

Toshiba Personal Computer
Satellite P10 Series
Maintenance Manual

TOSHIBA CORPORATION

Copyright

© 2003 by Toshiba Corporation. All rights reserved. Under the copyright laws, this manual cannot be reproduced in any form without the prior written permission of Toshiba. No patent liability is assumed with respect to the use of the information contained herein.

Toshiba Personal Computer Satellite P10 Series Maintenance Manual

First edition September 2003

Disclaimer

The information presented in this manual has been reviewed and validated for accuracy. The included set of instructions and descriptions are accurate for the P10 Series at the time of this manual's production. However, succeeding computers and manuals are subject to change without notice. Therefore, Toshiba assumes no liability for damages incurred directly or indirectly from errors, omissions, or discrepancies between any succeeding product and this manual.

Trademarks

IBM is a registered trademark, and OS/2 and PS/2 are trademarks of IBM Corporation. Microsoft, MS-DOS, Windows, DirectSound and DirectMusic are registered trademarks of Microsoft Corporation.

Intel and Pentium are registered trademarks, and SpeedStep is a trademark of Intel Corporation. Sound Blaster is a registered trademark of Creative Technology Ltd.

Centronics is a registered trademark of Centronics Data Computer Corporation.

Photo CD is a trademark of Eastman Kodak.

All other properties are trademarks or registered trademarks of their respective holders.

Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite P10 Series, referred to as the P10 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 P10 Series system unit and each FRU.
- Chapter 2 Troubleshooting Procedures explains how to diagnose and resolve FRU problems.
- Chapter 3 Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.
- Chapter 4 Replacement Procedures describes the removal and replacement of the FRUs.
- Appendices The appendices describe the following:

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

Conventions

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

Acronyms

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

Read Only Memory (ROM)

Keys

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

Key operation

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

User input

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

DISKCOPY A: B:

The display

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

```
Format complete
System transferred
```

Table of Contents

Chapter 1 Hardware Overview

1.1	Features	1-1
1.2	System Unit	1-5
1.3	2.5-inch Hard Disk Drive	1-12
1.4	Removable Drives	1-13
1.5	Power Supply	1-18
1.6	Batteries	1-20

Chapter 2 Troubleshooting Procedures

2.1	Troubleshooting Introduction	2-1
2.2	Troubleshooting Flowchart	2-2
2.3	Power Supply Troubleshooting	2-7
2.4	Display Troubleshooting	2-12
2.5	FDD Troubleshooting	2-15
2.6	Keyboard Troubleshooting	2-17
2.7	External USB Devices Troubleshooting	2-19
2.8	TV-Out Failure Troubleshooting	2-21
2.9	Printer Port Troubleshooting	2-23
2.10	TouchPad Troubleshooting	2-25
2.11	Speaker Troubleshooting	2-27
2.12	Optical Drive Troubleshooting	2-29
2.13	Modem Troubleshooting	2-32
2.14	PC Card Troubleshooting	2-34
2.15	IEEE 1394 Troubleshooting	2-36
2.16	Wireless LAN Troubleshooting	2-38
2.17	Bluetooth Troubleshooting	2-40

Chapter 3 Tests and Diagnostics

3.1	The Diagnostic Test	3-1
3.2	Executing the Diagnostic Test.....	3-2
3.3	Config Check Test.....	3-6
3.4	DMI Check Test	3-7
3.5	PIO Loopback Test.....	3-8
3.6	IEEE 1394 Test	3-9
3.7	Speaker Audio Test	3-10
3.8	Fan ON/OFF Test.....	3-11
3.9	Main Battery Charge Test	3-12
3.10	FDD Test	3-13
3.11	CD-ROM Test	3-14
3.12	Keyboard Test	3-15
3.13	Mouse (Pad) Test	3-18
3.14	LCD Pixels Mode Test.....	3-20
3.15	Lid Switch Test	3-21
3.16	HDD R/W Test.....	3-22
3.17	LAN Test.....	3-24
3.18	RTC Test	3-26
3.19	CD Control Button Test	3-27

Chapter 4 Replacement Procedures

4.1	General.....	4-1
4.2	Battery.....	4-7
4.3	PC Card.....	4-9
4.4	Optical Drive Module.....	4-12
4.5	Optical Drive.....	4-14
4.6	Wireless LAN Unit.....	4-16
4.7	Expansion Memory.....	4-19
4.8	Modem / Bluetooth Unit.....	4-22
4.9	Fan, Heat Sink, & CPU.....	4-25
4.10	HDD.....	4-29
4.11	Keyboard.....	4-33
4.12	Display Assembly.....	4-36
4.13	Top Cover.....	4-38
4.14	TouchPad.....	4-41
4.15	Speakers.....	4-43
4.16	System Board.....	4-45
4.17	Direct Play Button Board.....	4-47
4.18	Display Mask.....	4-49
4.19	LCD Module.....	4-51
4.20	FL Inverter Board.....	4-53

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 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	2.5-inch Hard Disk Drive.....	1-12
1.4	Removable Drives.....	1-13
1.4.1	DVD-R/-RW Drive	1-13
1.4.2	DVD-ROM Drive.....	1-15
1.4.3	DVD Multi-Drive.....	1-16
1.4.4	Combo Drive	1-17
1.5	Power Supply	1-18
1.6	Batteries	1-20
1.6.1	Main Battery.....	1-20
1.6.2	RTC battery	1-21

1.1 Features

The Satellite P10 Series Personal Computer uses extensive Large Scale Integration (LSI), and Complementary Metal-Oxide Semiconductor (CMOS) technology extensively to provide compact size, minimum weight and high reliability. This computer incorporates the following features and benefits:

❑ CPU

- Intel Desktop P4 up to 3.4GHZ , Northwood,Prescott or Celeron upgradable
- mPGA478 package CPU
- FSB400 Celeron CPU 2.6G
- FSB533 Northwood CPU 2.53G/2.66G/2.8G w/o HT
- FSB800 Northwood CPU 2.4G/2.6G/2.8G/3.0G/3.2G w/HT
- FSB800 Prescott CPU 3.2G/3.4G W/HT

❑ Chipset

- Intel DT Springdale (865 PE)
- Intel 82801 EB I/O Controller HUB5 (ICH5)
- PC87591L for Keyboard Controller, Battery management Unit, and RTC.
- T7L65XB for CardBus and SD Controller
- nVIDIA NV33M/NV34M/NV31M Graphics controller.
- ALC202 for AC97 CODEC.
- SW DIRECT DJ for Direct CD play controller.
- 8101L for LAN controller
- TSB43AB21A for IEEE1394 Controller
- LPC47N227 for Legacy I/O prot Controller.

❑ Memory

- On board with two 200-pin +2.5V SO-DIMM connector, supporting, DDR RAM memory modules. Maximum upgradable to 2GB by two1GMB SO-DIMM module.
- 128KB/512KB/1MB L2 Cache on CPU.
- External 32MB VGA DDR-SDRAM with NV33M
- External 64MB VGA DDR-SDRAM with NV34M
- External 64MB VGA DDR-SDRAM with NV31M

BIOS

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

 Power

- 12 cells Li-Ion 18650 size smart battery Pack with 95Wh capacity
- 1.5 hour operation as running battery mark 2001 version 1.0/+ program
- 12 hour charging time to 100% capacity on Li-Ion Battery with the system on.
- Brightness Minimum plus 3 steps

 HDD

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

 ODD Devices

One of the following:

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

 Optional Devices

- 256MB/512MB/1GB SO-DIMM modules
- MINI PCI module(802.11b,802.11a+b,802.11g,802.11a+g wireless LAN module)
- Modem with MDC solution module

 Keyboard

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

 TouchPad

This pointing control device, located in the center of the keyboard palm-rest, provides convenient control of the cursor without requiring desk space for a mouse. The TouchPad incorporates two mouse buttons.

 Display

- 15.4-inch WXGA TFT screen, 1920×1200 pixels, Response time 35ms (typ.); Contrast ratio 400:1 (typ.); Brightness 200 Nit (typ.)

❑ I/O Ports

- One 25 pins Parallel port, EPP/ECP Capability
- One 15 pins CRT port, Support DDC 2B
- One TV-out connector
- One MIC In port
- One headphone-out
- One 2pins AC Adapter Jack
- One type II PCMCIA Card Bus slots
- Three 4 pins USB ports
- One RJ11/RJ45 Port
- VR for volume control
- IrDA Port
- 1394 Port
- Line-in
- One SD-card Slot
- One 10/100T Ethernet Port

❑ PC Card

- One type II card sockets
- SRAM, OTPROM, FLASH ROM, mask ROM memory card up to 64MB
- MODEM/LAN card
- 1.8" 10.5mm removable ATA Device
- Card bus card
- ACPI 1.0 Compliant

❑ Universal Serial Bus (USB)

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

Parallel port

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

 External monitor port

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

 Sound system

A Cirrus logic 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.

 LAN port

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

 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 be played with the computer turned off. Pressing play in digital mode will start the computer and launch the digital music player application.

1.2 System Unit

The system unit is composed of the following major components:

- ❑ Processor
 - Intel Desktop P4 up to 3.4GHZ , Northwood,Prescott or Celeron upgradable
 - mPGA478 package CPU
 - FSB400 Celeron CPU 2.6G
 - FSB533 Northwood CPU 2.53G/2.66G/2.8G w/o HT
 - FSB800 Northwood CPU 2.4G/2.6G/2.8G/3.0G/3.2G w/HT
 - FSB800 Prescott CPU 3.2G/3.4G W/HT
- ❑ System Logic
 - Intel chipset MCH Springdale PE
 - Integrated DRAM controller
 - Accelerated Graphics Port (AGP) Interface
 - Hub Interface to Intel ICH5
 - Power Management Functions
- ❑ Fixed Disk Interface
 - Intel 82801 EB I/O Controller HUB5 (ICH5)
- ❑ Keyboard Controller
 - PC87591 is use as keyboard controller and battery management unit
- ❑ Memory
 - System DRAM
 - Two JEDEC standard 200-pins SO-DIMM memory support +2.5V /256MB/512MB/1GB.
 - System & KB Combine ROM BIOS
 - 1MB Flash ROM
- ❑ Video Subsystem (nVIDIA NV33M,NV34M,NV31M Graphics Controller)
 - Microsoft-DX9 & OpenGL-2.0 (with NVIDIA extensions) Graphics APIs hardware support
 - One integrated third-generation transform-and-lighting engines
 - NVIDIA next generation nFiniteFX+ vertex-&-pixel shaders (VS2.0+ & PS2.0+) technology enables full user-programmability for ultra-realistic“ cinematic quality” graphics content creation & display
 - Re-architected quad pipe rendering engine, with radically improved quad-pixel per clock performance
 - 50 million triangles per second setup engine
 - 1000 Million pixels per second fill rate
 - 256-bit 3D and 2D graphics accelerator, with full 32/64/128-bit color with 32- bit z/stencil (24+8 bit) support
 - Complete pipeline support for 128-bit color for ultimate rendering quality

- NVIDIA Accuviv+ anti-aliasing technology for full Quincunx AA capability – even for high-resolution UXGA panels
 - Extensive support of compression technology & on-the-fly de-compression for maximizing memory bandwidth utilization, with no visual quality compromises
 - Raw Peak memory bandwidth of 8.0 GB/second
 - Supports 128-bit DDR SDRAM, driven by a twin memory channel architecture, for maximizing memory bandwidth utilization to enhance rendering performance while minimizing power-consumption as well.
 - Dramatically more efficient early Z-cull and Z-clear algorithms
 - DirectX and S3TC texture compression support
 - AGP8x (with Fast Writes & Side-band-Signaling support) - for enhanced host interface bandwidth up-to 2.1Gbytes/second; with AGP4x, 2x support as well
 - Enhanced nView+ multi-display technology supporting any combination of notebook LCD, desktop VGA monitor, DVI display or TV set; with new user & applications control & interface support capabilities
 - Dual CRT/ Simultaneous Dual Display (same or different surfaces)
 - Integrated dual LVDS Transmitter supporting LCD panels up to 2048x1536 @60Hz
 - Integrated 400 MHz Palette-DAC for analog VGA monitors up to 2048x1536 @85Hz refresh
 - Integrated NTSC/PAL TV encoder supporting resolutions up to 1024x768 without the need for panning, with built-in Macrovision (7.1.L1) copy-protection
 - Integrated TMDS transmitter for Digital Visual Interface support with scaling and filtering for flat panels up to 1600x1200 @60Hz
 - DVD- and HDTV-ready MPEG-2 decoding up to 1920x1080i resolutions
 - Most comprehensive MPEG-2 hardware decode functionality, including Inverse Quantization, Inverse Discrete Cosine Transform, Motion Compensation and Color-Space-Conversion
 - VIP1.1 interface support for Analog Video In/Out functionality
 - Dual 12-bit or Single 24-bit configurable DVO ports for up-to 333Mpixels/sec transfer rates
 - Improved visual quality for all display planes (desktop or overlay) over all display devices (LCD, CRT, TV) – enabled by improved filtering, adaptive de-interlacing & per-pixel gamma-correction hardware circuitry
 - Full support for all Windows (ME, 2K, XP), MAC OSX & Linux operating systems
 - PowerMizer3.0 technology for further maximizing battery life, while minimizing performance compromises - through dynamic intelligent powering down of currently unused functional blocks
 - Advanced TSMC 0.15 micron with 8-layer metals process, for maximizing performance while minimizing power – a critical mobile combination
 - 31x31mm, 701 EPBGA package
- Video Subsystem (nVIDIA NV31M Graphics Controller)

- Microsoft®DirectX®9.0 and OpenGL 2.0 graphics API hardware support with NVIDIA extensions.
- Integrated third-generation transform-and-lighting engine.
- Next-generation NVIDIA nFiniteFX™ II vertex and pixel shaders (VS2.0+ and PS2.0+) technology enables full user programmability for ultrarealistic “cinematic quality” graphics content creation and display.
- Re-architected quad pipe rendering engine, with radically improved performance for quad-pixel with one texture per clock and for dual-pixel with two textures per clock. 60 million triangles per second setup engine.
- 1.2 billion pixels per second fill rate.
- 256-bit 3D and 2D graphics accelerator, with full 32-bit, 64-bit, or 128-bit color with
- 32-bit z-stencil (24 + 8 bit) support.
- Complete pipeline support for 128-bit color for ultimate rendering quality.
- NVIDIA Accuvision Antialiasing technology for full Quincunx AA capability, even for high-resolution UXGA panels.
- Extensive support for compression technology and on-the-fly decompression for maximizing memory bandwidth utilization, with no visual quality compromises.
- Raw peak memory bandwidth of 9.6 GBps.
- Support for 128-bit DDR SDRAM, driven by a deep twin independent memory channel architecture, extending from rendering pipes through memory controllers out to twin independent memory banks.
- Dramatically more efficient early z-cull and z-clear algorithms.
- DirectX and S3TC® texture-compression support.
- AGP 3.0 8X (with Fast Writes and sideband signaling support) for enhanced host interface bandwidth up to 2.1 GBps. Includes AGP 2.0 4X, 2X, and 1X support.
- Enhanced NVIDIA nView™ multi-display technology supporting any combination of notebook LCD, desktop VGA monitor, DVI display, or TV set. Includes new user controls, applications control, and interface support capabilities.
- Dual CRT/ simultaneous dual display (same or different surfaces).
- Integrated dual LVDS transmitter supporting LCD panels up to 2048 × 1536 × 32 at 60Hz.
- Integrated 400 MHz DAC for analog VGA monitors up to 2048 × 1536 × 32 at 85 Hz refresh.
- Integrated NTSC/PAL TV encoder supporting resolutions up to 1024 × 768 without the need for panning, with built-in Macrovision 7.1.L1 copy-protection.
- Integrated TMDS transmitter for Digital Visual Interface (DVI) support with scaling and filtering for flat panels up to 1600 × 1200 at 60 Hz for single link and up to 2560 × 1536 for dual-link TMDS.
- DVD-ready and HDTV-ready MPEG-2 decoding up to 1920 × 1080i resolutions.
- Most comprehensive MPEG-2 hardware decode functionality with inverse discrete cosine transformation (IDCT), motion compensation, and color space conversion.
- VIP 1.1 interface support for analog video-in and video-out functionality.

- Dual 12-bit or single 24-bit configurable DVO ports for up to 333 meg apixels/s transfer rates.
 - Improved visual quality for all display planes (desktop or overlay) over all display devices (LCD, CRT, TV). Includes improved filtering and per-pixel gamma-correction hardware circuitry.
 - Full support for Windows ME, Windows 2000, Windows XP, MAC OSX, and Linux operating systems.
 - NVIDIA PowerMizer™ 3.0 technology for further maximizing battery life, while minimizing performance compromises through dynamic intelligent powering down of currently unused functional blocks.
 - Advanced Taiwan Semiconductor Manufacturing Corporation (TSMC) 0.13 micron with 8-layer metals (copper) process, for maximizing performance while minimizing power — a critical combination for mobile applications.
 - 31 × 31 mm, 701 exposed drop-in heat sink (EDHSBGA) package.
- 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 Pre-compensation Modes
 - Serial Ports
 - 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

❑ Audio subsystem

- Cirrus logic ALC202 for AC97 codec
 - Ac ,97 2.1 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 Pseudo-Differential CD Input.
 - Extensive Power Management Support.
 - Meets or Exceeds the Microsoft® PC 99 Audio Performance Requirements.
 - S/PDIF Digital Audio Output.
 - CrystalClear ® 3D Stereo Enhancement.

❑ EE 1394A Host Controller

- TI TSB43AB21A 1394a-2000 OHCI PHY/Link layer Controller.
- Fully Supports provisions of IEEE 1394-1995 standard for high-performance serial bus and the IEEE 1394a-2000 supplement.
- Fully interoperable with FireWire™ and i.LINK™ implementations of IEEE Std 1394 .
- Meets Intel™ Mobile Power Guideline 2000.
- Full IEEE 1394a-2000 support includes: connection debounce, arbitrated short reset, multispeed concatenation, arbitration acceleration, fly-by concatenation, and port disable/suspend/resume.
- Power-down features to conserve energy in battery-powered applications include: automatic device power down during suspend, PCI power management for link-layer, and inactive ports powered down.
- Ultralow-power sleep mode.
- Provides two IEEE 1394a-2000 full compliant cable port at 100/200/400 megabits per second (Mbits/s).
- Cable ports monitor line conditions for active connection to remote node.
- Cable power presence monitoring.
- Separate cable bias (TPBIAS) for each port.
- 3.3-V core logic with universal PCI interfaces compatible with 3.3-V and
- 5-V PCI signaling environments.
- Physical write posting of up to three outstanding transactions.

- Implements PCI burst transfers and deep FIFOs to tolerate large host latency.
 - PCI_CLKRUN protocol.
 - External cycle timer control for customized synchronization.
 - Extended resume signaling for compatibility with legacy DV components.
 - PHY-Link logic performs system initialization and arbitration functions.
 - PHY-Link encode and decode function included for data-strobe bit level encoding.
 - PHY-Link incoming data resynchronized to local clock.
 - Low-cost 24.576-MHz crystal provides transmit and receive data at 100,200,and 400 Mbits/s.
 - Node power class information signaling for system power management.
 - Serial ROM interface supports 2-wire serial EEPROM devices.
 - Provides two general-purpose I/Os .
 - Register software control of contender bit, power class bits, link active control bit, and IEEE 1394a-2000 features.
 - Fabricated in advanced low-power CMOS process.
 - PCI and CardBus implementations.
 - Isochronous receive dual-buffer mode.
 - Out-of order pipelining for asynchronous transmit requests.
 - Register access fail interrupt when PHY SYSCLK is not active.
 - PCI power-management D1 power state.
- ❑ Audio DJ-Controller
- SW DIRECT DJ
 - “CD Player Mode” allows music CD play while notebook is OFF
 - “Direct mode” with “Push mode” technology allows function buttons (PLAY_PAUSE, NEXT_TRK/SCAN_FW, PREV_TRK/SCAN_RW, STOP_EJECT) to work while system is ON
 - Low power consumption – conserve notebook’s battery capacity
 - Work hand-in-hand with traditional ISA/PCI based audio chipset
 - “Pass through” mode allows this chip to be transparent to the OS and system hardware
 - ATAPI compliant during CD Player Mode
 - Auto power management-SLEEP and SUSPEND states
 - Supports Volume up/down control through and digital volume controller
 - Support activity icon display
 - Supports track number display
 - Minimal software required in Direct Mode
 - Maintains High Quality sound
 - Patent pending
- ❑ Card Bus/SD-IO Host Adapter
- Conforms to PCI power management specification revision 1.1
 - Conforms to PCI local bus specification revision 2.2
 - Supports remote wakeup feature (#PME-compliant) *
 - Supports PCI interrupts (INT)

- Supports PCI CLKRUN
- Supports suspend state
- Supports Plug & Play
- Operating frequency: PCI (33 MHz max)
- Supports LSI MIC2563 which controls power supply
- Supports 3.3-V PCI interface
- Conforms to SD memory card physical layer specifications (ver. 1.0)
 - Operating frequency 16 MHz max
 - Offers Multimedia card read/write
 - Supports 3.3 V
 - Offers multi-block write/read
- Conforms to SDIO card specifications (ver. 1.0)
 - Operating frequency 16 MHz max
 - Supports 3.3 V
 - Offers multi-block write/read
- Conforms to SmartMedia™ electrical specifications (ver. 1.20) and physical format specifications (ver. 1.20), supporting:
 - Supports 3.3-V SmartMedia™ (5.0 V not supported)
 - Supports hardware ECC
- Conforms to PC Card Standard Release 7
 - Supports 2 Slot PC-Card Socket

1.3 2.5-inch Hard Disk Drive

The internal HDD is a random access non-volatile storage device. It has a non-removable 2.5-inch magnetic disk and mini-Winchester type magnetic heads. The computer supports a 30 / 40 / 60 / 80GB HDD.

1.4 Removable Drives

The module compartments can accommodate the following removable modules:

- DVD-R/-RW drive
- DVD-ROM drive
- DVD Multi-drive drive
- Combo drive

1.4.1 DVD-R/-RW Drive

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

Read speeds

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

Write speeds

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

Access Speed

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

Buffer capacity 2 Mbytes (Max)

Supported formats

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

1.4.2 DVD-ROM Drive

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

Transfer rates

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

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

Buffer capacity

Matsushita SR-8177: 256 Kbytes (Max)

Toshiba SD-C2612 192 Kbytes (Max)

Supported formats

CD:	CD-Audio	CD-ROM (mode 1 and mode 2)	CD-ROM XA (mode 2, form 1 and form 2)
	CD-I Bridge	CD-I (mode 2, form 1 and form 2)	CD-TEXT
	Video CD	CD-RW	Photo CD
	CD-WO**	Enhanced Music CD (CD Plus)**	CD-I Ready**
	CD+(E)G*	CD-MIDI*	CD-R*
DVD:	DVD-5	DVD-9	DVD-10
	DVD-18*	DVD-RAM (2.6G/4.7G)	DVD-R (3.95G/4.7G)
	DVD-RW		

* Toshiba SD-C2612 only

** Matsushita SR-8177only

1.4.3 DVD Multi-Drive

The Matsushita UJ-811B DVD multi-drive is capable of driving either 12cm (4.72-inch) or 8cm (3.15-inch) DVDs and CDs without using an adaptor.

Read speed

DVD-ROM	Max 8X CAV (MAX 10800 kB/s)
CD-ROM	Max 24X CAV (MAX 3600 kB/s)

Write speed

CD-R :	Max16X Zone CLV
CD-RW	4X CLV
High Speed CD-RW	8XCLV
DVD-R	2XCLV
DVD-RW	1X CLV
DVD-RAM	2X ZCLV (4.7GB)

Access Speed

DVD-ROM	180ms (Typ.) (Random)
CD-ROM	150ms(Typ.) (Random)

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

Buffer Memory 2MB

Supported formats

CD: CD-DA	CD-ROM	CD-R/W
CD-R	CD-ROMXA	CD-I Ready
Video CD	PhotoCD(multi-session)	Cd-Extra(CD+)
CD-TEXT		
DVD: DVD-Video	DVD-ROM	DVD-R(3.9GB, 4.7GB)
DVD-RAM	DVD-RW(Ver.1.1)	

1.4.4 Combo Drive

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

Read speeds

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

Write speeds

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

Access Speed

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

* Toshiba SD-R2412

Buffer capacity 2 Mbytes (Max)

Supported formats

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

1.5 Power Supply

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

1. A/D conversion

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

- AC adaptor current
- Battery and temperature

2. AC adaptor and battery check

The EC checks the following by A/D converted values:

- Battery installed

The EC checks the following by GPIO values:

- AC adaptor connected

3. Abnormal check

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

4. Input port management

The EC monitors the following input signal status:

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

5. Beep and LED control

Beep is caused by the low battery status.

The EC controls the following two kinds of LED

DC IN LED (one color: green)

- Green = indicates AC adaptor is connected

Battery LED (two colors: orange and green)

- Green solid = The battery is fully charged.

- Orange = The computer is quick-charging the battery / The battery is low.

6. Power ON/OFF sequence

When power is turned on or off, the EC starts the power on or off sequence.

- SQ0-4 = power ON sequence
- SQ5-B = power OFF sequence

7. Battery charging control

The EC controls the following.

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

8. Detection of the low battery

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

- LB10M= The system will be driven by the battery for 12 more minutes.
- LB0 = The battery won't be able to drive the system after 3 minutes.
- LB1 = The battery can drive the system only during the suspend process.
- LB2 = The battery cannot drive the system.

9. New battery installation

When a new battery is installed, the EC communicates with the E²PROM in the battery to read information of the newly installed battery.

10. Battery capacity calculation

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

1.6 Batteries

The computer has two types of battery:

- Main battery pack (18650 size)
- RTC battery

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

The battery specifications are listed in the table below.

Battery name	Material	Output voltage	Capacity
Main battery	Lithium-Ion	14.8 V	6450mAh
RTC battery	Lithium	3.3 V	15 mAh

1.6.1 Main Battery

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

- Quick Battery Charge

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

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

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

NOTES

1. *The time required for normal charge is affected by the amount of power the system is consuming. Use of the fluorescent lamp and frequent disk access diverts power and lengthens the charge time.*
2. *Using quick charge, the power supply microprocessor automatically stops the charge after eight hours regardless of the condition of the battery. Overcharging could cause the battery to explode.*

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

1. The battery becomes fully charged.
2. The AC adaptor or battery is removed.
3. The battery or output voltage is abnormal.
4. The battery temperature is abnormal.
5. The battery SMBus communication fails.
6. The battery cell is bad.

Detection of full charge

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

1.6.2 RTC battery

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

Status	Time
Charging Time (power on)	About 48 hours
Data preservation period (full charge)	2 month

Chapter 2

Troubleshooting Procedures

Chapter 2 Contents

2.1	Troubleshooting Introduction	2-1
2.2	Troubleshooting Flowchart.....	2-2
2.3	Power Supply Troubleshooting.....	2-7
2.4	Display Troubleshooting.....	2-12
2.5	FDD Troubleshooting	2-15
2.6	Keyboard Troubleshooting	2-17
2.7	External USB Devices Troubleshooting.....	2-19
2.8	TV-Out Failure Troubleshooting	2-21
2.9	Printer Port Troubleshooting.....	2-23
2.10	TouchPad Troubleshooting.....	2-25
2.11	Speaker Troubleshooting	2-27
2.12	Optical Drive Troubleshooting	2-29
2.13	Modem Troubleshooting.....	2-32
2.14	PC Card Troubleshooting	2-34
2.15	IEEE 1394 Troubleshooting	2-36
2.16	Wireless LAN Troubleshooting.....	2-38
2.17	Bluetooth Troubleshooting	2-40

Figures

Figure 2-1	Troubleshooting flowchart (1/2)	2-3
Figure 2-1	Troubleshooting flowchart (2/2)	2-4
Figure 2-2	Power Supply Troubleshooting Process.....	2-7
Figure 2-3	Display troubleshooting process	2-12
Figure 2-4	FDD troubleshooting process.....	2-15
Figure 2-5	Keyboard troubleshooting process	2-17
Figure 2-6	External USB device troubleshooting process	2-19
Figure 2-7	TV-out troubleshooting process	2-21
Figure 2-8	Printer port troubleshooting process.....	2-23
Figure 2-9	TouchPad troubleshooting process.....	2-25
Figure 2-10	Speaker troubleshooting process	2-27
Figure 2-11	Optical drive troubleshooting process.....	2-29
Figure 2-12	Modem troubleshooting process	2-32
Figure 2-13	PC Card troubleshooting process	2-34
Figure 2-14	IEEE 1394 troubleshooting process	2-36

Tables

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

2.1 Troubleshooting Introduction

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

- | | | |
|----------------------|----------------------------|-------------------------|
| 1. Display | 6. Printer (parallel) port | 11. PC Card unit |
| 2. Floppy Disk Drive | 7. TouchPad | 12. IEEE 1394 port |
| 3. Keyboard | 8. Speaker | 13. Wireless LAN system |
| 4. USB ports | 9. Optical drive | 14. Bluetooth |
| 5. TV-out port | 10. Modem | |

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

The following tools are necessary for implementing the troubleshooting procedures:

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

2.2 Troubleshooting Flowchart

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

- Ask the user if a password is registered and, if it is, ask him or her to enter the password.
- Verify with the customer that Toshiba Windows XP is installed on the hard disk. Operating systems that were not preinstalled by Toshiba can cause the computer to malfunction.
- Make sure all optional equipment is removed from the computer.
- Make sure the floppy disk drive, if installed, is empty. If no FDD module is installed, you should use an external FDD to run the diagnostics tests

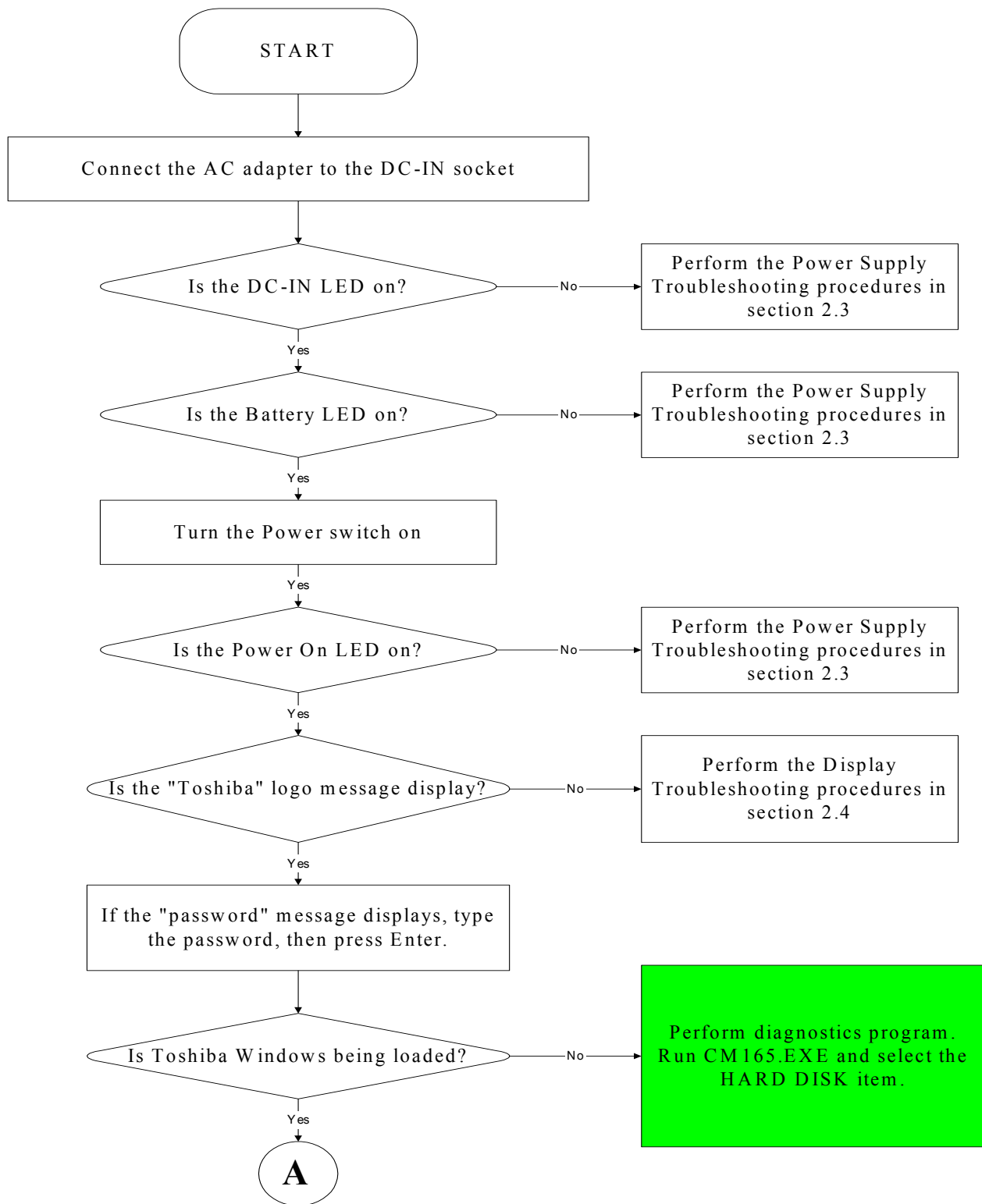


Figure 2-1 Troubleshooting flowchart (1/2)

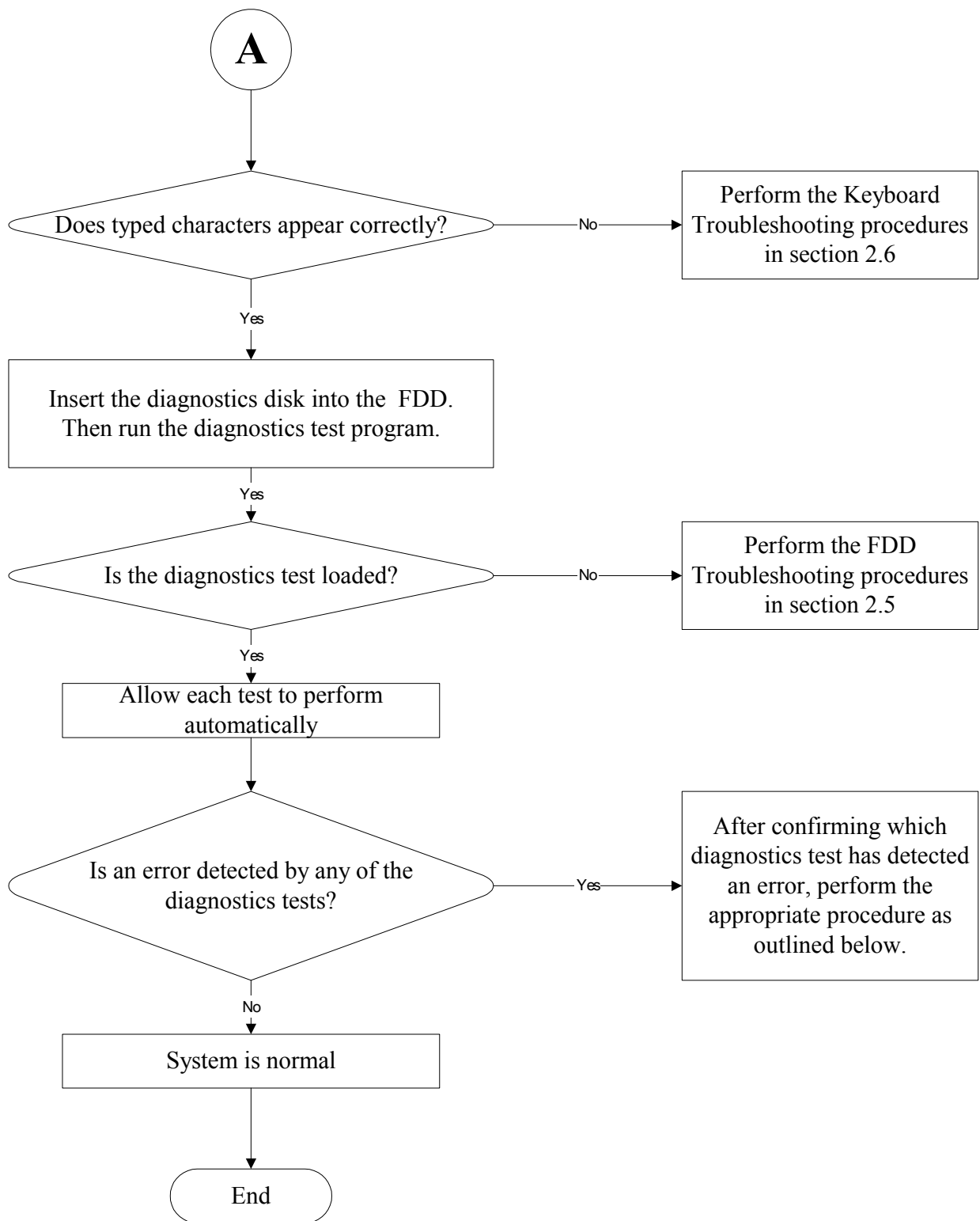


Figure 2-1 Troubleshooting flowchart (2/2)

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

1. If an error is detected by the battery test, perform the Power Supply Troubleshooting procedures in Section 2.3.
2. If an error is detected by the display test, perform the Display Troubleshooting procedures in Section 2.4.
3. If an error is detected by the floppy disk test, perform the FDD Troubleshooting procedures in Section 2.5.
4. If an error is detected by the keyboard test, perform the Keyboard Troubleshooting procedures in Section 2.6.
5. If an error is detected by the printer (parallel) port test, perform the Printer Port Troubleshooting procedures in Section 2.9.
6. If an error is detected by the TouchPad test, perform the TouchPad Troubleshooting procedures in Section 2.10.
7. If an error is detected by the audio test, perform the Speaker Troubleshooting procedures in Section 2.11 and the Optical Drive Troubleshooting Procedures in Section 2.12.
8. If an error is detected by the modem test, perform the Modem Troubleshooting Procedures in Section 2.13.

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

1. If an error is detected when using an external USB device, perform the External USB Devices Troubleshooting procedures in Section 2.7.
2. If an error is detected when using the TV-out connection, perform the TV-Out Failure Troubleshooting procedures in Section 2.8.
3. If an error is detected when using the speakers, perform the Speaker Troubleshooting procedures in Section 2.11.
4. If an error is detected when using the modem, perform the Modem Troubleshooting procedures in Section 2.13.
5. If an error is detected when using the PCMCIA unit, perform the PCMCIA Troubleshooting procedures in Section 2.14.
6. If an error is detected when using the IEEE1394 device, perform the IEEE1394 device Troubleshooting procedures in Section 2.15.
7. If an error is detected when using the Wireless LAN, perform the Wireless LAN Troubleshooting procedures in Section 2.16.
8. If an error is detected when using the Bluetooth, perform the Bluetooth Troubleshooting procedures in Section 2.17.

2.3 Power Supply Troubleshooting

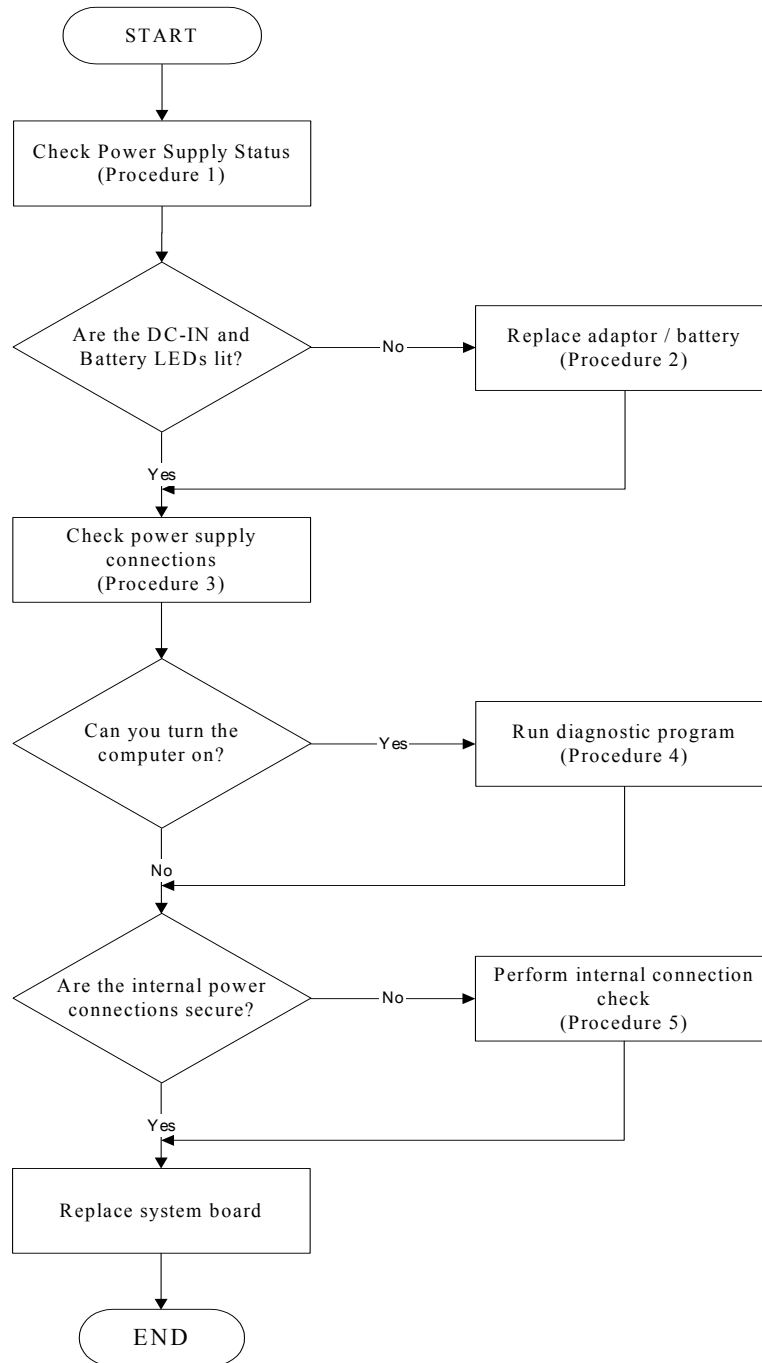


Figure 2-2 Power Supply Troubleshooting Process

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

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

Procedure 1 Power Status Check

The following LEDs indicate the power supply status:

 Battery LED

 DC-IN LED

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

Table 2-1 Battery LED

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

Table 2-2 DC-IN LED

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

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

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

Procedure 2 Adaptor / battery replacement

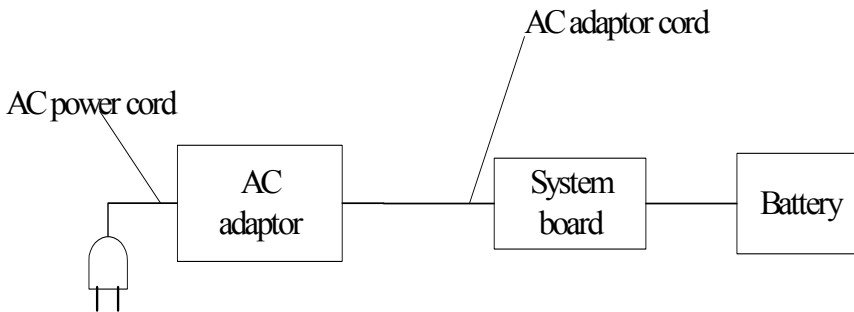
A faulty adaptor may not supply power or may not charge the battery. Perform Check 1.

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

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

Procedure 3 Power supply connection check

The power supply wiring diagram is shown below:



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

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

Procedure 4 Diagnostic check

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

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

Procedure 5 Replacement check

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

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

2.4 Display Troubleshooting

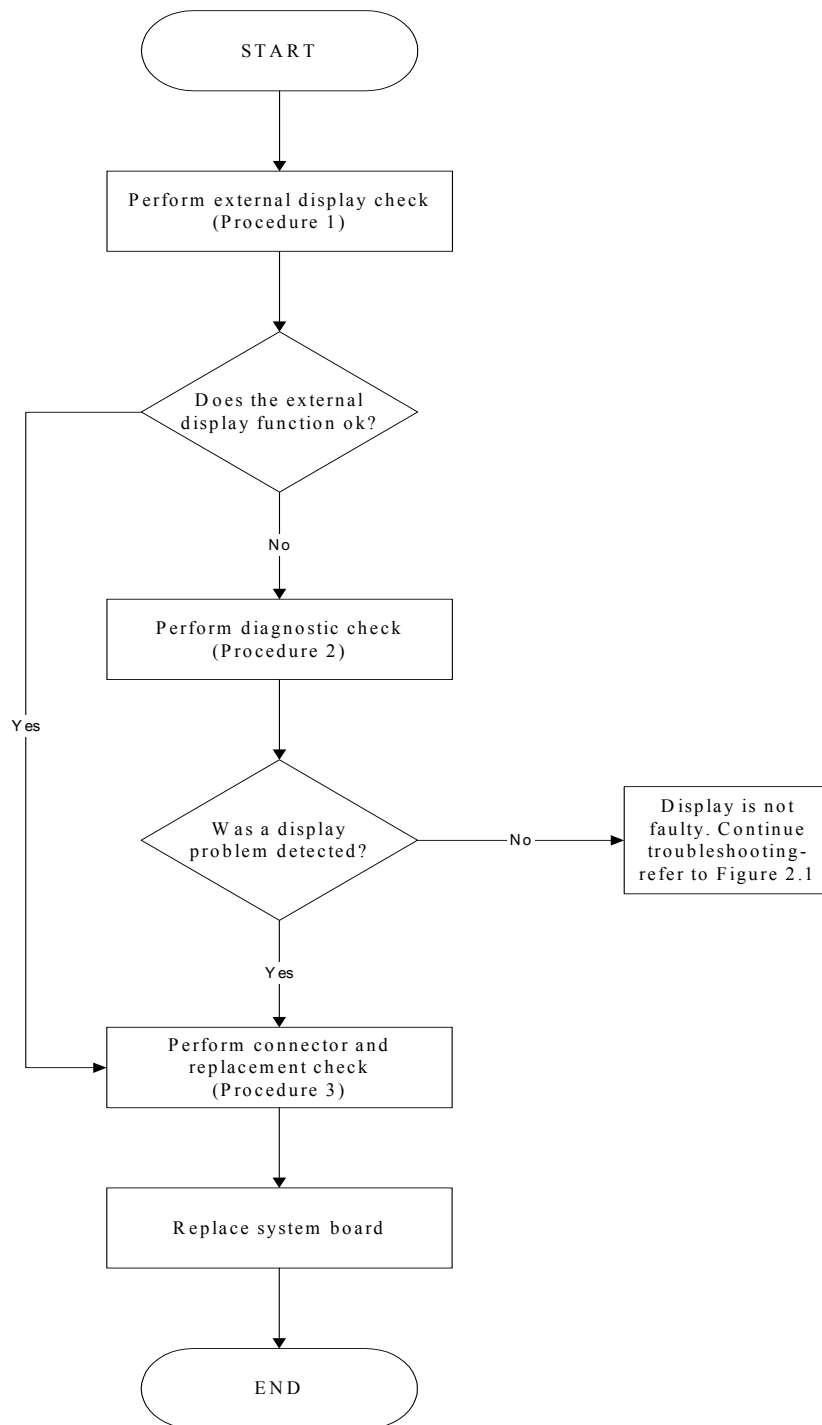


Figure 2-3 Display troubleshooting process

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

Procedure 1: External display check

Procedure 2: Diagnostic check

Procedure 3: Connector and replacement check

Procedure 1 External display check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connector and replacement check

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

- Check 1 Make sure the DDR RAM module is seated properly. Test display again. If the problem still exists, replace the DDR RAM module. If the problem still exists, perform Check 2.
- Check 2 Replace the FL inverter board with a new one and test display again. If the problem still exists, perform Check 3.
- Check 3 Replace the LCD module with a new one and test display again. If the problem still exists, perform Check 4.
- Check 4 Replace the LCD/FL cable with a new one and test display again. If the problem still exists, perform Check 5.
- Check 5 Replace the CPU with another of the same specifications. If the problem still exists, perform Check 6.
- Check 6 The system board may be damaged. Replace it with a new one.

2.5 FDD Troubleshooting

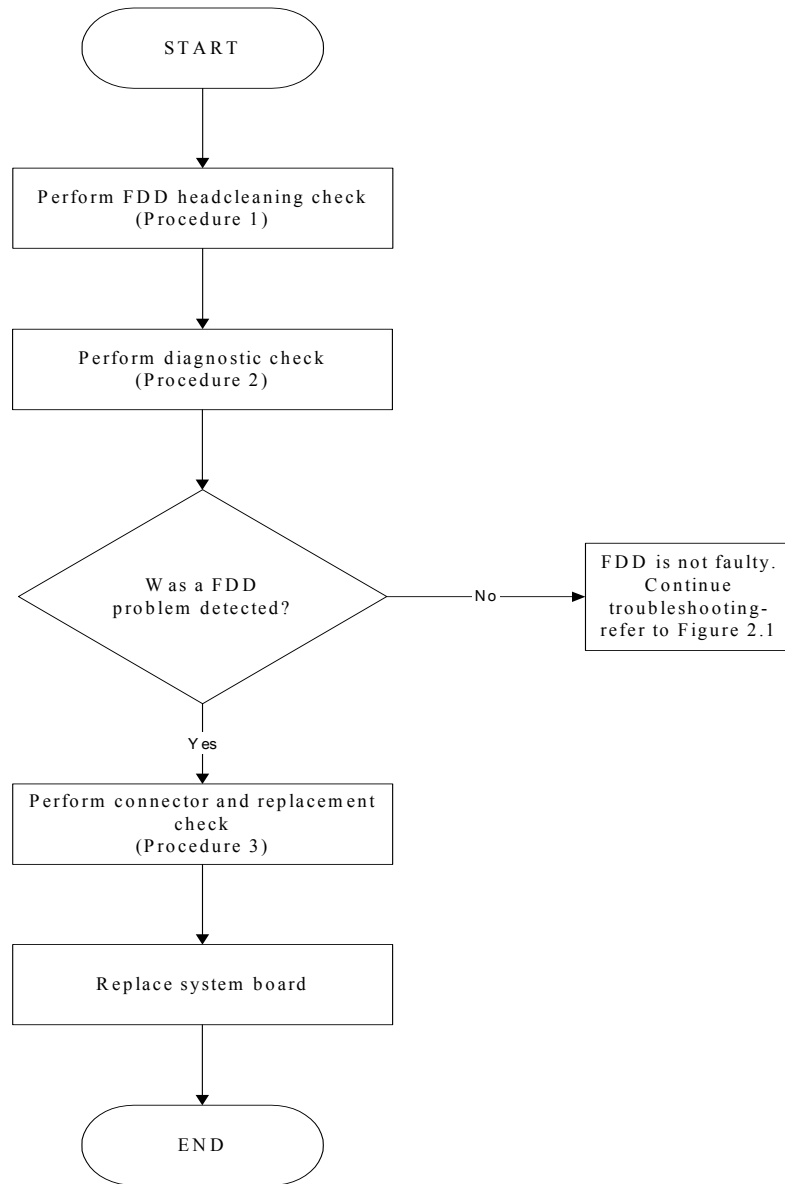


Figure 2-4 FDD troubleshooting process

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

Procedure 1: FDD head cleaning check

Procedure 2: Diagnostic check

Procedure 3: Connector check and replacement check

Procedure 1 FDD head cleaning check

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connector check and replacement check

The 3.5-inch FDD is connected to the system board. Refer to Chapter 4, *Replacement Procedures*, for instructions on how to disassemble the computer and then perform the following checks:

Check 1 Make sure the FDD flexible cable is firmly connected to the FDD and system board.

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

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

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

2.6 Keyboard Troubleshooting

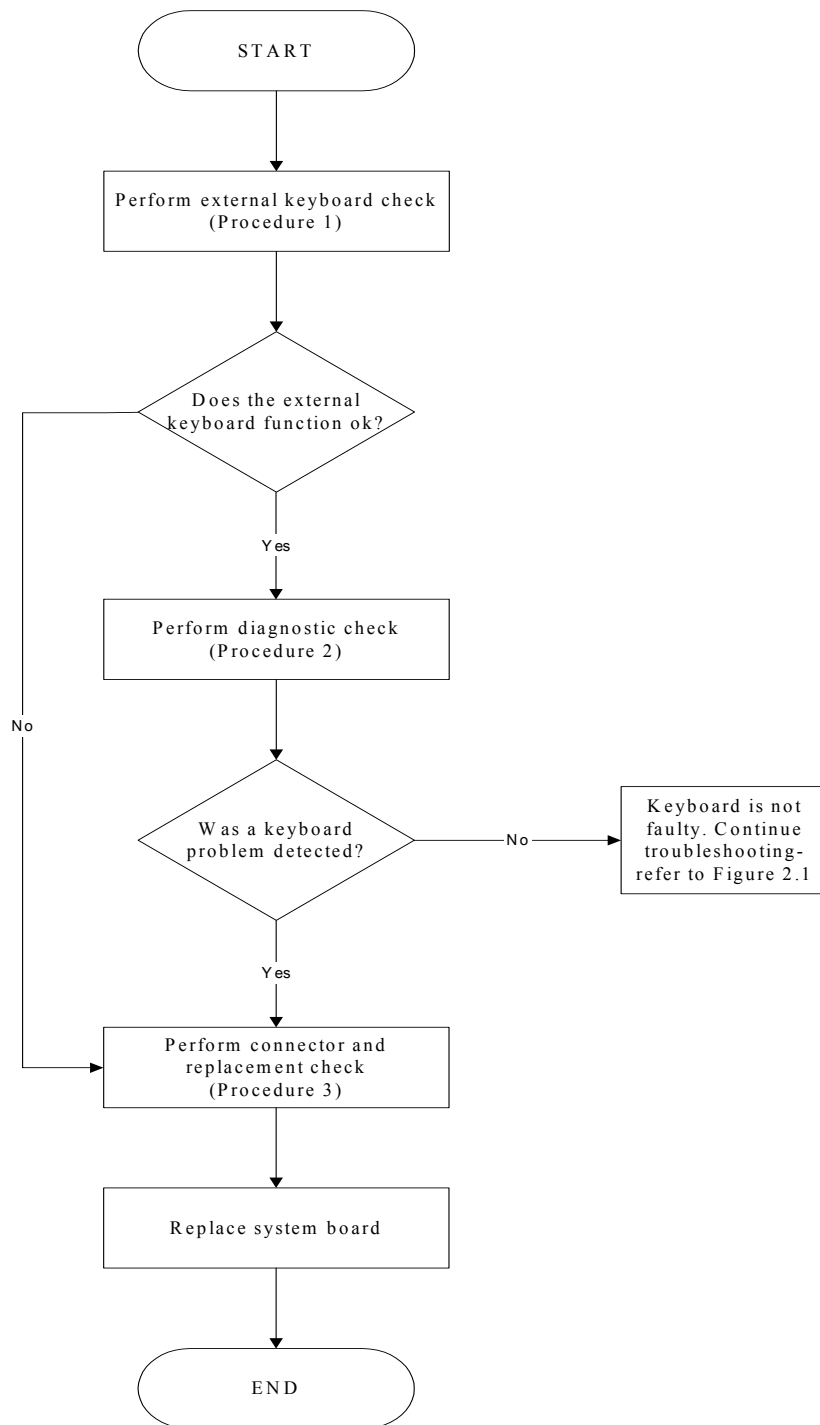


Figure 2-5 Keyboard troubleshooting process

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

Procedure 1: External keyboard check

Procedure 2: Diagnostic check

Procedure 3: Connector and replacement check

Procedure 1 External keyboard check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connector and replacement check

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

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

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

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

If the problem still exists, perform Check 3.

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

2.7 External USB Devices Troubleshooting

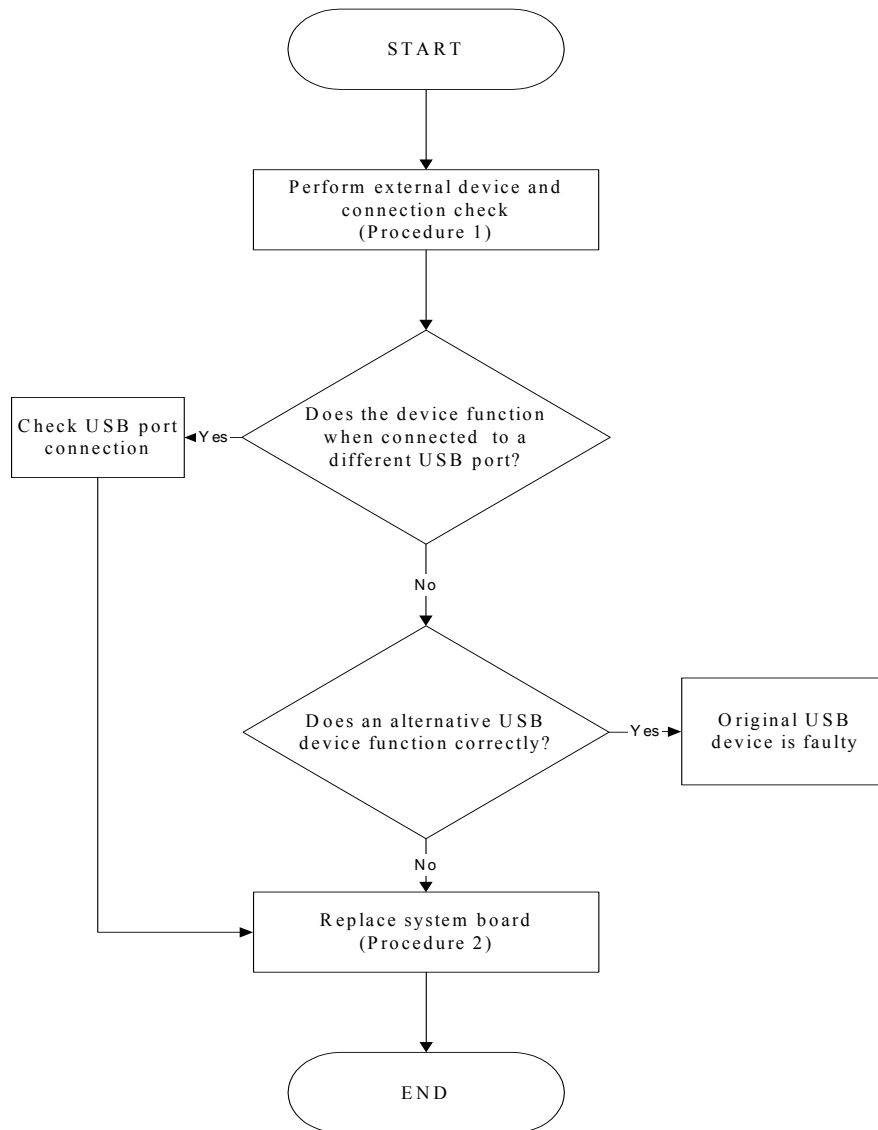


Figure 2-6 External USB device troubleshooting process

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

Procedure 1: External device and connection check

Procedure 2: Replace system board

Procedure 1 External device and connection check

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

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

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

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

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

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

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

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

Procedure 2 Replace system board

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

2.8 TV-Out Failure Troubleshooting

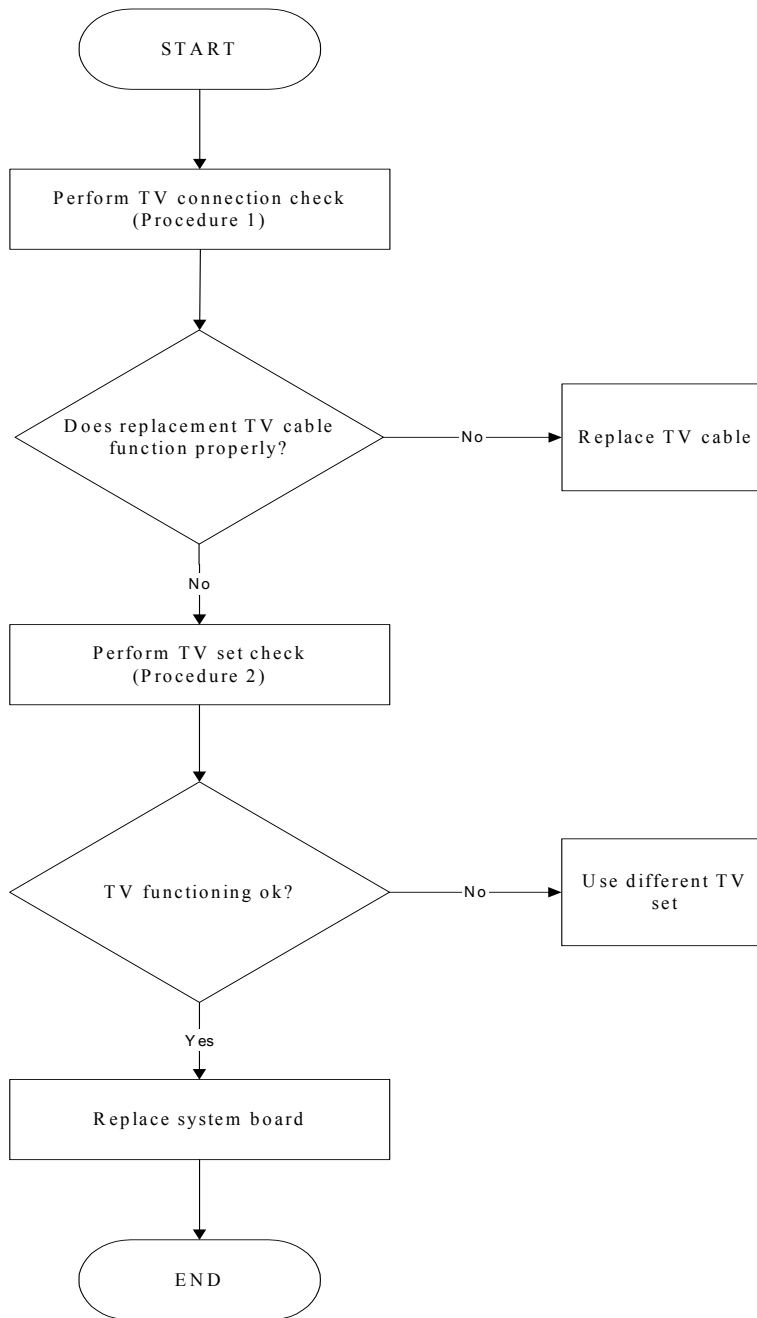


Figure 2-7 TV-out troubleshooting process

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

Procedure 1: TV connection check

Procedure 2: TV set check

Procedure 1 TV connection check

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

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

Procedure 2 TV set check

The TV set may be faulty. Perform Check 1:

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

2.9 Printer Port Troubleshooting

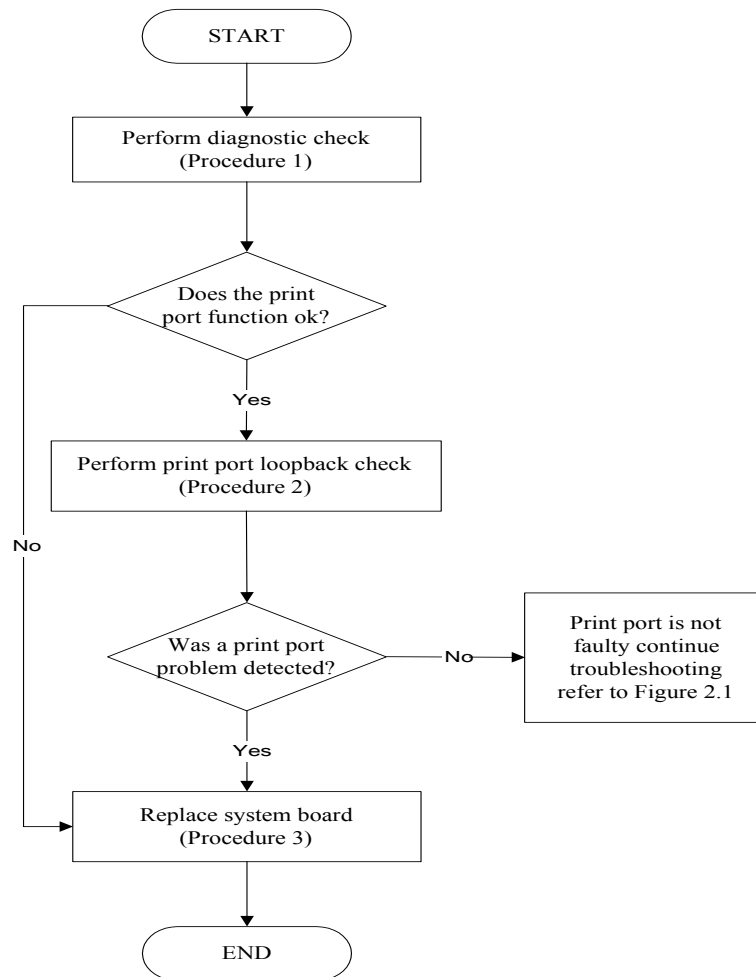


Figure 2-8 Printer port troubleshooting process

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.

2.10 TouchPad Troubleshooting

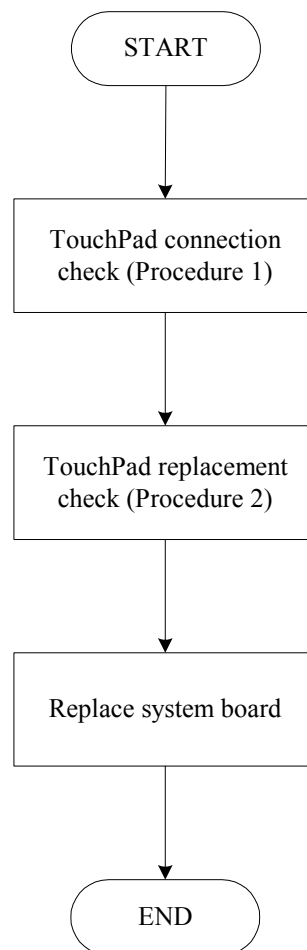


Figure 2-9 TouchPad troubleshooting process

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

Procedure 1: TouchPad connection check

Procedure 2: TouchPad replacement check

Procedure 1 TouchPad connection check

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

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

Procedure 2 TouchPad replacement check

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

2.11 Speaker Troubleshooting

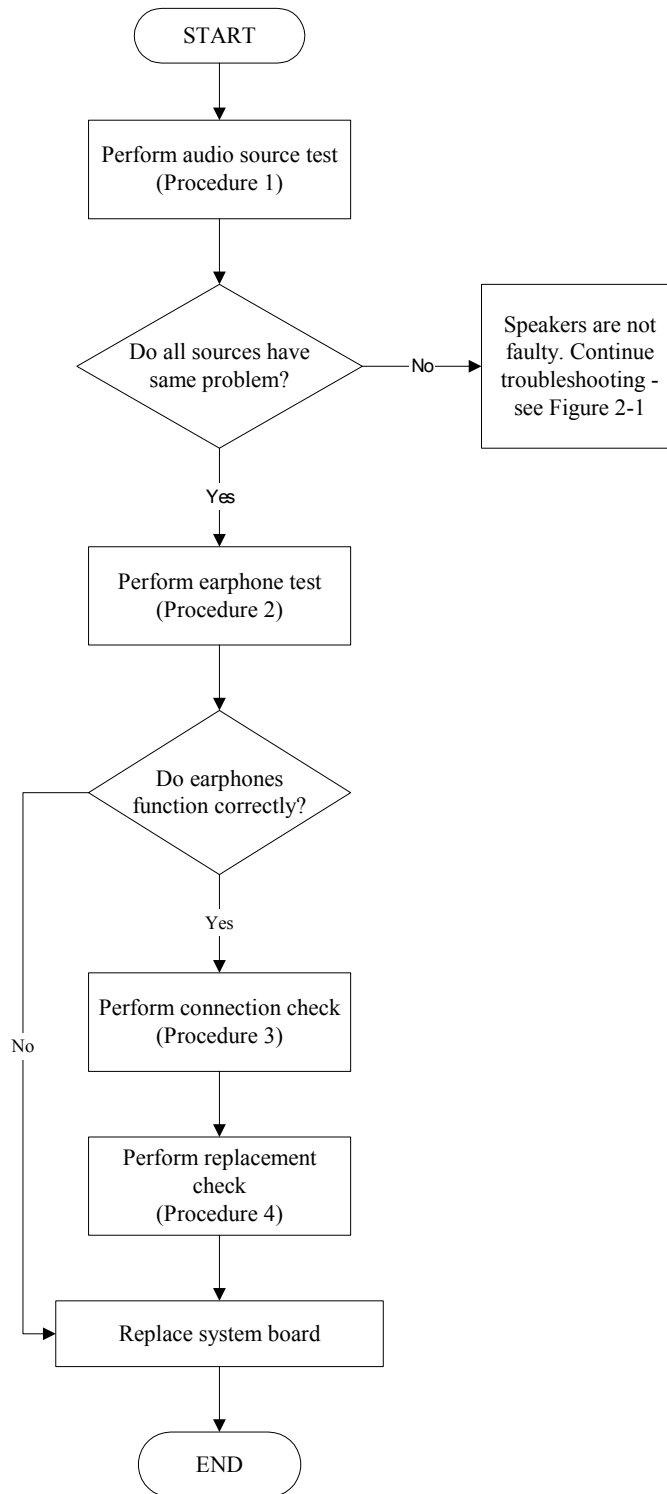


Figure 2-10 Speaker troubleshooting process

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

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

Procedure 1 Audio source test

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

Procedure 2 Earphone test

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

Procedure 3 Connection check

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

Procedure 4 Replacement check

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

2.12 Optical Drive Troubleshooting

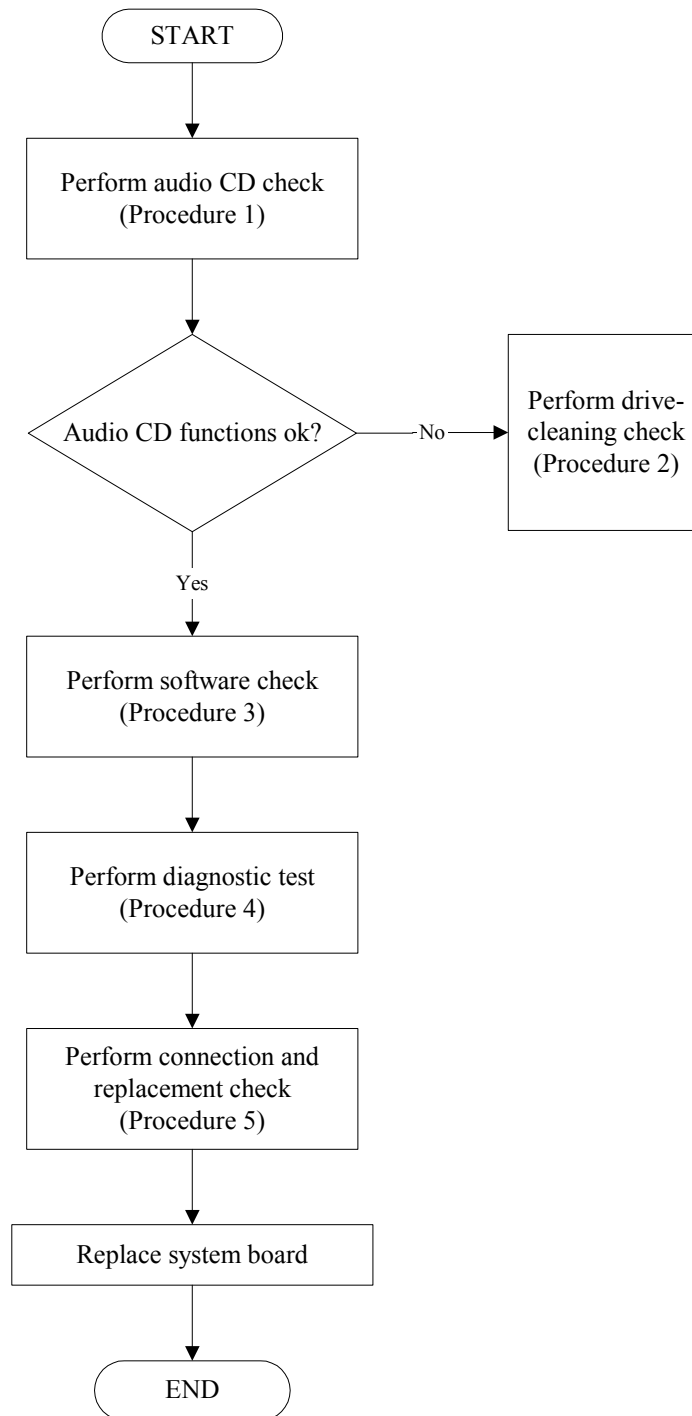


Figure 2-11 Optical drive troubleshooting process

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

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

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

Procedure 1: Audio CD test

Procedure 2: Drive cleaning check

Procedure 3: Software check

Procedure 4: Diagnostic test

Procedure 5: Connection and replacement check

Procedure 1 Audio CD check

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

Procedure 2 Drive cleaning check

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

Procedure 3 Software check

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

Procedure 4 Diagnostic test

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

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

Procedure 5 Connection check and replacement check

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

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

2.13 Modem Troubleshooting

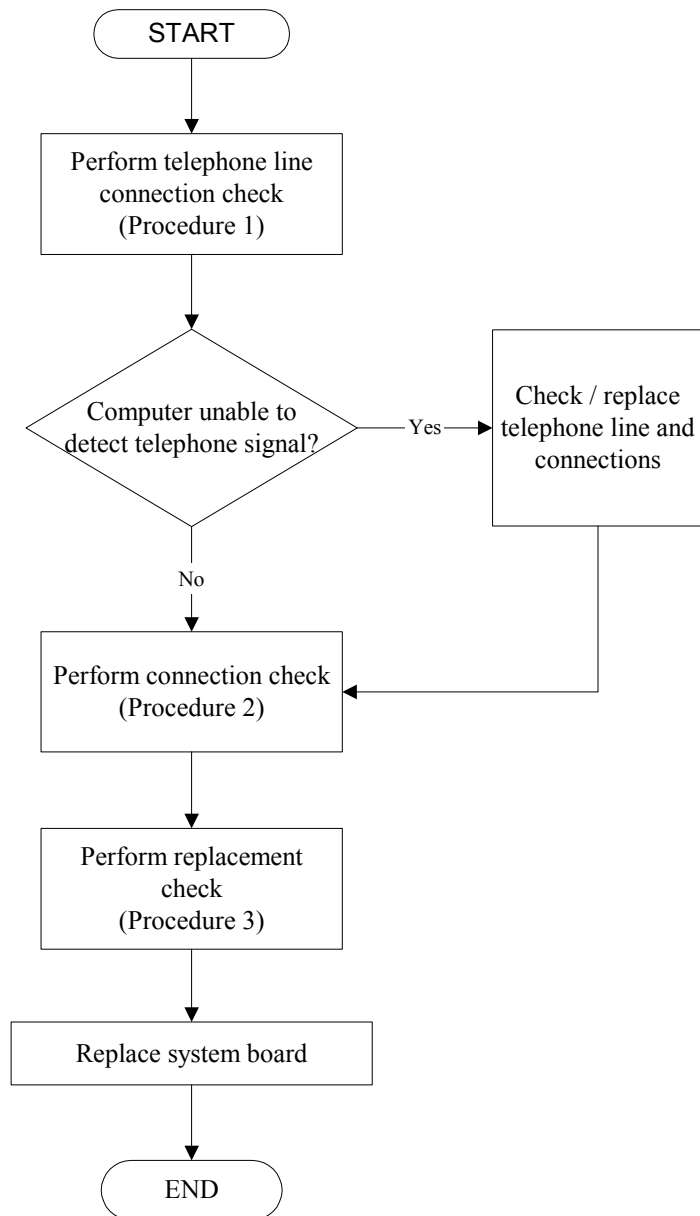


Figure 2-12 Modem troubleshooting process

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

Procedure 1: Telephone line connection check

Procedure 2: Modem card connection check

Procedure 3: Modem card replacement check

Procedure 1 Telephone line connection check

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

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

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

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

Procedure 2 Modem card connection check

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

Procedure 3 Modem replacement check

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

2.14 PC Card Troubleshooting

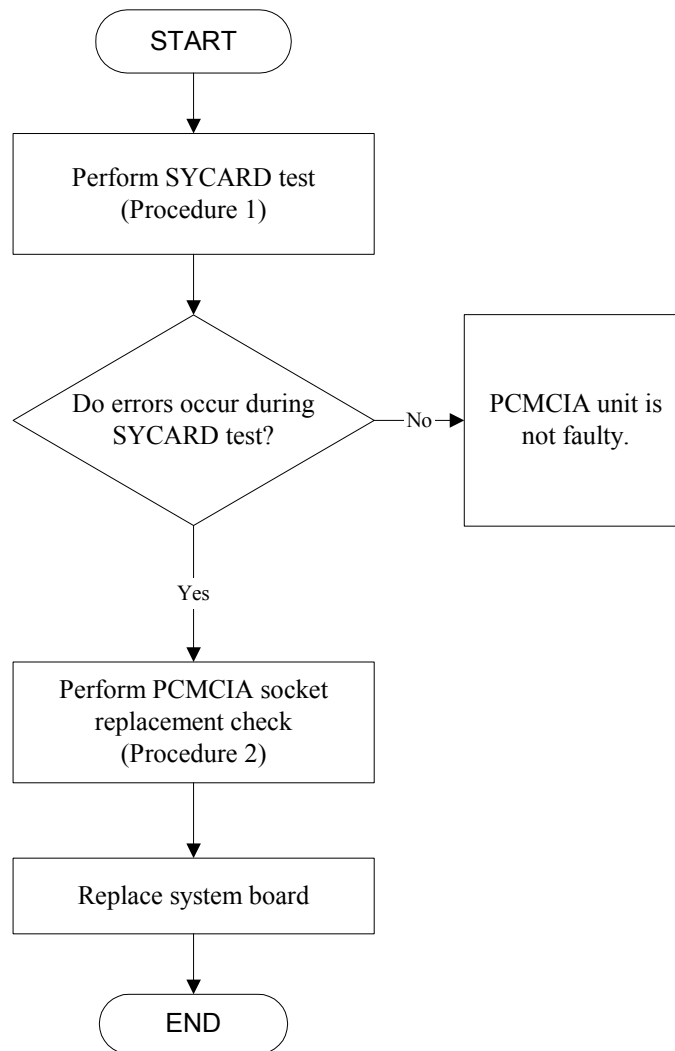


Figure 2-13 PCMCIA troubleshooting process

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.

2.15 IEEE 1394 Troubleshooting

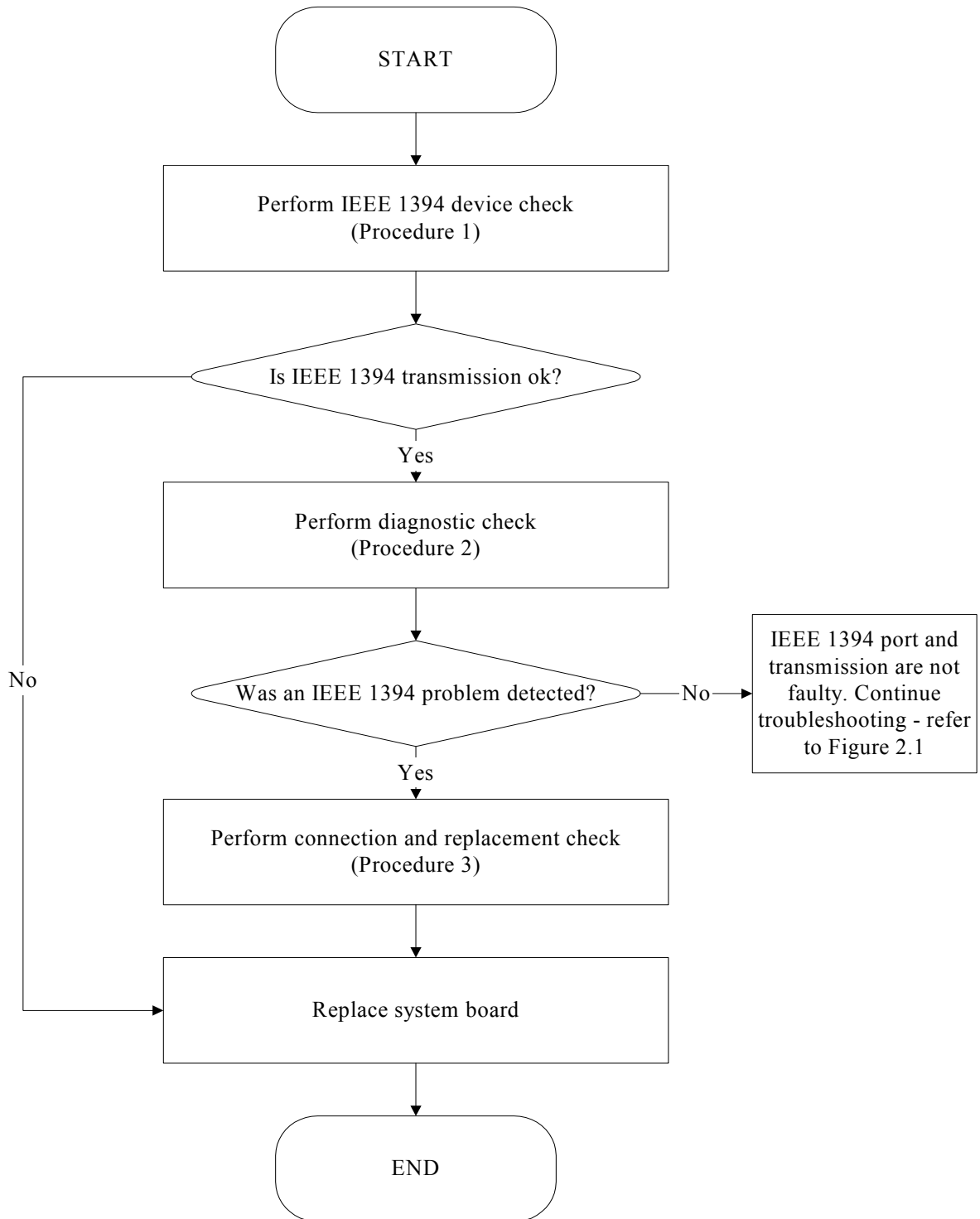


Figure 2-14 IEEE 1394 troubleshooting process

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

Procedure 1: IEEE 1394 device check

Procedure 2: Diagnostic check

Procedure 3: Connection and replacement check

Procedure 1 IEEE 1394 device check

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

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

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

Procedure 2 Diagnostic check

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

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

Procedure 3 Connection and replacement check

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

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

2.16 Wireless LAN Troubleshooting

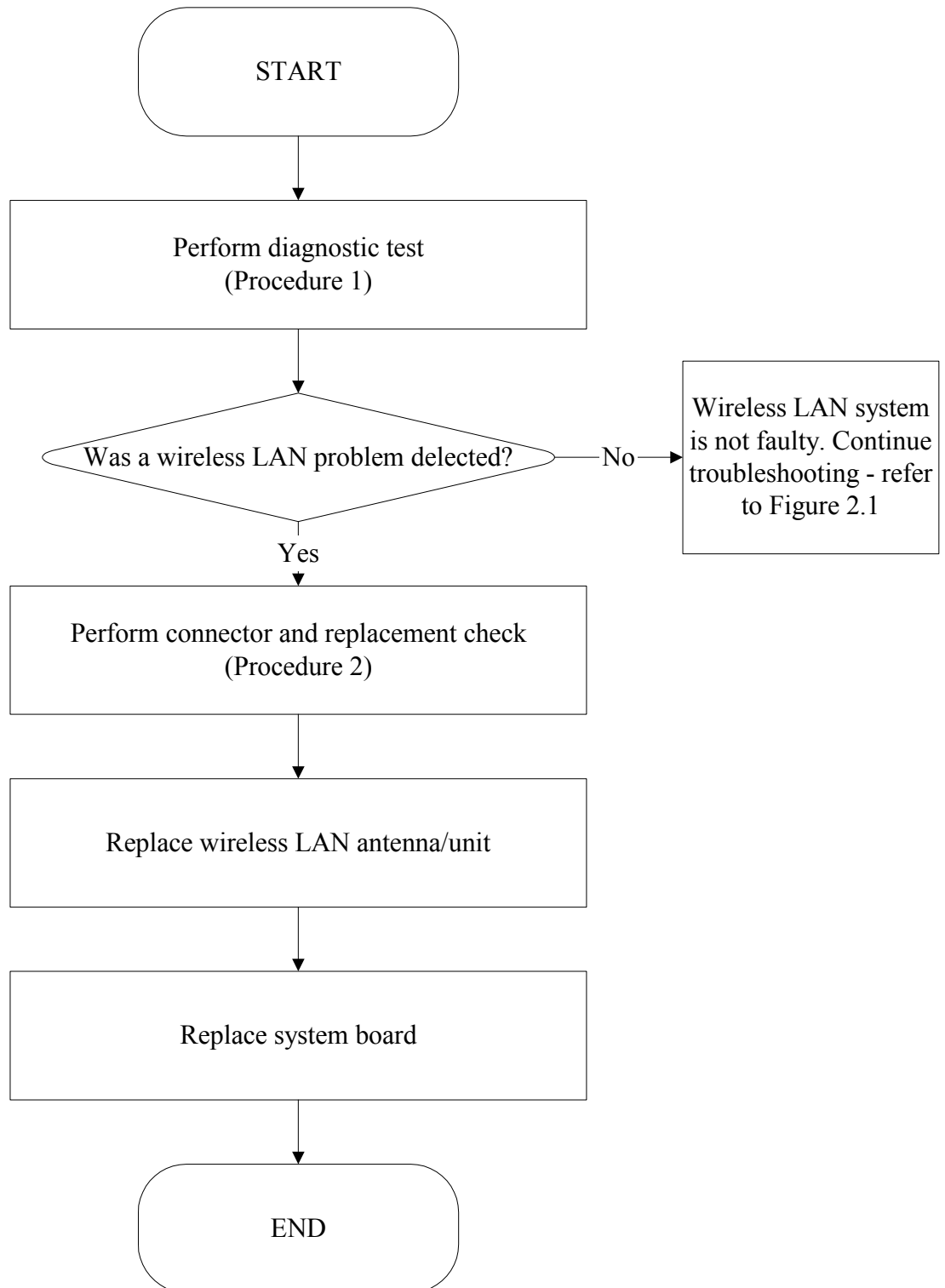


Figure 2-15 Wireless LAN troubleshooting process

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

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

Procedure 1 Diagnostic test

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

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

Procedure 2 Connector and replacement check

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

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

2.17 Bluetooth Troubleshooting

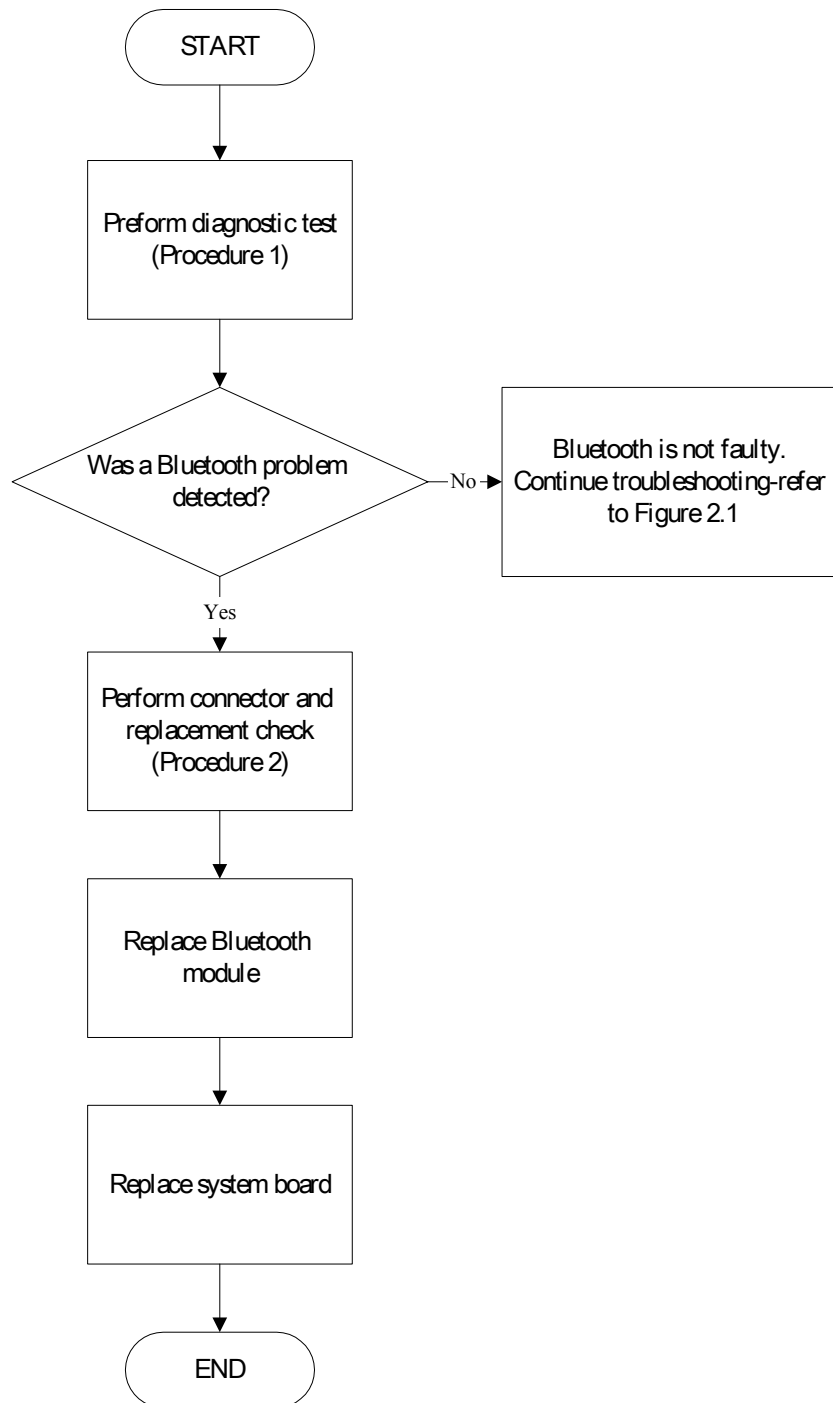


Figure 2-16 Bluetooth troubleshooting process

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

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

Procedure 1 Diagnostic test

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

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

Procedure 2 Connector and replacement check

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

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

Chapter 3

Tests and Diagnostics

Contents

3.1	The Diagnostic Test.....	3-1
3.2	Executing the Diagnostic Test.....	3-2
3.3	Config Check Test.....	3-6
3.4	DMI Check Test.....	3-7
3.5	PIO Loopback Test.....	3-8
3.6	IEEE 1394 Test.....	3-9
3.7	Speaker Audio Test.....	3-10
3.8	Fan ON/OFF Test.....	3-11
3.9	Main Battery Charge Test.....	3-12
3.10	FDD Test.....	3-13
3.11	CD-ROM Test.....	3-14
3.12	Keyboard Test.....	3-15
3.13	Mouse (Pad) Test.....	3-18
3.14	LCD Pixels Mode Test.....	3-20
3.15	Lid Switch Test.....	3-21
3.16	HDD R/W Test.....	3-22
3.17	LAN Test.....	3-24
3.18	RTC Test.....	3-26
3.19	CD Control Button Test.....	3-27

3.1 The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program to test the functions of the computer's hardware modules. The Test & Diagnostic Program is stored on the T&D diskettes. The program consists of a series of tests that run automatically when the Diagnostics Program items are selected and executed.

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

1. *Check all cables for loose connections.*
2. *Exit this program when you are at Main Menu.*

The TEST & DIAGNOSTIC PROGRAM contains the following functional tests:

- CONFIG CHECK TEST
- DMI CHECK TEST
- PIO LOOPBACK TEST
- IEEE1394 TEST
- SPEAKER AUDIO TEST
- FAN ON/OFF TEST
- MAIN BATTERY CHARGE TEST
- FDD TEST
- CD-ROM TEST
- KEYBOARD TEST
- MOUSE(PAD) TEST
- LCD PIXELS MODE TEST
- LID SWITCH TEST
- HDD R/W TEST
- LAN TEST
- RTC TEST

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

- The diagnostics diskette (2 pcs)
- A printer loopback connector (PIO Loopback Test)
- A formatted working diskette for the floppy disk drive test (Floppy Disk Drive Test)
- A data CD disc (CD-ROM Test)
- A LAN loopback connector (LAN Test)
- IEEE1394 Link Cable

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

3.2 Executing the Diagnostic Test

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

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

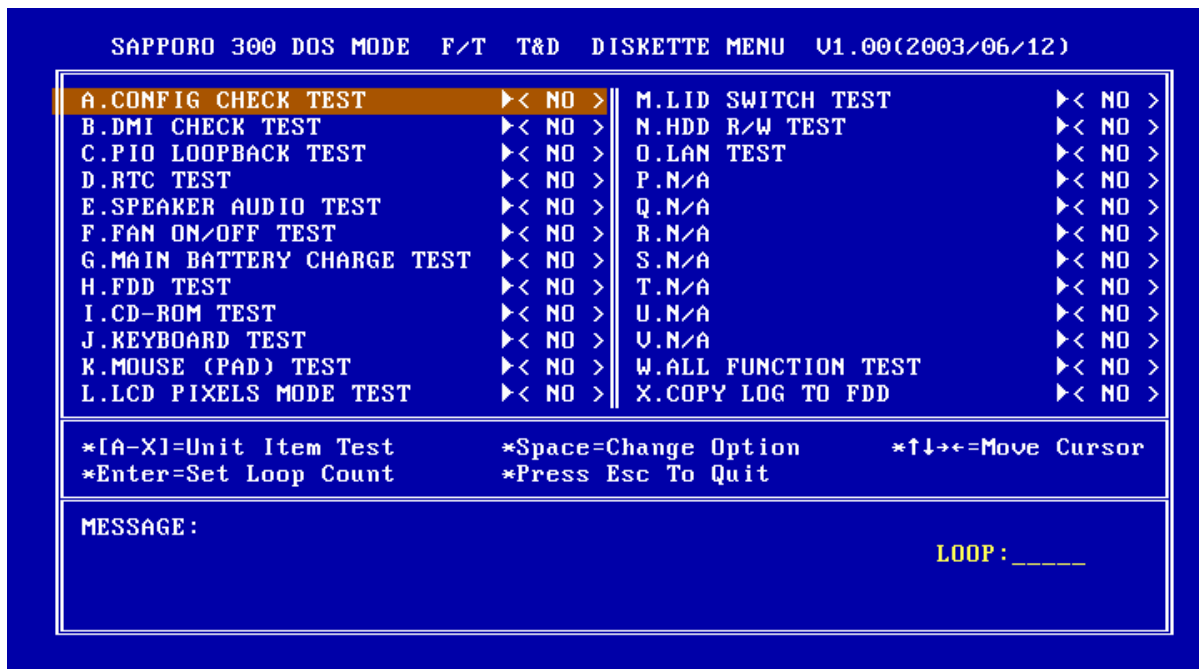
NOTE: To execute the CD test, make sure the CD is installed in the CD/DVD-ROM drive.

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

The test list is as the following:

- A. CONFIG CHECK TEST
- B. DMI CHECK TEST
- C. PIO LOOPBACK TEST
- D. IEEE1394 Test
- E. SPEAKER AUDIO TEST
- F. FAN ON/OFF TEST
- G. MAIN BATTERY CHARGE TEST
- H. FDD TEST
- I. CD-ROM TEST
- J. KEYBOARD TEST
- K. MOUSE (PAD) TEST
- L. LCD PIXELS MODE TEST
- M. LID SWITCH TEST
- N. HDD R/W TEST
- O. LAN TEST
- P. RTC TEST

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



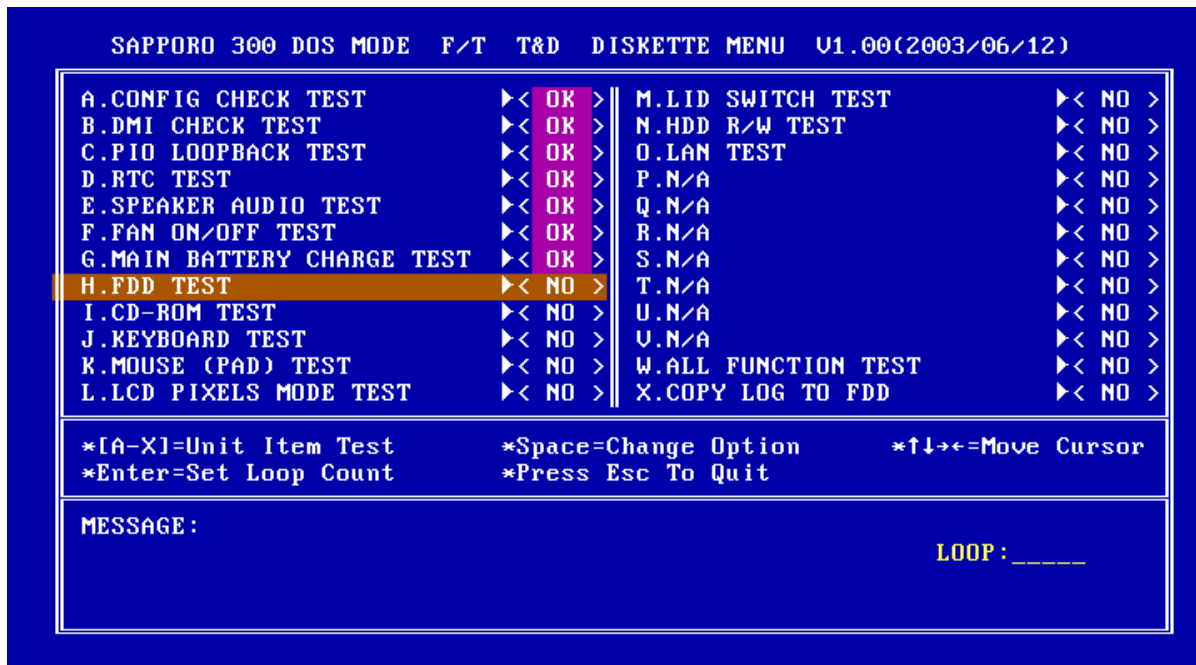
If the test result passes, the following display will show up:



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



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



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

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

```

SAPPORO 300 DOS MODE  F/T  T&D  DISKETTE MENU  V1.00(2003/06/12)

A.CONFIG CHECK TEST      ▶< OK >  M.LID SWITCH TEST      ▶< NO >
B.DMI CHECK TEST        ▶< OK >  N.HDD R/W TEST        ▶< NO >
C.PIO LOOPBACK TEST     ▶< OK >  O.LAN TEST            ▶< NO >
D.RTC TEST              ▶< OK >  P.N/A                 ▶< NO >
E.SPEAKER AUDIO TEST    ▶< OK >  Q.N/A                 ▶< NO >
F.FAN ON/OFF TEST       ▶< OK >  R.N/A                 ▶< NO >
G.MAIN BATTERY CHARGE TEST ▶< OK >  S.N/A                 ▶< NO >
H.FDD TEST              ▶< NO >  T.N/A                 ▶< NO >
I.CD-ROM TEST           ▶< NO >  U.N/A                 ▶< NO >
J.KEYBOARD TEST         ▶< NO >  V.N/A                 ▶< NO >
K.MOUSE (PAD) TEST      ▶< NO >  W.ALL FUNCTION TEST   ▶< NO >
L.LCD PIXELS MODE TEST ▶< NO >  X.COPY LOG TO FDD     ▶< NO >

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

MESSAGE:
                Do you copy log to floppy ? (y/n)  LOOP:_____

```

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

3.3 Config Check Test

The config check test checks unit configuration. It includes:

- ◆ CPU type
- ◆ System memory size
- ◆ ODD type
- ◆ HDD type & capacity
- ◆ BIOS version

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

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

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

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

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

                Please input the SKU: PSP20UFZ000F

CURRENT SPEC IS :
P4800 2800 1.00A ID7 32MB 256 DVD/RW HDD 60010 MODEM_LAN NoWEP NO_BT FIR 12cell
Press any key to continue . . .
```

3.4 DMI Check Test

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

DMI includes:

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

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

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

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



```
■ Compal DMI String R/W Utility U2.4.7 ■
Manufacturer(Type1, Offset04h) : TOSHIBA
Product Name(Type1, Offset05h) : Satellite P20
Version(Type1, Offset06h) : PSP20UFZ000F
Serial Number(Type1, Offset07h): 63015307CU
UUID(Type1, Offset08h) : 9659BE79-8FB6-11D7-B9ED-00023F811022
OEM Strings(Part Number,SW Number)(Type11, Offset05h):
=>PSP20UFZ000F,PSP20UFZ000F

Press any key to continue . . .
```

3.5 PIO Loopback Test

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

- ◆ 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 is passed or failed when finished.

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

Press any key to continue . . .
```

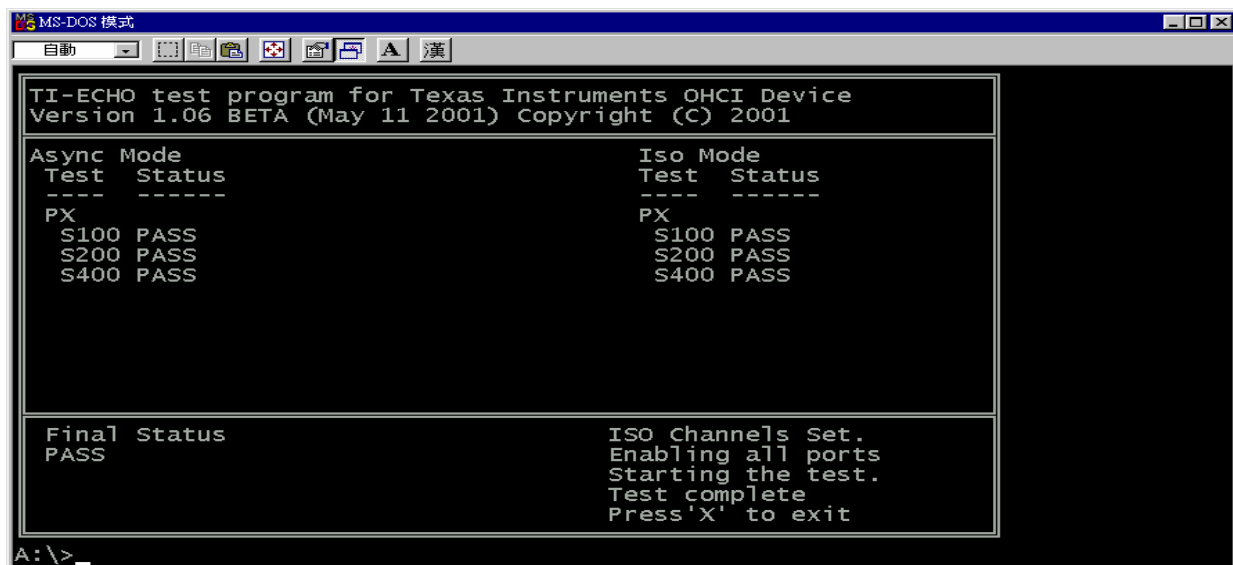
3.6 IEEE 1394 Test

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

1. An IEEE 1394-compatible device
2. An IEEE 1394 transmission line

To perform the test:

1. Copy the following files from the BTR20.RAR file on the diagnostics disk to a bootable diskette
 - ◆ 1394M.bat
 - ◆ TI.exe
 - ◆ TI1394.exe
2. Insert the disk, then boot the computer
3. Make sure the machines are firmly connected by the IEEE 1394 transmission line
4. Execute 1394M.bat on the computer
5. Select the IEEE 1394 transmission test for the test device
6. Start data transmission and complete check



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

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

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

A:\>
```

3.7 Speaker Audio Test

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

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

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

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

Test over, no errors found

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

3.8 Fan ON/OFF Test

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

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

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

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

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

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


3.9 Main Battery Charge Test

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

This test shows and measures the main battery:

- ◆ Battery type (Ni-MH / Lion)
- ◆ Manufacturer (Sony / Sanyo)
- ◆ Remain charge capacity (0 ~ 100%)
- ◆ Charge function (PASS/FAIL)
 - “Battery Is Full” showed when “remain charge capacity” is 100%

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

```
ONLY FOR 87591 T&D Series Battery Test Program. [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 . . .
```

3.10 FDD Test

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

3.11 CD-ROM Test

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

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

The CD-ROM test includes two subtests of the:

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

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

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

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

```
CDROM Utility (for Testing only) Ver 1.0
-----
Testing CDROM Information ..... Press [ESC] key to skip testing
-----
CD ROM Drive 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 . . .
```

3.12 Keyboard Test

The keyboard test checks the all keys function.

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

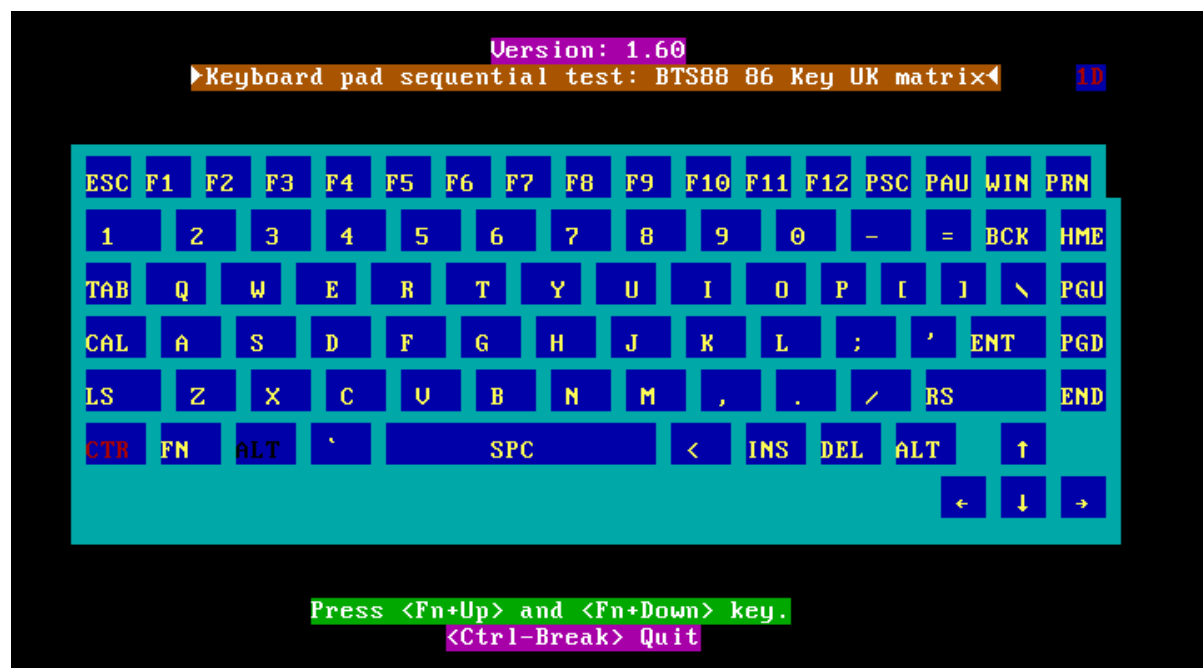
Before keyboard test starts, the keyboard matrix code should be chosen as below display:

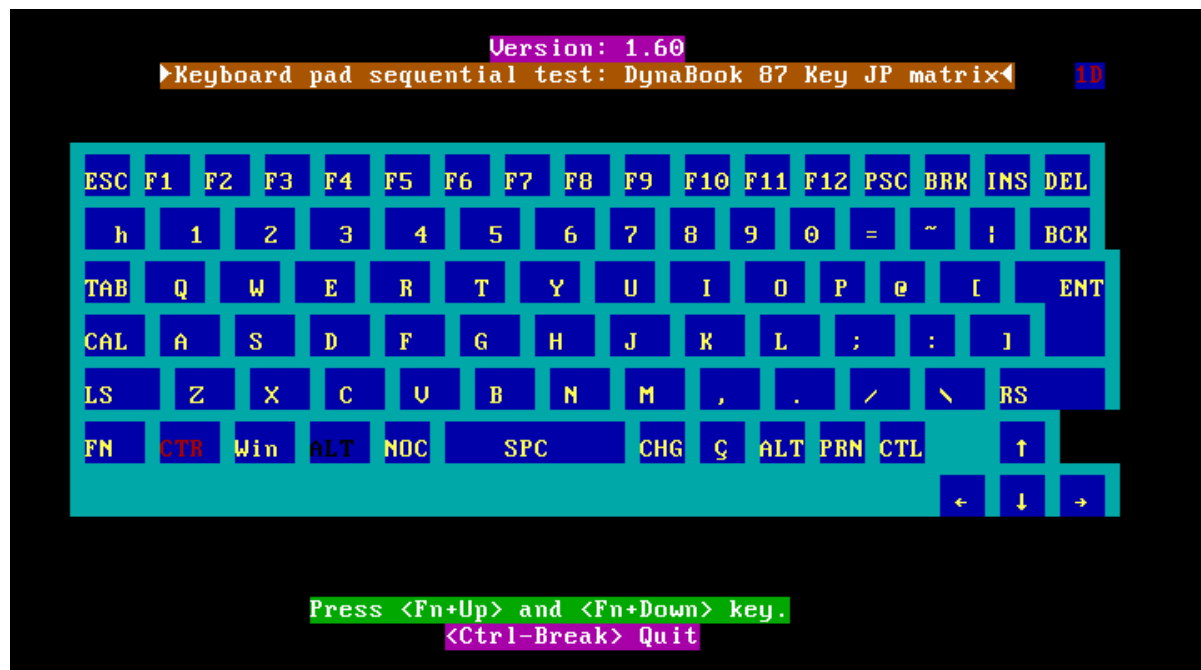
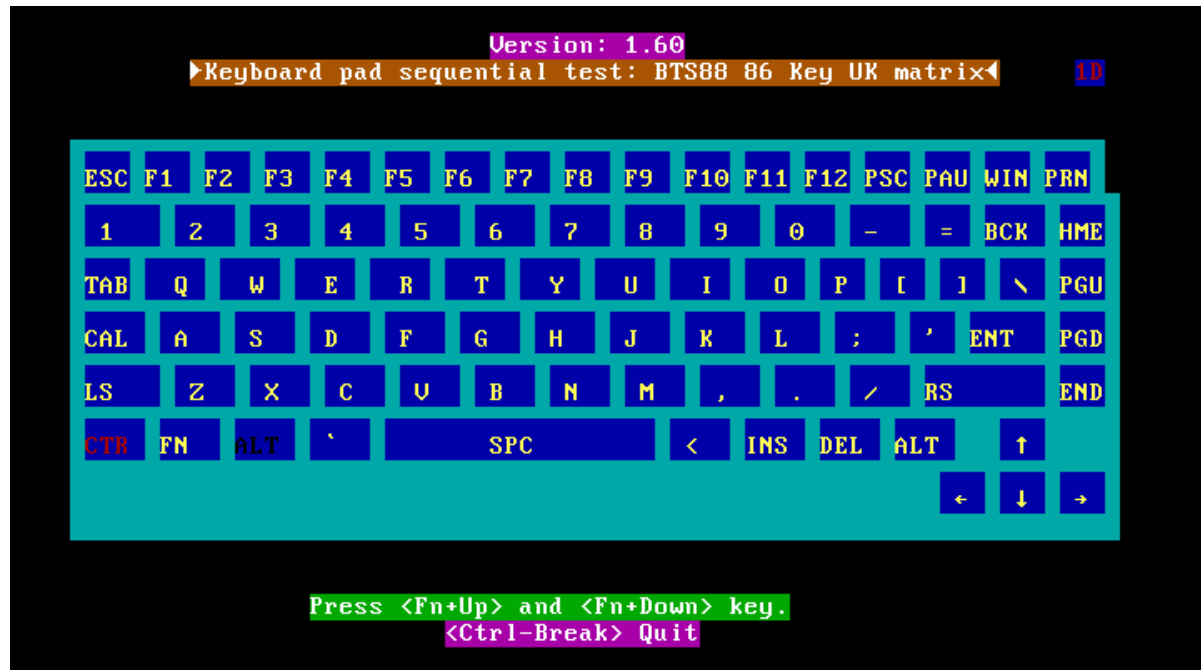
1. **K** (UK, for Europe)
2. **S** (US, for America)
3. **J** (JP, for Japan)

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

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

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





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

3.13 Mouse (Pad) Test

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

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

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

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



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

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

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

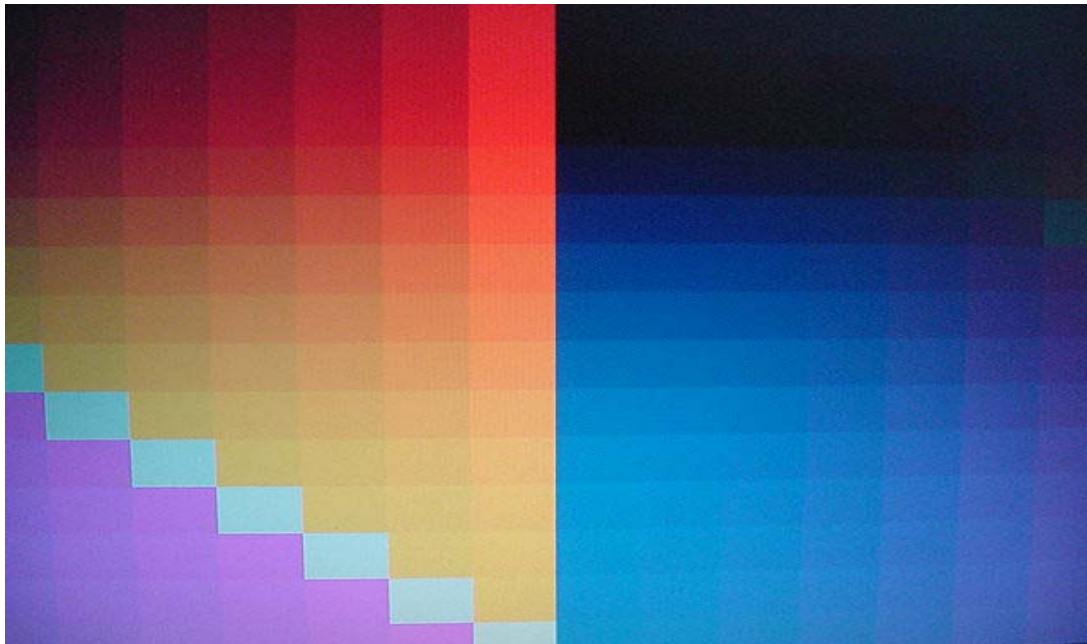
3.14 LCD Pixels Mode Test

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

This test includes two modes of the test:

1. Text Mode
 - including 40*25 (16 colors) and 80*25 (2/16colors).
2. VGA Mode
 - including 320*200 (4/16/256 colors), 640*200 (2/16 colors), 640*350 (2/16 colors), 640*480 (2/16/256 colors), 800*600 (256 colors) and 1024*768 (256 colors).

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



3.15 Lid Switch Test

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

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

Follow below steps to run this test:

1. Close the LCD cover.
2. Heard 3 “Beep” sound happened during LCD closed.
3. Open the LCD.

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

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

3.16 HDD R/W Test

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

The HDD test includes three subtests of the:

1. Sequential read (all surface)
2. Sequential write (all surface)
3. Partial W/R + Random W/R

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

- ◆ Model name
- ◆ Firmware revision
- ◆ Serial number
- ◆ CHR (Cylinder High Register) mode – including cylinders, heads, sectors and sizes.
- ◆ LBA (Logical Block Addressing) mode – including sectors and sizes.
- ◆ Support Ultra DMA Mode
- ◆ Support PIO Mode

```
HDD Utility (for Testing only) Ver 1.0
-----
Testing HDD Information ..... Press Ctrl+Break keys to stop testing
-----
Model name           = IC25N030ATCS04-0
Firmware revision    = CA30A71A
Serial number        = CSL304D5CARPWA
CHR Mode cylinders   = 16383
CHR Mode heads       = 16
CHR Mode sectors     = 63
CHR Mode sizes       = 8063 MB
LBA Mode sectors     = 58605120
LBA Mode sizes       = 28615 MB
Support Ultra DMA Mode = 3f
Support PIO Mode     = 1f
-----
Begin Testing ..... Sequential read (all surface)
--> Testing of Sectors = 13300947
```

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

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

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

3.17 LAN Test

The LAN test checks the LAN full-duplex environment.

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

And LAN information will show on the test screen:

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

The LAN test includes two subtests of the:

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

The subtests run automatically.

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

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

                                     Press any key to exit

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

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
```

3.18 RTC Test

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

The test runs automatically.

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

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

Please Check the result after test.

Press any key to continue . . .

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

Press any key to continue . . .
```

3.19 CD Control Button Test

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

The figure below will be displayed:



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

Press **Esc** to quit the test.

4.1 General

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

Battery pack							
PC Card	Wireless LAN Unit	Expansion Memory Module	Modem / Bluetooth Unit	Optical Drive Module	Keyboard		
				HDD	Display Assembly		
				Top Cover			
Fan & Heat Sink				Direct Play Button Board	Speakers	TouchPad	LCD Module
CPU							
System Board							FL Inverter Board

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

Battery pack							
PC Card	Wireless LAN Unit	Expansion Memory Module	Modem / Bluetooth Unit	Optical Drive Module	Keyboard		
				HDD	Display Assembly		
				Top Cover			
Fan & Heat Sink				Direct Play Button Board	Speakers	TouchPad	LCD Module
CPU							FL Inverter Board
System Board							

Safety Precautions

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

DANGER:

1. *Always use the lithium ion battery pack or backup battery that is authorized by Toshiba or compatible with the unit. Since other battery packs have different specifications, they may be incompatible with the unit, and may burst or explode. Heating or disassembling the battery pack could cause leakage of alkaline solution. Throwing the battery pack into a fire could cause the battery pack to explode.*
2. *The power supply, FL inverter and other components carry high voltages. To avoid the risk of electric shock when you need to turn on the power of a partially disassembled computer to check its operation, be very careful not to touch connectors or components. Also, do not disassemble individual components in first-level maintenance.*

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

1. *Always turn the power off and disconnect the AC adaptor from the power source.*
2. *Remove any metal jewelry or accessories such as necklaces, bracelets, or rings. Batteries in the computer retain an electrical charge so there is danger of electrical shock even when the computer is disconnected from an AC power source.*
3. *Never work with wet or damp hands.*
4. *The computer contains sharp edges and corners: be careful not to injure yourself.*
5. *Make sure that all replacement components meet the specifications for the computer and that all cables and connectors are securely fastened.*

CAUTION: To avoid damage to the computer:

1. *When you change a component, be sure the replacement component meets the required specifications. Never use foreign parts.*
2. *Metal objects such as screws or paper clips which fall into the unit can cause a short-circuit, fire, or other internal damage.*
3. *When assembling the computer, make sure you use the correct screws to secure the various pieces in place. Screw sizes are listed in their corresponding figure. Make sure all screws are securely fastened. Loose screws can cause short circuits, resulting in heat, smoke, or fire.*
4. *Before removing an FRU or other component, make sure all cables to the component have been disconnected.*
5. *If you use AC power, be sure to use the cable that came with the computer or one recommended by Toshiba.*

Before You Begin

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

1. Do not disassemble the computer unless it is operating abnormally.
2. Use only the correct and approved tools.
3. Make sure the working environment is free from the following elements whether you are using or storing the computer.
 - Dust and contaminants
 - Static electricity
 - Extreme heat, cold and humidity
4. Make sure the FRU you are replacing is causing the abnormal operation by performing the necessary troubleshooting and diagnostics tests described in chapters 2 and 3 of this manual.
5. Do not perform any operations that are not necessary and use only the described procedures for disassembling and installing FRUs in the computer.
6. After removing parts from the computer, place them in a safe place away from the computer so they will not be damaged and will not interfere with your work.
7. You will remove and replace many screws when you disassemble the computer. When you remove screws, make sure they are placed in a safe place and identified with the correct parts.
8. When assembling the computer make sure you use the correct screws to secure the various pieces. Screw sizes are listed in their corresponding figures.
9. The computer contains many sharp edges and corners, so be careful not to injure yourself.
10. After you have replaced an FRU, make sure the computer is functioning properly by performing the appropriate test on the FRU you have fixed or replaced.

Disassembly Procedures

The computer has two basic types of cable connectors:

- Pressure Plate Connectors
- Standard Pin Connectors

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

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

Assembly Procedures

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

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

While assembling the computer, remember the following general points:

- Take your time, making sure you follow the instructions closely. Most problems arise when you get in a hurry assembling the computer.
- Make sure all cables and connectors are securely fastened.
- Before securing the FRU or other parts, make sure that no cables will be pinched by screws or the FRU.
- Check that all latches are closed securely.
- Make sure all the correct screws are used to secure all FRUs. Using the wrong screw can either damage the threads on the screw or the head of the screw and may prevent proper seating of an FRU.

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

Tools and Equipment

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

- One M2 Phillips screwdriver to remove and replace screws.
- One T5 security screwdriver.
- Tweezers, to lift out screws that you cannot grasp with your fingers.
- ESD mats for the floor and the table you are working on.
- ESD wrist strap or heel grounder.
- Anti-static carpeting or flooring.
- Air-ionizers in highly static sensitive areas.

4.2 Battery

Removing the Battery Pack

To remove the battery pack from the battery bay, follow the steps below.

1. Turn the computer upside down.
2. Slide the **battery bay latch** to release the **battery pack** then remove it from the bay.

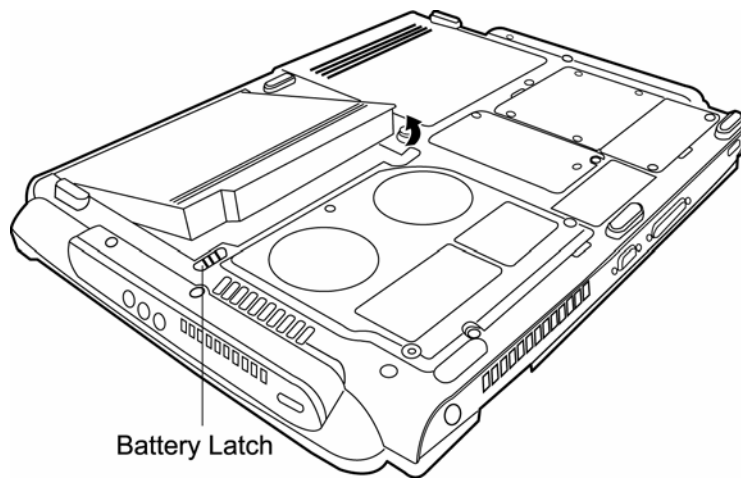


Figure 4-1 Removing the battery pack

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

Installing the Battery Pack

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

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

1. Slide the **battery pack** into the **battery bay**. The **battery bay latch** will click automatically and secure the **battery pack** in position.

4.3 PC Card

Removing a PC Card

To remove a PC Card, follow the steps below.

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

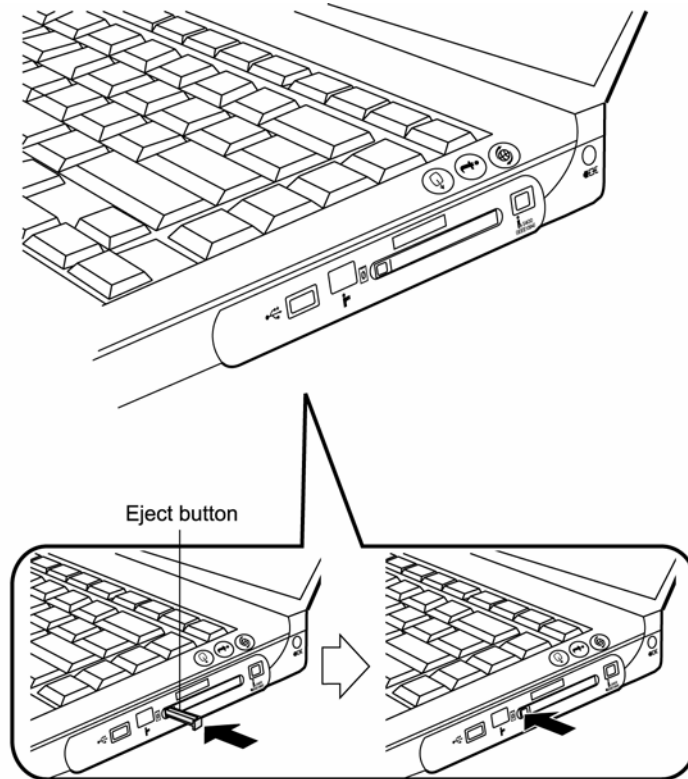


Figure 4-2 Pressing the eject button

2. Push the **eject button** once more to pop the **PC Card** out slightly.
3. Grasp the **PC Card** and remove it.

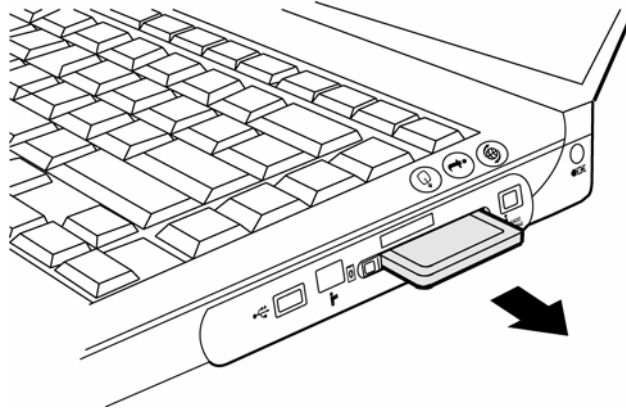


Figure 4-3 Removing the PC Card

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

Installing the PC Card

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

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

4.4 Optical Drive Module

Removing the Optical Drive Module

To remove the optical drive module, follow the steps below:

1. Turn the computer upside down.
2. Remove **one black M2.4x6 screw** from the back cover where it pins the optical drive module into place
3. Slide the **optical drive module** from the bay.

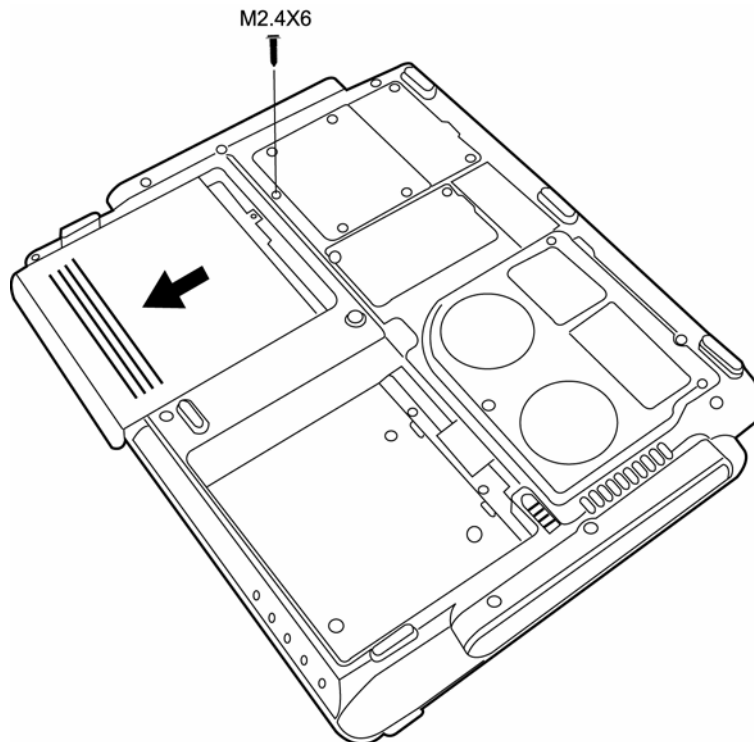


Figure 4-4 Removing the optical drive module

Installing the Optical Drive Module

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

1. Slide the device into the **optical drive module bay**.
2. Secure the **one black M2.4x6 screw**.

4.5 Optical Drive

This computer may be fitted with a:

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

Disassembling the Optical Drive

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

1. Remove **two black M2×8 screws** from the back bracket plate. Remove the **back bracket plate**.
2. Remove **four black M2×4 screws** (two from each side of the drive) securing the **main bracket**. Lift off the **main bracket**.

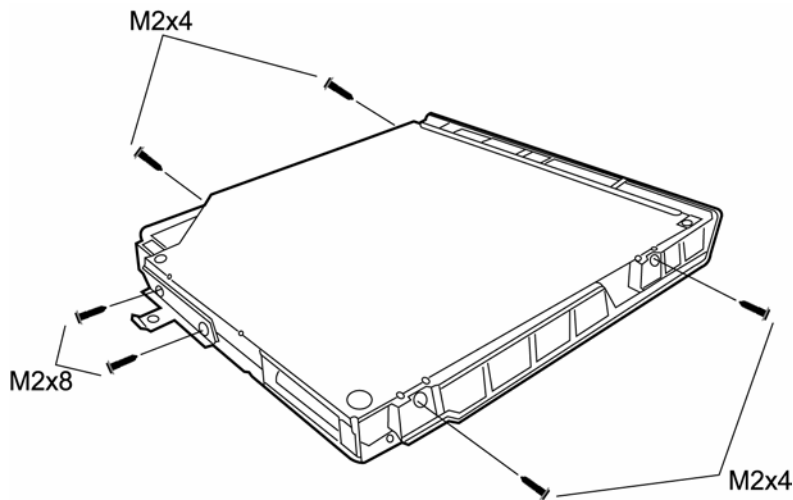


Figure 4-5 Removing the bracket screws

3. Pull the **optical drive board** from the rear of the drive.

Reassembling the Optical Drive

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

1. Fit the **optical drive board** to the rear panel of the **optical drive**.
2. Place the drive in the **main bracket** and secure with **four black M2×4 screws** (two from each side of the drive).
3. Position the **back bracket plate** and secure with **two black M2×8 screws**.

4.6 Wireless LAN Unit

Removing the Wireless LAN Unit

To remove the **wireless LAN unit**, first remove the battery pack then follow the steps below.

1. Turn the computer upside down and loosen **four embedded security screws** securing the **wireless LAN compartment cover**.
2. Lift off the **wireless LAN compartment cover**.

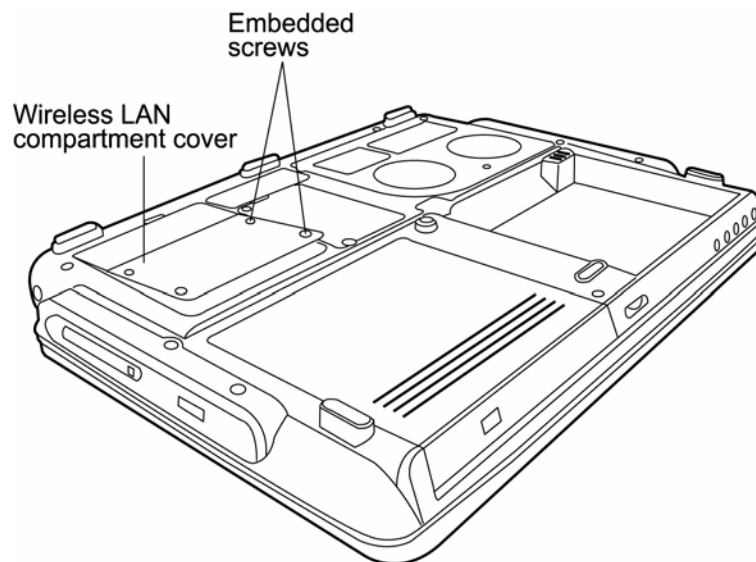


Figure 4-6 Removing the wireless LAN compartment cover

3. Detach the two ends of the **wireless LAN antenna**.
4. Gently press out on the **latches**. One end of the **wireless LAN unit** will pop up.
5. Grasp the **wireless LAN unit** and pull it out.

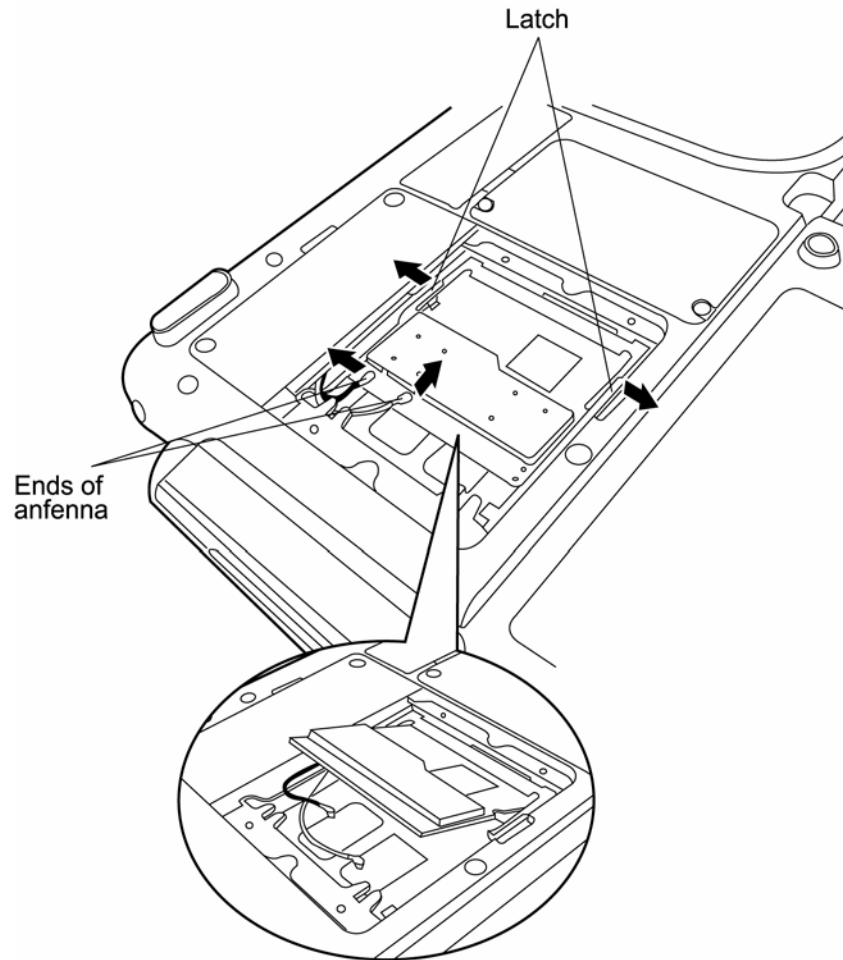


Figure 4-7 Removing the wireless LAN unit

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

Installing the Wireless LAN Unit

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

1. Turn the computer upside down and loosen **four embedded security screws** securing the **wireless LAN compartment cover**.
2. Lift off the **wireless LAN compartment cover**.
3. Fit the **wireless LAN unit's** connector to the computer's connectors and press carefully to ensure firm contact.

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

4. Gently, push the **wireless LAN unit** down until the **latches** engage the unit to hold it in place.
5. Attach the ends of the **wireless LAN antenna**. The **black antenna cable** should be attached to the connector nearer the rear side of the computer, the **white antenna cable** to the connector closer to the front panel.
6. Seat the **wireless LAN compartment cover** and secure it with the **four embedded security screws**.

4.7 Expansion Memory

Removing the Expansion Memory

To remove the expansion memory, first remove the battery pack, then follow the steps below.

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

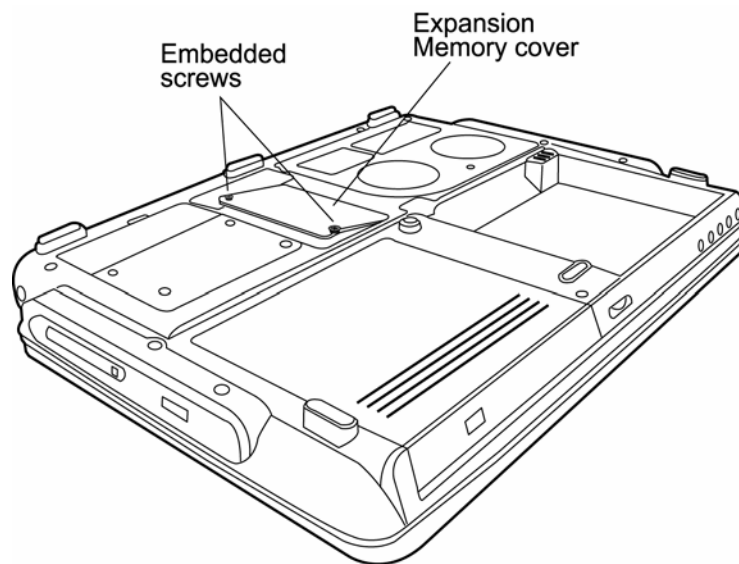


Figure 4-8 Removing the expansion memory cover

4. Gently press out on the **latches**. One end of the **expansion memory** pops up.
5. Grasp the **expansion memory** and pull it out.

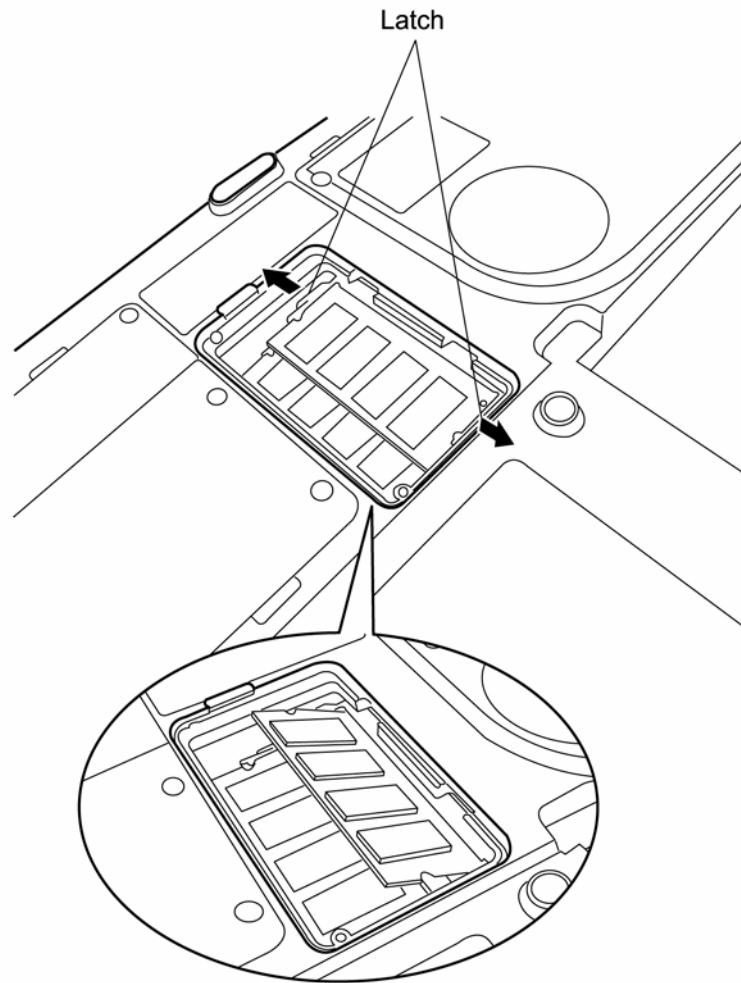


Figure 4-9 Removing the expansion memory

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

Installing the Expansion Memory

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

1. Turn the computer upside down.
2. Remove the **two embedded screws** securing the **expansion memory cover**.
3. Lift off the **expansion memory cover**.
4. 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.*

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

4.8 Modem / Bluetooth Unit

Optional modem and Bluetooth units occupy the same connector so only one can be fitted at a time. The removal and installation procedures are the same for both.

Removing the Modem / Bluetooth Unit

To remove the installed modem or Bluetooth unit, first remove the battery pack, then follow the steps below.

1. Turn the computer upside down.
2. Remove **two embedded screws** securing the **modem / Bluetooth unit cover**.
3. Lift off the **modem / Bluetooth unit cover**.

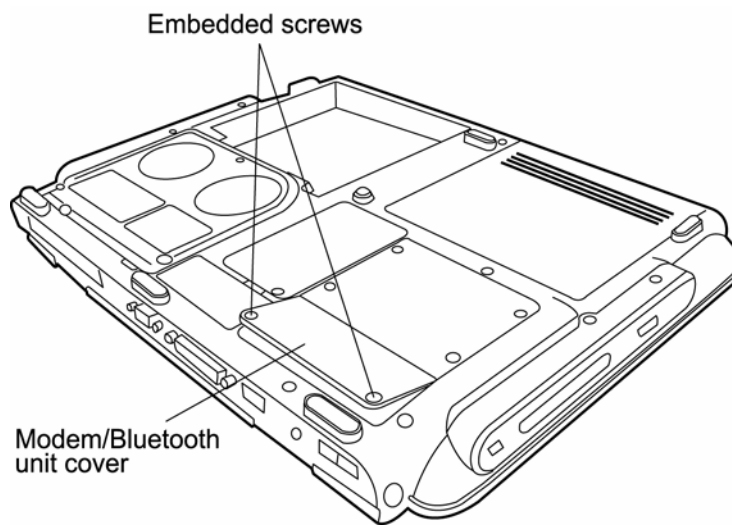


Figure 4-10 Removing the modem / Bluetooth unit cover

4. Remove **two M2.5×3 screws** securing the **modem / Bluetooth unit**.

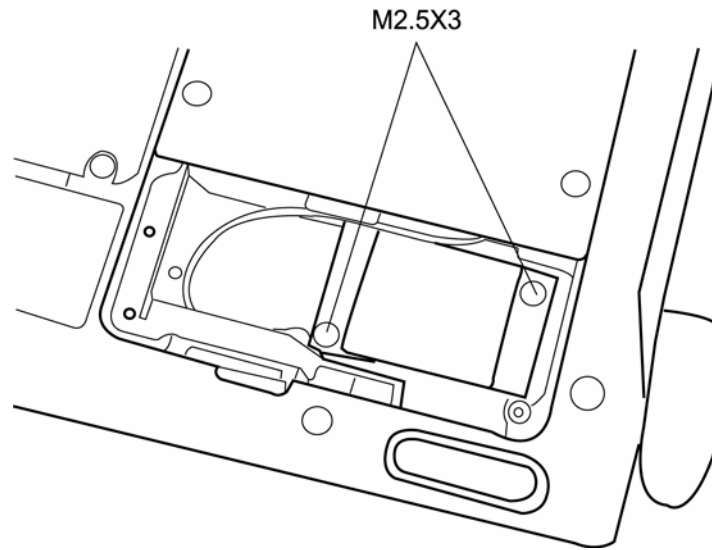


Figure 4-11 Removing the modem / Bluetooth unit screws

5. Carefully lift the unit off its connector.
6. If a **modem** is being removed, disconnect its **power cable** from the **system board**.
If a **Bluetooth unit** is being removed, disconnect its **FPC cable** from the **system board**.

Installing the Modem / Bluetooth Unit

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

1. Turn the computer upside down.
2. Remove **two embedded screws** securing the **modem / Bluetooth unit cover**.
3. Lift off the **modem / Bluetooth unit cover**.
4. If a **modem** is being fitted, connect the **power cable**.

If a **Bluetooth unit** is being fitted, connect the **FPC cable**.

5. Fit the **modem / Bluetooth unit** onto its connector and secure with **two M2.5×3 screws**.
6. Replace the **modem / Bluetooth unit cover** and secure with **two embedded screws**.

4.9 Fan, Heat Sink, & CPU

Removing the Fan, Heat Sink, & CPU

To remove the Fan, Heat Sink, and CPU, you must first remove the battery pack, then follow the steps below.

1. Turn the computer upside down and remove **three embedded security screws** securing the **fan compartment cover**. Remove the **fan compartment cover**.

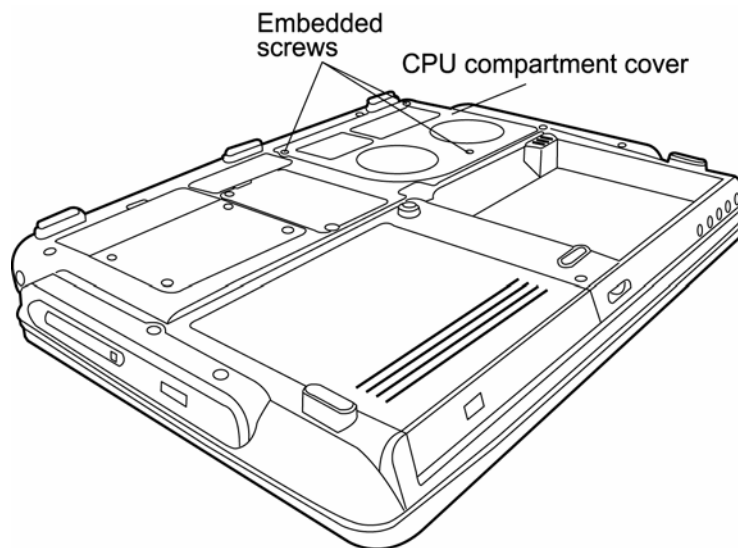


Figure 4-12 Removing the CPU compartment cover

2. Remove **four embedded screws** securing the **fan module**. Next, disconnect the fan module's **black and white power cables** from the system board.
3. Remove the **four embedded screws** securing the **heat sink**. These should be removed in numerical order so as not to place undo stress on the CPU below. The numbers are embossed on the heat sink chassis.
4. Lift off the **heat sink**.

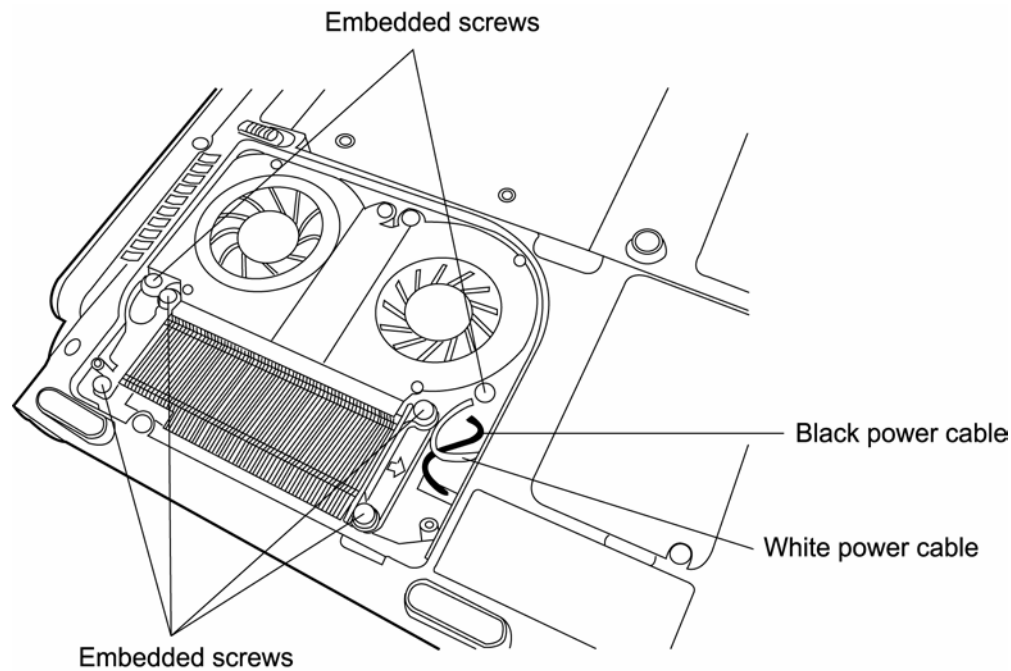


Figure 4-13 Removing the heat sink

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**.

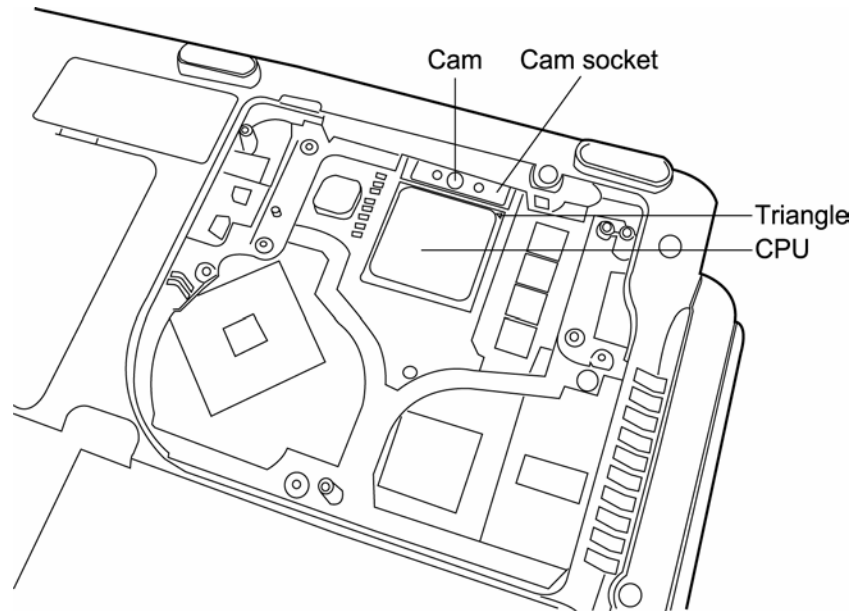


Figure 4-14 Removing the CPU

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

Installing the CPU

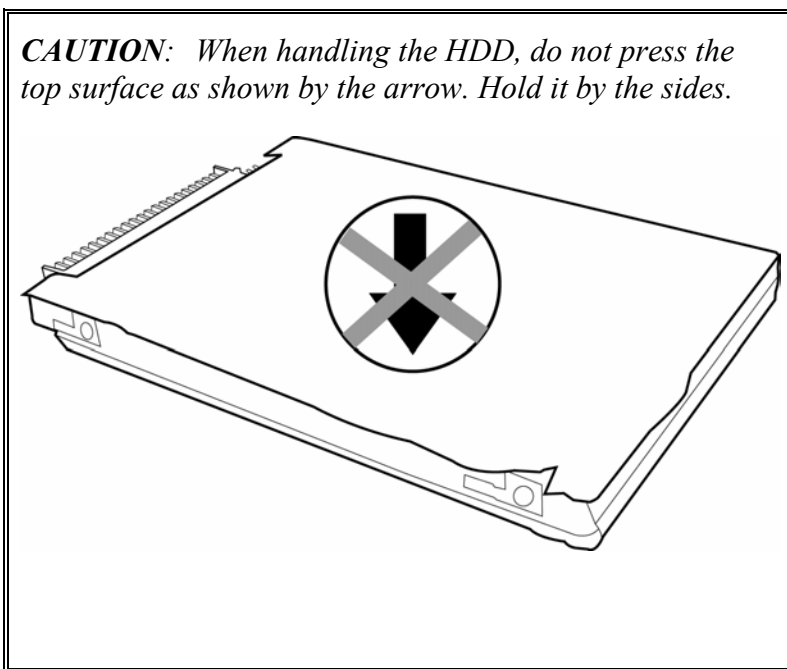
To install the CPU, follow the steps below and refer to the figures in the preceding section.

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

1. Make sure that the notch on the **cam** is aligned with the *open* position.
2. Seat the **CPU** to align the triangle mark on the **CPU** with the one on the **CPU socket**. Make sure the alignment is exact to avoid damaging pins on the **CPU**.
3. Press the **CPU** softly with your fingers and turn the **cam** on the **CPU socket** to the *closed* position with a flat-blade screwdriver to secure the **CPU**.
4. Seat the **heat sink** over the **CPU** and secure with four screws in the order indicated on the heat sink (1,2,3,4).
5. Secure the **CPU compartment cover** with the **three embedded security screws**.

4.10 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, first remove the battery pack and optical drive, then follow the steps below.

1. Remove **four M2.5×6 black screws** securing the **aluminum shield** covering the HDD and lift it out.
2. Gently pull the **HDD** toward the computer's front panel to disconnect it from the system board, then lift it out.

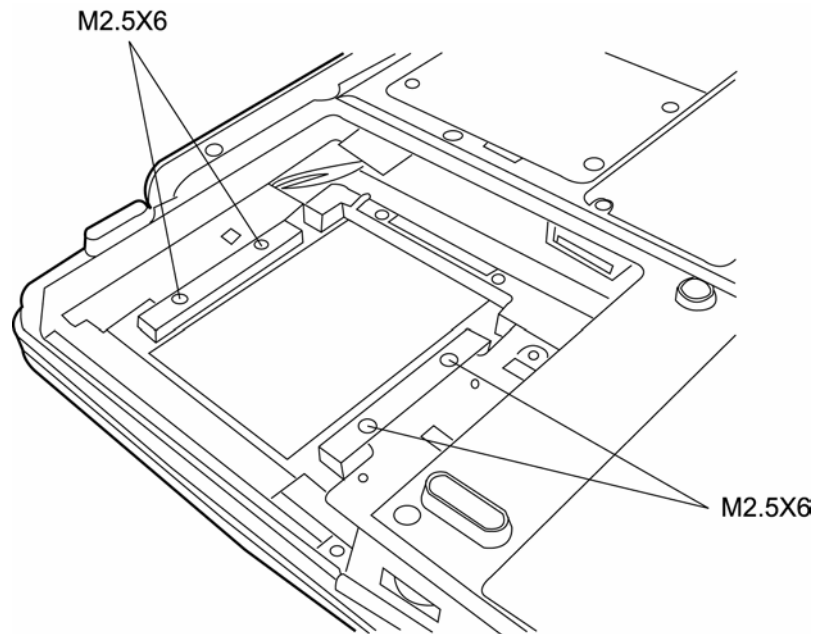


Figure 4-15 Removing the HDD unit cover screws

NOTE: It is not necessary to remove the HDD case unless you are going to replace the HDD.

3. Remove the **four M3×3 silver screws** that secure the **HDD case** to the **HDD**.

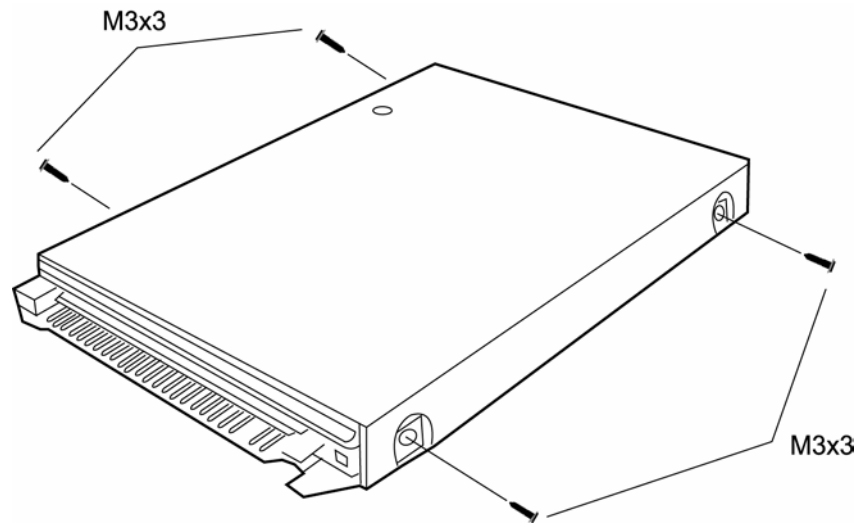


Figure 4-16 Removing the HDD unit case screws

4. Remove the **HDD** from the **HDD case**.

Installing the HDD

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

1. Seat the HDD in the HDD case and secure with four M3×3 silver screws.
2. Seat the **HDD unit** in the HDD slot
3. Secure the **aluminum shield** over the HDD with **four M2.5×6 black screws**.

4.11 Keyboard

Removing the Keyboard

To remove the keyboard, first remove the battery pack, then follow the steps below.

1. Open the display panel.
2. Insert a thin tool into each of the narrow holes in the **strip cover** and lever the **strip cover** up to release its latches.

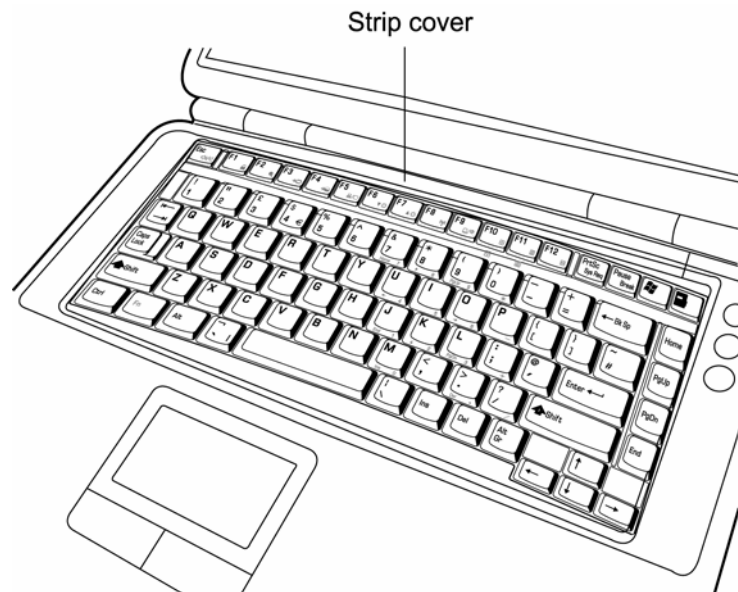


Figure 4-17 Removing the strip cover

3. Remove **two M2×3 black screws** securing the **keyboard**.
4. Lift the **keyboard** out and place over the display hinges, revealing the keyboard cable.
5. Disconnect the **keyboard cable** and remove the **keyboard**.

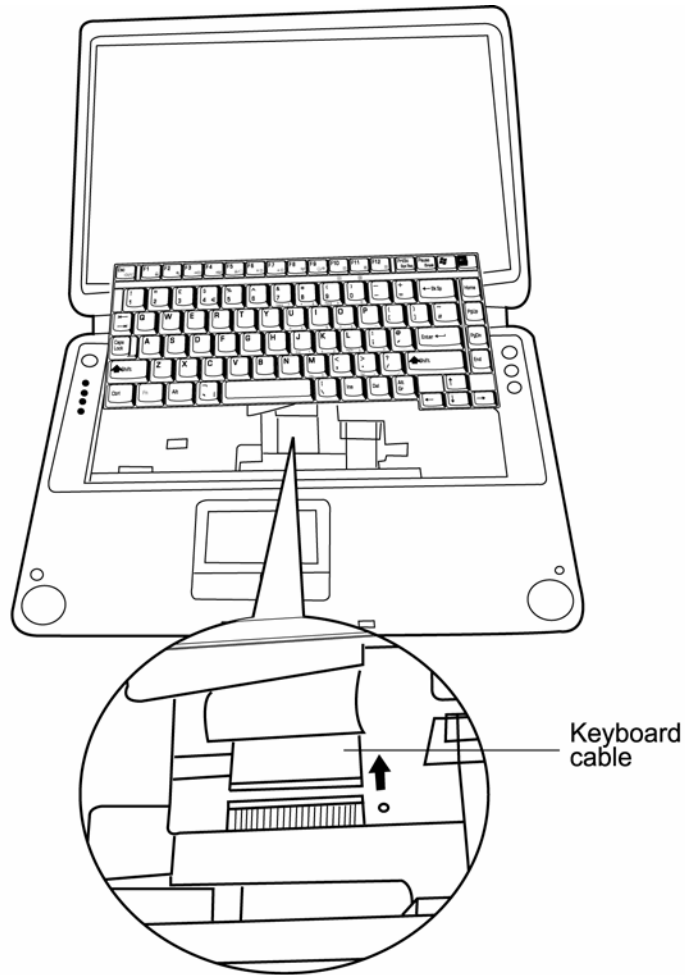


Figure 4-18 Removing keyboard cable and keyboard

Installing the Keyboard

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

1. Connect the **keyboard cable** to the system board.
2. Set the keyboard in place and secure it with **two M2×3 black screws**.
3. Seat the **strip cover** and press down to ensure the strip cover latches engage, locking it in place.

4.12 Display Assembly

Removing the Display Assembly

To remove the display assembly, first remove the battery pack, keyboard, and wireless LAN module, then follow the steps below.

1. Remove **one M2.5.x3 black screw** securing each hinge cover.
2. Disconnect the **LCD power cable** from the top chassis.
3. Remove **one M2x6 black screw** securing **LCD display cable** then unplug the cable.
4. Pull the wireless LAN module's **antennae wires** through the small hole beside the **LCD display cable connector**.

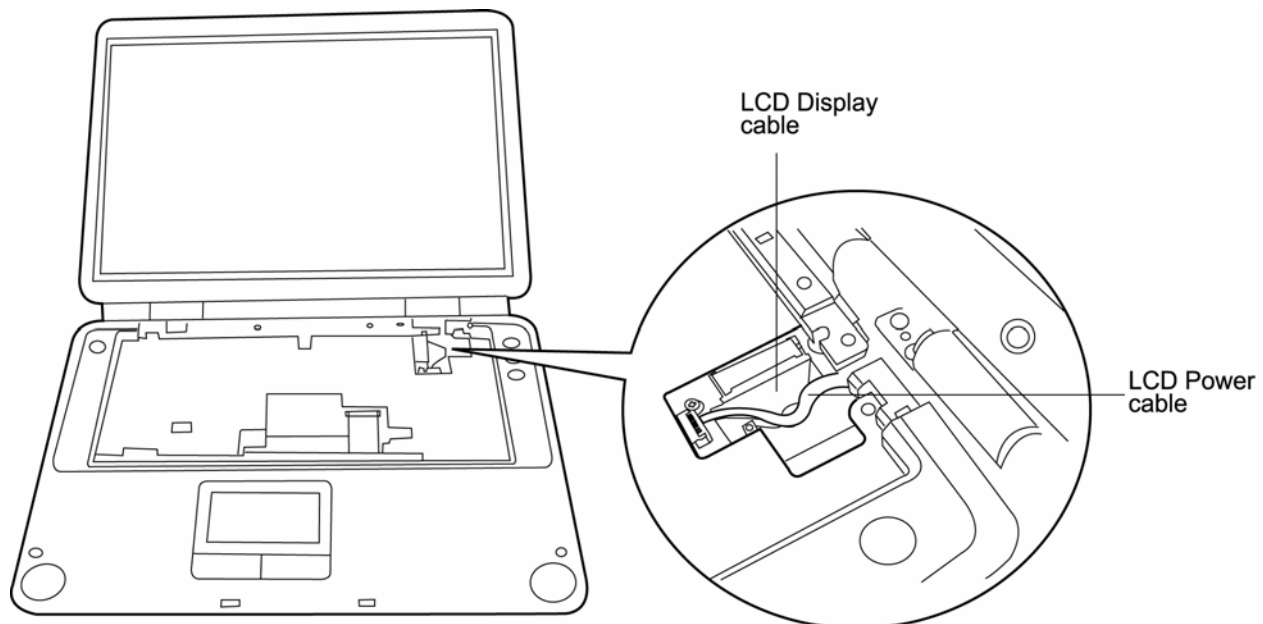


Figure 4-19 Removing the wireless LAN compartment cover

5. Remove two **M2.5x6 black screws** from each hinge and **two black M2.5x6 black screws** from the computer's back side (help hold the display assembly in place).
6. Lift the **display assembly** from the computer's chassis.

Installing the Display Assembly

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

4. Seat the display assembly taking care not to crush to the **LCD display cable**, the **LCD power cable**, or **wireless LAN antenna**.
5. Secure two **M2.5x6 black screws** to each hinge and **two black M2.5x6 black screws** to the computer's back side (which help hold the display assembly in place).
6. Feed the wireless LAN module's **antennae wires** through the small hole beside the **LCD display cable connector**.
7. Connect the **LCD power cable** to the top chassis.
8. Secure **one M2.5.x3 black screw** for each hinge cover
9. Reinstall the keyboard, wireless LAN module, and battery.

4.13 Top Cover

Removing the Top Cover

To remove the top cover, first remove the battery pack, display assembly, optical drive module, HDD, memory cover, fan, heat sink, and CPU as described in the preceding sections, then follow the steps below.

1. Remove **three M2.5×6 black screws** and **two M2.5×3 black screws** from the keyboard tray securing the **top cover**.
2. Detach the **upper FPC** and **lower FPC cables** on the top chassis.

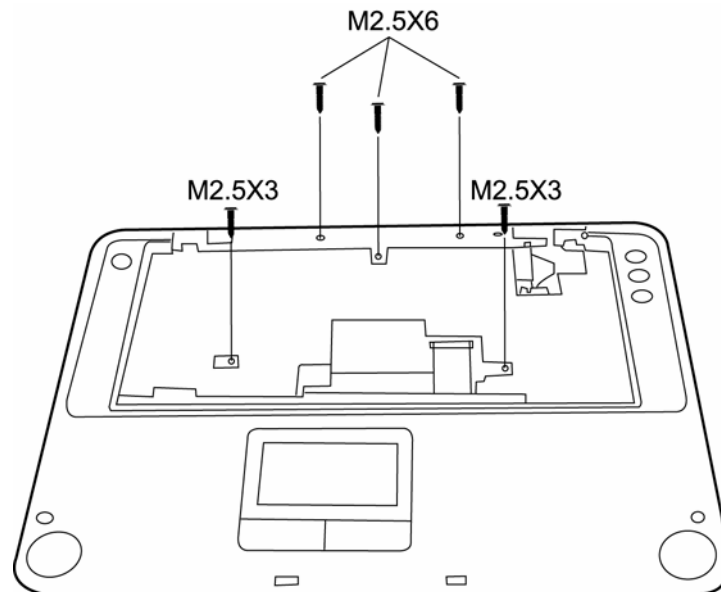


Figure 4-20 Removing the top cover screws and cables

3. Turn the computer upside down and remove the following **eleven screws**:
 - **Three M2×3 black screws** in the battery bay
 - **Two M2.5×6 black screws** from the back.
 - **Six M2.5×18 black screws** from the sides

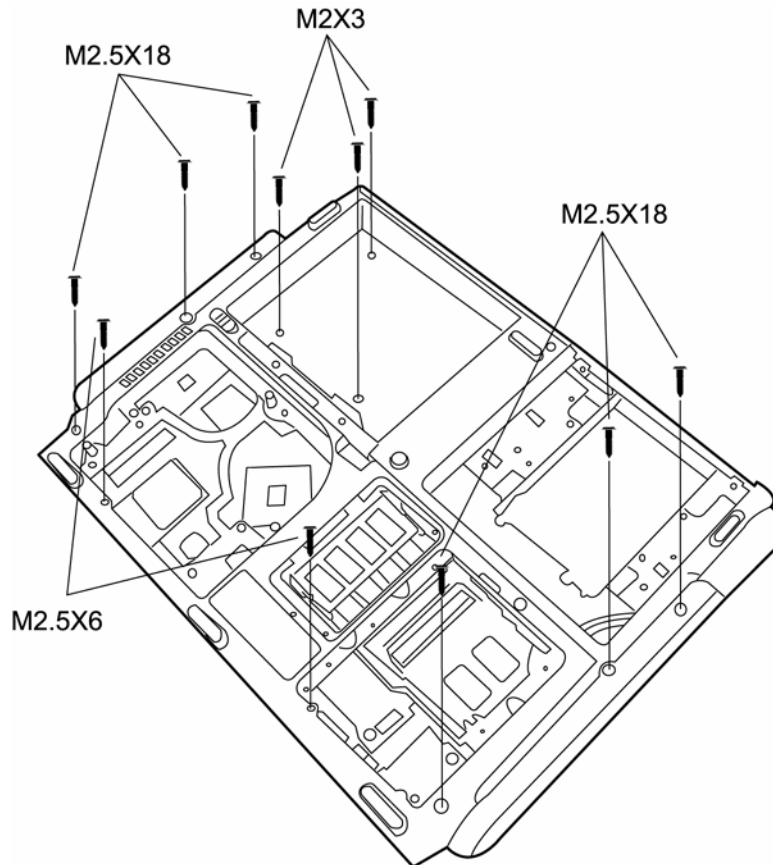


Figure 4-21 Removing the screws from the computer underside

4. Turn the computer upright lift off the **top cover**.

Installing the Top Cover

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

1. Seat the **top cover** and secure the **upper FPC** and **lower FPC cables** to the computer's top chassis.
2. Secure the top cover with **three M2.5×6 black screws** and **two M2.5×3 black screws**.
3. Turn the computer upside down and secure the following **eleven screws**:
 - **Three M2×3 black screws** in the battery bay
 - **Two M2.5×6 black screws** from the back.
 - **Six M2.5×18 black screws** from the sides

4.14 TouchPad

Removing the TouchPad

To remove the TouchPad, first remove the top cover, then follow the steps below.

1. Place the **top cover** face down.
2. Disconnect the **upper and lower TouchPad board FPC cables** from both the **TouchPad button board** and the **TouchPad**.
3. Remove **three M2.5x3 black screws** securing the **TouchPad cover**. Lift out the **TouchPad board**.
4. Remove **two M2.5x2 black screws** securing the **PPC board**. Lift it out.

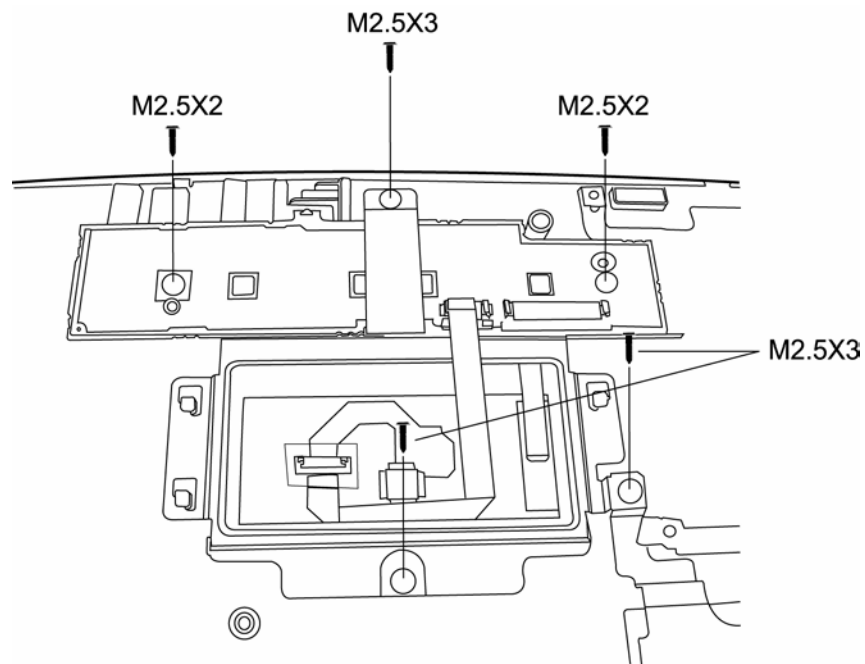


Figure 4-22 Removing the TouchPad button board

Installing the TouchPad

To install the TouchPad, follow the steps below and refer to the figure in the preceding section.

1. With the **top cover** upside down, place the **TouchPad**, the **TouchPad cover**, and **PPC Board** in position.
2. Secure the **PPC Board** with **two M2.5x2 black screws**.
3. Secure the **TouchPad cover** over the **TouchPad** with **three M2.5x3 black screws**.
4. Connect the **upper** and **lower TouchPad board FPC cables** to both the **TouchPad button board** and the **TouchPad**.
5. Restore the battery pack, keyboard, optical drive module, HDD, and top cover as they were originally.

4.15 Speakers

Removing the Speakers

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

1. Disconnect the **speaker FFC cables** from the right and left speakers.
2. Remove **two M2.5x6 black screws**, one from each speaker.

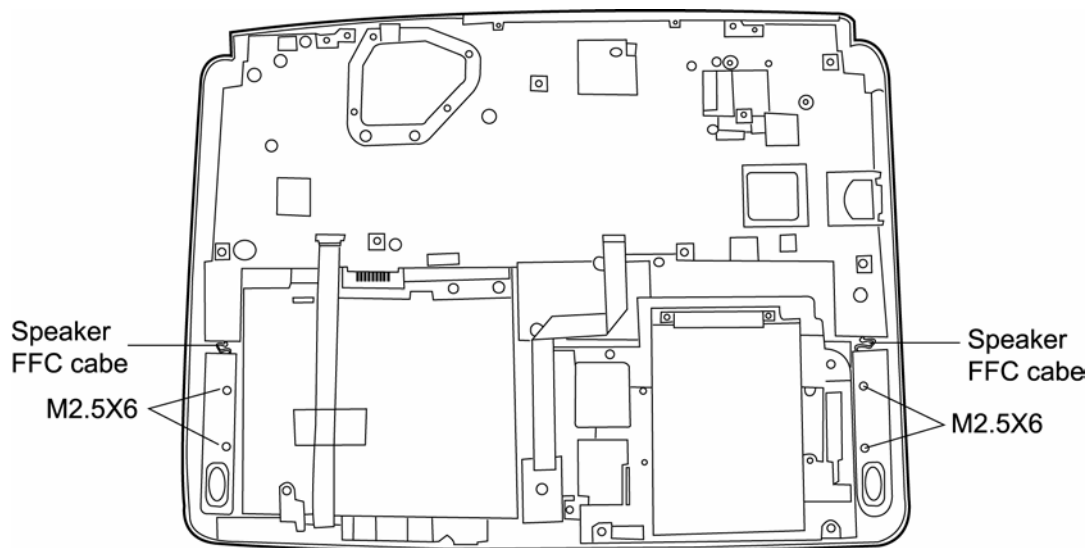


Figure 4-23 Removing the speaker screws

3. Lift out the speakers.

Installing the Speakers

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

1. Seat each **speaker**. The speaker cases are marked with **L** (left) and **R** (right).
2. Secure each speaker with **one M2.5×6 screw**.
3. Attach the left- and right-side **speaker cables** to the **system board**.
4. Reassemble the rest of the computer.

4.16 System Board

Removing the System Board

To remove the system board, first remove the speakers, then follow the steps below.

1. Remove **six M2.5×3 black screws** securing the **system board** to the bottom chassis.
2. Remove the **one M2.5x6 black screw** from the **volume board**.
3. Remove **two M2.5x6 black screws** from the **module support**.
4. Remove the **four hexagonal port screws**.

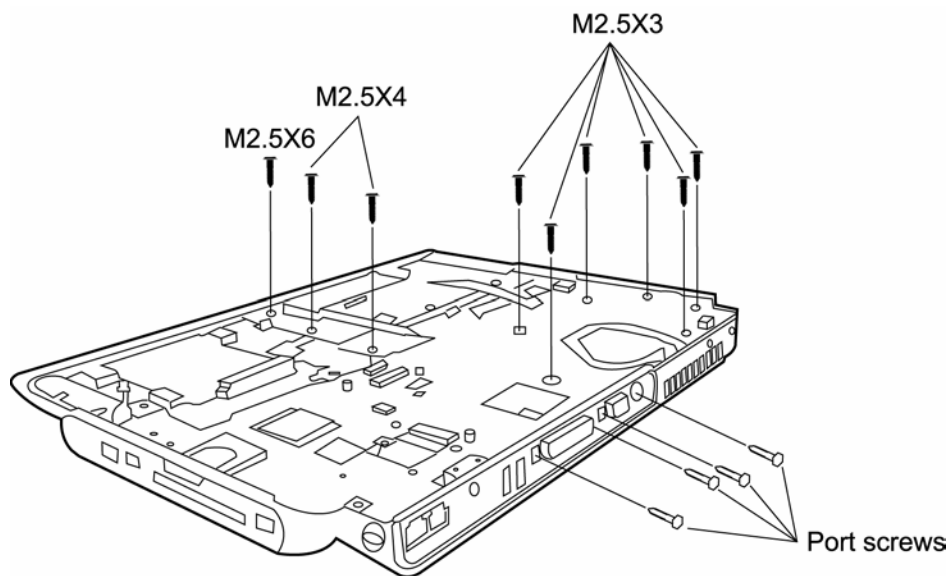


Figure 4-24 Removing the system board screws

5. Remove the **system board** from the chassis.

Installing the System Board

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

1. Seat the **system board** in the chassis and secure it with **six M2.5×3 black screws**.
2. Secure the **volume board** with **one M2.5x6 black screw**.
3. Secure the **module support** with **two M2.5x6 black screws**.
4. Secure the **four hexagonal port screws**.
5. Reassemble the computer.

4.17 Direct Play Button Board

Removing the Direct Play Button Board

To remove the direct play button board, first remove the top cover, then follow the steps below.

1. Release the **direct play button FFC** from the **system board**.
2. Release the two **front face hooks** securing the **front face** to the lower chassis, then gently pry the **front face** away from it.
3. Remove **two M2.5x3 black screws** securing the **direct play button board** to the **front face**.

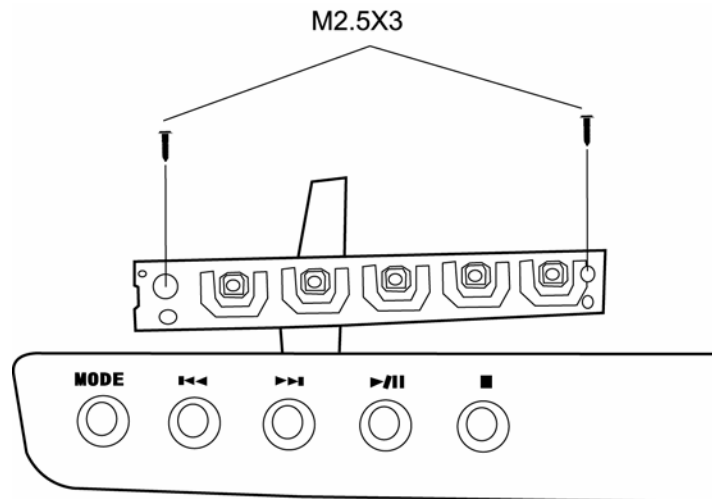


Figure 4-25 Removing the Direct Play cover assembly

Installing the Direct Play Button Board

To install the direct play button board, follow the steps below and refer to the figure in the preceding section.

1. Secure **two M2.5x3 black screws** to the **direct play button board**, attaching it to the **front face** in the process.
2. Attach the **front face** to the lower chassis, ensuring that the two front face hooks snap securely into place.
3. Attach the **direct play button FFC** to the **system board**.

4.18 Display Mask

Removing the Display Mask

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

1. Remove **four mask seals** to expose **two upper outer corners screws** and **two lower inner corner screws** securing the **display mask**.
2. Remove **one M2×6 black screw** from each corner that were covered by the **mask seals**.

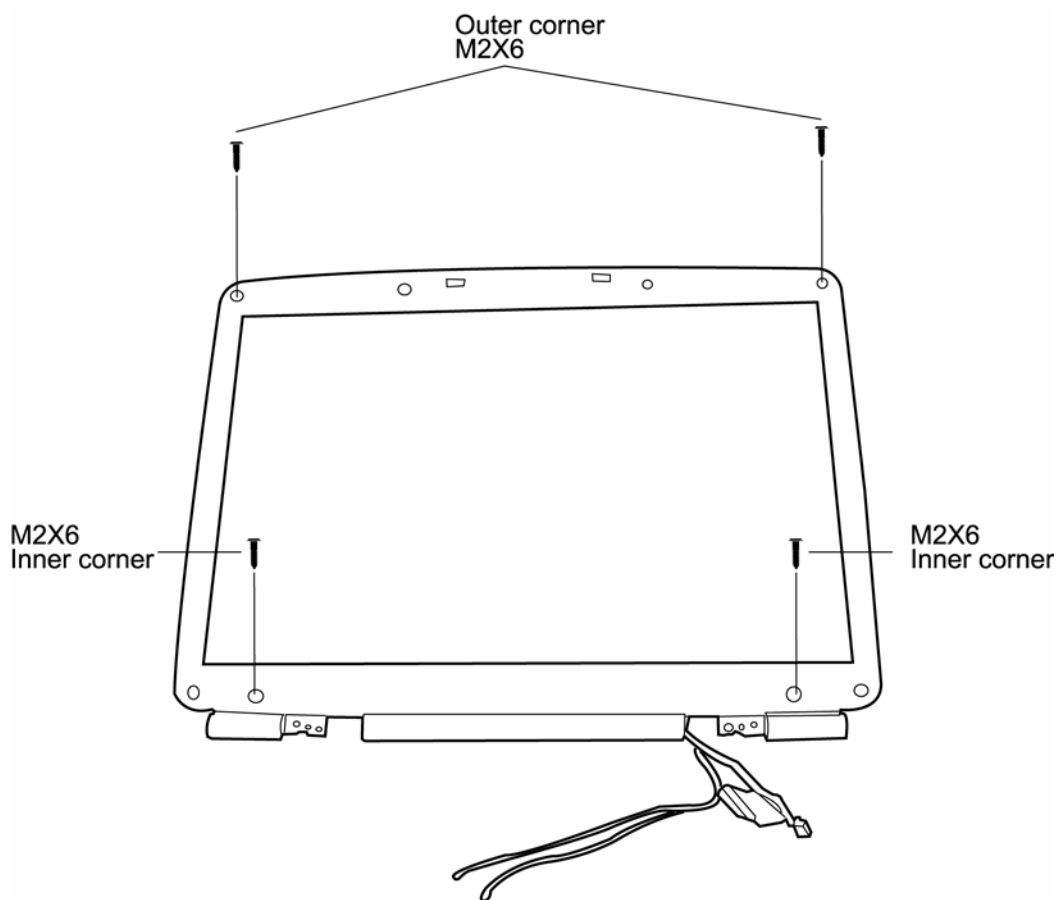


Figure 4-26 Removing the display mask screws

3. Carefully insert your fingers between the **mask** and the **LCD panel** and pry open the **snaps**. Start with the **four snaps** at the top of the **display mask**. Continue unsnapping the **display mask** along the two sides and the bottom edge.

Installing the Display Mask

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

1. Seat the **display mask** and secure the **snaps** on each side.
2. Secure the **display mask** with **two M2×6 black screws** at the top outer corner of the display assembly and another **two M2.5×6 screws** at the bottom inner corner.
3. Cover the secured screws with **mask seals**.

4.19 LCD Module

Removing the LCD Module

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

1. Remove **one M2x3 black screw** securing the **HV cable** and the **FL cable**.
2. Disconnect the **HV and FL cables** from the **FL inverter board**.
3. Remove **eight M2.5x3 black screws** securing the **LCD module bracket**, then remove the **LCD module bracket**.
4. Remove the **LCD module**.

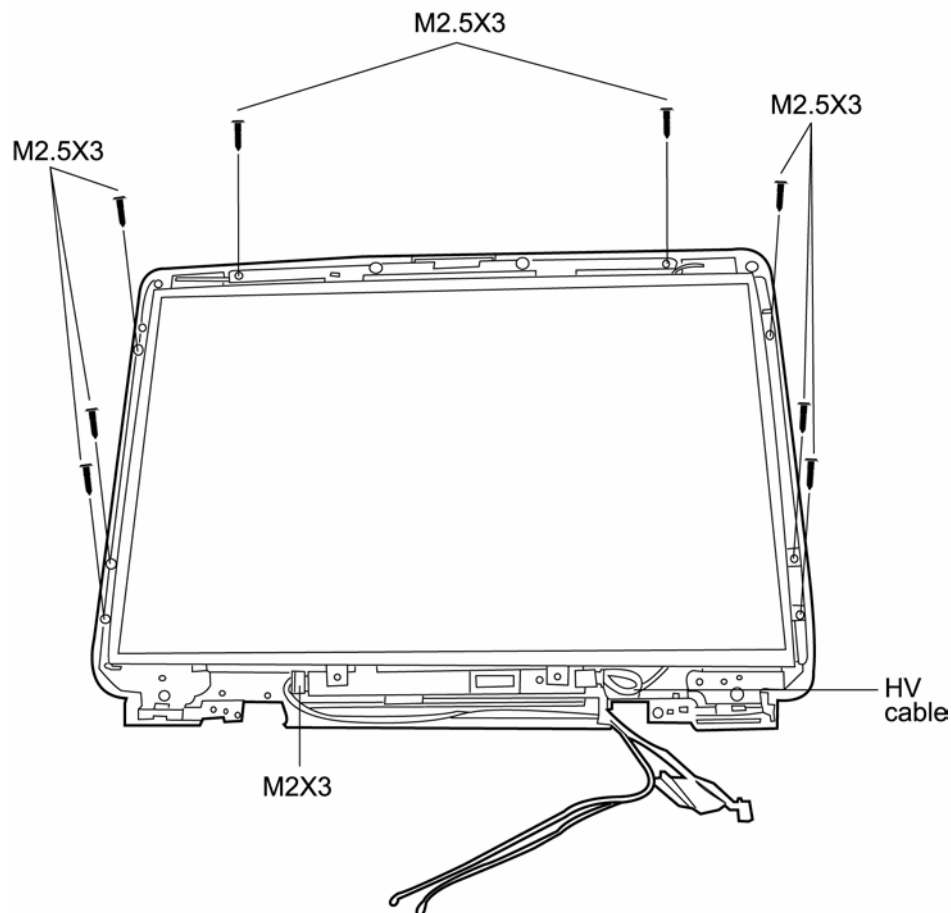


Figure 4-27 Removing the LCD module

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

Installing the LCD Module

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

1. Set the **LCD module** in the **display assembly**.
2. Connect the **FL cable** and the **HV cable** to the **FL inverter board**.
3. Secure the **LCD module** in the **display assembly** with the **LCD module bracket** and **eight M2.5x3 black screws**.
4. Secure **one M2x3 black screw** holding the left **HV cable** in place.

4.20 FL Inverter Board

Removing the FL Inverter Board

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

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

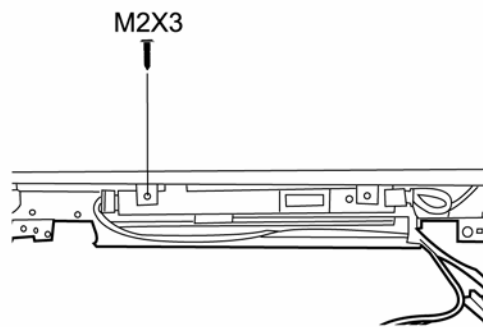


Figure 4-28 Removing the FL inverter board

Installing the FL Inverter Board

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

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

Appendices

Appendix Contents

Appendix A Handling the LCD Module.....	A-1
Appendix B Board Layout.....	B-1
B.1 System Board (FRDSY*) Bottom View	B-1
B.2 System Board (FRDSY*) Top View	B-2
Appendix C Pin Assignments	C-1
C.1 JP24/JP26 SODIMM I/F (200-PIN)	C-1
C.2 JP1 LCD I/F (40-pin)	C-5
C.3 JP15 RGB I/F (15-pin).....	C-6
C.4 JP34 HDD I/F (44-pin)	C-7
C.5 JP28 ODD Module I/F (60-pin).....	C-8
C.6 JP14 Parallel I/F (25-pin).....	C-9
C.7 JP21 PC Card I/F (150-pin)	C-10
C.8 JP27 Mini PCI I/F (124-pin).....	C-13
C.9 JP18, JP21 Fan I/F (3-pin)	C-15
C.10 AC Adaptor Connector (3-pin)---Find Power Team	C-15
C.11 Microphone (6-pin).....	C-15
C.12 Headphone Connector (6-pin).....	C-16
C.13 LINE-IN Connector (6-pin)	C-16
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 Japanese (JA) Keyboard	E-2
E.5 Korean (KO) Keyboard.....	E-3
E.6 Korean (CF) Keyboard	E-3
Appendix F Series Screw Torque List.....	F-1
Appendix G Reliability.....	G-1

Figures

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

Figure B.2 System board (FRDSY*) layout (Top) 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 JA keyboard..... E-2

Figure E-5 KO keyboard E-3

Figure E-6 CF keyboard E-3

Tables

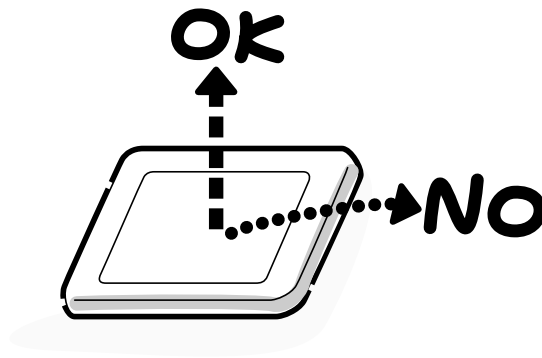
Table B-1	System board ICs (top and bottom)	B-3
Table B-1	System board connectors (top and bottom)	B-4
Table C-1	SODIMM I/F pin assignments (200-PIN)	1
Table C-2	LCD I/F pin assignments (40-pin)	5
Table C-3	RGB I/F pin assignments (15-pin)	6
Table C-4	HDD I/F pin assignments (44-pin)	7
Table C-5	ODD I/F pin assignments (50-pin)	8
Table C-6	Parallel I/F pin assignments (25-pin)	9
Table C-7	PC Card I/F pin assignments (154-pin)	10
Table C-8	Mini PCI I/F pin assignments (124-pin)	13
Table C-9-1	JP18 Fan I/F pin assignments (3-pin)	15
Table C-9-2	JP21 Fan I/F pin assignments (3-pin)	15
Table C-10	AC Adaptor Connector pin assignments (3-pin)	15
Table C-11	Microphone I/F pin assignments (6-pin)	15
Table C-12	Headphone Connector pin assignments (6-pin)	16
Table C-13	Headphone Connector pin assignments (6-pin)	16
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	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.

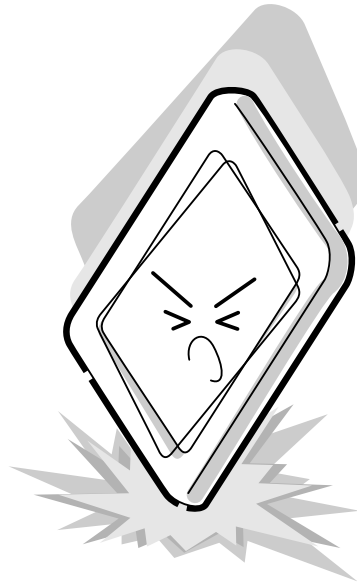
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



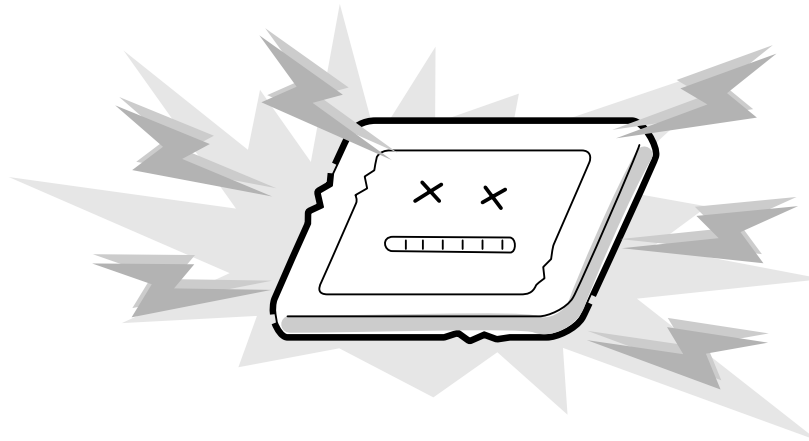
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



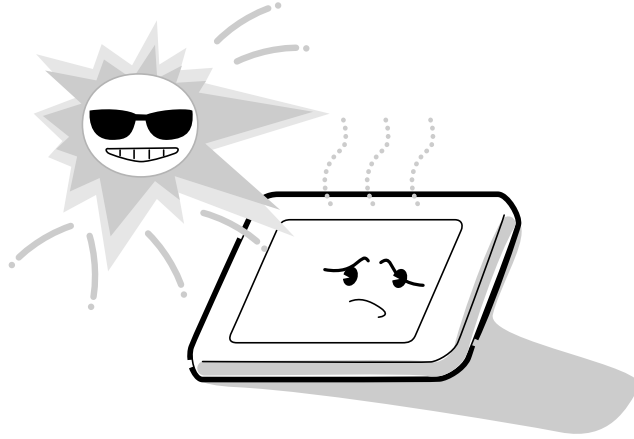
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



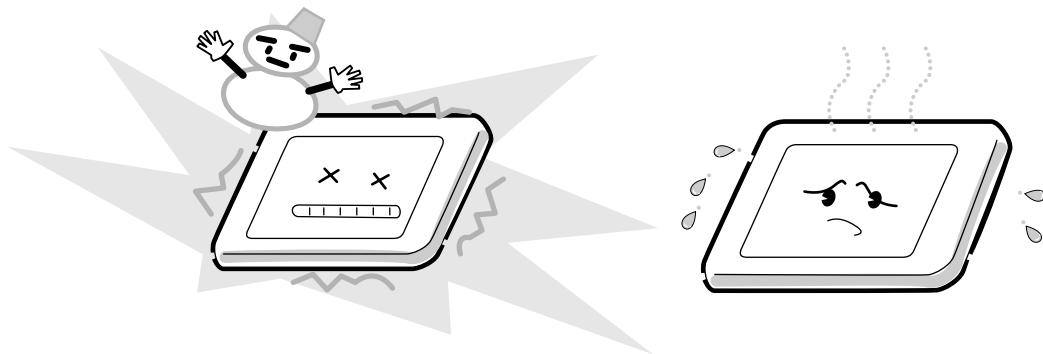
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.



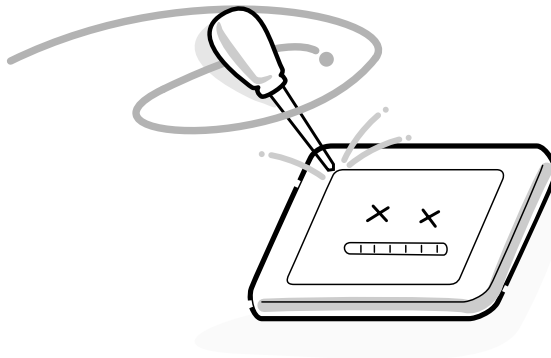
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



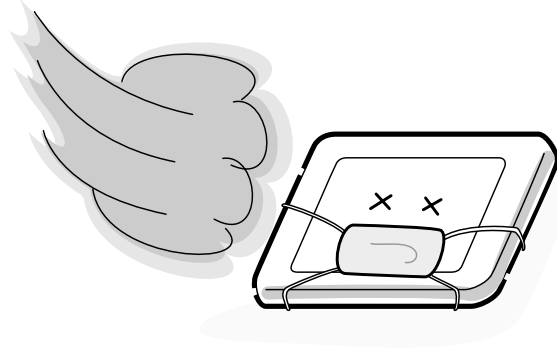
8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



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 (FRDSY*) Bottom View

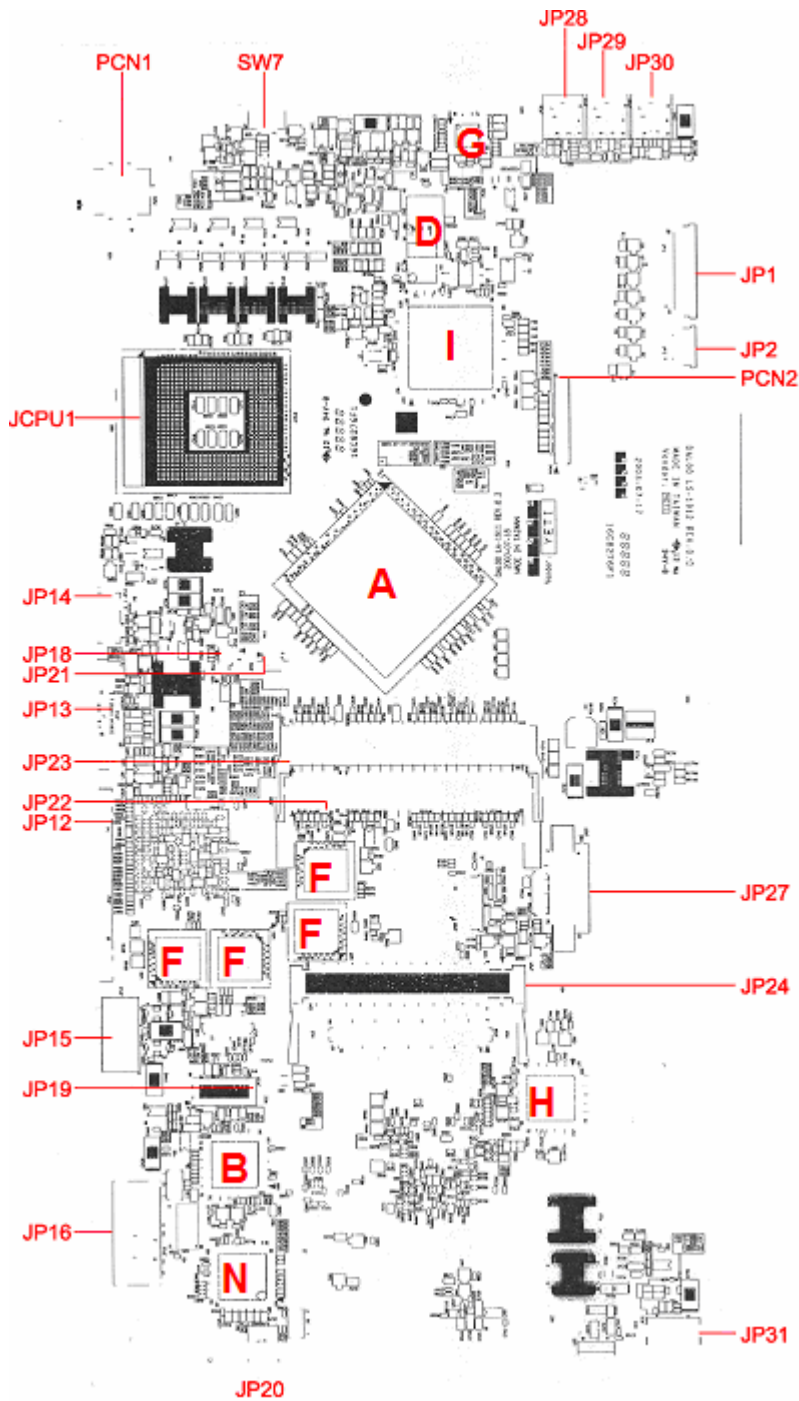


Figure B-1 System board (FRDSY*) layout (Bottom)

B.2 System Board (FRDSY*) Top View

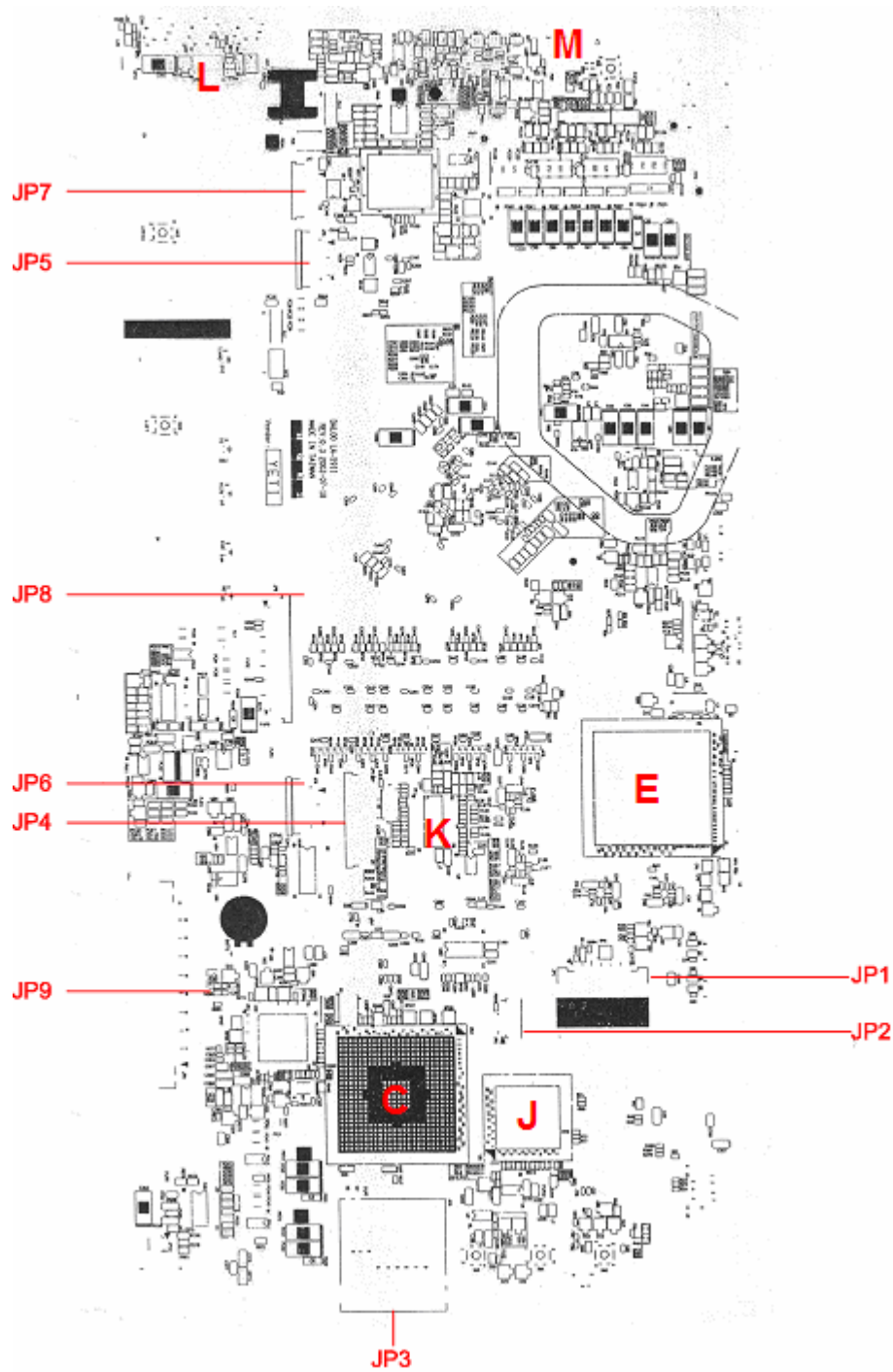


Figure B-2 System board (FRDSY*) layout (Top)

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

Mark	Number	Name
(A)	U43	MCH 865PE
(B)	U35	LAN Controller RTL8101L
(C)	U14	ICH5 Intel 82801
(D)	U56	BIOS ROM1024K8-90
(E)	U1	VGA Chip GO5200
(F)	U30, U34, U37, U38	4M32 VRAM
(G)	U44	AC97 Codec ALC202
(H)	U21	SUPER I/O LPC47N227
(I)	U45	KBC/EC PC87591L
(J)	U5	CARDBUS & SD Controller T7L58XB-0101
(K)	U11	Clock Generator ICS-952623CG
(L)	U48	Audio Amplifier Chip TPA0232
(M)	SW1	Lid Switch
(N)	U36	1394 Fire Wire Controller TSB43AB21A

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

Number	Name
JCPU1	CPU Socket
PCN1	DC-In Connector
JP15, JP31	USB Connector
JP16	RJ11/RJ45 Connector
JP27	ODD Connector
JP12	Parallel Connector
JP13	CRT Connector
JP14	S-Video Connector
JP9	HDD Connector
JP22, JP23	SODIMM Socket
JP19	MDC Module Connector
JP26	PC Card Connector
PCN2	Battery Connector
JP18, JP21	Fan Connector
U31	LAN Transformer
JP20	1394 Connector
JP3	SD Socket
JP1	LVDS Connector
JP24	MINI PCI
JP4	SW Board CONNECTOR
JP5	Direct CD button CONNECTOR
JP10,JP11	Speaker CONNECTOR
JP28 ,JP29 ,JP30	Audio JACK CONNECTOR
SW7	KILL SWITCH CONNECTOR
JP12	LED FPC CONNECTOR
JP6	VR/CIR Board CONNECTOR
JP7	EC TOOLS CONNECTOR
JP8	Keyboard CONNECTOR
JP2	Inverter Board CONNECTOR

Appendix C Pin Assignments

System Board

C.1 JP22/JP23 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	25VDD	O	10	2.5VDD	O
11	DQS0	I/O	12	DM0	O
13	DQ2	I/O	14	DQ6	I/O
15	VSS	-	16	VSS	-
17	DQ3	I/O	18	DQ7	I/O
19	DQ8	I/O	20	DQ12	I/O
21	2.5VDD	O	22	2.5VDD	O
23	DQ9	I/O	24	DQ13	I/O
25	DQS1	I/O	26	DM1	O
27	VSS	-	28	VSS	-
29	DQ10	I/O	30	DQ14	I/O
31	DQ11	I/O	32	DQ15	I/O
33	2.5VDD	O	34	2.5VDD	O
35	CK0	O	36	2.5VDD	O
37	CK0#	O	38	VSS	-
39	VSS	-	40	VSS	-
41	DQ16	I/O	42	DQ20	I/O
43	DQ17	I/O	44	DQ21	I/O
45	2.5VDD	O	46	2.5VDD	O
47	DQS2	I/O	48	DM2	O
49	DQ18	I/O	50v	DQ22	I/O

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

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

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

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

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

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

C.2 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	GND	-	2	TZOUT3-	I
3	TZOUT3+	I	4	GND	-
5	TXOUT3-	I	6	TXOUT3+	I
7	TXOUT0-	I	8	TXOUT0+	I
9	TXOUT2+	I	10	TXOUT2-	I
11	TXOUT1+	I	12	TXOUT1+	I
13	GND	-	14	TXCLK+	I
15	TXCLK-	I	16	PID0	O
17	PID1	O	18	PID2	O
19	PID3	O	20	TZCLK-	I
21	TZCLK+	I	22	GND	-
23	TZOUT0-	I	24	TZOUT0+	I
25	TZOUT2-	I	26	TZOUT2+	I
27	TZOUT1-	I	28	TZOUT1+	I
29	+LCDVDD	-	30	+LCDVDD	-

C.3 JP15 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	CRT_R	O	2	CRT_G	O
3	CRT_B	O	4	NC	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	+CRT_VCC	-	10	GND	-
11	NC	-	12	DDC_DATA	I/O
13	DACA_HSYNC	O	14	DACA_VSYNC	O
15	DDC_CLK	I/O			

C.4 JP9 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	PDD7	I/O	4	PDD8	I/O
5	PDD6	I/O	6	PDD9	I/O
7	PDD5	I/O	8	PDD10	I/O
9	PDD4	I/O	10	PDD11	I/O
11	PDD3	I/O	12	PDD12	I/O
13	PDD2	I/O	14	PDD13	I/O
15	PDD1	I/O	16	PDD14	I/O
17	PDD0	I/O	18	PDD15	I/O
19	GND	-	20	NC	-
21	PDDREQ	I	22	NC	-
23	PDIOW#	O	24	GND	-
25	PDIOR#	O	26	GND	-
27	PDIORDY	I	28	PCSEL	O
29	PDDACK#	O	30	GND	-
31	IRQ14	I	32	NC	-
33	PDA1	O	34	NC	-
35	PDA0	O	36	PDA2	O
37	PDCS1#	O	38	PDCS3#	O
39	PHDD_LED#	I	40	GND	-
41	+5VS	-	42	+5VS	-
43	GND	-	44	NC	-

C.5 JP27 ODD Module I/F (60-pin)

Table C-5 ODD I/F pin assignments (50-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	INT_CD_L	I	2	INT_CD_R	I
3	CD_AGND	-	4	GND	-
5	SIDE_RST#	O	6	SDD8	I/O
7	SDD7	I/O	8	SDD9	I/O
9	SDD6	I/O	10	SDD10	I/O
11	SDD5	I/O	12	SDD11	I/O
13	SDD4	I/O	14	SDD12	I/O
15	SDD3	I/O	16	SDD13	I/O
17	SDD2	I/O	18	SDD14	I/O
19	SDD1	I/O	20	SDD15	I/O
21	SDD0	I/O	22	SDDREQ	I
23	GND	-	24	SDIOR#	O
25	SDIOW#	O	26	GND	O
27	SIORDY	I	28	SDDACK#	O
29	IRQ15	I	30	NC	O
31	SDA1	O	32	+5VCD	I
33	SDA0	O	34	SDA2	I
35	SDCS1#	O	36	SDCS3#	-
37	SHDD_LED#	I	38	+5VCD	O
39	+5VCD	-	40	+5VCD	-
41	+5VCD	-	42	+5VCD	-
43	GND	-	44	GND	-
45	GND	-	46	GND	-
47	GND	-	48	GND	-
49	NC	-	50	NC	-

C.6 JP12 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	STROB; 000	O	2	PDB00; 100	I/O
3	PDB01; 100	I/O	4	PDB02; 100	I/O
5	PDB03; 100	I/O	6	PDB04; 100	I/O
7	PDB05; 100	I/O	8	PDB06; 100	I/O
9	PDB07; 100	I/O	10	ACK; 000	I
11	BUSY; 100	I	12	PE; 100	I
13	SELCT; 100	I	14	AUTFD; 000	O
15	ERROR; 000	I	16	PINIT; 000	O
17	SLIN; 000	O	18	GND	-
19	GND	-	20	GND	-
21	GND	-	22	GND	-
23	GND	-	24	GND	-
25	GND	-			

C.7 JP26 PC Card I/F (84-pin)

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

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

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

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

JP24 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	SWITCH	O	14	NC	-
15	NC	-	16	NC	-
17	PIRQH#	I	18	+5VS_MINIPCI	-
19	+3.3V	O	20	PIRQG#	I
21	NC	-	22	NC	-
23	GND	-	24	+3.3V	O
25	PCICLK	O	26	PCIRST#	O
27	GND	-	28	+3.3V	O
29	REQ1#	I	30	GNT1#	O
31	+3.3V	O	32	GND	-
33	AD31	I/O	34	WLANME#	I
35	AD29	I/O	36	NC	-
37	GND	-	38	AD30	I/O
39	AD27	I/O	40	+3.3V	O
41	AD25	I/O	42	AD28	I/O
43	NC	-	44	AD26	I/O
45	CBE3#	I/O	46	AD24	I/O
47	AD23	I/O	48	MINI_IDSEL	I/O
49	GND	-	50	GND	-
51	AD21	I/O	52	AD22	I/O
53	AD19	I/O	54	AD20	I/O
55	GND	-	56	PAR	I/O
57	AD17	I/O	58	AD18	I/O
59	CBE2#	I/O	60	AD16	I/O

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

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

C.8 JP18, JP21 Fan I/F (3-pin)

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

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

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

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

C.9 AC Adaptor Connector (3-pin)

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

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

C.10 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	-	2	MIC	I
3	BIAS	I	4	NC	-
5	NC	-	6	ANGND	-

C.11 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	INTSPK_L1	O
3	INTSPK_R1	O	4	NBA_PLUG	I
5	ANGND	-	6	NC	-

C.12 LINE-IN Connector (6-pin)

Table C-13 Headphone Connector pin assignments (6-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	ANGND	-	2	LINE_IN_L	O
3	LINE_IN_R	O	4	LINE_IN_R	I
5	ANGND	-	6	ANGND	-

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 9D	E0 14	E0 F0	14	
75	Ins	E0 52	E0 D2	E0 70	E0 F0	70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0	71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0	6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0	6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0	69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0	75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0	72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0	7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0	7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0	74	*1
110	Esc	01	81	76	F0	76	
112	F1	3B	BB	05	F0	05	
113	F2	3C	BC	06	F0	06	
114	F3	3D	BD	04	F0	04	
115	F4	3E	BE	0C	F0	0C	
116	F5	3F	BF	03	F0	03	
117	F6	40	C0	0B	F0	0B	
118	F7	41	C1	83	F0	83	
119	F8	42	C2	0A	F0	0A	
120	F9	43	C3	01	F0	01	
121	F10	44	C4	09	F0	09	*3

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

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

Notes:

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

Table D-2 Scan codes with left Shift key

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

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

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

Table D-3 Scan codes in Numlock mode

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

Table D-4 Scan codes with Fn key

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

Table D-5 Scan codes in overlay mode

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

Table D-6 No.124 key scan code

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

Table D-7 No.126 key scan code

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

*: This key generates only make codes.

Appendix E Key Layout

E.1 United States (US) Keyboard



Figure E-1 US keyboard

E.2 United Kingdom (UK) Keyboard



Figure E-2 UK keyboard

E.3 Spanish (SP) Keyboard



Figure E-3 SP keyboard

E.4 Japanese (JA) Keyboard



Figure E-4 JA keyboard

E.5 Korean (KO) Keyboard



Figure E-5 KO keyboard

E.6 Korean (CF) Keyboard



Figure E-6 CF keyboard

Appendix F Series Screw Torque List

Table F-1 Series Screw Torque List

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MAAA0015320	M2*3	8	LCD BRK TO LCDPANEL	2~2.5kg
MAAA0015320	M2*3	1	INVERTER TO COVER SUB ASSY	2~2.5kg
MAAA0015320	M2*3	4	XDROM LOW TO XDROM MODULE	2~2.5kg
MAAA0015320	M2*3	2	MODULE LOCK BRACKET TO XDROM MODULE	2~2.5kg
MAAA0015320	M2*3	2	KEYBOARD TO LOGIC ASSY	2~2.5kg
MAAA0001210	M2*5	4	CARD BUS TO MB	2~2.5kg
MAAA0001210	M2*5	2	HDD CONNT TO MB	2~2.5kg
MAAA0001210	M2*5	2	CD ROM CONN TO MB	2~2.5kg
MACA0007204	M2.5*3	1	LCD CABLE TO COVER SUB ASSY	2.5~3kg
MACA0007204	M2.5*3	2	TRACK PAD BOARD TO LOGIC UPPER	2.5~3kg
MACA0007204	M2.5*3	3	TRACK PAD BRACKET TO LOGIC UPPER	2.5~3kg
MACA0007204	M2.5*3	2	CD PLAY BOARD TO CD PLAY COVER ASSY	2.5~3kg
MACA0007204	M2.5*3	2	MDC TO MB	2.5~3kg
MACA0007204	M2.5*3	6	MB TO LOW SUPPORT	2.5~3kg
MACA0007204	M2.5*3	5	LOGIC UPPER TO LOGIC LOWER	2.5~3kg
MACA0007204	M2.5*3	2	HINGE COVER L/ R TO LOGIC	2.5~3kg
MAC925005N0	M2.5*5	2	HING ASSY TO COVER SUB ASSY (R+L)	3~4kg
MAC925005N0	M2.5*5	4	LCD PANEL ASSY TO COVER SUB ASSY(R+L)	2.5~3kg
MAC925006Z0	M2.5*6	4	LCD BAZELTO COVER SUB ASSY	2.5~3kg
MAC925006Z0	M2.5*6	1	VR BOARD TO LOGIC LOWER	2.5~3kg
MAC925006Z0	M2.5*6	2	MODULE SUPPORT TO LOGIC LOWER	2.5~3kg

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
MAC925006Z0	M2.5*6	2	SPEAKER L/R TO LOGIC LOWER	2.5~3kg
MAC925006Z0	M2.5*6	14	LOGIC UPPER TO LOGIC LOWER	2.5~3kg
MAC925006Z0	M2.5*6	4	HDD ASSY TO LOGIC ASSY	2.5~3kg
MAC925006Z0	M2.5*6	1	XDROM ASSY TO LOGIC ASSY	2.5~3kg
MAC925018Z0	M2.5*18	7	LOGIC UPPER TO LOGIC LOWER	2.5~3kg
MAAA4303000	M3*3	2	HDD BRACKET L TO HDD MODULE	2.5~3kg
MAAA4303000	M3*3	2	HDD BRACKET R TO HDD MODULE	2.5~3kg
MAFA94001N0	4.75*9.6	2	VGA PORT TO LOGIC ASSY	2.5~3kg
MAFA94001N0	4.75*9.6	2	PRINT PORT TO LOGIC ASSY	2.5~3kg
MAAAA173500	自攻 1.7	3	MTS PANEL TO MTS DVD ROM MODULE	1.7~2kg
MAAAA173500	自攻 1.7	2	MKE PANEL TO MKE DVD ROM MODULE	1.7~2kg

Appendix G Reliability

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

Table G-1 MTBF

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

