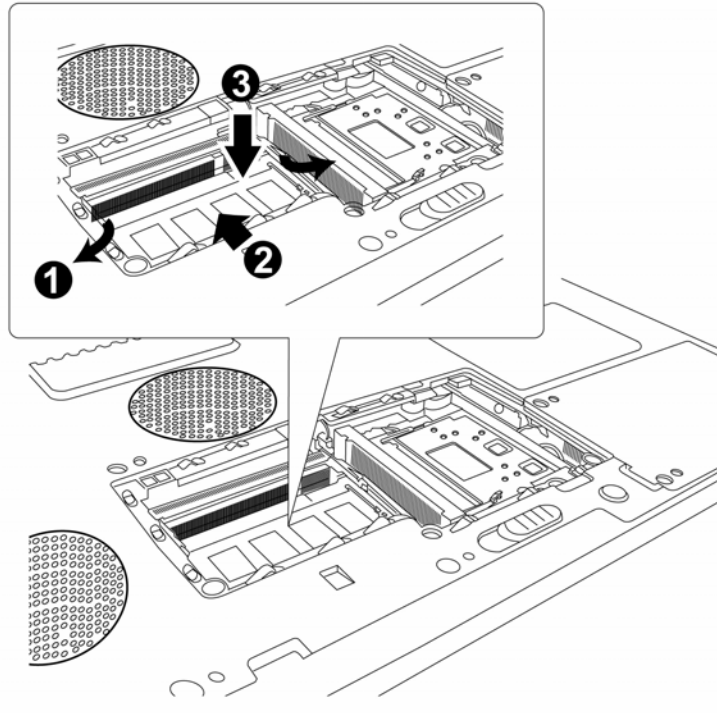


Figure 4-13 Installing the expansion memory

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 4-14 Removing the strip cover

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

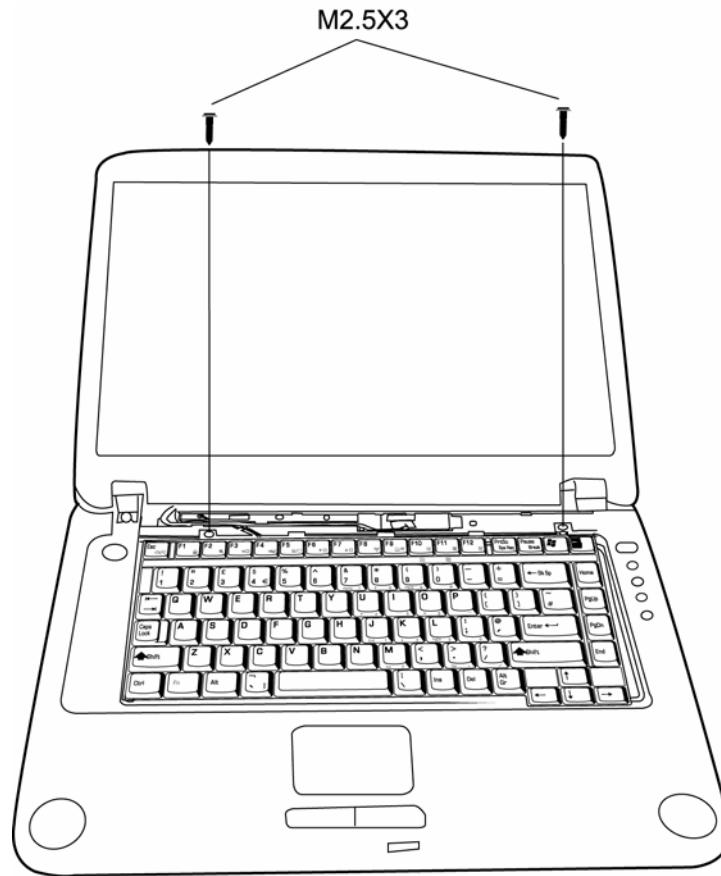


Figure 4-15 Removing the keyboard

4. After removing the screws, flip the keyboard latch with either a screwdriver or a fingernail.
5. Lift the keyboard out of its bay, revealing the keyboard cable.
6. Disconnect the keyboard cable and remove the keyboard from the computer entirely.

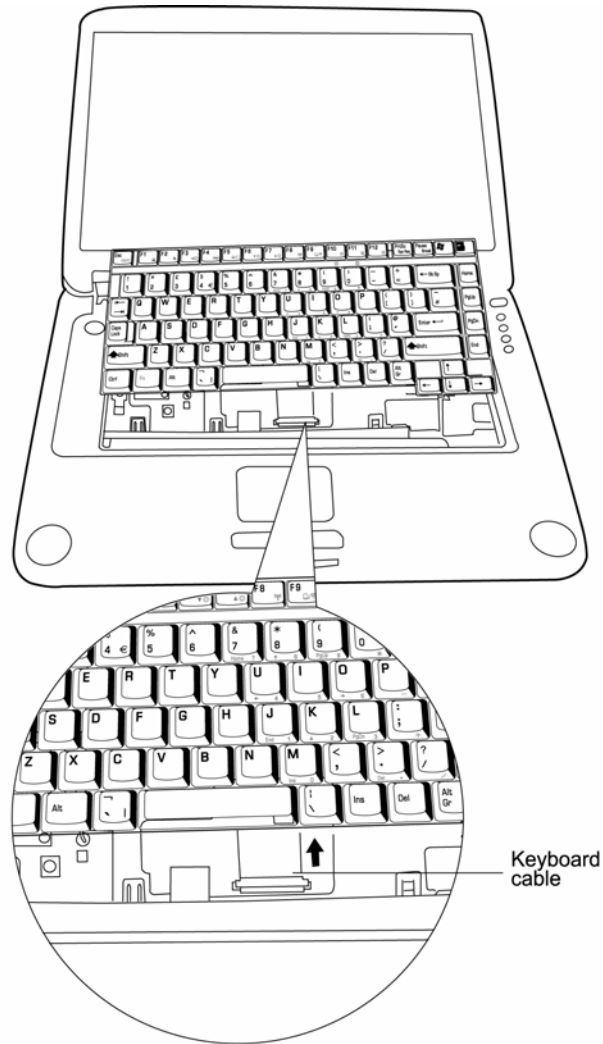


Figure 4-16 Disconnecting the keyboard cable

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. Engage the flip latch with either a screwdriver or a fingernail.
4. 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.

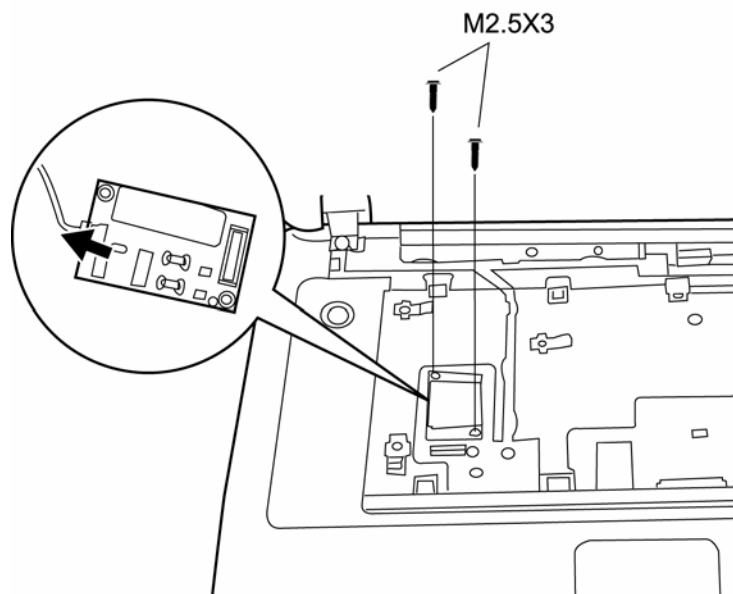


Figure 4-17 Removing the modem module

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. Turn the computer upside down and remove two black M2.5x18 screws.

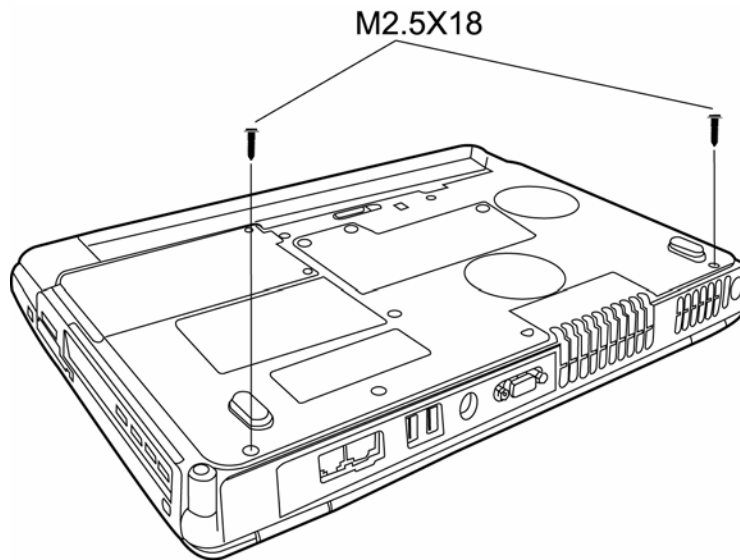


Figure 4-18 Removing the display assembly screws

2. Turn the computer right side up again, and then remove the two black M2.5x5 screws securing the hinge bracket

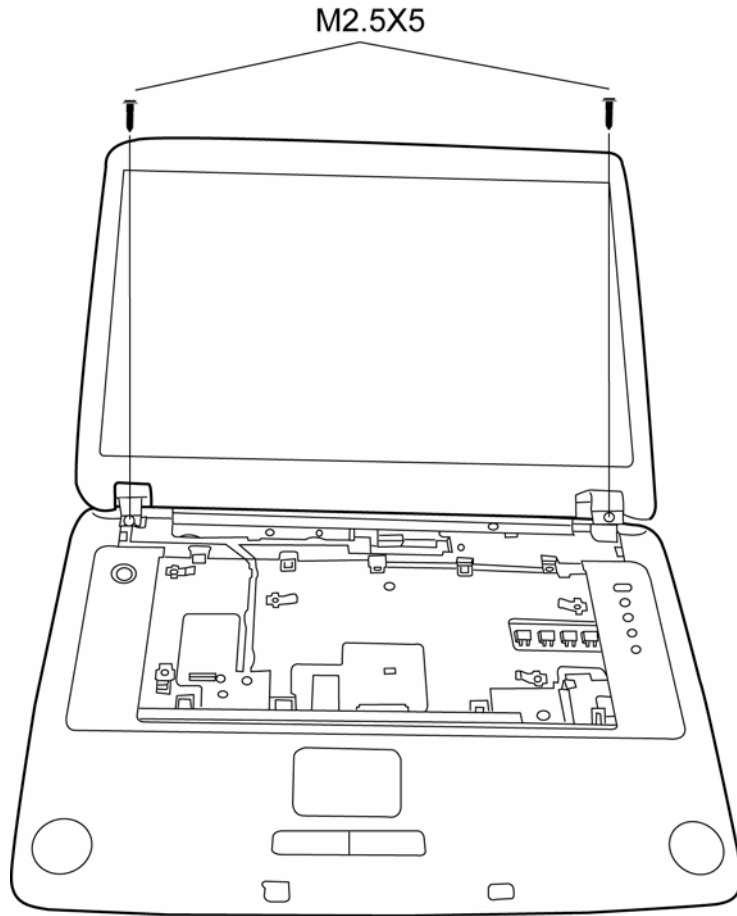


Figure 4-19 Removing the display assembly screws

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

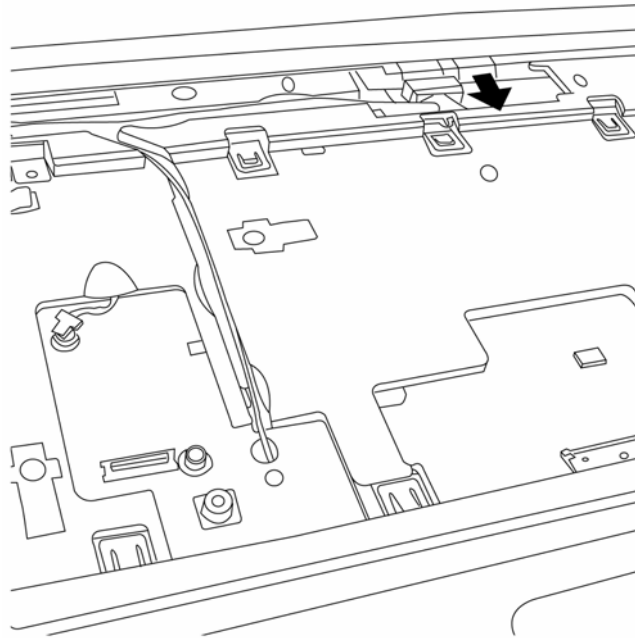


Figure 4-20 Removing the LCD display cable

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

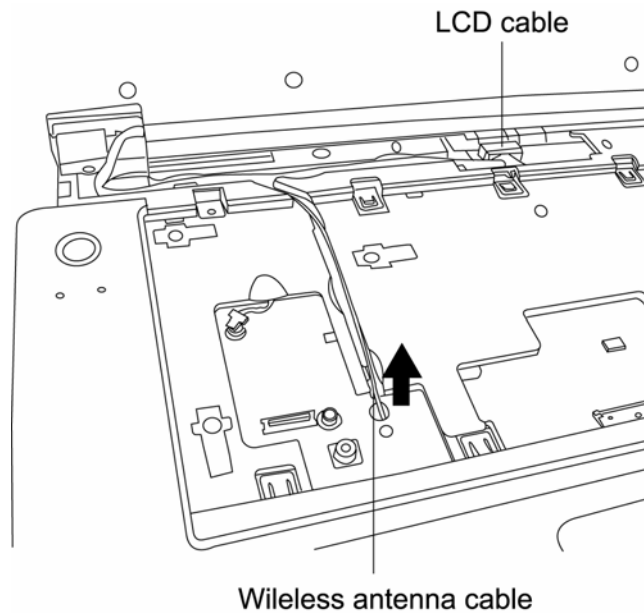


Figure 4-21 Pulling the wireless LAN antenna wires

5. 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. Feed the wireless LAN module's antennae wires through the small hole beside the LCD display cable connector.
3. Connect the LCD power cable to the top chassis.
4. Reinstall the keyboard and wireless LAN module.
5. Secure the hinge bracket with two black M2.5x5 screws
6. Turn the computer upside down and secure two black M2.5x18 screws

4.12 Top & Bottom Cover

Removing the Covers

To remove the top & bottom covers, 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 two black M2.5x18 black screws and four black M2.5x3 screws securing the top half of the cover:

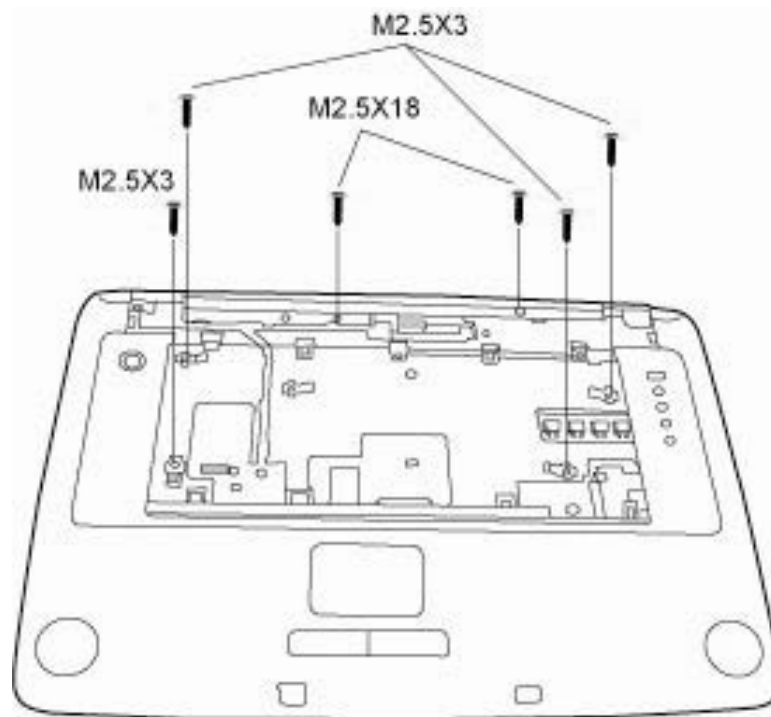


Figure 4-22 Removing the top cover-1

2. Turn the computer upside down and remove twelve black M2.5x18 screws and four black M2.5x5 screws securing the bottom half of the cover:

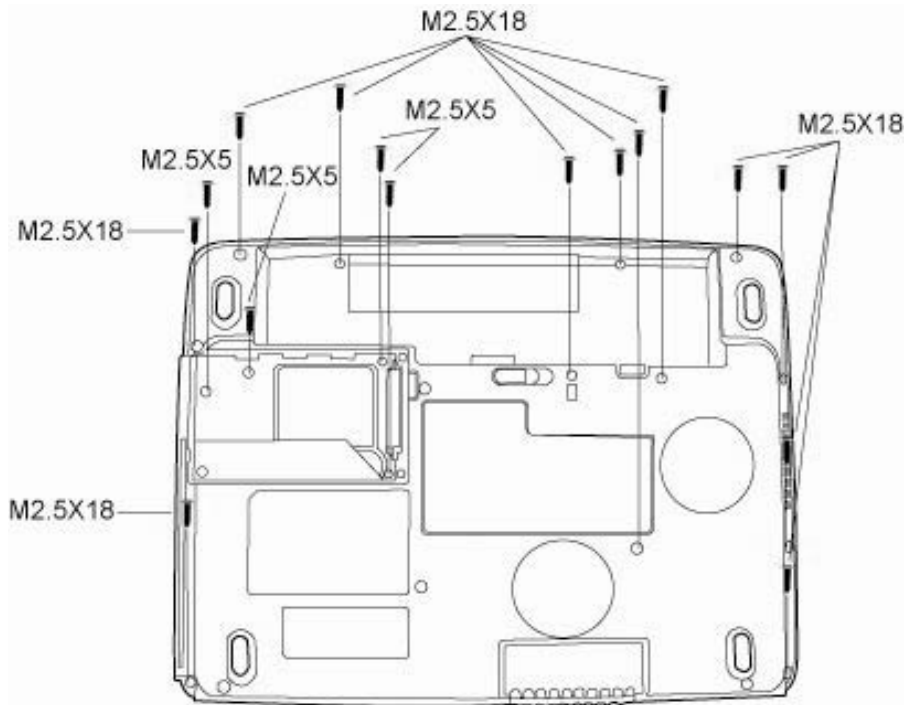


Figure 4-23 Removing the top cover-2

3. Detach the upper FFC cable (A).
4. Remove 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.
2. Secure the top cover with two black M2.5x18 black screws and four black M2.5x3 screws.
3. Turn the computer upside down and secure twelve black M2.5x18 screws and four black M2.5x5 screws.

4.13 Touch Pad

Removing the Cover

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

1. Remove the two black M2.5x3 screws securing Touch Pad LED board FFC cable to the Touch Pad, and then detach it.

Note: One screw is under the mylar flap.

2. Remove one M2.5x3 screw securing the Touch Pad Bracket and then slide it out.

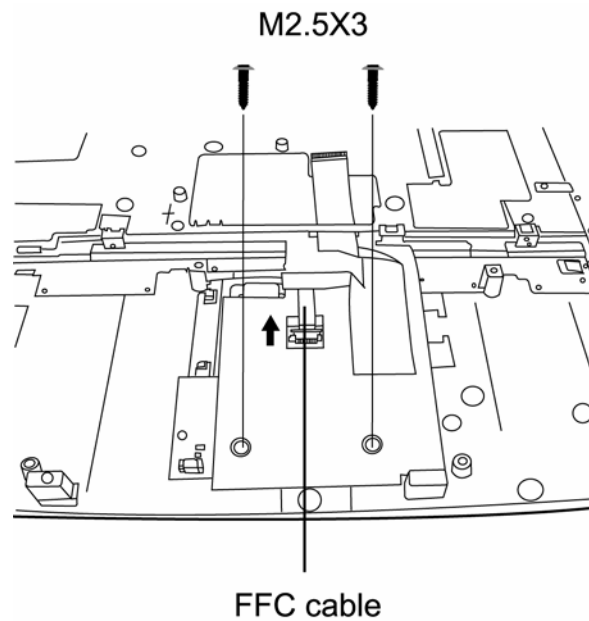


Figure 4-24 Removing the Touch Pad LED board

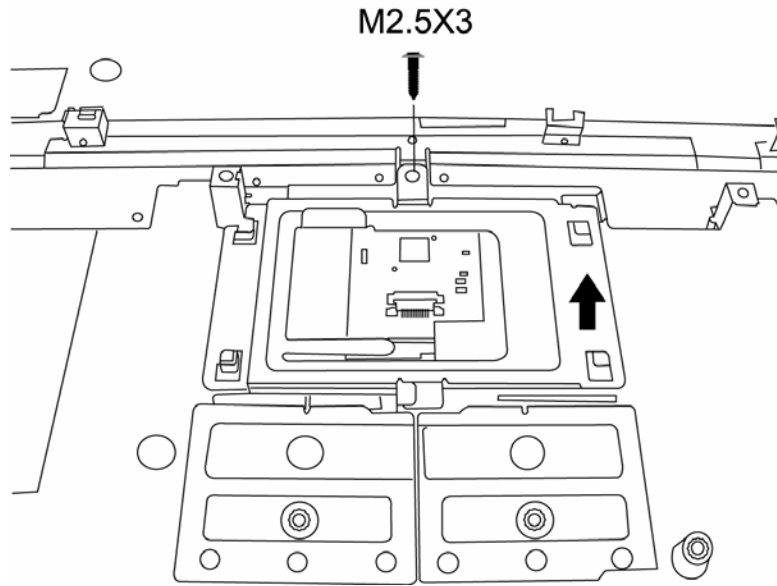


Figure 4-25 Removing the touch pad

Installing the Touch Pad

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

1. Secure Touch Pad Bracket with one M2.5x3 screw.
2. Connect the Touch Pad LED board FFC cable to the Touch Pad, and then secure it with two black M2.5x3 screws.

4.14 Speakers

Removing the Speakers

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

1. Disconnect the right and left speaker cables from the system board.

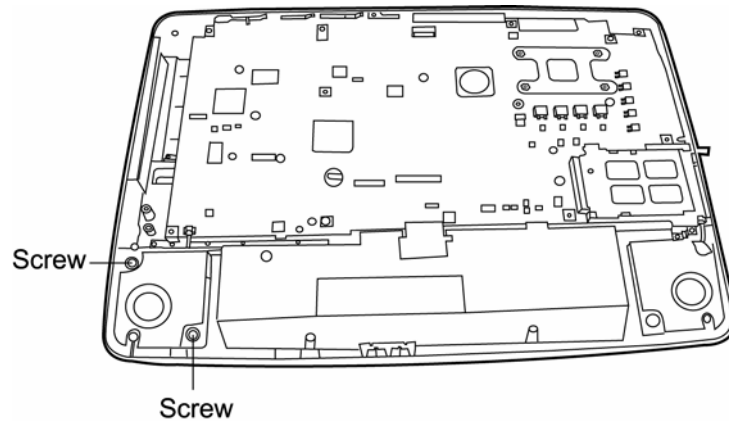


Figure 4-26 Removing the speakers

2. Remove two special screws securing each speaker into place.
3. 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.
2. Secure each speaker with two special screws.
3. Attached the left and right speaker cables to the system board.

4.15 System Board

Removing the System Board

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

1. Remove the three black M2.5x5 screws securing the system board to the bottom cover.

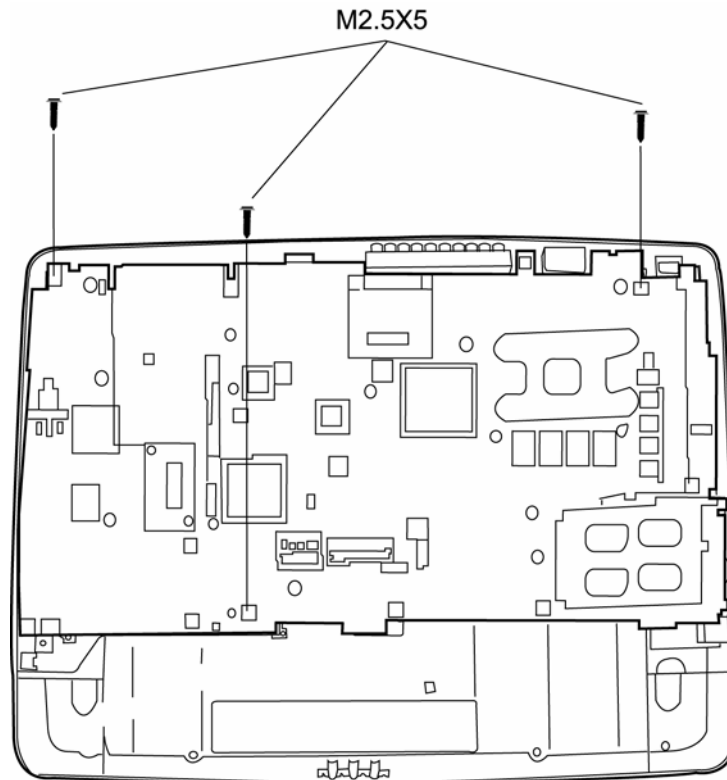


Figure 4-27 Removing the system board

2. Remove the two silver hex screws securing the system board to the back chassis.

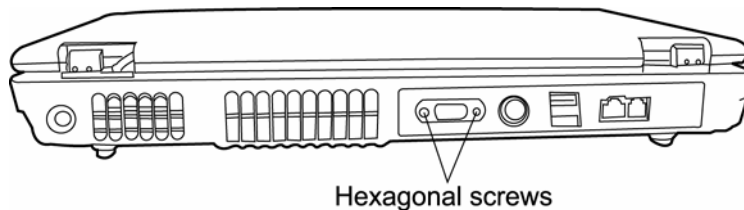


Figure 4-28 Removing the hexagonal screws

3. Pry the backside of the chassis out, then remove the system board.

Installing the System Board

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

1. Seat the system board in the chassis
2. Secure it to the back chassis with two silver hex screws.
3. Secure it to the bottom cover with three black M2.5x5 screws.

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 keyboard, top and bottom covers to reveal the system board, then follow the steps below:

CAUTION: *If you remove the heat sink, you should use the CPU grease tool to remove the grease on the CPU and heat sink.*

1. On the topside of the system board, remove four M2x5 screws securing the fan module.

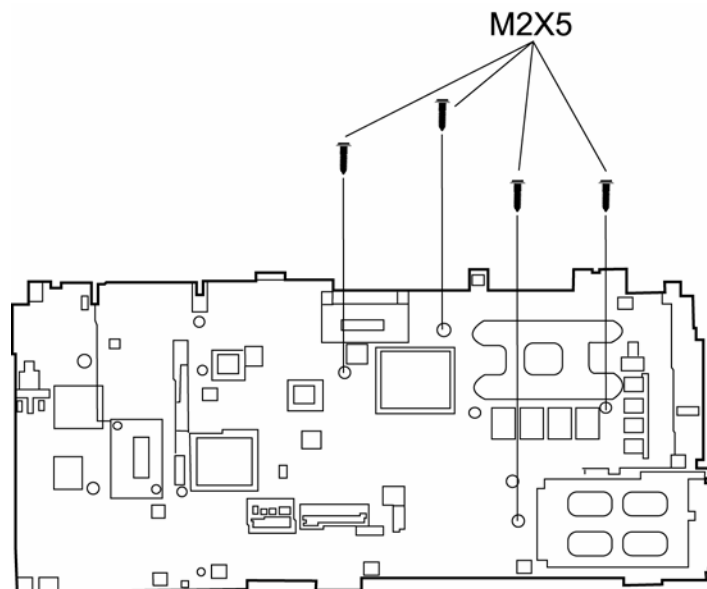


Figure 4-29 Removing the fan module screws

2. Remove the two fan connectors from the system board.

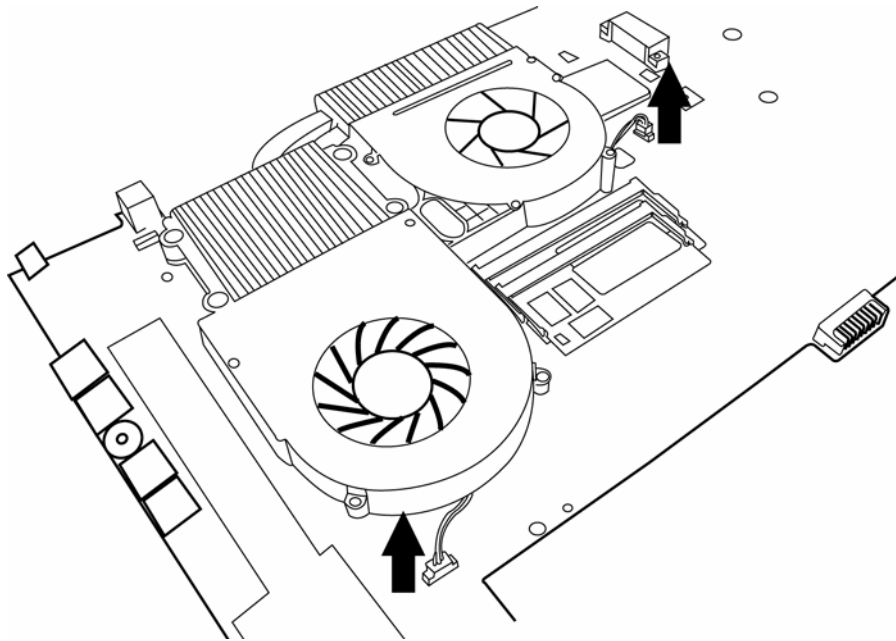


Figure 4-30 Removing the fan module

3. Lift off the fan module.
4. Remove the four embedded screws securing the heat sink in the order indicated on the heat sink. Lift out the heat sink while preventing stress to the CPU below.

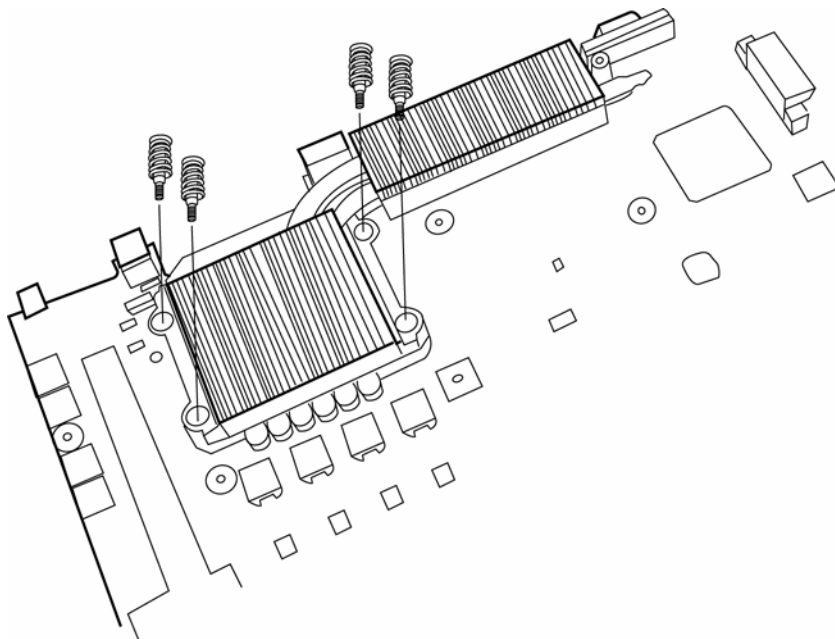


Figure 4-31 Removing the heat sink

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

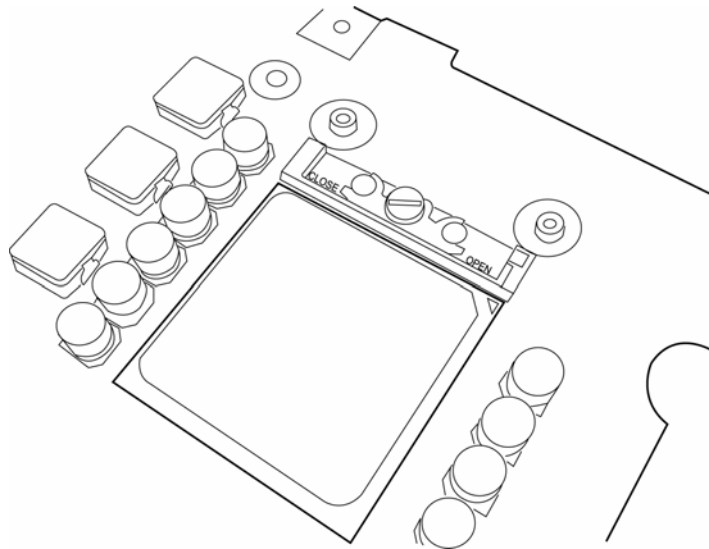


Figure 4-32 Removing the CPU

6. Gently lift out the CPU.

Installing the CPU

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

CAUTION: Reapply fresh grease with the grease tool 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 the four embedded screws in the order indicated on the heat sink.
5. Seat the fan module.
6. Attach the two fan connectors to the system board.
7. Secure the fan module to the topside of the system board with four M2x5 screws.

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 and upper corner screws that are used to hold the display mask together.
2. Remove the four M2.5×5 black screws from the corners.
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.

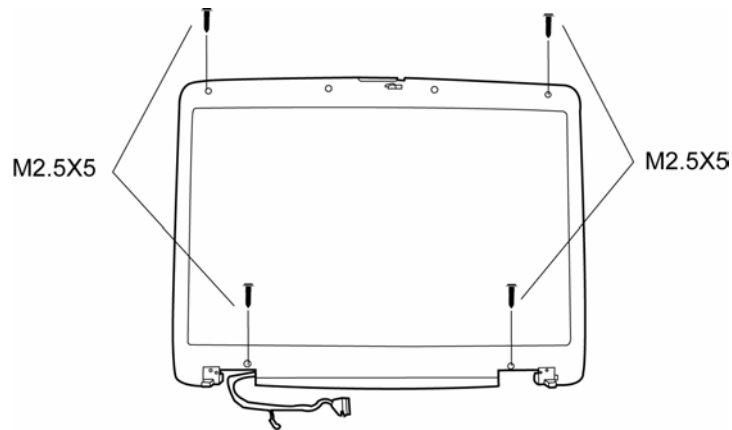


Figure 4-33 Removing the display mask

Installing the Display Mask

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

1. Seat the display mask and secure the snaps on each side.
2. Secure the display mask with four M2.5x5 screws at the corners.
3. Cover the 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 one black M2x3 screw securing the FL inverter board and one black M2.5x3 screw securing the LCD cable.
2. Disconnect the LCD cable from the FL inverter board.
3. Remove six M2.5x5 black screws securing the LCD module bracket to LCD cover.

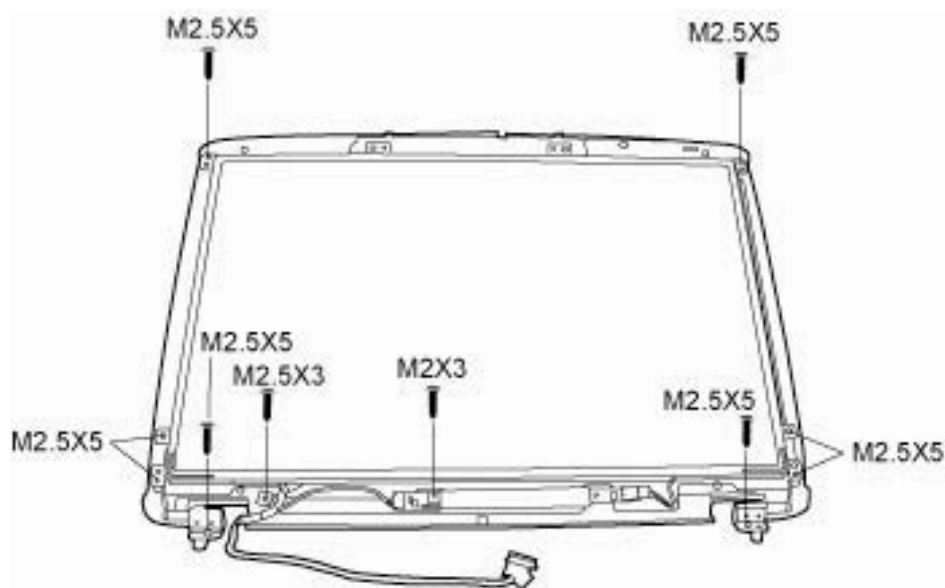


Figure 4-34 Removing the LCD module-1

4. Remove eight M2x3 screws securing LCD module bracket to the LCD module.

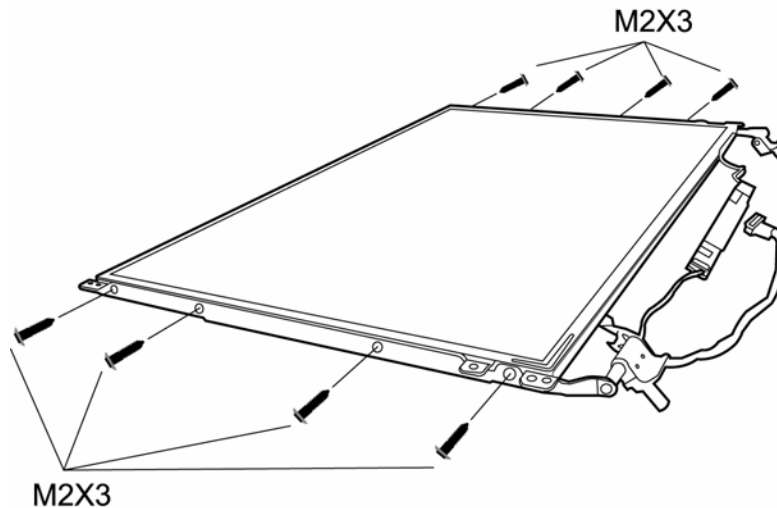


Figure 4-35 Removing the LCD module-2

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. Secure the LCD module bracket to the LCD module eight M2x3 screws.
3. Secure the LCD module bracket to LCD cover with six black M2.5x5 screws.
4. Connect the LCD cable to the FL inverter board.
5. Secure the FL inverter board with one black M2x3 screw and the LCD cable with one black M2.5x3 screw.

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.

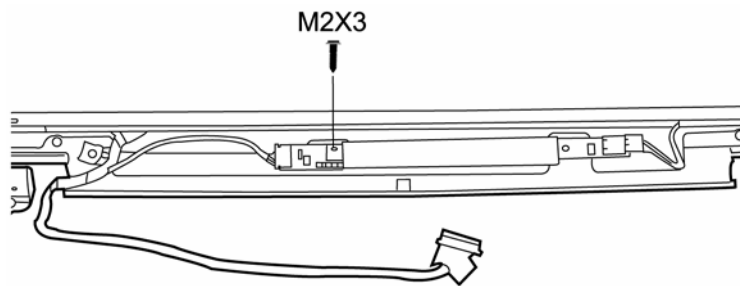


Figure 4-36 Removing the FL inverter board

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.

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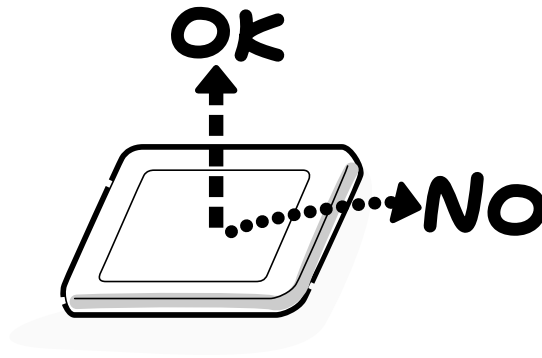
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Appendix A Handling the LCD Module

Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. 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.

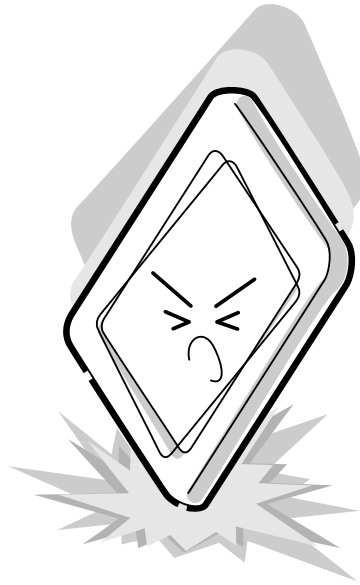
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



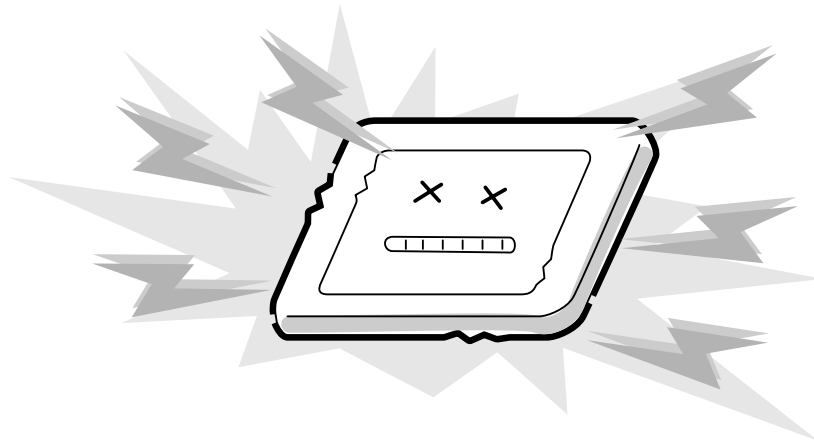
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



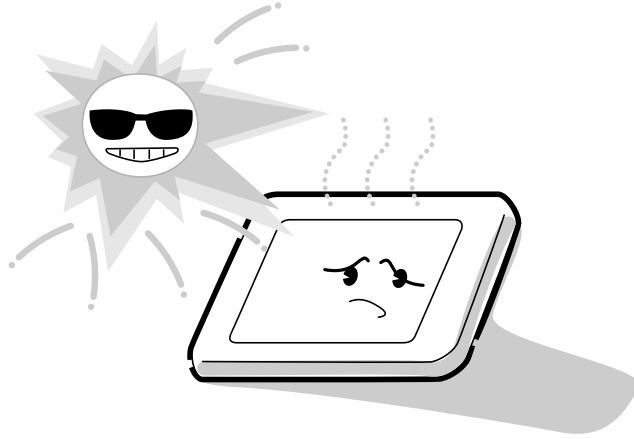
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



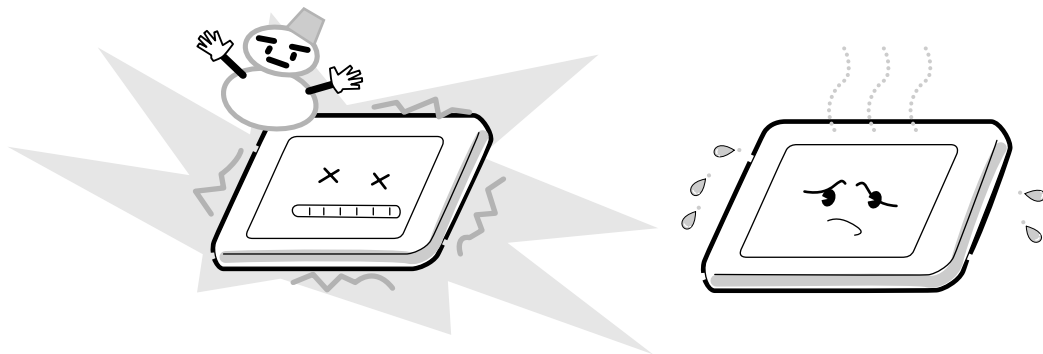
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



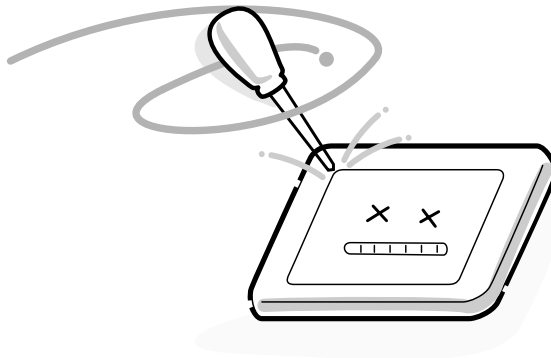
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



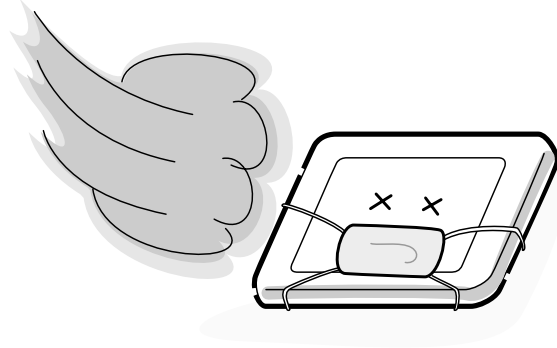
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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.



Appendix B Board Layout

B.1 System Board (FRDSY*) Bottom View

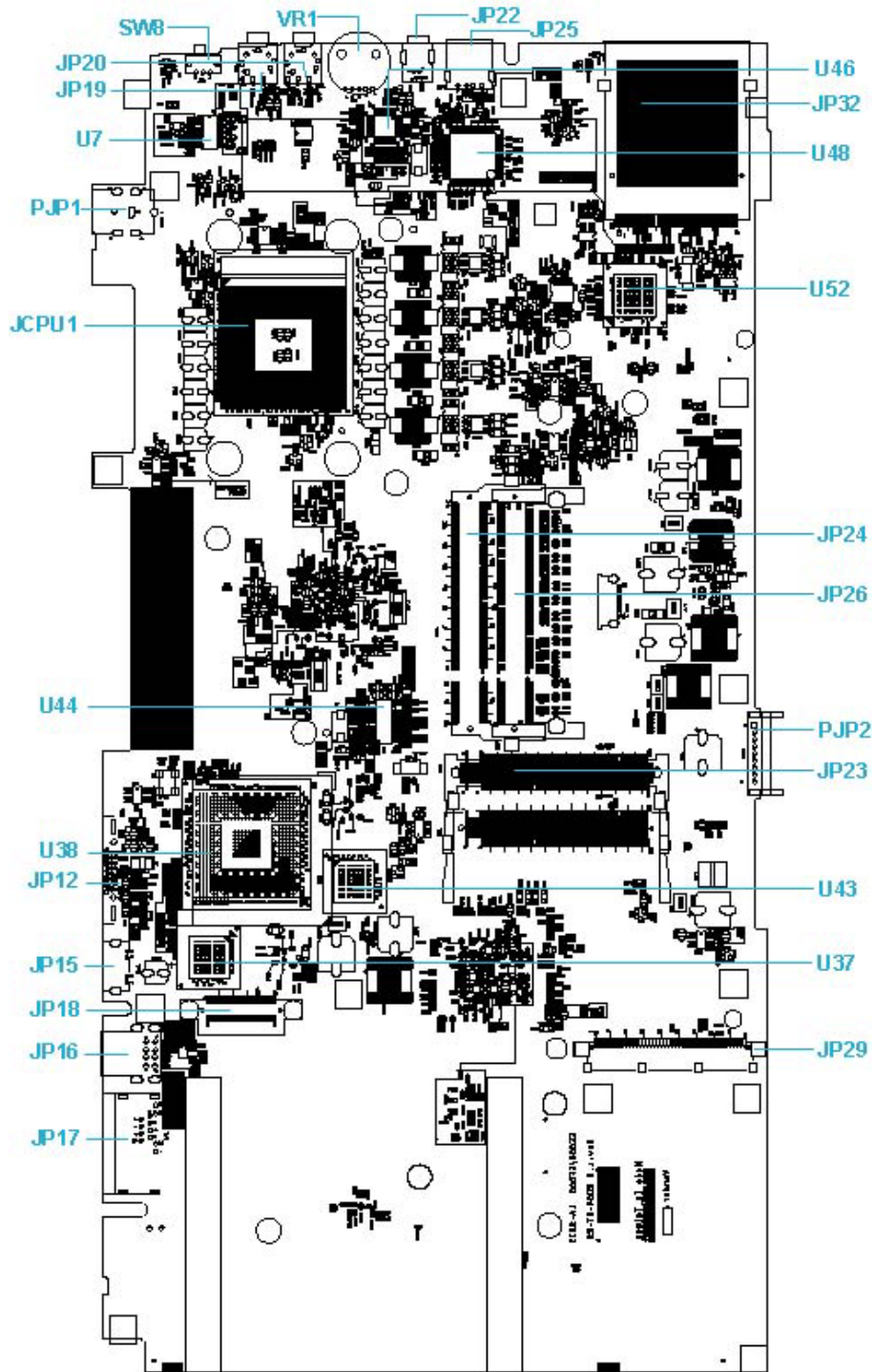


Figure B-1 System board (FRDSY*) layout (Bottom)

B.2 System Board (FRDSY*) Top View

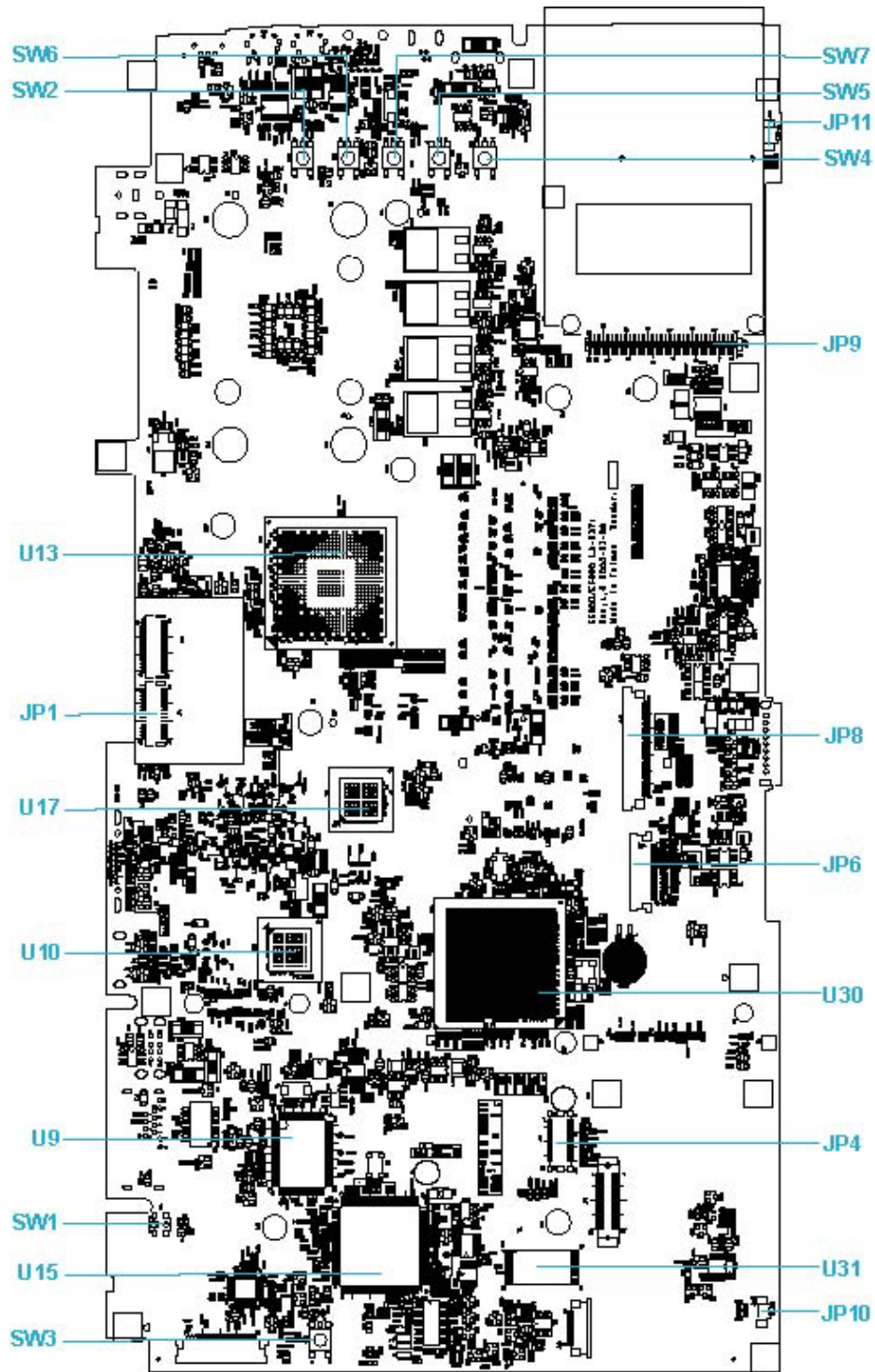


Figure B-2 System board (FRDSY*) layout (Top)

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

Mark	Number	Name
A	U13	ATI_RC300ML / RX3000ML
B	U38	ATI_M11P
C	U44	ICS951402AGT
D	U30	ATI_IXP150
E	U15	KB910
F	U9	RTL8100CL
G	U48	VIA_VT6301S
H	U10,U17,U37,U43	VGA RAM
I	U31	1MB Flash ROM
J	U46	ALC250
K	U52	CB714

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

Number	Name
JP1	LVDS for EFQ00
JP4	MDC
JP6	Touch Pad board
JP8	Keyboard
JP9	PCMCIA
JP10	Speaker (L)
JP11	Speaker (R)
JP12	CRT
JP15	TV OUT
JP16	USB PORT
JP17	RJ11/RJ45
JP18	ODD
JP19	Microphone in jack
JP20	Headphone out jack
JP22	1394
JP23	MINI PCI
JP24	DDR-SODIMM SLOT1
JP25	USB PORT
JP26	DDR-SODIMM SLOT0
JP29	HDD
JP32	5 in 1
JCPU1	CPU Socket
PJP1	AC IN

PJP2	Battery
SW1	LID Switch
SW2	Mode Key
SW3	Power Bottom
SW4	Rev Bottom
SW5	Frd Bottom
SW6	Play Bottom
SW7	Stop Bottom
SW8	Kill Switch
U7	Audio Amp : TPA6010A4PWP
U9	LAN : RTL8100CL
U10	VGA RAM
U13	(NB) : ATI RX300ML for EFQ00
U15	K/B : KB910
U17	VGA RAM
U30	(SB) : ATI IXP150_A46
U31	1MB Flash ROM
U37	VGA RAM
U38	VGA Chip : ATI M11P
U43	VGA RAM
U44	Clock Generator : ICS951402AGT
U46	Audio Chip : ALC250-C
U48	IEEE1394 : VT6301S
U52	PCMCIA : CB714
VR1	Volume Control

Appendix C Pin Assignments

System Board

C.1 JP24,JP26

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 JP12

Table C-2 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 JP29

Table C-3 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 JP18

Table C-4 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 JP9

Table C-5 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-5 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.6 JP23

Table C-6 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-6 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.7 JP1

Pin No.	Signal name	Function
1	VSS	GND
2	VDD	POWER SUPPLY : +3.3V
3	VDD	POWER SUPPLY : +3.3V
4	VEDID	DDC 3.3V POWER SUPPLY : +3.3V
5	NC	Non-Connection
6	CLKEDID	DDC Clock
7	DATAEDID	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	VSS	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	VSS	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	VSS	GND
17	RXOCLKIN-	Negative LVDS differential clock input (Odd)
18	RXOCLKIN+	Positive LVDS differential clock input (Odd)
19	VSS	GND
20	RxEIN0-	Negative LVDS differential data input (Even), [R0-R5, G0]
21	RxEIN0+	Positive LVDS differential data input (Even), [R0-R5, G0]
22	VSS	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	VSS	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	VSS	GND
29	RxECLKIN-	Negative LVDS differential clock input (Even)
30	RxECLKIN+	Positive LVDS differential clock input (Even)

C.8 JP32

Pin No.	Signal name
1	5 in 1-GND
2	5M-CD-COM
3	5M-CD-SW
4	
5	SD-WP-SW
6	SD-DAT1
7	SD-DAT0
8	SD-CLK
9	SD-VCC
10	SD-CMD
11	SD-DAT3
12	SD-DAT2
13	M5-B5
14	MS-DATA1
15	MS-DATA0
16	MS-DATA2
17	MS-INS
18	MS-DATA3
19	MS-SCLK
20	MS-VCC
21	S.M/xD-04
22	S.M/xD-05

Pin No.	Signal Name
23	S.M/xD-06
24	S.M/xD-07
25	S.M-LVD
26	#S.M/xD-R/B
27	#S.M/xD-RE
28	#S.M/xD-CE
29	S.M/xD-VCC
30	#S.M-CD
31	S.M/xD-03
32	S.M/xD-02
33	S.M/xD-01
34	S.M-D0
35	S.M/xD-WP-IN
36	#S.M/xD-WE
37	#S.M/xD-ALE
38	#S.M/xD-CLE
39	xD-CD
40	xD-VCC
41	SD-CD-COM
42	SD-CD-SW
43	SM-WP-SW
44	5in1-GND

C.9 JP21 JP30

Table C-9-1 JP21 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 JP30 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.10 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.11 JP19

Table C-11 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.12 JP20

Table C-12 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	

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

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

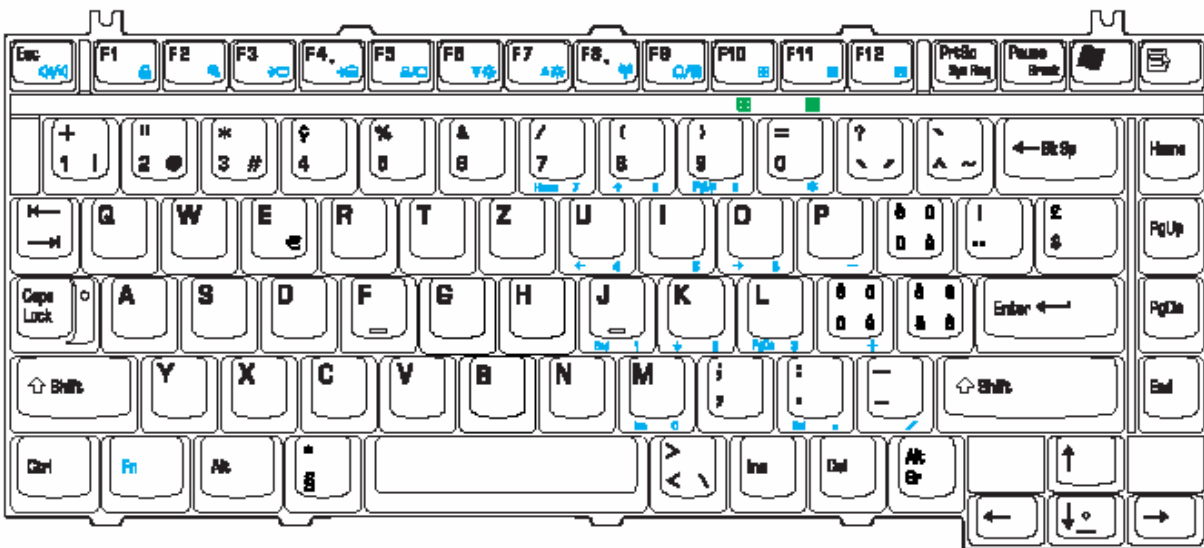


Figure E-12 Swissc-Darfon keyboard

E.13 IT new Keyboard

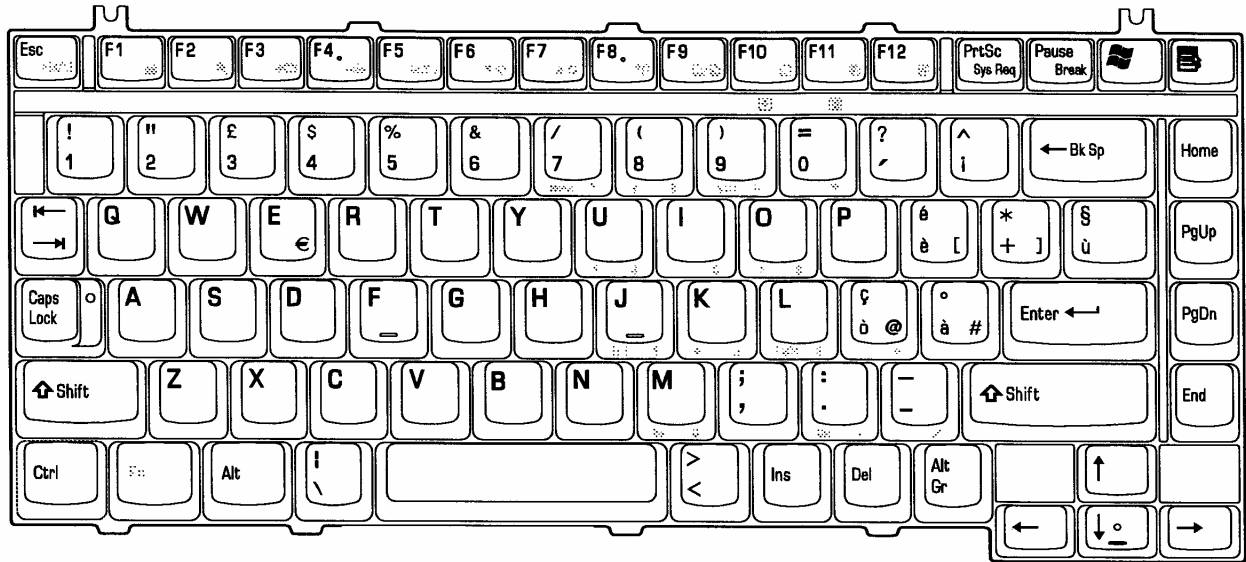


Figure E-13 IT new keyboard

Appendix F Series Screw Torque List

Table F-1 Series Screw Torque List

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MMCK20030Z0	M2*3	8	LCD HINGE ASSY L&R TO LCD 17.0"	1.2~1.5kg
MMCK25050Z0	M2.5*5	6	170" LCD HINGEs TO COVER SUB ASSY	
MMCK20030Z0	M2*3	1	INVERTER TO COVER SUB ASSY	
MMCK25050Z0	M2.5*5	1	LCD CABLE TO COVER	
MMCK25050Z0	M2.5*5	4	LCD BEZEL TO COVER	
MMCK25050Z0	M2.5*5	2	SADDLE R TO UPPER	
MMCK25050Z0	M2.5*5	2	SADDLE L TO UPPER	
			TRACK PAD & MYLAR	
MAC925003Z0	M2.5*3	1	TRACK PAD BKT TO UP	
MAC925003Z0	M2.5*3	2	TP LED PCB ASSY TO UP	
MMCK20050N0	M2*5	2	PCMCIA TO MB	
MAAA0051400	M2*7	2	PCMCIA TO MB	
MAAA0051400	M2*7	2	MODULE CONN TO MB	
MACK20003Z0	M2*13	2	HDD CONN TO MB	
MMCK25050Z0	M2.5*5	1	BATT. LATCH TO LOWER	
			SPEAKER L ASSY TO LOWER SUB ASSY	
			SPEAKER R ASSY TO LOWER SUB ASSY	
MMCK20050N0	M2*5	4	THERMAL FAN TO M/B	
MAC925003Z0	M2.5*3	2	MDC TO MB	
MMCK25050Z0	M2.5*5	3	MB TO LOGIC LOWER SUB ASSY	
MAC925018Z0	M2.5*18	3	LU TO LL TOP SIDE	

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MAC925003Z0	M2.5*3	4	LU TO LL TOP SIDE	
MAC925018Z0	M2.5*18	12	LL TO LU BOTTOM SIDE	
MMCK25050Z0	M2.5*5	4	LL TO LU BOTTOM SIDE	
MAC925018Z0	M2.5*18	1	LCD ASSY TO LOGIC TOP SIDE	
MMCK25050Z0	M2.5*5	1	LCD ASSY TO LOGIC TOP SIDE	
MAC925018Z0	M2.5*18	1	LCD ASSY TO LOGIC BACK SIDE	
MMCK25050Z0	M2.5*5	1	LCD ASSY TO LOGIC BACK SIDE	
ECEEQ01M000	M2.5*6	1	MINI-PCI BKT ASSY TO LL	
ECEEQ01N000	M2.5*6	1	MINI-PCI BKT ASSY TO LL	
ECEEQ01M000	M2.5*6	3	RAM DOOR TO LOGIC	
MMCK25050Z0	M2.5*5	1	ODD ASSY TO LOGIC	
MMCK25050Z0	M2.5*5	0	HDD ASSY TO LOGIC	
MMCK25050Z0	M2.5*5	2	HDD DOOR TO LOGIC	
MAC925003Z0	M2.5*3	2	K/B ASSY TO LOGIC	
			STRIP COVER ASSY TO LOGIC	
MAFA94001N0	D-SUB NUT	2	CRT CONN.	
			RUBBER	
MMCK20030Z0	M2*3	2	ODD LOCK TO ODD	
			BTS88 HDD ESD PLATE ASSY TO HDD	
MAAA4303000	M3*3	2	HDD BRK L TO HDD	
MAAA4303000	M3*3	2	HDD BRK R TO HDD	

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

