

**Toshiba Personal Computer  
Satellite  
Maintenance Manual**

**TOSHIBA CORPORATION**

*[CONFIDENTIAL]*

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Toshiba Personal Computer Satellite Maintenance Manual

First edition May. 2009

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## Preface

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This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite, referred to as the Satellite Series in this manual.

The procedures described in this manual are intended to help service technicians isolate faulty Field Replaceable Units (FRUs) and replace them in the field.

### SAFETY PRECAUTIONS

Four types of messages are used in this manual to bring important information to your attention. Each of these messages will be italicized and identified as shown below.

***DANGER:*** “Danger” indicates the existence of a hazard that could result in death or serious bodily injury if the safety instruction is not observed.

***WARNING:*** “Warning” indicates the existence of a hazard that could result in bodily injury if the safety instruction is not observed.

***CAUTION:*** “Caution” indicates the existence of a hazard that could result in property damage if the safety instruction is not observed.

***NOTE:*** “Note” contains general information that relates to your safe maintenance service.

Improper repair of the computer may result in safety hazards. Toshiba requires service technicians and authorized dealers or service providers to ensure the following safety precautions are adhered to strictly.

Be sure to fasten screws securely with the right screwdriver. If a screw is not fully fastened, it could come loose, creating a danger of a short circuit, which could cause overheating, smoke or fire.

If you replace the battery pack or RTC battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

The manual is divided into the following parts:

- Chapter 1 Hardware Overview describes the Satellite Series system unit and each FRU.
- Chapter 2 Troubleshooting Procedures explains how to diagnose and resolve FRU problems.
- Chapter 3 Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.
- Chapter 4 Replacement Procedures describes the removal and replacement of the FRUs.
- Appendices The appendices describe the following:

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

## Conventions

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

### *Acronyms*

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

Read Only Memory (ROM)

### *Keys*

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

### *Key operation*

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

### *User input*

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

**DISKCOPY A: B:**

### *The display*

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

```
Format complete  
System transferred
```

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# **Chapter 1**

## **Hardware Overview**

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## 1.1 Features

The Toshiba Satellite L450/Pro L450/L450D/Pro L450D is a full size notebook PC based on the Dual Core Processor, providing high-speed processing capabilities and advanced features. The computer employs a Lithium Ion battery that allows it to be battery-operated for a longer period of time. The display uses 15.6-inch WXGA LCD panel. The PGA socket supports BTO for the CPU so that the system can be designed to suit your needs.

The computer has the following features:

### Processor

The computer is equipped with one of the following processors.

- Intel Penryn processor Dual (25W/35W) Core
- Intel Penryn SEAM CPU
- Intel Merom Celeron/ SEAM CPU
- AMD Lion (Turion X2) Ultra Dual-Core Processor
- AMD Lion (Turion X2) Dual-Core Processor
- AMD Athlon X2 Dual-Core Processor
- AMD Sable (Sempron) Processor

### Memory

The computer has two SODIMMs slot comes standard with 1GB/2GB, accepting BTO for your memory requirements. It can incorporate up to 8 GB of main memory. It supports DDR2 at 800MHz.

### Battery Pack

The computer is powered by one rechargeable and removable Lithium Ion battery pack. The capacity can be either 3-cell or 6-cell, depending on the model of the computer.

### RTC Battery

The internal RTC battery backs up the Real Time Clock and calendar.

### Hard Disk Drive (HDD)

The computer accommodates 9.5 mm HDD types with following storage capacities:

- 160/250/320/400/500 GB (9.5 mm thick) SATA (5,400rpm)

**❑ ODD**

- 12.7mm height DVD Super Multi drive supporting  $\pm$ R Double Layer w/ Labelflash

**❑ Display**

The LCD displays available come with one of following types:

- 15.6" COLOR TFT/HD LCD, 1366 X 768 HD Resolution

**❑ Graphics**

- Intel GM45/GL40 integrated graphic
- AMD RS780MN/RS780MC integrated graphic

(depending on the model of the computer).

**❑ Keyboard**

The computer is equipped with a Toshiba standard 300mm keyboard, which has 86/87 keys support without stick-point. It is a Vista compliance keyboard, where you may find Windows key and application keys.

**❑ Pointing Device**

The integrated Wide Touch Pad and two control buttons in the palm rest allow control of the on-screen pointer and support functions such as the scrolling of windows.

**❑ External Monitor Port**

The analog VGA port provides support for VESA DDC2B compatible functions. A WDDM driver is ready for Vista.

**❑ Universal Serial Bus (USB) Ports**

The computer has three USB 2.0 ports. It is supported to daisy-chain a maximum of 127 USB devices. The serial data transfer rate is 480 Mbps or 12 Mbps and 1.5 Mbps. These ports support PnP installation and hot plugging.

Bridge Media Slot

This slot allows you to insert SD, MiniSD/ MicroSD (through adapter), Memory Stick and MMC memory card. It supports High speed SD and SDHC. An I/O port heel cover is needed. This model does not support CF cards.

Sound system

The integrated sound system provides support for the computer's internal speakers and microphone, as allowing an external microphone and headphones to be connected via the appropriate jacks.

Internal Camera (BTO)

It supports 0.3M and 1.3M pixels with Auto Macro. It comes with blue LED. The internal microphone is BTO with the internal camera. The microphone comes with echo cancellation. This camera is not a rotation type.

HDMI Out Port (BTO)

HDMI 1.3 out port can connect with Type A connector HDMI cable. One HDMI cable can send and receive video, audio and control signals.

Headphones Line out Jack

This jack connects digital speakers or a stereo headphone (16 ohm minimum). When connected to a digital speaker or headphones, the internal speaker is automatically disabled.

Microphone/ Line-in Jack

A 3.5mm mini microphone jack enables connection of a three-conductor microphone for monaural input and also enables the connection of a stereo device for audio input.

LAN

The computer has built-in support for 10M/100M Ethernet LAN (10/100 megabits per second, 10/100BASE-T). It is a Realtek 8103EL for 10M/100Mbit LAN.

**❑ Wireless LAN**

Some computers in this series are equipped with a Wireless LAN card. This WLAN module may come in with the following types (depending on the model):

- Intel 802.11a/b/g/n (Shirley Peak 1x2; Shirley Peak 3x3)
- Intel 802.16e & 802.11a/b/g/n (Echo Peak 1x2)
- Atheros HB93, Atheros HB95 – HMC type; Atheros XB91, Atheros XB95 – FMC type
- Realtek 802.11b/g (RTL8187B) – FMC type, Realtek 802.11b/g (RTL8187SE) – HMC type, 802.11b/g/n (RTL8191SE)

**❑ Internal Modem (BTO)**

Some models are equipped with the integrated modem. The integrated modem provides capability for data and fax communications that support the V.90 (V.92) standards and includes a modem jack for connection to the telephone line. Please note that both the V.90 and V.92 standards are only supported in the USA, Canada, United Kingdom, France, Germany and Australia - only the V.90 standard is supported in other regions. You should also be aware that the speed of data and fax transfer will depend on the analog telephone line conditions. The integrated model is only installed as a standard device in some markets. This internal modem comes with MDC 1.5 solution (Azalia interface).

**❑ Figure 1-1 shows the computer and its system unit configuration.**

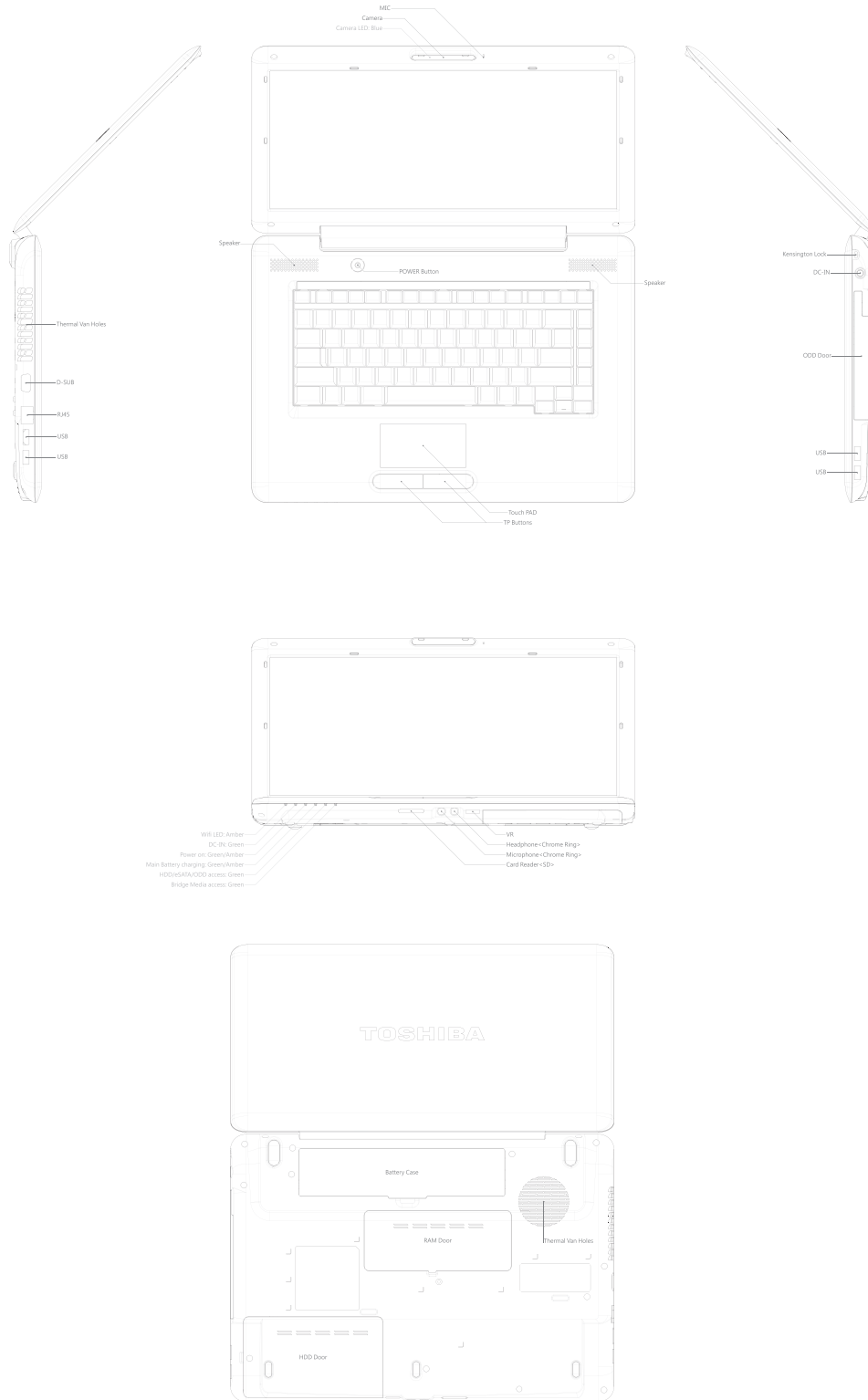


Figure 1-1 ID Parts Description Placement Part A

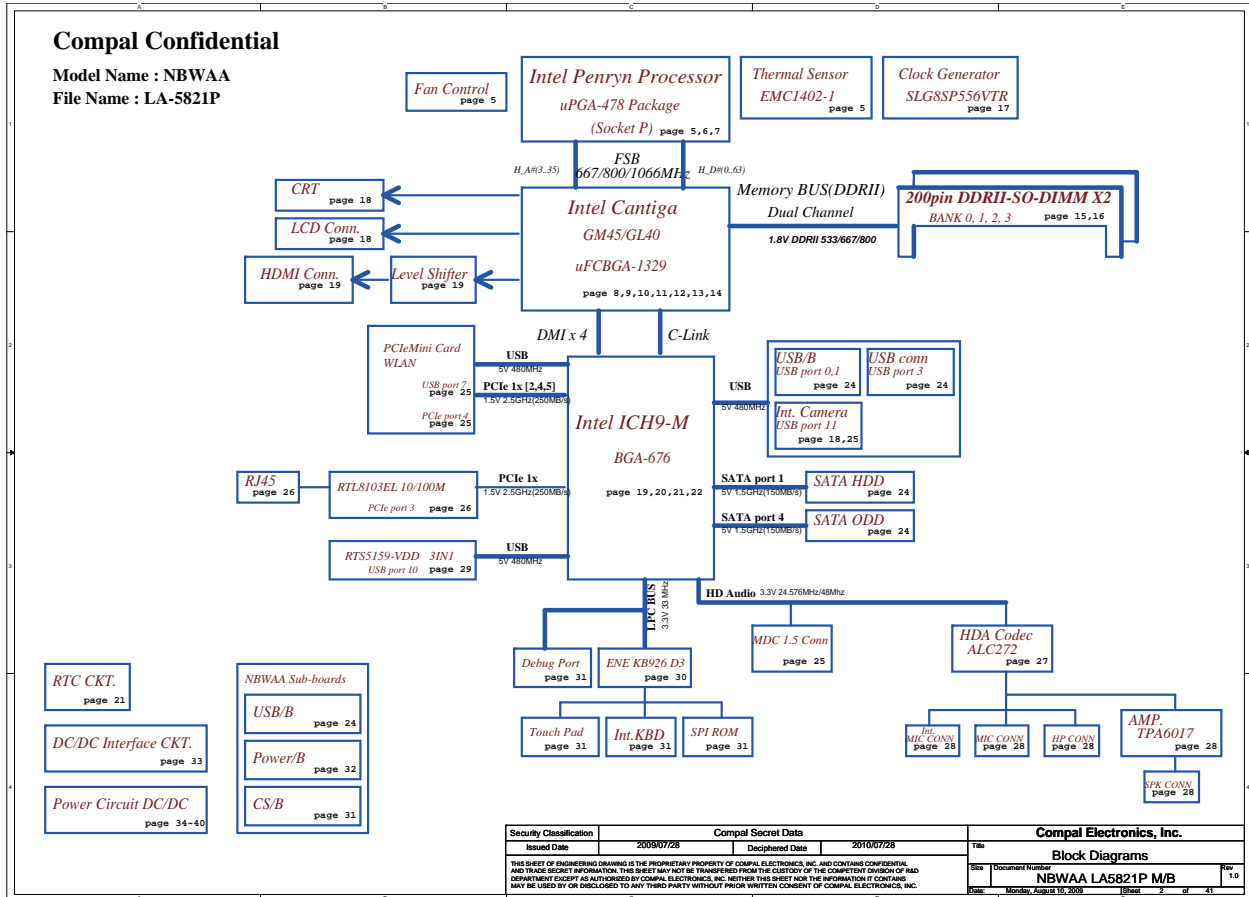


Figure 1-2 The system diagram of the computer (Intel platform)

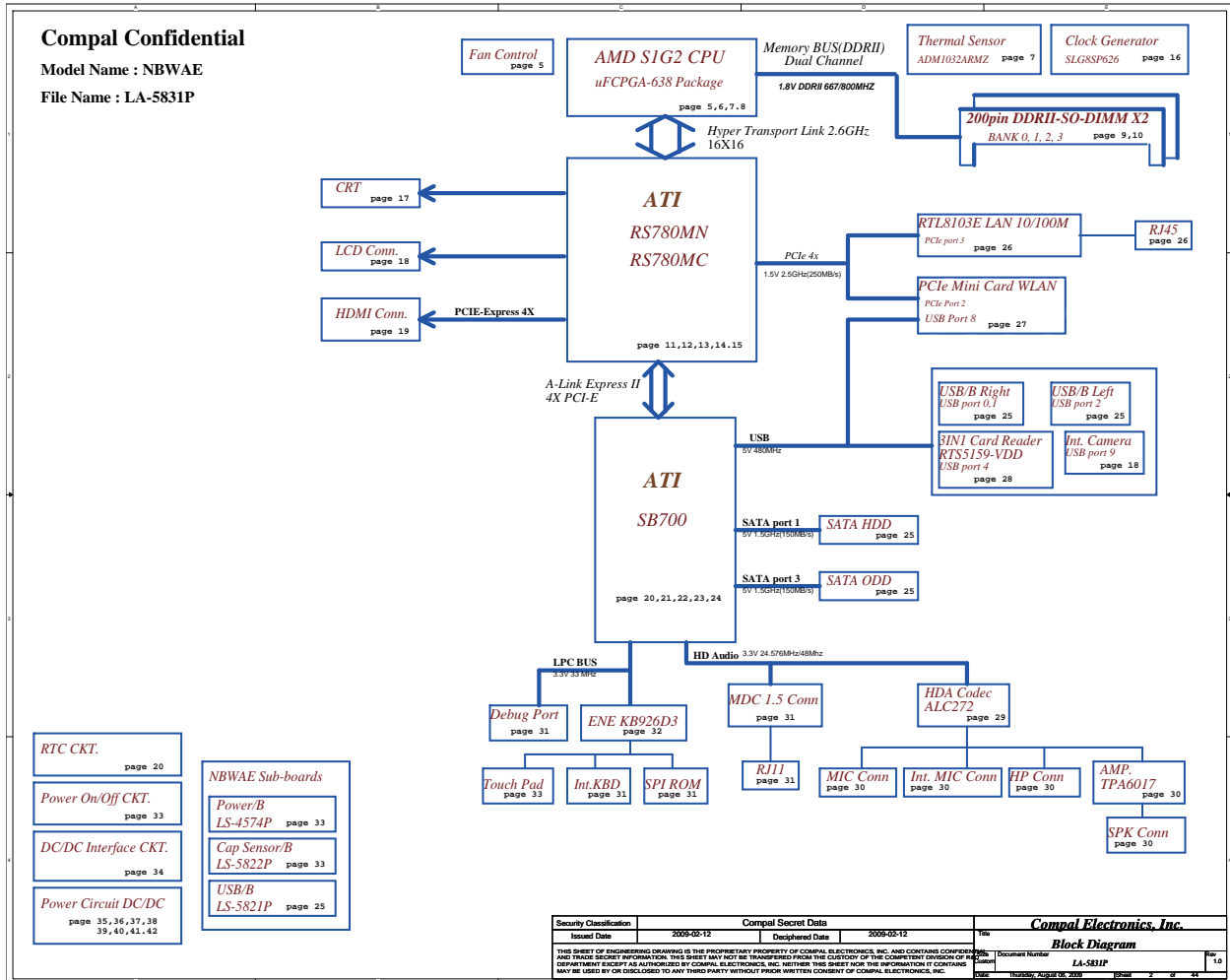


Figure 1-3 The system diagram of the computer (AMD platform)



The system unit of the computer consists of the following components:

Processor

The computer is equipped with one of the following processors.

- Intel Penryn processor Dual (25W/35W) Core
- Intel Penryn SEAM CPU
- Intel Merom Celeron/ SEAM CPU
- AMD Lion (Turion X2) Ultra Dual-Core Processor
- AMD Lion (Turion X2) Dual-Core Processor
- AMD Athlon X2 Dual-Core Processor
- AMD Sable (Sempron) Processor

Memory

The computer has two SODIMMs slot comes standard with 1GB/2GB, accepting BTO for your memory requirements. It can incorporate up to 8 GB of main memory. It supports DDR2 at 800MHz.

BIOS ROM (EEPROM)

The system BIOS and Keyboard BIOS share one single 1024KB flash ROM. The flash utility can be used to program both system and keyboard BIOS at the same time.

System Controllers

- Advanced Power Management 1.2 support
- ACPI2.0 b and PC2001 compliant
- Support SMBus specification V2.0
- Hot keys for system control
- Audio volume output control
- External LED control
- Battery scope report and control
- Sticky key support
- Power switch control
- Two host interface channels support
- Supports three independent devices
- Internal Keyboard country selection
- Wireless LAN on/off button

EC/KBC

Supported by ENE KB926QFD3

Clock Generator

Supported by Realtek (RTM880N), Silego (SLG8SP626), SILEGO SLG8SP626 and REALTEK RTM880N

Graphics Controller

- Intel® GM45/GL40 as integrated graphics solution
- AMD RS780MN/RS780MC as intergrated solution
- DVI-D supported by conversion cable from HDMI

Audio Controller

- Realtek Azalia ALC272
- One Audio-in port: Mic.-in/Line-in
- One Audio-out port: Headphone-out / Line-out
- Internal Microphone (with Internal Camera, MIC with echo cancellation)
- Volume control: Digital control, rotary type, no mute function
- Microsoft inbox audio driver support
- Software EQ support

Wireless LAN Controller

- Intel 802.11a/b/g/n [Echo Peak 1x2 (TBD) & Shirley Peak 1x2 & Shirley Peak 3x3 (TBD)]
- Atheros 802.11b/g [XB95 (TBD) & HB95 (TBD)] , b/g/n [XB91 1x2 (TBD) & HB93 2x2 (TBD)]
- Realtek 802.11b/g (RTL8187B & RTL8187SE) , b/g/n (RTL8191SE 1x2)
- Intel WiMAX 802.16e (Echo Peak 1x2) (TBD)
- Normal screw for all model

## 1.2 2.5-inch HDD

The computer contains an extremely low-profile and lightweight, high-performance HDD. The HDD incorporates 9.5 mm height magnetic disk and mini-Winchester type magnetic heads. The HDD interface conforms to Serial ATA. Storage capacities supported are 160/250/320/400/500 GB.

The HDD is shown in Figure 1-2 and some of its specifications are listed in Table 1-1.

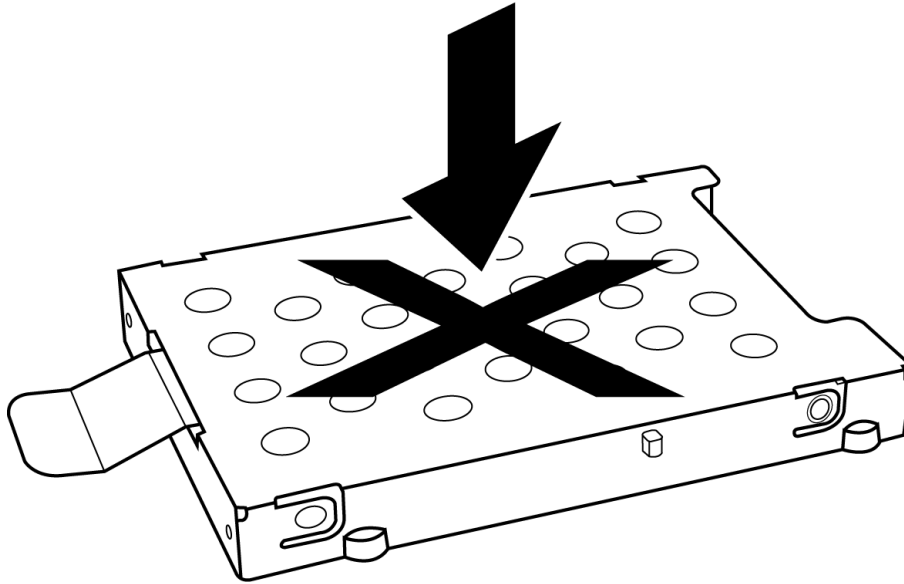


Figure 1-4 SATA HDD

Table 1-1 HDD Specifications

Item	Specifications				
Capacity (GB)	160 GB	250 GB	320G	400 GB	500 GB
Rotational Speed (RPM)	5400 RPM	5400 RPM	5400 RPM	5400 RPM	5400 RPM
Height	9.5 mm	9.5 mm	9.5 mm	9.5 mm	9.5 mm
User Data Sectors	312,581,808	488,397,168	625,142,448	781,422,768	976,773,168
Bytes / Sector	512	512	512	512	512

### 1.3 DVD Super Multi (+-R Double Layer)

The DVD Super Multi drive accepts 12-cm (4.72-inch) and 8-cm (3.15-inch) discs. At maximum, the drive can play back a DVD at 8x speed, read CD-ROM at 24x speed, and write CD-R at 24x speed, CD-RW at 4x speed, US CD-RW at 24x speed, High Speed CD-RW at 10x speed, DVD-R at 8x speed, DVD-RW at 6x speed, DVD+R at 8x speed, DVD+R (Double Layer) at 6x speed, DVD-R (Double Layer) at 6x speed, DVD+RW at 8x speed and DVD-RAM at 5x speed.

The DVD Super Multi drive is shown in Figure 1-3 and its specifications are listed in Table 1-2.

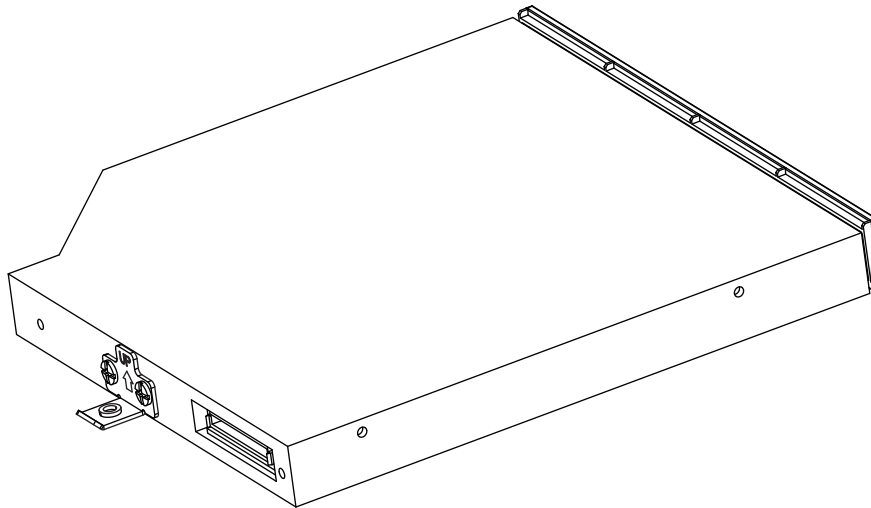


Figure 1-5 DVD Super Multi Drive

Table 1-2 DVD Super Multi Drive Specifications

Item	DVD-ROM Mode	CD-ROM Mode
Data Transfer Rate (Mbytes/s)	33.3 (U-DMA transfer mode 2) 16.6 (PIO mode 4, Multiword DMA mode 2)	
Access Time (ms)		
Average Random Access	180	130
Data Buffer Size (Mbytes)	2MB	
Formats Supported	DVD: DVD-VIDEO, DVD-ROM, DVD-R, DVD-RW, DVD-RAM, DVD+R, DVD+-R (Double Layer), DVD+RW.  CD: CD-DA, CD-ROM, CD-R, CD-RW, CD-ROMXA, Photo CD (Multi-Session), Video CD, CD-Extra (CD+), CD-Text.	

## **1.4 Power Supply**

The power supply unit provides constant voltage 19V for the system board and performs the following functions:

1. Power input monitor
  - Checks whether the AC adapter (DC power supply) is connected to the computer.
  - Checks whether the battery pack is connected to the computer.
  - Monitors the DC power supply input voltage (AC Adapter output voltage).
2. Power supply's internal control
  - Turns on and off the battery pack charging power supply.
  - Issues a charging current instruction to the PWM control IC of the battery pack charging power supply.
  - Controls the supply of DC power supply input (AC Adapter output) to the power supply unit.
  - Controls the supply of power to the system block (load/logic circuit side).
  - Controls forced shutdown if the power supply malfunctions.
3. Logic circuit control
  - Instructs the gate array to enable/disable tuning the power on.
  - Controls power-on/off operation.
4. Status display
  - Battery indicator (in green or amber).
  - DC-IN indicator (in green color)
5. External interface
  - Performs communication through the I2C bus (via the internal EC/KBC).
  - Transfers the power supply operation mode.

6. Output monitor

- Monitors the voltage output to the system block (load/logic circuit side).
- Monitors the voltage, over voltage, input/output current of the battery pack.
- Monitors the internal temperature of the battery pack.
- Monitors the supply voltage from the AC adapter.

## 1.5 Batteries

The computer has the following two types of batteries:

- Main Battery Pack
- Real Time Clock (RTC) Battery

### 1.5.1 Main Battery

The main battery pack serves as the computer's main power source when the AC adapter is not attached. The main battery maintains the state of the computer so that it can resume it.

- 3-cell LI-ION / 6-cell LI-ION
- Inserted from bottom side
- Charging time 12 hrs max.(System on)/ 4 hrs max. (System off)
- One hour quick charge to 60%~70%

### 1.5.2 Battery Charging Control

Battery charging is controlled by EC KB926. When the AC adapter and battery pack are attached to the computer, the EC KB926 controls the charge on/off state and detects a full charge.

- Battery Charge

When the AC adapter is attached, the battery is charged by off-state charge when the system is powered off or by on-state charge when it is powered on.

*Table 1-3 Quick/Normal Charging Time*

State	Charge Time	
Off-State Charge	3/6 Cell	About 4 hours max
On-State Charge	3/6 Cell	About 12 hours max

**NOTE:** *The time required for normal charge depends on the power consumption by the system. Using the fluorescent lamp and frequently accessing the disk consume much power and lengthen the charge time.*

Any of the following cases stops battery charge:

1. The battery becomes fully charged.
2. The AC adapter or battery pack is removed.
3. The battery or AC adapter voltage is abnormal.

Detection of full charge

A full charge is detected only when the battery is being charged by quick or normal charge.

A full charge is detected when either of the following conditions is met:

1. The current in the battery charging circuit drops below the predetermined value.
2. The charging time exceeds the fixed limit.

### **1.5.3 RTC Battery**

The RTC battery provides power to keep the current date, time and other system information in memory while the computer is turned off.



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## **Chapter 2**

# **Troubleshooting Procedures**

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## 2.1 Troubleshooting Introduction

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

- |                          |                  |               |             |
|--------------------------|------------------|---------------|-------------|
| 1. Display               | 5. Speaker       | 9. Camera     | 13. HDMI    |
| 2. Keyboard              | 6. Optical drive | 10. 3in1 card | 14. MIC     |
| 3. External USB<br>ports | 7. Modem         | 11. HDD       | 15. Thermal |
| 4. Touch Pad             | 8. Wireless LAN  | 12. CRT port  | 16. LAN     |

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

## 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, if it is, ask him or her to enter the password.
- Verify with the customer that Toshiba Windows 7 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

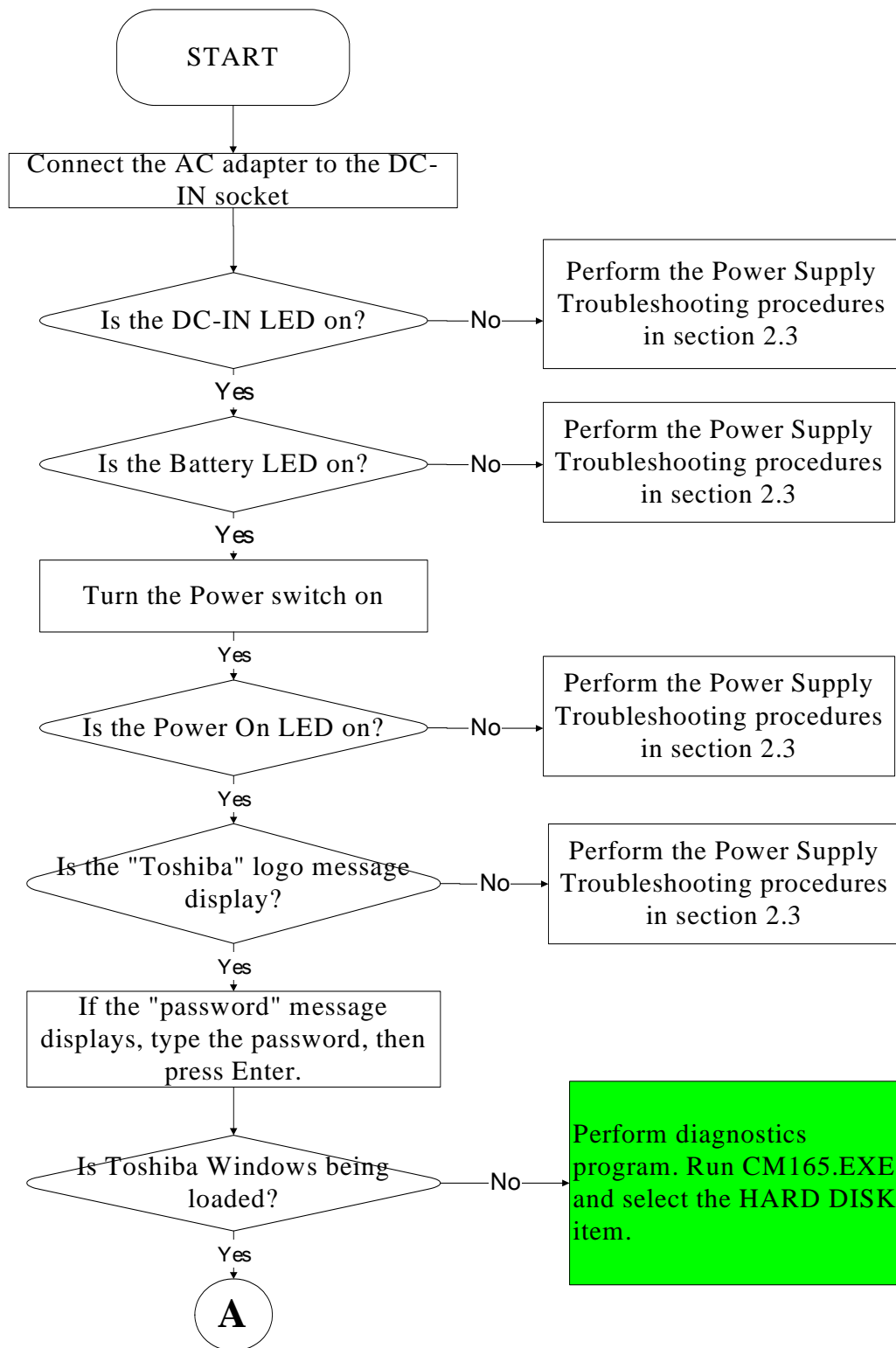


Figure 2-1 Troubleshooting flowchart (1/2)

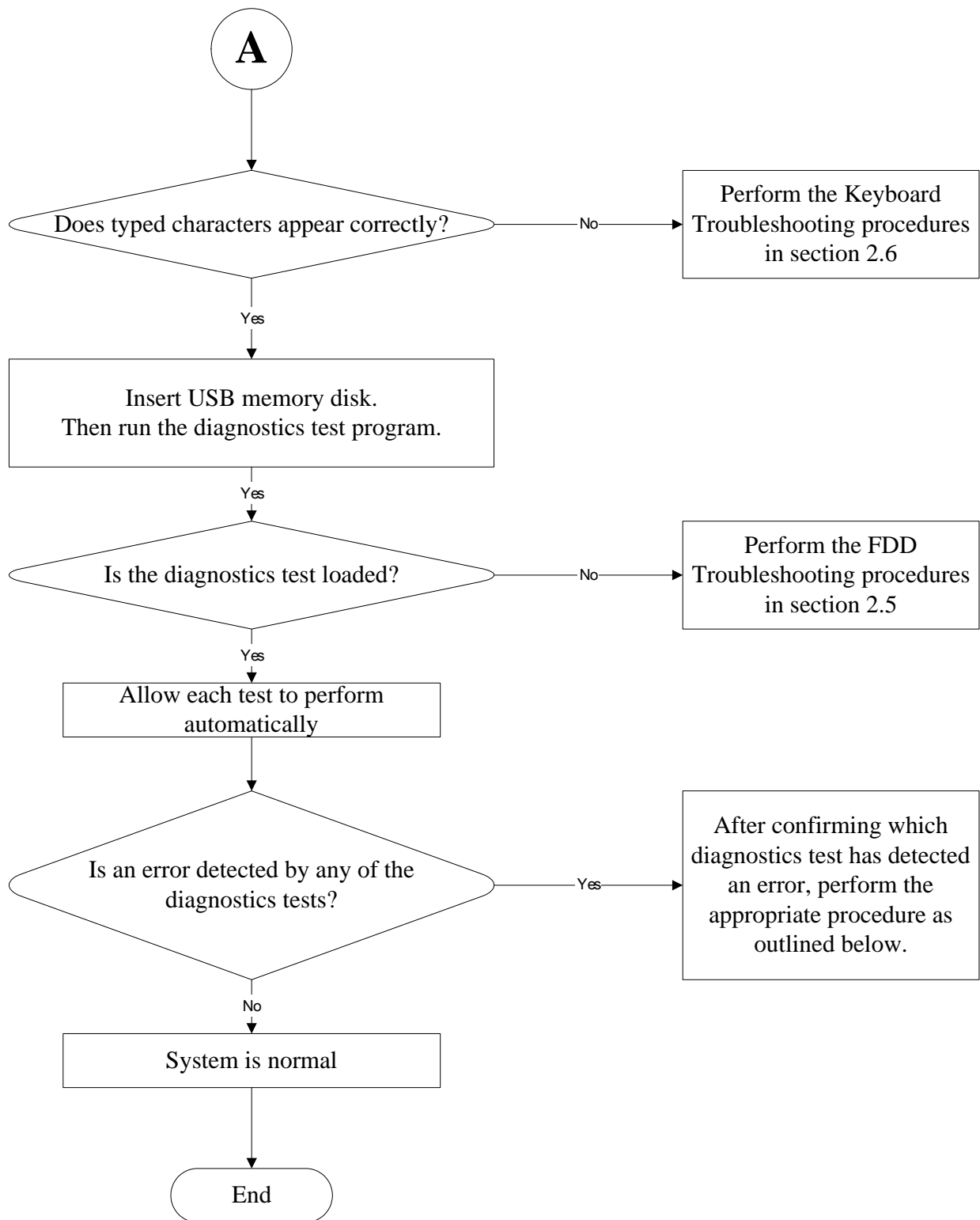


Figure 2-1 Troubleshooting flowchart (2/2)



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 keyboard test, perform the Keyboard Troubleshooting procedures in Section 2.5
4. If an error is detected by the TouchPad test, perform the TouchPad Troubleshooting procedures in Section 2.7
5. If an error is detected by the audio beep test, perform the Speaker Troubleshooting procedures in Section 2.8 and the Optical Drive Troubleshooting Procedures in Section 2.9

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

1. If an error is detected when using an external USB device, perform the External USB Devices Troubleshooting procedures in Section 2.6
2. If an error is detected when using the speakers, perform the Speaker Troubleshooting procedures in Section 2.8
3. If an error is detected when using the modem, perform the Modem Troubleshooting procedures in Section 2.10
4. If an error is detected when using the Wireless LAN, perform the Wireless LAN Troubleshooting procedures in Section 2.11
5. If an error is detected when using the HDMI TV, perform the HDMI TV troubleshooting procedures in Section 2.16.
6. If an error is detected when using the MIC, perform the MIC troubleshooting procedures in Section 2.17

## 2.3 Power Supply Troubleshooting

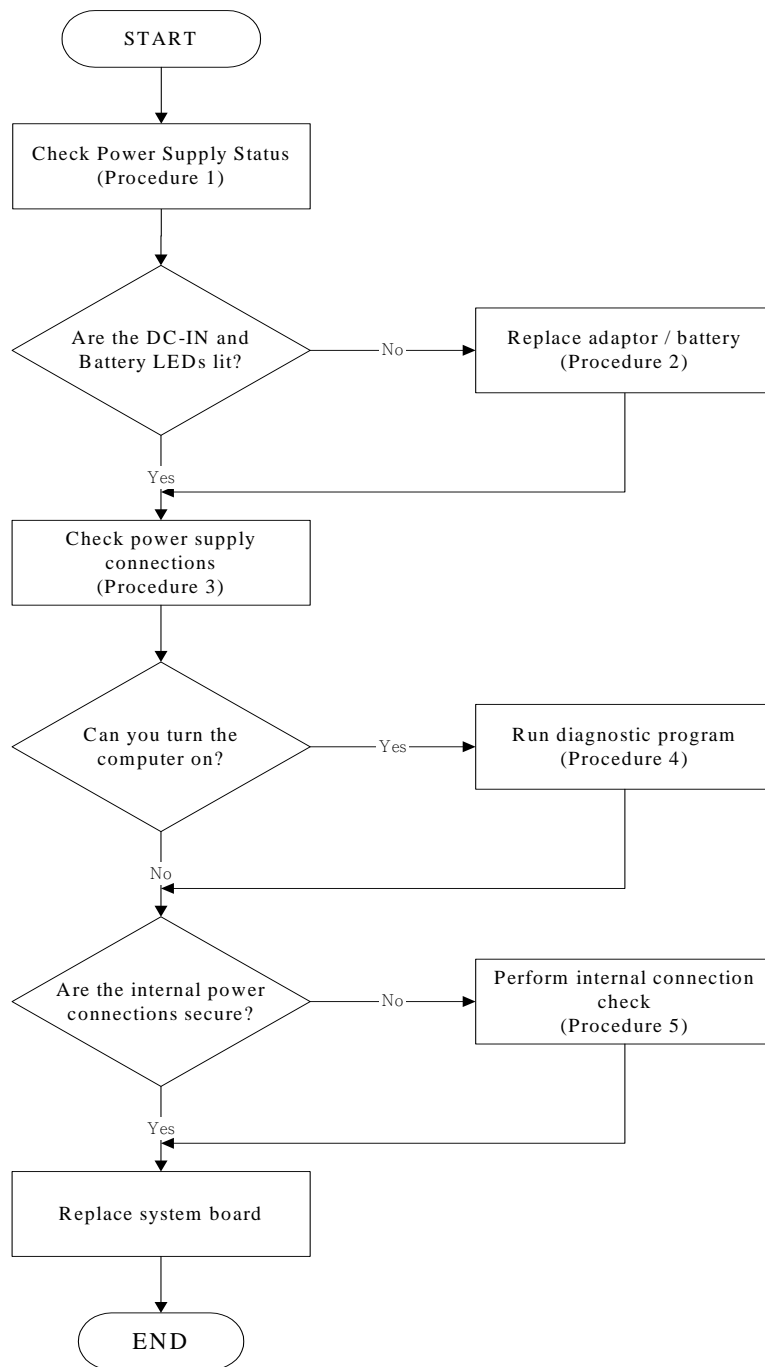


Figure 2-2 Power Supply Troubleshooting Process

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	Red, solid on	Battery charging with AC.
	White, solid on	Battery fully charged by AC
	Red color off	Battery abnormal stop charging with AC (Bad cell/ Overheated)
Discharging	Red, blinking (LED on for 1 second every 4 seconds)	Battery within low state: 12 minutes remaining
	Red, 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.
	Red color off	Battery not in low or critical low state; It's in discharging state

Table 2-2 DC-IN LED

<b>AC-IN LED</b>	<b>Power supply status</b>
Solid on	AC power exists (LED is solid White).
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**

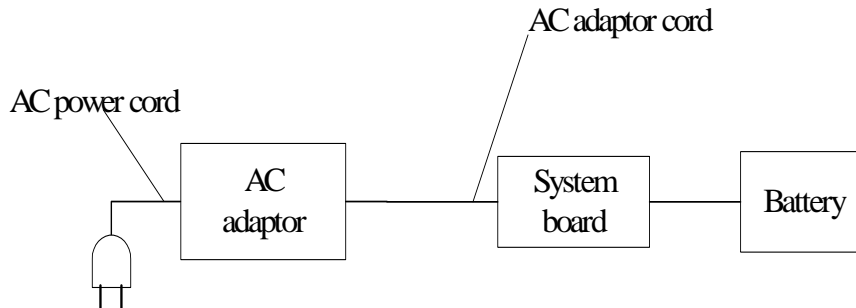
A faulty adaptor may not supply power or may not charge the battery. Perform Check 1.

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

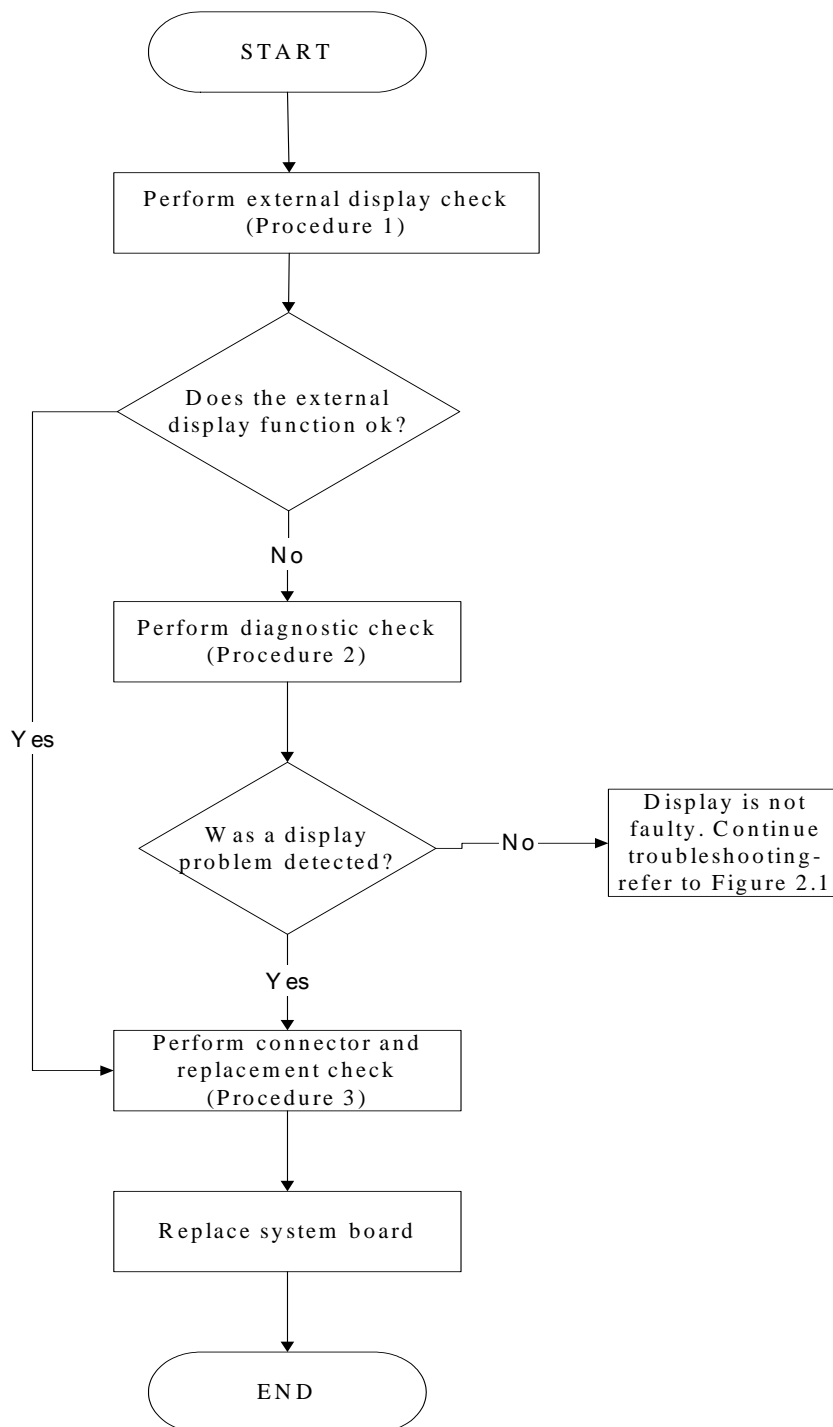


Figure 2-3 Display troubleshooting process



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, and then boot the computer. The computer automatically detects the external display.

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

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

### **Procedure 2 Diagnostic check**

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

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

### **Procedure 3 Connector and replacement check**

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

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

## 2.5 Keyboard Troubleshooting

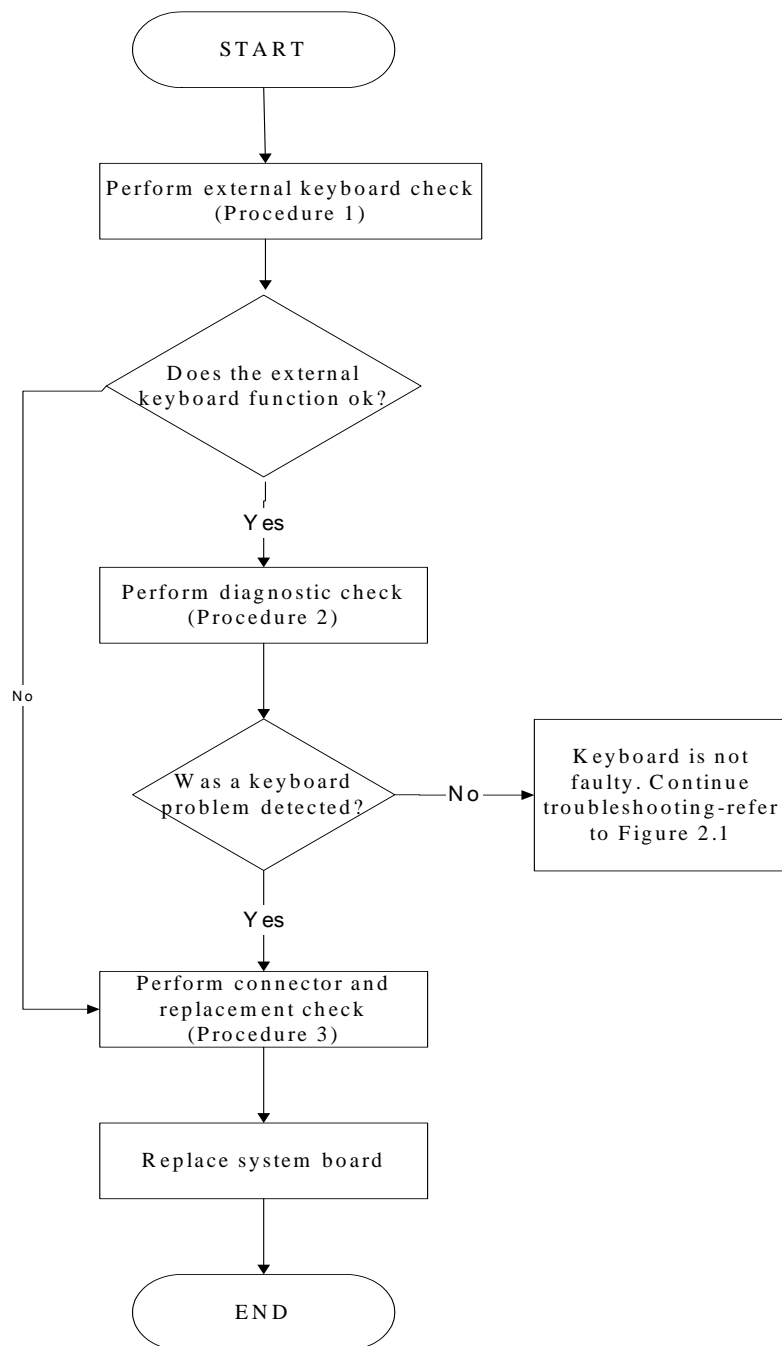


Figure 2-4 Keyboard troubleshooting process

To determine if the computer's keyboard is functioning properly, perform the following procedures. Figure 2-4 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, and 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 having some problem. Replace it with a new one and following the instructions in Chapter 4.

### **Procedure 2 Diagnostic check**

Run the test and Diagnostics 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 ok.

### **Procedure 3 Connector and replacement check**

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

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

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

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

If the problem still exists, perform Check 3.

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

## 2.6 External USB Devices Troubleshooting

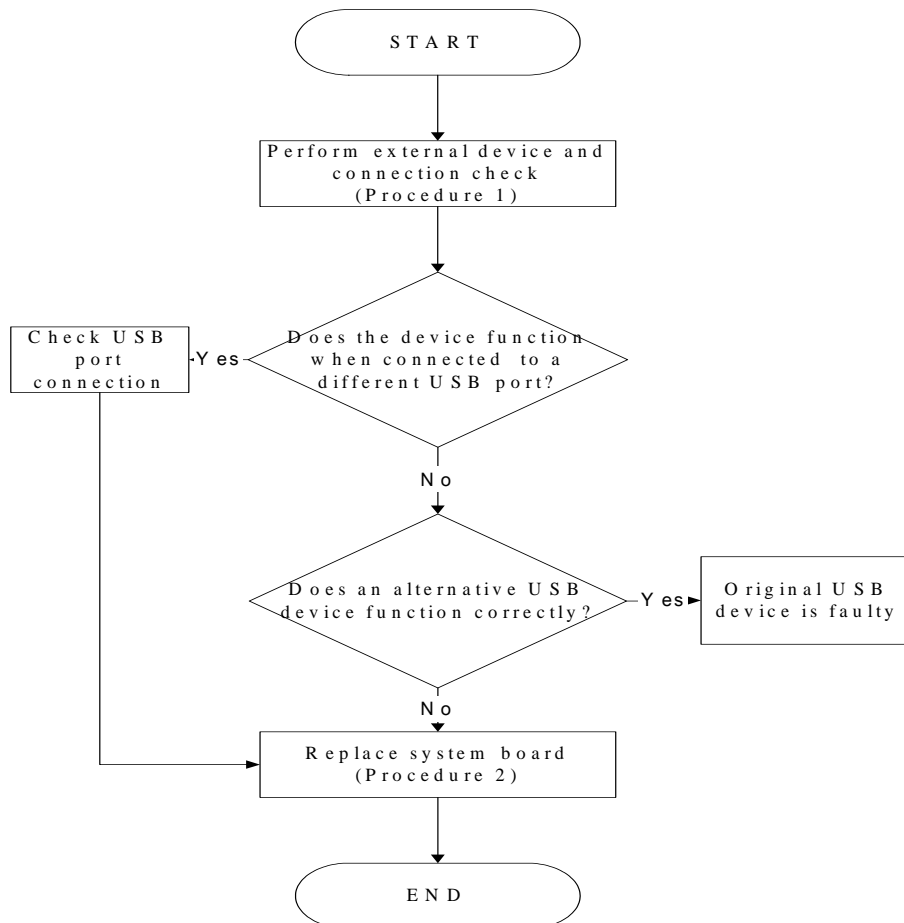


Figure 2-5 External USB device troubleshooting process

To determine if the computer's external USB devices are functioning properly, perform the following procedures. Figure 2-5 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 or USB small 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.

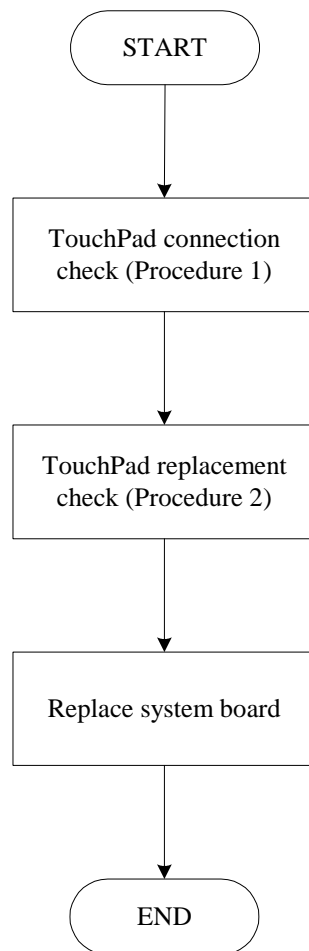
If the alternative USB device works correctly, the original device may be damaged and should be replaced.

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

### **Procedure 2 Replace system board**

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

## 2.7 Touchpad Troubleshooting



*Figure 2-6 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 FPC is still not functioning properly, replace the system board with a new one following the steps in Chapter 4.



## 2.8 Speaker Troubleshooting

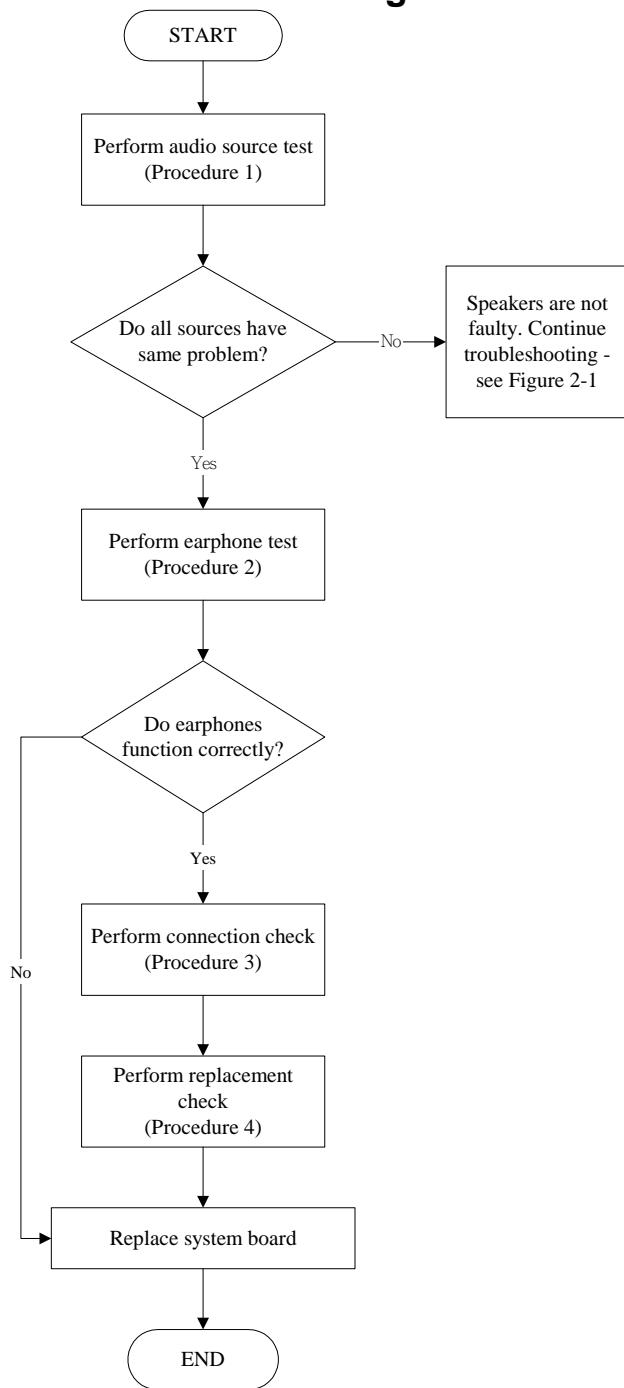


Figure 2-7 Speaker troubleshooting process

To determine if the computer's built-in speakers are functioning properly, perform the following procedures. Figure 2-7 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.

## 2.9 Optical drive troubleshooting

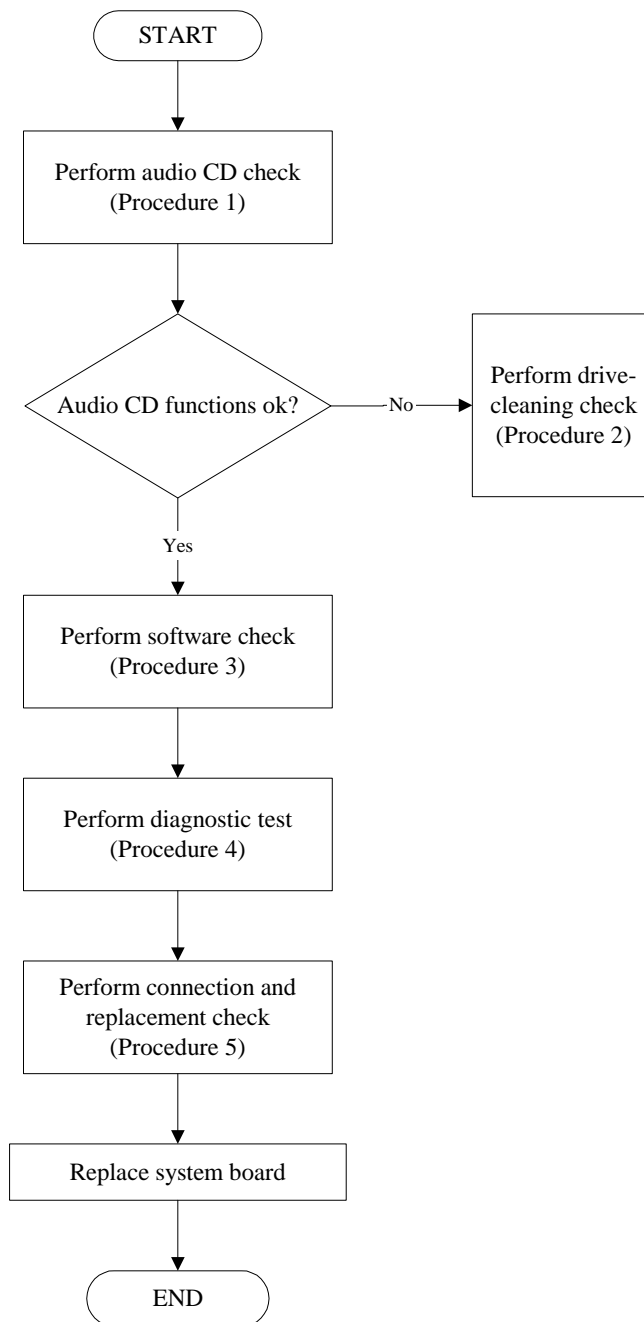


Figure 2-8 Optical drive troubleshooting process

This section describes how to determine if the computer's internal optical drive is functioning properly. The *Satellite A350*, *SATEGO A350*, *EQUIUM A350 Series Maintenance Manual* module bays can accommodate the following optical drives:

DVD SuperMulti supporting +-R Double Rayer

*Satellite L450D/455D*, *Satellite pro L450D Series Maintenance Manual*

Figure 2-8 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*.

## 2.10 Modem Troubleshooting

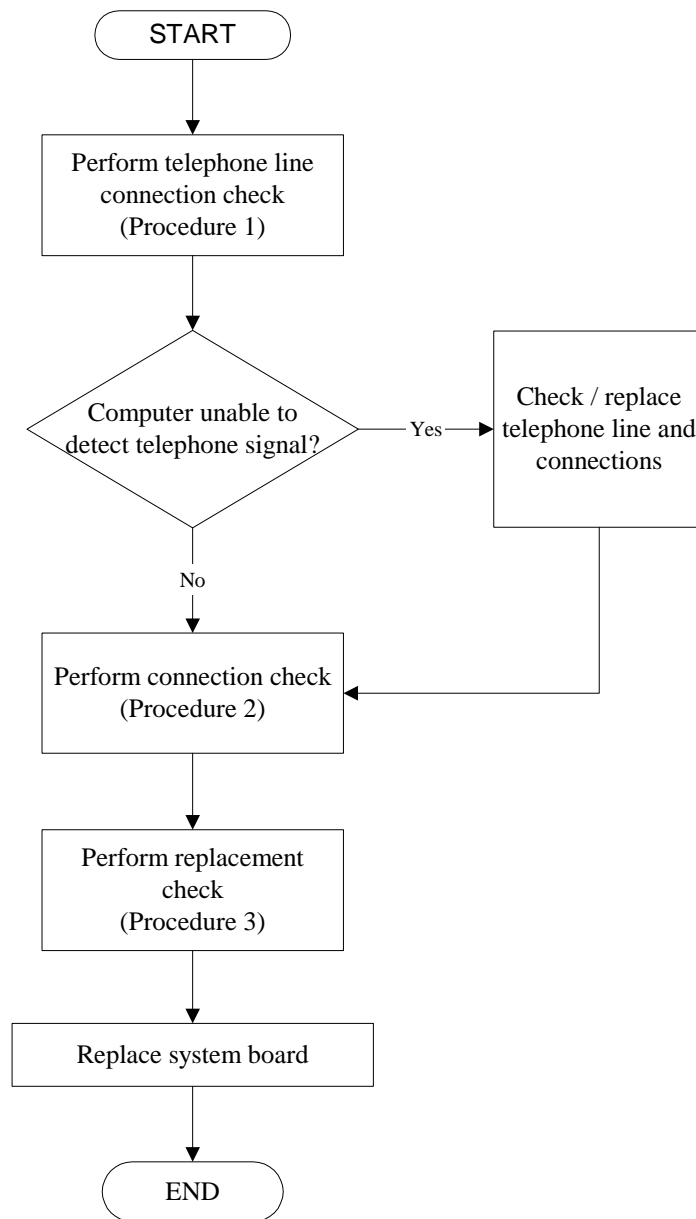


Figure 2-9 Modem troubleshooting process

This section describes how to determine if the computer's modem is functioning properly. Figure 2-9 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.

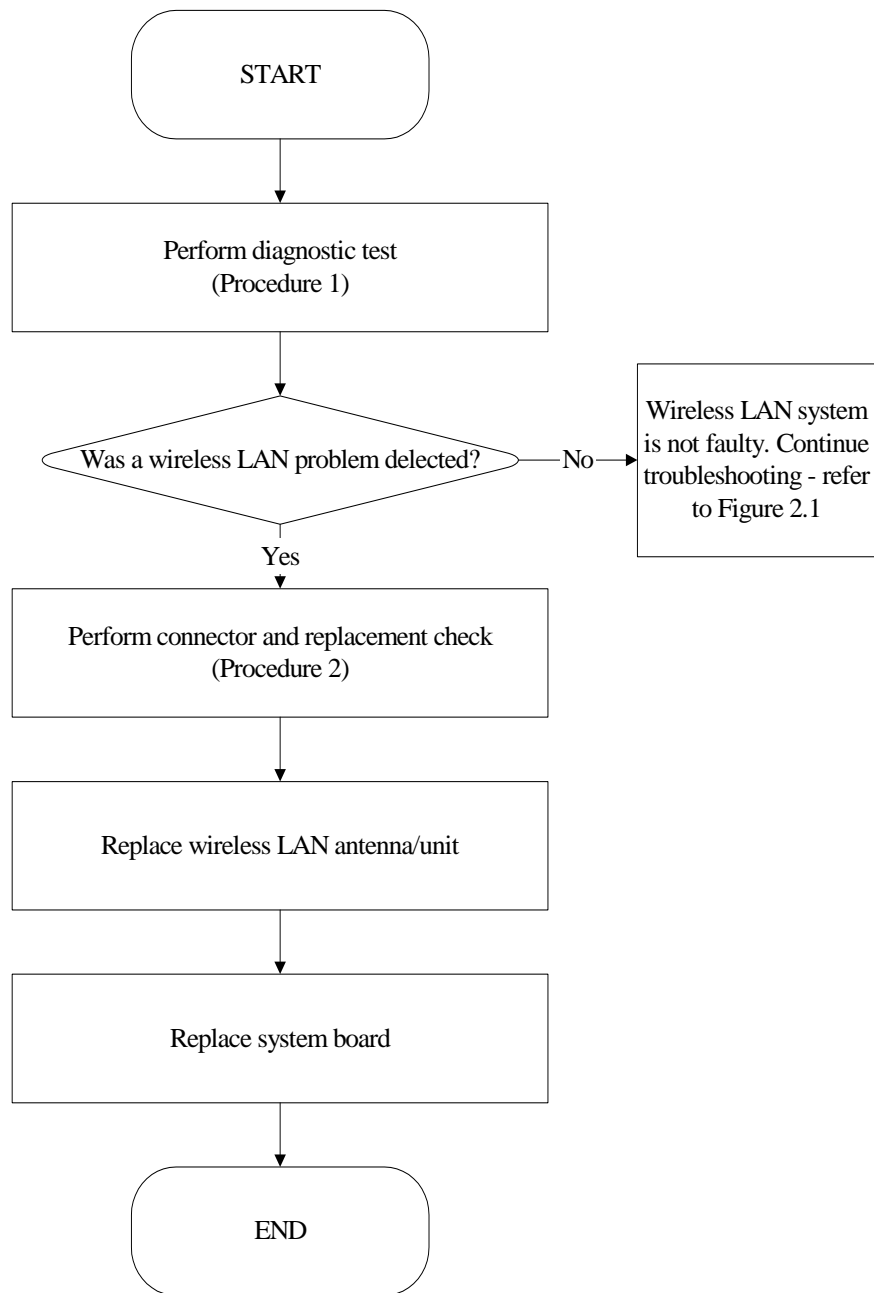
### **Procedure 2 Modem card connection check**

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*.

## 2.11 Wireless LAN Troubleshooting



*Figure 2-10 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 2-10 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. Test and Diagnostic 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 module (refer to Chapter 4 for instructions) and that the wireless LAN module 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”, and then make sure that the wireless communication LED on the front panel is light. If the LED is light 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 light 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.

## 2.12 Camera Troubleshooting

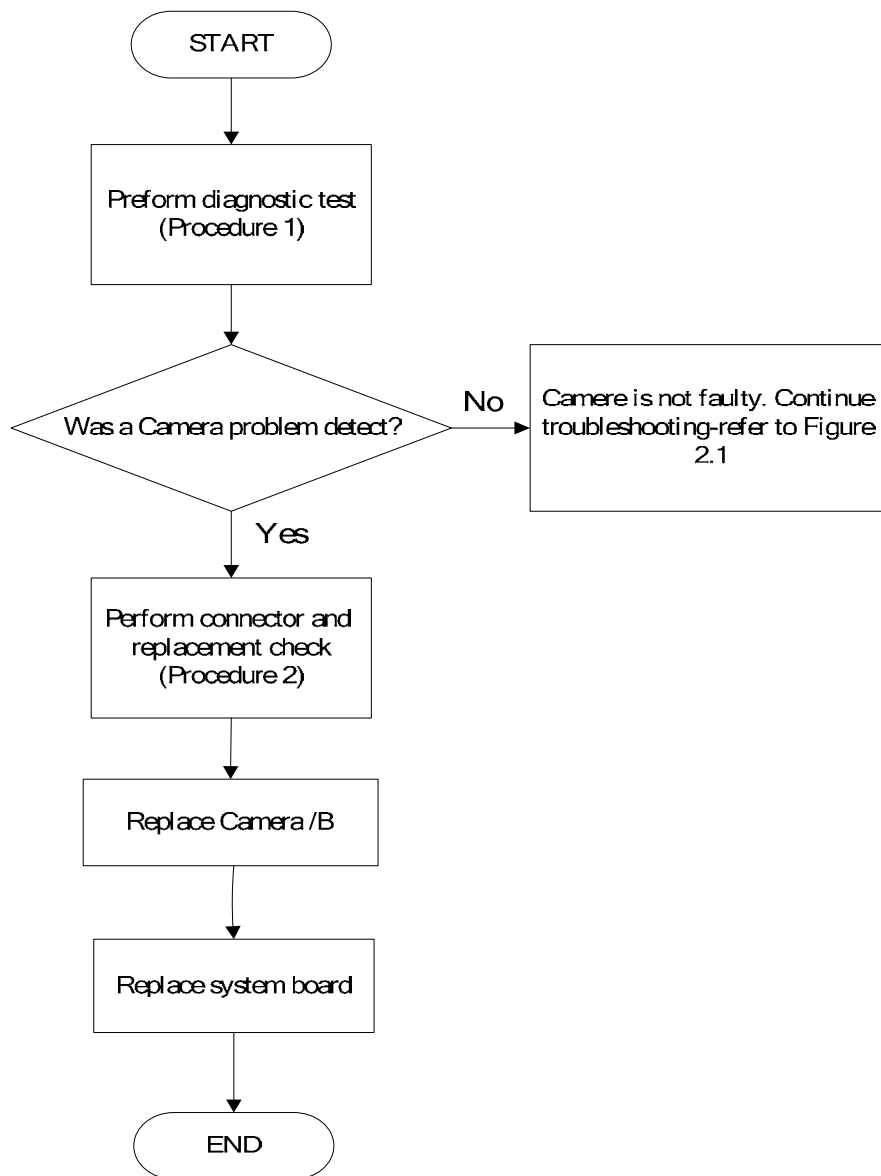


Figure 2-11 Camera troubleshooting process

The Camera board or system board may be the reason of a Camera fault. Either of these two components may be damaged. To determine if the computer's Camera is functioning properly, perform the following procedures. Figure 2-11 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 functioning Program in windows, which will display the Camera test result.

If tests and diagnostics result abnormal go to Procedure 2. If an error is not located, the Camera system is functioning properly.

### **Procedure 2 Connector and replacement check**

The Camera board 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 Camera board FFC is securely slotted into the system board. If the problem persists, go to Check 2.
- Check 2 The Camera board 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.

### 2.13 3 in 1 card Troubleshooting

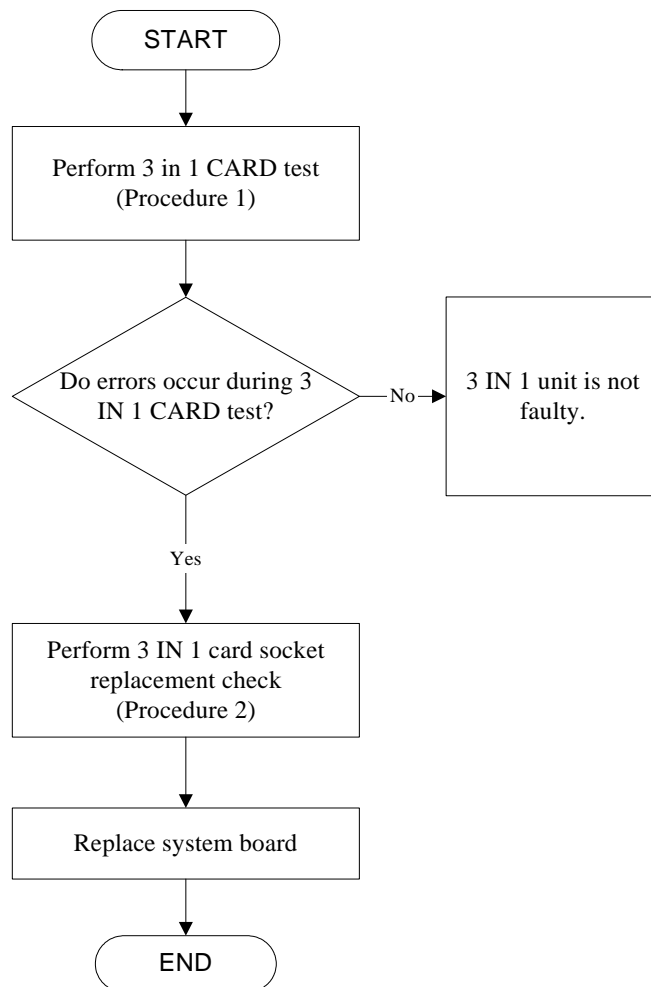


Figure 2-12 3in 1 card troubleshooting process

This section describes how to determine if the Bridge media assemble card player is functioning properly. The process is summarized in Figure 2-12. Perform the steps below starting with Procedure 1 and continuing with the other procedures as required.

Procedure 1: Bridge media assemble card test

Procedure 2: Express socket replacement check

### **Procedure 1 Bridge media assemble card test**

The Bridge media assemble card test card contains a Bridge media assemble card test program. Ensure the card is fully inserted into the socket before running the program.

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

### **Procedure 2 Bridge media assemble card socket replacement check**

The Bridge media assemble 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. If the problem persists, the system board may be defective or damaged. Replace the system board with a new one following the steps in Chapter 4.

## 2.14 HDD Troubleshooting

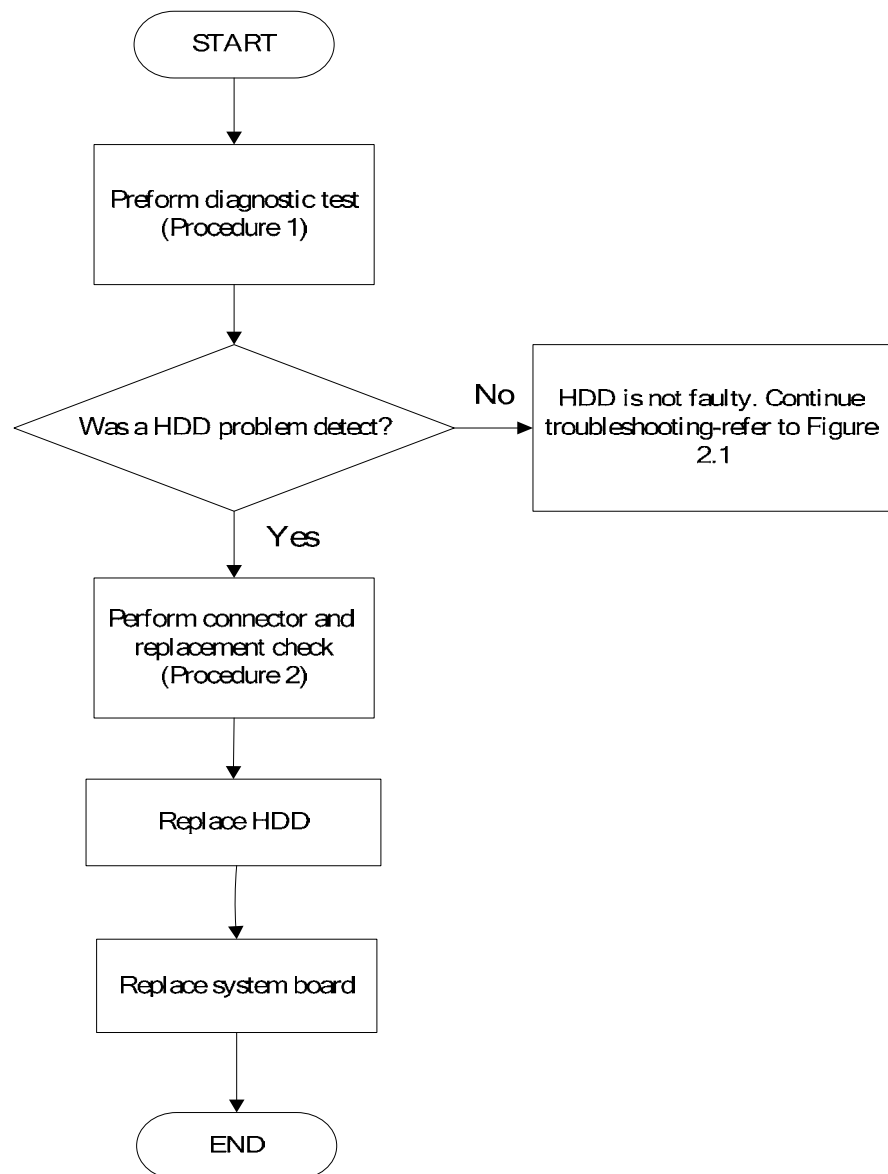


Figure 2-13 HDD troubleshooting process

The HDD or system board may be the reason of a HDD fault. Either of these two components may be damaged. To determine if the computer's HDD is functioning properly, perform the

*Satellite L450D/455D, Satellite pro L450D Series Maintenance Manual*

following procedures. Figure 2-13 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 HDD R/W 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 HDD function is functioning properly.

### **Procedure 2 Connector and replacement check**

The HDD 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 HDD module is securely slotted into the system board. If the problem persists, go to Check 2.
- Check 2 The HDD module 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.

## 2.15 CRT Troubleshooting

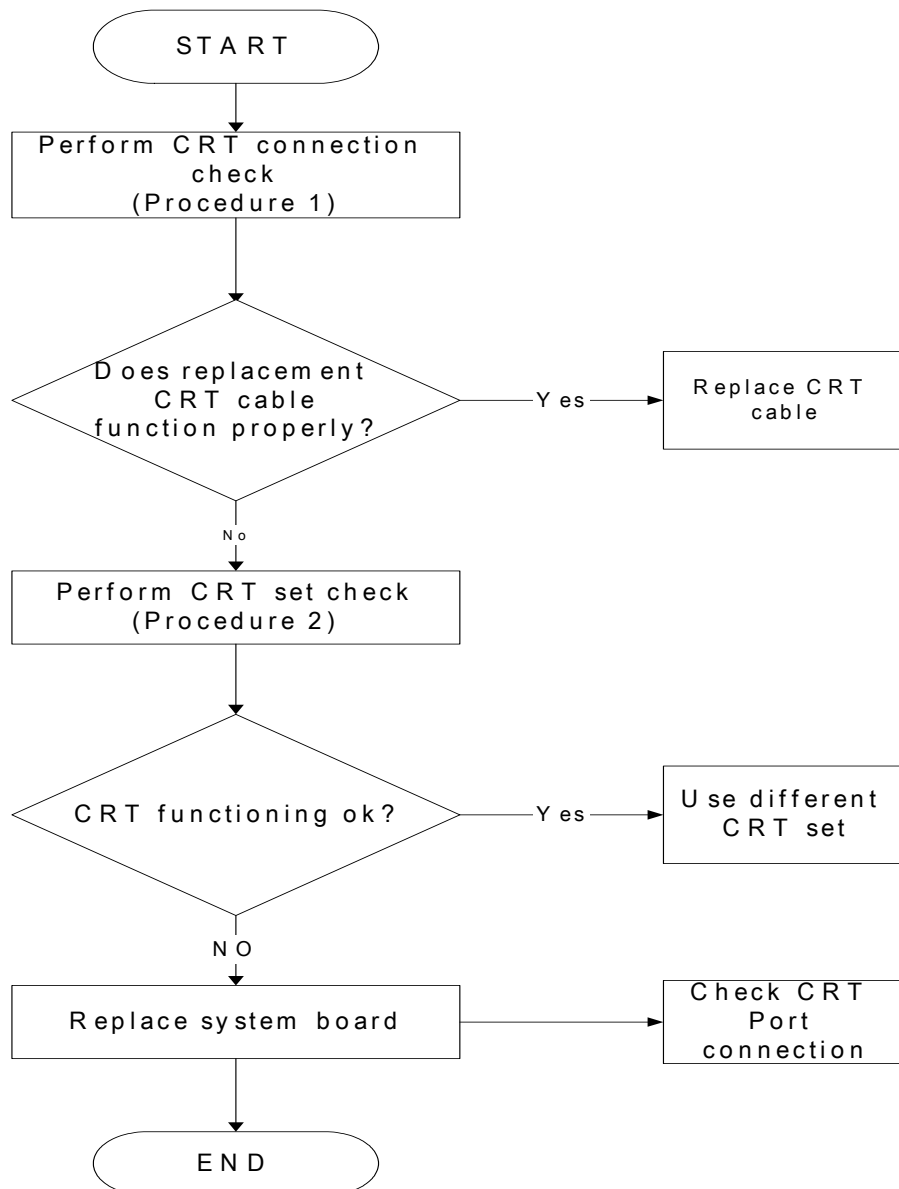


Figure 2-14 CRT Troubleshooting Process

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

Procedure 1: CRT connection check  
*Satellite L450D/455D, Satellite pro L450D Series Maintenance Manual*



Procedure 2: CRT set check

**Procedure 1 CRT connection check**

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

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

**Procedure 2 CRT set check**

The CRT set may be faulty. Perform Check 1:

- Check 1 Try using the set for CRT 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 CRT to the computer. If the replacement CRT 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.

## 2.16 HDMI Troubleshooting

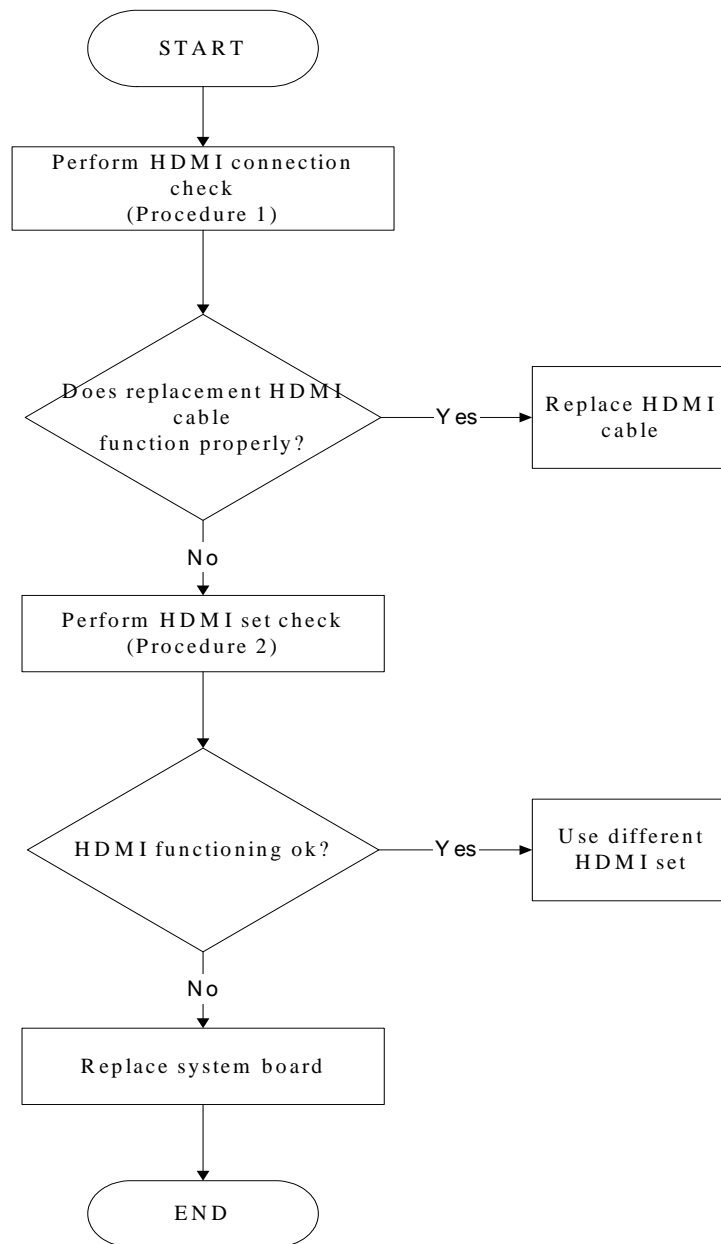


Figure 2-15 HDMI troubleshooting process

To determine if the computer's HDMI port is functioning properly, perform the following procedures. Figure 2-15 outlines the process. Start with Procedure 1 and continue as instructed.

*Satellite L450D/455D, Satellite pro L450D Series Maintenance Manual*

Procedure 1: HDMI connection check

Procedure 2: HDMI set check

### **Procedure 1 HDMI connection check**

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

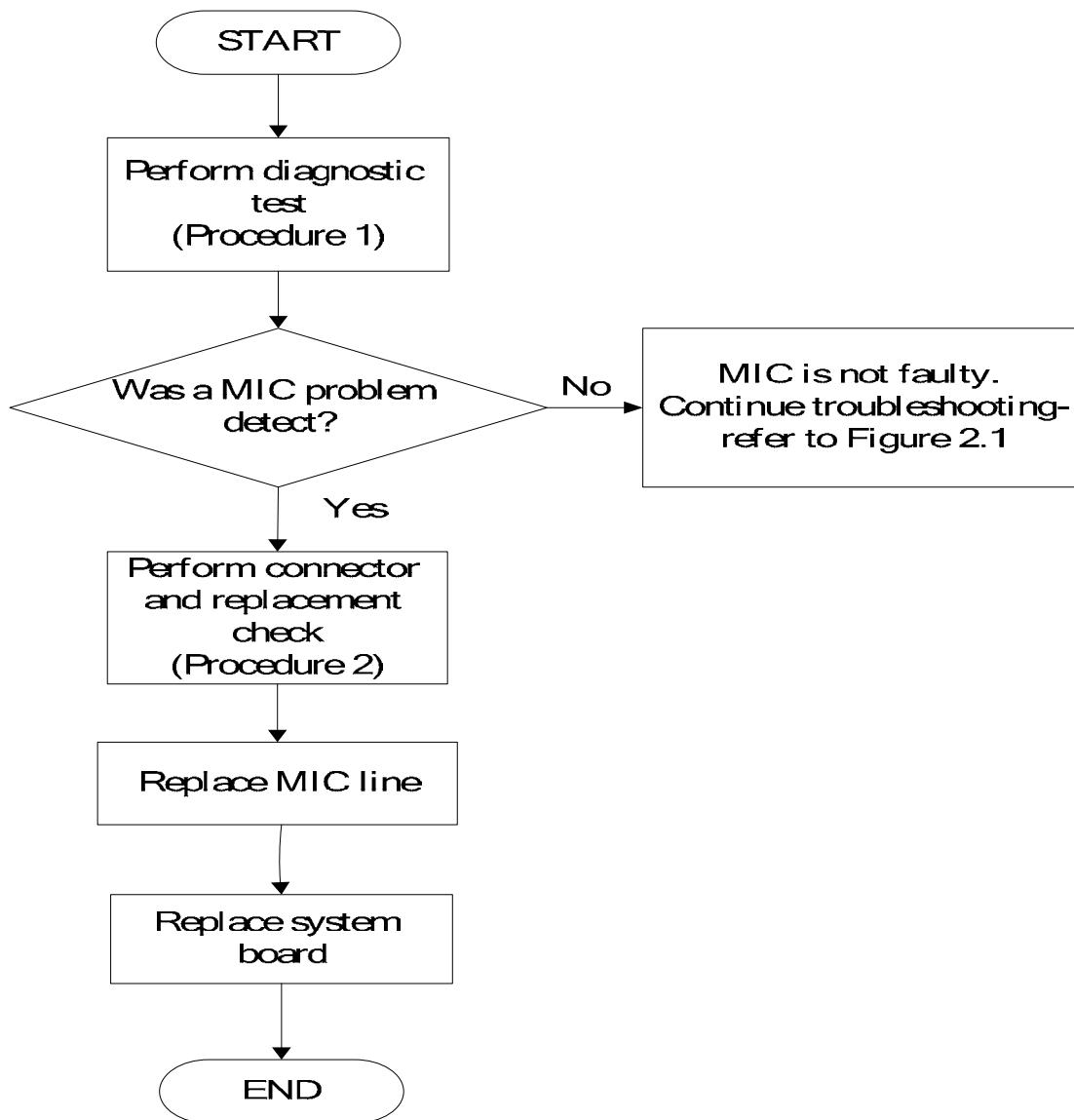
- Check 1 Make sure HDMI cable is firmly plugged into both the CRT set and the CRT port of the computer. If the cable is connected correctly, go to Check 2.
- Check 2 Make sure the HDMI port is firmly secured to the system board of the computer. If the malfunction remains, go to Check 3.
- Check 3 The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

### **Procedure 2 HDMI 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.

## 2.17 MIC Troubleshooting



*Figure 2-16 MIC troubleshooting process*

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

Procedure 1: Diagnostic test

Procedure 2: Connector and replacement check

### **Procedure 1 Diagnostic test**

Run the functioning Program on Windows model, which will display the MIC test result.

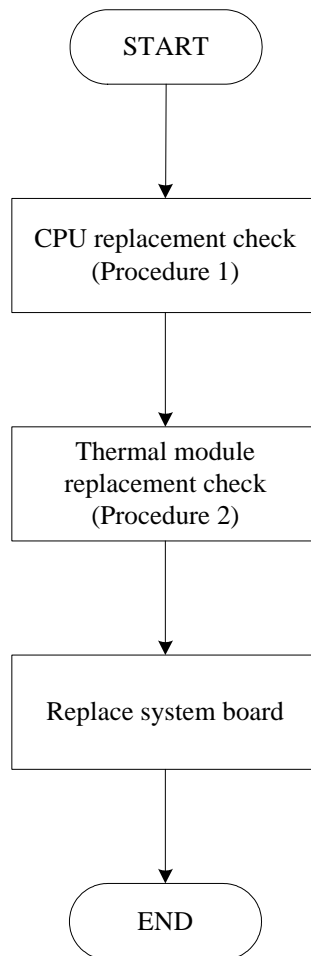
If tests and diagnostics result abnormal go to Procedure 2. If an error is not located, the MIC module functioning is properly.

### **Procedure 2 Connector and replacement check**

The MIC line 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 MIC line is securely slotted into the system board. If the problem remains, go to Check 2.
- Check 2 The MIC line 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.

## 2.18 Thermal Module troubleshooting



*Figure 2-17 Thermal Module troubleshooting process*

To determine if the computer's built-in Thermal Module is functioning properly, perform the following procedures. Figure 2-17 outlines the process. Start with Procedure 1 and continue as instructed.

Procedure 1: CPU replacement check

Procedure 2: Thermal Module replacement check

Procedure 3: System board replacement check

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**Procedure 1 CPU replacement check**

Refer to Chapter 4, *Replacement Procedures*, for instructions on how to disassemble the computer and then perform the following checks.

If there is still an error after replacement CPU, go to Procedure 2.

**Procedure 2 Thermal Module replacement check**

Refer to Chapter 4, *Replacement Procedures*, for instructions on how to disassemble the computer and then perform the following checks.

If there is still an error after replacement Thermal Module, go to Procedure 2.

**Procedure 3 System board replacement check**

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

## 2.19 LAN troubleshooting

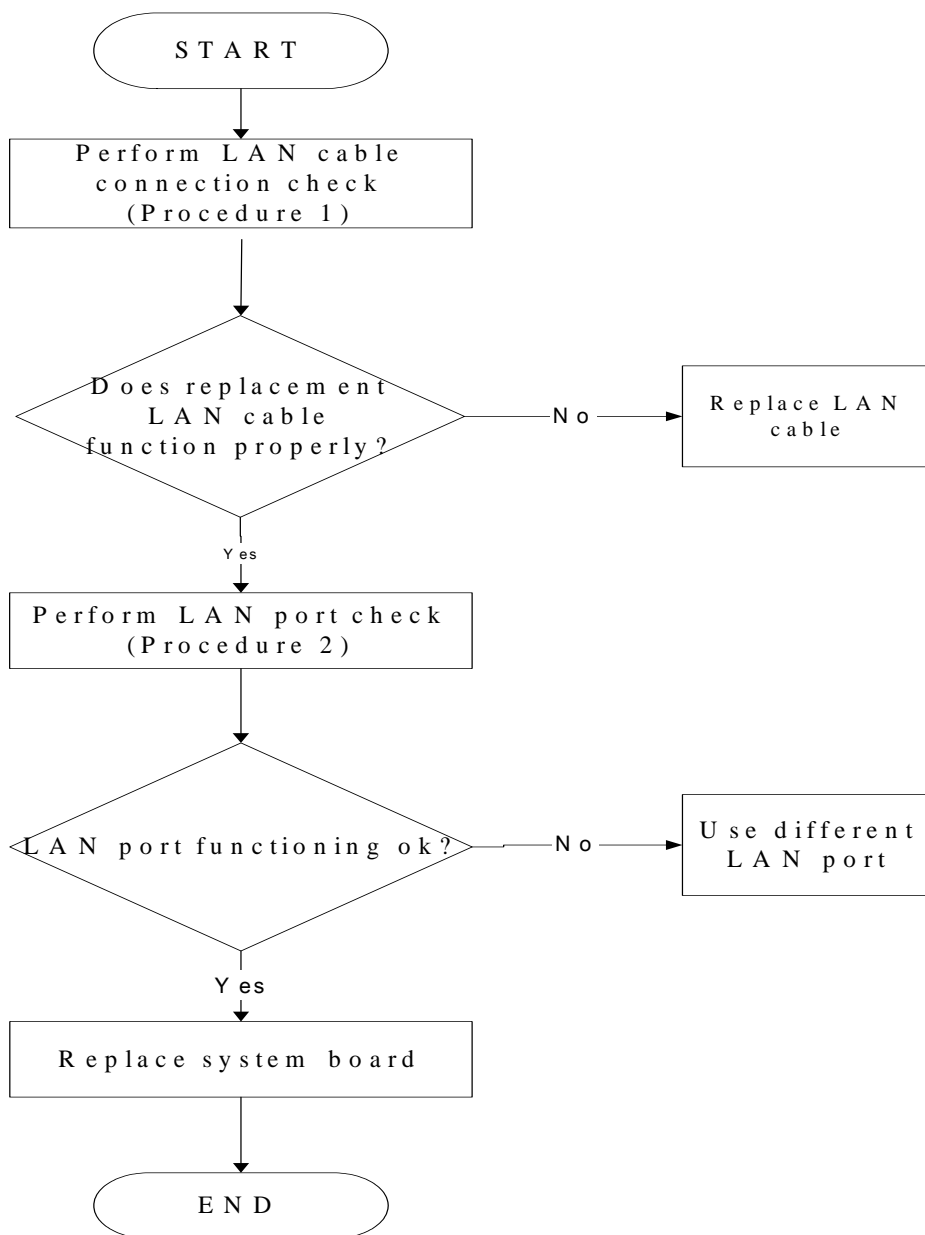


Figure 2-18 LAN troubleshooting process

To determine if the computer's built-in LAN is functioning properly, perform the following procedures. Figure 2-18 outlines the process. Start with Procedure 1 and continue as instructed.



Procedure 1: LAN connection check

Procedure 2: LAN port check

### **Procedure 1 LAN connection check**

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

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

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

### **Procedure 2 LAN port check**

The LAN set may be faulty. Perform Check 1:

Check 1 Try connecting a different LAN port to the computer. If the replacement LAN 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.

---

# **Chapter 3**

## **Tests and Diagnostics**

---

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3.3 Display Configuration ..... 9  
3.4 Beep sound test..... 10  
3.5 Fan ON/OFF Test..... 11

```
**** Fan ON/OFF Test ,Please Listen To The FAN Sound ?? ****  
Press Any Key To Fan On Test ..  
  
Fan On Test :rotating.. ( Press Any Key To Fan Off Test )  
Fan Off Test :stopping..  
  
Do you feel FAN rotating wind?  
  
[Y,N]?
```

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### 3.1 The Diagnostic Test

This chapter explains how to use the Test & Diagnostic program to test the functions of the **(Base on Los Angeles 10A+/10AG+/10AL+ T&D version 1.2)** 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
- Beep sound TEST
- FAN ON/OFF TEST
- MAIN BATTERY CHARGE TEST
- FDD TEST
- Memory check
- KEYBOARD TEST
- MOUSE(PAD) TEST
- LCD PIXELS MODE TEST
- MAGNETIC SWITCH TEST
- LAN TEST
- RTC TEST
- IEEE1394 CODE TEST
- Speaker EQ Check&Rewrite
- Button Test
- Front Edge logo Check
- 1<sup>st</sup> HDD Test
- 2<sup>nd</sup> HDD Test
- RDMI Test
- WDMI Test

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

- The diagnostics USB disk
- A formatted working diskette for the floppy disk drive test (Floppy Disk Drive Test)
- A LAN loopback

## 3.2 Executing the Diagnostic Test

Free\_DOS is required to run the DIAGNOSTICS PROGRAM. To start the DIAGNOSTIC PROGRAM, follow these steps:

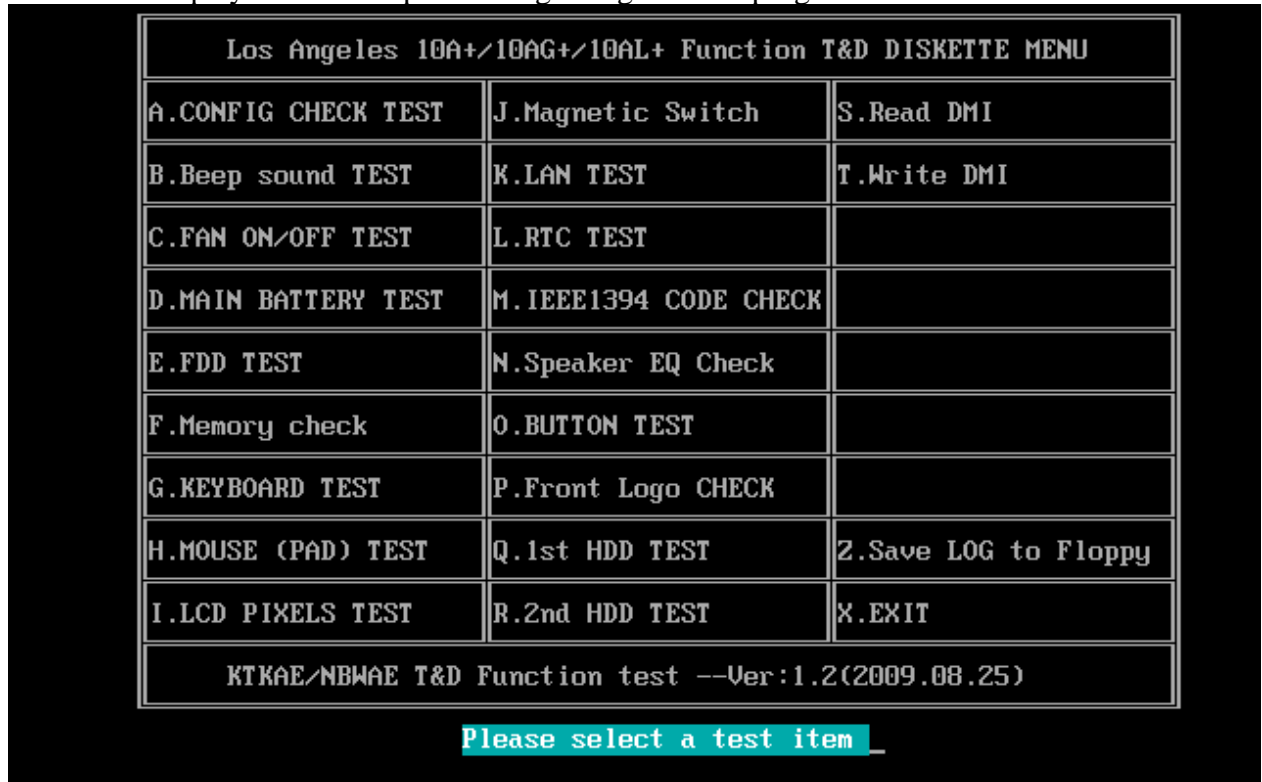
Insert the diagnostics USB disk drive and turn on the computer. (The diagnostics diskette contains the Free-DOS boot files.) And then follow the instructions for T&D program installed in USB driver)

The T&D Program can run single test by you press corresponsive English letter of test item, and it also asks you if you like to copy test log file to USB disk as reference at the end of test(s).

The test list is as the following:

- A. CONFIG CHECK TEST
- B. Beep sound TEST
- C. FAN ON/OFF TEST
- D. MAIN BATTERY Charge TEST
- E. FDD TEST
- F. Memory check
- G. KEYBOARD TEST
- H. MOUSE (PAD) TEST
- I. LCD PIXELS MODE TEST
- J. MAGNETIC Switch TEST
- K. LAN TEST
- L. RTC TEST
- M. IEEE1394 CODE TEST
- N. SPEAKER EQ CHECK TEST
- O. Button Test
- P. Front Edge logo Check
- Q. 1st HDD Test
- R. 2nd HDD Test
- S. RDMI Test
- T. WDMI 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.

Los Angeles 10A+/10AG+/10AL+ Function T&D DISKETTE MENU		
A.CONFIG CHECK TEST	J.Magnetic Switch	S.Read DMI
B.Beep sound TEST	K.LAN TEST	T.Write DMI
C.FAN ON/OFF TEST	L.RTC TEST	
D.MAIN BATTERY TEST	M.IEEE1394 CODE CHECK	
E.FDD TEST	N.Speaker EQ Check	
F.Memory check	O.BUTTON TEST	
G.KEYBOARD TEST	P.Front Logo CHECK	
H.MOUSE (PAD) TEST	Q.1st HDD TEST	Z.Save LOG to Floppy
I.LCD PIXELS TEST	R.2nd HDD TEST	X.EXIT
KTKAE/NBWA E T&D Function test --Ver:1.2(2009.08.25)		
Please select a test item _		



### 3. Tests and Diagnostics

---

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.

Los Angeles 10A+/10AG+/10AL+ Function T&D DISKETTE MENU		
A.CONFIG CHECK TEST	J.Magnetic Switch	S.Read DMI
B.Beep sound TEST	K.LAN TEST	T.Write DMI
C.FAN ON/OFF TEST	L.RTC TEST	
D.MAIN BATTERY TEST	M.IEEE1394 CODE CHECK	
E.FDD TEST	N.Speaker EQ Check	
F.Memory check	O.BUTTON TEST	
G.KEYBOARD TEST	P.Front Logo CHECK	
H.MOUSE (PAD) TEST	Q.1st HDD TEST	Z.Save LOG to Floppy
I.LCD PIXELS TEST	R.2nd HDD TEST	X.EXIT
KTKAE/NBWAE T&D Function test --Ver:1.2(2009.08.25)		

Please select a test item \_

### 3.3 Display Configuration

This Item will show the unit configuration. It includes:

- ◆ CPU (CPU type)
- ◆ DDRAM SIZE
- ◆ Panel ID
- ◆ HDD1 type & capacity (Vendor ID. Model .Firmware)
- ◆ HDD2 type & capacity (Vendor ID. Model .Firmware)
- ◆ VRAM size / VGA CHIP TYPE
- ◆ Battery cell (3cell; 6cell; 9cell)
- ◆ Wireless type
- ◆ LAN Type
- ◆ 1394
- ◆ Bluetooth
- ◆ SKUID

The screen should display as below:

```
=====
===== Configuration as Below =====
=====
cputype=AMDAthlon-QL-65
DDRAMSIZE=4096MBRAM
PanelID=N156B3-L02
HDD1=TOSHIBAMK3263GSX
HDD2=
VRAMSIZE&UGATYPE=256MB&AMD
BATT=6cell
WirelessTYPE= Atheros0D200
LANTYPE=8102E
1394=NO
Bluetooth=NO
SKUID=10

ARE YOU TEST OK?[Y,N]?_
```

### 3.4 Beep sound test

The beep sound test allows the user to aurally confirm the speaker functions. And the speaker will send out music during test.

**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.

```
=====Speaker audio Test=====
1.Please adjust volume to max level.
2.Please listen to both of speaker will send out Beep sound
  (3 times).

Press any key to continue . . .
```

### 3.5 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. Feel the wind or listen the rotating sound to check whether the fan is working or not.

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

- ◆ The computer will stop the fan working after any key pressed. Feel the wind or listen the sound to check if the fan is “OFF”.

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 Fan On Test ..

Fan On Test :rotating.. ( Press Any Key To Fan Off Test )
Fan Off Test :stopping..

Do you feel FAN rotating wind?

[Y,N]?
```

- ◆ After Press “Y”, computer will auto test FAN RPM, and it will auto check.

The screen will show below picture, if FAN RPM check is OK;

```
EC_Value: 2c 44
**** Fan Test Program For A51 Use V1.1 2005/2/3 ****

FAN Speed Test : 4300 RPM [PASS] 0004300 0
```

If FAN RPM check is NG, it will show as below:

```
EC_Value: 4 4
**** Fan Test Program For A51 Use V1.1 2005/2/3 ****

FAN Speed Test : 4500 RPM [FAIL]
```

### 3.6 Main Battery Charge Test

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

- 1.>. 90W with 19V DC for UMA SKU
- 2.>- 120W with 19V DC for discrete SKU

This test shows and measures the main battery:

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

The screen should display as below, if the charge function is OK, will show:.

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

Battery Type: Lion
Manufacturer: Sony
Remain charge capacity : 80.0%

Charge Test-> [ PASS ]

Press any key to continue . . .
```

If the charge function is NG, the screen will display as:

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

Battery Type: Lion
Manufacturer: Sony
Remain charge capacity : 86.5%

Charge Test-> [ FAIL ]

Press any key to continue . . .
```

### 3.7 FDD Test

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

The Floppy Disk Test includes three subtests of the:

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

**NOTE:** The write-protected device of this formatted diskette should be “Disable”.

The subtests run automatically.

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

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

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

### 3.8 Memory check

This test will check if the computer's Memory Frequency and Size is correct in every slot.

Before Memory test start, you should choice the below item:

1. Memory Read test
2. Memory Write test
3. Memory Read & Write test
4. Memory INFO test



```
=====MEMORY R&W Test=====

Please check the Memory read or write Test
1: Memory Read test
2: Memory Write test
3: Memory Read&Write test
4: Memory INFO test
[1,2,3,4]?_
```

When you execute this test, after you press the related number, the test picture will show as below:

#### Memory Read Test

```
= Read Test === block 2 =====
Address: 00000001 : 37FF8000
                Read Test fails at: 137FF8000 : 2
are the RAM read data is ok? [Y,N]?_
```

### Memory Write Test

```
= Write Test === block 2 =====  
Address: 00000001 : 37FF8000  
Write Test fails at: 137FF8000 : 2  
are the RAM write data is ok? [Y,N]?_
```

### Memory Read & Write Test

```
= Write Test === block 2 =====  
Address: 00000001 : 37FF8000  
Write Test fails at: 137FF8000 : 2  
Read test:  
Write test:  
are the RAM R&W is ok? [Y,N]?_
```

### Memory Info Test

```
=====
COMPAL Electronic Inc.                               V1.0.0.1
Author : STD.SID TEAM.
WARNING: THIS PROGRAM IS FOR INTERNAL USE ONLY.
Copyright (c) 2008 COMPAL Electronic Inc. All rights reserved.
=====
DIM: 0
    Size0: 1024 MB
    Speed0: 800
    Manufacturer0: 3GA1801

DIM: 1
    Size1: 1024 MB
    Speed1: 800
    Manufacturer1: 2F

are the RAM type is ok? [Y,N]?
```

### 3. 9 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:

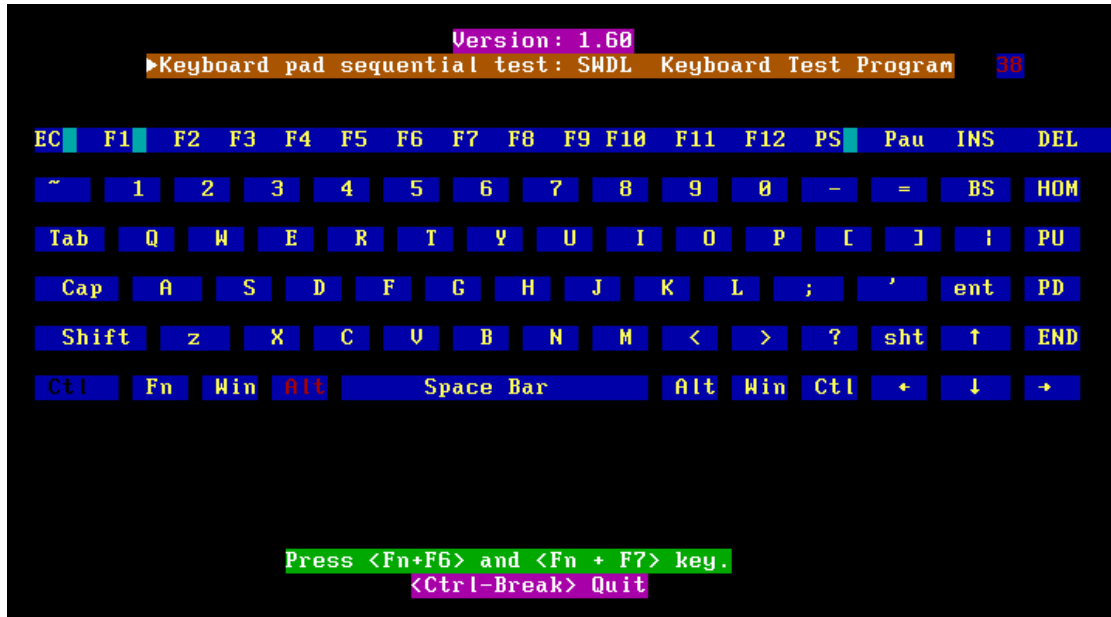
1. **S** (US, for America)
2. **J** (Japan, for Japan)
3. **K**(UK, for United Kingdom)

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.

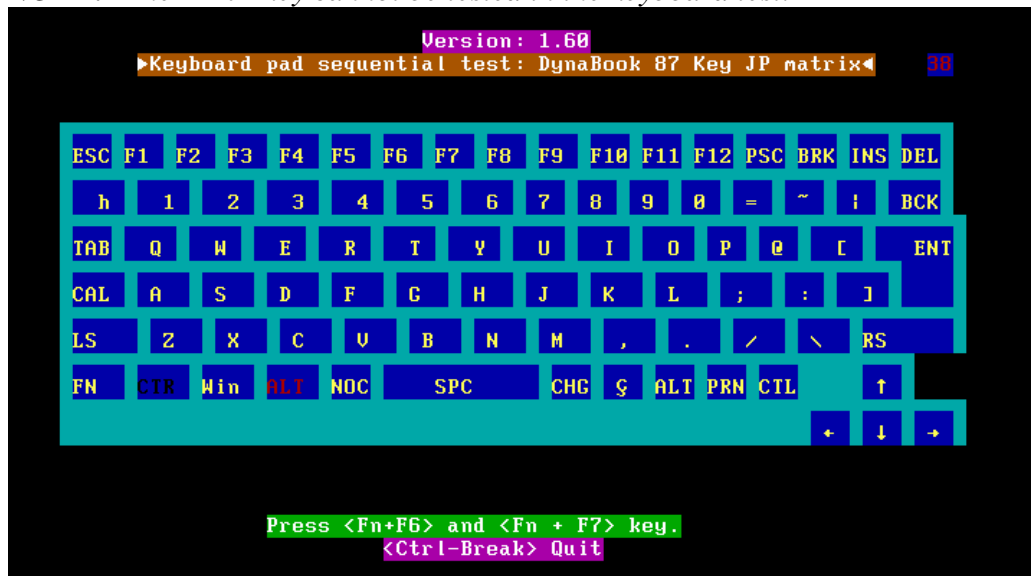
It will indicate whether the sub test is passed or failed after the question.

### US Keyboard

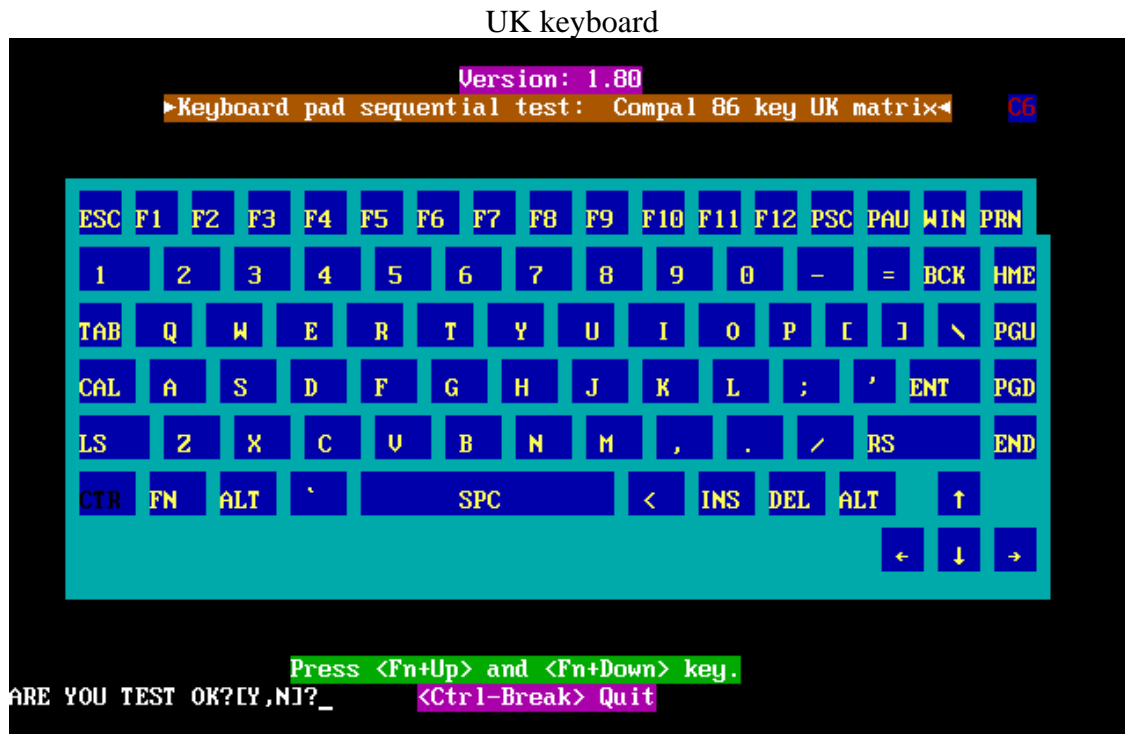


### Japan keyboard

**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.



### 3.10 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.

### 3.11 LCD Pixels Mode Test

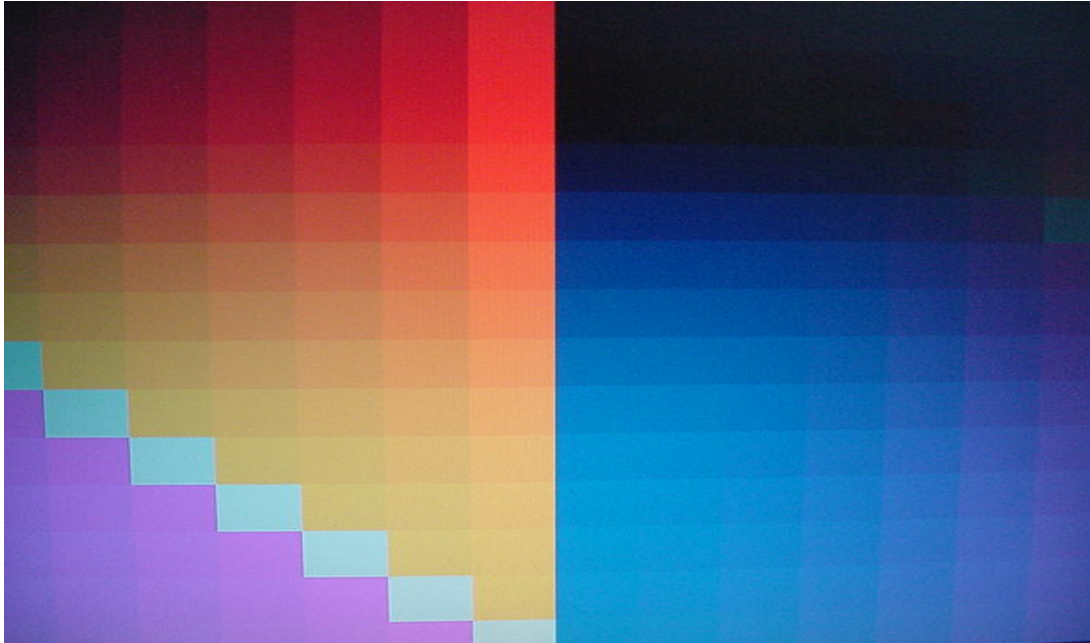
This LCD pixels mode test checks whether video display is fine.

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.



### 3.12 Magnetic Switch Test

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

Follow below steps to run this test:

1. Close the LCD cover.
2. Open the LCD.

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

1>. If the Magnetic switch test fail, it will show below display:

```
Magnetic switch test program Ver 1.10 __ PE/SW: Jone  
Please close and open LCD!
```

2>. If the Magnetic switch test pass, it will show below display:



```
Magnetic Switch test is Pass!  
ARE YOU TEST OK?[Y,N]?
```

### 3.13 LAN Test

The LAN test checks the LAN full-duplex environment.

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

And LAN information will show on the test screen:

- ◆ IO Base – Port: A000H
- ◆ IRQ – BH, it's "IRQ B".
- ◆ Node – it is "MAC Address".
- ◆ Line Speed – 1000Mbps or 100Mbps or 10 Mbps.

- ◆ Bus ID – it's "14".

The LAN test includes three subtests of the:

1. Speed1000
2. Speed100
3. Speed10

The subtests run automatically.

```
==== LAN TEST ====  
  
1.Please plug-in the Loopback into LAN port.  
2.Please see test result in middle of display.  
  (Pass: 000 , Fail: xxx )  
  
Press any key to continue . . .
```

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

### 3. Tests and Diagnostics

---

```
MP Program for PCI/PCI-E Family LAN Product/Client 1.22 02-01-08 version
IOBASE = A000H IRQ = B H Node:001EEC3EC8DA 1000M: 10K 100M: 5K 10M: 2K
VID =10ECH DID =8136H SVID =1179H SSID =FF00H Lan Adapters: 1
Now is: 1
Open Your MPLAN.CFG in this machine! 100M Link OK 10M Link OK
Test Item Result(Pass/Fail)
1.PG_LAN=false none
2.Reg_R/W=true Pass
3.Speed1000=true none Rxtimeout 1
4.Speed100=true Pass ROK= 2000 TOK= 2000
5.Speed10=true Pass Error= 0
6.Debug=true Txtimeout = 50
7.AutoRun=true

***** Pass in debugging mode *****
Press 'ESC' key to exit .....

E:\LAN>
```

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



### 3.14 RTC Test

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

The test runs automatically.

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

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

Please Check the result after test.

Press any key to continue . . .

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

Press any key to continue . . .
```

### 3.15 Read 1394 GUID

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

***NOTE:** Must open the RAM Door to see RAM connector GUID bar code before test item begins. LC\_LA don't support this function*

The figure below will be displayed:

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

Please check RAM Connector GUID bar code.

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

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

### 3.16 Speaker EQ(Equalizer Quality factor) Type Check&Re-Write

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

The EQ Type test includes two subtests of the:

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

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

LC\_LA only support No brand mode.

The figure below will be displayed:

```

Please select read or write EQ

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

[1,2]?1

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

Please check Logic up left side mark then Select Speaker type
1: Harman 2speaker
2: Harman 3speaker
3: harman 5speaker
4: No brand speaker
[1,2,3,4]?_

```

### 3.17 Sensor Button Test

**NOTE:** LC\_LA don't support this function.

The Sensor button test allows the user to manually test each of Sensor button buttons.



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.

### 3.18 Front Edge Logo check

*NOTE: LC\_LA don't support this function.*

Because this Model have Front Edge Logo, must set the Front Edge Logo if the unit has this logo, if you select this item, the figure below will be displayed:

```
=====KTKAE Front Edge Logo led enable/disable TEST=====

please check Front Edge Logo led :

if have ,please select enable(1)
if not have ,please select disable(2)

1.Enable Front Edge Logo LED
2.Disable Front Edge Logo LED

[1,2]?
```

Please check the units whether have the Front Edge Logo:

If have the logo, please key 1 to set the Front Edge Logo.

If not have the logo, please key 2 to disable the Front Edge Logo.

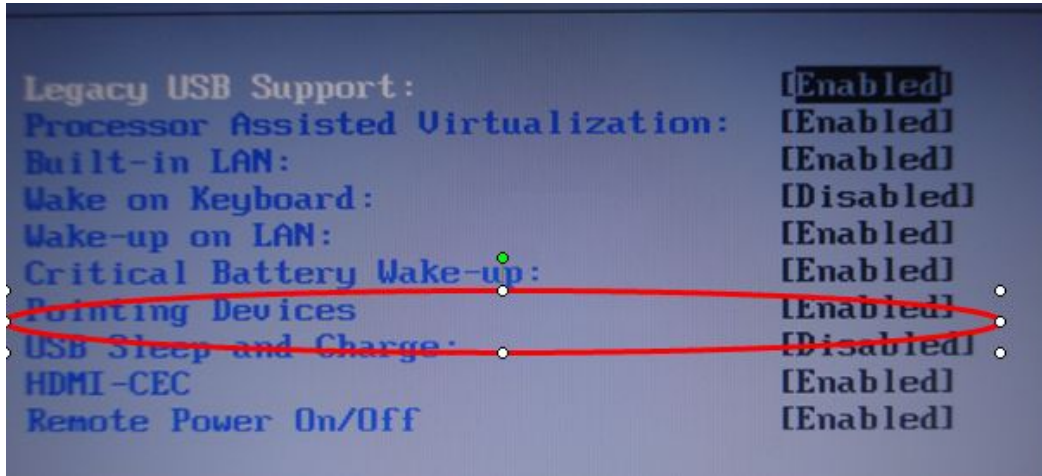
Please read the notice to check the function is enabling or be disable in BIOS setup menu.

Restart the computer after you change BIOS setting of this function every time.

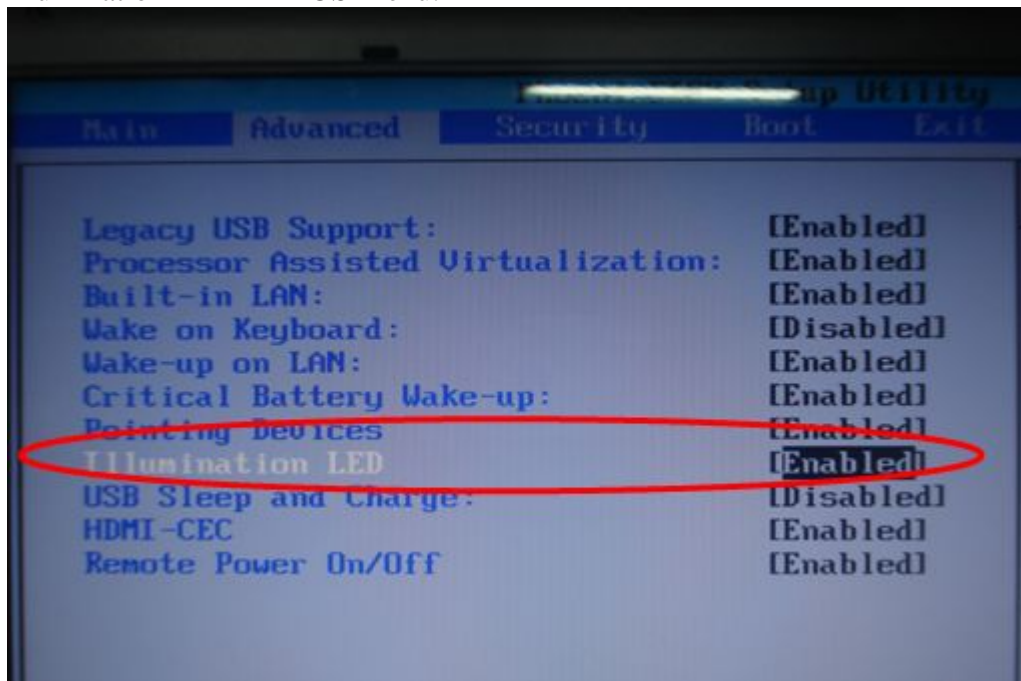
**Notice: Check logo LED on/off function.**

1. If we select “2” to disable the Front Edge logo function by program, there haven’t the item of Illumination LED in BIOS Menu, the picture likes below.





2. If we select “1” to enable the Front Edge logo function by program, There have the item of Illumination LED in BIOS Menu.



2.1 Select enable to let the Front Edge logo item in enable mode (show as below picture), and then restart the machine, the Front Edge Logo Led will be light.

### 3.19 1<sup>st</sup> HDD Test

The HDD test allows the user to verify the 1<sup>st</sup> HDD ok or not. First, please select HDD test method, Screen would display as below:

```
===== HDD TEST =====  
  
1.HDD W/R test(all surface)  
2.Partial W/R + Random W/R  
[1,2]?
```

After you select the method, then input password: “hard disk”, if input password is Right, the screen would display as below:

```
Input password is Right  
Press any key to Test HDD function  
  
Press any key to continue . . .
```

If input password is wrong, the screen would display as below:

```
Input Password is wrong
ARE YOU INPUT PASSWORD AGAIN?[Y,N]?
```

The screen will display as below picture to show the subtest is passed or failed when finished:

If it is show the picture as below, it means HDD function is OK

```
*** Hard disk test tools V1.72 Compal STD/TTF ***
CHR Mode Cylinders=16383
CHR Mode Head=16
CHR Mode Sectors=63
CHR Mode Sizes=8455 MB

LBA Mode Sectors=488397168
LBA Mode Sizes =250059 MB

HDD Random R/W 100 sectors ..... PASS !
HDD Sequential R/W 100 sectors ... PASS !

LBA Verify Sectors: 488397168, C/H/S = 30401 / 255 / 63
LBA Sectors Verify ... PASS!

ARE YOU TEST OK?[Y,N]?
```

If the picture shows as below, it means the HDD function is NG

```
*** Hard disk test tools V1.60 Compal STD/TTF ***
Reset DISK1 .....Pass !
Error ! Can't use Enhanced Disk Drive Support Function
ARE YOU TEST OK?[Y,N]?
```

### 3.19 2<sup>nd</sup> HDD Test

*NOTE: LC\_LA don't support this function.*

The HDD test allows the user to verify the 2<sup>nd</sup> HDD ok or not. It will show the below picture, and user must select whether it has 2<sup>nd</sup> HDD.

```
Please check if you have second HDD?  
[Y,N]?N
```

```
The unit have no second HDD.
```

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

If you second HDD, please press “Y”, then computer will request you select HDD test method, Choice HDD test method, Screen would display as below:

```
===== HDD TEST =====  
  
1.HDD W/R test(all surface)  
2.Partial W/R + Random W/R  
[1,2]?
```

After you select the method, then input password: “hard disk”, if input password is Right, the

screen would display as below:

```
Input password is Right
Press any key to Test HDD function

Press any key to continue . . .
```

If input password is wrong, the screen would display as below:

```
Input Password is wrong
ARE YOU INPUT PASSWORD AGAIN?[Y,N]?
```

The screen will display as below picture to show the subtest is passed or failed when finished:

If it is show the picture as below, it means HDD function is OK

### 3. Tests and Diagnostics

---

```
*** Hard disk test tools V1.72 Compal STD/TTF ***  
CHR Mode Cylinders=16383  
CHR Mode Head=16  
CHR Mode Sectors=63  
CHR Mode Sizes=8455 MB  
  
LBA Mode Sectors=488397168  
LBA Mode Sizes =250059 MB  
  
HDD Random R/W 100 sectors ..... PASS !  
HDD Sequential R/W 100 sectors ... PASS !  
  
LBA Verify Sectors: 488397168, C/H/S = 30401 / 255 / 63  
LBA Sectors Verify ... PASS!  
  
ARE YOU TEST OK?[Y,N]?
```

If the picture shows as below, it means the HDD function is NG

```
*** Hard disk test tools V1.60 Compal STD/TTF ***  
Reset DISK1 .....Pass !  
Error ! Can't use Enhanced Disk Drive Support Function  
  
ARE YOU TEST OK?[Y,N]?
```

### 3.21 Read DMI

Compal write Toshiba Part No (version), Toshiba Serial No (Serial No), Product Name, OEM string and UUID, If you want to double check the DMI data, please select Read DMI item, the figure below will be displayed:

```
Manufacturer : TOSHIBA
Product_Name : Satellite A355D
Serial_Number : X8116579K
Version      : PSALEU-004005
Asset_Number : *
UUID        : 6C64768B8CE211DD8A58001EEC40A110
DEM_Strings : PSALEU-004005,SQ004806V04,11Q40
Are the DMI data is OK? [Y,N]?
```

### 3.22 Write DMI

When you want to write DMI data, please select which data you want to write, the figure below will be displayed:

1. Write OME string (64)



2. Write Version (32)
3. Write Serial (32)
4. Write Product (32)

```
please choice the item
1: Write OEM String
2: Write Version
3: Write Serial
4: Write Product
please enter the num you choose:
```

After write OK, you should reboot the system that can make the setting effective, or you can write next data before reboot system, the figure below will displayed:

```
please choice the item
1: Write OEM String
2: Write Version
3: Write Serial
4: Write Product
please enter the num you choose: 1
please enter the OEM String: psmadk-011002

Modify OEM String to psmadk-011002

Jump to EEPROM Bank : 0

Erase EEPROM Start Offset : a0 End Offset:dd Size:62
.....
Jump to EEPROM Bank : 0

Flash EEPROM Start Offset : a0
.....
Confirm the data ?
.....
Modify EM String success!

*****Please reboot the system.To make the setting effective
*****Do you want to modify other dmi ? *****
Press Y for Yes or N for No:
```

***NOTE:** should input correct DMI data, and should reboot the system that can make the setting effective.*

---

## **Chapter 4**

# **Replacement Procedures**

---

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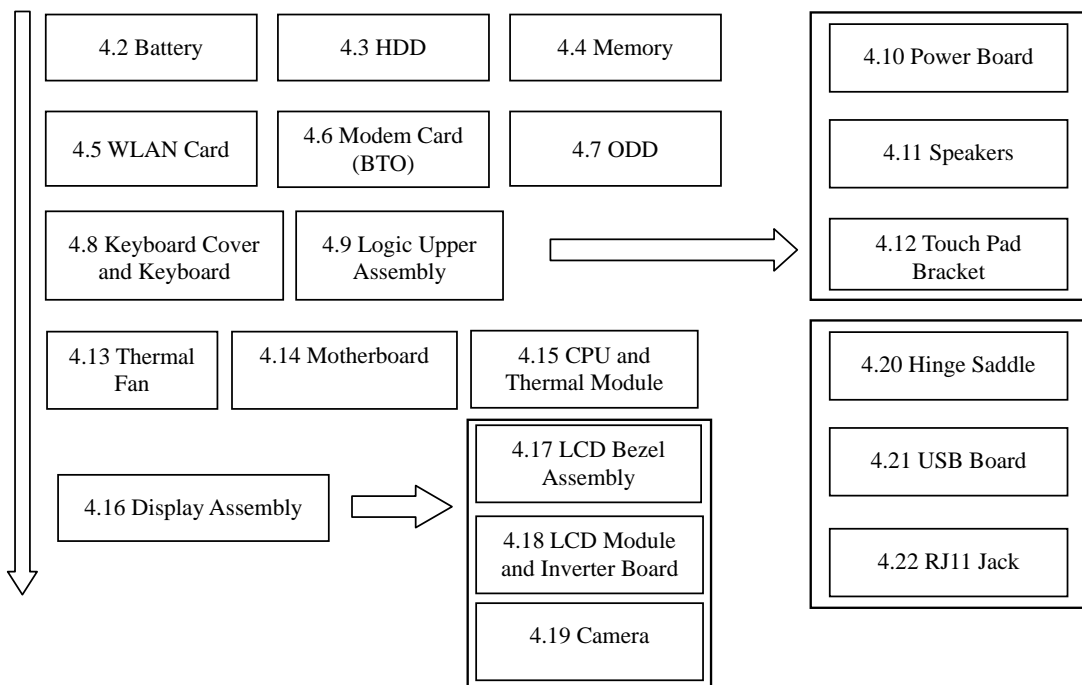
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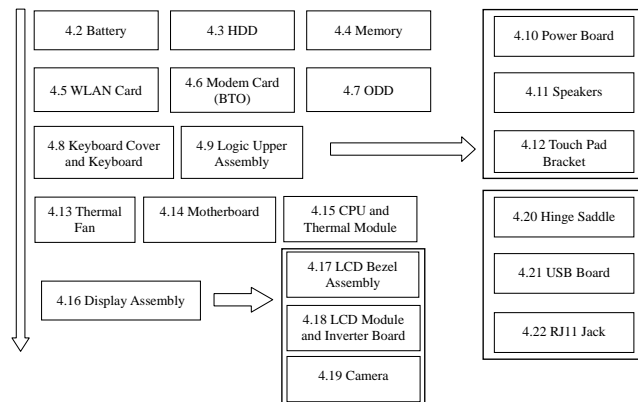
## 4.1 General

This chapter explains how to disassemble the laptop and replace Field Replaceable Units (FRUs). Some replacement procedures may not require you to remove all the surrounding FRUs to replace only one FRU. The chart below shows the FRUs in the order in which they should be removed in a top-down manner, irrespective of their physical locations. The FRUs shown in the top area of the chart should normally be removed before removing the FRUs shown in the bottom area. To replace the FRUs, first identify the suspect FRU for the system failure. Next, according to this chart, determine the FRUs that need to be removed before removing the suspect FRU. After you determine those FRUs, go to the appropriate sections according to the section numbers shown in the boxes. Then start removal and replacement.



How to use the chart (two examples):

- For removing the Motherboard:  
First, remove parts from 4.8 Keyboard Cover & Keyboard, 4.9 Logic Upper Assembly, 4.13 Thermal Fan.
- For removing the LCD Module:  
First, remove LCD Bezel Assembly, then remove the LCD module and the Inverter Board.



**Safety Precautions**

Before you begin disassembly read the following safety precautions carefully. Be sure to follow them while you are working.

***DANGER:***

- 1. Always use the genuine batteries or replacement batteries authorized by Toshiba. Batteries other than those differ in specifications and are incompatible with the laptop. They may burst or explode. To avoid leakage of alkaline solutions, never heat or disassemble the battery packs. Never throw the battery packs into a fire. If this is violated, they will explode.*
- 2. The components such as the power supply and inverter carry high voltages. When you partially disassemble the laptop and turn on the components, use extreme care not to touch the connectors and components to avoid the risk of electrical shock. Do not disassemble individual components during first-level maintenance.*

***WARNING:***

- 1. To avoid the risk of electrical shock, turn the laptop off and remove the AC adapter from the electrical outlet.*
- 2. Because the battery in the laptop is left charged, the risk of electrical shock remains even after the AC adapter is removed from the electrical outlet. To avoid the risk of electrical shock, be sure to remove any metal jewelry or accessories such as necklaces, bracelets, and rings before starting work. Never work with damp or wet hands.*
- 3. To avoid personal injury, use care to avoid the sharp edges or corners of the components.*

**CAUTION:**

1. *Before replacing a component, make sure that the replacement component meets the required specifications. To avoid laptop failures, never use components that do not meet the specifications.*
2. *To avoid internal damage such as short circuits and fire, never drop metal objects such as screws, pins, paper clips, etc. into the components. When a screw is removed, be sure to replace a screw that is the same size as the original screw. Make sure that all the screws are fastened securely. Loose screws can cause short circuits, overheating, smoke, or fire.*
3. *Before raising a FRU or other component, make sure that all the component cables have been disconnected to avoid the risk of electrical shock caused by accidental contact with the energized components.*
4. *For AC input, be sure to use the AC adapter and AC power cable that come with your laptop or Toshiba-recommended equivalents.*
5. *To avoid the risk of electrical shock, make sure that all the replacement components meet the specifications of the laptop and that all the cables and connectors are fastened securely.*
6. *Inside the PC are components that become hot during operation (such as the CPU and cooling module). To avoid burns, let the hot components cool down before starting inspection or repair task.*

**Before You Begin**

Before you begin to disassemble the laptop, keep in mind the precautions and advice in this section. Always begin disassembly by removing the AC adapter and battery pack. Remove the optional parts and accessories as well. The procedures for removing the batteries will be explained later.

Disassemble the laptop only when an abnormality has occurred.

Use only the recommended tools.

To run and store the laptop, be sure to prepare a working environment that is free from:

- Dust and contaminants
- Static electricity
- Extremely high or low temperatures and extremely high humidity

Run the diagnostic tests explained in Chapter 2 of this manual to identify the FRU that has probably caused the system failure.

Perform only the required machine operations. Use only the disassembly and reinstallation procedures described in this manual.

Place the removed components in a safe place away from the laptop so that they are not damaged or get in the way of you doing your work.

Normally, a number of screws need to be removed or replaced during disassembling. Place the removed screws in a safe place so that you can easily find the right screws for the right components.

When assembling the laptop, use the specified screws to fasten the parts to the specified locations. See the appropriate explanations and figures for screw sizes.

To avoid personal injury, use care to handle components that have sharp edges or corners.

After you have replaced a FRU, check that the FRU works correctly to ensure normal laptop operation.

## **Disassembly Procedures**

The cable connectors come in these two basic types:

- Pressure plate connectors
- Normal pin connectors

To remove a pressure plate connector, pull up the tabs on either side of the connector's plastic pressure plate and gently pull the cable out of the connector. To reconnect the cable to the pressure plate's connector, raise the pressure plate up to a satisfactory height and slide the cable into the connector. Secure the cable in the correct position by pressing down the sides of the pressure plate so that the plate is flush with the sides of the connector. Grasp and pull the cable gently to check that the cable is connected firmly. If the cable came off the connector, reinsert the cable by raising the pressure plate up to a satisfactory height.

Normal pin connectors are used for all the other types of cables. These connectors can be installed or removed by simply inserting them or pulling them out.

## **Assembly Procedures**

You have to reassemble the laptop after you have disassembled the laptop and fixed the component that caused the problem.

When reassembling the laptop, keep the following general guidelines in mind:

- Take your time to carry out the suggested instructions completely. Hurried reassembly can often cause problems.
- Check that all the cable and connectors are fastened securely.
- Before securing the FRUs or other parts, check that the cables are not caught by the screws or FRUs.
- Check that all the latches are closed securely.
- Check that all the required screws are used to secure the FRUs. Using wrong screws can damage the threads or heads of the screws or does not ensure that the FRUs are secure.

After installing a FRU, make sure that the FRU and laptop work normally.

## Tools and Equipment

For your safety and that of other people in the working environment, it is strongly recommended that you use electrostatic discharge (ESD) equipment. The proper use of this equipment will ensure successful repair work and reduce the costs for repairing damaged components. The equipment and tools required for disassembly and reassembly are:

- One 2 mm Phillips screwdriver
- One 4 mm flat-blade screwdriver
- Torx screwdriver
- Tweezers (for pulling out screws)
- ESD mats (for the floor and work desks)
- An ESD wrist strap or heel grounder
- Anti-static carpets or flooring
- Air ionizers (for highly electrostatic sensitive areas)
- A plastic card (in credit card size)

## Screw Tightening Torque

To secure screws, follow the torque values listed below. Over tightening can damage components and screws. Under tightening can loosen the screw or cause screws to come off, which may result in short circuits or other damage.

- |  |                        |
|--|------------------------|
| <input type="checkbox"/> M2 (2 mm)               | 0.22 N·m (2.2 kgf·cm)  |
| <input type="checkbox"/> M2.5 (2.5 mm)           | 0.36 N·m (3.5 kgf·cm)  |
| <input type="checkbox"/> M3 (3 mm)               | 0.51 N·m (5.0 kgf·cm)  |
| <input type="checkbox"/> M2.5x4 PSP TITE screws  | 0.204 N·m (2.0 kgf·cm) |
| <input type="checkbox"/> M2.5x6 GIZA TITE screws | 0.36 N·m (3.5 kgf·cm)  |

### **Colors of Screw Shanks**

For easy identification of the correct screws, the screw shanks are colored according to their lengths, as follows:

- Screws of an odd-numbered length                      White
  - Screws of a special length                                      Black
- Screws of a special length are those of a length having decimal places (i.e. 16mm).

### **Symbols of Screws on the Laptop Body**

For easy maintenance, the screw types are shown on the laptop body as symbols. A symbol consists of a letter representing the screw type and a numeral representing the screw length.

- Screw type                                      Letter
- Bind screw                                      B (stands for bind)
- Flat-head screw                                F (stands for flat-head)
- Super flat-head screw                        S (stands for super flat-head)
- Tapping screw                                 T (stands for tapping)
- Other screws                                    U (stands for unique-pan head screws, studs, etc.)

### **Symbol examples**

- 6 mm bind screw                                B6
  - 12 mm bind screw                                B12
  - 5 mm stud                                         U5
- (The numeral represents the rounded length of the threaded portion regardless of the entire stud length.)

## 4.2 Battery

### Removing the Battery Pack

Remove the battery pack according to the following procedures and Figure 4.1.

**CAUTION:** When handling the battery packs, use care not to short circuit the terminals. Do not drop, hit, twist, or bend the battery packs. Do not scratch or break up their casing.

1. Turn the laptop upside down so that the bottom is facing you.
2. Slide out the battery lock.
3. Slide the battery release latch and remove the battery pack from the laptop.

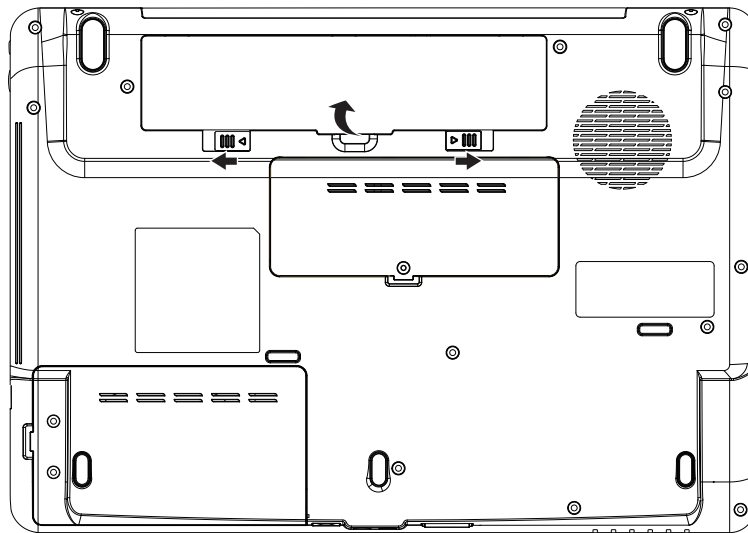


Figure 4.1 Removing the Battery Pack

**NOTE:** Dispose of the used battery packs as required by local ordinances or regulations.



### **Installing the Battery Pack**

Install the battery pack according to the following procedures.

**CAUTION:** *The battery packs contain a lithium ion battery, which can explode due to improper replacement, use, handling, or disposal. Always dispose of the battery packs as required by local ordinances or regulations. Use only replacement batteries recommended by Toshiba.*

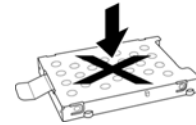
**NOTE:** *Visually check the battery's terminals. If they are dirty, clean them with a dry cloth.*

1. Gently insert a new or recharged battery pack into place. Check that the battery release latch slides in and stops with a click.
2. Slide in the battery lock.

## 4.3 HDD

### Removing the HDD

**CAUTION:** Do not press on the top or bottom of the drive. Applying such pressure can either corrupt the data in the drive or damage the drive.



There is one HDD equipped in the laptop. Remove the HDD (hard disk drive) according to the following procedures and Figure 4.2, 4.3.

1. To remove the HDD, remove two M2.5x6 HDD door screws that secure the HDD and then remove the HDD door.

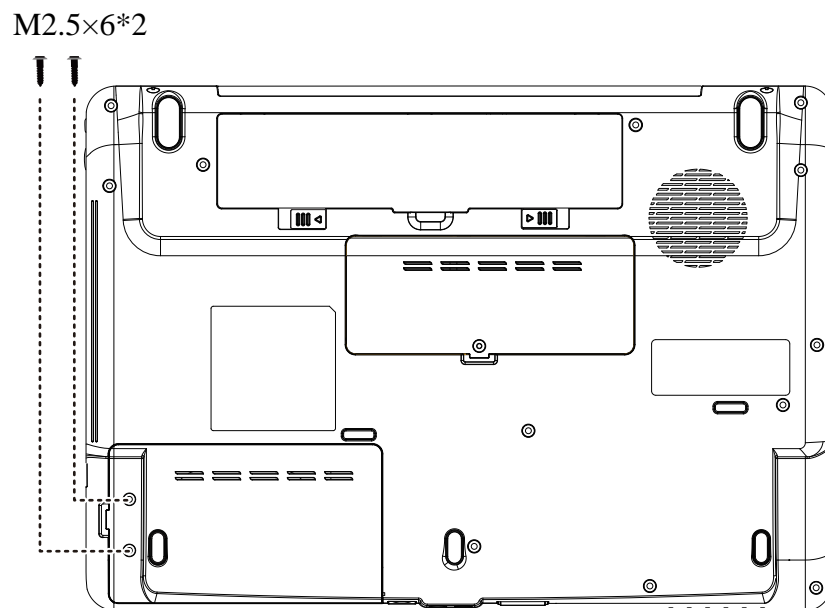


Figure 4.2 Removing the HDD door

2. Remove the HDD pack by pulling on the tab attached to the pack.

**NOTE:** Do not disassemble the HDD pack when it is working normally. Disassemble or replace the HDD pack only if it fails.

3. Place the HDD pack on a flat surface such as a desk.
4. To separate the plate from the HDD, remove four M3x3 screws according to the number sequence sealed on the HDD plate.

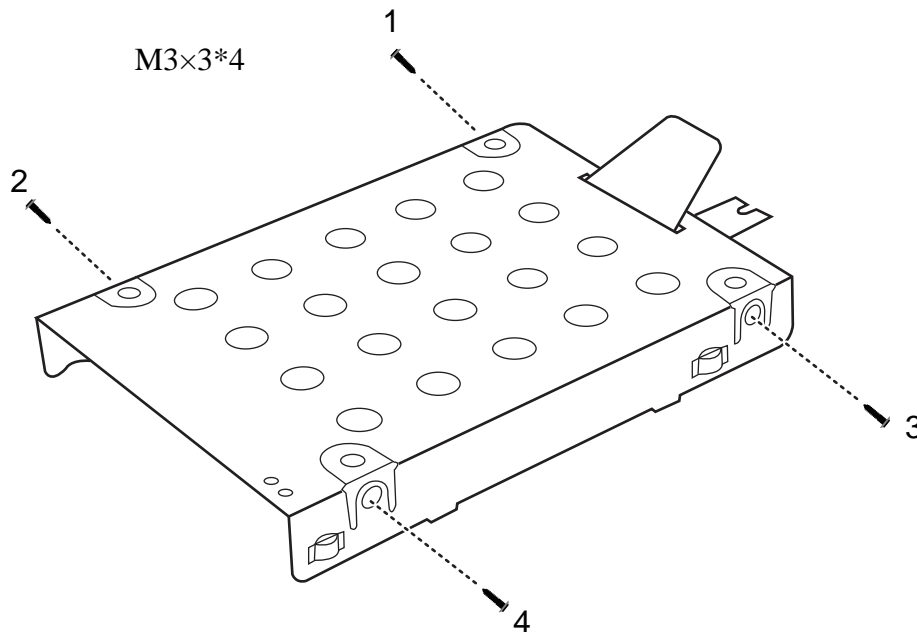


Figure 4.3 Removing the HDD plate

**CAUTION:** Do not apply pressure to the top or bottom of the drive.

**Installing the HDD**

Install the HDD according to the following procedures.

**CAUTION:** *To avoid damage, always hold the HDD only by its sides.*

1. Place the HDD into the HDD plate.
2. Secure the HDD and its plate with four M3x3 screws.

**CAUTION:** *To prevent the HDD plate from being distorted when installing the HDD pack into the laptop, do not press the center of the HDD pack. Always hold the HDD pack by its sides.*

3. Install the HDD pack into the correct position in the laptop. Connect the HDD pack to the laptop.
4. Secure the HDD door by tightening two M2.5x6 screws.

## 4.4 Memory

### Removing the Optional Memory

Remove the optional memory according to the following procedures and Figure 4.4, and 4.5 after checking that the laptop is turned off.

**CAUTION:** Remove the optional memory after turning off the laptop. If this is violated, the laptop or memory can be damaged.

1. Turn the laptop upside down.
2. Remove one M2.5x5.4 screw that secures the RAM door.
3. Remove the RAM door.

**CAUTION:** Do not touch the connectors on the memory or in the laptop. Contaminated connectors can cause memory access problems.

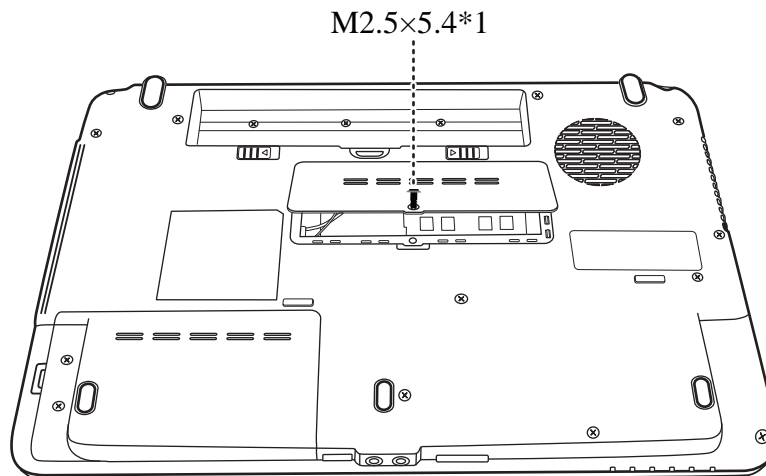


Figure 4.4 Removing the RAM door

4. Spread out the two memory lock latches so that the memory pops up.

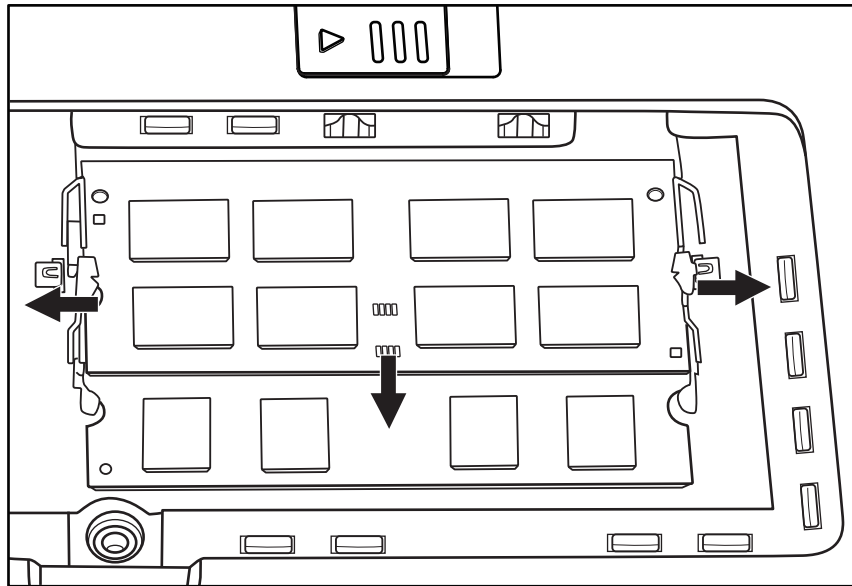


Figure 4.5 Removing the RAM from connector

5. Pull the memory up and out at an angle, using care to avoid touching the connectors.

### Installing the Optional Memory

Install the optional memory according to the following procedures after checking that the laptop is turned off.

**CAUTION:** Install the optional memory after turning off the laptop. If this is violated, the laptop or memory can be damaged.

1. Insert the memory into the connector at an angle of 45 degrees.
2. Press down on the memory module so that it is secured with both memory lock latches.
3. Reinstall the optional RAM door.
4. Secure the RAM door with one M2.5x5.4 screw.

After the laptop is turned on, check the hardware configuration in the Hardware Setup or TESTUP program to make sure that the installed memory has been recognized by the system. If it has not been recognized yet, check the connections.

## 4.5 WLAN Card

### Removing the WLAN Card

Remove the WLAN card according to the following procedures and Figure 4.6.

1. Detach the two antennas on the WLAN card.
2. Remove two M2.5x3 screws securing the WLAN card.
3. Pull the WLAN card out at an angle.

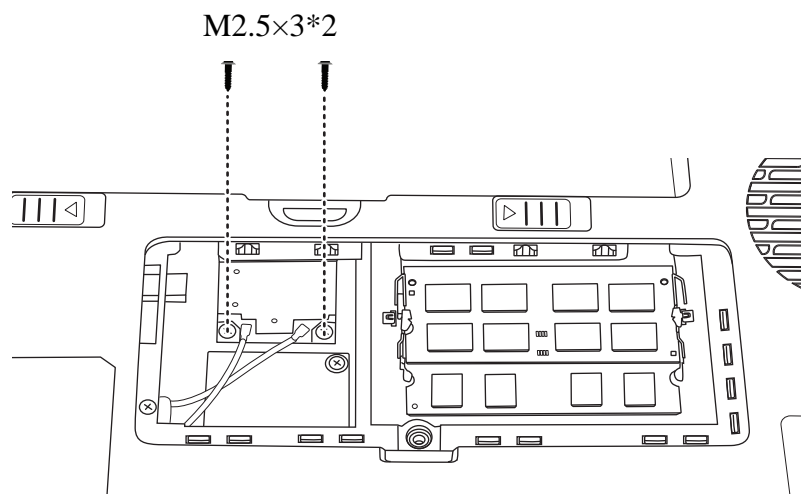


Figure 4.6 Removing the WLAN card

### Installing the WLAN Card

Install the WLAN card according to the following procedures.

1. Insert the WLAN card into the connector.
2. Press the card down and secure it with two M2.5x3 screws.
3. Attach the two antennas to the WLAN card.

## 4.6 Modem Card (BTO)

### Removing the Modem Card

Remove the modem card according to the following procedures and Figure 4.7.

1. Remove two M2.5x3 screws that secure the modem card.
2. Flip the modem card over, and detach the cable connected to the card.

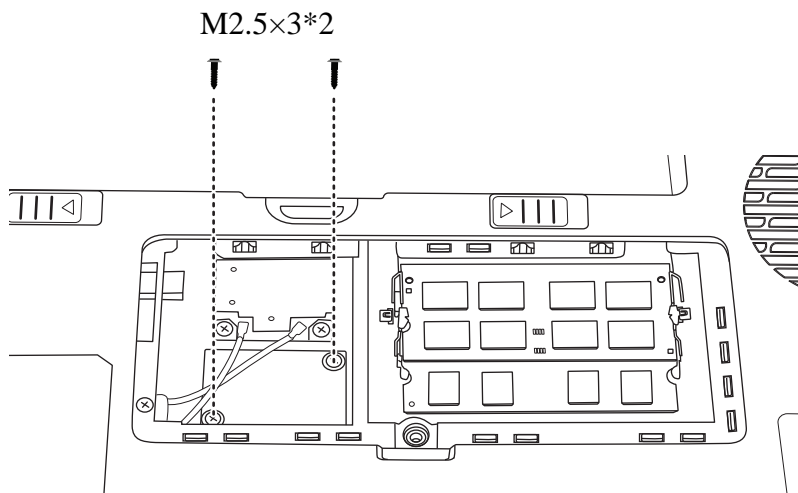


Figure 4.7 Removing the modem card

### Installing the Modem Card

Install the modem card according to the following procedures.

1. Attach the cable to the back of the modem card.
2. Install the card in the correct position and secure it with two M2.5x3 screws.



## 4.7 ODD

### Removing the ODD Bay Module

**NOTE:** The installation and removal procedures are the same for all the modules that can be installed in the ODD bay. See the appropriate sections for the disassembly procedures of specific modules.

Remove the ODD bay module according to the following procedures and Figure 4.8.

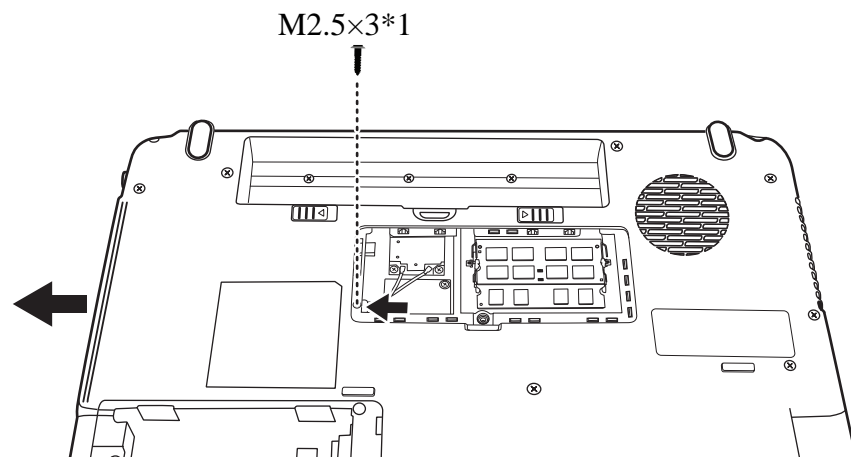


Figure 4.8 Removing the ODD Bay module

1. Turn the laptop upside down.
2. Remove one M2.5x3 screw.
3. Push the ODD bracket in the direction of the arrow.

**CAUTION:** Handle the ODD bay module carefully it can become hot during operation.

### Installing the ODD Bay Module

Install the ODD bay module according to the following procedures.

1. Place the ODD bay module in the correct position and slide it in.
2. Push it in until it meets the end.
3. Secure the ODD bay module with one M2.5x3 screw.

### Disassembling the ODD Drive

**NOTE:** Do not disassemble the ODD drive when it is working normally. Disassemble or replace the ODD drive only if it fails.

Disassemble the ODD drive according to the following procedures and Figure 4.9.

1. Remove two M2×2.5 screws.
2. Remove the bracket.

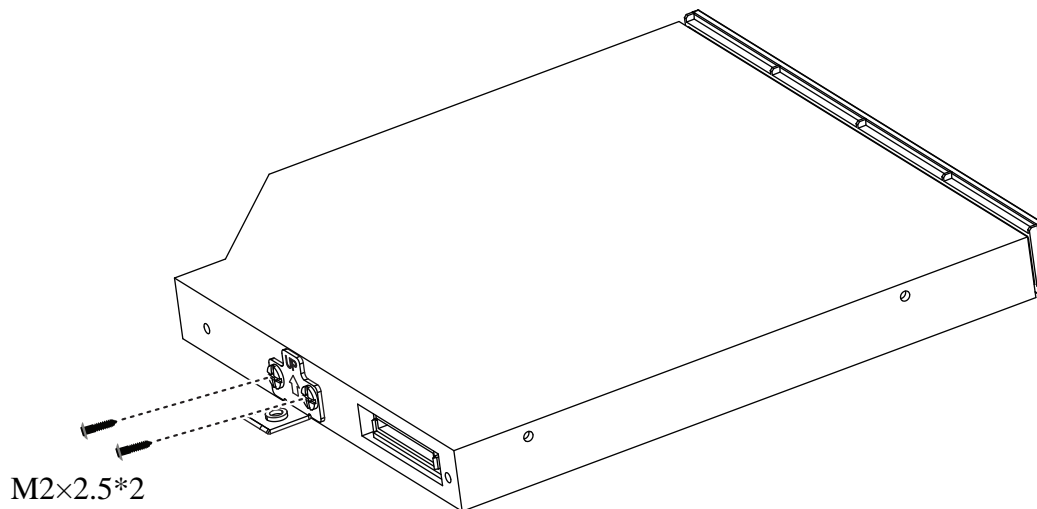


Figure 4.9 Removing the bracket from the ODD drive

### **Assembling the ODD Drive**

Assemble the ODD drive according to the following procedures.

1. Seat the bracket in the correct position.
2. Secure them with two M2×2.5 screws.

## 4.8 Keyboard Cover and Keyboard

### Removing the Keyboard Cover and Keyboard

Remove the Keyboard Cover and Keyboard according to the following procedures and Figure 4.10, 4.11, 4.12.

1. Use a flat head screwdriver to lift the keyboard cover from the laptop.
2. Remove the keyboard cover.

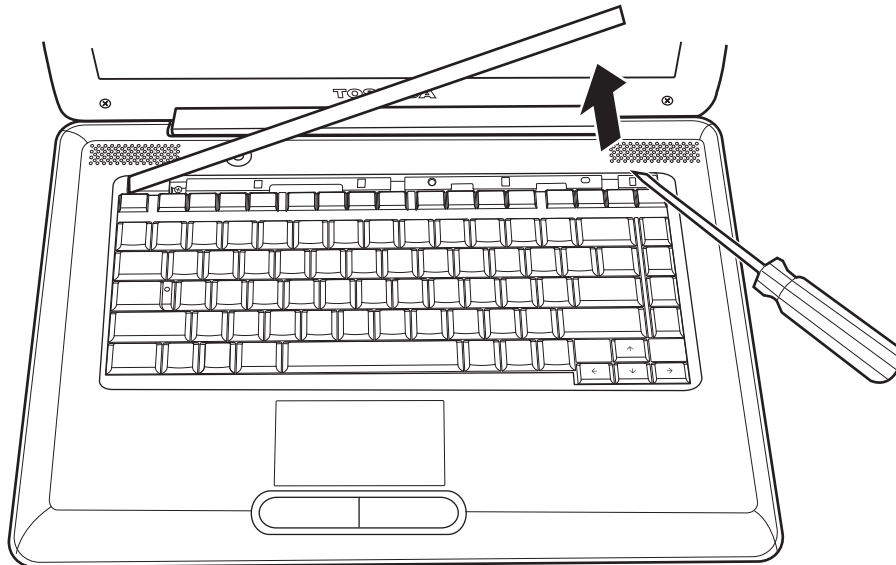


Figure 4.10 Removing the keyboard cover

3. Remove two M2.0x3 screws.

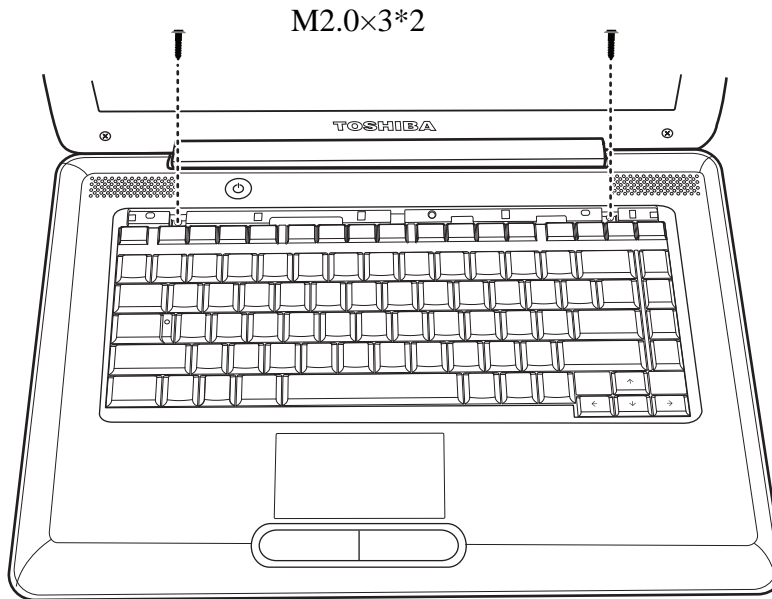


Figure 4.11 Removing screws from the keyboard

4. Flip the keyboard over and detach the cable on the back of the keyboard from the motherboard.

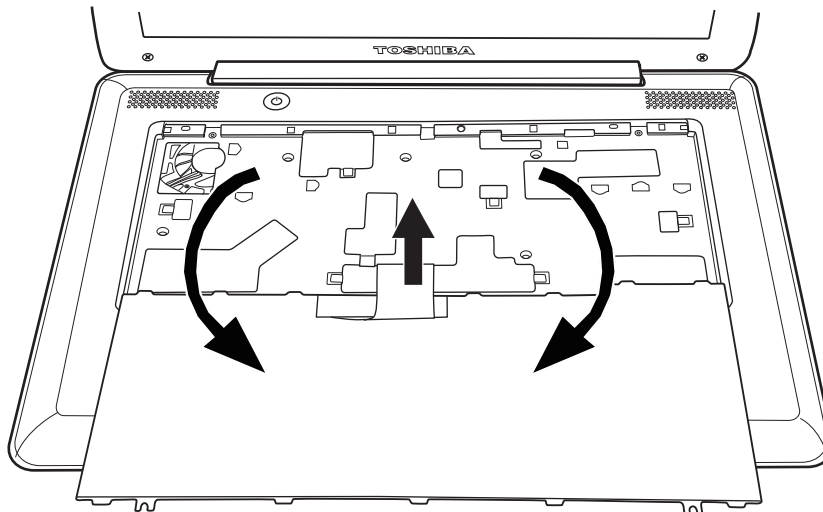


Figure 4.12 Removing the keyboard

**Installing the keyboard Cover and Keyboard**

Install the keyboard cover and keyboard according to the following procedures.

1. Attach the cable on the back of the keyboard to the motherboard and place the keyboard in the correct position.
2. Secure the keyboard with two M2.0x3 screws.
3. Place the keyboard cover in the correct position, then press the cover down from the middle to the left side, make sure the three hooks on the back of the cover stuck in the laptop.
4. Press down the cover on the right side to make sure the two hooks on the back of the cover stuck in the laptop.
5. Press down the cover in the position around the key F9 and slide to the left side to make one hook on the back of the cover stuck in the laptop.

## 4.9 Logic Upper Assembly

### Removing the Logic Upper Assembly

Remove the logic upper assembly according to the following procedures and Figure 4.13 and 4.14.

1. Turn the laptop upside down and remove the following 19 screws:
  - Sixteen M2.5x10 screws
  - Three M2.5x3 screws

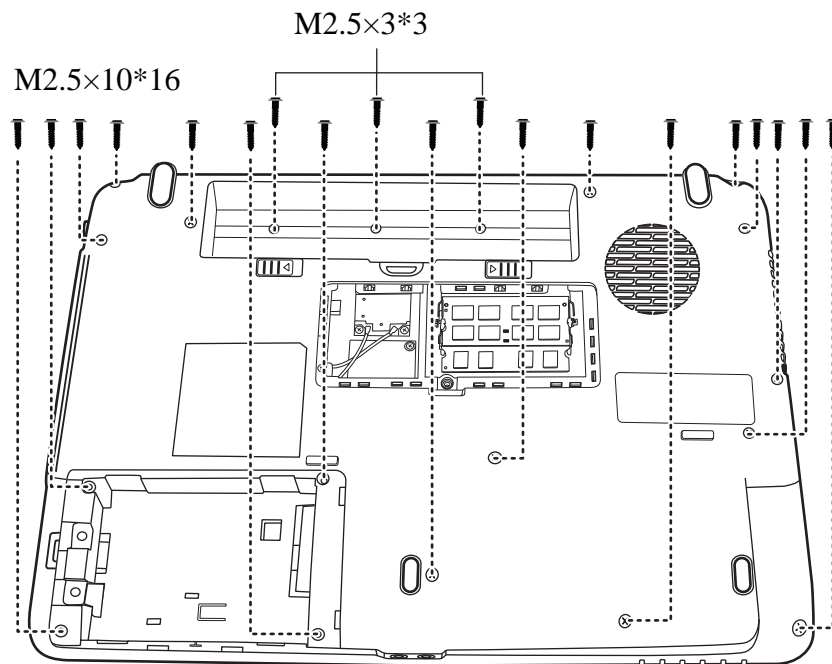


Figure 4.13 Removing the screws from the bottom of the laptop

2. Turn to the front and remove five M2.5x10 screws and detach four cables as indicated in the Figure 4.14.

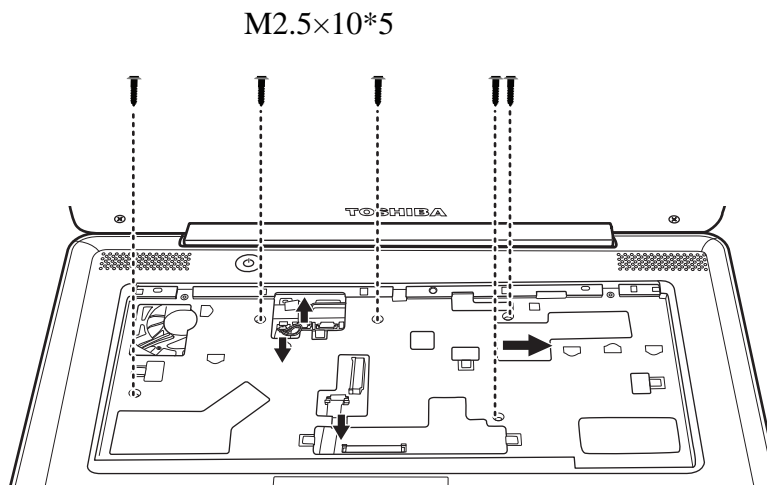


Figure 4.14 Removing five screws from the laptop and detach four cables.

3. Lift up the logic upper assembly.

### Installing the Logic Upper Assembly

Install the logic upper assembly according to the following procedures.

1. Seat the logic upper assembly to the front of the laptop, and adjust to the correct position.
2. Attach the four cables and secure the five screws as indicated in Figure 4.14.
3. Turn the laptop upside down and secure it with 19 screws as indicated in Figure 4.13:
  - Sixteen M2.5x10 screws
  - Three M2.5x3 screws



## 4.10 Power Board

### Removing the Power Board

Remove the power board according to the following procedures and Figure 4.15.

1. Remove one M2.5x4 screw from the power board.
2. Separate the power board from the logic upper assembly.

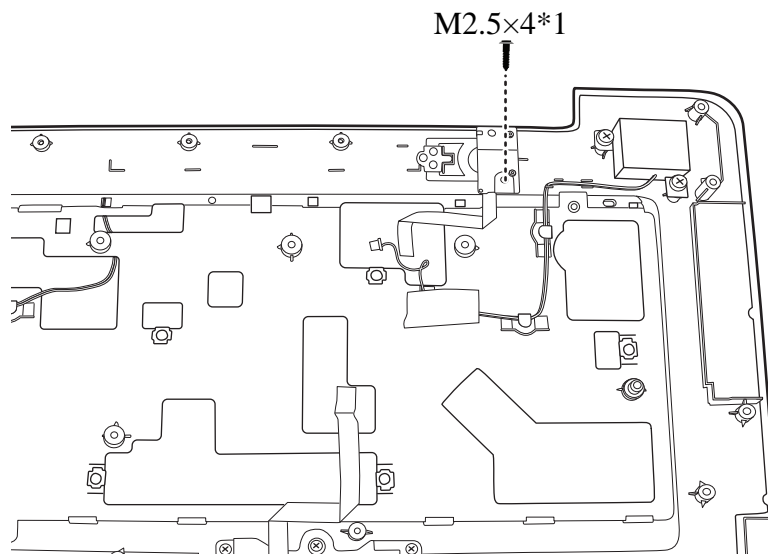


Figure 4.15 Removing the power board

### Installing the power switch board

Install the power switch according to the following procedures.

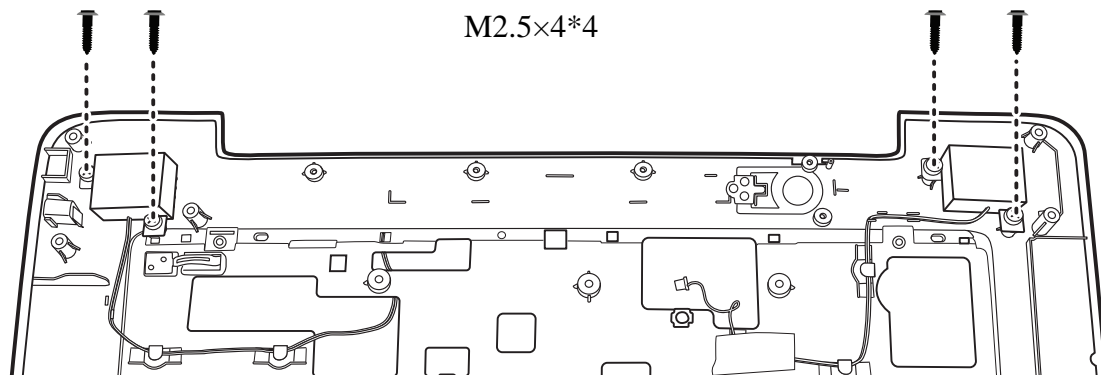
1. Seat the power board in the correct place on the logic upper assembly.
2. Secure the power board with one M2.5x4 screw.

## 4.11 Speakers

### Removing the Speakers

Remove the Speakers according to the following procedures and Figure 4.16.

1. Remove four M2.5x4 screws from the left and right speaker.
2. Remove the left and right speakers from the logic upper assembly.



*Figure 4.16 Removing the speakers*

### Installing the Speakers

Install the speakers according to the following procedures.

1. Seat the left and right speaker in the correct position.
2. Press speakers and secure the speakers with four M2.5x4 screws.

## 4.12 Touch Pad Bracket

### Removing the Touch Pad Bracket

Remove the touch pad bracket according to the following procedures and Figure 4.17.

1. Remove three M2x4 screws from the pouch pad bracket.

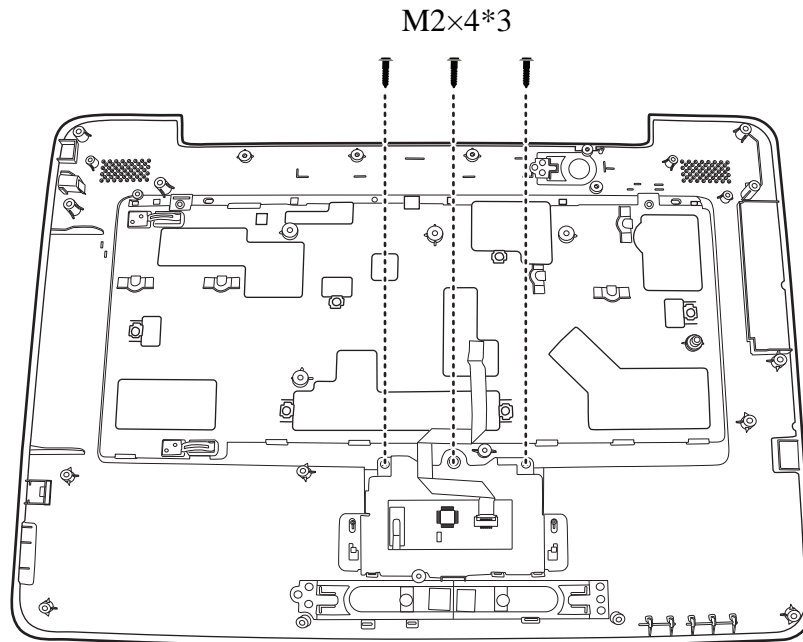


Figure 4.17 Removing the screws from the touch pad bracket

2. Push the touch pad bracket upward to remove it.

### Installing the Touch Pad Bracket

Install the touch pad bracket according to the following procedures.

1. Seat the touch pad bracket in the correct position and secure it with three M2x4 screws.

## 4.13 Thermal Fan

### Removing the Thermal Fan

Remove the thermal fan according to the following procedures and Figure 4.18.

1. Detach the cable from the motherboard.
2. Remove one M2.5x5 screw from the thermal fan.
3. Remove the thermal fan from the logic lower assembly.

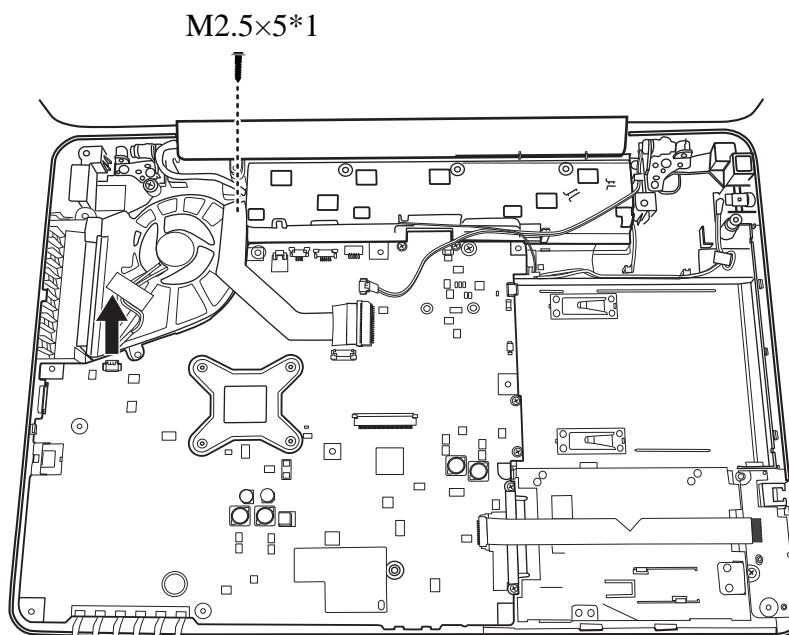


Figure 4.18 Removing the thermal fan from the logic lower assembly

### Installing the Thermal Fan

Install the thermal fan according to the following procedures.

1. Seat the thermal fan in the correct position on the logic lower assembly.
2. Secure the thermal fan with one M2.5x5 screw.
3. Attach the cable to the motherboard.

## 4.14 Motherboard

### Removing the Motherboard

Remove the motherboard according to the following procedures.

1. Remove one M2.5x4 screw and detach three cables from the logic lower assembly as indicated by arrows in Figure 4.19.

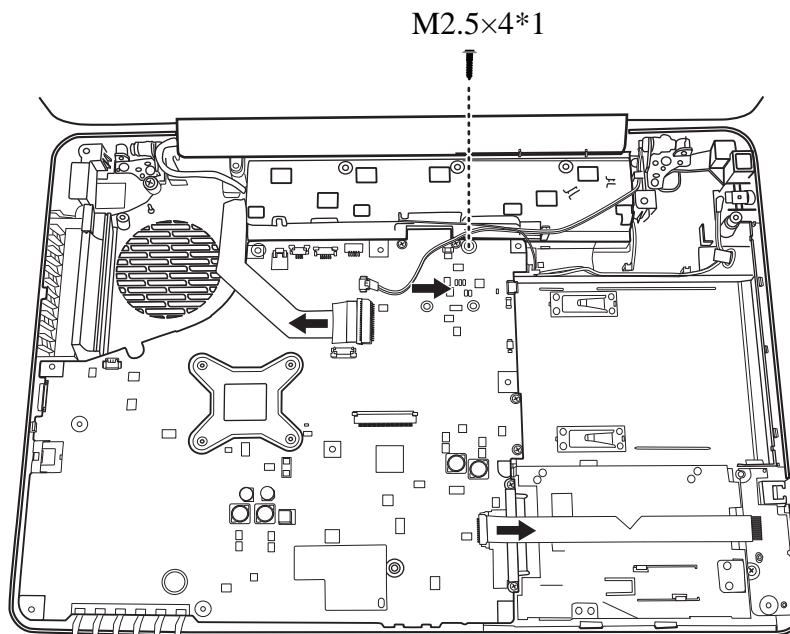


Figure 4.19 Removing motherboard from logic lower assembly

2. Remove the DC\_IN CONN and pull it out of the routing channel, as shown in Figure 4.20.

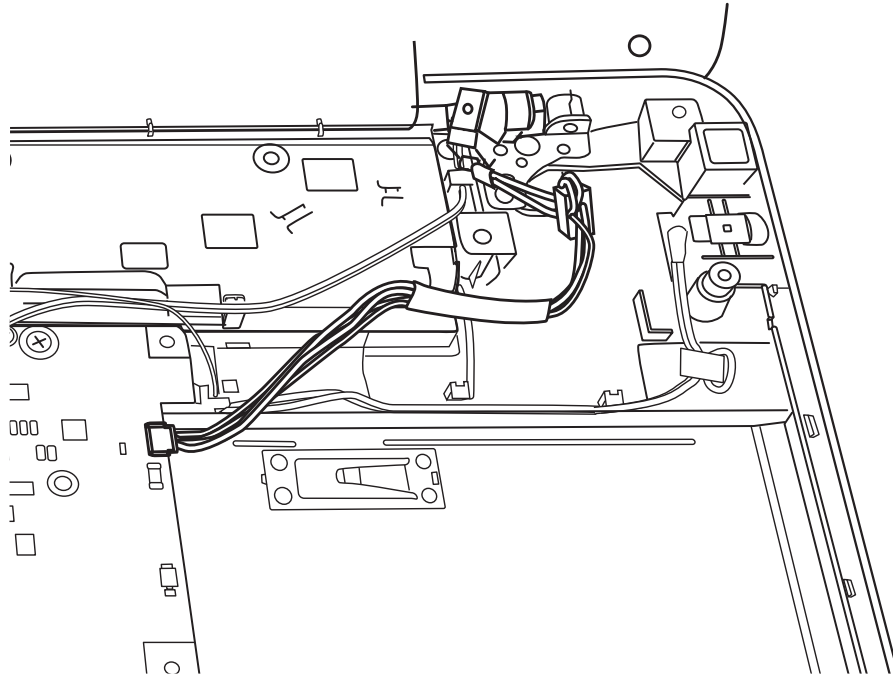


Figure 4.20 Removing the DC\_IN

3. Use left hand to hold down the lower part of the motherboard and right hand to pick the motherboard up.

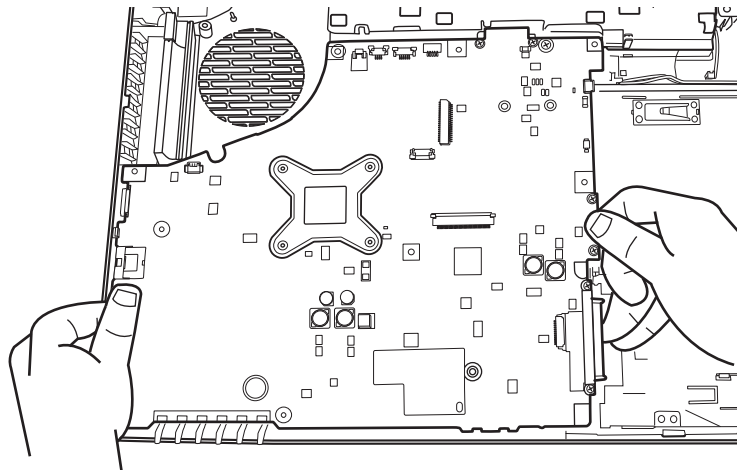


Figure 4.21 Picking up the motherboard

4. Remove the motherboard from the logic lower assembly.

## Installing the Motherboard

Install the motherboard according to the following procedures.

1. Before seat the motherboard on the logic lower assembly, pull out the USB FFC to avoid being pressed.
2. Align the VGA CONN and RJ45 CONN to the holes in the logic lower assembly as shown in Figure 4.22.

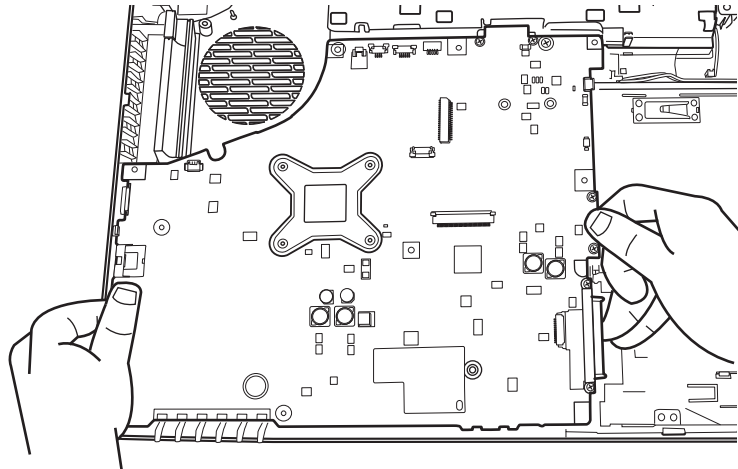


Figure 4.22 Align the VGA CONN and RJ45 CONN

3. Align the Audio CONN to the holes in the logic lower assembly and push the motherboard downward. Make sure the SPDIF & Audio CONN fit the holes.

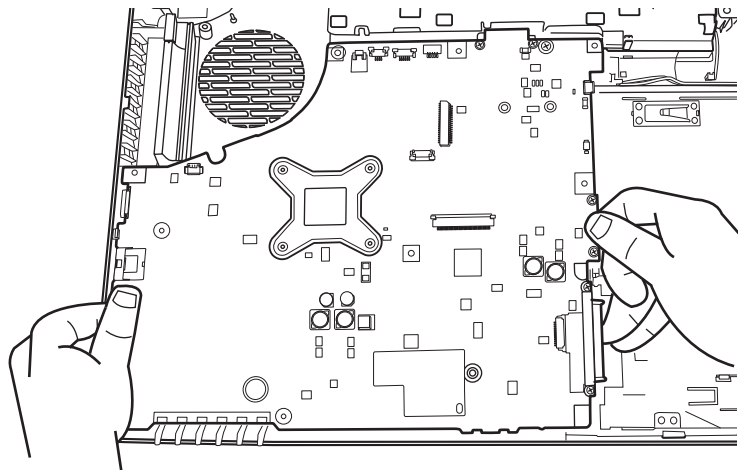
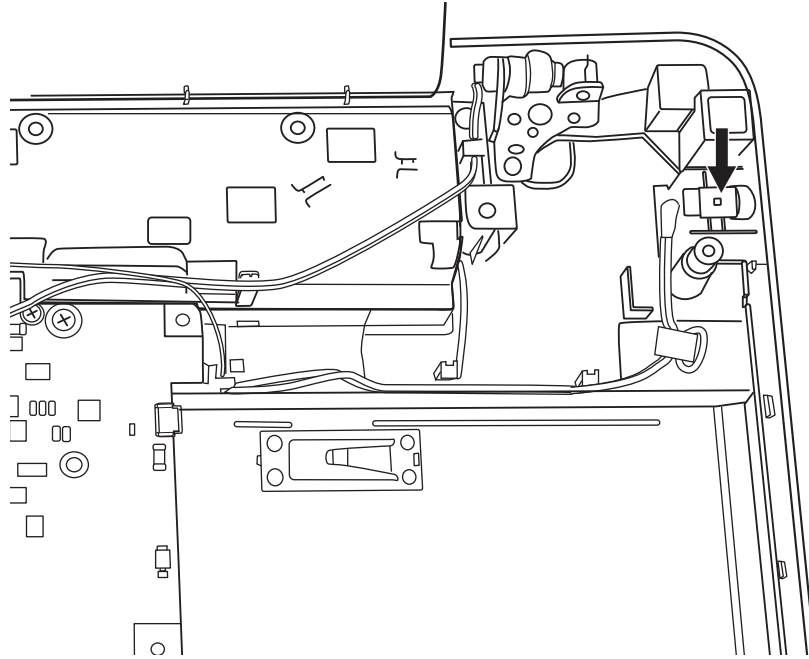


Figure 4.23 Align the Audio CONN

4. Put the DC\_IN CONN in the lower DC\_IN trough and route the cable from left to right under the routing channel as shown in Figure 4.24.



*Figure 4.24 Installing the DC-in jack*

5. Secure one M2.5x4 screw.
6. Attach three cables to the motherboard as indicated by arrows in Figure 4.19.



## 4.15 CPU and Thermal Module

### Removing CPU and Thermal Module

Remove the CPU and the CPU thermal module according to the following procedures and Figure 4.25, 4.26.

**CAUTION:**

*When removing the thermal module, keep the following in mind:*

1. *The thermal module can become very hot during operation. Be sure to let it cool down before starting the repair work.*
2. *If you remove the CPU thermal module, please use soft cloth with alcohol to clean the CPU and CPU thermal module. Reapply Shinetsu 7762 grease before installing the CPU thermal module. If you use one new CPU thermal module, please make sure remove the release paper first.*

1. Remove four spring screws securing the thermal module to the motherboard, according to the number sequence sealed on the thermal module.
2. Remove the thermal module from the motherboard.

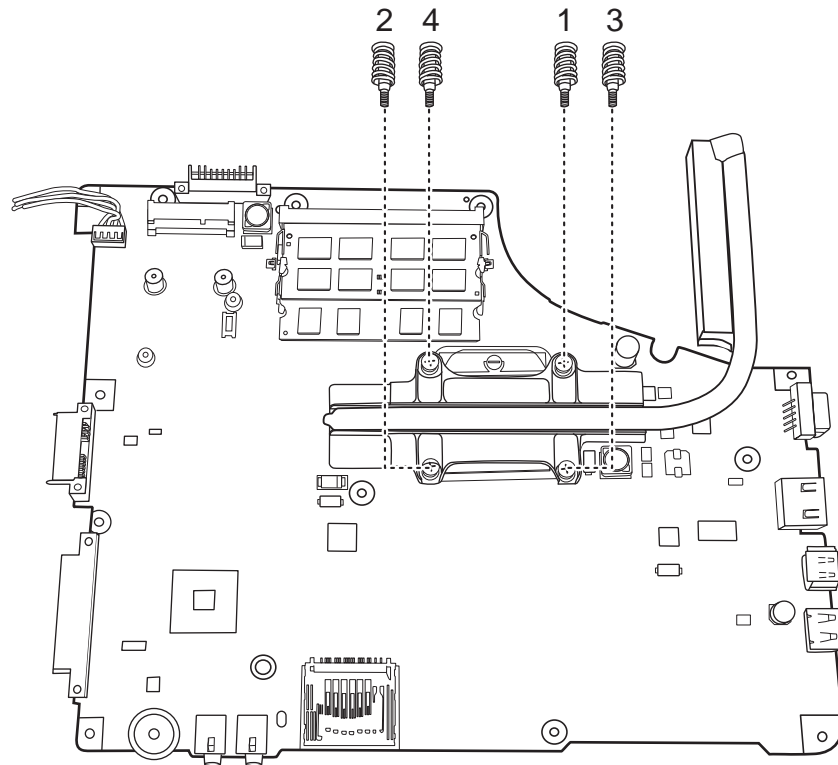


Figure 4.25 Removing the Thermal Module spring screws

**CAUTION:**

When removing the CPU, keep the following in mind:

The CPU can become very hot during operation. Be sure to let it cool down before starting repair work.

3. Unlock the CPU by rotating the cam on the CPU socket counterclockwise to the unlock position with a flat-blade screwdriver.

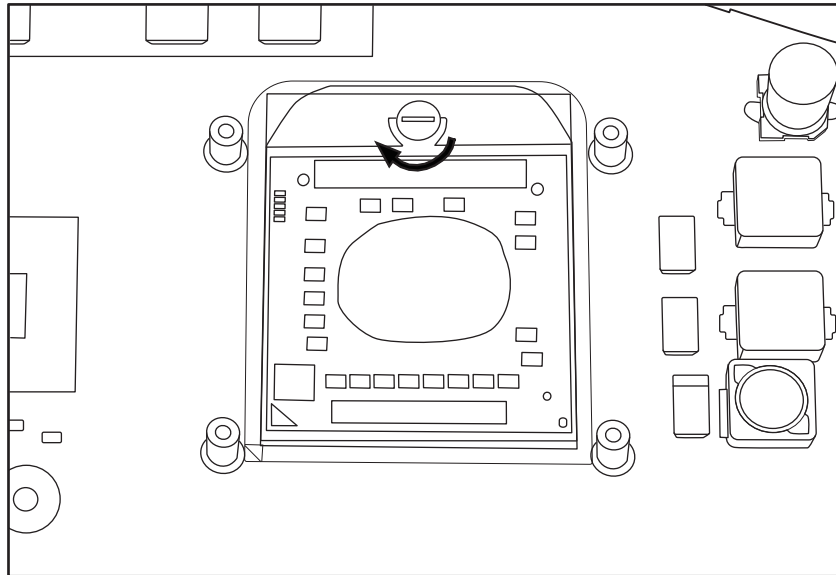


Figure 4.26 Removing the CPU

4. Remove the CPU.

### Installing CPU and Thermal Module

Install the CPU and Thermal Module according to the following procedures.

1. Check the cam is in the unlock position.
2. Seat the CPU on the socket, using care not to damage the pins. Align the CPU with the CPU socket by using the triangle as a guide.
3. Rotate the cam clockwise to the lock position with a flat-blade screwdriver.

#### **CAUTION:**

*When installing the thermal module, keep the following in mind:*

1. *Be sure to confirm the correct position for the module.*
2. *Secure the relevant screws on the motherboard according to the number sequence sealed on the thermal module.*

4. Reapply Shinetsu 7762 grease on the CPU thermal module as shown in Figure 4.27. If you use one new CPU thermal module, remove the release papers on the thermal pads first.

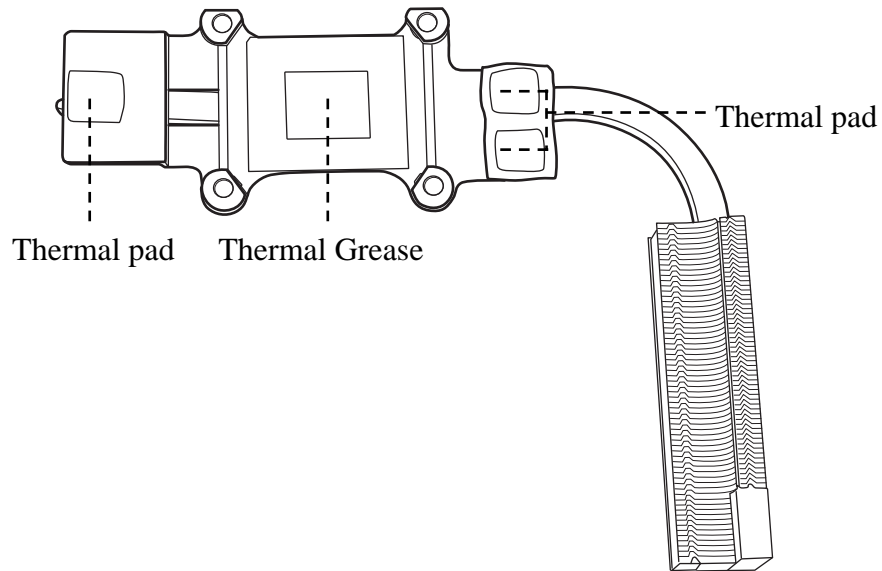


Figure 4.27 Reapply the Shinetsu 7726 grease on the thermal module and remove the release papers

5. Install the thermal module into the correct position in the laptop.
6. Secure it with four spring screws according to the number sequence sealed on the thermal module.

## 4.16 Display Assembly

### Removing the Display Assembly

**CAUTION:** Use care to avoid the antenna cable being caught between the display assembly and the laptop.

Remove the display assembly according to the following procedures and Figure 4.28, 4.29.

1. Turn the laptop so the rear is facing you and remove two M2.5x4.5 screws.



Figure 4.28 Removing the screws from the rear of the laptop

2. Remove three M2.5x4 and one M2.5x5 screws securing the display assembly to the laptop.

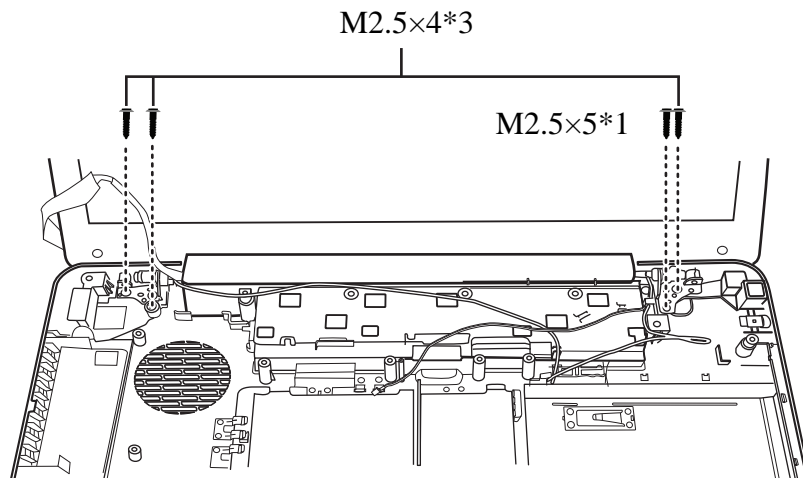


Figure 4.29 Removing the display assembly

3. Remove the display assembly.

**Installing the Display Assembly**

Install the display assembly according to the following procedures.

1. Place the display assembly in the correct position.
2. Secure the display assembly with three M2.5x4 screws and one M2.5x5 screw.
3. Close the display panel and turn the laptop so the rear is facing you and secure two M2.5x4.5 screws.

## 4.17 LCD Bezel Assembly

### Removing the LCD Bezel Assembly

Remove the LCD bezel assembly according to the following procedures.

1. Remove four rubber seals from the LCD bezel assembly.
2. Remove two M2.5x5 and two M2.5x6 screws as shown in Figure 4.30.

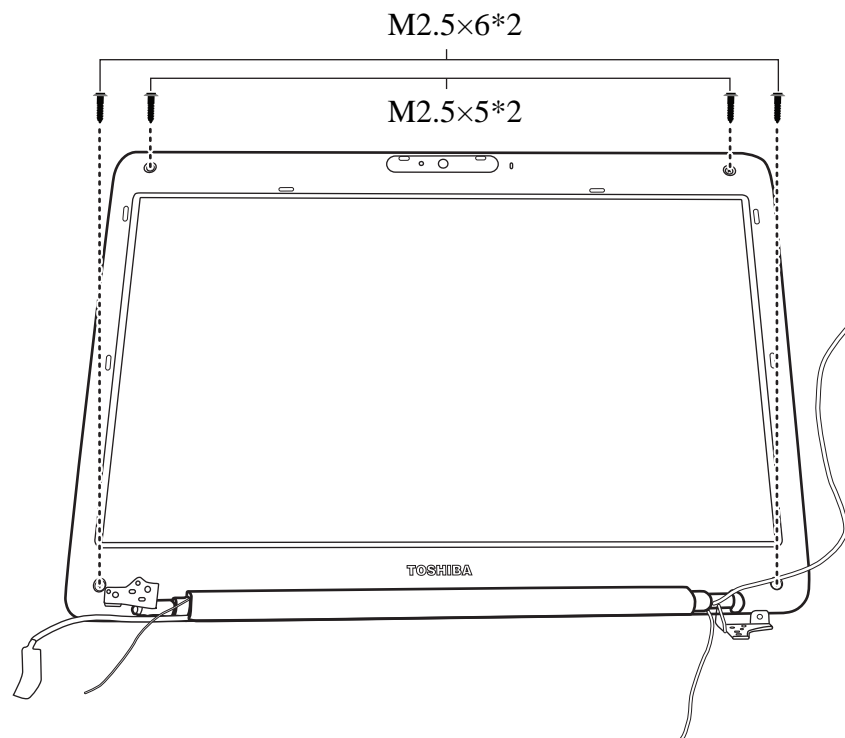
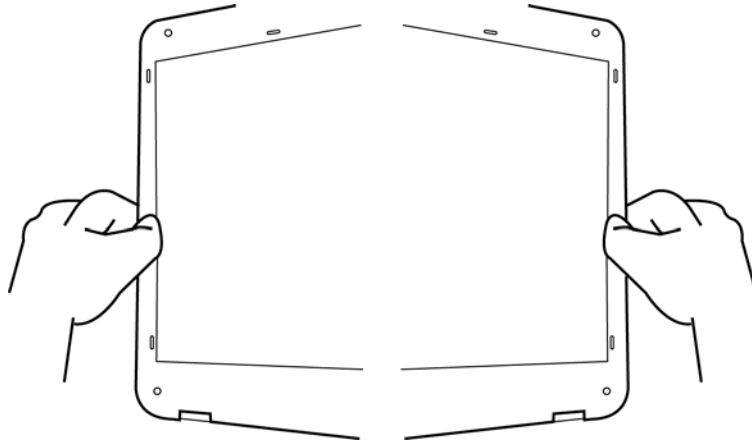


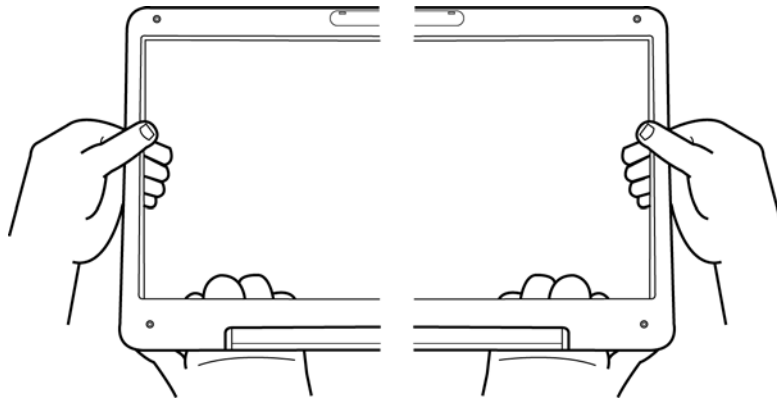
Figure 4.30 Removing the LCD Bezel Assembly

3. Peel off the bezel from left and right side as shown in Figure 4.31.



*Figure 4.31 Peel off the bezel*

4. Push the bezel from the left and right side as shown in Figure 4.32 and remove the bezel from the display assembly.



*Figure 4.32 Remove the bezel*

### **Installing the Display Mask**

Install the LCD bezel assembly according to the following procedures.

1. Seat the LCD bezel assembly in the correct position.



2. Press the bezel downside hook as shown in Figure 4.33.

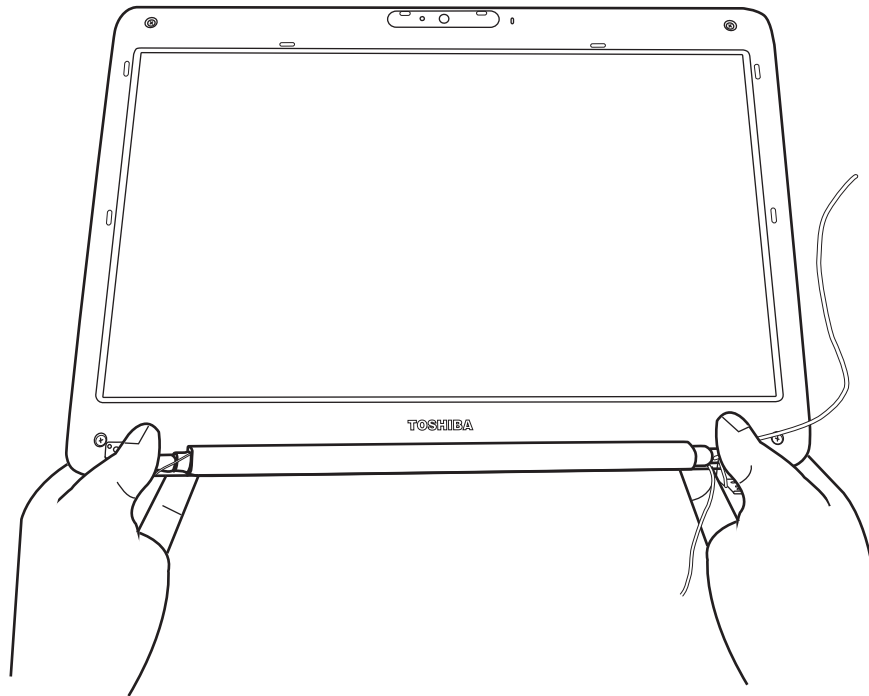


Figure 4.33 Press the bezel downside hook

3. Press the left and right side of the bezel as shown in Figure 4.34.

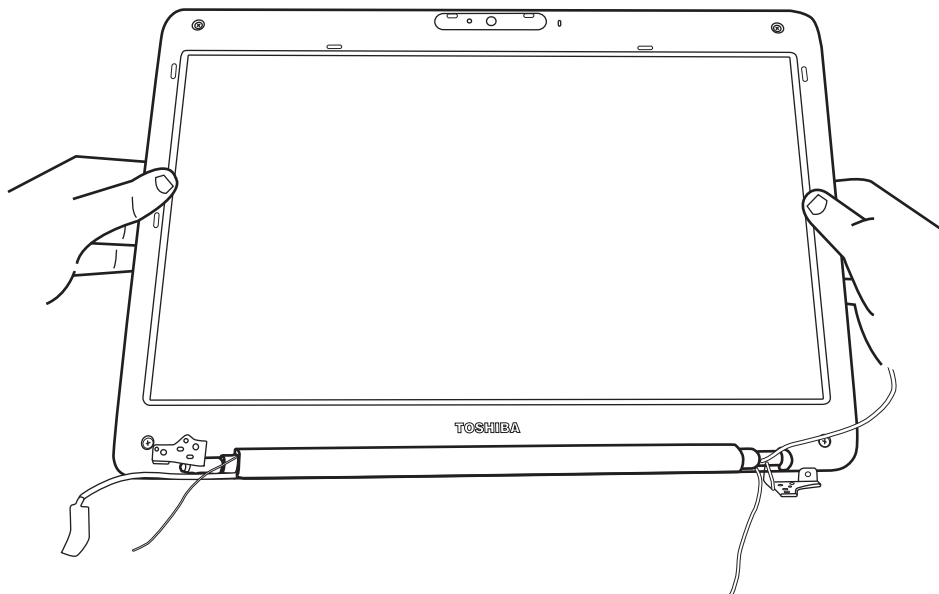
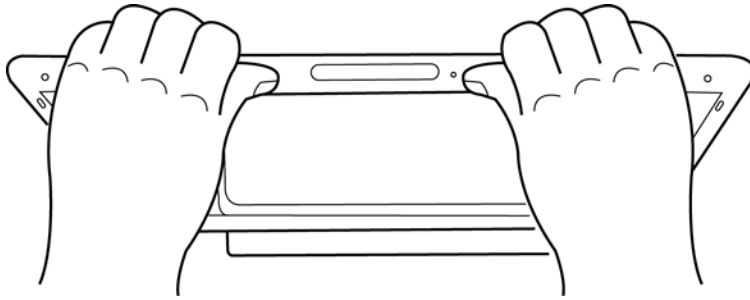


Figure 4.34 Press the left and right side of the bezel

4. Press the bezel upside hooks as shown in Figure 4.35.



*Figure 4.35 Press the bezel upside hooks*

5. Secure it to the display assembly with two M2.5x5 and two M2.5x6 screws.
6. Put four rubber seals over the screw holes.

## 4.18 LCD Module and Inverter Board

### Removing the LCD Module and Inverter Board

Remove the LCD module and the inverter board according to the following procedures and Figure 4.36, 4.37, 4.38 and 4.39.

1. Remove one M2x4 screw securing the inverter board and detach two cables connected to the two ends of the inverter. Then remove the inverter board.

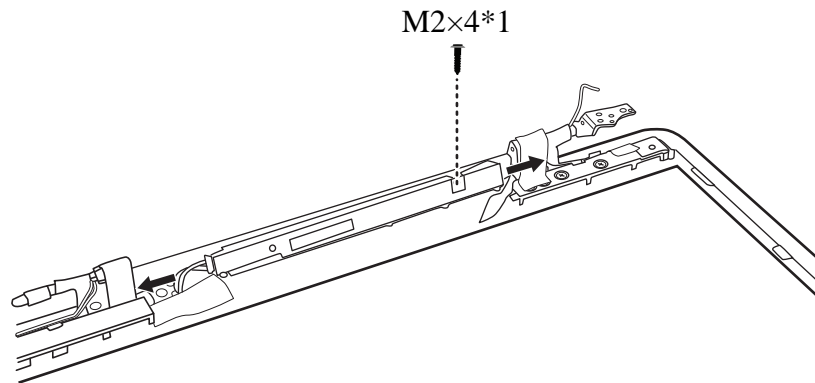
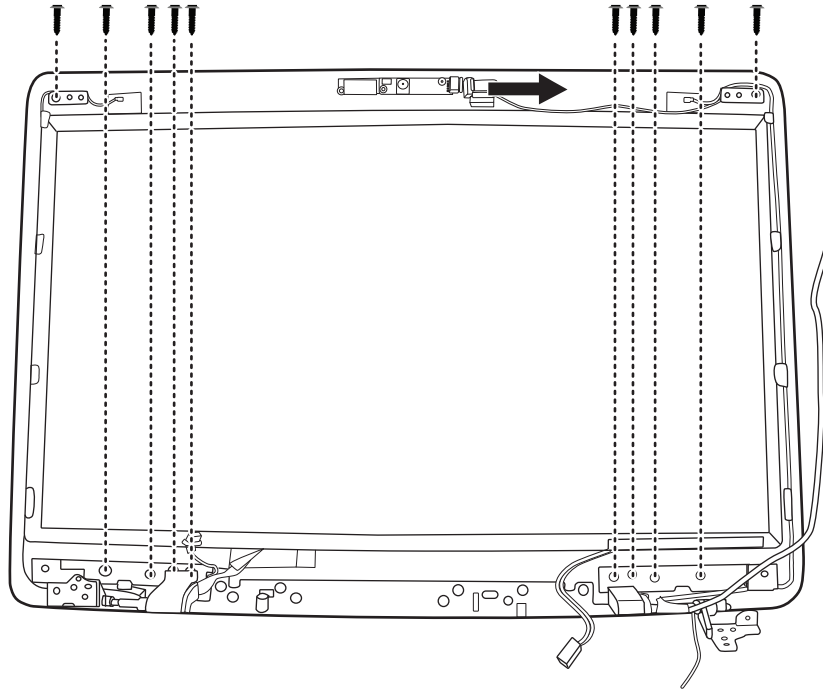


Figure 4.36 Removing the Inverter Board

2. Remove ten M2.5x4 screws securing the LCD module to the LCD cover assembly and detach one cable from camera.
3. Lift the LCD module out of the LCD cover assembly.

M2.5×4\*10



*Figure 4.37 Removing the LCD Module from the LCD cover assembly*

4. Remove six M2x3 screws according to the sequence indicated in Figure 4.38 on each side of the LCD hinge assembly and then remove the LCD hinge assembly.

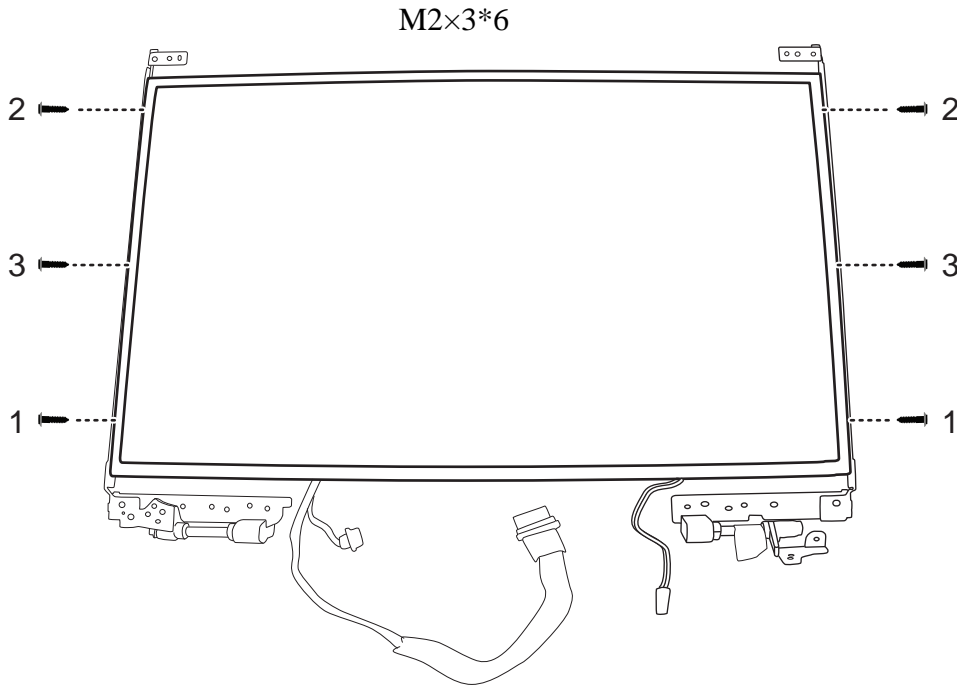


Figure 4.38 Removing the LCD Hinge Assembly

5. Turn the LCD module over and place it face down on a protective surface, such as a foam pad.
6. Remove the tape and LVDS cable connector. Then detach the LVDS cable.

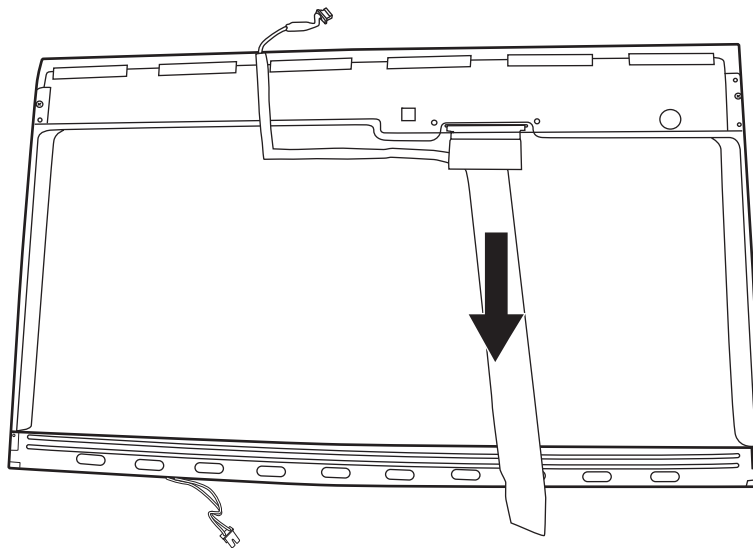


Figure 4.39 Removing the LCD module

**NOTE:**

*ICs are fragile. Use extreme care not to apply pressure to the ICs along the edges of the LCD module.*

*Dispose of used LCD panels (fluorescent (FL) tubes) as required by local ordinances or regulations.*

*The LVDS cable must be carefully peeled away before disconnecting it from the LCD panel.*

**Installing the LCD Module and Inverter Board**

Install the inverter board according to the following procedures.

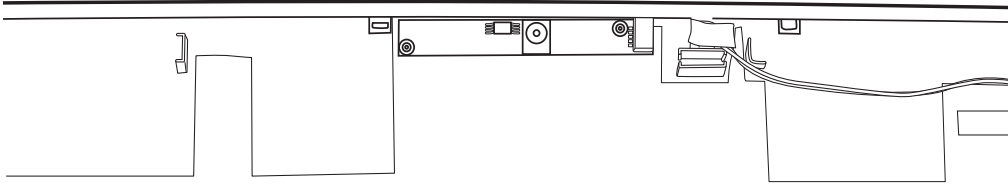
1. Place the LCD module cover face down on a protective surface such as a foam pad.
2. Connect the LVDS cable to the LCD panel connector.
3. Turn the LCD right side up.
4. Seat the LCD hinge assembly in the correct position beside the LCD panel and secure it with six M2x3 screws.
5. Seat the LCD module in the correct position in the LCD cover assembly and secure it to the LCD cover assembly with ten M2.5x4 screws.
6. Seat the inverter board in correct position and connect two cables to the two ends of the inverter board. Then secure it with one M2x4 screw.

## **4.19 Camera (BTO)**

### **Removing the Camera**

Remove the camera according to the following procedures and Figure 4.40.

1. Pick the camera up from the LCD cover.



*Figure 4.40 Removing the camera*

### **Installing the Camera**

Install the camera according to the following procedures.

1. Put the camera in the correct position on the LCD cover.

## 4.20 Hinge Saddle

### Removing the Hinge Saddle

Remove the hinge saddle according to the following procedures and Figure 4.41.

1. Remove two M2.5x6 screws that secure the hinge saddles to the logic lower assembly.
2. Remove the hinge saddles from the logic lower assembly.

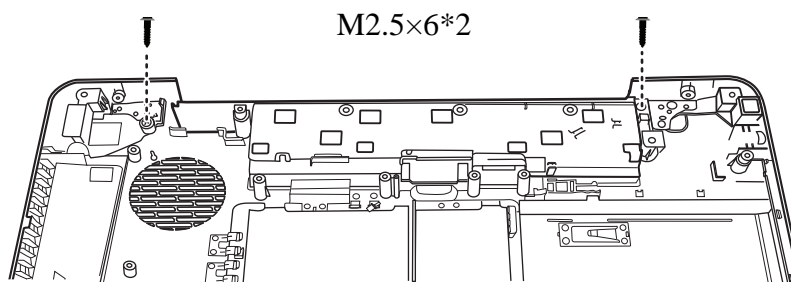


Figure 4.41 Removing the Hinge Saddle

### Installing the Hinge Saddle

Install the hinge saddle according to the following procedures.

1. Seat the hinge saddles in the correct position on the logic lower assembly.
2. Secure the hinge saddles with two M2.5x6 screws.



## 4.21 USB Board

### Removing the USB Board

Remove the USB board according to the following procedures and Figure 4.42.

1. Remove one M2.5x3 screw that secures the USB board to the logic lower assembly.
2. Remove the USB board from the logic lower assembly.

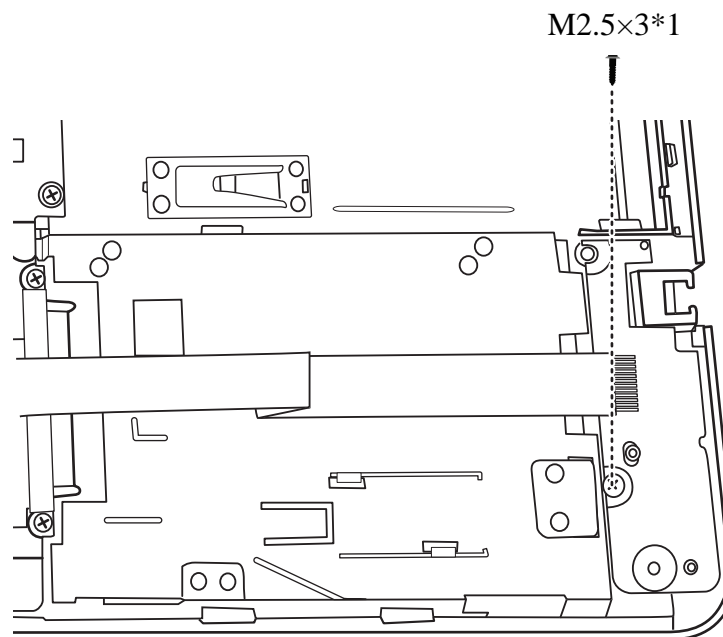


Figure 4.42 Removing the USB Board

### Installing the USB Board

Install the USB board according to the following procedures.

1. Seat the USB board in the correct position on the logic lower assembly.
2. Secure the USB board to the logic lower assembly with one M2.5x3 screw.

## 4.22 RJ11 Jack

### Removing the RJ11 Jack

Remove the RJ11 jack according to the following procedures and Figure 4.43.

1. Pick up the RJ11 jack from the socket on the logic lower assembly and pull the cable out of the routing channel.

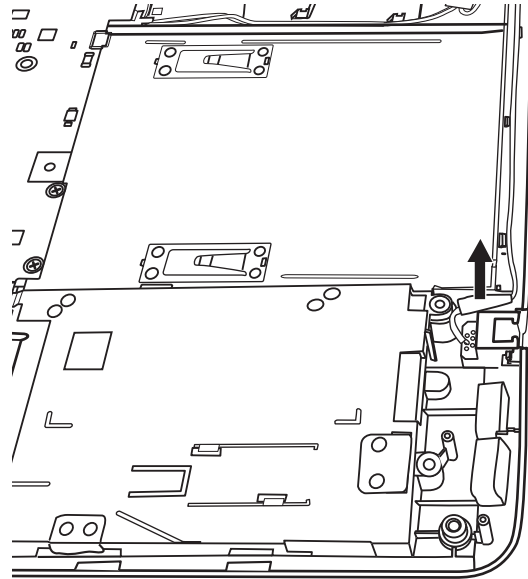


Figure 4.43 Removing the FM Jack

### Installing the RJ11 Jack

Install the RJ11 Jack according to the following procedures.

1. Seat the RJ11 jack in the socket on the logic lower assembly.
2. Align the cable to the routing channel on the logic lower assembly.

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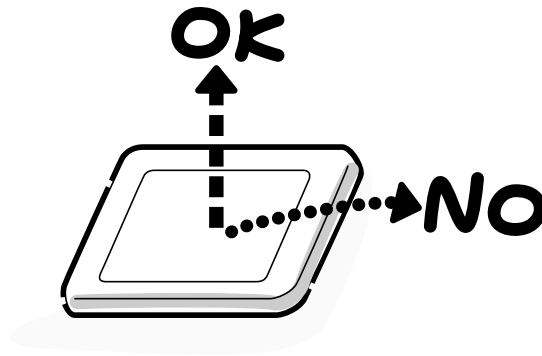
## Appendix A Handling the LCD Module

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### Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling it to prevent damaging it.

1. When installing the LCD module in the display assembly, make sure that you seat it so that it is properly aligned and maximum visibility of the display is maintained.



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

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



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

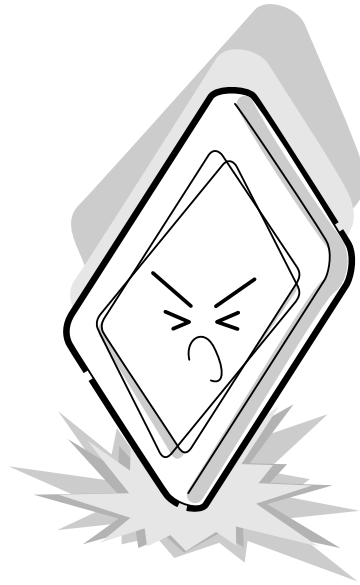
If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a soft cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.



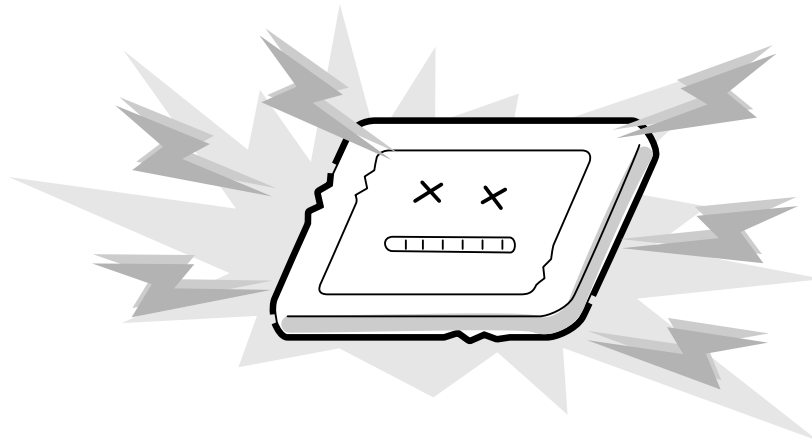
4. If water or other liquid is left on the panel's surface for a long period, it can change the screen's tint or stain it. Be sure to quickly wipe off any liquid.



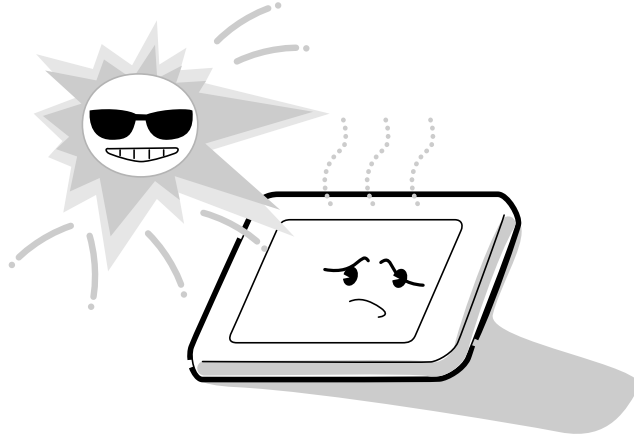
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



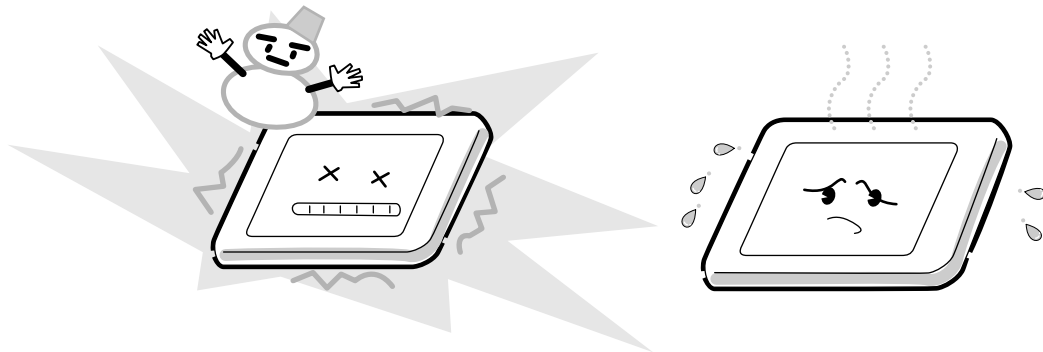
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle grounding device when handling the module.



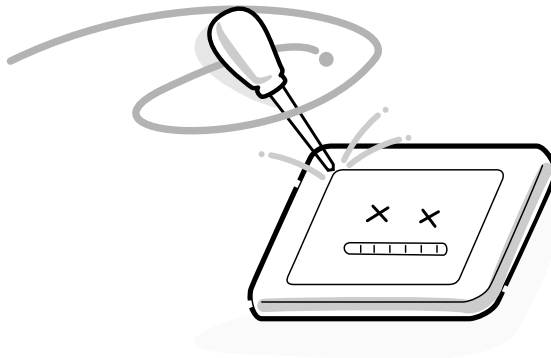
7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.



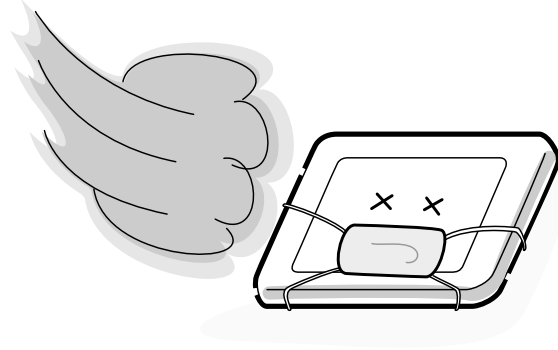
8. Do not store the module at temperatures below its specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.



9. Do not disassemble the LCD module. Disassembly can cause malfunctions.



10. If you transport the module, do not use packing material that contains epoxy resin (amine) or silicon glue (alcohol or oxime). These materials can release gas that can damage the panel's polarization.



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## Appendix B Board Layout

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### B.1 System Board Top View

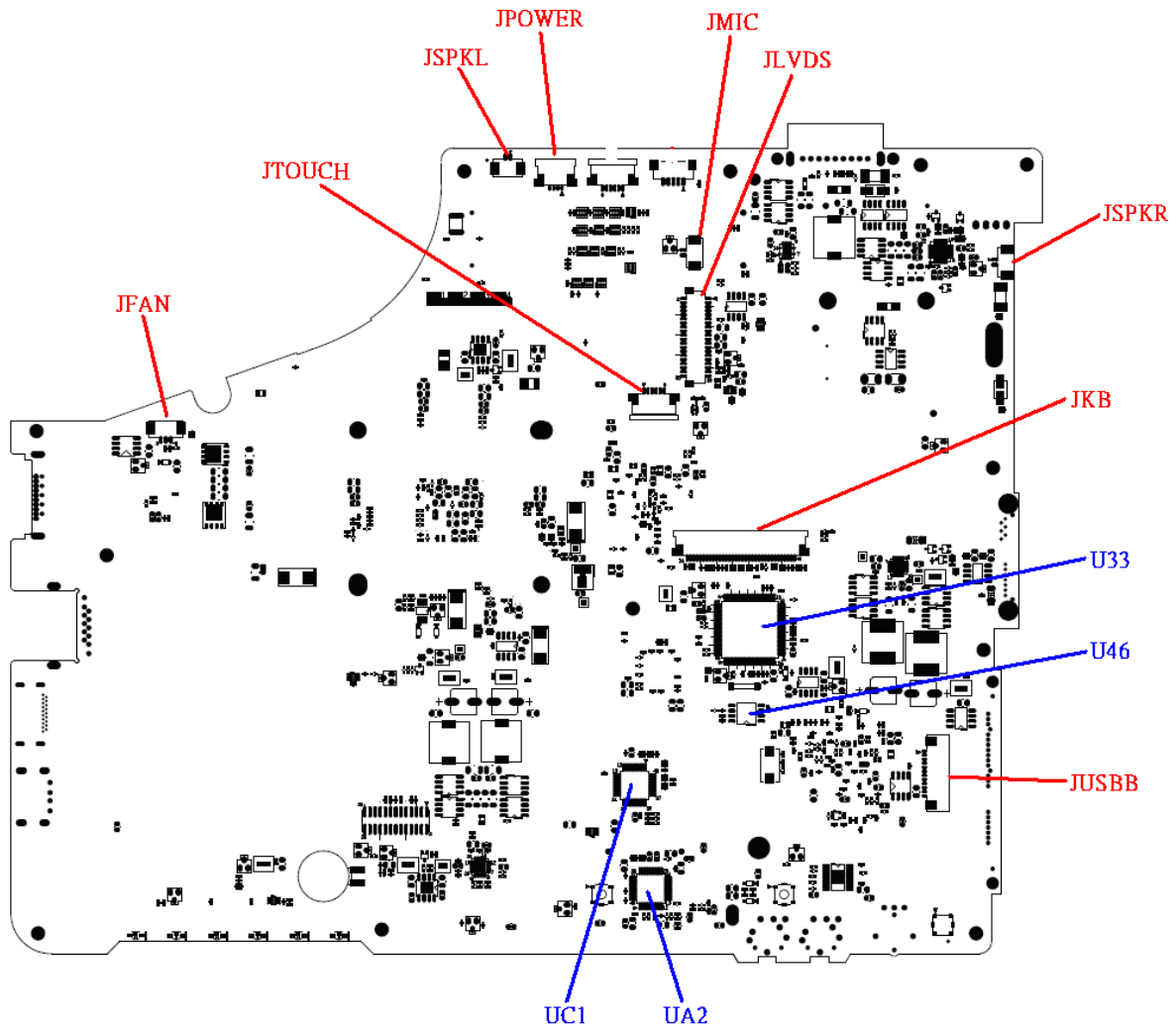


Figure B-1 System Board Layout (Top)



## B.2 System Board Bottom View

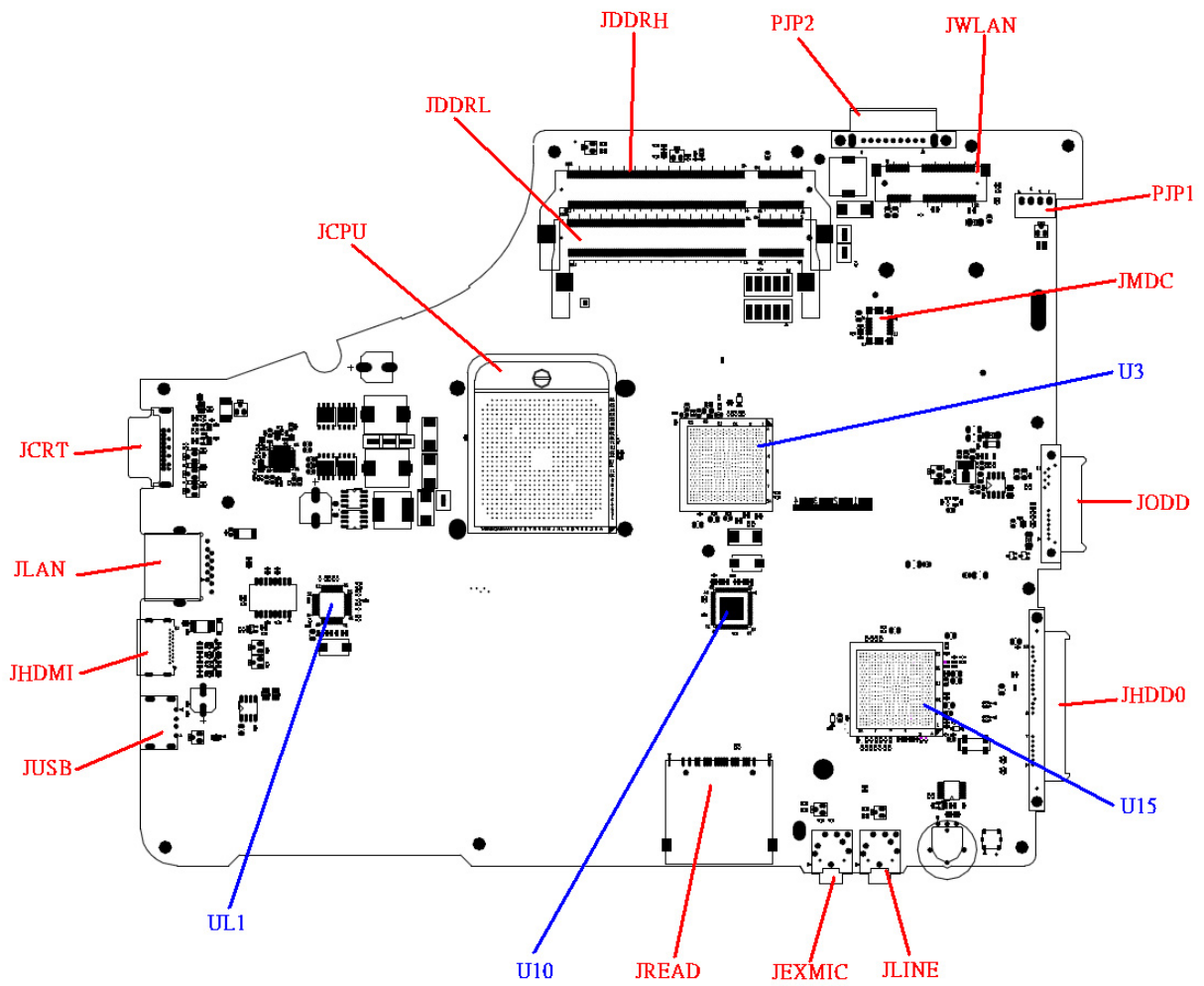


Figure B-2 System Board Layout (Bottom)

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

<b>Number</b>	<b>Name</b>
U3	North Bridge (RS780MN / RS780MC)
U10	Clock Generator (SLG8SP626VTR)
U15	South Bridge (SB700)
U33	EC (KB926QFD3)
U46	BIOS ROM
UA2	CODEC (ALC272-GR)
UC1	Card Reader Controller (RTS5159-VDD-GR )
UL1	LAN Controller (RTL8103EL-GR)

*Table B-2 System Board Connectors (top and bottom)*

<b>Number</b>	<b>Name</b>
JCPU	CPU Socket
JFAN	Fan conn.
JDDR1, JDDR2	DDR2 conn.
JCRT	CRT conn.
JREAD	3 in 1 Card Reader conn.
JMIC	Microphone conn.
JSPKR, JSPKL	Speaker conn.
JWLAN	WLAN conn.
JHDD0	1 <sup>ST</sup> SATA HDD conn.
JODD	ODD conn.
JUSB	USB conn.
JHDMI	HDMI conn.
JKB	Keyboard conn.
JTOUCH	TP/B conn.
JPOWER	Power/B conn.
JLAN	LAN conn.
JLINE	Headphones conn.
JEXMIC	External MIC conn.
JLVDS	LVDS conn.
JUSBB	USB/B conn.
JMDC	MDC conn.

PJP1	AC Adaptor conn.
PJP2	Battery conn.

## Appendix C Pin Assignments

### System Board

#### C.1 JFAN

Table C-1 FAN I/F pin assignments (3-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+FAN1	-	2	FAN_SPEED1	I
3	GND	-			

#### C.2 JLVDS

Table C-2 LVDS I/F pin assignments (40-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	GND	-
3	UMA_LCD_TXCLK_ACLK+	O	4	UMA_LCD_TXOUT0_A0+	O
5	UMA_LCD_TXCLK_ACLK-	O	6	UMA_LCD_TXOUT0_A0-	O
7	GND	-	8	GND	-
9	DAC_BRIG	O	10	UMA_LCD_TXOUT0_A1+	O
11	INVT_PWM	O	12	UMA_LCD_TXOUT0_A1-	O
13	GND	-	14	GND	-
15	NC	-	16	UMA_LCD_TXOUT0_A2+	O
17	NC	-	18	UMA_LCD_TXOUT0_A2-	O
19	GND	-	20	GND	-
21	UMA_LCD_DDC_CLK	O	22	NC	O
23	UMA_LCD_DDC_DAT	O	24	+5V_LVDS_CAM	-
25	+LCDVDD_R	-	26	GND	-
27	+LCDVDD_R	-	28	USB20_P9_R	O
29	+3VS	-	30	USB20_N9_R	O
31	NC	-	32	GND	-
33	+LCD_INV	-	34	NC	-
35	+LCD_INV	-	36	NC	-
37	+LCD_INV	-	38	GND	-
39	+LCD_INV	-	40	BKOFF#	O

### C.3 JCRT

Table C-3 CRT pin assignments (15-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	RED_L	O	2	GREEN_L	O
3	BLUE_L	O	4	GND	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	+CRT_VCC	-	10	GND	-
11	NC	-	12	D_DDCCDATA	O
13	HSYNC	O	14	VSYNC	O
15	D_DDCCCLK	O			

### C.4 JHDMI

Table C-4 HDMI I/F pin assignments (19-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	HDMI_R_D2+	O	2	GND	-
3	HDMI_R_D2-	O	4	HDMI_R_D1+	O
5	GND	-	6	HDMI_R_D1-	O
7	HDMI_R_D0+	O	8	GND	-
9	HDMI_R_D0-	O	10	HDMI_R_CK+	O
11	GND	-	12	HDMI_R_CK-	O
13	NC	-	14	NC	-
15	HDMI_SCLK	O	16	HDMI_SDATA	O
17	GND	-	18	+HDMI_5V_OUT	-
19	HDMI_HPD	O			

### C.5 JHDD0

Table C-5 HDD I/F pin assignments (22-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	SATA_TXP1	O
3	SATA_TXN1	O	4	GND	-

5	SATA_IRX_DT X_N1	O	6	SATA_IRX_DT X_P1	O
7	GND	-	8	+3VS	-
9	+3VS	-	10	+3VS	-
11	GND	-	12	GND	-
13	GND	-	14	+5VS	-
15	+5VS	-	16	+5VS	-
17	GND	-	18	NC	-
19	GND	-	20	NC	-
21	NC	-	22	NC	-

## C.6 JODD

Table C-6 SATA ODD I/F pin assignments (14-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	SATA_TXP3	O
3	SATA_TXN3	O	4	GND	-
5	SATA_IRX_DT X_N3	O	6	SATA_IRX_DT X_P3	O
7	GND	-	8	NC	-
9	+5VS	-	10	+5VS	-
11	NC	-	12	GND	-
13	GND	-	14	GND	-

## C.7 JCAM

Table C-7 Internal Camera Connector pin assignments (5-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5V_CAM	-	2	USB20_N9_R_R	I/O
3	USB20_P9_R_R	I/O	4	GND	-
5	GND	-			

## C.8 JWLAN

Table C-8 WLAN Connector pin assignments (52-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
A1	NC	-	A2	+3VS	-
A3	NC	-	A4	GND	-
A5	NC	-	A6	+1.5VS	-
A7	CLKREQ_MCARD 2#	I	A8	NC	-
A9	GND	-	A10	NC	-
A11	CLK_PCIE_MCAR D2#	O	A12	NC	-
A13	CLK_PCIE_MCAR D2	O	A14	NC	-
A15	GND	-	A16	NC	-
A17	NC	-	A18	GND	-
A19	NC	-	A20	WL_OFF#	O
A21	GND	-	A22	PLT_RST#	O
A23	PCIE_PTX_C_IRX _N2	I	A24	+3VS	-
A25	PCIE_PTX_C_IRX _P2	I	A26	GND	-
A27	GND	-	A28	+1.5VS	-
A29	GND	-	A30	SMB_CK_CLK1	I/O
A31	PCIE_ITX_C_PRX _N2	O	A32	SMB_CK_DAT1	I/O
A33	PCIE_ITX_C_PRX _P2	O	A34	GND	-
A35	GND	-	A36	USB20_N8	I/O
A37	GND	-	A38	USB20_P8	I/O
A39	+3VS	-	A40	GND	-
A41	+3VS	-	A42	NC	-
A43	GND	-	A44	NC	-
A45	NC	-	A46	NC	-
A47	NC	-	A48	+1.5VS	-
A49	E51_TXD_R	O	A50	GND	-
A51	E51_RXD_R	I	A52	+3VS	-

## C.9 JLAN

Table C-9 LAN Connector pin assignments (14-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	RJ45_MIDI0+	I/O	2	RJ45_MIDI0-	I/O
3	RJ45_MIDI1+	I/O	4	NC	-
5	NC	-	6	RJ45_MIDI1-	I/O
7	NC	-	8	NC	-
9	+3V_LAN	-	10	LAN_SK_LAN_LI NK#	O
11	+3V_LAN	-	12	LAN_ACTIVITY#	O
13	LANGND	-	14	LANGND	-

## C.10 JDDR1, JPDDRH

Table C-10 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	VSS	O
3	VSS	O	4	DQ4	I/O
5	DQ0	I/O	6	DQ5	I/O
7	DQ1	I/O	8	VSS	O
9	VSS	O	10	DM0	I/O
11	DQS0#	I/O	12	VSS	O
13	DQS0	I/O	14	DQ6	I/O
15	VSS	O	16	DQ7	I/O
17	DQ2	I/O	18	VSS	O
19	DQ3	I/O	20	DQ12	I/O
21	VSS	O	22	DQ13	I/O
23	DQ8	I/O	24	VSS	I/O
25	DQ9	I/O	26	DM1	O
27	VSS	O	28	VSS	O
29	DQS1#	I/O	30	CK0	I/O
31	DQS1	I/O	32	CK0#	I/O

Table C-10 SODIMM I/F pin assignments (200-PIN) (2/4)



Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
33	VSS	O	34	VSS	O
35	DQ10	I/O	36	DQ14	I/O
37	DQ11	I/O	38	DQ15	I/O
39	VSS	O	40	VSS	O
41	VSS	O	42	VSS	O
43	DQ16	I/O	44	DQ20	I/O
45	DQ17	I/O	46	DQ21	I/O
47	VSS	O	48	VSS	O
49	DQS2#	I/O	50v	NC	-
51	DQS2	I/O	52	DM2	I/O
53	VSS	O	54	VSS	O
55	DQ18	I/O	56	DQ22	I/O
57	DQ19	I/O	58	DQ23	I/O
59	VSS	O	60	VSS	O
61	DQ24	I/O	62	DQ28	I/O
63	DQ25	I/O	64	DQ29	I/O
65	VSS	O	66	VSS	O
67	DM3	I/O	68	DQS3#	I/O
69	NC	-	70	DQS3	I/O
71	VSS	O	72	VSS	O
73	DQ26	I/O	74	DQ30	I/O
75	DQ27	I/O	76	DQ31	I/O
77	VSS	O	78	VSS	O
79	CKE0	I/O	80	NC/CKE1	I/O
81	VDD	O	82	VDD	O
83	NC	-	84	NC/A15	-
85	BA2	I/O	86	NC/A14	-
87	VDD	O	88	VDD	O
89	A12	I/O	90	A11	I/O
91	A9	I/O	92	A7	I/O
93	A8	I/O	94	A6	I/O
95	VDD	O	96	VDD	O

Table C-10 SODIMM I/F pin assignments (200-PIN) (3/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
97	A5	I/O	98	A4	I/O
99	A3	I/O	100	A2	I/O
101	A1	I/O	102	A0	I/O
103	VDD	O	104	VDD	O
105	A10/AP	I/O	106	BA1	I/O
107	BAD	I/O	108	RAS#	I/O
109	WE#	I/O	110	S0#	I/O
111	VDD	O	112	VDD	O
113	CAS#	I/O	114	ODT0	I/O
115	NC/S1#	I/O	116	NC/A13	I/O
117	VDD	O	118	VDD	O
119	NC/ODT1	I/O	120	NC	-
121	VSS	O	122	VSS	O
123	DQ32	I/O	124	DQ36	I/O
125	DQ33	I/O	126	DQ37	I/O
127	VSS	O	128	VSS	O
129	DQS4#	I/O	130	DM4	I/O
131	DQS4	I/O	132	VSS	O
133	VSS	O	134	DQ38	I/O
135	DQ34	I/O	136	DQ39	I/O
137	DQ35	I/O	138	VSS	O
139	VSS	O	140	DQ44	I/O
141	DQ40	I/O	142	DQ45	I/O
143	DQ41	I/O	144	VSS	O
145	VSS	O	146	DQS5#	I/O
147	DM5	I/O	148	DQS5	I/O
149	VSS	O	150	VSS	O
151	DQ42	I/O	152	DQ46	I/O
153	DQ43	I/O	154	DQ47	I/O
155	VSS	O	156	VSS	O
157	DQ48	I/O	158	DQ52	I/O
159	DQ49	I/O	160	DQ53	I/O

Table C-10 SODIMM I/F pin assignments (200-PIN) (4/4)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
161	VSS	O	162	VSS	O
163	DQ18	I/O	164	DQ22	I/O
165	DQ19	I/O	166	DQ23	I/O
167	VSS	O	168	VSS	O
169	DQ24	I/O	170	DQ28	I/O
171	DQ25	I/O	172	DQ29	I/O
173	VSS	O	174	VSS	O
175	DM3	I/O	176	DQS3#	I/O
177	NC	-	178	DQS3	I/O
179	VSS	O	180	VSS	O
181	DQ26	I/O	182	DQ30	I/O
183	DQ27	I/O	184	DQ31	I/O
185	VSS	O	186	VSS	O
187	CKE0	I/O	188	NC/CKE1	I/O
189	VDD	O	190	VDD	O
191	NC	-	192	NC/A15	-
193	BA2	I/O	194	NC/A14	-
195	VDD	O	196	VDD	O
197	A12	I/O	198	A11	I/O
199	A9	I/O	200	A7	I/O

## C.11 JM1C

Table C-11 Internal Microphone Connector pin assignments (2-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	INT_MIC	I	2	GND	-

## C.12 JLINE

Table C-12 HEADPHONE Connector pin assignments (10-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	HP_L_L	O
3	HP_R_L	O	4	NBA_PLUG	I
5	GND	-	6	NC	-

## C.13 JKB

Table C-13 Keyboard Connector pin assignments (34-pin)

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

Table C-14 USB Connector pin assignments (4P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+USB_VCCB	-	2	USB20_N2_R	I/O
3	USB20_P2_R	I/O	4	GND	-

## C.14 JUSBB

Table C-15 USB/B Connector pin assignments (12P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+USB_VCCA	-	2	+USB_VCCA	-
3	+USB_VCCA	-	4	+USB_VCCA	-
5	NC	-	6	GND	-
7	USB20_N0_R	I/O	8	USB20_P0_R	I/O
9	GND	-	10	USB20_N1_R	I/O
11	USB20_P1_R	I/O	12	GND	-

## C.15 JCS

Table C-16 FUN/B connector pin assignments (8P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+3VL_CS	-	2	CAP_INT#	I
3	CAP_RST#	O	4	GND	-
5	ESB_CK_L	I/O	6	ESB_DA_L	I/O
7	NC	-	8	NC	-

## C.16 JPOWER

Table C-17 POWER/B connector pin assignments (4P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	NC	-	2	NC	-

3	ON/OFFBTN#	I	4	GND	-
---	------------	---	---	-----	---

## C.17 JREAD

Table C-18 CARD READER connector pin assignments (21-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	SDWP#		2	SD_DATA1	
3	SD_MS_DATA0		4	GND	
5	GND		6	MSBS	
7	SDCLK		8	MS_DATA1	
9	SD_MS_DATA0		10	+VCC_3IN1	
11	MS_DATA2_SD_D ATA7		12	GND	
13	MSCD#		14	MS_DATA3_SD_D ATA6	
15	SDCMD		16	MSCLK	
17	+VCC_3IN1		18	SD_DATA3	
19	GND		20	SD_DATA2	
21	SDCD#				

## C.18 JEXMIC

Table C-19 EXMIC connector pin assignments (5P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	MIC1_L_L	I
3	MIC1_L_R	I	4	MIC_SENSE	I
5	GND	-			

## C.19 JSPKL

Table C-20 SPKL connector pin assignments (2P-pin)

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	SPK_L1	O	2	SPK_L2	O

3	NC	-	4	NC	-
---	----	---	---	----	---

## C.20 JSPKR

*Table C-21 SPKR connector pin assignments (2P-pin)*

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	SPK_R1	O	2	SPK_R2	O
3	NC	-	4	NC	-

## C.21 JTOUCH

*Table C-22 T/P connector pin assignments (6P-pin)*

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	+5VS_TOUCH	-	2	TP_CLK	I/O
3	TP_DATA	I/O	4	TP_SWL	O
5	TP_SWR	O	6	GND	-

## C.22 JMDC

*Table C-23 MDC connector pin assignments (12-pin)*

Pin No.	Signal name	I/O	Pin No.	Signal Name	I/O
1	GND	-	2	+3VALW	-
3	HDA_SDOOUT_MDC	O	4	NC	-
5	GND	-	6	+3VALW	-
7	HDA_SYNC_MDC	O	8	GND	-
9	HDA_SDIN1_MDC	I	10	GND	-
11	HDA_RST#_MDC	O	12	HDA_BITCLK_MDC	O

## Appendix D Keyboard Scan/Character Codes

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

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



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

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

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

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
58	Ctrl(L)	1D	9D	14	F0	14	*3
60	Alt (L)	38	B8	11	F0	11	*3
61	Space	39	B9	29	F0	29	
62	ALT (R)	E0 38	E0 B8	E0 11	E0 F0	11	
64	Ctrl(R)	E0 1D	E0 9D	E0 14	E0 F0	14	
75	Ins	E0 52	E0 D2	E0 70	E0 F0	70	*1
76	Del	E0 53	E0 D3	E0 71	E0 F0	71	*1
79	←	E0 4B	E0 CB	E0 6B	E0 F0	6B	*1
80	Home	E0 47	E0 C7	E0 6C	E0 F0	6C	*1
81	End	E0 4F	E0 CF	E0 69	E0 F0	69	*1
83	↑	E0 48	E0 C8	E0 75	E0 F0	75	*1
84	↓	E0 50	E0 D0	E0 72	E0 F0	72	*1
85	PgUp	E0 49	E0 C9	E0 7D	E0 F0	7D	*1
86	PgDn	E0 51	E0 D1	E0 7A	E0 F0	7A	*1
89	→	E0 4D	E0 CD	E0 74	E0 F0	74	*1
110	Esc	01	81	76	F0	76	
112	F1	3B	BB	05	F0	05	
113	F2	3C	BC	06	F0	06	
114	F3	3D	BD	04	F0	04	
115	F4	3E	BE	0C	F0	0C	
116	F5	3F	BF	03	F0	03	
117	F6	40	C0	0B	F0	0B	
118	F7	41	C1	83	F0	83	
119	F8	42	C2	0A	F0	0A	
120	F9	43	C3	01	F0	01	
121	F10	44	C4	09	F0	09	*3

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

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

**Notes:**

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

Table D-2 Scan codes with left Shift key

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

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

	With left <b>Shift</b>	With right <b>Shift</b>
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	C6	7E	F0 7E

Table D-5 Scan codes in overlay mode

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

Table D-6 No.124 key scan code

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

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

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

\*: This key generates only make codes.

# Appendix E Key Layout

## 1. United States (US) Keyboard

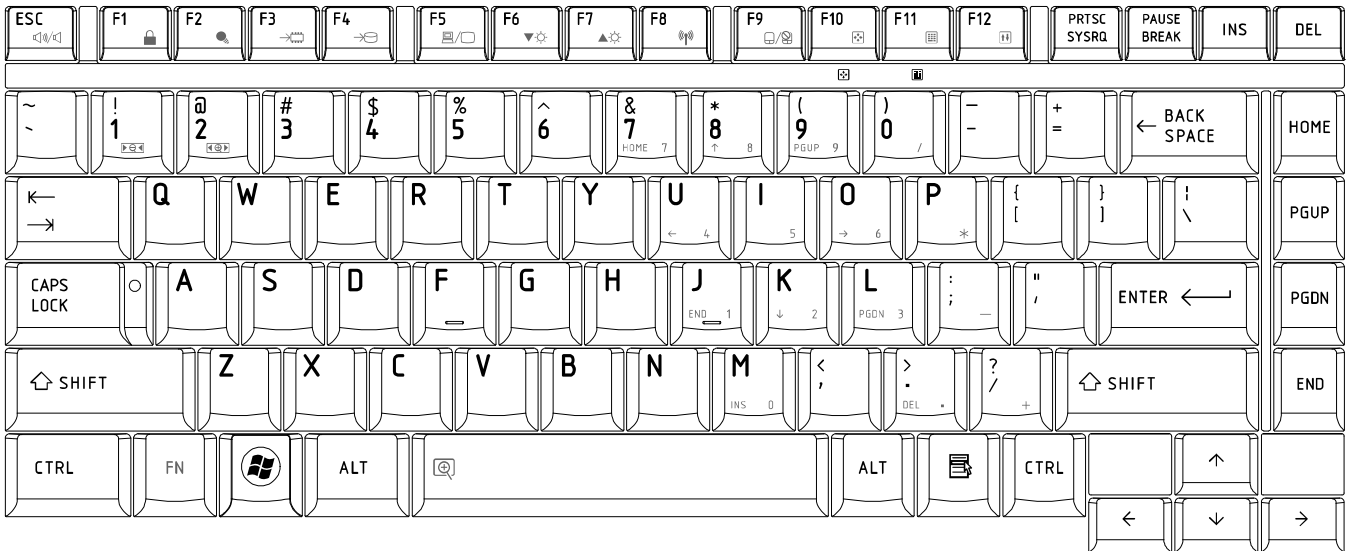


Figure US keyboard

## 2. Traditional Chinese (CH) Keyboard

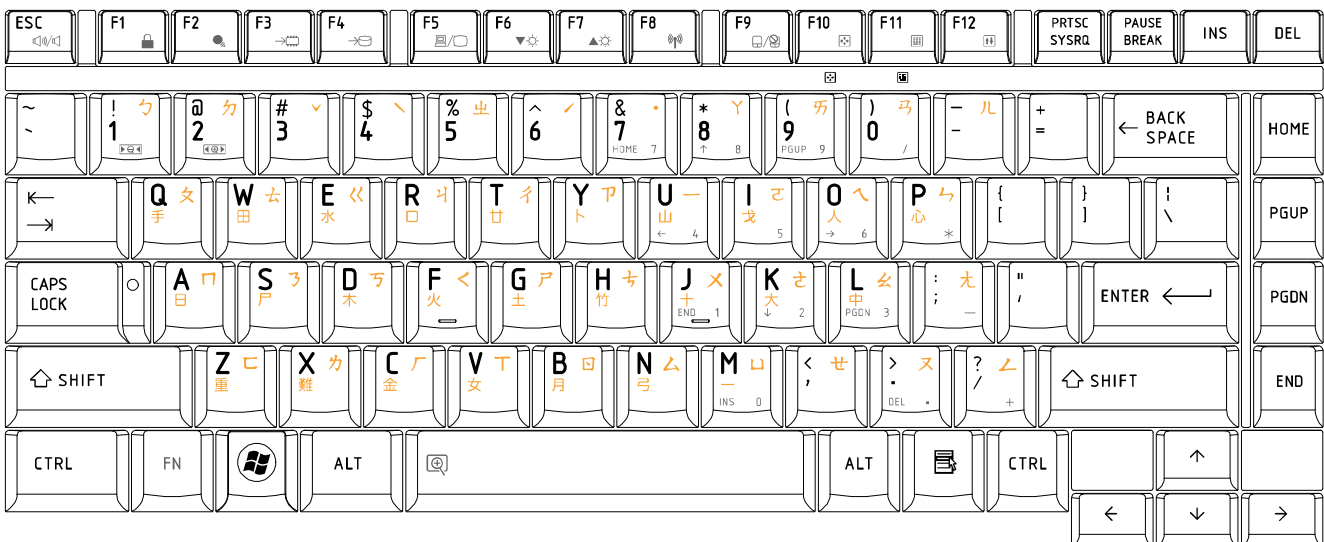


Figure CH keyboard



### 3. Thai (TI) Keyboard

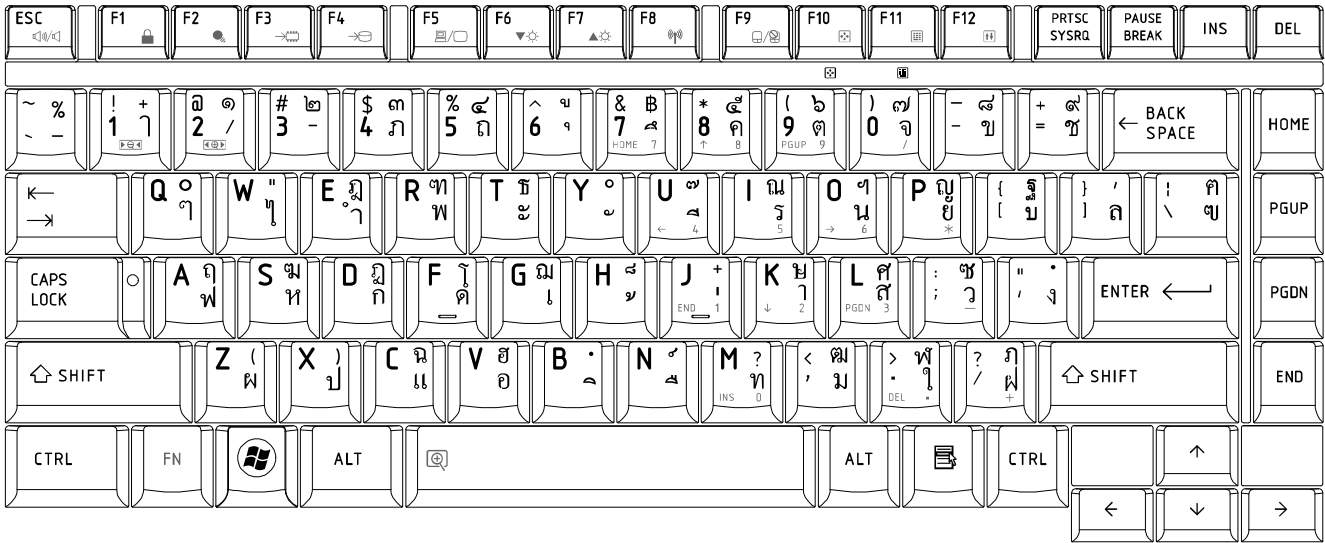


Figure TI keyboard

### 4. Korean (KO) Keyboard

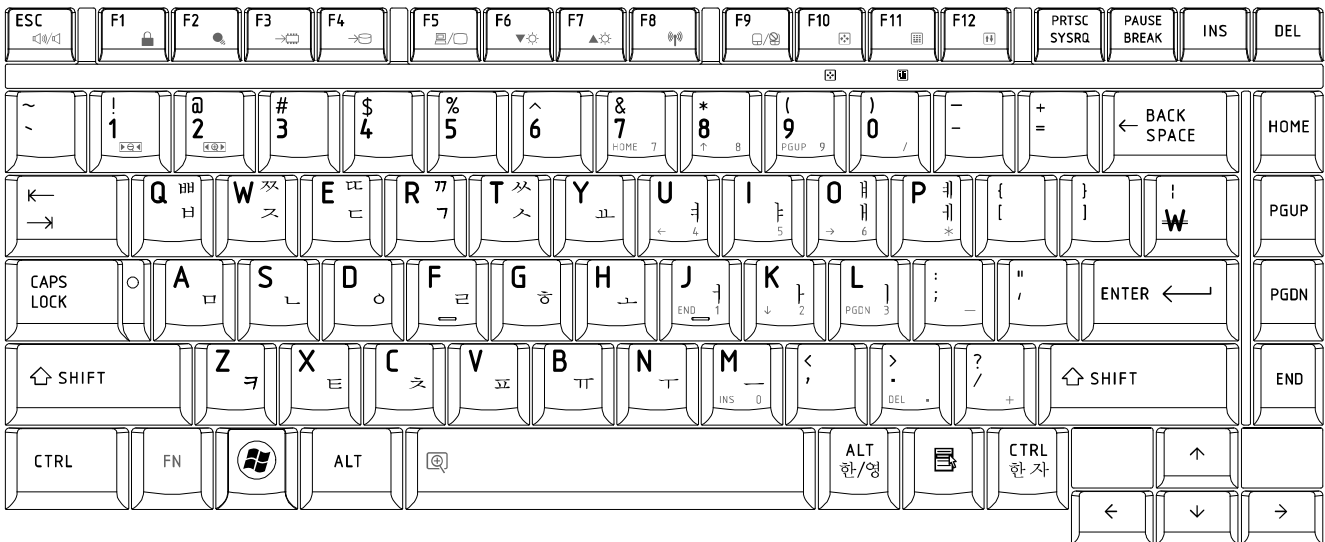


Figure KO keyboard

## 5. United Kingdom (UK) Keyboard



Figure UK keyboard

## 6. US International (UI) Keyboard

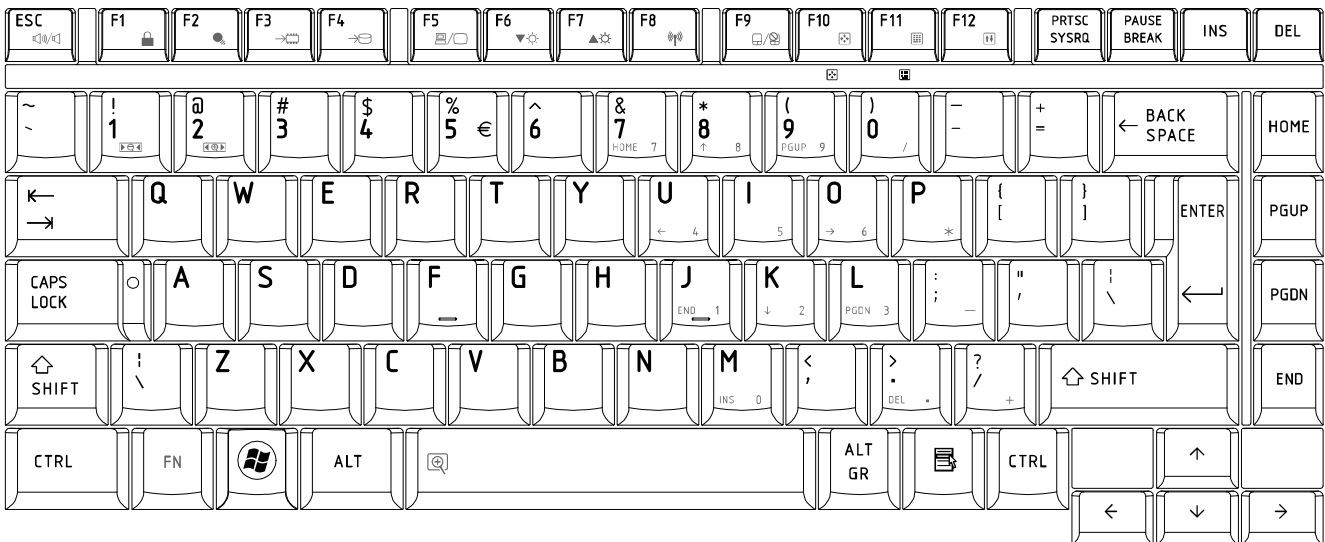


Figure UI keyboard

## 7. Hebrew (HB) Keyboard

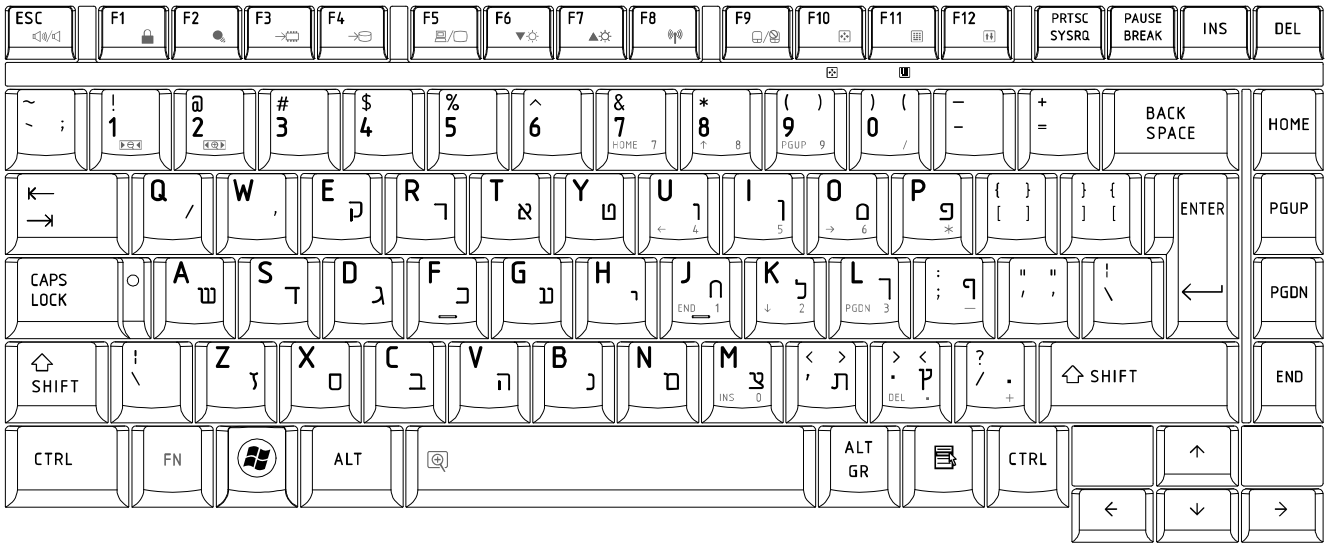


Figure HB keyboard

## 8. Danish (DM) Keyboard

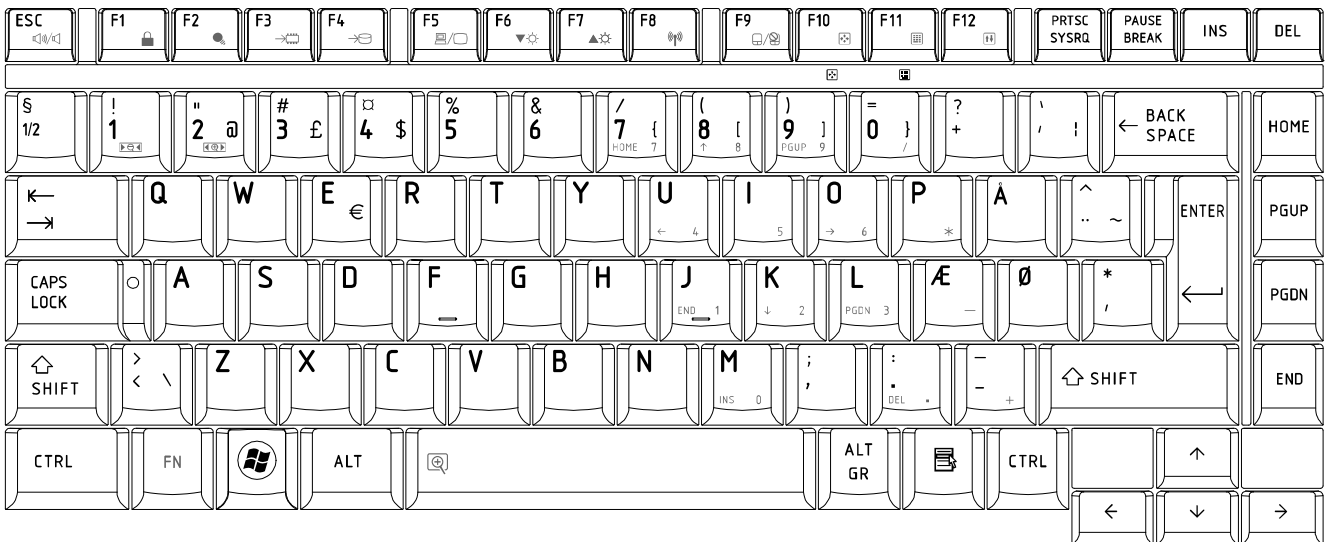


Figure DM keyboard

## 9. Swiss (SW) Keyboard

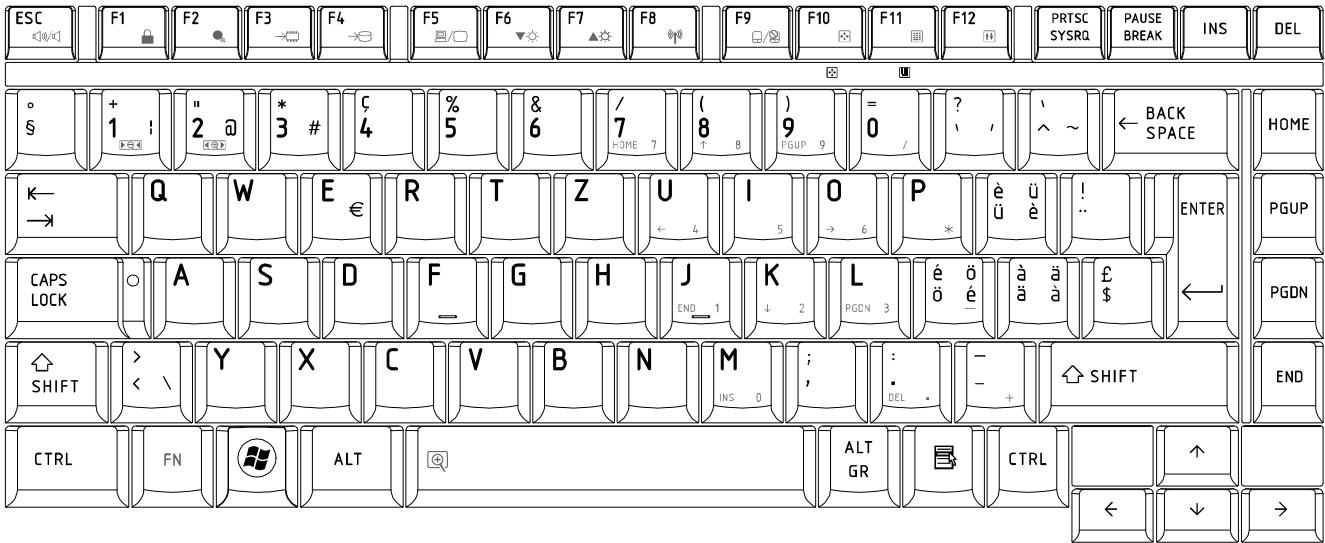


Figure SW keyboard

## 10. Arabic (ARE) Keyboard

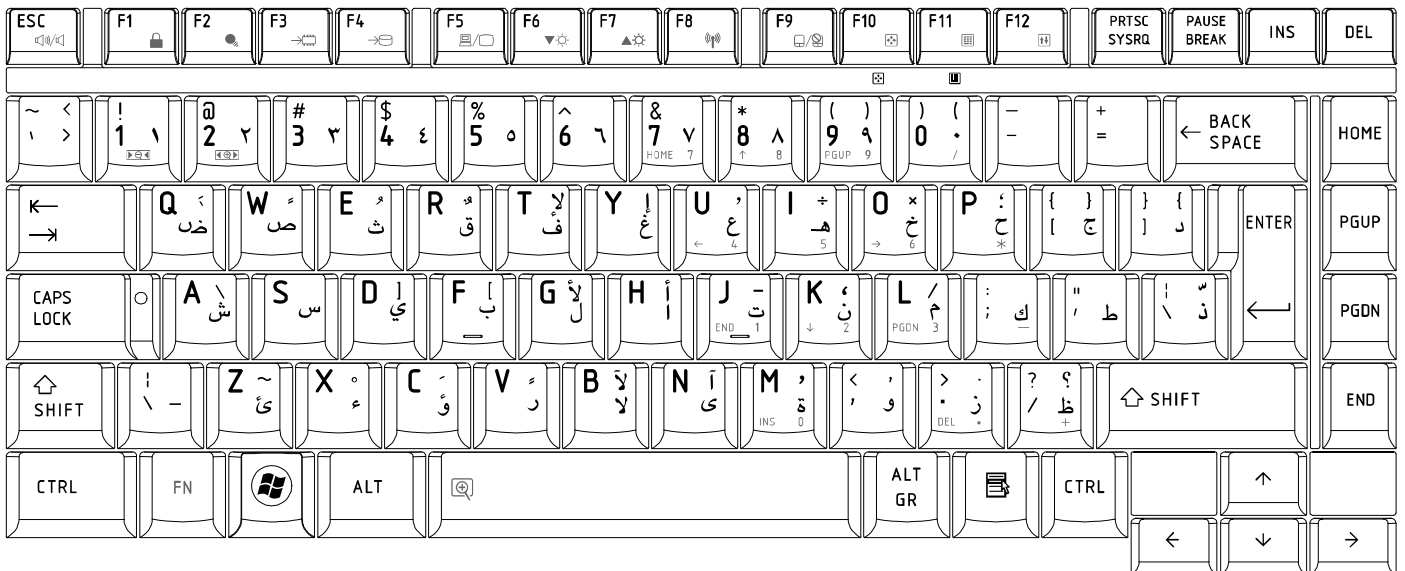


Figure ARE keyboard

## 11. Czech (CZ) Keyboard

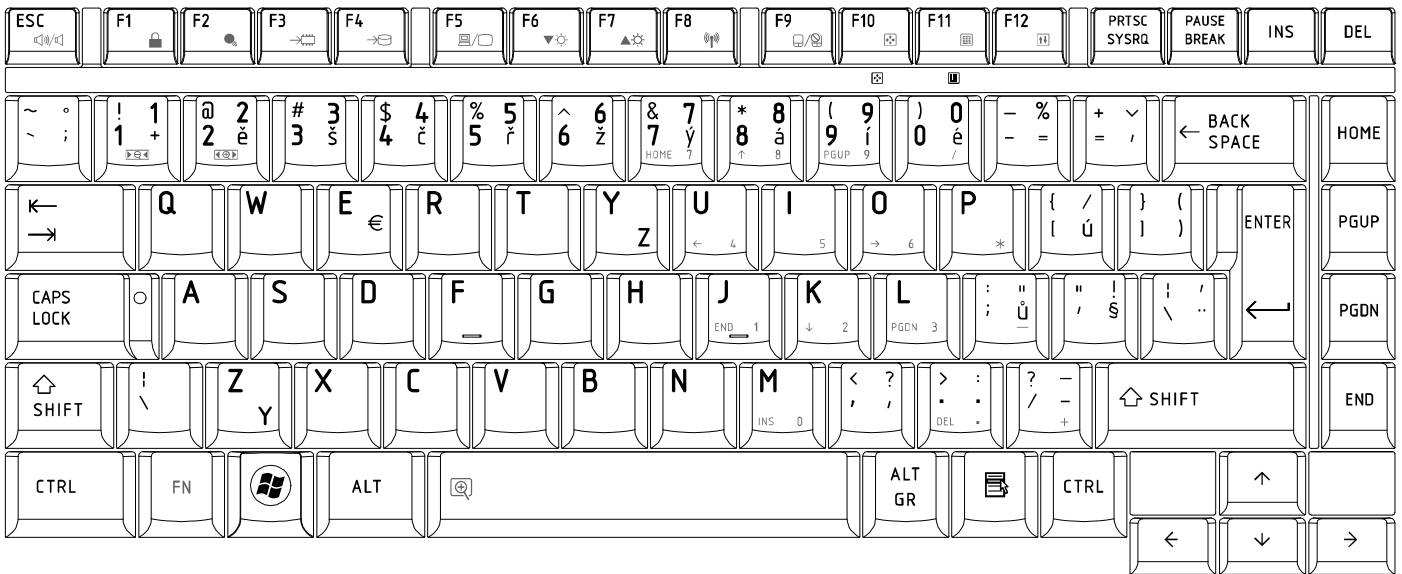


Figure CZ keyboard

## 12. Russian (RU) Keyboard

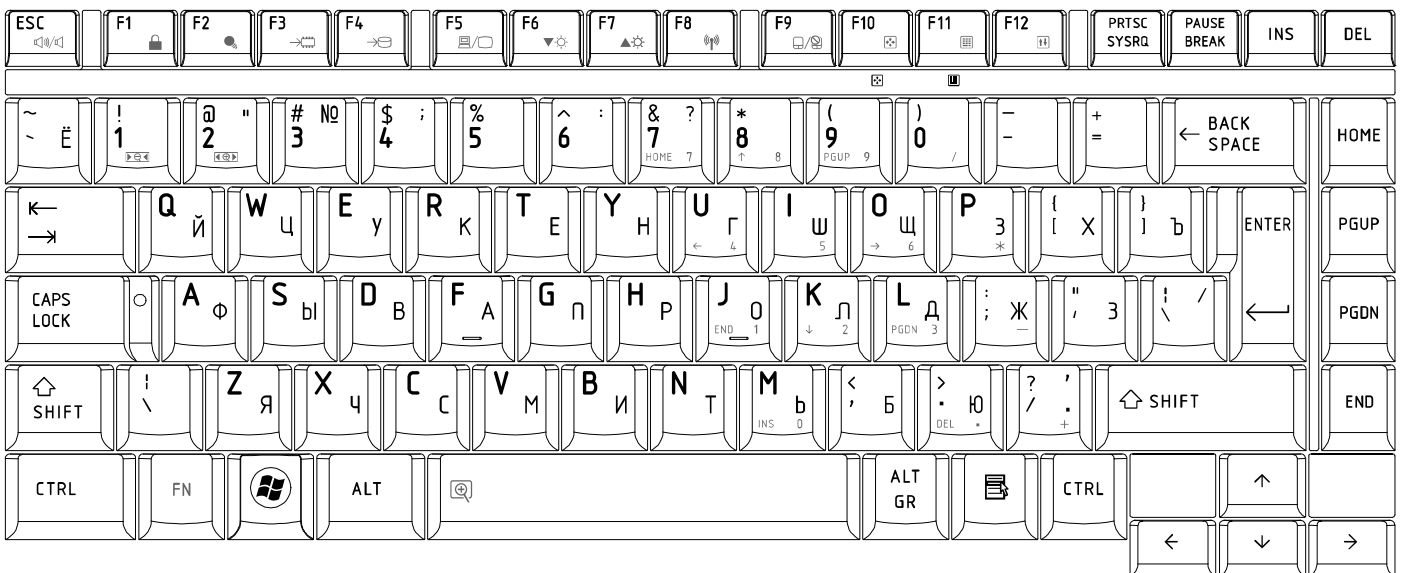


Figure RU keyboard

### 13. Portuguese (P0) Keyboard

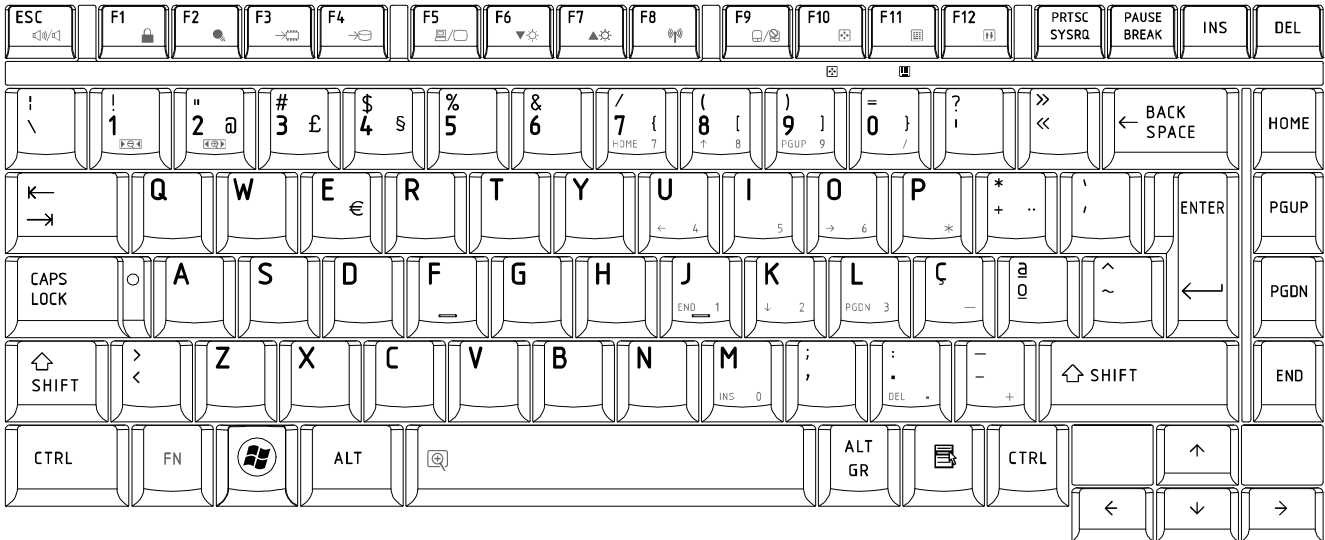


Figure P0 keyboard

### 14. Slovakian (SL) Keyboard

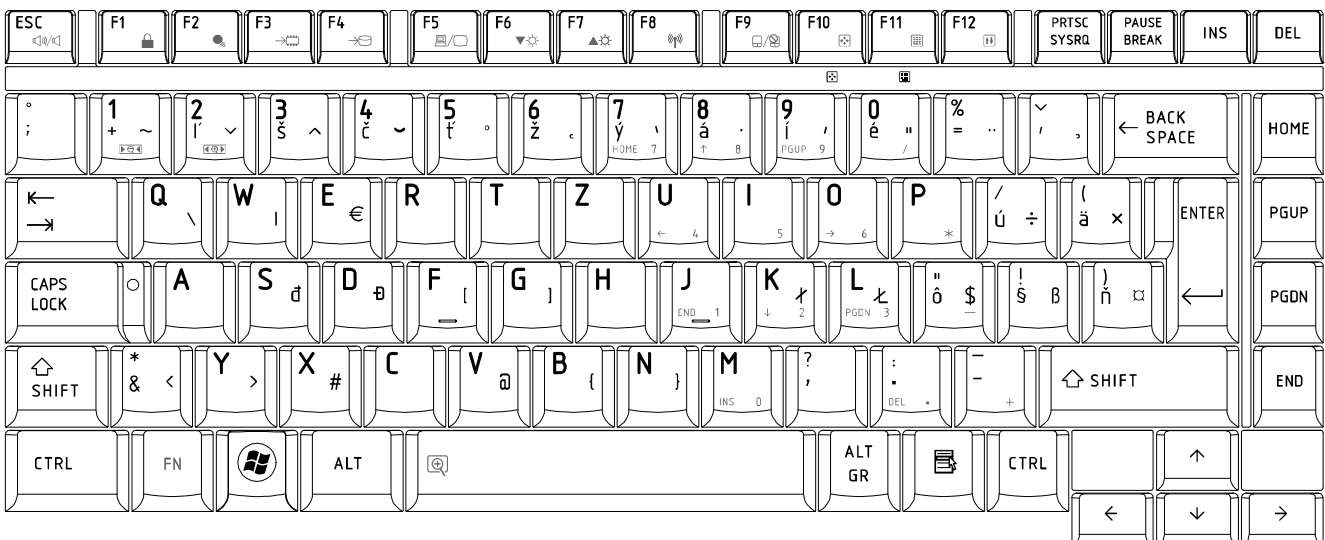


Figure SL keyboard

## 15. Italian (IT) Keyboard

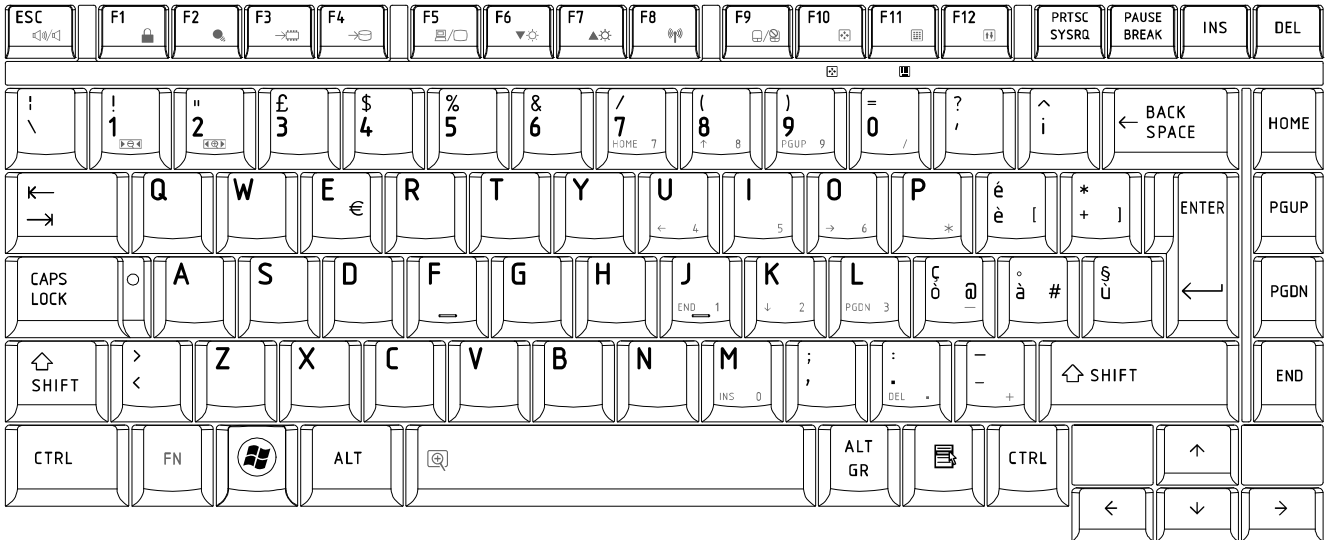


Figure IT keyboard

## 16. French (FR) Keyboard

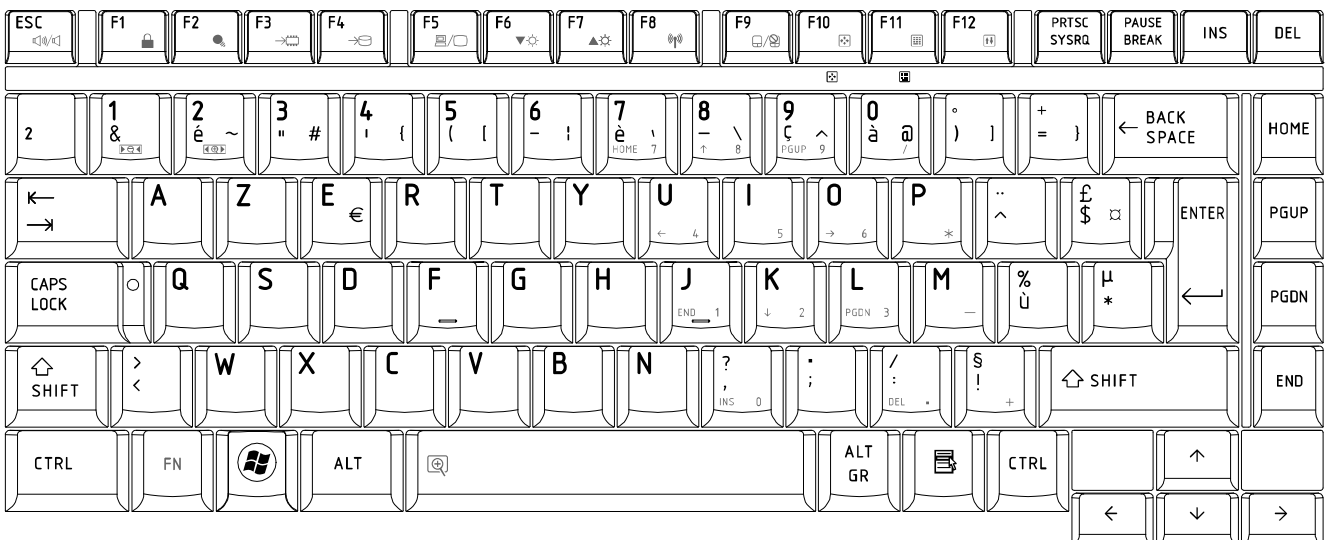


Figure FR keyboard

## 17. German (GR) Keyboard

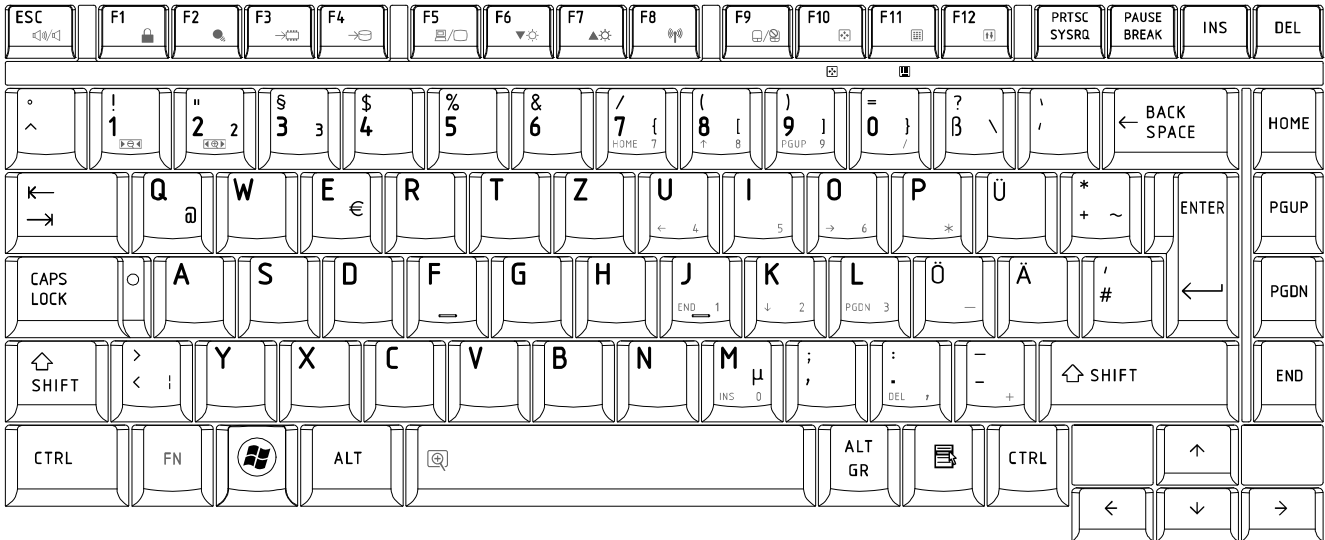


Figure GR keyboard

## 18. Greek (GK) Keyboard

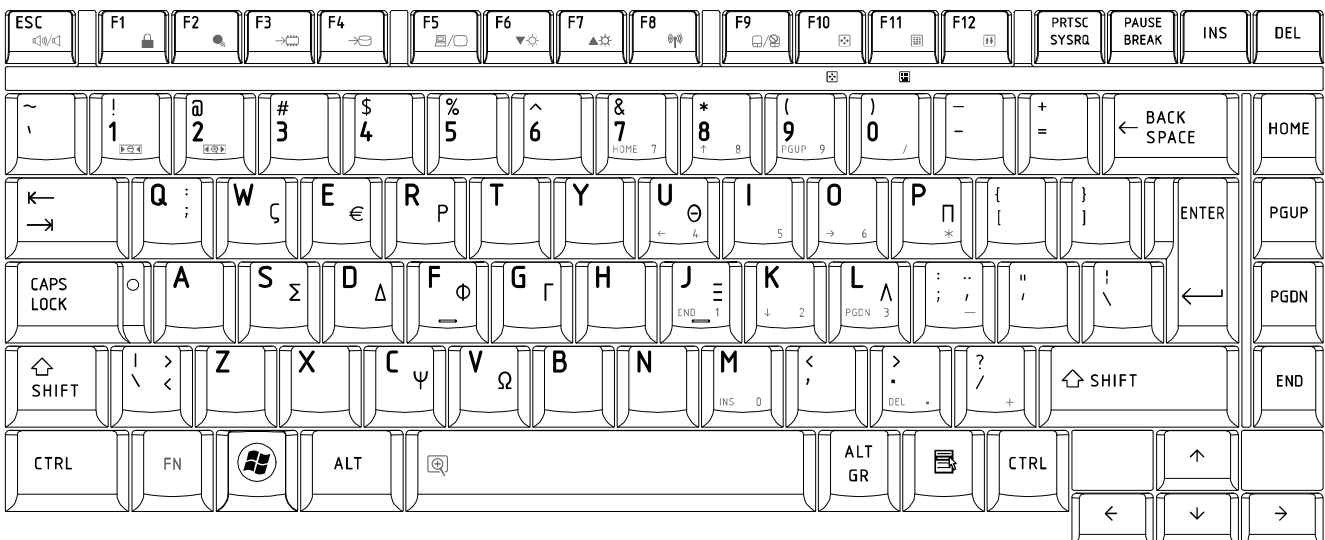


Figure GK keyboard



## 19. Canada French (CF) Keyboard

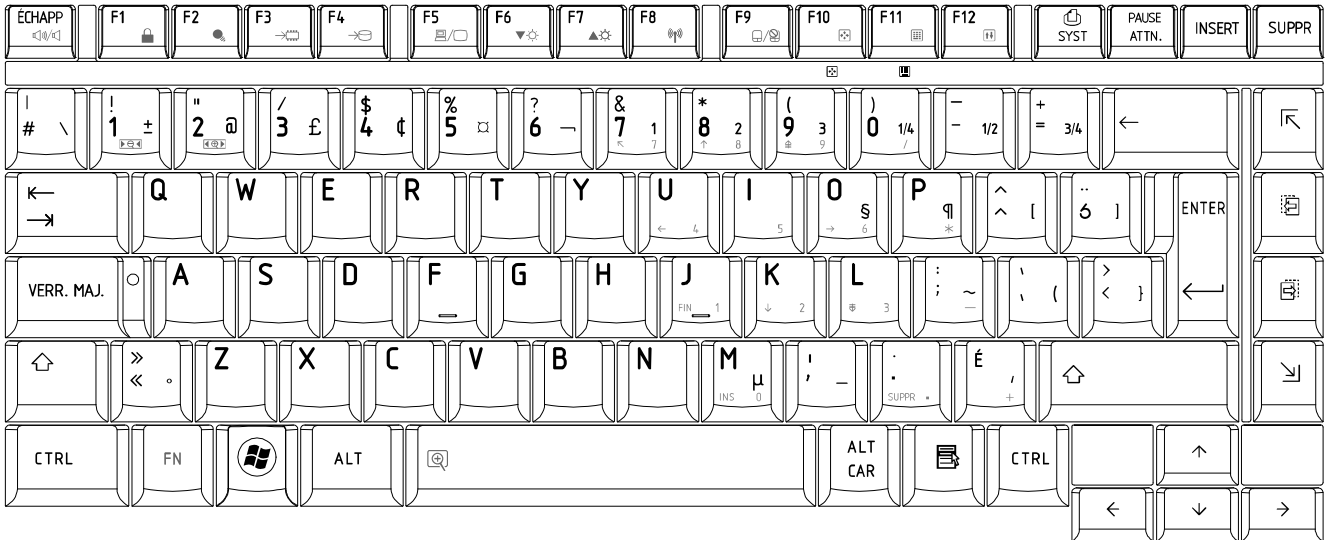


Figure CF keyboard

## 20. Hungarian (HG) Keyboard

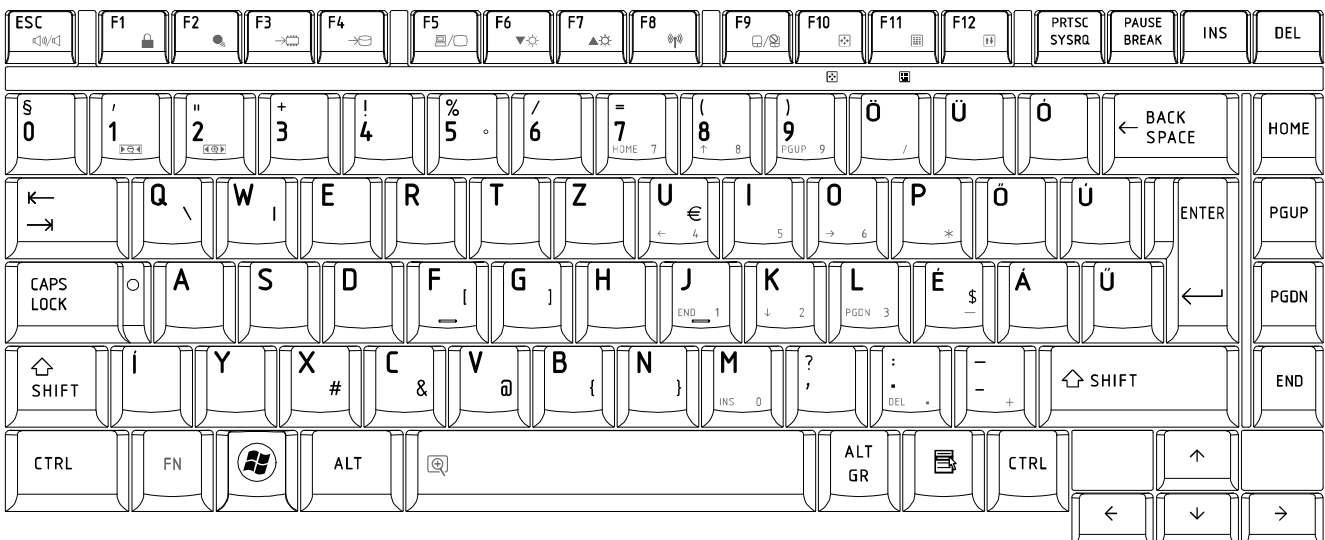
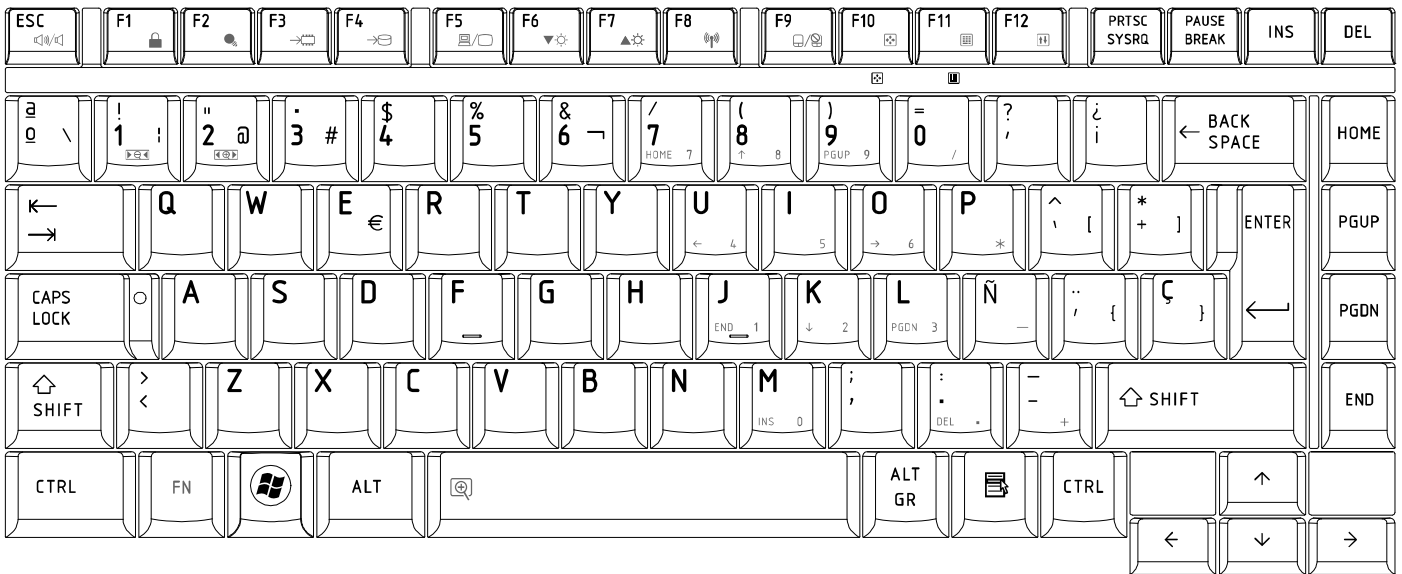


Figure HG keyboard

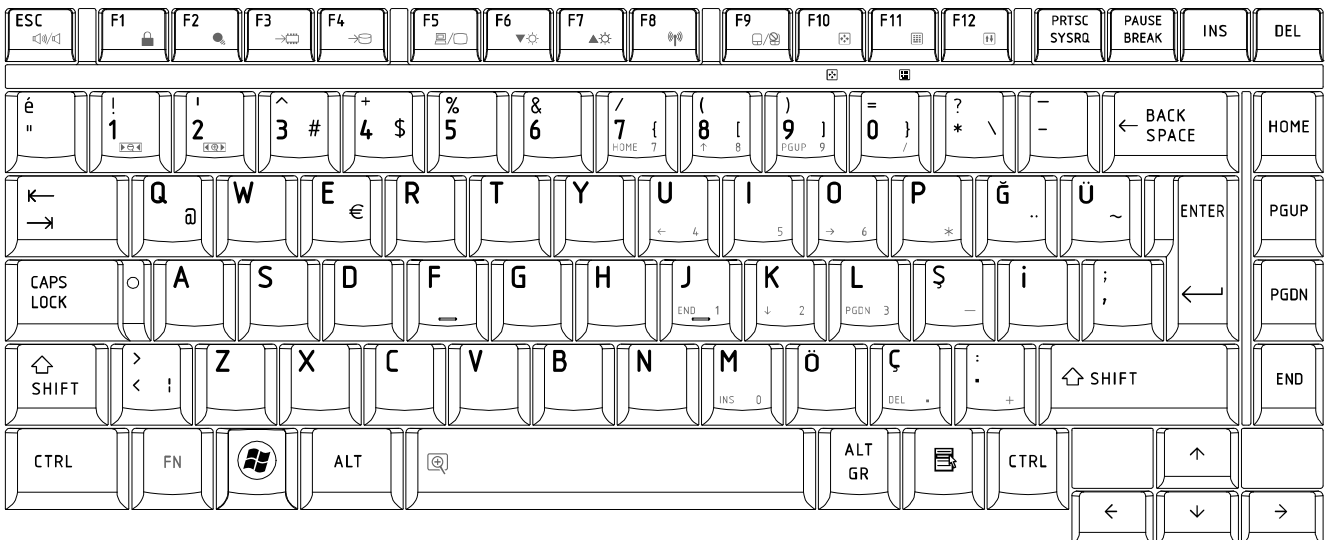
## 21. Spanish (SP) Keyboard

Figure SP keyboard



## 22. Turkish (TR) Keyboard

Figure TR keyboard



### 3. Turkish F (TF-F) Keyboard

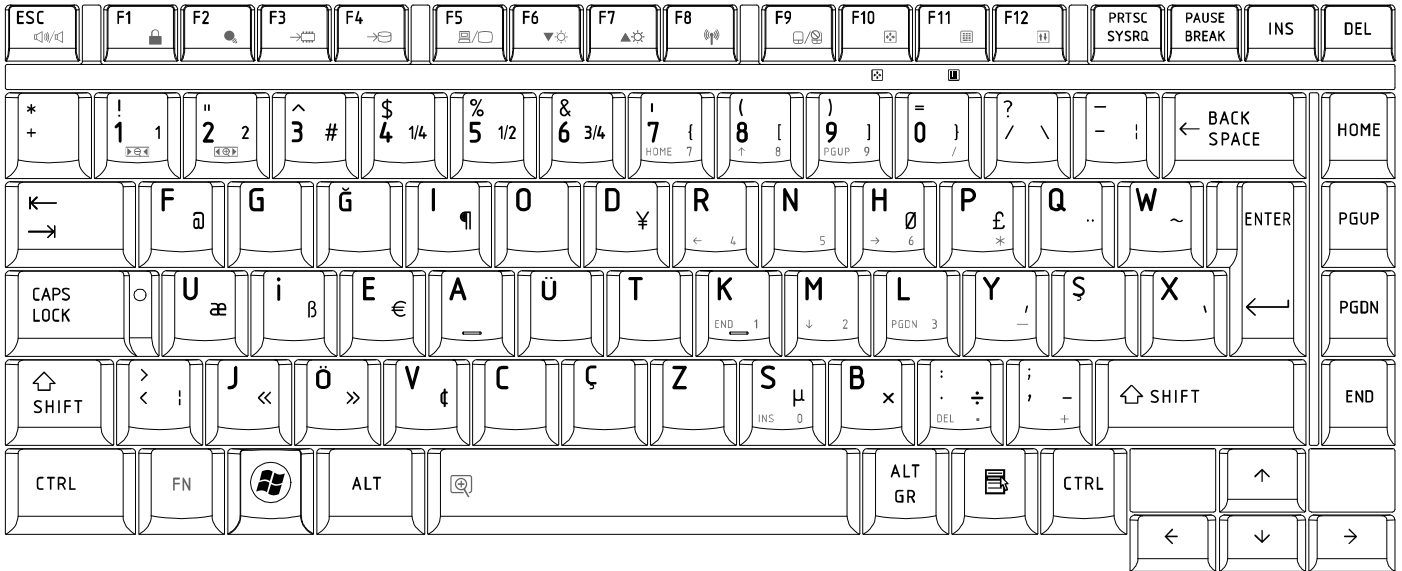


Figure TF-F keyboard

### 24. Swedish (SD) Keyboard

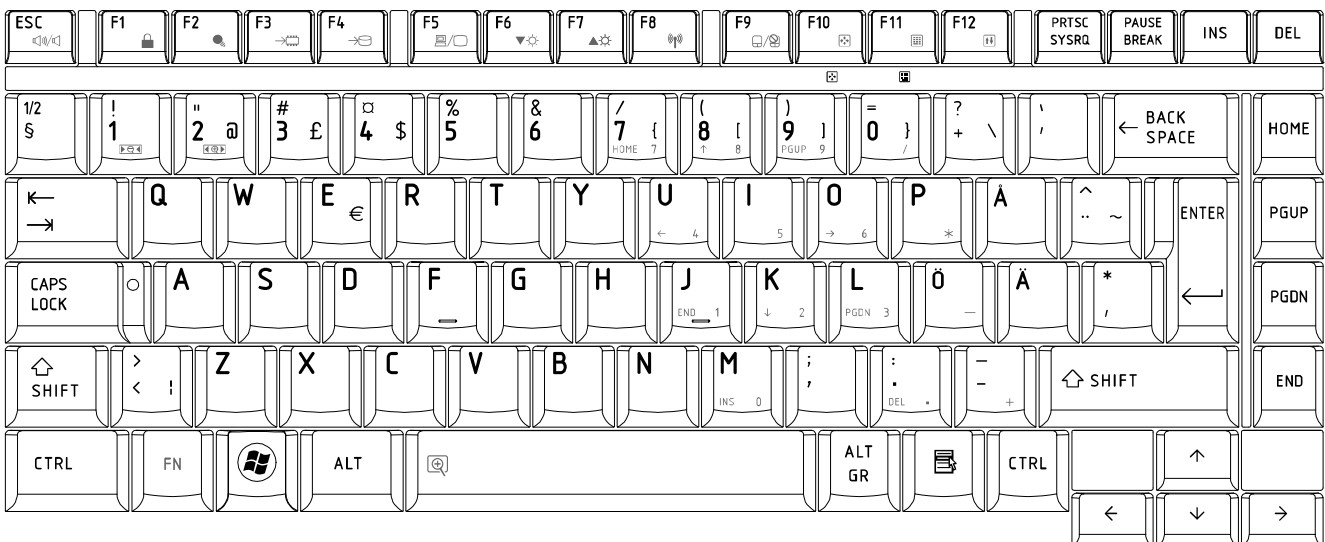


Figure SD keyboard

## 25. Belgian (BE) Keyboard

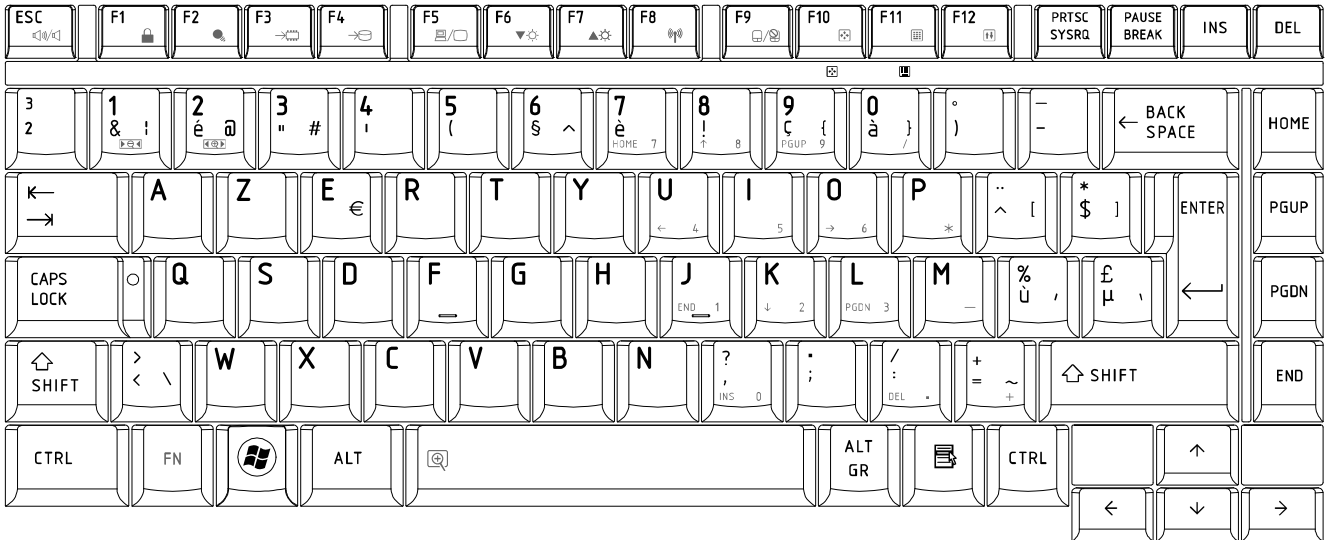


Figure BE keyboard

## 26. Yugoslavian (YU) Keyboard

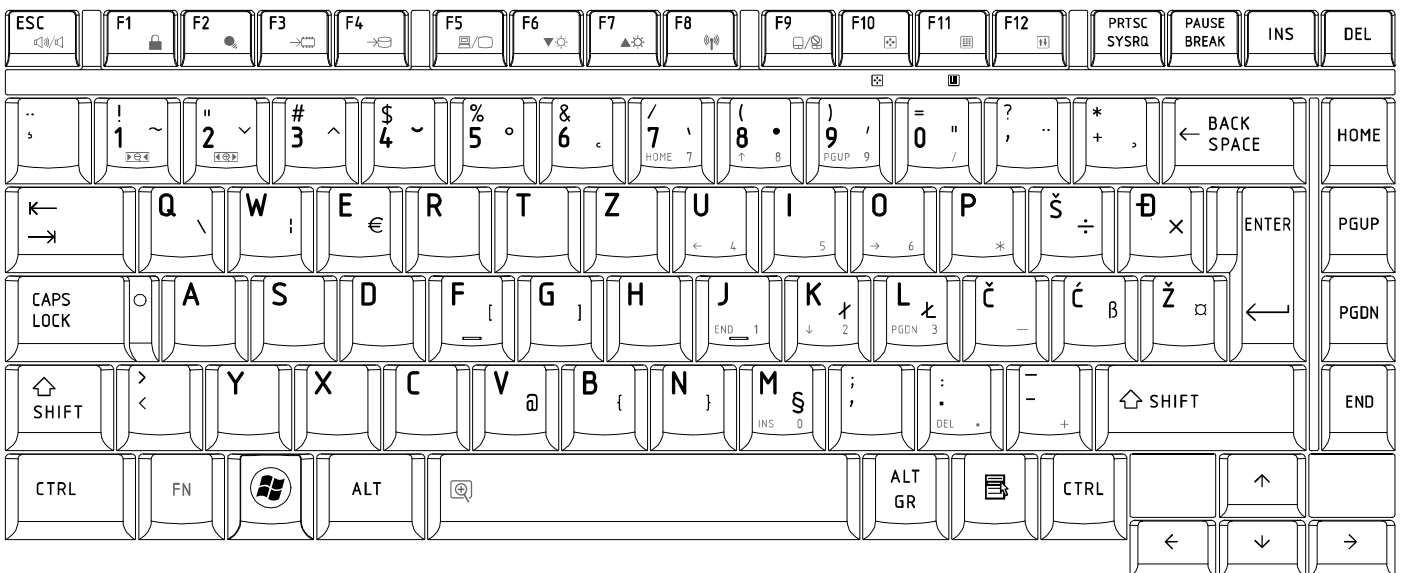


Figure YU keyboard

## 27. Norwegian (NW) Keyboard

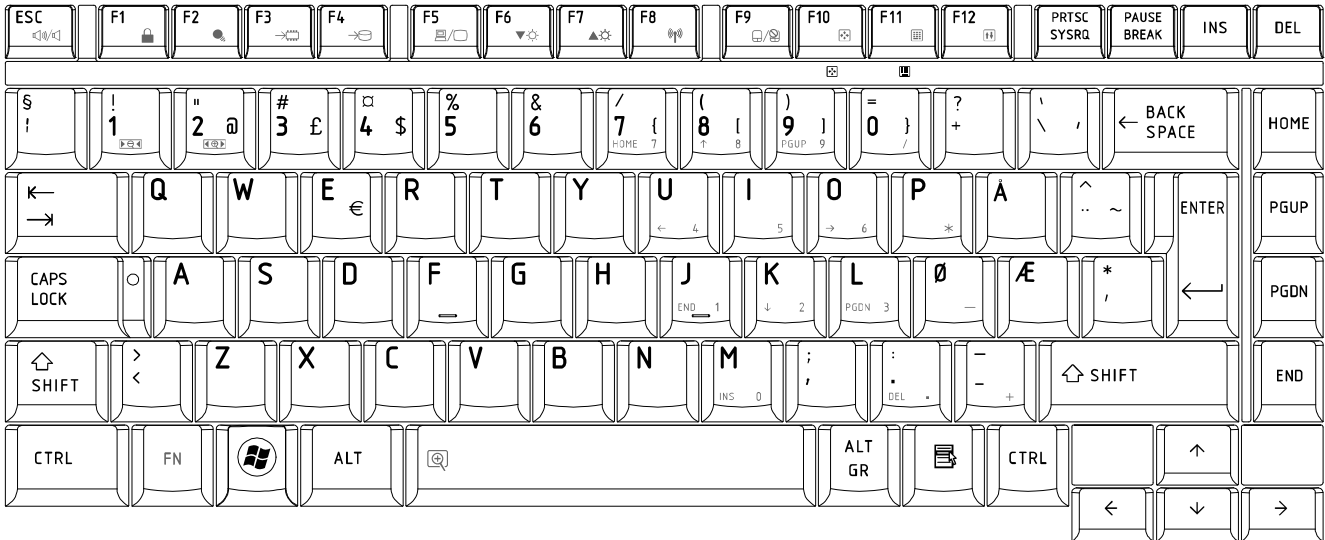


Figure NW keyboard

## 28. Scandinavian (ND) Keyboard

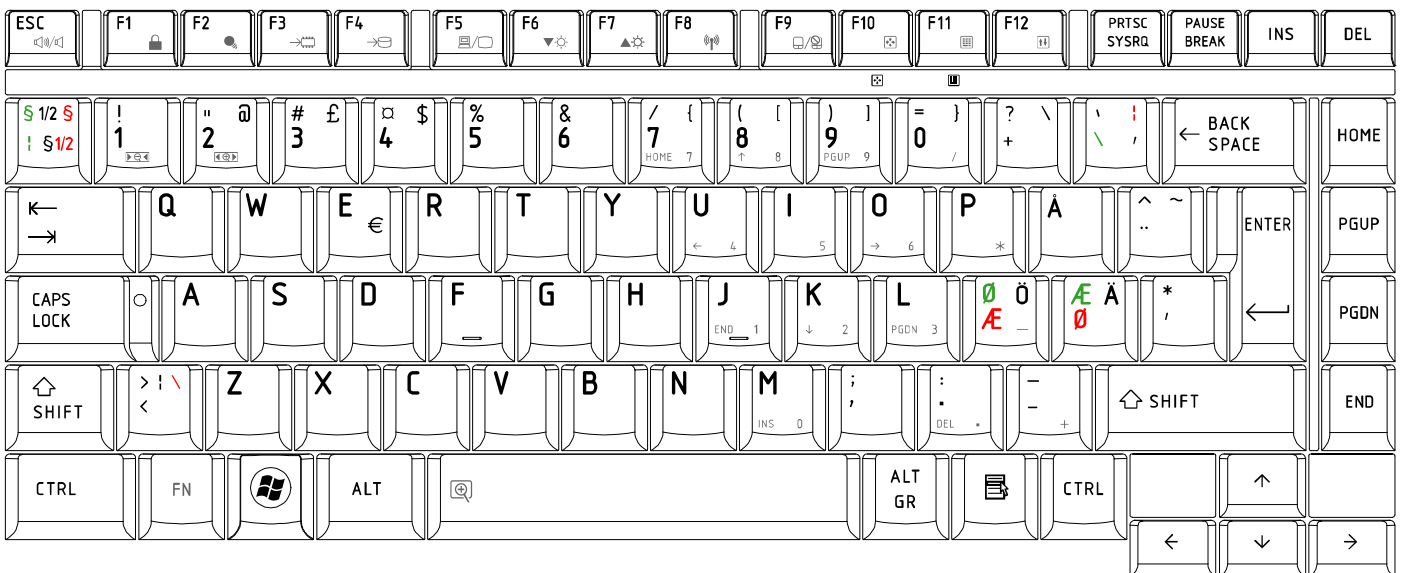


Figure ND keyboard

## 29. Canadian Multinational (AC) Keyboard

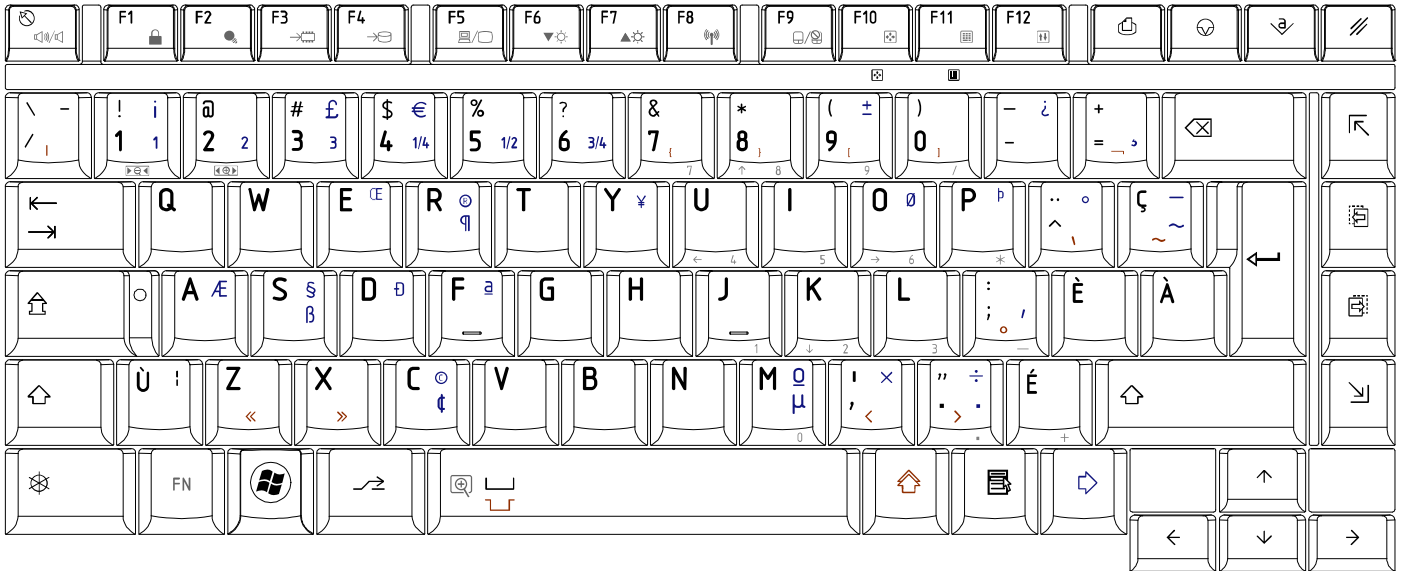


Figure AC keyboard

## 30. Canadian Bilingual (CB) Keyboard

Figure CB keyboard



### 31. Japanese (JP) Keyboard



Figure JP keyboard

### 32. Romania (RO) Keyboard



Figure RO keyboard

## 32. Bulgaria (BU) Keyboard



Figure BU keyboard



## Appendix F Series Screw Torque List (KTKAA)

Table F-1 Series Screw Torque List

SCREW P/N	SCREW SPEC	Q'ty	LOCATION	SCREW TORQUE
LCD ASSY				
MACK2002MG0	M2.0*3	6	LCD BRK TO LCD PANEL(R/L)	1.2~1.5kg
MAAA00153G0	M2.0*4	1	INVERTER TO COVER SUB ASSY (SINGLE LAMP)	2.5~3.0 kg
MA0000061G0	M2.5*4	10	LCD BRACKET ASSY (R/L) TO COVER SUB ASSY (LCD INSIDE 2+8)	2.5~3.0 kg
MACA00173G0	M2.5*5	2	LCD BEZEL TO COVER ASSY(TOP SIDE)	2.5~3.0 kg
MAC925006G0	M2.5*6 WHITE	2	LCD BEZEL TO COVER ASSY(DOWN SIDE)	2.5~3.0 kg
MB				
MA0000081G0(M2*6)	M2*4	2	BATTERY CONN TO MB	2.5~3.0 kg
MA0000081G0	M2*6	2	ODD CONN TO MB	2.5~3.0 kg
MA0000081G0	M2*6	2	1st HDD CONN TO MB	2.5~3.0 kg
MACA00023G0	M2.5*3	2	WLAN CARD TO MB	2.5~3.0 kg
MACA00023G0	M2.5*3	2	MDC TO MB	2.5~3.0 kg
AM01O000300	SPRING SCREW	4	CPU SINK ASSY TO CPU PLATE STANDOFF	2.5~3.0 kg
HDD ASSY				
MAAA03032G0	M3*3	4	HDD BRACKET TO HDD (MAIN)	2.5~3.0 kg
MAAA03032G0	M3*3	4	HDD BRACKET TO HDD (2nd)	2.5~3.0 kg
ODD ASSY				
MACK20251G0	M2*2.5	2	ODD BRK TO ODD MODULE	1.2~1.5kg
LOG UP				
MA000009KG0	M 2.0* 6.8 (半牙)	4	SPEAKER R/L TO LOG UP	2.5~3.0 kg
MA0000061G0	M 2.5* 4	1	POWER PCB TO UP	2.5~3.0 kg
MA0000069G0	M 2* 4	3	TP BRK TO LOG UP	2.5~3.0 kg
LOG LOWER ASSY				

MA0000062G0	M 2.5*6	2	SADDLE TO LOWER	2.5~3.0 kg
LOGIC ASSY				
MA0000061G0	M2.5*4	6	LCD HINGE (L/R) TO SADDLE	2.5~3.0 kg
MA0000061G0	M2.5*4	1	MB TO LOWER	2.5~3.0 kg
MA0000061G0	M2.5* 4	1	USB BOARD TO LOWER	2.5~3.0 kg
MACA00173G0	M2.5* 5	2	FAN TO LOWER	2.5~3.0 kg
MACA00023G0	M2.5* 3	1	ODD BRK TO LOWER	2.5~3.0 kg
MACA00023G0	M2.5* 3	3	LOWER (BATT HOUSING) TO UP	2.5~3.0 kg
MAC925010G0	M2.5X10	5	KB SUPPORT TO LOWER	2.5~3.0 kg
MAC925010G0	M2.5X10	16	LOWER TO UPPER	2.5~3.0 kg
MA0000062G0	M2.5X 6	2	HDD 1 <sup>st</sup> DOOR TO LOWER	2.5~3.0 kg
MA0000061G0	M2.5* 4	2	HDD 2 <sup>nd</sup> DOOR TO LOWER	2.5~3.0 kg
MA0000035G0	M2.5X5.4(半牙)	1	RAM DOOR TO LOWER	2.5~3.0 kg
MACK2002MG0	M 2.0*3	2	KeyBoard to UP	1.2~1.5kg

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## Appendix G Reliability

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

*Table G-1 MTBF*

<b>Component</b>	<b>Time (hours)</b>
LCD	10,000
Keyboard	60,000
HDD	300,000
Optical (DVD/CD) drive	60,000
AC adaptor	60,000