

Toshiba Personal Computer
Satellite A30 Series
Maintenance Manual

TOSHIBA CORPORATION

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Toshiba Personal Computer Satellite A30 Series Maintenance Manual

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Disclaimer

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite A30 Series, referred to as A30 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 A30 Series system unit and each FRU.
- Chapter 2 Troubleshooting Procedures explains how to diagnose and resolve FRU problems.
- Chapter 3 Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.
- Chapter 4 Replacement Procedures describes the removal and replacement of the FRUs.
- Appendices The appendices describe the following:

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

Conventions

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

Acronyms

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

Read Only Memory (ROM)

Keys

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

Key operation

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

User input

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

DISKCOPY A: B:

The display

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

```
Format complete
System transferred
```

Table of Contents

Chapter 1 Hardware Overview

1.1	Features	1-1
1.2	System Unit	1-5
1.3	3.5-inch Floppy Disk Drive	1-8
1.4	2.5-inch Hard Disk Drive	1-9
1.5	DVD-R/RW/RAM Drive	1-10
1.6	Power Supply	1-11
1.7	Batteries	1-13

Chapter 2 Troubleshooting Procedures

2.1	Troubleshooting	2-1
2.2	Troubleshooting Flowchart	2-2
2.3	Power Supply Troubleshooting	2-7
2.4	Display Troubleshooting	2-12
2.5	Keyboard Troubleshooting	2-15
2.6	External USB Devices Troubleshooting	2-18
2.7	TV-Out Failure Troubleshooting	2-20
2.8	Printer Port Troubleshooting	2-22
2.9	Touch Pad Troubleshooting	2-24
2.10	Speaker Troubleshooting	2-26
2.11	DVD-ROM and Multi-Drive Troubleshooting	2-28
2.12	Modem Troubleshooting	2-31
2.13	PC Card Troubleshooting	2-33
2.14	IEEE 1394 Troubleshooting	2-35
2.15	Wireless LAN Troubleshooting	2-37

Chapter 3 Test and Diagnostic Operation Handbook

3.1	The Diagnostic Test.....	3-1
3.2	Executing the Diagnostic Test.....	3-3
3.3	Executing the Diagnostic Test.....	3-6
3.4	DMI Check Test.....	3-7
3.5	PIO Loopback Test.....	3-8
3.6	RTC Test.....	3-9
3.7	32-Bit for Sycard Test.....	3-10
3.8	Speaker Audio Test.....	3-11
3.9	Fan ON/OFF Test.....	3-12
3.10	Modem Test.....	3-13
3.11	Main Battery Charge Test.....	3-14
3.12	FDD Test.....	3-15
3.13	CD-ROM Test.....	3-16
3.14	Keyboard Test.....	3-17
3.15	Mouse (Pad) Test.....	3-19
3.16	LCD Pixels Mode Test.....	3-21
3.17	Lid Switch Test.....	3-22
3.18	HDD R/W Test.....	3-23
3.19	LAN Test.....	3-25

Chapter 4 Replacement Procedures

4.1	General.....	4-1
4.2	Battery.....	4-7
4.3	PC Card.....	4-8
4.4	Expansion Memory.....	4-9
4.5	HDD.....	4-11
4.6	Keyboard.....	4-14
4.7	Wireless LAN Unit.....	4-17
4.8	Optical Media.....	4-19
4.9	CPU.....	4-22
4.10	Display Assembly.....	4-26
4.11	The Cover.....	4-30
4.12	System Board.....	4-34
4.13	Modem.....	4-36
4.14	Fan.....	4-37
4.15	LED/Button Board.....	4-39
4.16	TouchPad.....	4-41
4.17	Speakers.....	4-43
4.18	Display Mask.....	4-45
4.19	FL Inverter Board.....	4-47
4.20	LCD Module.....	4-49

Appendices

Appendix A Handling the LCD Module..... A-1
Appendix B Board Layout..... B-1
Appendix C Pin Assignments C-1
Appendix D Keyboard Scan/Character Codes..... D-1
Appendix E Key Layout E-1
Appendix F Satellite A30 Series Screw Torque List F-1
Appendix G Reliability G-1

Chapter 1

Hardware Overview

Chapter 1 Contents

1.1	Features	1-1
1.2	System Unit.....	1-5
1.3	3.5-inch Floppy Disk Drive	1-8
1.4	2.5-inch Hard Disk Drive.....	1-9
1.5	DVD-R/RW/RAM Drive	1-10
1.6	Power Supply	1-11
1.7	Batteries	1-13
	1.7.1 Main Battery.....	1-14
	1.7.2 RTC battery	1-15

Figures

Figure 1-1	3.5-inch FDD.....	1-8
Figure 1-2	2.5-inch HDD	1-9
Figure 1-3	DVD-R/RW/RAM drive	1-10

Tables

Table 1-1	3.5-inch FDD specifications.....	1-8
Table 1-2	2.5-inch HDD specifications	1-9
Table 1-3	DVD-ROM drive specifications.....	1-10
Table 1-4	Battery specifications	1-13
Table 1-5	Time required for quick charges	1-14
Table 1-6	RTC battery charging/data preservation time	1-15

1.1 Features

The Satellite A30 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:

❑ Processor

- Portability Intel Celeron® CPU up to 2.8GHZ(without HTT)
- Portability Intel Pentium® 4 (NW) CPU up to 3.06GHZ (without HTT)
- Portability Intel Pentium® 4 (NW) CPU up to 3.2GHZ (with HTT)
- Portability Intel Pentium® 4(Prescott) CPU up to 3.46GHZ(with HTT)
- Micro FC-PGA package CPU

❑ Chipset

- Intel Montara-GT (RG 82852 GME)
- Intel ICH4-M (FW 82801 DM)
- PC87591 for Keyboard Controller, Battery management Unit, and RTC.
- ENE CB1410-B0 for PC Card Bus controller.
- Integrated VGA solution in North Bridge (Montara – GT)
- ALC202 for AC'97 CODEC.
- VT6301S for IEEE 1394 controller.
- Realtek RTL8101L on board LAN.

❑ Memory

- On board two 200-pin +2.5V DDR SDRAM SO-DIMM connectors, supporting DDR SDRAM SO – DIMMs. Can upgrade to 2GB using two 1GB SO-DIMMs.
- 128KB/256 KB/512KB/1MB L2 Cache on CPU.
- 16MB VGA DDR RAM shared with System Memory.

❑ HDD

Following three sizes of HDD are available: 30GB/40GB/60GB/80GB.

- Bus Master IDE
- 9.5m/m, 2.5” HDD Support
- Support Ultra 100 synchronous DMA

❑ FDD

Optical drive module

- 5.25" 12.7mm height COMBO device
- 5.25" 12.7mm height DVD-R/RW device
- 5.25" 12.7mm height DVD Multi device

 I/O Ports

- One 25 pins Parallel port, EPP/ECP Capability
- One 15 pins CRT port, Support DDC 2B
- One TV-out connector
- One MIC In port
- On Line In port
- One Headphone-out
- One DC-In Jack
- One type II PC Card CardBus slot
- Two USB 2.0 ports
- One RJ11/RJ45 Port
- VR for volume control
- One IEEE 1394 port
- One FIR port

 Options

- 128MB/256MB/512MB/1024MB DDR SDRAM SO-DIMMs
- MINI PCI module (802.11b Agere wireless LAN module/802.11a+b Askey wireless LAN module/802.11a+b+g Askey wireless LAN module/802.11b+g Askey wireless LAN module)
- MDC Modem
- Dual-Band Antenna for Wireless LAN Communication.

 PC Card Organization

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

 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.

TouchPad

This pointing device control stick, 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

Following three types of display are available:

- 14.1-inch XGA screen, 1024×768 pixels, 262k color images
- 15.0-inch SXGA screen, 1400×1050 pixels, 262k color images
- 15.0-inch XGA screen, 1024×768 pixels, 262k color images

 Batteries

The computer has two batteries: a Lithium-Ion main battery pack and RTC battery that backs up the Real Time Clock and CMOS memory.

 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 and 480 Mbps serial data transfer. 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 enables connection of an external monitor, which is recognized automatically by Video Electronics Standards Association (VESA) Display Data Channel (DDC) compatible functions.

 PC Card Slot

The PC Card Slot accommodates one 5mm card (Type II) and supports SRAM, OTPROM, FLASH ROM, and mask ROM memory cards up to 64MB as well as MODEM/LAN cards, ATA cards and CardBus cards. ACPI 1.0b compliant.

 Sound system

A REALTEK ALC202 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.

❑ Internal modem

The internal modem provides capability for data and fax communication and supports ITU-T V.90. For data reception it operates at 56,000 bps and for data transmission it operates at 33,600 bps. For fax transmission it operates at 14,400 bps. The speed of data transfer and fax depends on analog telephone line conditions. It has an RJ-11 modem jack for connecting to a telephone line.

❑ LAN port

The computer comes with an RJ-45 Local Area Network (LAN) port. The LAN port provides connectivity for LAN. It supports IEEE 802.3 10Base-T and 100Base-T. It also supports Wake on LAN and Remote Wake Up (RWU).

❑ CD/Digital Mode Button and audio/video control buttons

Unlock the control buttons by pressing the CD/Digital Mode Button for three seconds. When unlocked, the CD or Digital LED will light on the front panel. When unlocked, press the CD/Digital Mode Button briefly to switch between CD mode and digital mode. CDs can not be played with the computer turned off. Pressing play in digital mode will launch the digital music player application.

1.2 System Unit

The system unit is composed of the following major components:

❑ Processor

- Portability Intel Celeron® CPU up to 2.8GHZ(without HTT)
- Portability Intel Pentium® 4 (NW) CPU up to 3.06GHZ (without HTT)
- Portability Intel Pentium® 4 (NW) CPU up to 3.2GHZ (with HTT)
- Portability Intel Pentium® 4(Prescott) CPU up to 3.46GHZ(with HTT)
- Micro FC-PGA package CPU

❑ Memory Controller Hub (MCH)

- System DDR SDRAM
 - Two JEDEC standard 200-pins DDR SDRAM SO-DIMM connectors, support +2.5V 256/512MB/1024MB each connector.
- System BIOS
 - 512KB Flash ROM

❑ System Logic

- Intel 852GME chipset GMCH
- Integrated DRAM controller
- Hub Interface to Intel ICH4-M
- Power Management Functions

❑ Video Subsystem

- UMA VGA Memory up to 64MB
- Display Core Frequency of 200/250/266MHZ
- 3D Graphics Engine
- Analog Display support
- Digital Video out port(DVOB and DVOC)support
 - DVOB With 165-MHZ dot clock support for 12 bit interface.
- Dedicated 2FP(local flat panel) interface
 - Single or dual channel LVDS panel support up to SXGA+ panel, resolution with frequency range from 25MHZ to 112MHZ per channel.

❑ SMsC LPC 47N227 Super I/O with LPC Interface

- PC99 and ACPI 1.0b Compliant
- Programmable Wakeup Event Interface
- SMI Support
- Two IRQ Input Pins

- Intelligent Auto Power Management
- 2.88MB Super I/O Floppy Disk Controller
- Floppy Disk Available on Parallel Port Pins (ACPI Compliant)
- Enhanced Digital Data Separator
- 2 Mbps, 1Mbps, 500 Kbps, 300 Kbps, 250 Kbps Data Rates
- Programmable Precompensation Modes
- Two Full Function Serial Ports
- High Speed NS 16C550 Compatible UARTs with Send/Receive 16-Byte FIFOs
- Supports 230k and 460k Baud
- Programmable Baud Rate Generator
- Modem Control Circuitry
- Infrared Communications Controller
- IrDA v1.2 (4Mbps), HPSIR, ASKIR, Consumer IR Support
- 2 IR Ports
- 96 Base I/O Address, 15 IRQ Options and 3 DMA Options
- Multi-Mode Parallel Port with ChiProtect
- Standard Mode IBM PC/XT, PC/AT, and PS/2 Compatible Bidirectional Parallel Port
- Enhanced Parallel Port (EPP)
Compatible – EPP 1.7 and EPP 1.9 (IEEE 1284 Compliant)
- IEEE 1284 Compliant Enhanced Capabilities Port (ECP)
- ChiProtect Circuitry for Protection Against Damage Due to Printer Power-On
- 192 Base I/O Address, 15 IRQ and 3 DMA Options

❑ KBC/EC (Keyboard Controller/Embedded Controller)

- PC87591 is use as keyboard controller and battery management unit

❑ Audio subsystem

Realtek ALC202 for AC97 codec

- 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 CB1410 Card Bus Host Adapter

- 3.3V operation with 5V tolerance
- 144-pin LQEP package for CB 1410 single slot Cardbus controller compliant with
 - PCI Local Bus Specification, Revision 2.2.
 - PCI bus Power Management Interface Specification, Revision 1.1
 - PCI Mobile Design Guide, Version 1.1
 - Advanced Configuration and Power Inface Specification, Revision 1.0
 - PC99 System Design Guide
 - PC Card Standard, March 1997
- Interrupt configuration
 - Supports parallel PCI interrupts
 - Supports parallel IRQ and parallel 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 D3 Cold (CB-1420 and CB-1410 only)
- Supports D3STAE# (CB-1410 only)
- DMA Control Logic
- Supports PC/PCI DMA
- Supports Distributed DMA
- Power Switch Interface
- Supports parallel 4 wire power switch interface (CB-1410 and CB-1211)
- Misc Control Logic
- Supports serial EEPROM interface
- Supports socket activity LED
- Supports 5 GPIOs and GPE#
- Supports Zoomed Video Port
- Supports SPKPOUT, CAUDIO and RIOUT#
- Supports PCI LOCK#

1.3 3.5-inch Floppy Disk Drive

The 3.5-inch FDD is a thin, high-performance reliable drive that supports 720KB (formatted) 2DD and 1.44MB (formatted) 2HD disks.

The FDD is shown in Figure 1-1. The specifications for the FDD are listed in Table 1-1.

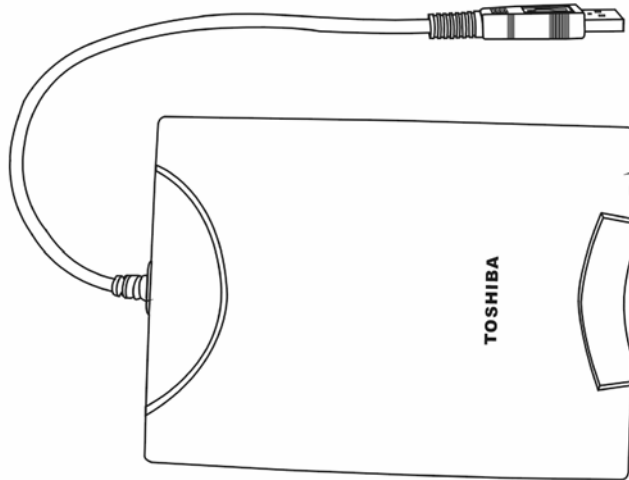


Figure 1-1 3.5-inch FDD

Item	2MB mode	1MB mode
Storage capacity (KB)		
Unformatted	2,000	1,000
Formatted	1,440	720
Number of heads	2	2
Number of cylinders	80	80
Recording method	Modified Frequency Modulation (MFM)	

Table 1-1 3.5-inch FDD specifications

1.4 2.5-inch Hard Disk Drive

The removable 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 or 60GB HDD.

The HDD is shown in Figure 1-2. Specifications are listed in Table 1-2.

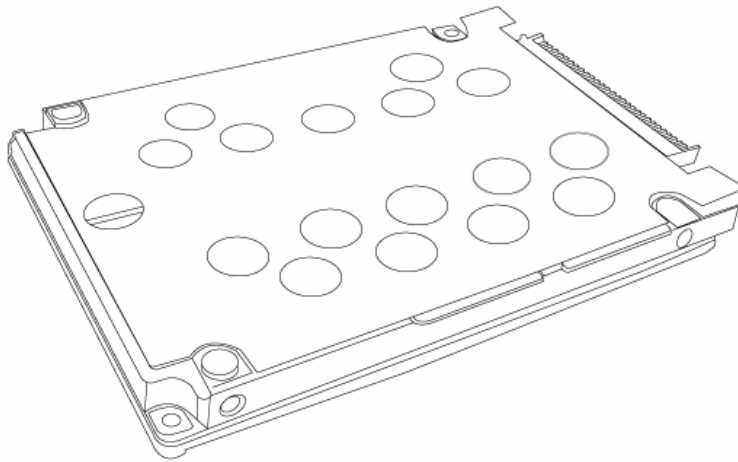


Figure 1-2 2.5-inch HDD

Items	Toshiba MK3021GAS (30GB)	Toshiba MK4021GAS (40GB)	Toshiba MK6021GAS (60GB)
Formatted capacity (GB)	27.94	37.26	55.89
Logical Blocks(LBA)	58,605,120	78,125,000	117,187,500
Rotational speed (rpm)	4,200	4,200	4,200
Buffer (MB)	2	2	2
Bytes per sector	512	512	512

Table 1-2 2.5-inch HDD specifications

1.5 DVD-R/RW/RAM Drive

Matsushita CD-RW/DVD-ROM UJDA740, DVD-RAM UJ-810, DVD-ROM SR-8177 and TOSHIBA CD-RW/DVD SD-R2212, DVD-R/-RW SD-R6012 accommodates either 12cm (4.72-inch) or 8cm (3.15-inch) CDs or DVDs. It provides maximum eight-speed play: reads 10,820KB per second on a maximum DVD-ROM mode play and 3,600KB per second on a maximum CD-ROM mode play.

The optical media drive is shown in Figure 1-3. Specifications for the TOSHIBA DVD-R/-RW SD-R6012 drive are described in table 1-3.

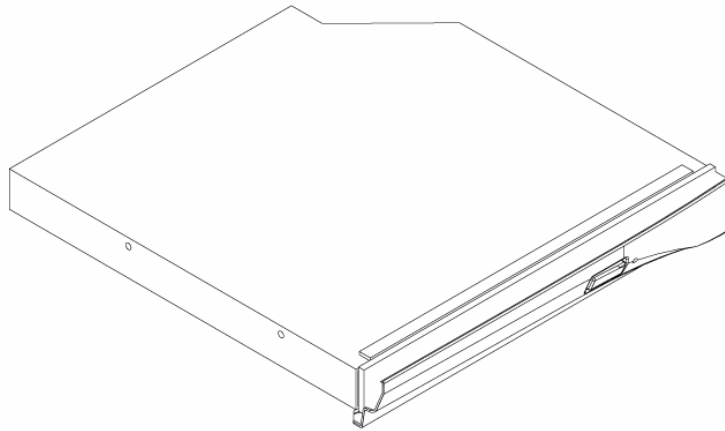


Figure 1-3 DVD-R/RW/RAM drive

Read Speed:	8x DVD-ROM; 24x CD-ROM
Write Speed:	16x CD-R; 4x CD-RW; 8x High Speed; 1x DVD-R; 1x DVD-RW; 2x DVD-RAM
Power Supply:	Single +5V
Audio:	Output Level: 0.7 +/- 0.15 Vrms Frequency: 20 HZ – 20 kHz +/- 3 dB S/N Ratio: >= 80 dB (1 kHz, EIAJ) Distortion: <= 0.1% (1 kHz, EIAJ) Channel Separation: >= 65 dB (1 kHz, EIAJ)
Power Supply:	Operating Voltage: DC 5 V +/- 0.25V Power Consumption: Peak 1800 mA (max.), Read (CD) 1100 mA (typ.), Read (DVD) 950 mA (typ.), Write 1000 mA (typ.), Standby 100 mA (typ.) Ripple: 100 mVp-p max.
ATAPI Interface:	PIO Mode: 16.6 MB/s (PIO mode4) DMA Mode: 16.6 MB/s (Multi-word mode2) Ultra DMA Mode: 33.3 MB/s (Ultra DMA mode2)
Access Time:	DVD-ROM 180 ms typ. (1/3 stroke); CD-ROM 130 ms typ. (1/3 stroke)
Start Up/Stop Time:	15s/6s

Table 1-3 DVD-ROM drive specifications

1.6 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.

1.7 Batteries

The computer has two types of batteries:

- Main battery pack
- 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 Table 1-4.

Battery name	Material	Output voltage	Capacity
Main battery	Lithium-Ion	14.8 V	6,450 mAh
RTC battery	Lithium	3.0 V	14 mAh

Table 1-4 Battery specifications

1.7.1 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 time required for quick charges is listed in Table 1-5.

Status	Charging time
Normal charge (power on)	8 hours or longer
Quick charge (power off)	About 4 hours

Table 1-5 Time required for quick charges

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.

1.7.2 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. Table 1-6 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

Table 1-6 RTC battery charging/data preservation time

Chapter 2

Troubleshooting Procedures

Chapter 2 Contents

2.1	Troubleshooting	2-1
2.2	Troubleshooting Flowchart	2-2
2.3	Power Supply Troubleshooting	2-7
2.4	Display Troubleshooting	2-12
2.5	Keyboard Troubleshooting	2-15
2.6	External USB Devices Troubleshooting	2-18
2.7	TV-Out Failure Troubleshooting	2-20
2.8	Printer Port Troubleshooting	2-22
2.9	Touch Pad Troubleshooting	2-24
2.10	Speaker Troubleshooting	2-26
2.11	DVD-ROM and Multi-Drive Troubleshooting	2-28
2.12	Modem Troubleshooting	2-31
2.13	PC Card Troubleshooting	2-33
2.14	IEEE 1394 Troubleshooting	2-35
2.15	Wireless LAN Troubleshooting	2-37

Figures

Figure 2-1	Troubleshooting flowchart	2-3
Figure 2-2	Power Supply Troubleshooting Process.....	2-7
Figure 2-3	Display troubleshooting process	2-12
Figure 2-4	Keyboard troubleshooting process	2-15
Figure 2-5	External USB device troubleshooting process	2-18
Figure 2-6	TV-out troubleshooting process	2-20
Figure 2-7	Printer port troubleshooting process.....	2-22
Figure 2-8	Touch Pad troubleshooting process.....	2-24
Figure 2-9	Speaker troubleshooting process	2-26
Figure 2-10	DVD-ROM / Multi-Drive troubleshooting process	2-28
Figure 2-11	Modem troubleshooting process	2-31
Figure 2-12	PC Card troubleshooting process	2-33
Figure 2-13	IEEE 1394 troubleshooting process	2-35

Tables

Table 2-1	Battery LED	2-8
Table 2-2	DC-IN LED	2-9

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. Touch Pad | 11. IEEE 1394 port |
| 2. Keyboard | 7. Speaker | 12. Wireless LAN system |
| 3. USB ports | 8. DVD-ROM and CD-RW | |
| 4. TV-out port | 9. Modem | |
| 5. Printer (parallel) port | 10. PC CARD unit | |

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

The following tools are necessary for implementing the troubleshooting procedures:

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

2.2 Troubleshooting Flowchart

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.

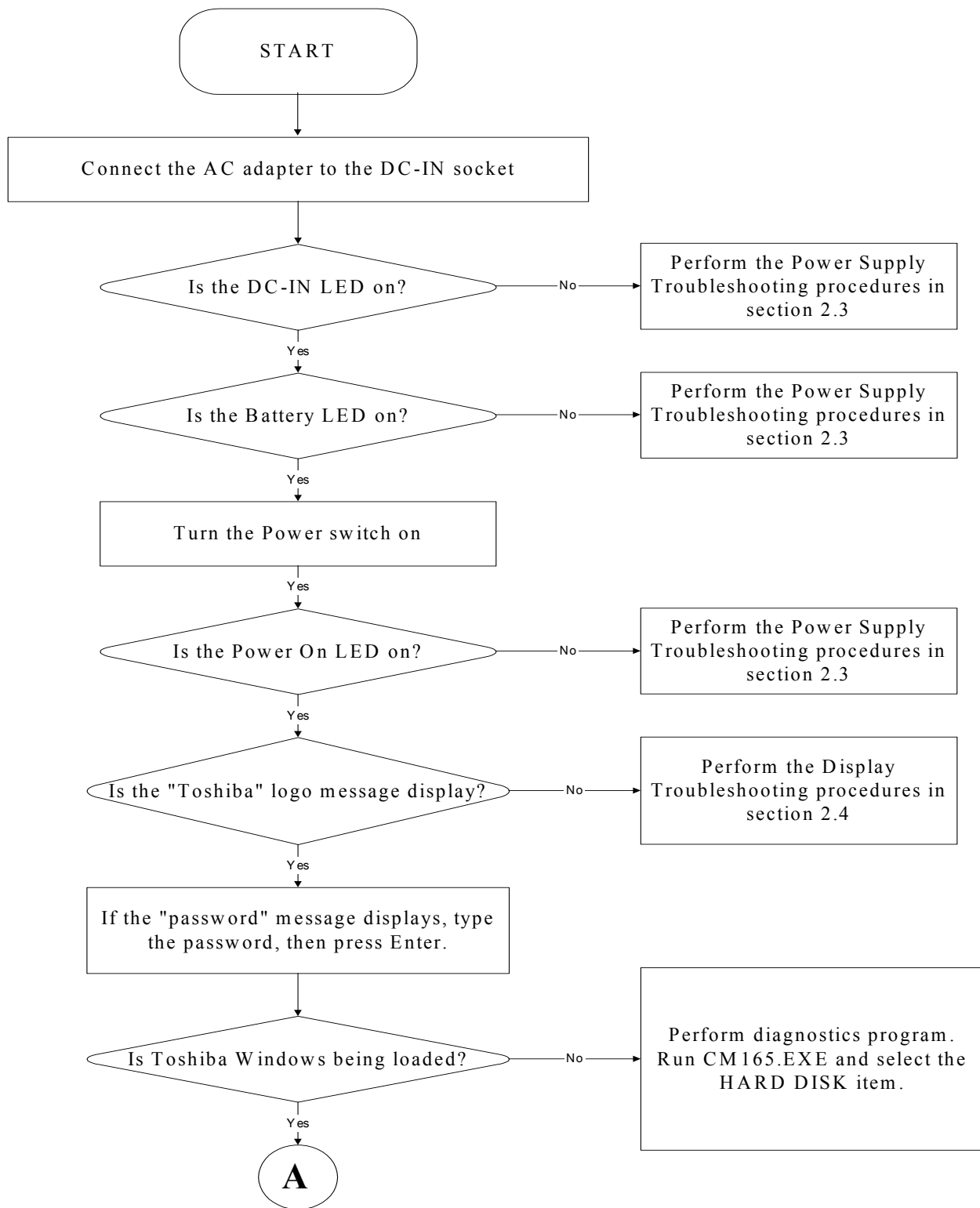


Figure 2-1 Troubleshooting flowchart (1/2)

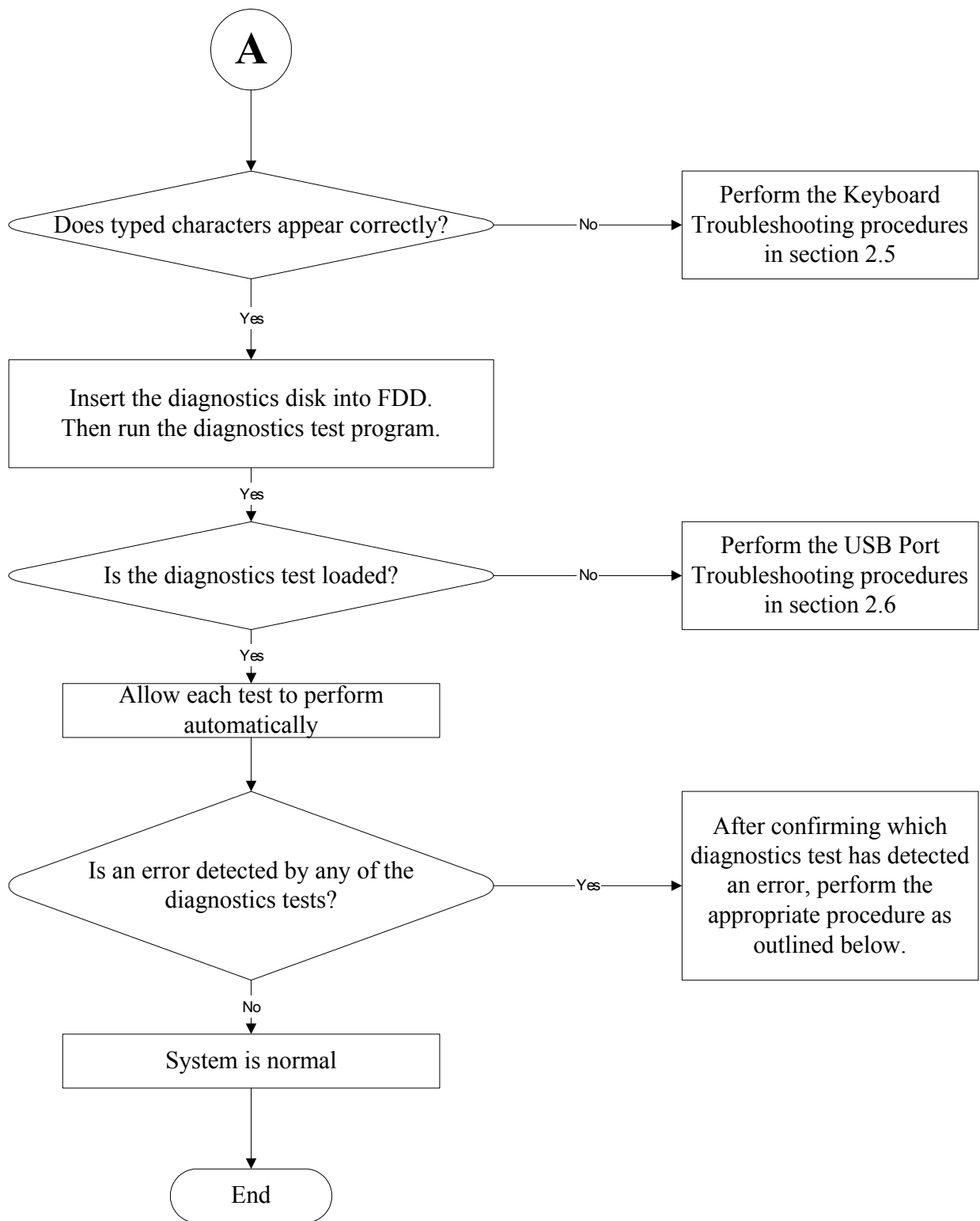


Figure 2-1 Troubleshooting flowchart (2/2)

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 keyboard test, perform the Keyboard Troubleshooting procedures in Section 2.5.
4. If an error is detected by the USB floppy disk test, perform the USB Port Troubleshooting procedures in Section 2.6.
5. If an error is detected by the printer (parallel) port test, perform the Printer Port Troubleshooting procedures in Section 2.8.
6. If an error is detected by the Touch Pad test, perform the Touch Pad Troubleshooting procedures in Section 2.9.
7. If an error is detected by the audio test, perform the DVD-ROM / Multi-Drive Troubleshooting Procedures in Section 2.11 and the Speaker Troubleshooting procedures in Section 2.10.
8. If an error is detected by the modem test, perform the Modem Troubleshooting Procedures in Section 2.12.

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

1. If an error is detected when using the TV-out connection, perform the TV-Out Failure Troubleshooting procedures in Section 2.7.
2. If an error is detected when using the speakers, perform the Speaker Troubleshooting procedures in Section 2.10.
3. If an error is detected when using the modem, perform the Modem Troubleshooting procedures in Section 2.12.
4. If an error is detected when using the PC Card unit, perform the PC Card Troubleshooting procedures in Section 2.13.
5. If an error is detected when using the IEEE1394 device, perform the IEEE1394 device Troubleshooting procedures in Section 2.14.
6. If an error is detected when using the Wireless LAN, perform the Wireless LAN Troubleshooting procedures in Section 2.15.

2.3 Power Supply Troubleshooting

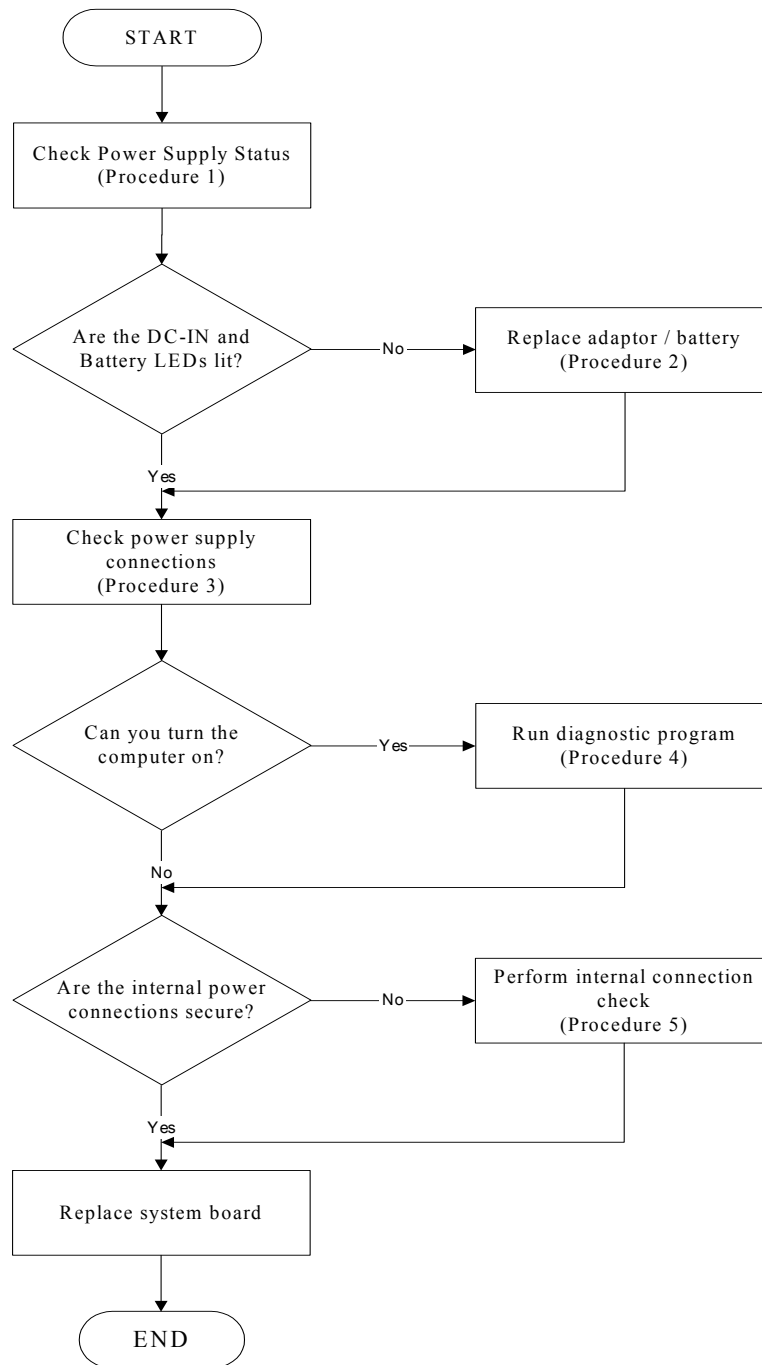


Figure 2-2 Power Supply Troubleshooting Process

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

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

Procedure 1 Power Status Check

The following LEDs indicate the power supply status:

 Battery LED

 DC-IN LED

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

Table 2-1 Battery LED

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

Table 2-2 DC-IN LED

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

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

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

Procedure 2 Adaptor / battery replacement

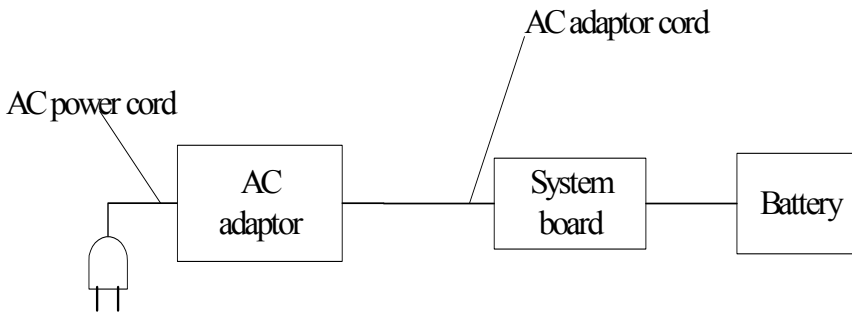
A faulty adaptor may not supply power or may not charge the battery. Perform Check 1.

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

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

Procedure 3 Power supply connection check

The power supply wiring diagram is shown below:



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

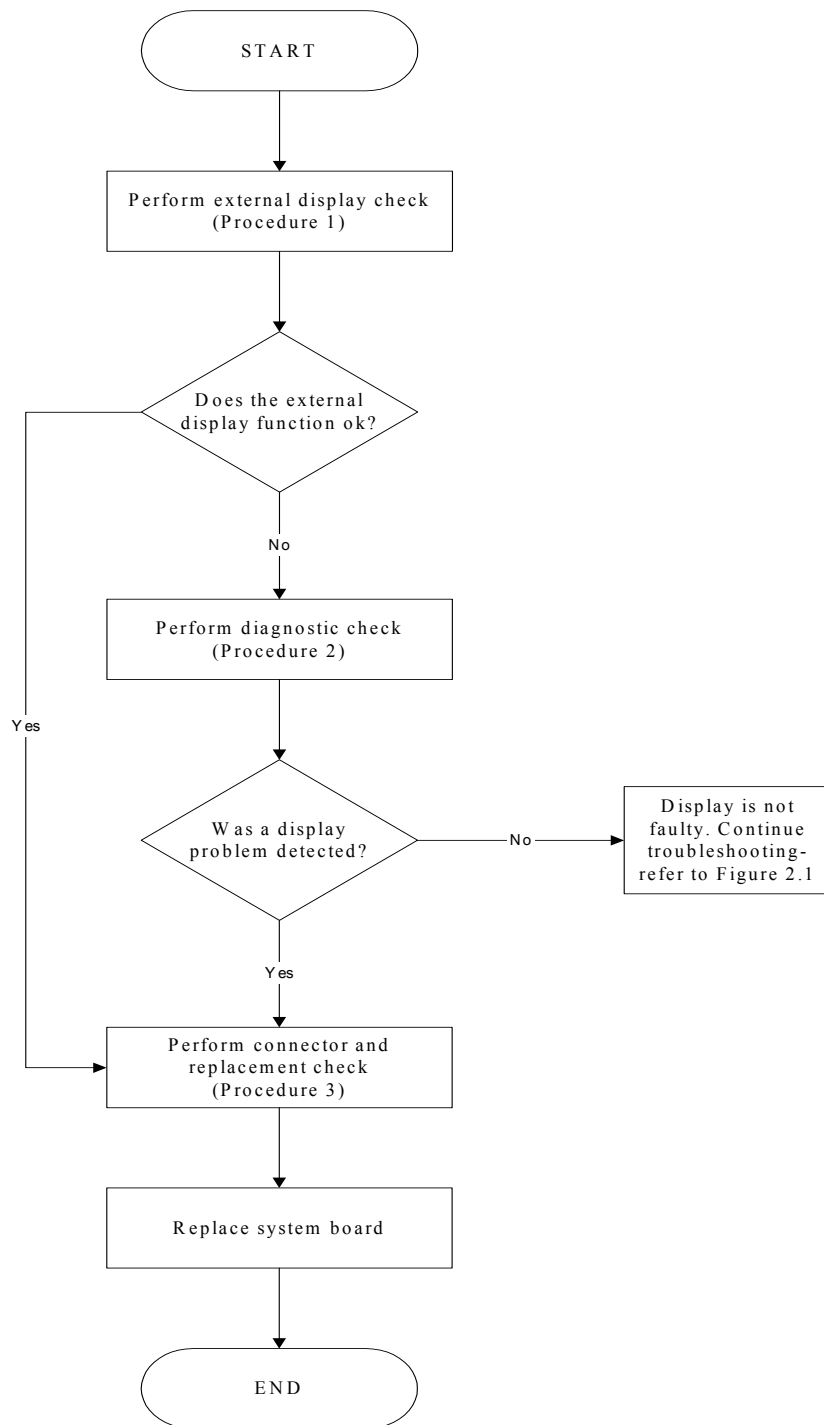


Figure 2-3 Display troubleshooting process

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 Keyboard Troubleshooting

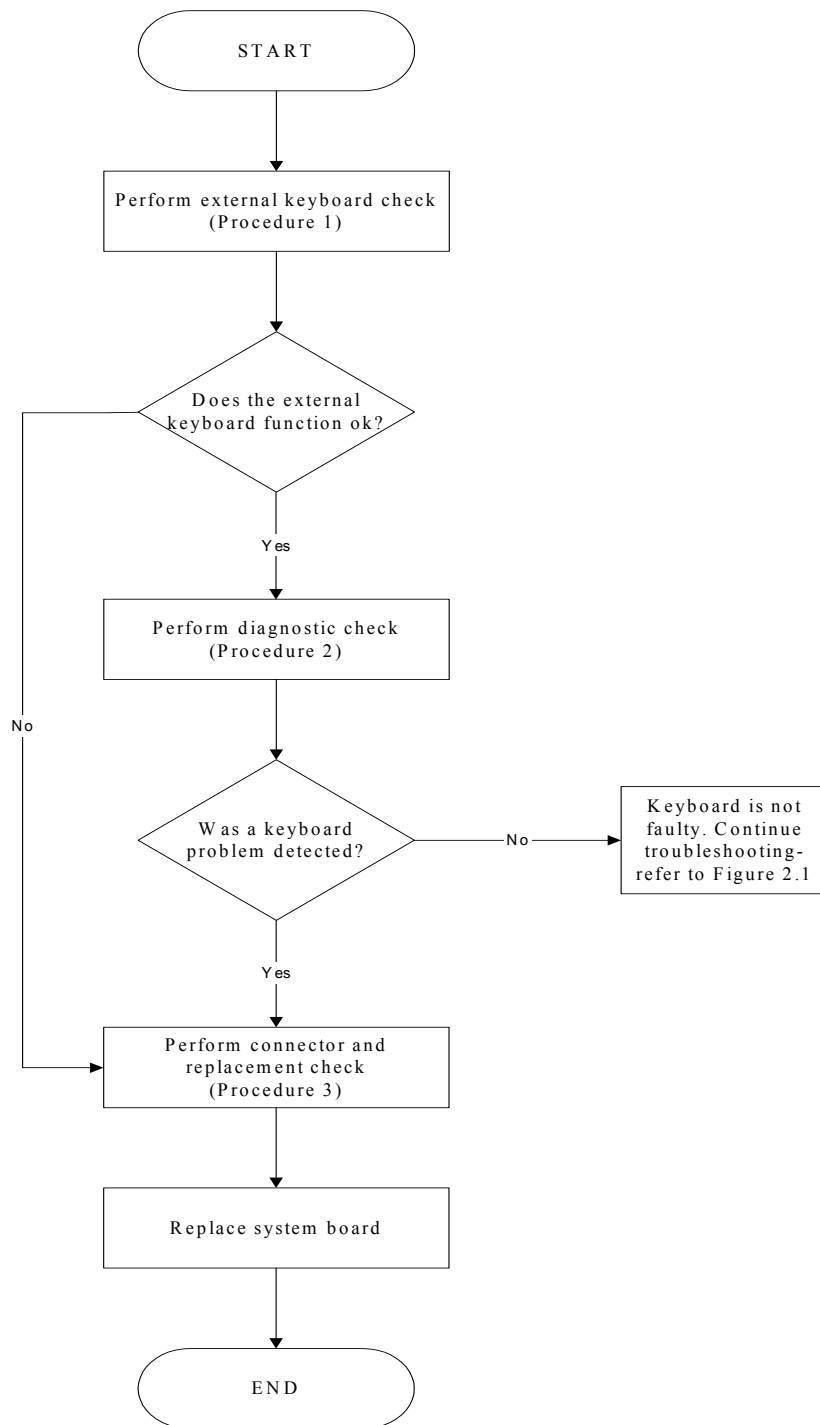


Figure 2-4 Keyboard troubleshooting process

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

Procedure 1: External keyboard check

Procedure 2: Diagnostic check

Procedure 3: Connector and replacement check

Procedure 1 External keyboard check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connector and replacement check

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

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

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

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

If the problem still exists, perform Check 3.

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

2.6 External USB Devices Troubleshooting

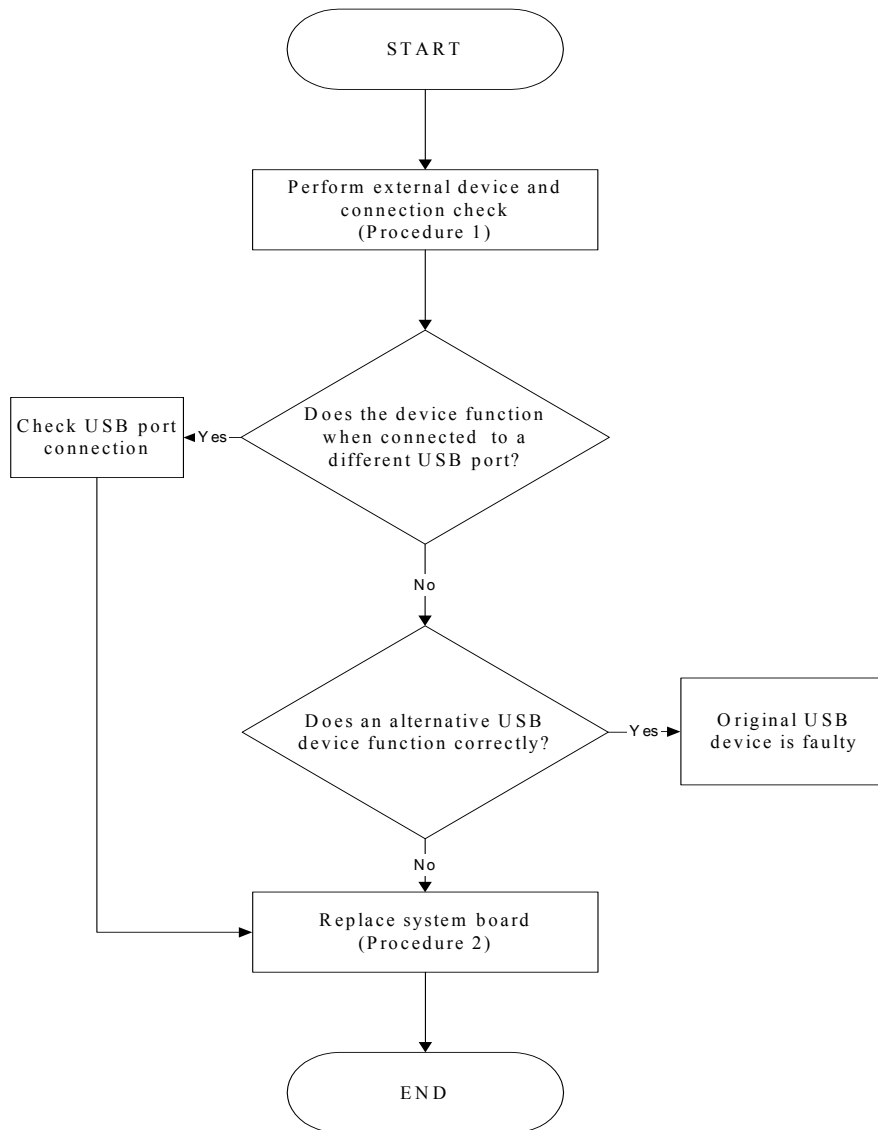


Figure 2-5 External USB device troubleshooting process

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

Procedure 1: External device and connection check

Procedure 2: Replace system board

Procedure 1 External device and connection check

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

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

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

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

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

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

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

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

Procedure 2 Replace system board

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

2.7 TV-Out Failure Troubleshooting

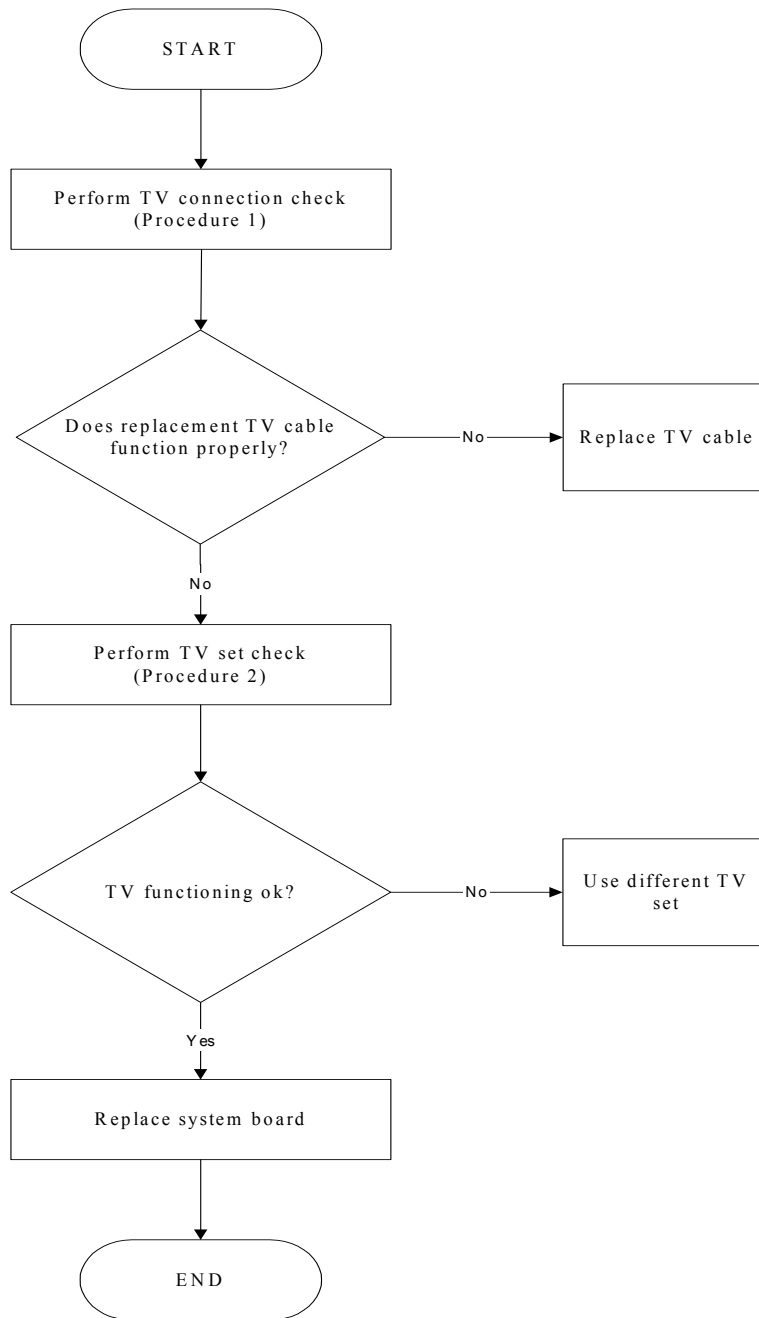


Figure 2-6 TV-out troubleshooting process

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

Procedure 1: TV connection check

Procedure 2: TV set check

Procedure 1 TV connection check

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

- Check 1 Make sure TV cable is firmly plugged into both the TV set and the TV-out port of the computer. If the cable is connected correctly, go to Check 2.
- Check 2 Make sure the TV-out port is firmly secured to the system board of the computer. If the malfunction remains, go to Check 3.
- Check 3 The TV cable may be damaged. Replace with a good cable. If the malfunction remains, go to Procedure 2.

Procedure 2 TV set check

The TV set may be faulty. Perform Check 1:

- Check 1 Try using the set for television reception. If it does not work, the set may be damaged. If the set does work, perform Check 2.
- Check 2 Try connecting a different television to the computer. If the replacement television works, the original set may be damaged. If the replacement set does not work the system board may be damaged. Replace it with a new one following the instructions in Chapter 4.

2.8 Printer Port Troubleshooting

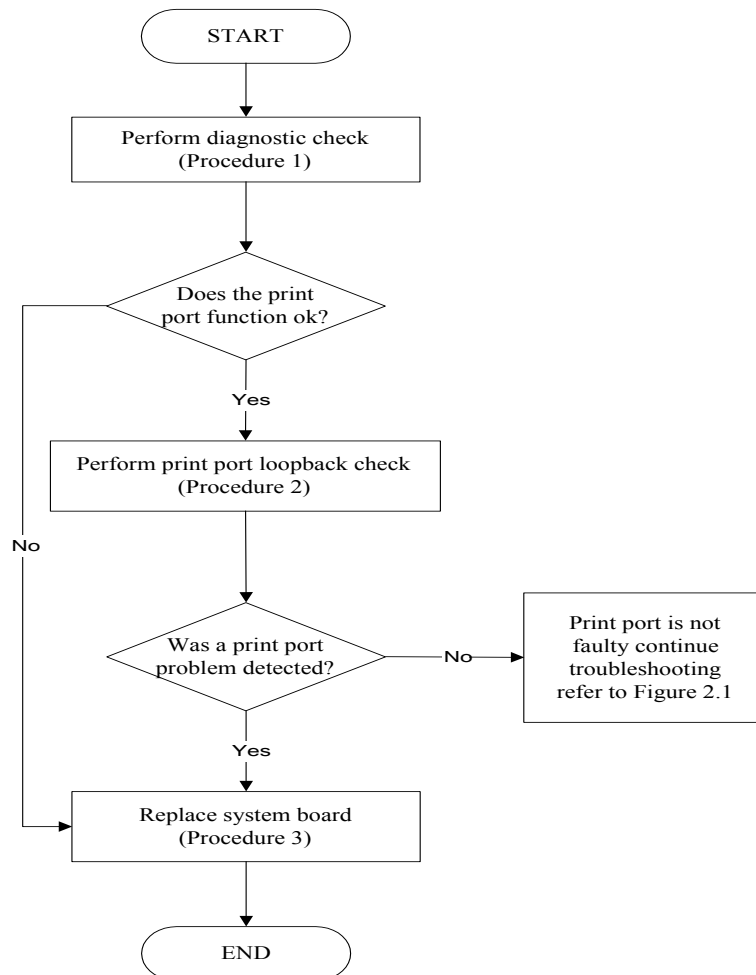


Figure 2-7 Printer port troubleshooting process

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

Procedure 1: Diagnostic check

Procedure 2: Printer port loopback check

Procedure 3: Replace system board

Procedure 1 Diagnostic check

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

Procedure 2 Printer port loopback check

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

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

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

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

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

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

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

Procedure 3 Replace system board

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

2.9 Touch Pad Troubleshooting

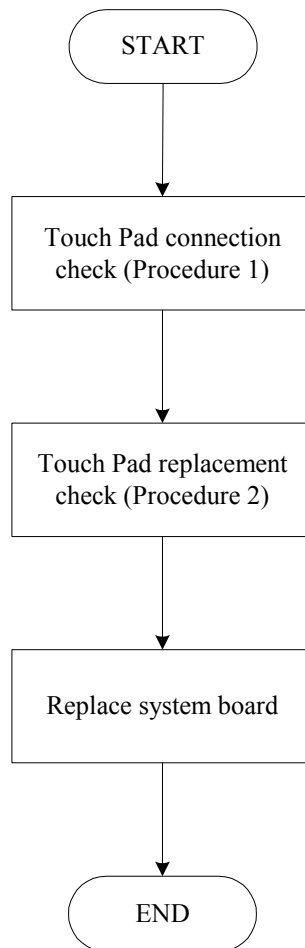


Figure 2-8 Touch Pad troubleshooting process

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.

2.10 Speaker Troubleshooting

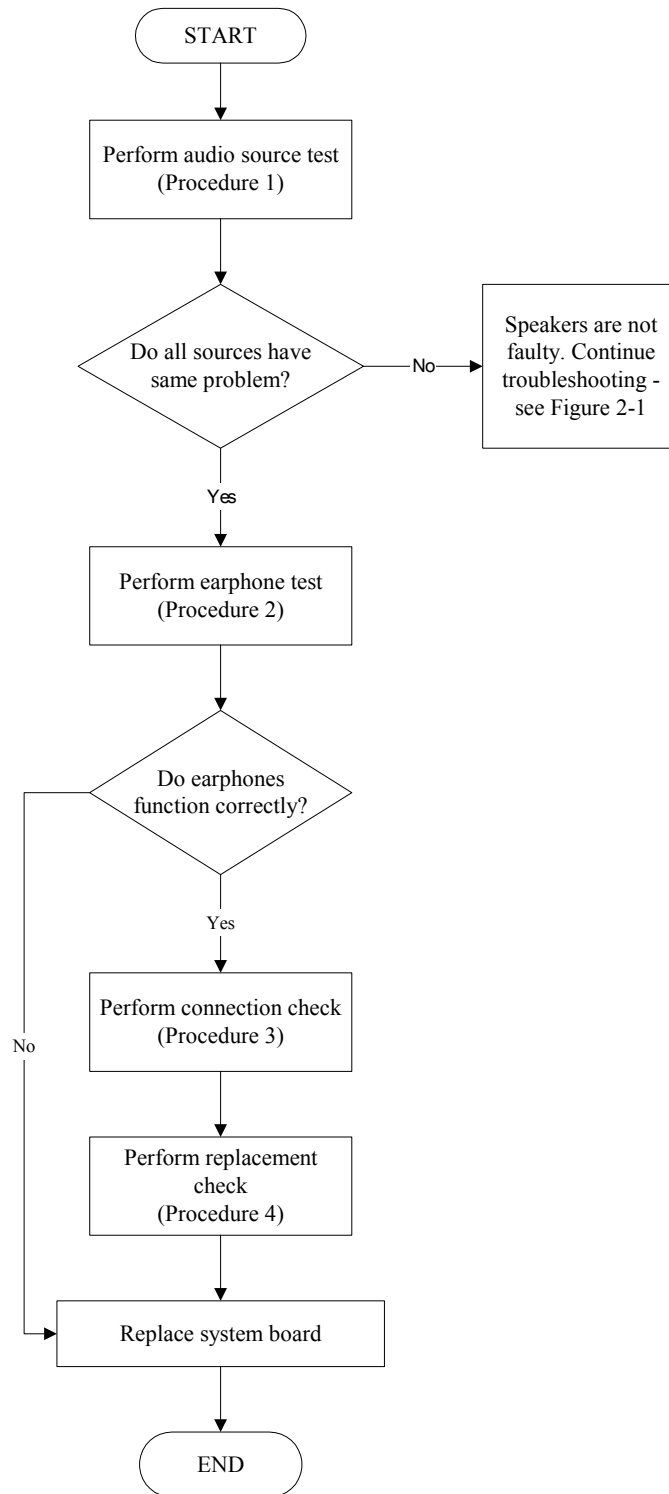


Figure 2-9 Speaker troubleshooting process

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

Procedure 1: Audio source test

Procedure 2: Earphone test

Procedure 3: Connection check

Procedure 4: Replacement check

Procedure 1 Audio source test

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

Procedure 2 Earphone test

Connect a set 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.

2.11 DVD-ROM and Multi-Drive Troubleshooting

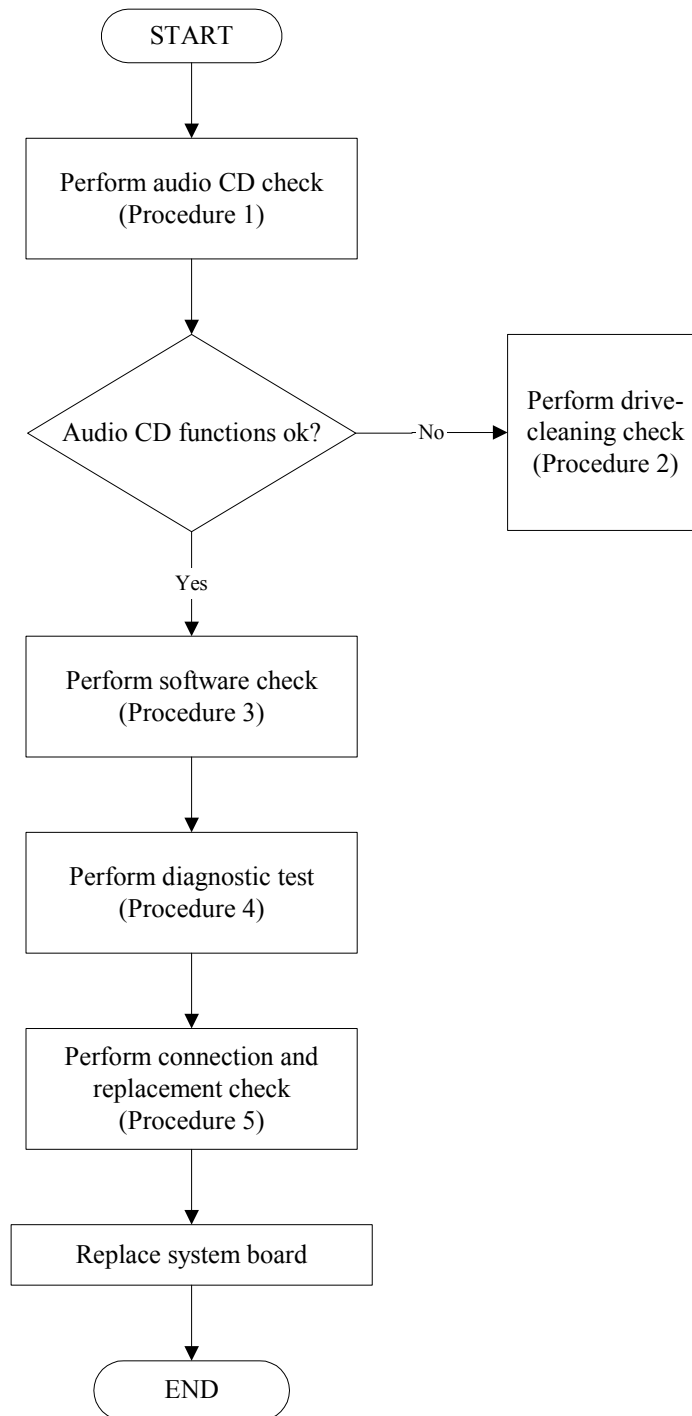


Figure 2-10 DVD-ROM / Multi-Drive troubleshooting process

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*.

2.12 Modem Troubleshooting

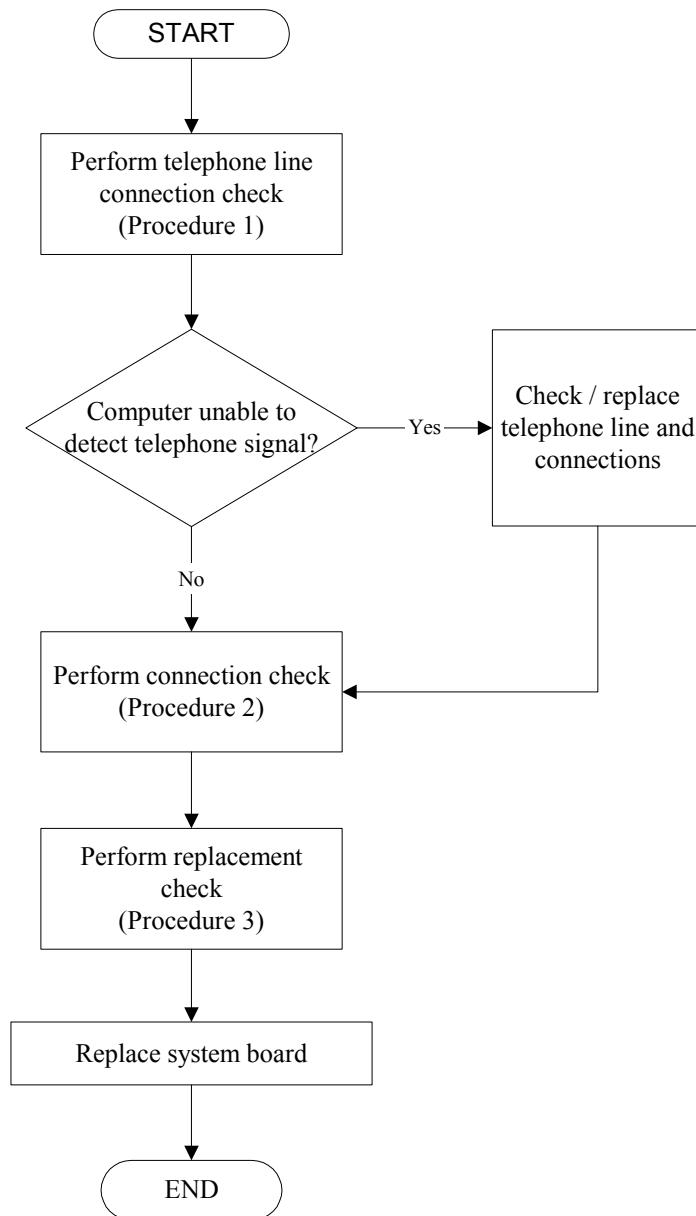


Figure 2-11 Modem troubleshooting process

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

Procedure 1: Telephone line connection check

Procedure 2: Modem card connection check

Procedure 3: Modem card replacement check

Procedure 1 Telephone line connection check

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

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

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

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

Procedure 2 Modem card connection check

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

Procedure 3 Modem replacement check

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

2.13 PC Card Troubleshooting

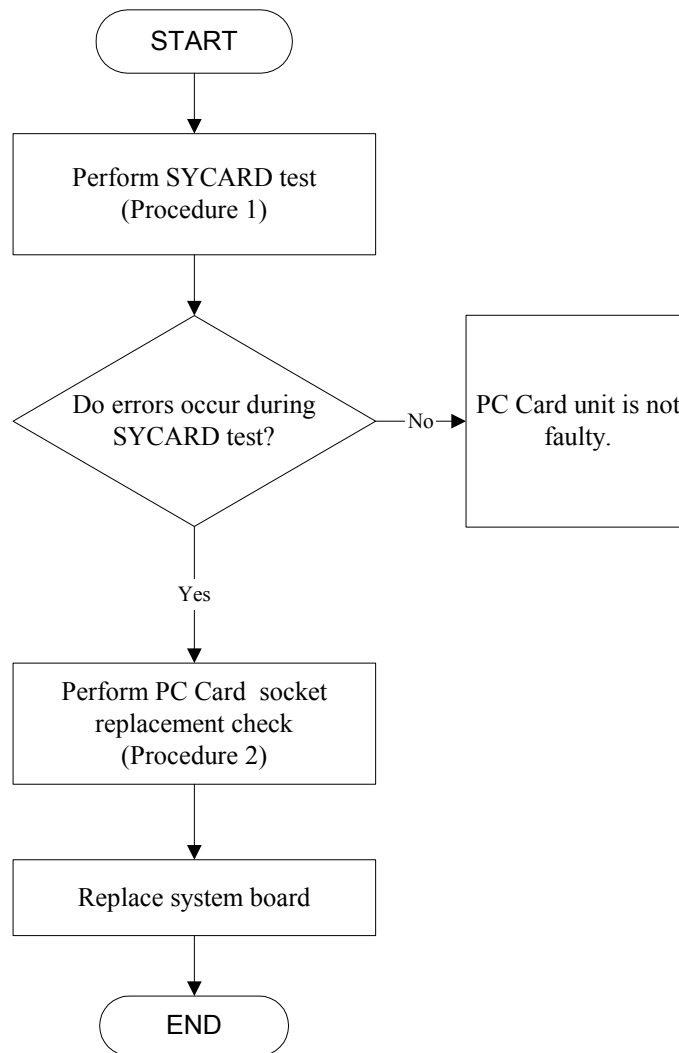


Figure 2-12 PC Card troubleshooting process

This section describes how to determine if the PC 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: PC Card socket replacement check

Procedure 1 SYCARD test

The SYCARD test card contains a PC Card 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 PC Card socket replacement check

The PC Card 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.

2.14 IEEE 1394 Troubleshooting

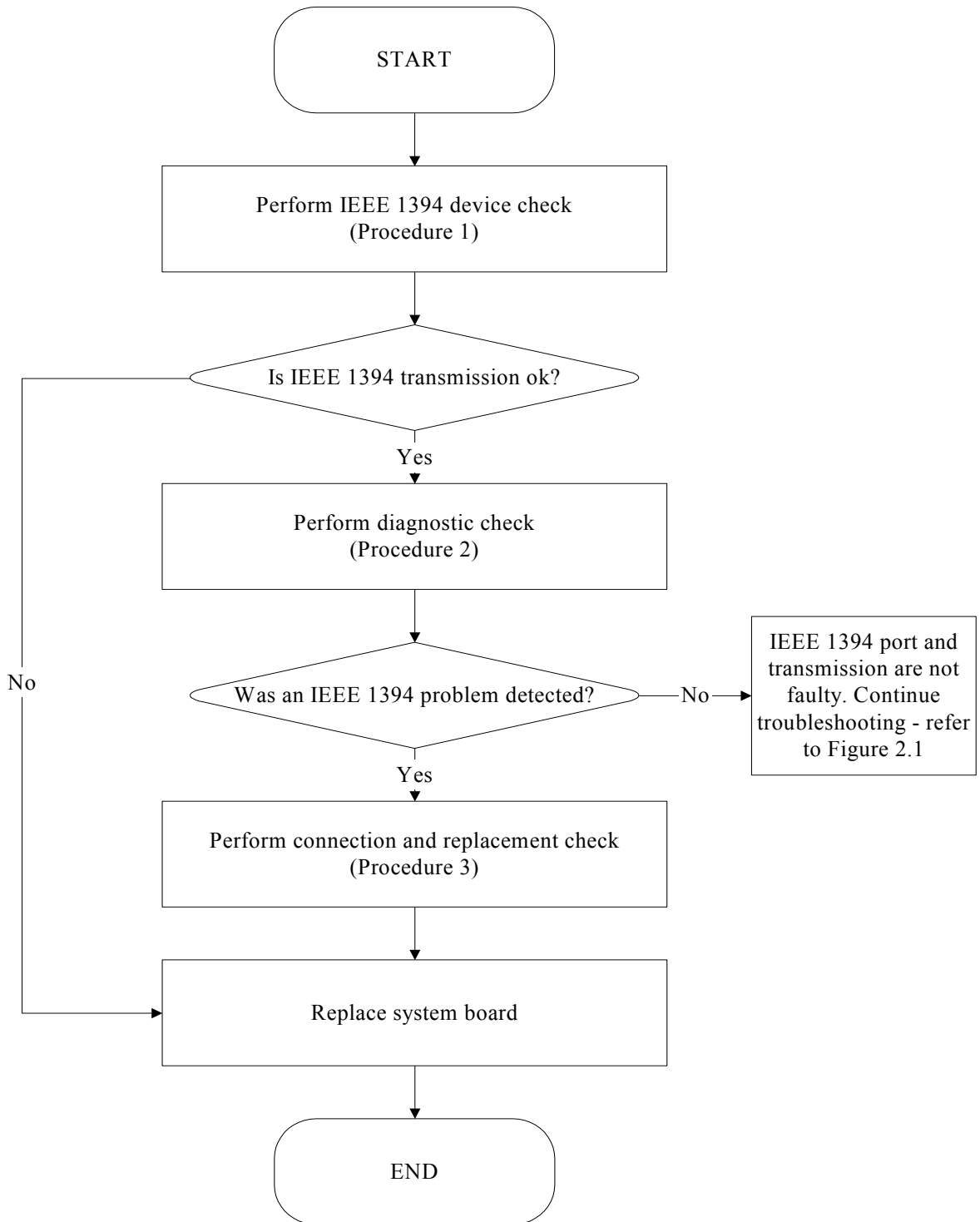


Figure 2-13 IEEE 1394 troubleshooting process

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

Procedure 1: IEEE 1394 device check

Procedure 2: Diagnostic check

Procedure 3: Connection and replacement check

Procedure 1 IEEE 1394 device check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connection and replacement check

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

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

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

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

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

2.15 Wireless LAN Troubleshooting

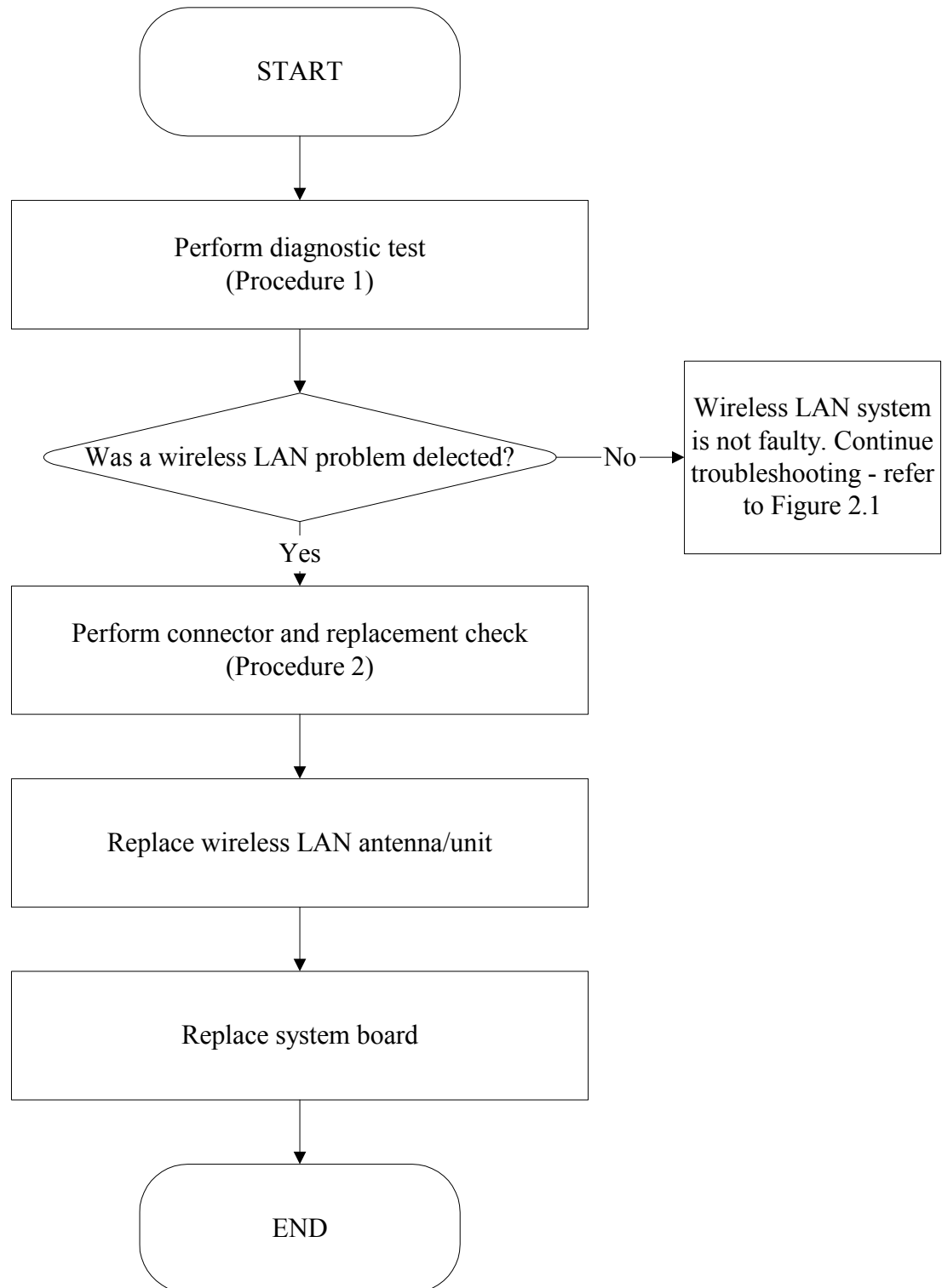


Figure 2-14 Wireless LAN troubleshooting process

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

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

Procedure 1 Diagnostic test

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

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

Procedure 2 Connector and replacement check

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

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

Chapter 3

Test and Diagnostic Operation Handbook

Contents

3.1	The Diagnostic Test	3-1
3.2	Executing the Diagnostic Test	3-3
3.3	Executing the Diagnostic Test	3-6
3.4	DMI Check Test.....	3-7
3.5	PIO Loopback Test	3-8
3.6	RTC Test.....	3-9
3.7	32-Bit for Sycard Test.....	3-10
3.8	Speaker Audio Test.....	3-11
3.9	Fan ON/OFF Test	3-12
3.10	Modem Test	3-13
3.11	Main Battery Charge Test.....	3-14
3.12	FDD Test.....	3-15
3.13	CD-ROM Test.....	3-16
3.14	Keyboard Test.....	3-17
3.15	Mouse (Pad) Test	3-19
3.16	LCD Pixels Mode Test	3-21
3.17	Lid Switch Test.....	3-22
3.18	HDD R/W Test	3-23
3.19	LAN Test	3-25

3.1 The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program (**based on DAL00 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
- PIO LOOPBACK TEST
- RTC TEST
- PC CARD TEST
- SPEAKER AUDIO TEST
- FAN ON/OFF TEST
- MODEM 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

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

- The diagnostics diskette (2 pcs)
- A printer loopback connector (PIO Loopback Test)
- 32-bit Sycard for PC Card function test (Sycard Test)
- A formatted working diskette for the floppy disk drive test (Floppy Disk Drive Test)
- A data CD disc (CD-ROM Test)
- A LAN loopback connector (LAN Test)

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

3.2 Executing the Diagnostic Test

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

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

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 the corresponding letter of a test item, or run two or more test items what you like if you choose them with “Arrow cursors” and “Space Bar” – You can also set a test loop by pressing the “Enter” button. It will ask you if you want to copy the test log file to diskette as reference when the tests finish.

The test list is as follows:

- A. CONFIG CHECK TEST
- B. DMI CHECK TEST
- C. PIO LOOPBACK TEST
- D. RTC Test
- E. 32-BIT FOR SYCARD TEST
- F. SPEAKER AUDIO TEST
- G. FAN ON/OFF TEST
- H. MODEM TEST
- I. MAIN BATTERY CHARGE TEST
- J. FDD TEST
- K. CD-ROM TEST
- L. KEYBOARD TEST
- M. MOUSE (PAD) TEST
- N. LCD PIXELS MODE TEST
- O. LID SWITCH TEST
- P. HDD R/W TEST
- Q. LAN TEST

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

Sapporo X <DBL10> DOS MODE F/T T&D DISKETTE MENU U1.0<2003/08/20>			
A.CONFIG CHECK TEST	<< NO >>	M.MOUSE <PAD> TEST	<< NO >>
B.DMI CHECK TEST	<< NO >>	N.LCD PIXELS MODE TEST	<< NO >>
C.PIO LOOPBACK TEST	<< NO >>	O.LID SWITCH TEST	<< NO >>
D.RTC TEST	<< NO >>	P.HDD R/W TEST	<< NO >>
E.32Bit FOR SYCARD TEST	<< NO >>	Q.LAN TEST	<< NO >>
F.SPEAKER AUDIO TEST	<< NO >>	R.N/A	<< NO >>
G.FAN ON/OFF TEST	<< NO >>	S.N/A	<< NO >>
H.MODEM <LUCENT> TEST	<< NO >>	T.N/A	<< NO >>
I.MAIN BATTERY CHARGE TEST	<< NO >>	U.N/A	<< NO >>
J.FDD TEST	<< NO >>	V.N/A	<< NO >>
K.CD-ROM TEST	<< NO >>	W.TEST ALL	<< NO >>
L.KEYBOARD TEST	<< NO >>	X.COPY LOG TO FDD	<< NO >>
* [A-X] =Unit Item Test * Space =Change Option * ↑↓←→ =Move Cursor			
* Enter =Set Loop Count * Press Esc To Quit			
MESSAGE:		LOOP: _____	

If the test result passes, the following appears:



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



Press any key for the next action – the display below is presented if copying a 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.

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

3.3 Executing the Diagnostic 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 of a unit Part Number to make comparison with known SKU data.

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

It will show if its configuration is correct in **green** or incorrect in **red**.

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

```
<Neil Fu> <2002/8/7F> <Ver 1.0>
Command Line: cfg TabFileName SKU
Example      : cfg btw10tab.txt PS110E-0002S-GR

                Please input the PART NUMBER

example:

                PS110E-0002S-G
                PS110E-033L-FR
                PAE5511CME

                * Need Of Uppercase Character *

Please input:PAE5511CME

CURRENT SPEC IS :
CL 256 UJDA730DVD/CDRW1.00_CDRW_DVD IC25N030ATCS04-0 30000 1.20A

WANTED SPEC IS :
CL 256 UJDA730DVD/CDRW1.00_CDRW_DVD IC25N030ATCS04-0 30000 1.20A

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

3.4 DMI Check Test

Checks if the computer's Desktop Management Interface (DMI) is correct.

DMI includes:

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

It needs input of a unit Part Number before it shows this unit's DMI information and makes a 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 passed or failed after comparison.



```
■ Compal DMI String R/W Utility V2.4.7 ■
Manufacturer(Type1, Offset04h) : TOSHIBA
Product Name(Type1, Offset05h) : DynaBook E5/511CME
Version(Type1, Offset06h) : PAE5511CME
Serial Number(Type1, Offset07h): 72045781C
UUID(Type1, Offset08h) : 9B8CEABF-905F-11D6-9EDB-00023F7993AA
OEM Strings(Part Number,SW Number)(Type11, Offset05h):
=>PAE5511CME,PCM0012B0S01/S3A1133D001

Press any key to continue . . .
```

3.5 PIO Loopback Test

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

- ◆ External Interrupt
- ◆ External Loopback
 - including Pattern test, Data Pin test, Control register test & Control pin/ Status pin test.

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

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

```
***** Parallel Port Test Program !! *** V1.0 10/16/00 **
Testing LPT1 Internal Loopback: Testing patterns...FF FF [ PASS ]
Testing LPT1 External Interrupt...[ PASS ]
Testing LPT1 External Loopback...
  1. Data Pin (p2~p9) & Err Pin (p15) Test ..[ PASS ]
  2. Control Register Test ..[ PASS ]
  3. Control Pin & Status Pin Test ..[ PASS ] [ PASS ]

Press any key to continue . . .
```

3.6 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 passed or failed when finished.

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

Please Check the result after test.

Press any key to continue . . .

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

Press any key to continue . . .
```

3.7 32-Bit for Sycard Test

Checks the computer's 32-bit PC Card function. The test runs when the Sycard is inserted into a specific slot for test in sequence as shown below.

NOTE: To execute this test, you must make sure the test connector of Sycard marked "CARDBUS".

There are two slots to be tested. A "beep" is generated during test for each slot.

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

```

PCCtest 450/550 CardBus test software v2.06
02 026933 on Bus 2, Function 0, Device 4, Controller 1
Current Slot = 0 PCI Bus = 3 Scratch Buffer = 34BB:0000
CardBus Socket Registers = 000D2000 Test Memory Window = 000D0000 CBus = 3
Checking Socket Controller.....Passed
Power on delay (Vcc = 3.3 volt).....Complete
Basic Operational Test.....Passed
Data Pattern Test.....Passed
Parity Error Test (CPERR#).....Passed
Parity Test (CPAR).....Passed
CSERR# Test.....Passed
Vcc Test.....Passed
Speaker Test.....Passed
CSTSCHG Test.....Passed
CINT# Test.....Passed
CRST# Test.....Passed
CCLKRUN# Test.....Passed
Slave Abort (CSTOP#) Test.....Passed
PCCtest model number UNKNOWN
Configuring PCCtest Master Mode (M1)....Complete
Master Mode Read Test.....Passed
Master Mode Write Test.....Passed
Test completed with 0 errors - PASSED
Press any key to continue . . .

```

3.8 Speaker Audio Test

The speaker audio test allows the user to aurally confirm the speaker functions. It checks both speakers by sounding a three consecutive “beeps.”

NOTE: Remember to turn up the volume to “**Maximum**” before this test starts.

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

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

Test over, no errors found

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

3.9 Fan ON/OFF Test

The fan test allows the user to aurally test whether the fan is working. Follow the procedures below:

- ◆ The computer will turn the fan be “ON” after any key is pressed. Listen to check whether the fan is working or not.

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

- ◆ The computer will stop the fan after any key pressed again. Listen to check if the fan is “OFF” – it means there is no rotating sound.

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

```
** Fan ON/OFF Test ,Please Listen To The FAN Sound !!  
Press Any Key To Start Test ..  
FAN On Test :  
  
FAN Off Test :  
  
Do you hear FAN rotating sound?  
[Y,N]?
```

3.10 Modem Test

The Modem test checks the function of dial tone detection.

NOTE: Remember to plug **phone line** into the Modem connector of unit before this test starts.

The test takes the Modem off-hook and checks for line current. Lack of line current is a failure, as the Codec needs line current to work in this mode – it means that there is no phone line connected, and the test will be aborted and showed “fail”. Then samples are taken, and checked the following items:

- ◆ Two tones.
- ◆ Both tones within a band of 276 to 640 Hz.
- ◆ Tone levels differ from average sample levels by a factor of 10.

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

```
Soft Modem check utility Version 2.32
Found Lucent MR Device @ dev=31, func= 6 codecadr= 2400, dmaadr= 2000
We are the secondary codec 2
PScodecFlag = 2
Global Status Register = 300
Modem Codec ready

Number Of Lines Supported:1
PScodecFlag = 2
Global Status Register = 300

Setting Sample Rates
Initialization complete
Loop current sense value = 3 or about 18 ma

Start In and Out DMA
Wait for DMA to Complete
 2, 1000.0,  1.0,  0.0
Dialtone detected within range
Frequency 1 = 382.812500
Frequency 2 = 375.000000
Loop current sense value = 0 or about 0 ma
```


3.11 Main Battery Charge Test

NOTE: The AC adaptor (90W, 19V / 120W, 19V) for Sapporo X (DBL10) should be connected to successfully run this test.

This test shows and measures the main battery:

- ◆ Battery type (Ni-MH / Lion)
- ◆ Manufacturer (Panasonic / 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 passed or failed when finished.

```
ONLY FOR 87591 T&D Series Battery Test Program.[5911] V1.0 2002/07/23
MAIN Battery
Battery Type: Ni-MH
Manufacturer: Panasonic
Remain charge capacity : 91.8%
Charge Test-> [ PASS ]
Press any key to continue . . .
```

3.12 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 may be erased.

The Floppy Disk Test includes three subtests of the:

1. Sequential seek/verify function (Range: Track 0 ~ 79)
2. Funnel code seek/verify function (Range: Track 0 ~ 79)
3. Write/Read/Compare pattern function (Range: Track 75 ~ 79)

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

The subtests run automatically.

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

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

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

3.13 CD-ROM Test

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

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

The CD-ROM test includes two subtests of the:

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

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

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

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

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

Partial sequential read . . . . 198950

Random read . . . . . 95496      PASS

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

Press any key to continue . . .
```

3.14 Keyboard Test

The keyboard test checks the all keys function.

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

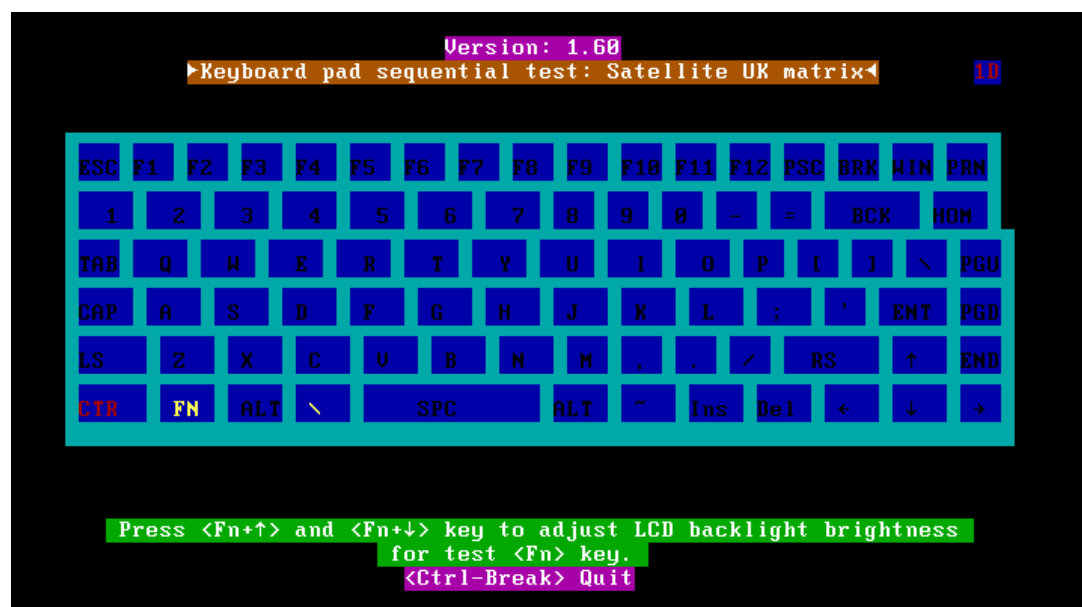
Before keyboard test starts, the keyboard matrix code should be chosen as below display:

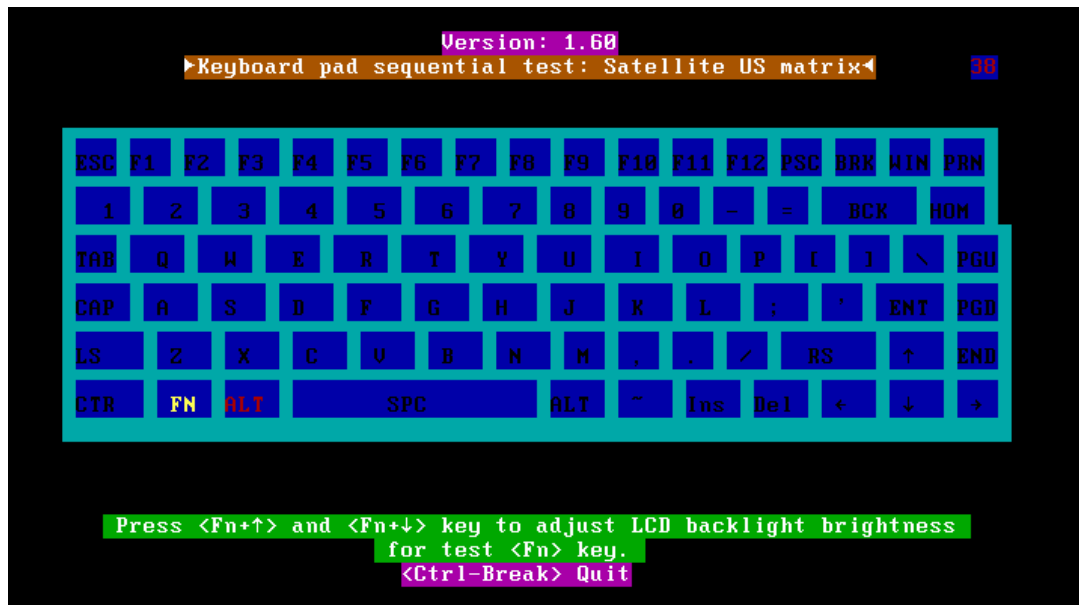
1. **K** (UK, for Europe)
2. **S** (US, for America)

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

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

NOTE: The “**Fn**” key cannot be tested in the keyboard test. To determine whether the “**Fn**” key is working correctly, press “**Fn+F6**” or “**Fn+F7**” keys to check if LCD display brightness change gradually.





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

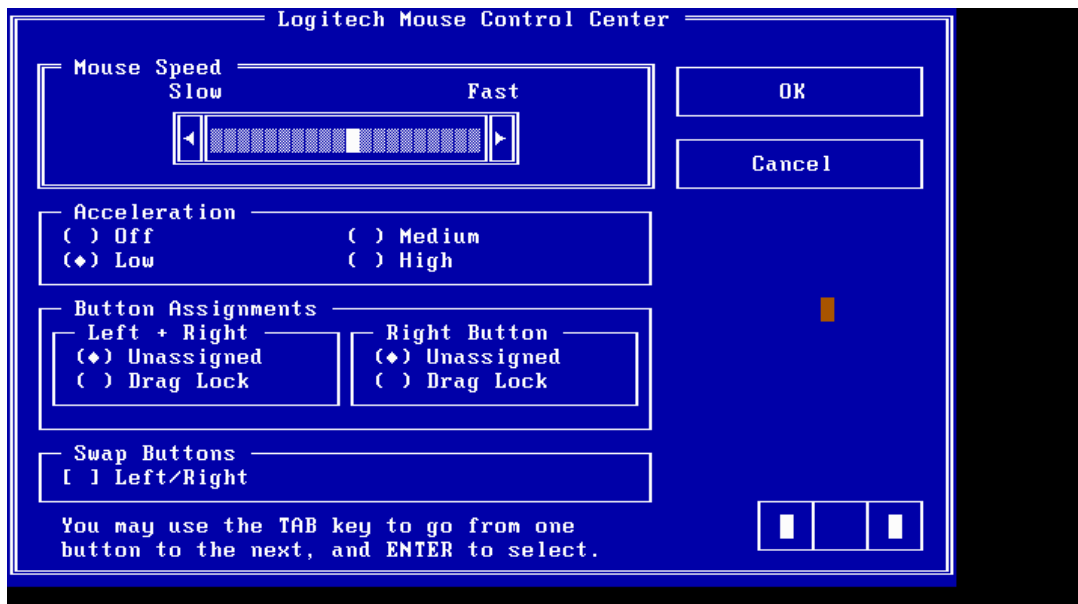
3.15 Mouse (Pad) Test

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.*

This Touch Pad test program does not support "Scroll Button" function.

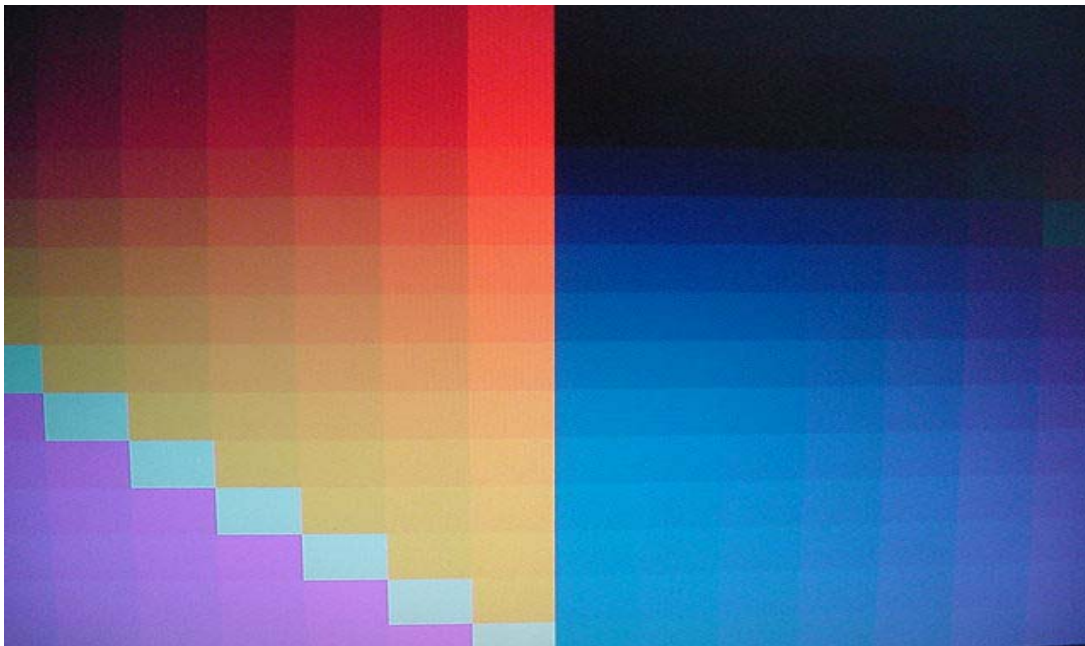
3.16 LCD Pixels Mode Test

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

This test includes two test modes:

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 passed or failed after the question.



3.17 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 passed or failed.

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

3.18 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 the password “**TOSHIBA**” before the 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 above, indicating whether the subtest passed or failed when finished.

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

3.19 LAN Test

The LAN test checks the LAN full-duplex environment.

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

And LAN information will show on the test screen:

- ◆ IO Base – Port: 3000H
- ◆ IRQ – AH, it's "IRQ 10".
- ◆ Node – it is "MAC Address".
- ◆ Line Frame – 1514 Bytes.
- ◆ Line Speed – 100Mbps or 10 Mbps.
- ◆ Bus ID – it's "4".

The LAN test includes two subtests of the:

1. Speed100
 - including Ethernet_802.2, Ethernet_II, Ethernet_SNAP and Ethernet_802.3. All test items are in LSB mode.
2. Speed10
 - including Ethernet_802.2 in LSB mode.

The subtests run automatically.

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

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

                               Press any key to exit

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

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
```

Chapter 4

Replacement Procedures

Chapter 4 Contents

4.1	General.....	4-1
4.2	Battery.....	4-7
4.3	PC Card.....	4-8
4.4	Expansion Memory.....	4-9
4.5	HDD.....	4-11
4.6	Keyboard.....	4-14
4.7	Wireless LAN Unit.....	4-17
4.8	Optical Media.....	4-19
4.9	CPU.....	4-22
4.10	Display Assembly.....	4-26
4.11	The Cover.....	4-30
4.12	System Board.....	4-34
4.13	Modem.....	4-36
4.14	Fan.....	4-37
4.15	LED/Button Board.....	4-39
4.16	TouchPad.....	4-41
4.17	Speakers.....	4-43
4.18	Display Mask.....	4-45
4.19	FL Inverter Board.....	4-47
4.20	LCD Module.....	4-49

Figures

Figure 4-1	Removing the battery	4-7
Figure 4-2	Popping out the eject button	4-8
Figure 4-3	Removing expansion memory screws.....	4-9
Figure 4-4	Opening the expansion memory latches	4-9
Figure 4-5	Removing the expansion memory into the connector slot.....	4-10
Figure 4-6	Removing the optical media drive	4-12
Figure 4-7	Unscrewing the HDD.....	4-12
Figure 4-8	Pulling the HDD out of the connector socket	4-12
Figure 4-9	Removing the HDD from the HDD bay	4-13
Figure 4-10	Inserting the HDD into the HDD bay	4-13
Figure 4-11	Removing the strip cover	4-14
Figure 4-12	Removing the keyboard screws	4-14
Figure 4-13	Removing the keyboard from the chassis	4-15
Figure 4-14	Disconnecting the keyboard cable	4-15
Figure 4-15	Inserting the keyboard.....	4-16
Figure 4-16	Securing the keyboard with screws.....	4-16
Figure 4-17	Replace the strip cover.....	4-16
Figure 4-18	Detaching the connector cables	4-17
Figure 4-19	Pressing the wireless LAN unit latches	4-17
Figure 4-20	Pressing the wireless LAN unit into place.....	4-18
Figure 4-21	Attaching the wireless LAN connector cables.....	4-18
Figure 4-22	Removing the optical media drive	4-19
Figure 4-23	Removing the back screws.....	4-19
Figure 4-24	Removing the back bracket.....	4-19
Figure 4-25	Removing the side screws.....	4-20
Figure 4-26	Removing the optical media drive bracket	4-20
Figure 4-27	Removing the front face.....	4-20
Figure 4-28	Removing the CPU compartment cover screws	4-22
Figure 4-29	Removing the CPU compartment cover	4-22

Figure 4-30	Removing the heat sink screws	4-23
Figure 4-31	Removing the heat sink	4-23
Figure 4-32	Unlocking the CPU cam	4-23
Figure 4-33	Removing the CPU	4-24
Figure 4-34	Unlocking the CPU cam	4-24
Figure 4-35	Aligning the CPU triangle	4-24
Figure 4-36	Inserting the heat sink	4-25
Figure 4-37	Tightening the heat sink screws	4-25
Figure 4-38	Replacing the CPU compartment cover	4-25
Figure 4-39	Removing the strip cover	4-26
Figure 4-40	Removing the joint covers	4-26
Figure 4-41	Detaching the LCD cable	4-27
Figure 4-42	Removing the bracket screws	4-27
Figure 4-43	Lifting the display away from the chassis	4-27
Figure 4-44	Seating the display assembly	4-28
Figure 4-45	Inserting the wireless LAN connector	4-28
Figure 4-46	Connecting the LCD cable	4-28
Figure 4-47	Removing the screws securing the bottom of the cover	4-30
Figure 4-48	Removing the screws securing the top of the cover	4-31
Figure 4-49	Removing the cables	4-31
Figure 4-50	Removing the cover	4-32
Figure 4-51	Attaching the cables	4-32
Figure 4-52	Connecting the screws securing the top of the cover	4-32
Figure 4-53	Removing the screws securing the bottom of the cover	4-33
Figure 4-54	Removing the module support	4-34
Figure 4-55	Removing the system board screws	4-34
Figure 4-56	Removing the system board	4-35
Figure 4-57	Removing the system board screws	4-35
Figure 4-58	Securing the module support	4-35
Figure 4-59	Removing the system board	4-36
Figure 4-60	Removing the screws that secure the fan to the system board	4-37
Figure 4-61	Removing the Northbridge screws	4-37

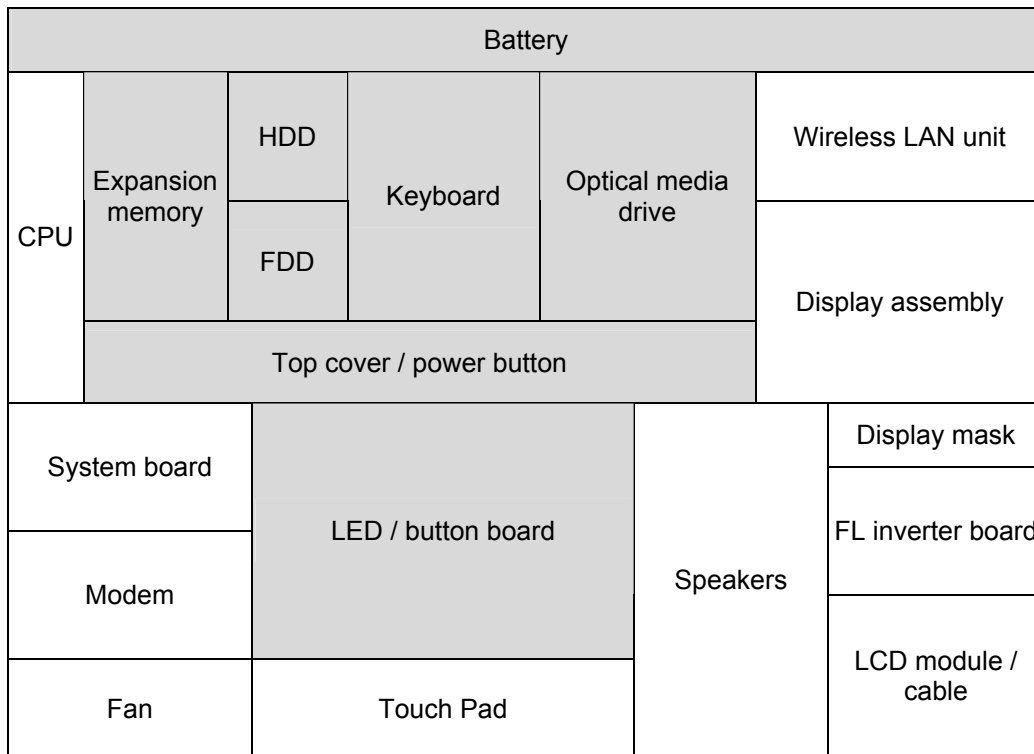
Figure 4-62	Disconnecting the fan power cables	4-38
Figure 4-63	Removing the fan	4-38
Figure 4-64	Removing the LED/button board mounting bracket screw	4-39
Figure 4-65	Removing the mounting bracket and the board	4-39
Figure 4-66	The LED/button board	4-39
Figure 4-67	Removing the TouchPad cable	4-41
Figure 4-68	Detaching the TouchPad bracket screws	4-41
Figure 4-69	Removing the TouchPad board and bracket	4-42
Figure 4-70	Removing the speaker wires	4-43
Figure 4-71	Unscrewing the right speaker.....	4-43
Figure 4-72	Removing the Speakers.....	4-43
Figure 4-73	Removing the mask seals.....	4-45
Figure 4-74	Removing two screws securing the display mask.....	4-45
Figure 4-75	Removing the display mask.....	4-46
Figure 4-76	Removing the tape	4-47
Figure 4-77	Removing the FL screws.....	4-47
Figure 4-78	Detaching the FL FPC and HV cable.....	4-47
Figure 4-79	Connecting the FL FPC and HV cable.....	4-48
Figure 4-80	Securing the FL screws.....	4-48
Figure 4-81	Connecting the tape.....	4-48
Figure 4-82	Freeing the LCD cable	4-49
Figure 4-83	Removing the module screws	4-49
Figure 4-84	Removing the LCD module	4-50
Figure 4-85	Removing the LCD cable.....	4-50
Figure 4-86	Removing the 14" LCD bracket screws.....	4-50
Figure 4-87	Removing the LCD bracket	4-51
Figure 4-88	Attaching the LCD cable	4-51
Figure 4-89	Positioning the LCD module.....	4-52
Figure 4-90	Fastening the 14" LCD bracket screws.....	4-52
Figure 4-91	Securing the LCD cable	4-52

4.1 General

This section 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					
CPU	Expansion memory	HDD	Keyboard	Optical media drive	Wireless LAN unit
		FDD			Display assembly
	Top cover / power button				
System board		LED / button board		Speakers	Display mask
Modem					FL inverter board
Fan		Touch Pad			LCD module / cable

The example below shows FRUs to be removed before the LED / button board can be removed and repaired or replaced. The LED / button board is overlapped by the top cover which must be removed before the LED / button board can be reached. The top cover is in turn overlapped by the expansion memory, HDD, FDD, keyboard and CD-ROM / DVD-ROM drive. Always starts the disassembly process by removing the battery.



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, follow the steps below.

1. Turn the computer upside down with the front of the computer's fan and rear ports facing your body.
2. Slide the **battery latch** to the right to release it. The **battery pack** will pop up slightly allowing you to lift it out.

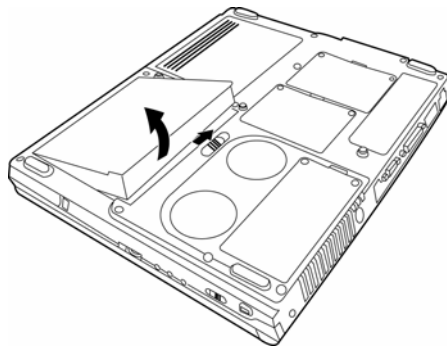


Figure 4-1 Removing the battery

NOTE: For environmental reasons, please return spent battery packs to Toshiba.

Installing the Battery Pack

To install the battery pack, follow the steps below.

1. Turn the computer's power off.
2. Disconnect all cables connected to the computer.
3. Hold the battery pack so that the label faces down and the connectors on the battery face the connectors on the computer.
4. Gently press down. The **battery latch** clicks and automatically secures the **battery pack** in position.

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.

4.3 PC Card

Removing a PC Card

To remove a PC Card, follow the steps below.

1. Push the **eject button** for the card you want to release. The button pops out when you release it.
2. Push the **eject button** once more to pop the **PC Card** out slightly.

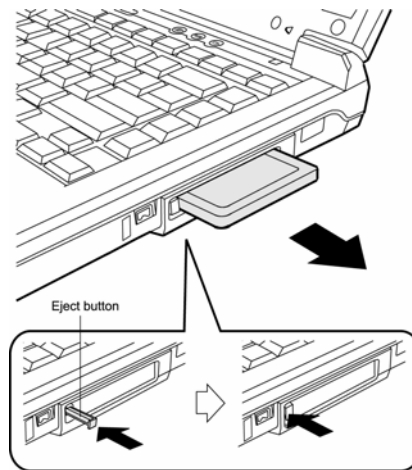


Figure 4-2 Popping out the eject button

3. Grasp the **PC Card** and remove it.
4. **Push** the **eject button** back into place, if necessary.

Installing the PC Card

To install the PC Card, follow the steps below.

1. Make sure the **two eject buttons** do not stick out.
2. Insert the **PC Card** and press gently to ensure a firm connection.

4.4 Expansion Memory

Removing the Expansion Memory

To remove the expansion memory, follow the steps below.

1. Turn the computer upside down.
2. Remove the **two embedded screws** securing the **expansion memory cover**.

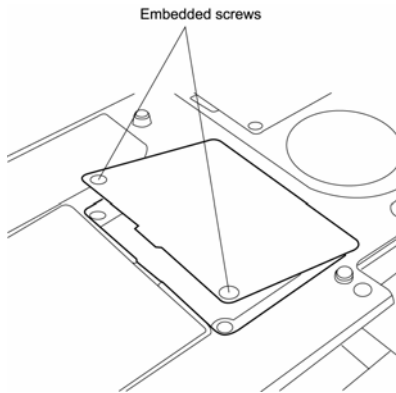


Figure 4-3 Removing expansion memory screws

3. Lift off the **expansion memory cover**.
4. Gently press out on the **latches** locking the **expansion memory** chip into slot A (the bottom most one.) One end of the **expansion memory** will pop up.

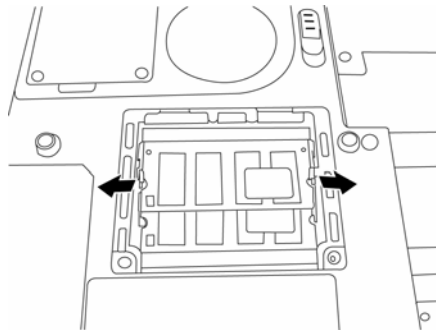


Figure 4-4 Opening the expansion memory latches

5. Grasp the **expansion memory** and pull it out.

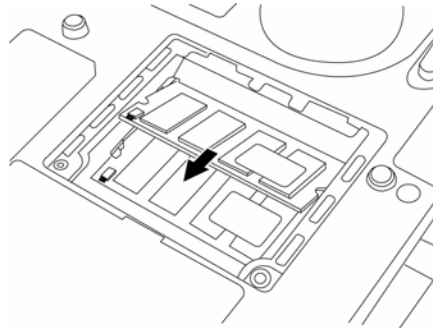


Figure 4-5 Removing the expansion memory into the connector slot

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

To install the expansion memory, follow the steps below.

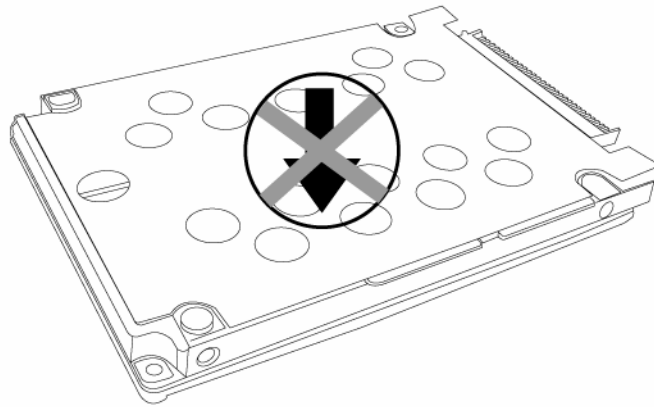
1. Fit the **expansion memory's** connectors into the computer's connectors and press carefully to ensure firm contact.

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

2. Gently, push the **expansion memory** down until **latches** on either side engage the **expansion memory** to hold it in place.
3. Seat the **expansion memory cover** in place and secure it with **two embedded screws**.

4.5 HDD

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



Removing the HDD

To remove the HDD, follow the steps below.

1. Turn the computer upside down with the **optical media drive** facing your body.
2. Remove **one M2.5x5 black screw** and then remove the **optical media drive**.

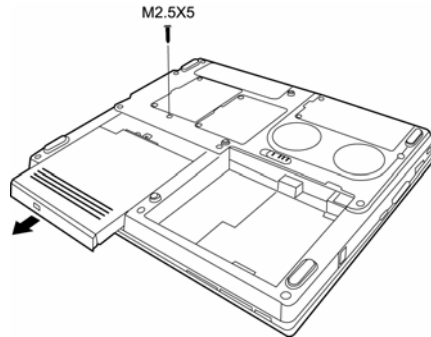


Figure 4-6 Removing the optical media drive

3. Remove the **four M2.5x5 black screws** that secure the **HDD** to the computer.

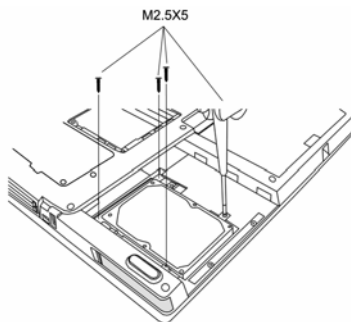


Figure 4-7 Unscrewing the HDD

4. With two fingers, pull back on the **HDD** using the back brackets. The **HDD** slides out of the connector socket inside the **HDD bay**.

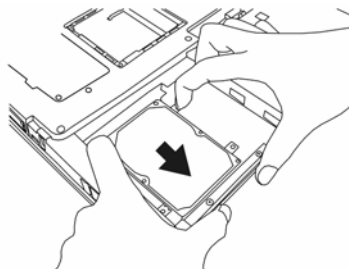


Figure 4-8 Pulling the HDD out of the connector socket

5. Gently pull the **HDD** out of the **HDD bay**.

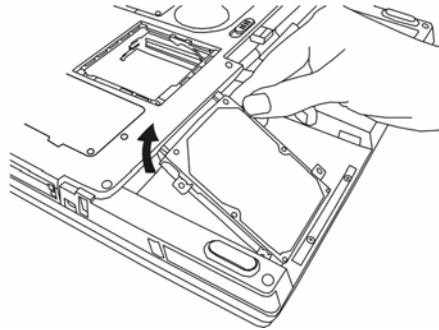


Figure 4-9 Removing the HDD from the HDD bay

Installing the HDD

To install the HDD, follow the steps below.

1. Turn the computer upside down with the **optical media drive** facing your body.
2. Gently place the **HDD** in the **HDD bay**.

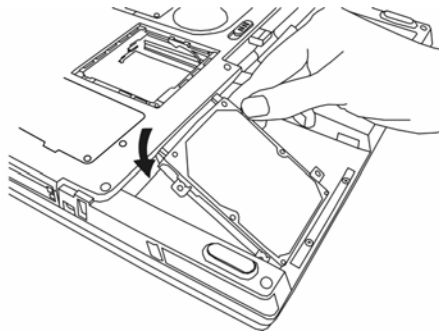


Figure 4-10 Inserting the HDD into the HDD bay

3. With two fingers, slide the **HDD** into the connector slot using the back brackets and until it snaps into place.
4. Secure the HDD with **four M2.5×5 black screws**.

4.6 Keyboard

Removing the Keyboard

To remove the keyboard, follow the steps below.

1. Open the **display panel** until it is almost horizontal.
2. Depress the F1 key on the back row of your **keyboard** and insert a thin tool into the narrow hole beneath the **strip cover**.

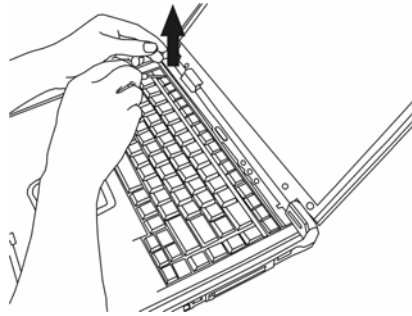


Figure 4-11 Removing the strip cover

3. Use the tool to gently pry the strip cover away from the computer
4. Remove **two M1.7x2 black screws** from the top of the keyboard where they secure it to the computer chassis.

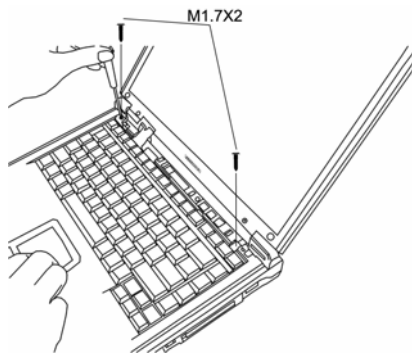


Figure 4-12 Removing the keyboard screws

5. Gently pull the keyboard up from the top and then out. The bottom part of the keyboard has 5 teeth that are inserted into notches in the chassis, so be sure not to break them off as you remove the keyboard.

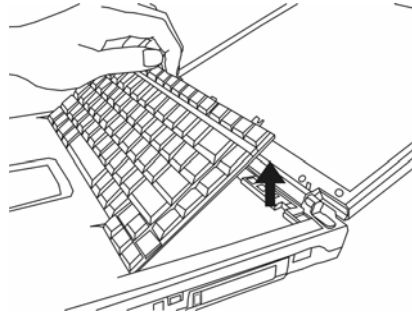


Figure 4-13 Removing the keyboard from the chassis

6. On the keyboard's bottom side is a **keyboard cable**. Gently detach it by pulling in back toward the display panel.

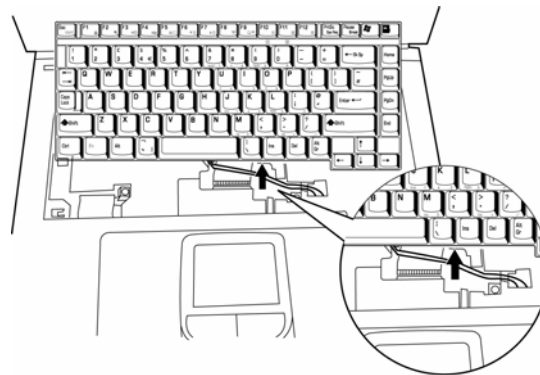


Figure 4-14 Disconnecting the keyboard cable

7. Remove the **keyboard**.

Installing the Keyboard

To install the keyboard, follow the steps below.

1. Turn the **keyboard** upside down on the **palm rest** and connect the **keyboard cable** to the system board.

- Turn the **keyboard** face up and set it in place. Ensure that the teeth at the bottom of the keyboard match up with and are inserted into the notches in the chassis.

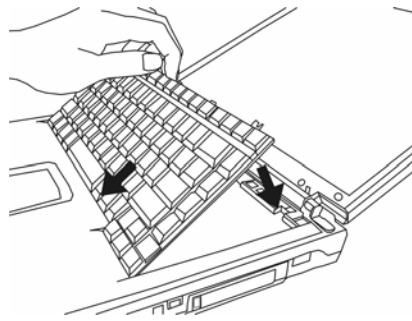


Figure 4-15 Inserting the keyboard

- Secure the **keyboard** with **two M1.7×2 black screws**.

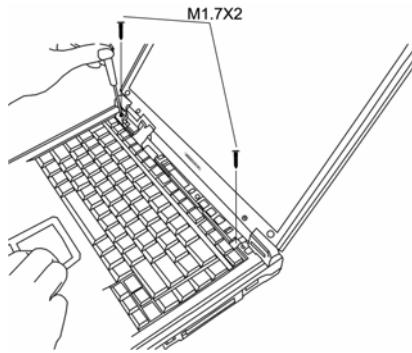


Figure 4-16 Securing the keyboard with screws

- Replace the strip cover.

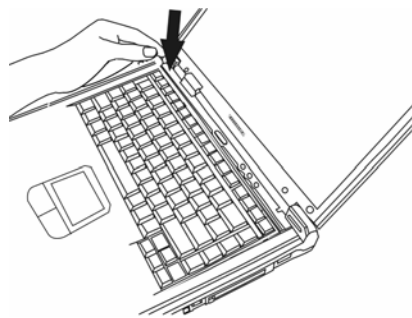


Figure 4-17 Replace the strip cover

4.7 Wireless LAN Unit

Removing the Wireless LAN Unit

To remove the **wireless LAN unit**, follow the steps below.

1. Turn the computer upside down and loosen the **two embedded screws**.
2. Remove the **wireless LAN module cover**.
3. Disconnect the **black and white wireless LAN connector cables**.

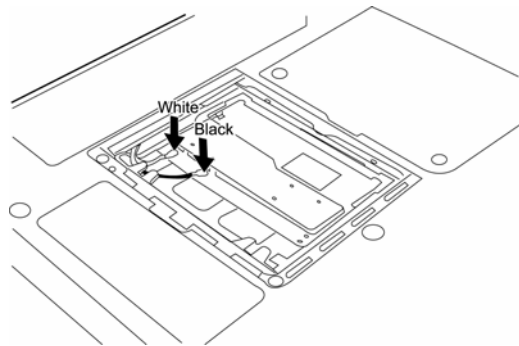


Figure 4-18 Detaching the connector cables

4. Gently press out on the **latches** locking the **wireless LAN unit** into the slot. One end of the **wireless LAN unit** pops up.

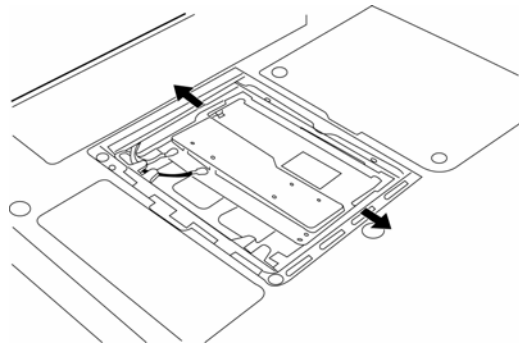


Figure 4-19 Pressing the wireless LAN unit latches

5. Grasp the end of the **wireless LAN unit** and pull it out.

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.

1. Fit the **wireless LAN unit's** connectors into the computer's connectors and press carefully to ensure firm contact.
2. Gently, push the **wireless LAN unit** down until the **latch** engages the unit.

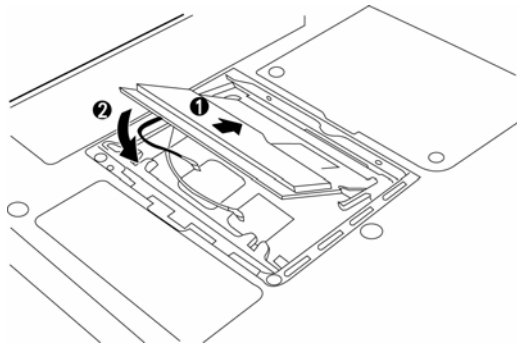


Figure 4-20 Pressing the wireless LAN unit into place

3. Attach ends of **wireless LAN connector cables**. The white aerial cable should be attached to top-most connector (nearer the **back side** of the computer), the black aerial cable to the bottom-most connector.

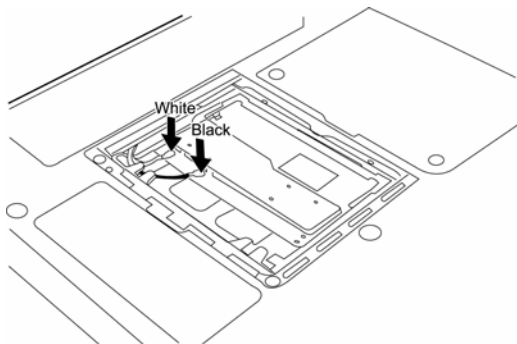


Figure 4-21 Attaching the wireless LAN connector cables

4. Restore the **wireless LAN module cover**.

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

4.8 Optical Media

Removing the optical media drive

To remove the optical media drive, follow the steps below.

1. Turn the computer upside down with the **optical media drive** facing your body.
2. Remove **one M2.5x5 black screw** and then remove the **optical media drive**.

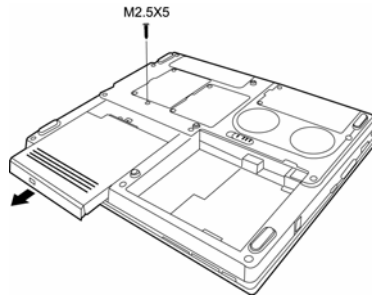


Figure 4-22 Removing the optical media drive

NOTE: You should not disassemble the optical media drive, as described below, unless you are going to replace it.

3. Remove the **two M2x3 silver bracket screws** at the back of the **optical media drive**.

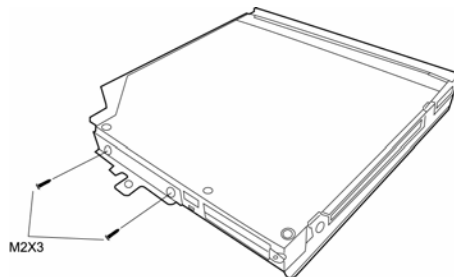


Figure 4-23 Removing the back screws

4. Remove the **back bracket**.

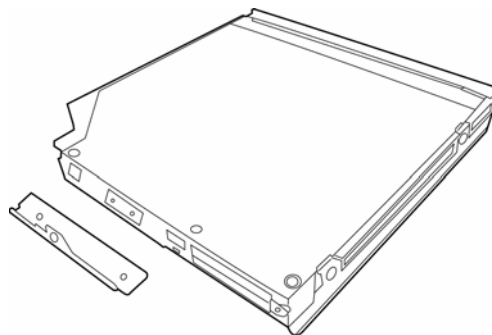


Figure 4-24 Removing the back bracket

- Remove the **four M2x3 black bracket screws** on either side of the **optical media drive**.

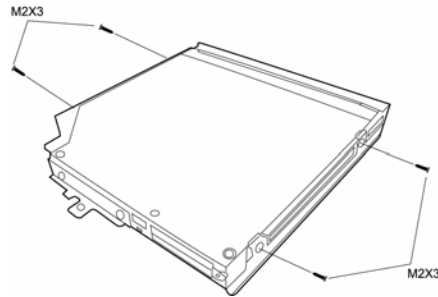


Figure 4-25 Removing the side screws

- Remove the **optical media drive bracket**.

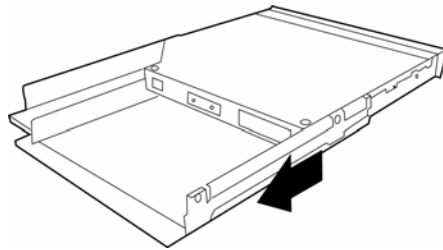


Figure 4-26 Removing the optical media drive bracket

- Insert a paper clip into the manual eject slot to open the **optical media drive**.
- Insert the paper clip into the slot behind the front face's left edge. This pops the front face off.

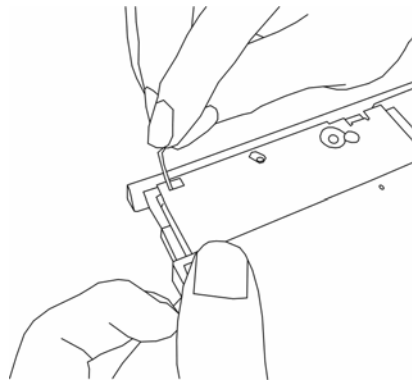


Figure 4-27 Removing the front face

Installing the Optical Media

To install an optical media drive, follow the steps below.

1. Turn the computer upside down with the **optical media drive** bay facing your body.
2. Slide the **optical media drive** into **optical media drive bay**, pushing it forward until it clicks into place.
3. Secure the **optical media drive** with one **M2.5x5 black screw**

4.9 CPU

Removing the CPU

To remove the CPU, follow the steps below.

1. Turn the computer upside down and remove **two M2.5×4 security screws** securing the **CPU compartment cover**.

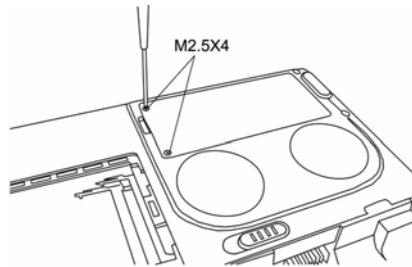


Figure 4-28 Removing the CPU compartment cover screws

2. Remove the **CPU compartment cover**.

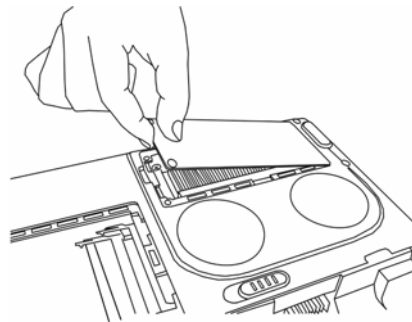


Figure 4-29 Removing the CPU compartment cover

3. Remove **four M2.5×5 black screws** securing the **heat sink**. They must be unscrewed in catty-corner order (i.e. lower-left first, then upper right second, and so-on.)

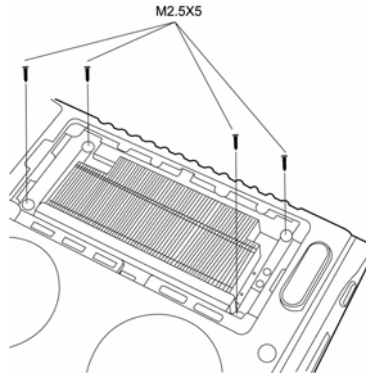


Figure 4-30 Removing the heat sink screws

4. Remove the **heat sink**.

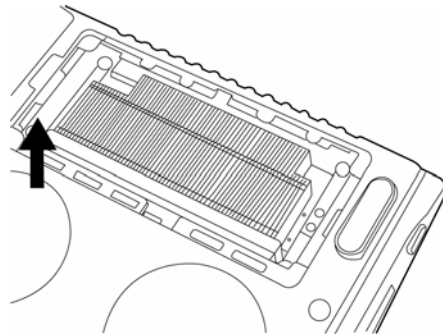


Figure 4-31 Removing the heat sink

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

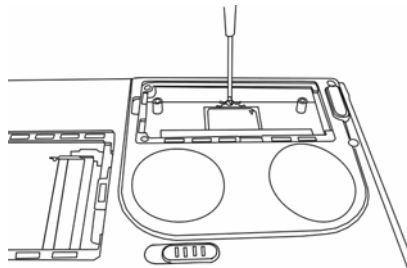


Figure 4-32 Unlocking the CPU cam

6. Gently lift out the **CPU**.

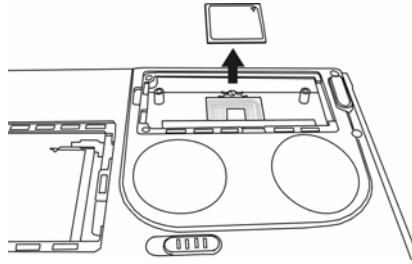


Figure 4-33 Removing the CPU

Installing the CPU

To install the CPU, 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. Reapply fresh grease before installing the heat sink.

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

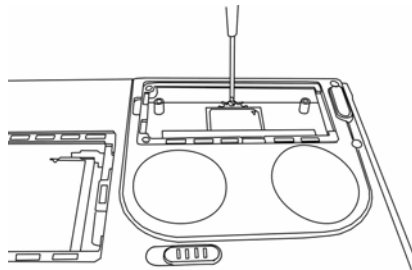


Figure 4-34 Unlocking the CPU cam

2. Seat the **CPU** to align the triangle mark on the **CPU** with the upper right corner of the socket if the front of the computer is facing your body. Make sure the alignment is exact to avoid damaging pins on the **CPU**.

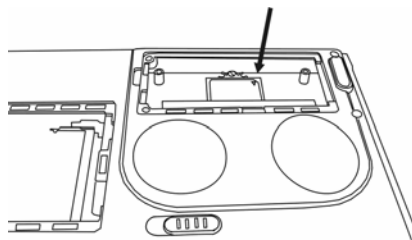


Figure 4-35 Aligning the CPU triangle

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** making sure that the **heat sink** is oriented so that the two knobs in the **CPU compartment** secure it.

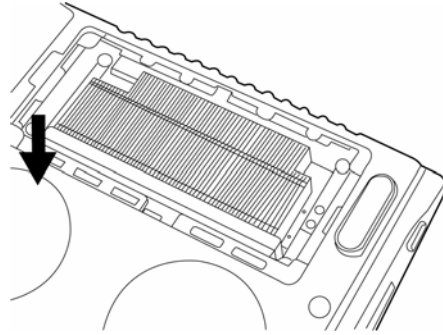


Figure 4-36 Inserting the heat sink

5. Secure the **heat sink** with **four M2.5×5 black screws**. The screws must be put tightened in a catty-corner order (i.e. lower-left first, then upper right second, etc.)

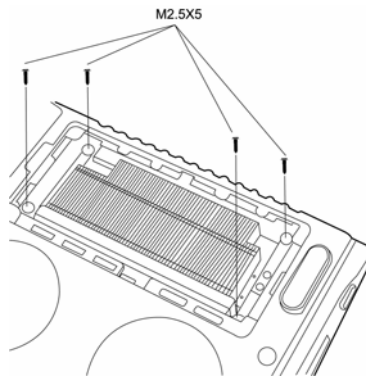


Figure 4-37 Tightening the heat sink screws

6. Replace the **CPU compartment cover**.

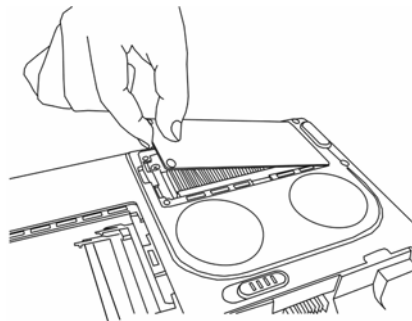


Figure 4-38 Replacing the CPU compartment cover

7. Secure the CPU compartment cover with two M2.5×4 security screws.

4.10 Display Assembly

Removing the Display Assembly

To remove the display assembly, first remove the battery and the wireless LAN module (or simply disconnect its aerial cables first), then follow the steps below.

NOTE: *If you have a wireless LAN card installed, you will have to disconnect the wireless LAN connector wire before removing the display assembly. See section 4-7 for details.*

1. Insert a thin tool into the hole on the **strip cover** and slide it to the right. The **strip cover** will pop up allowing you to remove it.



Figure 4-39 Removing the strip cover

2. Remove **two M2.5×5 black screws** and slide the **joint covers** outwards and upward to remove them. Note that you'll have to push the display back until it rests at a 135° angle in order to get the **joint covers** out completely

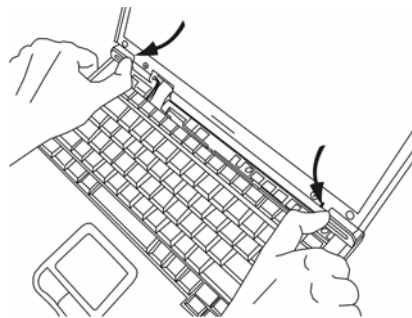


Figure 4-40 Removing the joint covers

3. Remove the keyboard as described in section 4-6, *Removing the Keyboard*.

4. Remove **one M1.7x2 black screws** connecting the **LCD cable** to the chassis.

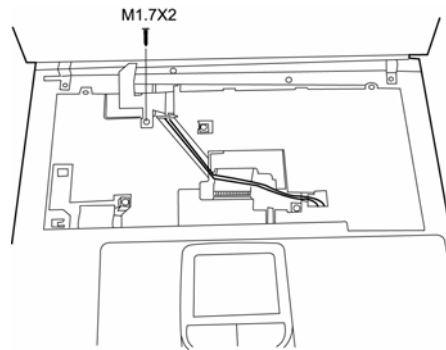


Figure 4-41 Detaching the LCD cable

5. From each top corner, remove: **one M2.5x18 black screw (outer)** and **one M2.5x8 black screw (inner)**. From each back corner, remove: **one M2.5x8 black screw**. There are a total of three screws for each corner, and six screws for the whole display assembly.

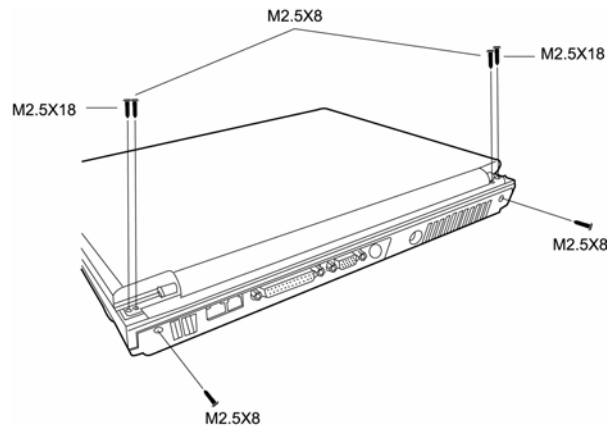


Figure 4-42 Removing the bracket screws

6. Gently lift the **display assembly** away from the computer's chassis with the display in the closed position.

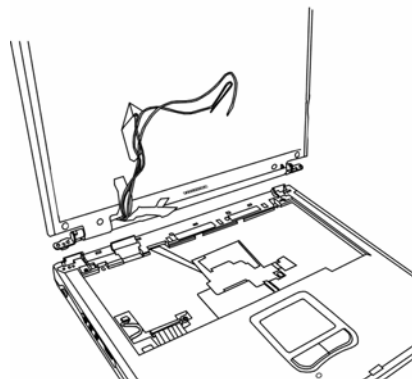


Figure 4-43 Lifting the display away from the chassis

Installing the Display Assembly

To install the display assembly, follow the steps below.

1. Seat the display assembly taking care not to crush to the **LCD display cable**.

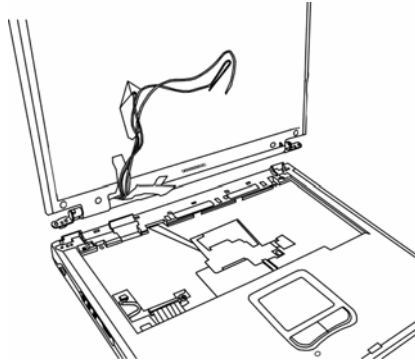


Figure 4-44 Seating the display assembly

2. Feed the **wireless LAN connector** into the **wireless LAN compartment**.

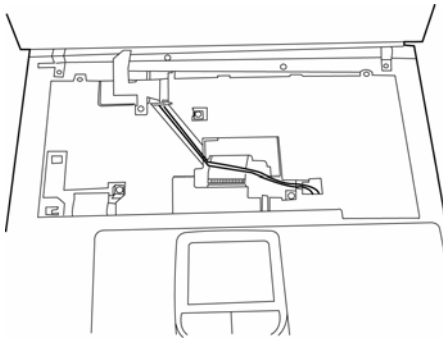


Figure 4-45 Inserting the wireless LAN connector

3. Place computer upside down and attach the ends of the **wireless LAN connector** to the **wireless LAN unit**.
4. Attach **LCD display cable** to connector on **system board** and secure with one **M1.7×2 screw**.

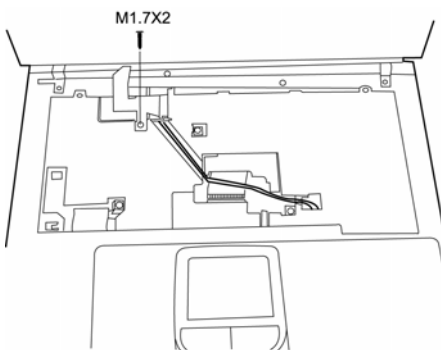


Figure 4-46 Connecting the LCD cable

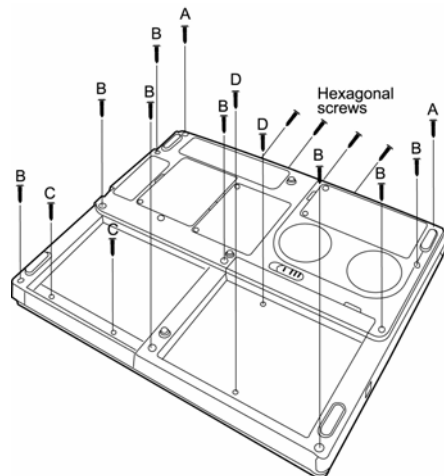
5. Attach the **joint covers** by slipping them down and in, then insert **two M2.5×5 black screws** to connect the display assembly to the chassis. Note that you'll have to push the display back until it rests at a 135° angle in order to get the **joint covers** in completely.
6. Attach the keyboard as described earlier.
7. Position **strip cover** and slide it to the left to lock it in position.

4.11 The Cover

Removing the Cover

To remove the cover, follow the steps below.

1. Remove the battery, optical media drive, HDD, keyboard, and display assembly as described in previous sections.
2. Remove the following **eighteen screws** from the bottom of the computer:
 - Eight M2.5×18 black screws
 - Two M2.5x8 black screws
 - Two M2.5x3 black screws in the battery bay
 - Two M2.5x5 silver screws in the optical media bay
 - Four hexagonal screws for the video monitor port and the parallel port.

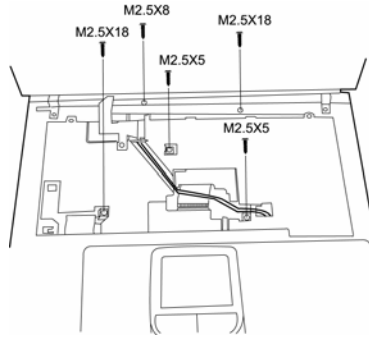


A: M 2.5 x 8 B: M 2.5 x 18 C: M 2.5 x 5 D: M 2.5 x 3

Figure 4-47 Removing the screws securing the bottom of the cover

3. Turn the computer over.

4. Remove the following **five screws** from the top of the computer:
 - Two M2.5×18 black screws
 - Two M2.5 ×5 black screws
 - One M2.5 ×8 black screws



A: M 2.5 x 18 B: M 2.5 x 5 C: M 2.5 x 8

Figure 4-48 Removing the screws securing the top of the cover

5. Remove the following cables:
 - TouchPad FPC cable
 - LED/control button FFC cable
 - Speaker cable

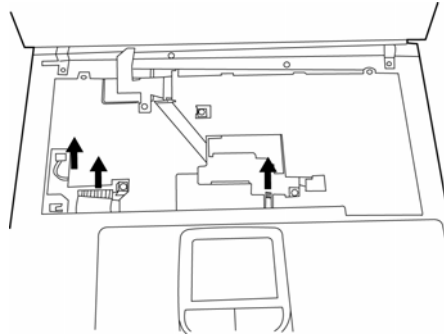


Figure 4-49 Removing the cables

6. Lift the top cover from the computer's chassis.

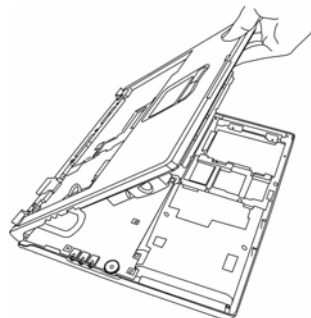


Figure 4-50 Removing the cover

Installing the Cover

To install the top cover and display assembly, follow the steps below.

1. Seat the cover on the computer's chassis.
2. Attach the following cables:
 - TouchPad FPC cable
 - LED/control button FFC cable
 - Speaker cable

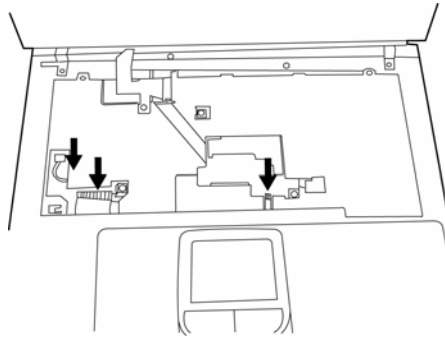
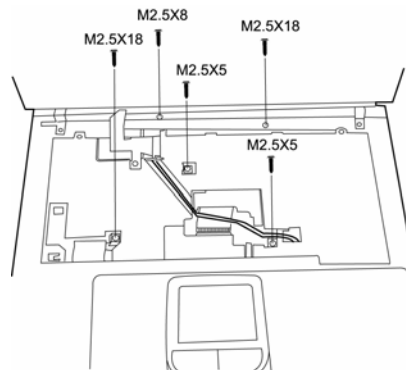


Figure 4-51 Attaching the cables

3. Connect the following **five screws** from the top of the computer:
 - Two M2.5×18 black screws
 - Two M2.5 ×5 black screws
 - One M2.5 ×8 black screws

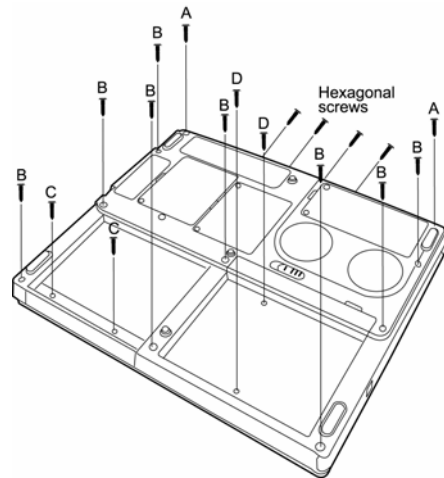


A: M 2.5 x 18 B: M 2.5 x 5 C: M 2.5 x 8

Figure 4-52 Connecting the screws securing the top of the cover

4. Attach the keyboard and display assembly as described in previous sections.
5. Turn the computer over.
6. Connect the following **eighteen screws** from the bottom of the computer:
 - Eight M2.5×18 black screws

- Two M2.5x8 black screws
- Two M2.5x3 black screws in the battery bay
- Two M2.5x5 silver screws in the optical media bay
- Four hexagonal screws for the video monitor port and the parallel port.



A: M 2.5 x 8 B: M 2.5 x 18 C: M 2.5 x 5 D: M 2.5 x 3

Figure 4-53 Removing the screws securing the bottom of the cover

7. Insert the optical media, the battery and the HDD as described in previous sections.

4.12 System Board

Removing the System Board

To remove the system board, follow the steps below.

1. Remove the computer cover as described in a previous section.
2. Place the computer upside down so the optical media and battery bays are lying face down.
3. Remove **two M2×4 silver screws** and **two M2.5x5 black screws** securing the **module support**. Slide the module support towards the system board then remove.

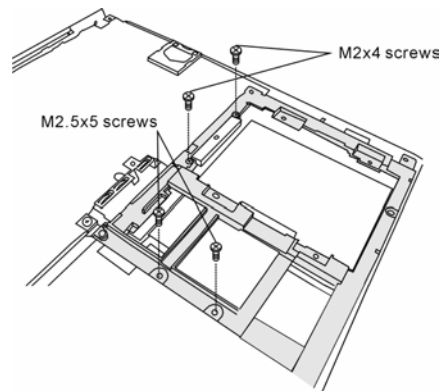


Figure 4-54 Removing the module support

4. Remove **two M2.5x5 black screws** securing the system board to the chassis.

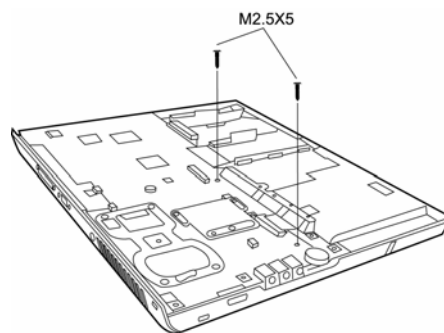


Figure 4-55 Removing the system board screws

5. Gently remove the system board by pulling it away from the back of the chassis, out and up ward. The rear parallel port, TV-Out port and USB ports may stick a little to the chassis on the way out, but resist the urge to pull too hard.

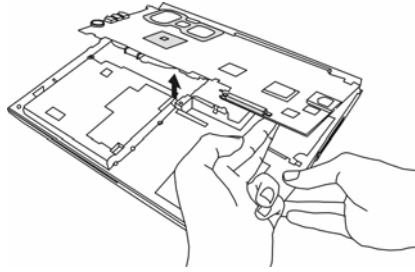


Figure 4-56 Removing the system board

Installing the System Board

To install the system board, follow the steps below.

1. Seat the **system board**, making sure to ease the ports into their openings on the chassis and cover.
2. Secure the system board with **two M2.5x5 black screws**.

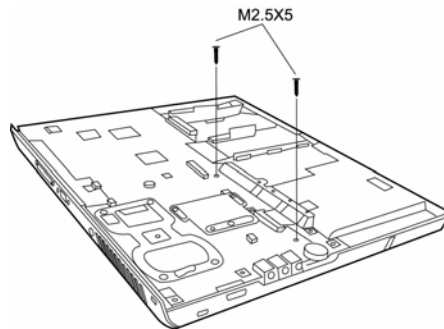


Figure 4-57 Removing the system board screws

3. Secure the module support in place with **two M2x4 silver screws** and **two M2.5x5 black screws**.

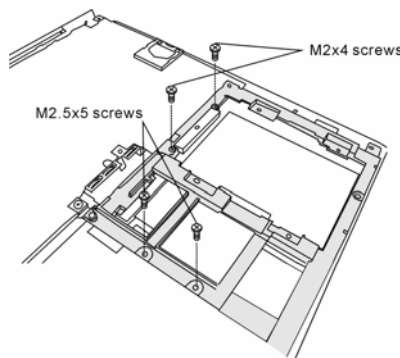


Figure 4-58 Securing the module support

4.13 Modem

Removing the Modem

To remove the modem, follow the steps below.

1. Remove the system board, as described in a previous section.
2. Remove **two M2.5x5 black screws** securing the modem to the **system board**.

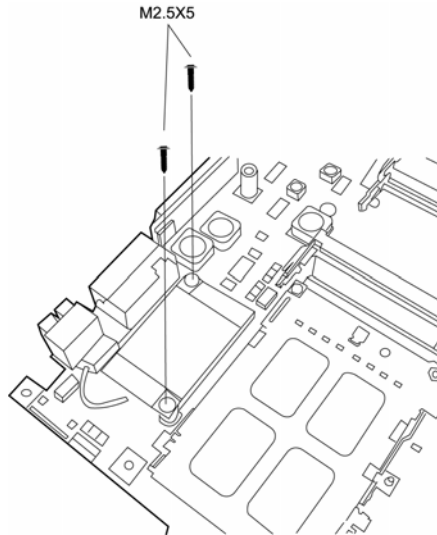


Figure 4-59 Removing the system board

3. Disconnect the **modem cable** from the **modem module**.
4. Gently lift the **modem module** from the **system board**.

Installing the Modem

To install the modem, follow the steps below.

1. Place the **modem module** on the **system board**.
2. Connect the **modem cable** to the **modem module**.
3. Secure **two M2.5x5 black screws** connecting the modem to the **system board**.
4. Reinstall the system board, as described in a previous section.

4.14 Fan

Removing the Fan

To remove the fan, follow the steps below.

1. Remove all of the modules and the system board as described in previous sections.
2. Place the **system board** so that the fan is on the bottom. Remove **two M2×5 silver screws** securing the fan.

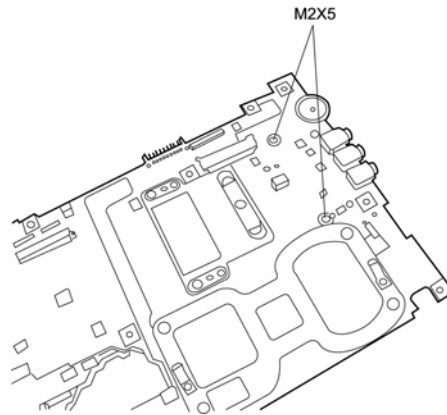


Figure 4-60 Removing the screws that secure the fan to the system board

3. Remove the **Northbridge heat sink cover**, which also secures the fan. To do so, you must loosen **3 embedded screws**.

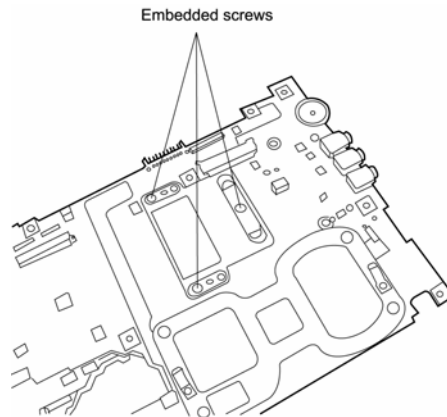


Figure 4-61 Removing the Northbridge screws

4. Turn the system board over.

5. Disconnect the fan power cables.

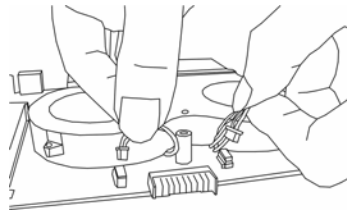


Figure 4-62 Disconnecting the fan power cables

6. Remove the fan.

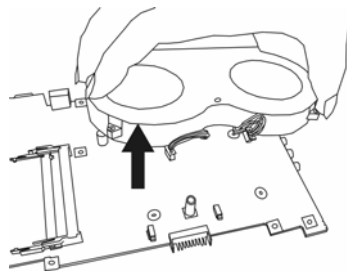


Figure 4-63 Removing the fan

Installing the Fan

To install the fan, follow the steps below.

1. Seat the **fan** on the system board.
2. Secure it with two M2×5 silver screws.
3. Secure the **Northbridge heat sink cover**, which also holds the fan place. To do so, you must tighten **3 embedded screws**.
4. Connect the **fan power cables** to the **system board**.

4.15 LED/Button Board

Removing the LED/Button Board

To remove the LED/button board, follow the steps below.

1. Remove all of the modules and the computer cover as described in previous sections.
2. Place **top cover** upside down.
3. Remove **one M2.5x3 black screw** from the **LED/button board mounting bracket**.

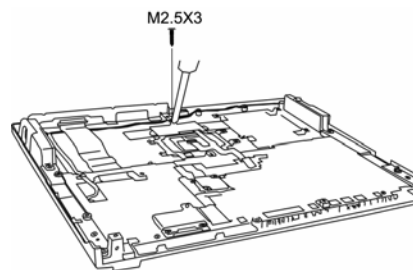


Figure 4-64 Removing the LED/button board mounting bracket screw

4. Slide the **mounting bracket** a little to the right, if the back of the cover faces you, and then lift it and the board out.

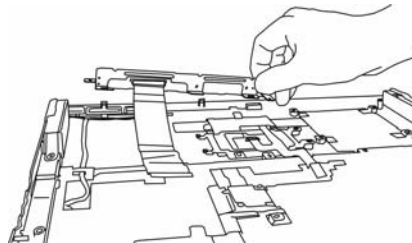


Figure 4-65 Removing the mounting bracket and the board

5. Remove **three M2x3 black screws** from the face of the LED/button board.

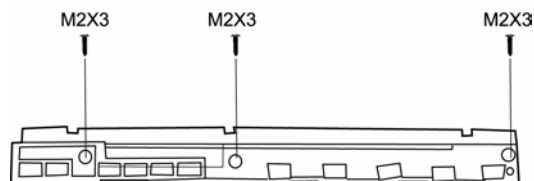


Figure 4-66 The LED/button board

Installing the LED/Button Board

To install the LED/button board, follow the steps below.

1. Seat the **LED/button board** on the **mounting bracket** and secure with **three M2×3 screws**.
2. Position **LED/button board** and **mounting bracket** inside the **top cover** and secure it with **one M2.5×3 screws**.
3. Attach **LED/button FFC cable** to the system board.
4. Restore all the modules and cover pieces as described in previous sections.

4.16 TouchPad

Removing the TouchPad

To remove the TouchPad, follow the steps below.

1. Remove the computer's modules and top cover as described in previous sections.
2. Pull the **TouchPad FPC cable** out from behind the **silver system board shield**.

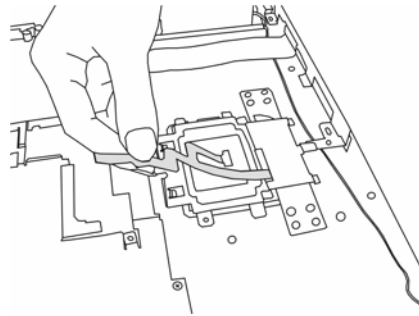


Figure 4-67 Removing the TouchPad cable

3. Remove **two M2.5 x3 black screws** from the TouchPad bracket.

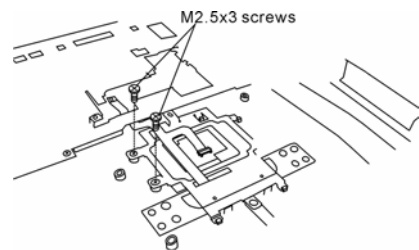


Figure 4-68 Detaching the TouchPad bracket screws

4. With LCD/Button board away from you, slide the TouchPad bracket toward you to disconnect it from its cover seat.

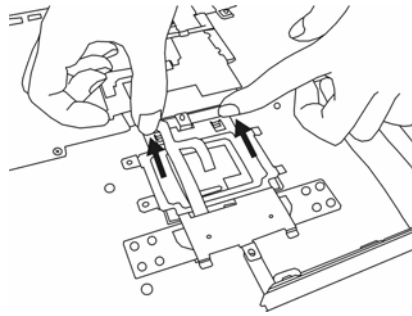


Figure 4-69 Removing the TouchPad board and bracket

5. Lift out the **TouchPad** along with the TouchPad bracket.

Installing the TouchPad

To install the TouchPad, follow the steps below.

1. With **top cover** upside down, place **TouchPad** in position and cover it with **TouchPad cover**. Slide **TouchPad cover** back to lock it in position.
2. Feed **TouchPad FPC cable** through **silver system board shield** on the **top cover**.
3. Attach **two M2.5×3 screws** to secure **TouchPad board**.

4.17 Speakers

Removing the Speakers

To remove the speakers, follow the steps below.

1. Place the **top cover** upside down and remove the **TouchPad bracket and board** as described in previous sections of the manual.
2. Slide the **speaker wires** out from under the **LCD/Button board bracket**.

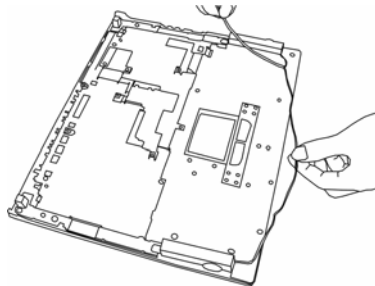


Figure 4-70 Removing the speaker wires

3. Detach the **LED/button FFC cable** and the **speaker cable** from the adhesive glue binding them to the cover so you can slide the **speaker wires** out from under them.
4. Remove **one M2.5x5 black screw** from each speaker.

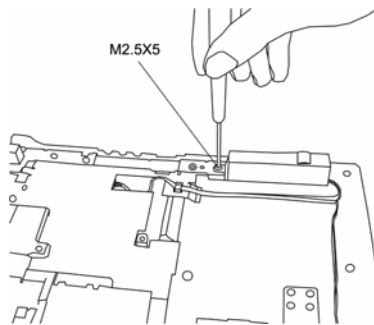


Figure 4-71 Unscrewing the right speaker

5. Remove the speakers.

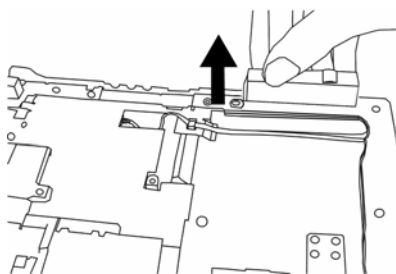


Figure 4-72 Removing the Speakers

Installing the Speakers

To install the speakers, follow the steps below.

1. Place the **top cover** upside down and remove the **TouchPad bracket** and **board** as described in previous sections of the manual.
2. Detach the **LED/button FFC cable** and the **speaker cable** from the adhesive glue binding them to the cover so you can slide the **speaker wires** under them.
3. Seat each **speaker**. The speaker closest to the **speaker cables** goes on the right.
4. Secure each speaker with one M2.5×5 screw.
5. Reattach the **LED/button FFC cable** and the **speaker cable** to the adhesive glue on the cover so you can slide the **speaker wires** under them.
6. Slide the **speaker wires** under the **LCD/Button board bracket**.
7. Reattach the **TouchPad bracket** and **board** as described in previous sections of the manual.

4.18 Display Mask

Removing the Display Mask

To remove the display mask, follow the steps below.

1. On each bottom corner, remove **one mask seal** by the hinge to expose **one screw** securing the **display mask**.

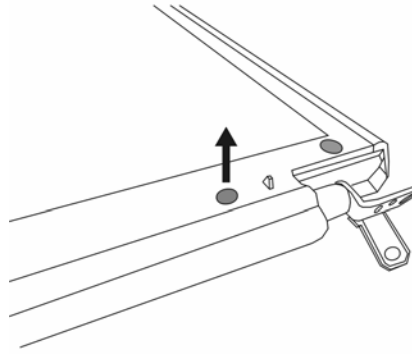


Figure 4-73 Removing the mask seals

2. On each bottom corner, remove **one M2.5×8 screw** that was covered by the **mask seal**.

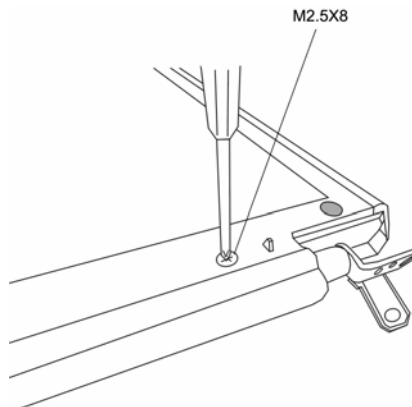


Figure 4-74 Removing two screws securing the display mask

3. A total of 22 snaps secure the **display mask**. Carefully insert your fingers between the **display mask** and the **LCD panel** and pry open the **snaps**.

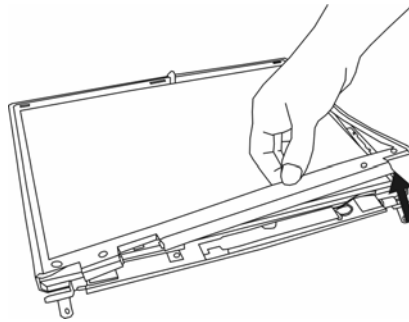


Figure 4-75 Removing the display mask

Installing the Display Mask

To install the display mask, follow the steps below.

1. Seat the **display mask** and secure the **snaps** on each side.
2. Secure the **display mask** with **two M2.5×8 screws** at the hinges.
3. Attach **two mask seals** to cover the **screws**.

4.19 FL Inverter Board

Removing the FL Inverter Board

To remove the FL inverter board, follow the steps below.

1. Remove **one strip of tape** securing the **HV cable** and **two strips of tape** to uncover two screws securing the **FL inverter board**.

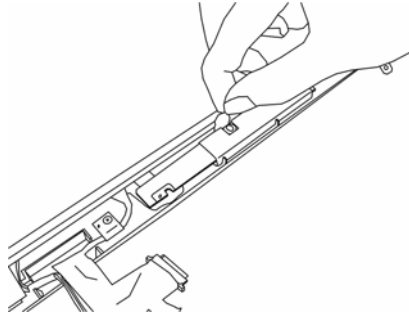


Figure 4-76 Removing the tape

2. Remove the **two M2x3 black screws** securing the **FL inverter board**.

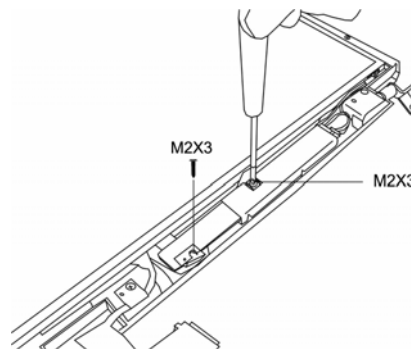


Figure 4-77 Removing the FL screws

3. Carefully lift up the **FL inverter board** and disconnect the **FL FPC** and the **HV cable** from the **FL inverter board**.

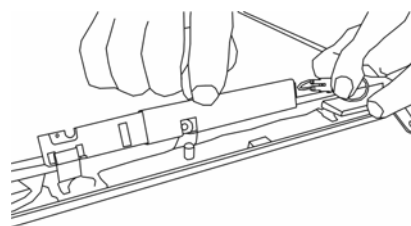


Figure 4-78 Detaching the FL FPC and HV cable

Installing the FL Inverter Board

To install the FL inverter board, follow the steps below.

1. Connect the **FL FPC** and **HV cable** to the **FL inverter board**.

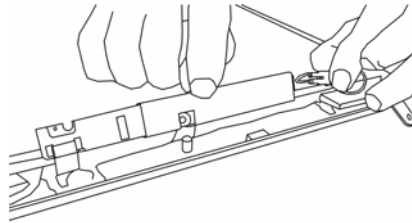


Figure 4-79 Connecting the FL FPC and HV cable

2. Seat the **FL inverter board** and secure it with **two silver M2×3 screws**.

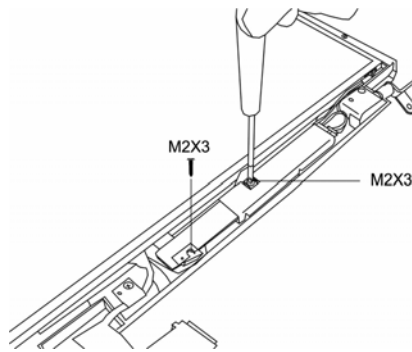


Figure 4-80 Securing the FL screws

3. Secure the **HV cable** with **one strip of tape**.
4. Cover the two screws securing the **FL inverter board** with tape.

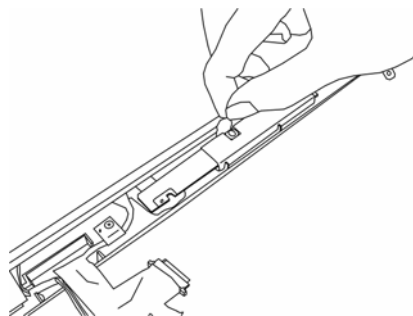


Figure 4-81 Connecting the tape

4.20 LCD Module

Removing the LCD Module

To remove the LCD module, follow the steps below.

1. Remove the FL inverter board as described in previous sections.
2. Remove **one M2×3 screw** to release **LCD cable**.

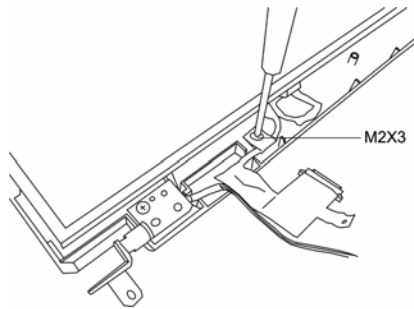


Figure 4-82 Freeing the LCD cable

3. Remove six **M2×3 screws** securing the **LCD module**.

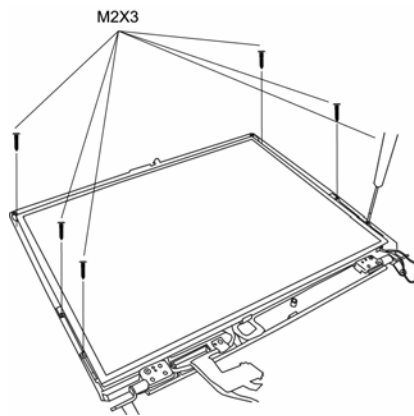


Figure 4-83 Removing the module screws

4. Lift the **LCD module** out of the **LCD cover**.

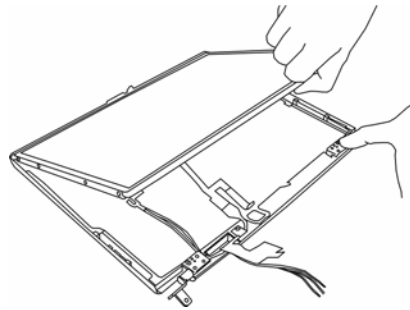


Figure 4-84 Removing the LCD module

5. Disconnect the **LCD cable** from **LCD connector**.

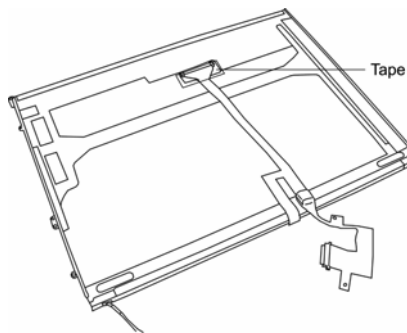


Figure 4-85 Removing the LCD cable

6. Remove **eight M2×3 screws** securing the **LCD bracket** (the number of bracket screws may vary on different models: 14" models have four, while 15" models have eight).

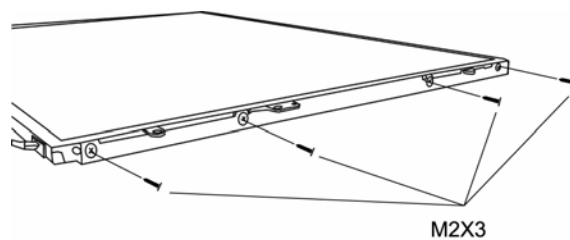


Figure 4-86 Removing the 14" LCD bracket screws

7. Remove **LCD bracket**.

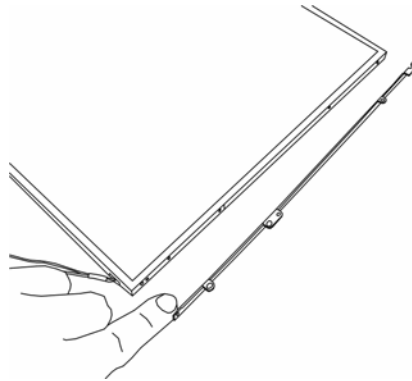


Figure 4-87 Removing the LCD bracket

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.

1. Connect the **LCD cable** to the **LCD connector** on the back of the **LCD module**.

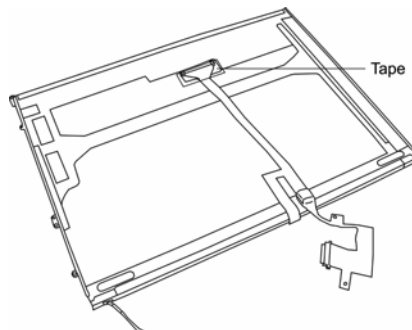


Figure 4-88 Attaching the LCD cable

2. Secure **LCD cable** with a **stripe of tape**.
3. Secure the **LCD bracket** to the **LCD module** with **eight M2×3 screws** (the number of bracket screws may vary on different models).

4. Position the **LCD module** in place.

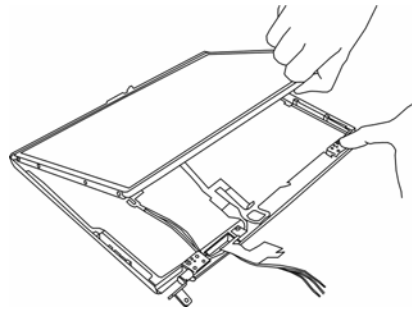


Figure 4-89 Positioning the LCD module

5. Secure the **LCD module** with **eight M2×3 screws** (the number of bracket screws may vary on different models: 14" models have four, while 15" models have eight).

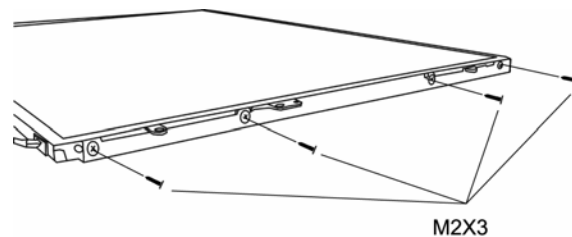


Figure 4-90 Fastening the 14" LCD bracket screws

6. Secure **LCD cable** with **one M2×3 screw**.

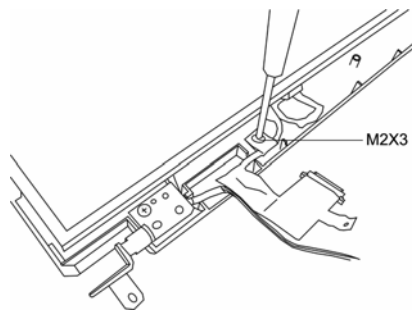


Figure 4-91 Securing the LCD cable

Appendices

Appendix Contents

Appendix A Handling the LCD Module.....	A-1
Appendix B Board Layout.....	B-1
B.1 System Board Front View.....	B-1
B.2 System Board (FRDSY*) Back View.....	B-2
Appendix C Pin Assignments	C-1
C.1 JP21/JP22 SODIMM I/F (200-pin).....	C-1
C.2 JP1 LCD I/F (30-pin).....	C-5
C.3 JP12 RGB I/F (15-pin).....	C-6
C.4 JP10 HDD I/F (44-pin).....	C-7
C.5 JP23 CD-ROM I/F (60-pin).....	C-8
C.6 JP11 Parallel I/F (25-pin).....	C-9
C.7 JP19 PC Card I/F (154-pin).....	C-10
C.8 JP20 Mini PCI I/F (124-pin).....	C-12
C.9 JP24.JP26 Fan I/F (3-pin).....	C-14
C.10 AC Adaptor Connector (4-pin).....	C-14
C.11 Microphone (6-pin).....	C-14
C.12 Headphone Connector (6-pin).....	C-14
Appendix D Keyboard Scan/Character Codes	D-1
Appendix E Key Layout	E-1
E.1 United States (US) Keyboard.....	E-1
E.2 United Kingdom (UK) Keyboard	E-1
E.3 Spanish (SP) Keyboard.....	E-2
E.4 Korean (KO) Keyboard.....	E-2
E.5 French (FR) Keyboard	E-3
E.6 German (GR) Keyboard.....	E-3
E.7 Japan (JA-W) Keyboard	E-4
E.8 Italy (IT) Keyboard.....	E-4
Appendix F Satellite A30 Series Screw Torque List.....	F-1
Appendix G Reliability.....	G-1

Figures

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

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

Figure E-1 US keyboard E-1

Figure E-2 UK keyboard E-1

Figure E-3 SP keyboard..... E-2

Figure E-4 KO keyboard E-2

Figure E-5 FR keyboard E-3

Figure E-6 GR keyboard..... E-3

Figure E-7 JA-W keyboard..... E-4

Figure E-8 IT keyboard E-4

Tables

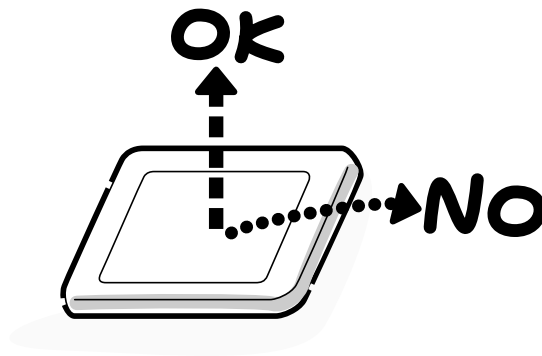
Table B-1	System board ICs	B-3
Table B-2	System board connectors	B-4
Table C-1	SODIMM I/F pin assignments (200-pin).....	C-1
Table C-2	LCD I/F pin assignments (30-pin)	C-5
Table C-3	RGB I/F pin assignments (15-pin).....	C-6
Table C-4	HDD I/F pin assignments (44-pin)	C-7
Table C-5	CD-ROM I/F pin assignments (60-pin)	C-8
Table C-6	Parallel I/F pin assignments (25-pin).....	C-9
Table C-7	PC Card I/F pin assignments (154-pin)	C-10
Table C-8	Mini PCI I/F pin assignments (124-pin).....	C-12
Table C-9	Fan I/F pin assignments (3-pin)	C-14
Table C-10	AC Adaptor Connector pin assignments (4-pin)	C-14
Table C-11	Microphone I/F pin assignments (6-pin).....	C-14
Table C-12	Headphone Connector pin assignments (6-pin).....	C-14
Table D-1	Scan codes (set 1 and set 2)	D-1
Table D-2	Scan codes with left Shift key.....	D-5
Table D-3	Scan codes in Numlock mode.....	D-6
Table D-4	Scan codes with Fn key.....	D-6
Table D-5	Scan codes in overlay mode.....	D-7
Table D-6	No.124 key scan code	D-7
Table D-7	No.126 key scan code	D-8
Table F-1	Satellite A30 Series Screw Torque List.....	F-1
Table G-1	MTBF.....	G-1

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.

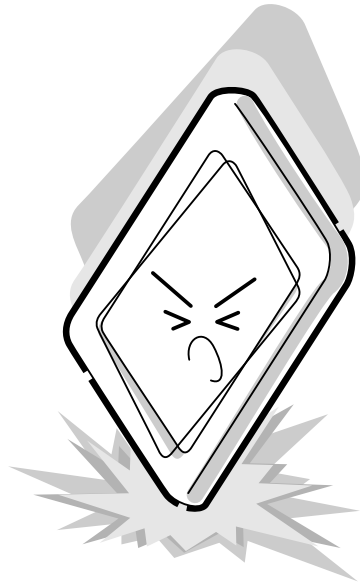
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



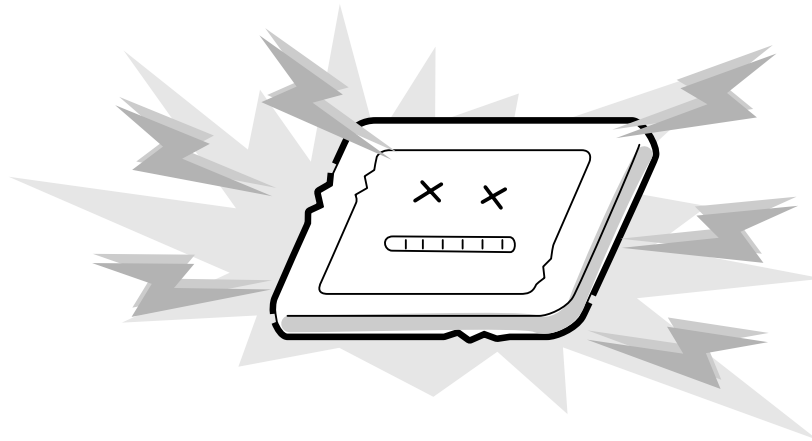
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



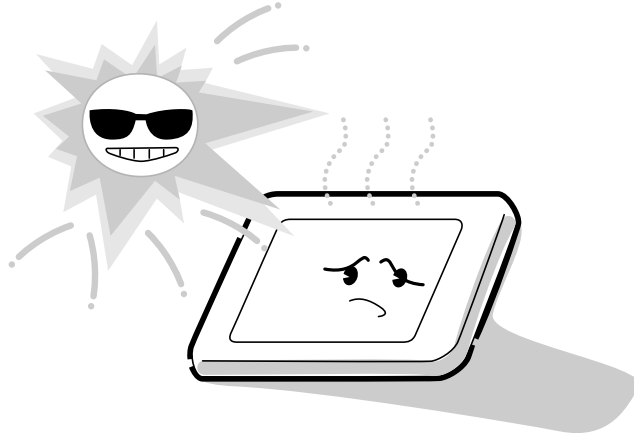
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



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.



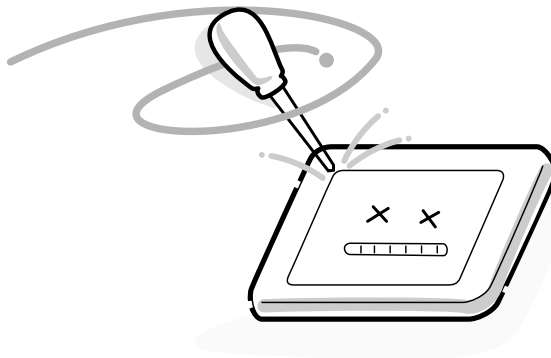
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



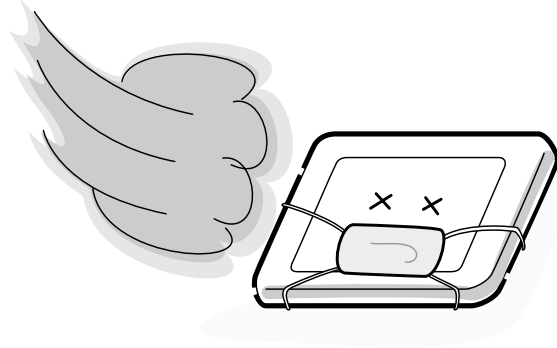
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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 Front View

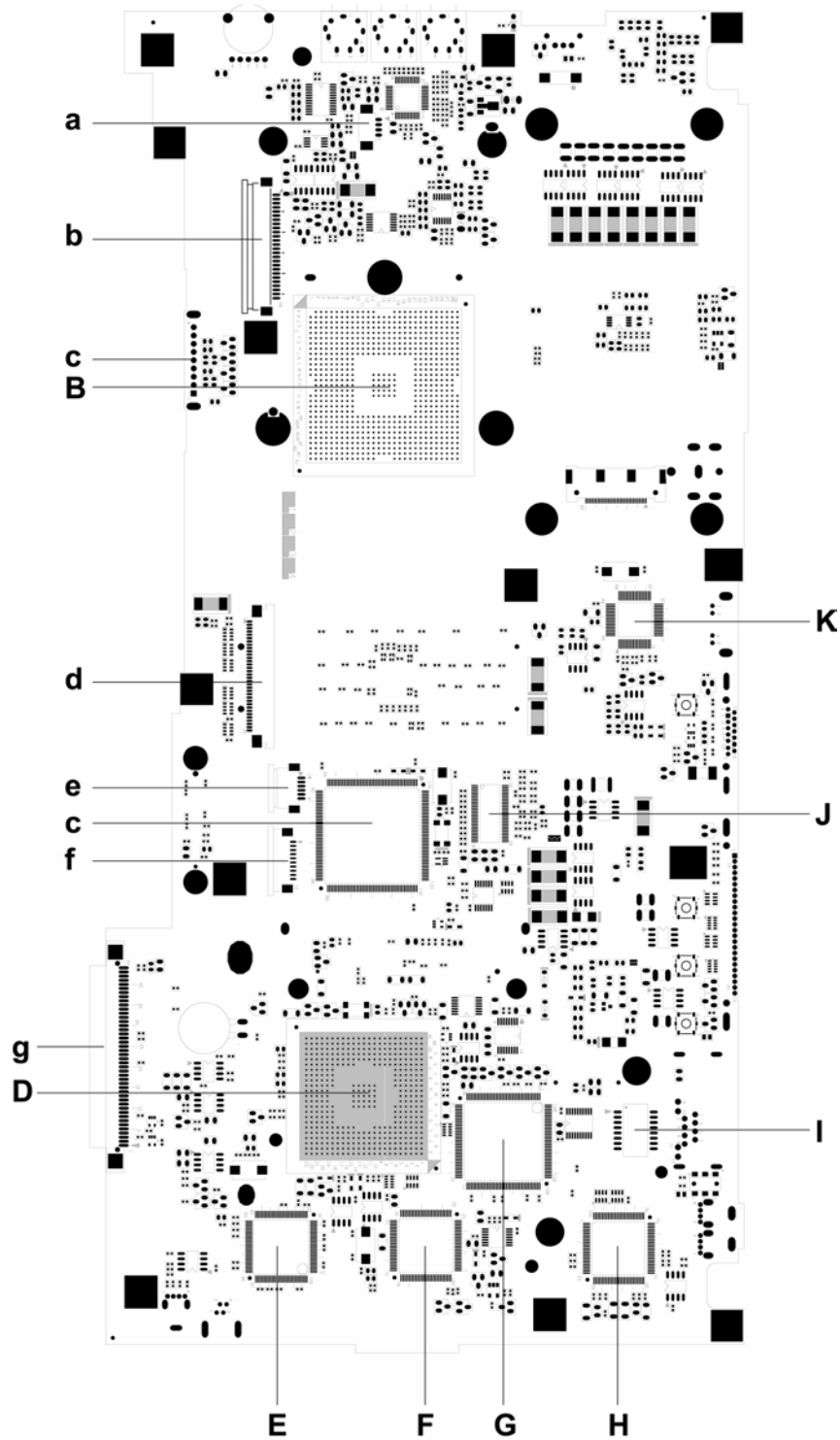


Figure B-1 System board (FRDSY*) layout (front)

B.2 System Board (FRDSY*) Back View

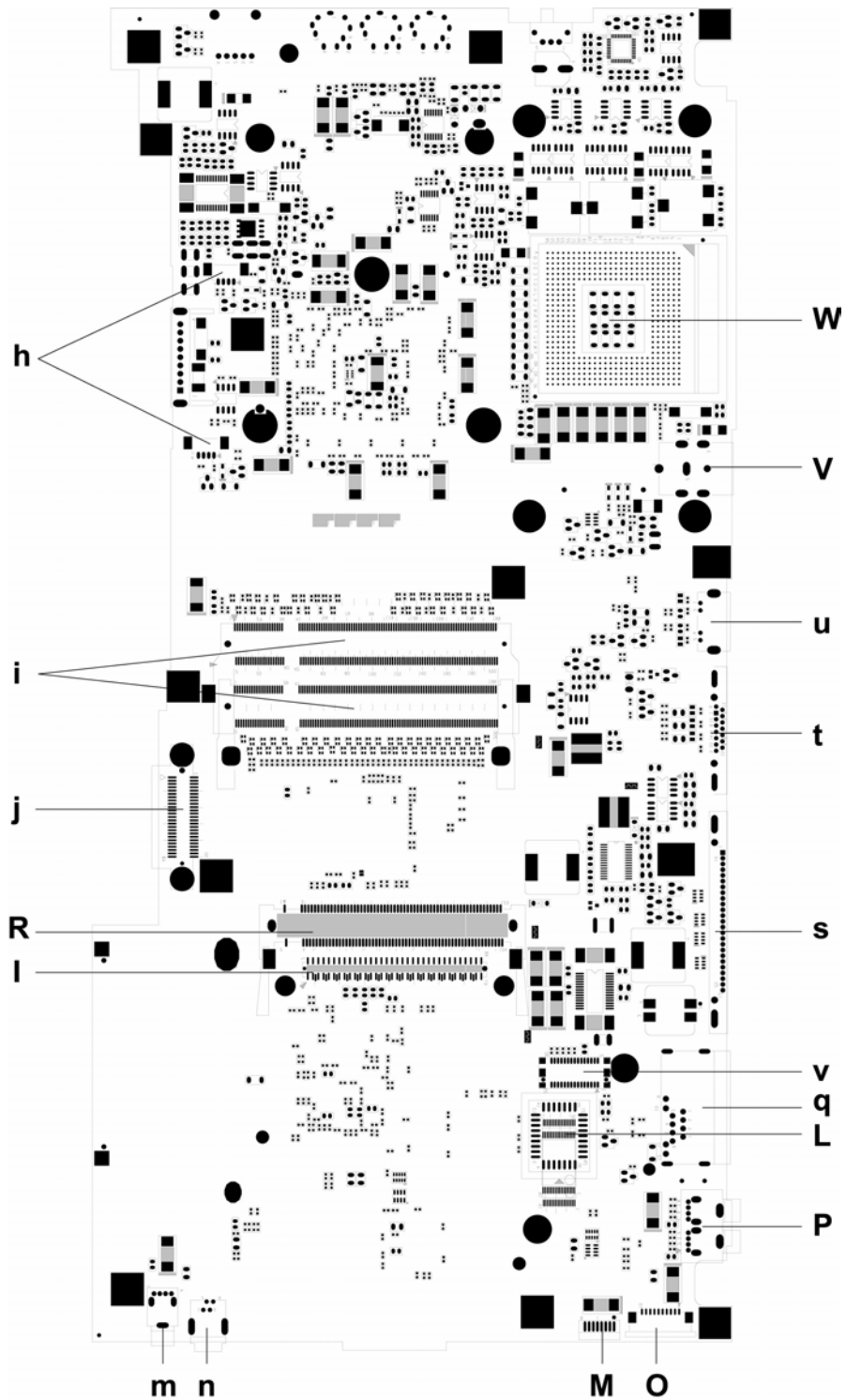


Figure B-2 System board (FRDSY*) layout (back)

Table B-1 System board ICs

Mark	Number	Name
A	U45	AC'97 Codec. (ALC202)
B	U26	Montara – GT (RG82852GME)
C	U24	K/B Controller (PC87591L)
D	U25	ICH4 – M (FW82801DH)
E	U29	IEEE1394 Controller (VT63015)
F	U18	LAN Controller (RTL8101L)
G	U11	PC Card Bus Controller (CB1410 – B0)
H	U7	Super I/O (LPC47N227)
I	U17	Clock Generator (CY28346ZC – 2)
J	U5	TV Decoder (CH7011A)
K	U42	Flash ROM (BIOS)
L	U40	FIR (TFDU6102)

Table B-2 System board connectors

Mark	Number	Name
a	JP4	Internal Speaker Connector
b	JP8	SW/LED Board Connector
c	PCN2	Battery Connector
d	JP9	K/B Connector
e	JP6	T/P FPC Connector
f	JP10	HDD Connector
g	SW1	Lid Switch
h	(SW3, SW4, SW5)	Short – Cut key (Internet hot key, E-Mail hot key, TV-out hot key)
i	SW2	Power Button
j	JP1	LCD Panel Cable Connector
k	JP2, JP3, JP5	Audio Jack (Line-In, Micro Phone, Head phone)
l	VR1	Audio Volume Regulator
m	JP22, JP24	Fan Connectors
n	JP20, JP21	DDR SDRAM SO – DIMM Connector
o	JP25	ODD Connector
p	JP19	Mini PCI Connector
q	JP18	Card Bus Connector
r	JP23	IEEE1394 Connector
s	JP13	USB Connector
t	JP15	RJ11/RJ45 Connector
u	JP17	MDC Connector
v	JP11	Print Port Connector
w	JP12	External Monitor Connector
x	JP14	S-Vido Connector
y	PCN1	DC-IN Jack
z	JCPU1	CPU Socket
a0	SW6	Wireless LAN ON/OFF Switch

Appendix C Pin Assignments

System Board

C.1 JP21/JP22 SODIMM I/F (200-pin)

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	VDD	O	10	VDD	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	VDD	O	22	VDD	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	VDD	O	34	VDD	O
35	CK0	O	36	VDD	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	VDD	O	46	VDD	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	VDD	O	58	VDD	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	VDD	O	70	VDD	O
71	CB0	O	72	CB4	O
73	CB1	O	74	CB5	O
75	VSS	-	76	VSS	-
77	DQS8	I/O	78	DM8	O
79	CB2	O	80	CB6	O
81	VDD	O	82	VDD	O
83	CB3	O	84	CB7	O
85	DU	O	86	DU/RESET#	O
87	VSS	-	88	VSS	-
89	CK2	O	90	VSS	-
91	CK2#	O	92	VDD	O
93	VDD	O	94	VDD	O
95	CKE1	O	96	CKE0	O
97	DU/A13	O	98	DU/BA2	O
99	A12	O	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	VDD	O	114	VDD	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#	O
123	DU	O	124	DU	O
125	VSS	-	126	VSS	-
127	DQ32	I/O	128	DQ36	I/O
129	DQ33	I/O	130	DQ37	I/O
131	VDD	O	132	VDD	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	VDD	O	144	VDD	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	VDD	O	156	VDD	O
157	VDD	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	VDD	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	VDD	O	180	VDD	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	VDD	O	192	VDD	O
193	SDA	O	194	SA0	O
195	SCL	O	196	SA1	O
197	VDD_SPD	O	198	SA2	O
199	VDD_ID	O	200	DU	O

C.2 JP1 LCD I/F (30-pin)

Table C-2 LCD I/F pin assignments (30-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	IB+	O	2	IB+	O
3		-	4	DAC BRIG	O
5	INVT_PWM	O	6	DISPOFF#	O
7	+LCDVDD	O	8	+LCD/DD	O
9	LCD_B0+	O	10	LCD_B00-	O
11	LCD_B1+	O	12	LCD_B01-	O
13	LCD_B2+	O	14	LCD_B02-	O
15		-	16	LCD-BCLK+	O
17	GND	O	18	PID0	I
19	PID1	I	20	PID2	I
21	PID3	I	22	LCD_A0+	O
23	LCD_A0-	O	24	LCD_A1+	O
25	LCD_A1-	O	26	LCD_A2+	O
27	LCD_A2-	O	28	GND	-
29	LCD_ACLK+	O	30	LCD_ACLK-	O

C.3 JP12 RGB I/F (15-pin)

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

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	INTCRT-R	O	2	INTCRT-G	O
3	INTCRT-B	O	4	NC	-
5	GND	-	6	GND (VGAGND)	-
7	GND (VGAGND)	-	8	GND (VGAGND)	-
9	VCC	-	10	GND	-
11	NC	-	12	INTDDCA	I/O
13	INTCRT_HSYNC	O	14	IVTCRT_VSYNIC	O
15	INTDDCCK	I/O			

C.4 JP10 HDD I/F (44-pin)

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

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	PIDE-RST	O	2	GND	-
3	IDE-PDD7	I/O	4	IDE_PDD08	I/O
5	IDE-PDD6	I/O	6	IDE_PDD09	I/O
7	IDE-PDD5	I/O	8	IDE_PDD10	I/O
9	IDE-PDD4	I/O	10	IDE_PDD11	I/O
11	IDE-PDD3	I/O	12	IDE_PDD12	I/O
13	IDE-PDD2	I/O	14	IDE_PDD13	I/O
15	IDE-PDD1	I/O	16	IDE_PDD14	I/O
17	IDE-PDD0	I/O	18	IDE_PDD15	I/O
19	GND	-	20	NC	-
21	IDE_PDDREQ	I	22	NC	-
23	IDE_PDIOW#	O	24	GND	-
25	IDE_PDIOR#	O	26	GND	-
27	IDE_PDIORDY	I	28	PCSEL	O
29	IDE_PDDACK#	O	30	GND	-
31	INT_IRQ 14	I	32	NC	-
33	IDE_PDA1	O	34	GND	-
35	IDE_PDA0	O	36	IDE_PDA2	O
37	IDE_PDCS1#	O	38	IDE_PDCS3	O
39	PHDD_LED#	I	40	GND	-
41	+5VS	O	42	+5VS	O
43	GND	-	44	NC	-

C.5 JP23 CD-ROM I/F (60-pin)

Table C-5 CD-ROM I/F pin assignments (60-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	INT-CD-L	I	2	INTCD-R	I
3	CD AGND	-	4	GND	-
5	SIDE RST#	O	6	IDE_CDD8	O
7	IDE-CDD7	O	8	IDE_CDD9	O
9	IDE-CDD6	O	10	IDE_CDD10	O
11	IDE-CDD5	O	12	IDE_CDD11	O
13	IDE-CDD4	O	14	IDE_CDD12	O
15	IDE-CDD3	O	16	IDE_CDD13	O
17	IDE-CDD2	O	18	IDE_CDD14	O
19	IDE-CDD1	O	20	IDE_CDD15	O
21	IDE-CDD0	O	22	IDE_SODRE0	I
23	GND	-	24	IDE_SDIOR#	O
25	IDE-SIOW#	O	26	GND	O
27	IDE-SIORDY	I	28	IDE_SDDACK#	O
29	INT-IRQ15	O	30	X	O
31	IDE-SDA1	O	32	+5V5	O
33	IDE-SRA0	O	34	IDE-SDA2	O
35	IDE-SPCS1#	O	36	IDE-SRCS3#	O
37	SHDD LED#	I	38	+5V5	O
39	+5V5	O	40	+5V5	-
41	+5V5	-	42	+5V5	O
43	GND	-	44	GND	-
45	GND	O	46	GND	-
47	GND	O	48	GND	O
49	X	O	50	X	O
51		O	52		-
53		O	54		-
55		O	56		-
57		O	58		O
59		O	60		-

C.6 JP11 Parallel I/F (25-pin)

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

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	LPTSTB#	O	2	FD0	I/O
3	FD1	I/O	4	FD2	I/O
5	FD3	I/O	6	FD4	I/O
7	FD5	I/O	8	FD6	I/O
9	FD7	I/O	10	LPTACK#	I
11	LPTBUSY	I	12	LPTDE	I
13	LPTSLCT	I	14	LPTAFD#	O
15	LPTERR#	I	16	INIT#	O
17	SLCTIN#	O	18	GND	-
19	GND	-	20	GND	-
21	GND	-	22	GND	-
23	GND	-	24	GND	-
25	GND	-			

C.7 JP19 PC Card I/F (154-pin)

Table C-7 PC Card I/F pin assignments (154-pin) (1/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
A1	GND	-	A31	S1_ROY#	I/O
A2	GND	-	A32	S1_A21	I/O
A3	S1_D3	I/O	A33	+S1_VCC	I/O
A4	S1_C01#	I	A34	+51-VCC	I/O
A5	S1_D4	I/O	A35	+S1_VPP	I
A6	S1_D11	I/O	A36	+S1-VPP	I/O
A7	S1_D5	I/O	A37	S1_A16	O
A8	S1_D12	I/O	A38	S1_A22	O
A9	S1_D6	-	A39	S1_A75	O
A10	S1_D13	I/O	A40	S1_A23	O
A11	S1_D7	I/O	A41	S1_A12	I/O
A12	S1_D14	I/O	A42	S1_A24	-
A13	S1_CE1#	I/O	A43	S1_A7	I/O
A14	S1_015	I/O	A44	S1_A25	I/O
A15	S1_A10	I/O	A45	S1_A6	I/O
A16	S1_CE2	-	A46	S1_VS2	I/O
A17	S1_OE#	I/O	A47	S1_A5	I/O
A18	S1_VS1	I/O	A48	S1_RST	I/O
A19	S1_A11	I/O	A49	S1_A4	-
A20	S1_IORD#	I/O	A50	S1=WAIT#	I/O
A21	S1_A9	I/O	A51	S1_A3	I/O
A22	S1_IONR#	-	A52	S1_INDRACK#	I/O
A23	S1_A8	I/O	A53	S1_A2	I/O
A24	S1_A17	I/O	A54	S1_REQ#	O
A25	S1_A13	I/O	A55	S1_A1	I/O
A26	S1_A18	I/O	A56	S1_BVD2	I/O
A27	S1_A14	I/O	A57	S1_A0	-
A28	S1_A19	-	A58	S1_BVD1	I/O
A29	S1_WE#	I/O	A59	S1_D0	I
A30	S1_A20	I/O	A60	S1_D8	I/O

Table C-7 PC Card I/F pin assignments (154-pin) (2/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
A61	S1_D1	I	A73	GND	-
A62	S1_D9	I/O	A74	GND	I/O
A63	S1_D2	I	A75	GND	I/O
A64	S1_DIP	I/O	A76	GND	I
A65	S1_WP	-	A77	GND	I/O
A66	S1_CD2#	I	A78	GND	I
A67	GND	I/O	A79	GND	I/O
A68	GND	I/O	A80	GND	I
A69	GND	I/O	A81	GND	I/O
A70	GND	I/O	A82	GND	I
A71	GND	I/O	A83	GND	I/O
A72	GND	I/O	A84	GND	I

C.8 JP20 Mini PCI I/F (124-pin)

Table C-8 Mini PCI I/F pin assignments (124-pin) (1/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	NC	-
3	NC	-	4	NC	-
5	NC	-	6	NC	-
7	NC	-	8	NC	-
9	NC	-	10	NC	-
11	NC	-	12	NC	-
13	RILL_SW#	O	14	NC	-
15	NC	-	16	NC	-
17	PIRQH#_MINI_2	I	18	+5VS_MINIPCI	O
19	+3V	O	20	PIRQG#_MINI	I
21	NC	-	22	NC	-
23	GND	-	24	+3V	O
25	CLK_PIC_MINI	O	26	PCI_GNT#1	O
27	GND	-	28	+3V	O
29	PCI_REQ#1	I	30	PCI_GNT#1	O
31	+3V	O	32	GND	-
33	PCI_AD31	I/O	34	WLANME#	I
35	PCI_AD29	I/O	36	NC	-
37	GND	-	38	PCI_AD30	I/O
39	PCI_AD27	I/O	40	+3V	O
41	PCI_AD25	I/O	42	PCI_AD28	I/O
43	NC	-	44	PCI_AD26	I/O
45	PCI_C/BE#3	I/O	46	PCI_AD24	I/O
47	PCI_AD23	I/O	48	MINI_IDSEL	I/O
49	GND	-	50	GND	-
51	PCI_AD21	I/O	52	PCI_AD22	I/O
53	PCI_AD19	I/O	54	PCI_AD20	I/O
55	GND	-	56	PCI_PAR	I/O
57	PCI_AD17	I/O	58	PCI_AD18	I/O
59	PCI_CBE2	I/O	60	PCI_AD16	I/O

Table C-8 Mini PCI I/F pin assignments (124-pin)(1/2)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
61	PCI_IRDY#	I/O	62	GND	-
63	+3V	O	64	PCI_FRAME#	I/O
65	PCI_CLKRUN#	I/O	66	PCI_TRDY#	I/O
67	PCI_SERR#	I/O	68	PCI_STOP#	I/O
69	GND	-	70	+3V	O
71	PCI_PERR#	O	72	PCI_DEVSEL	I/O
73	PCI_C/BE#1	I/O	74	GND	-
75	PCI_AD14	I/O	76	PCI_AD15	I/O
77	GND	-	78	PCI_AD13	I/O
79	PCI_AD12	I/O	80	PCI_AD11	I/O
81	PCI_AD10	I/O	82	GND	-
83	GND	-	84	PCI_AD09	I/O
85	PCI_AD08	I/O	86	PCI_C/BE#0	I/O
87	PCI_AD07	I/O	88	+3V	O
89	+3V	O	90	PCI_AD06	I/O
91	PCI_AD05	I/O	92	PCI_AD04	I/O
93	NC	-	94	PCI_AD02	I/O
95	PCI_AD03	I/O	96	PCI_AD00	I/O
97	+5VS_MINIPCI	O	98	NC	-
99	PCI_AD01	I/O	100	NC	-
101	GND	-	102	GND	-
103	NC	-	104	GND	-
105	NC	-	106	NC	-
107	NC	-	108	NC	-
109	NC	-	110	NC	-
111	X	I	112	NC	-
113	GND	-	114	GND	-
115	NC	-	116	NC	-
117	GND	-	118	GND	-
119	GND	-	120	GND	-
121	NC	-	122	X	I
123	+5V5	-	124	+3V	-

C.9 JP24.JP26 Fan I/F (3-pin)

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

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VAIW	O	3	FAN-SPEED	I
2	NC	-	4	GND	-

C.10 AC Adaptor Connector (4-pin)

Table C-10 AC Adaptor Connector pin assignments (4-pin)

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

C.11 Microphone (6-pin)

Table C-11 Microphone I/F pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	ANGND	-	3	MIC	I
3	+AND_VREF	I	4	NC	-
5	NC	-	6	ANGND	-

C.12 Headphone Connector (6-pin)

Table C-12 Headphone Connector pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	ANGND	-	2	INTSPKL_L1	O
3	INTSPKR_R1	O	4	NBA PLUG	-
5	AGND	I	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.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
29	\	2B	AB	5D	F0	5D	*5
30	Caps Lock	3A	BA	58	F0	58	
31	A	1E	9E	1C	F0	1C	
32	S	1F	9F	1B	F0	1B	
33	D	20	A0	23	F0	23	
34	F	21	A1	2B	F0	2B	
35	G	22	A2	34	F0	34	
36	H	23	A3	33	F0	33	
37	J	24	A4	3B	F0	3B	*2
38	K	25	A5	42	F0	42	*2
39	L	26	A6	4B	F0	4B	*2
40	; :	27	A7	4C	F0	4C	*2
41	' "	28	A8	52	F0	52	
43	Enter	1C	9C	5A	F0	5A	*3
44	Shift (L)	2A	AA	12	F0	12	
45	No.102 key	56	D6	61	F0	61	
46	Z	2C	AC	1A	F0	1A	
47	X	2D	AD	22	F0	22	
48	C	2E	AE	21	F0	21	
49	V	2F	AF	2A	F0	2A	
50	B	30	B0	32	F0	32	
51	N	31	B1	31	F0	31	
52	M	32	B2	3A	F0	3A	*2
53	, <	33	B3	41	F0	41	*2
54	. >	34	B4	49	F0	49	*2
55	/ ?	35	B5	4A	F0	4A	*2
57	Shift (R)	36	B6	59	F0	59	

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

Cap No.	Keytop	Code set 1				Code set 2			Note
		Make		Break		Make		Break	
58	Ctrl(L)	1D	9D	14	F0	14		*3	
60	Alt (L)	38	B8	11	F0	11		*3	
61	Space	39	B9	29	F0	29			
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0	11			
64	Ctrl(R)	E0 1D	E0 90	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
202	Fn	—		—		—		—		*4
203	Win	E0	5B	E0	DB	E0	1F	E0	F0 1F	
204	App	E0	5D	E0	DD	E0	2F	E0	F0 2F	

Notes:

1. * Scan codes differ by mode.
2. * Scan codes differ by overlay function.
3. * Combination with the **Fn** key 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
203	Win	E0 AA E0 5B	E0 DB E0 2A	E0 F0 12 E0 1F	E0 F0 1F E0 12
204	App	E0 AA E0 5D	E0 DD E0 2A	E0 F0 12 E0 2F	E0 F0 2F E0 12

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

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

Table D-3 Scan codes in Numlock mode

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

Table D-4 Scan codes with Fn key

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

Table D-5 Scan codes in overlay mode

Cap No.	Keytop	Code set 1		Code set 2	
		Make	Break	Make	Break
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

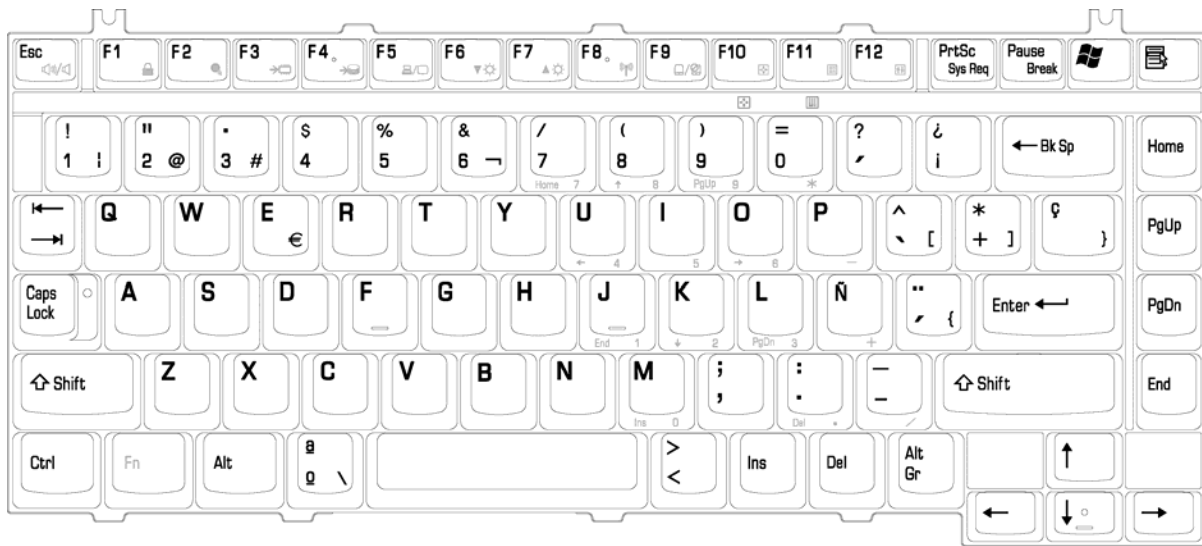


Figure E-3 SP keyboard

E.4 Korean (KO) Keyboard



Figure E-4 KO keyboard

E.5 French (FR) Keyboard



Figure E-5 FR keyboard

E.6 German (GR) Keyboard



Figure E-6 GR keyboard

E.7 Japan (JA-W) Keyboard



Figure E-7 JA-W keyboard

E.8 Italy (IT) Keyboard



Figure E-8 IT keyboard

Appendix F Satellite A30 Series Screw Torque List

Table F-1 Satellite A30 Series Screw Torque List

ITEM		SCREW P/N	SCREW SPEC	Q'ty		LOCATION	SCREW TORQUE
1.	LCD ASSY	MACK25080Z0	M2.5X8 (ZBL)	2		HINGE ASSY TO COVER SUB ASSY	
2.				2		LCD BEZEL TO COVER	
3.		MAAA0015320	M2X3 (ZBL)	2		INVERTER TO COVER SUB ASSY	
4.				14"	6	LCD-BRK TO LCD	
4.				15"	8	LCD BRK TO LCD	
5.				6		LCD PANEL ASSY TO COVER SUB ASSY	
6.	1		LCD CABLE TO COVER				
1.	MB ASSY	MAC925004Z0	M2.5X5 (ZBL)	4		CUP SUPP TO MB	
2.				4		CPU THERMAL SIAK TO STAND OFF	
3.				2		MDC TO MB	
4.		MAA00001210	M2X5 (ZBL)	4		PCMCIA TO MB	
5.				2		CD ROM CONN TO MB	
6.				2		FAN MODULE TO MB	
1.	LOGIC ASSY	MAC925003Z0	M2.5X3 (ZBL)	3		L U SHIELD TO L U	
2.				2		TP BRK TO L U	
3.				1		LED SUPP PLATE - TP BRK-L	
4.				2		NECK TO LOG - UP	

ITEM		SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
5.		MAC92500AZ0	M2.5X5 (ZBL)	1	SADDLER R - L U SHIELD - L U	
6.				1	SADDLE L-L SHIELD-L U	
7.				2	SPEAKER R/L TO SADDLE TO L U	
8.		MAAA0015320	M2X3 (ZBL)	3	LED BOARD TO LED SUPP PLATE	
1.	LOG LOW ASSY	MAC925003Z0	M2.5X3 (ZBL)	1	BATT LATCH TO LATCH KNOB	
1.	LOGIC ASSY	MAC925004Z0	M2.5X5 (ZBL)	2	MB TO L L	
2.				2	MODULE SUPP TO L L	
3.				2	L U SHIELD - MB - L L SHIELD - L L	
4.				2	L L SUPPORT C	
5.				2	L L TO SADDLE R/L (HINGE back)	
6.				1	L L TO XDORM SUPP	
7.				4	HDD ASSY - L L - MODULE SUPP - L U	
8.		MACK25082Z0	M2.5X8	2	L L TO SADDLE R/L (HINGE back)	
9.				2	LCD ASSY TO LOGIC ASSY (BACK SIDE)	
10.		MACK25082Z0	M2.5X8 (ZBL)	2	LCD ASSY TO LOGIC ASSY (HINGE TO SADDLE)	
11.				1	LOG - UP - LO - MB - LOG - LI - LOGLOW	
12.			MACK20040N1	M2.0X4	2	MODULE - SUPPORT

ITEM	SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE	
13.	MMCK7030Z0	M1.7X2	1	LCD - CABLE TO LU - SHIELD		
14.			2	KB TO L U SHIELD		
15.	MAC925018Z0	M2.5X18 (ZBL)	8	L L TO L U		
16.			2	LCD ASSY TO LOGIC ASSY (HINGE TO L L)		
17.			1	LOGUP - LOG - UP SHIELD - MB - LOG LOW SHIELD		
18.			1	LOGUP - LOG - UP SHIELD - MB - LOG LOW SHIELD - LOG LOW		
19.			2	CPU DOOR TO L L		
20.	MAC925003Z0	M2.5X3 (ZBL)	2	L L TO L U (BATTERY)		
21.	LOGIC ASSY	MAAA0015320	M2X3 (ZBL)	6	DVD ROM MODULE (Toshiba)	
22.				6	DVD ROM MODULE (Mke)	
23.				6	COMBO MODULE (Toshiba)	
24.				6	COMBO MODULE (Kme)	
25.				6	DVD RAM MODULE (Toshiba)	
26.				6	DVD RAM MODULE (Kme)	
27.				6	DVD RAM MODULE (TEAC)	
28.				6	COMBO MODULE (TEAC)	

ITEM		SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
29.	LOGIC ASSY	MAAA4303000	M3X3 (ZBL)	4	HDD ASSY	
30.		MAAAA173500	1.7	3	COMBO KME	
31.		MAFA9400100	D-SUB NUT	4	L L TO D-SUB CONN	

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
FDD	30,000
DVD-ROM drive, CD-RW/DVD-ROM drive	60,000
AC adaptor	60,000

