Toshiba Personal Computer

TOSHIBA DX730/DX735 / Qosmio DX730

dynabook REGZA PC D731

(PQQ10x, PQQ11x)

Maintenance Manual

TOSHIBA CORPORATION

S/ No

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TOSHIBA DX730/735 / Qosmio DX730 / dynabook REGZA PC D731 Maintenance Manual

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Disclaimer

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer TOSHIBA DX730/DX735 / Qosmio DX730 / dynabook REGZA PC D731.

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, RTC battery or backup 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 TOSHIBA DX730/DX735 / Qosmio DX730 / dynabook REGZA PC D731 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
- Keyboard scan/character codes
- Key layout

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 XXXXX that appears on its display is presented in the type face below:

```
Format complete
System transferred
```

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Chapter 1
Hardware Overview

Chapter 1 Contents

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1.1 Features

TOSHIBA DX730/DX735, Qosmio DX730 or dynabook REGZA PC D731 is an AIO PC based on Intel Huron River Processor, providing high-speed processing capabilities and advanced features. The display uses 23.0-inch FHD LCD panel at resolution of 1920x1080.

The computer has the following features:

- Processor

  CPU is Intel Huron River Processor:

  Intel Core i7 CPU (1333MHz FSB)

  Core i7-2670QM (2.20G) Hz

  Intel Core i5 CPU (1333MHz FSB)

  Core i5-2430M (2.40G) Hz

  Intel Core i3 CPU (1333MHz FSB)

  Core i3-2330M (2.20G) Hz

  Intel Pentium CPU (1333MHz FSB)

  Pentium B950 (2.10G) Hz

  Intel Celeron CPU (1333MHz FSB)

  Celeron B800 (1.50G) Hz

- Host Bridge System Controller

  System Controller Intel 6 Series Chipset HM65.

- Graphics

  Intel integrated graphics or external nVIDIA N12P-GS graphics.

- Memory

The computer has two SO-DIMM slots, which come standard with DDR3-1333MHz memory module. DDR3 is driven at 1.5V. It accepts BTO/CTO for your memory requirements. It can incorporate up to 8.0GB of main memory.

Using the following sizes of memory modules:

- 2048 MB (256M×64) / DDR3-1333MHz
- 4096 MB (512M×64) / DDR3-1333MHz

❑ Hard Disk Drive (HDD)

The computer accommodates 3.5-inch 25.4mm height Serial ATA HDD with following storage capacities:

- 1 TB (25.4mm thick) SATA (7,200rpm)
- 2 TB (25.4mm thick) SATA (5,900rpm)

❑ ODD

The computer accommodates a fixed 12.7mm ODD with one of following types:

- Tray Type DVD Super Multi +-R Double Layer drive
- Tray Type DVD Super Multi +-R Double Layer with Label Flash™ drive
- Tray Type BD Combo with Label Flash™ drive
- Tray Type BD Writer drive
- Tray Type BD Writer with Label Flash™ drive

❑ Display

LCD display comes in the following type at Full HD resolution 1920x1080:

- 23.0-inch Full HD 1920x1080 CSV LED display

❑ Touch Screen (BTO)

Support Touch Screen Function with internal sensor kits.

❑ On-Board LAN

The internal LAN supports 10/100/1000Mbit Ethernet, enabling connection to a LAN at up to 1000Mbps.

- Wireless LAN and Bluetooth (BTO)

  The internal PCI Mini slot supports IEEE802.11bg (MOW) / IEEE802.11bgn (MOW) Wireless LAN cards, and WLAN + Bluetooth combo card is also supported. The Antenna has two wires dual band.

- Sound System

  Realtek ALC269Q integrated audio controller supports multimedia. The sound system contains the following:

  - Stereo speakers
  - Subwoofer speaker
  - Headphone jack
  - External microphone jack

- Webcam with embedded internal microphone

  The computer has an internal camera. It supports maximum resolution of 1280x1024 without auto Macro. Camera LED is supported; LED is on when Camera is working. The internal microphone is embedded in this camera module.

- Keyboard

  Bundled with a wireless keyboard that supports 2.4G RF wireless transferring technology with a receiver USB dongle:

  - Toshiba 2010 A4 + Numeric Keys Half Gross Flat with 5 mechanical buttons
  - A mechanical switch for keyboard power on / off
  - AA Battery x 2
  - Support Battery Check LED

- Mouse

  Bundled with a wireless mouse that supports 2.4G RF wireless transferring technology with a receiver USB dongle:

  - Support 3 buttons and a tilt wheel
  - A mechanical switch for mouse power on / off
  - AA Battery x 1

- Support Battery Check LED

❑ Keyboard / Mouse Receiver Dongle

Bundled with a USB 2.4G RF wireless receiving dongle for Keyboard / Mouse:

- Radio Channel is 2.4GHz ISM band (2.402G ~ 2.479G) with total 78 channels
- Support USB Connectivity

❑ USB Port

Support USB3.0 x 2 ports and USB2.0 x 4 ports. High-Speed USB3.0 allows data transfers up to 5Gbps and USB2.0 allows data transfers up to 480Mbps, and one USB3.0 port supports Sleep & Charge Function.

❑ TV Tuner (BTO)

Support ISDB-T TV tuner with PCI Express Mini Card for Japan, or ATSC/NTSF TV tuner for USA and DVB-T TV tuner for Australia.

❑ TV Tuner Antenna Port (BTO)

For all TV Tuner modules, it supports LNB Power Supply to BS/CS antenna.

❑ Instant TV (BTO)

Support ISDB-T Digital for Japan only, a user needs to have mini B-CAS card for Digital installed. This function shows TV within seconds when instant TV is turned on.

❑ HDMI Out Port (BTO)

A HDMI monitor can be connected to HDMI Out Port on the computer.

❑ HDMI In Port

Support one HDMI In for multi-devices which are certificated with HDMI Logo.

❑ D-Port In + Audio Line-In L/R (BTO)

Support 1 set of D-Port In for AV, it is for Japan with TV Tuner model.

- B-CAS Card Slot SIM Type x 2 (BTO)

  Support B-CAS Slot for B-CAS Card, it is for Japan with TV Tuner model.

- Bridge Media Slot

  Support 3-in-1 card reader slot for SD, Mini SD, Micro SD, SDXC, MMC, Memory Stick and Memory Stick Pro Cards to provide memory card read on your computer.

- Control Button

  Support 6 Additional Control Buttons on left side:

  - Display off Button: Turn on/off LCD and Mute on/off at the same time
  - AV Select Button: Switch out-sourcing AV source between HDMI and D-Port
  - Brightness + Button: Increase brightness of LCD
  - Brightness – Button: Reduce brightness of LCD
  - Volume + Button: Increase volume of AV input source
  - Volume – Button: Reduce volume of AV input source

- AC Adapter

  Support Power 120W / 180W AC/DC Adapter, Input Voltage is between AC 100V ~ 240V, Input Frequency is between 50 ~ 60 Hz, Output Voltage is DC 19V.

- RTC Battery

  RTC Battery provides the power supply to maintain date, time and other system information in memory, and Battery Type is CR2032.

❑ Figures 1-1/1-2/1-3 and 1-4 show the computer and its system unit configuration, respectively.

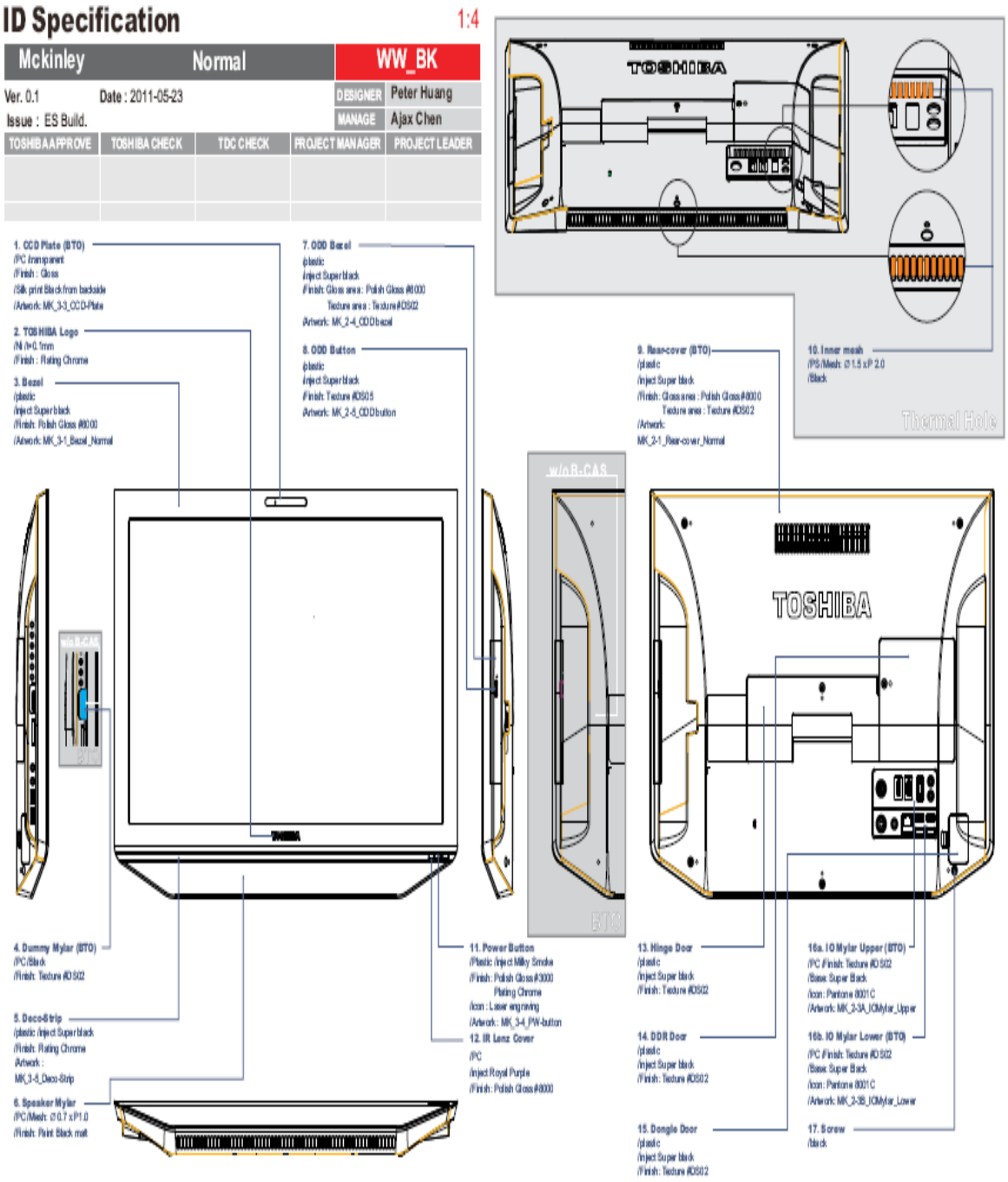


Figure 1-1 ID Parts Description Placement

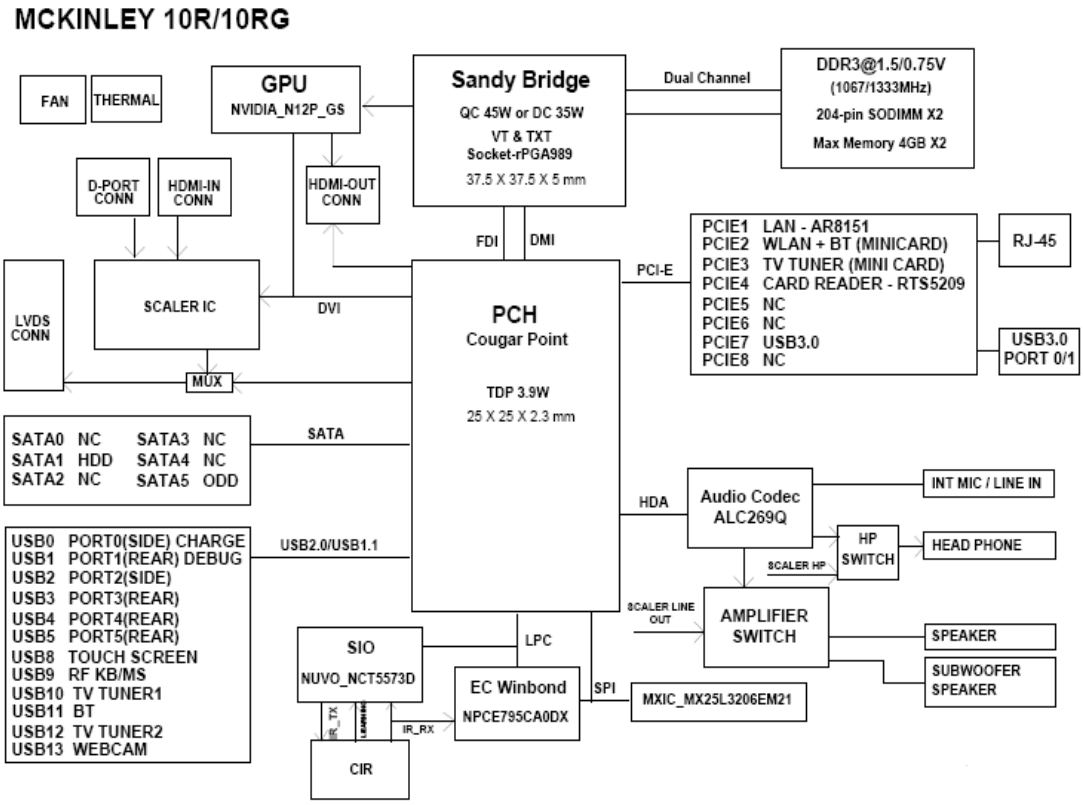


Figure 1-2 Computer Block Diagram

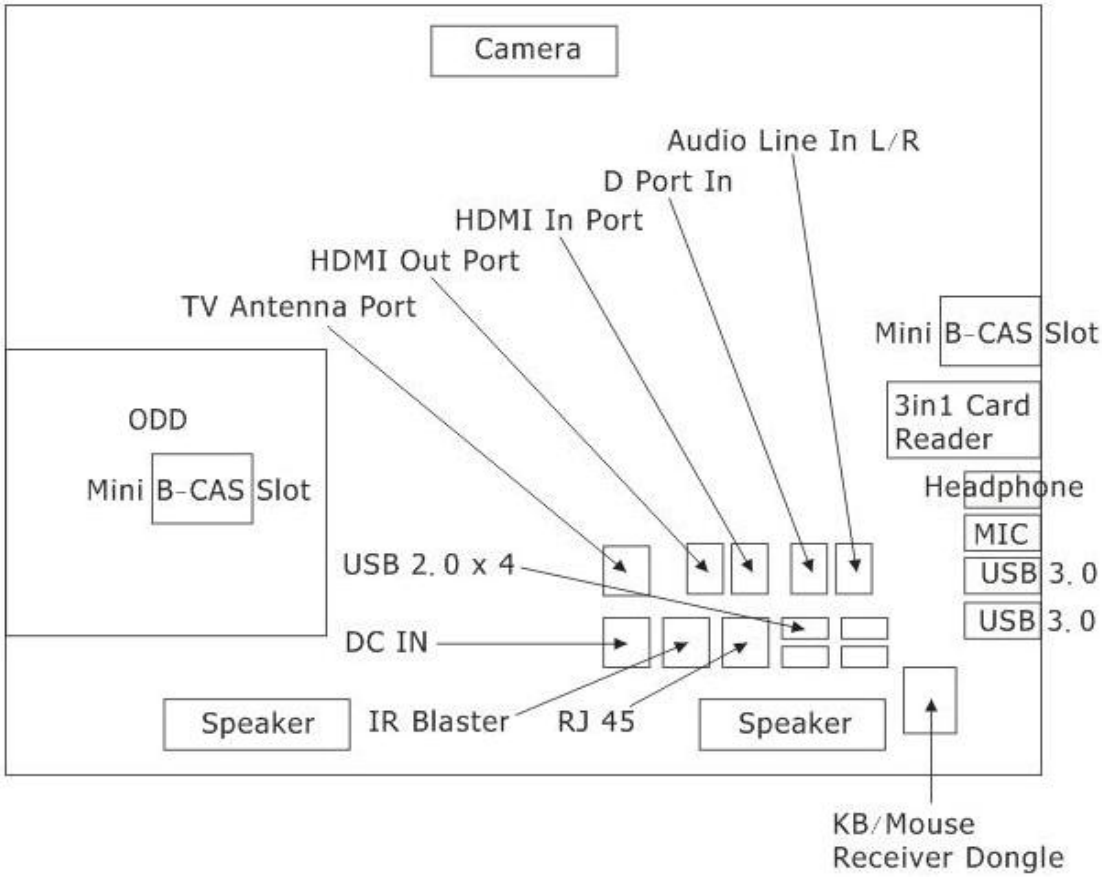


Figure 1-3 System Board Configurations

1.2 System Unit Components

Figure 1-4 is Block Diagram of the System Unit.

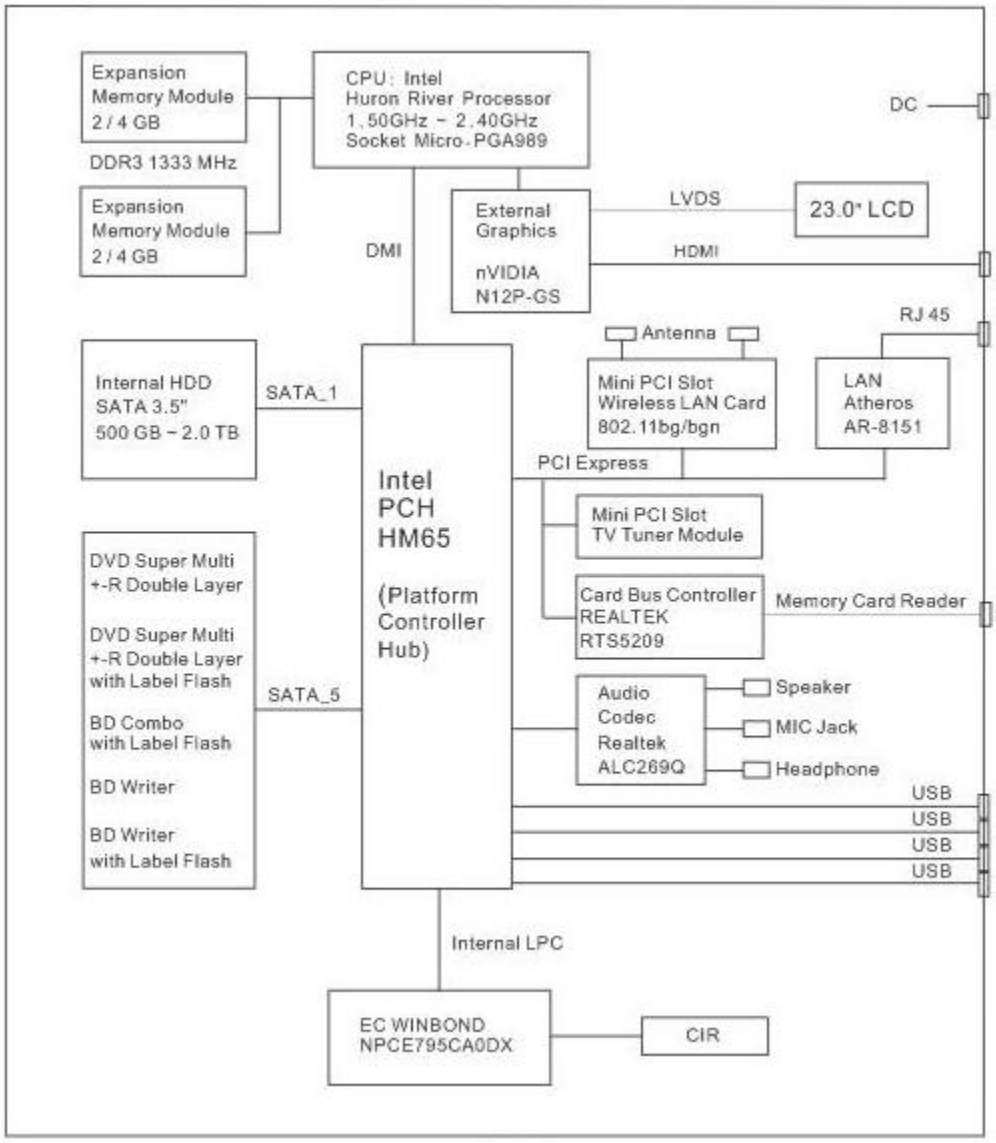


Figure 1-4 System Unit Block Diagram

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

- Processor: Intel Huron River Processor.
  - Intel Core i7 Processor (FSB, 1333 MHz)
    - Core Speed: 2.20 GHz
    - System Bus: 1333 MHz
    - On-Die Level 2 Cache: 6 MB
  - Intel Core i5 Processor (FSB, 1333 MHz)
    - Core Speed: 2.40 GHz
    - System Bus: 1333 MHz
    - On-Die Level 2 Cache: 3 MB
  - Intel Core i3 Processor (FSB, 1333 MHz)
    - Core Speed: 2.20 GHz
    - System Bus: 1333 MHz
    - On-Die Level 2 Cache: 3 MB
  - Intel Pentium Processor (FSB, 1333MHz)
    - Core Speed: 2.10 GHz
    - System Bus: 1333 MHz
    - On-Die Level 2 Cache: 2 MB
  - Intel Celeron Processor (FSB, 1333MHz)
    - Core Speed: 1.50 GHz
    - System Bus: 1333 MHz
    - On-Die Level 2 Cache: 2 MB
- Memory: Two expansion memory slots are provided. They can hold 2.0/4.0GB memory modules available as options to grow up to 8.0GB.
  - PC3 1333 MHz DDR3 SDRAM modules supported
  - 2048/4096MB modules supported
    - 2048 MB (256M x 64)
    - 4096 MB (512M x 64)
  - DDR3 1.5 volt operation
  - No parity bit
  - 64-bit data transfer

- BIOS ROM (Flash EEPROM)
  - 32Mb x 1 chip (4096KB flash parts)
    - NvStorage Size : 64K
    - NvStorage Free Space : 63K
    - FV00 Size : 1644K
    - FV00 Free Space : 539K
    - FV01 Size : 636K
    - FV01 Free Space : 393K

- System Controller
  - Intel 6 Series Chipset HM65 PCH
    - Direct Media Interface (DMI)
    - PCI Express Interface
    - Serial ATA (SATA) Interface
    - LPC Interface
    - Interrupt Interface
    - Universal Serial Bus (USB) Interface
    - Power Management Interface
    - Processor Interface
    - SMBus Interface
    - System Management Interface
    - Real Time Clock Interface
    - Miscellaneous Signals
    - Intel High Definition Audio Link
    - Controller Link
    - Serial Peripheral Interface (SPI)
    - Thermal Signals
    - Testability Signals
    - Clock Signals
    - DVI Signal
    - Analog Display / VGA DAC Signals
    - Intel Flexible Display Interface (Intel FDI)
    - Digital Display Signals
    - General Purpose I/O Signals
    - Manageability Signals
    - Power and Ground Signals
    - Pin Straps
    - External RTC Circuitry
    - Device and Revision ID Table

- Bridge Media Controller
  - Realtek RTS5209
    - Memory Card Reader Controller

- Audio Controller: Realtek ALC269Q integrated audio controller supports multimedia. It contains the following features.
  - 95dB SNR DACs can meet Windows Vista Premium requirement
  - 90dB SNR ADCs can meet Windows Vista Premium requirement
  - Two stereo DACs support 16/20/24-bit PCM format for stereo audio playback
  - Two stereo ADCs support 16/20-bit PCM format for two stereo independent sound inputs
  - All DACs supports 44.1k/48K/96k/192kHz sample rate
  - All ADCs support 44.1k/48k/96kHz sample rate
  - 16/20/24-bit S/PDIF-OUT supports 44.1k/48k/88.2k/96k/192kHz sample rate
  - Up to four channels of digital microphone input are supported
  - Supports MONO line output with independent volume control
  - High-quality analog differential CD input
  - Supports external PCBEEP input and built-in digital BEEP generator
  - Software selectable 2.5V/3.75V/4.2V VREFOUT
  - Two jack detection pins each designed to detect up to 4 jacks
  - 1dB resolution of analog output volume control
  - Programmable 20dB and 40dB boost for analog microphone input
  - Supports hardware digital volume control for digital microphone input
  - Built-in headphone amplifiers for port-A and port-D
  - 4 GPIOs (GPIO0 / GPIO3 are digital GPIO shared with digital MIC interface, GPIO1 / GPIO2 are analog) for customized applications
  - EAPD (External Amplifier Power Down) is supported
  - Supports Anti-pop mode when analog power AVDD is on and digital power is off
  - Power support: 3.3V digital core power; 1.5V~3.3V digital IO power for HDA link; 3.3V ~ 5.0V analog power
  - Power management features
  - 48-pin LQFP ‘Green’ packages
  - 48-pin QFN ‘Green’ packages

- KBC/EC (Keyboard Controller / Embedded Controller): WINBOND NPCE795CA0DX chip is used to serve as KBC/EC and Super IO.
  - KBC
    - Scan controller function
    - Interface controller function
  - EC
    - Power supply sequence control
    - Overheat shutdown support
    - LED control
    - Beep control
    - Device ON/OFF
    - Cooling fan speed control
    - Universal I/O port
    - Battery capacity check
    - Flash memory reprogramming function
    - EC access interface
    - I2C communication control
- Clock Generator
  - Intel HM65 Integrated Clock Generator
    - Generating the clock signal required for the system
- LAN Controller
  - Atheros AR8151-10/100/1000Mbit
    - IEEE802.3 10BASE-T/100BASE-TX physical layer interface
    - IEEE 802.3u Auto-Negotiation support
    - Digital Adaptive Equalization control
    - 10BASE-T auto-polarity correction
    - LAN Connect interface
    - Automatic detection of “unplugged mode”
    - Remote boot (PXE 2.1)
    - Smart power down when link is not detected
- Wireless LAN Controller
  - Support following 2 kinds of mini PCI wireless LAN cards
    - IEEE 802.11bg

  - IEEE 802.11bgn

- Data Rate
  - IEEE 802.11bg: Standard 54M bps
  - IEEE 802.11bgn: Standard 130M bps

- Frequency Channel
  - IEEE802.11bg: 2.4GHz
  - IEEE802.11bgn: 2.4GHz / 5.4GHz

1.3 3.5-inch HDD

The computer contains an extremely low-profile, lightweight and high-performance HDD. The HDD incorporates 3.5-inch 25.4mm height magnetic disk and mini-Winchester type magnetic heads. The HDD interface conforms to Serial ATA. Storage capacities supported are 1T and 2T.

The HDD is shown in Figure 1-5.

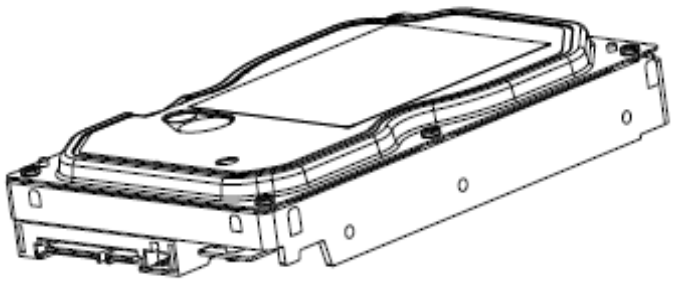


Figure 1-5 SATA HDD

1.4 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+R at 8x speed, DVD-R (Double Layer) at 6x speed, DVD+R (Double Layer) at 6x speed, DVD-RW at 6x speed, DVD+RW at 8x speed and DVD-RAM at 5x speed.

DVD Super Multi Drive is shown in Figure 1-6 and its specifications are listed in Table 1-2.

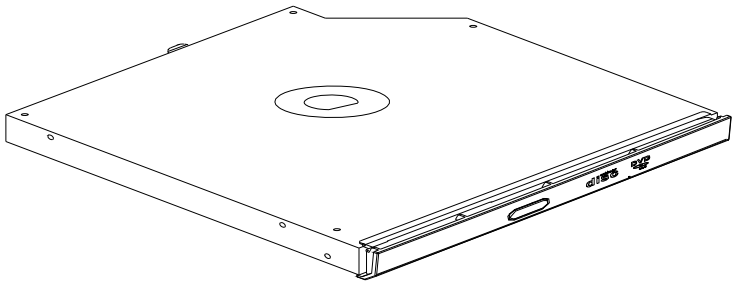


Figure 1-6 DVD Super Multi Drive

Table 1-1 DVD Super Multi Drive Specifications

Item	DVD-ROM mode	CD-ROM mode
Data Transfer Rate (Mbytes/s)	33.3 (U-DMA transfer mode 2) 16.7 (PIO mode 4, Multiword DMA mode 2)	
Access Time (ms) Average Random Access	130 ms	130 ms
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.	

1.5 Blue-Ray Writer

Blue-Ray Writer drive accepts 12-cm (4.72-inch) or 8-cm (3.15-inch) discs. At maximum, it can read CD-ROM at 24x speed, play DVD-ROM at 8x speed, read BD-ROM Video at 1.6x speed, BD-ROM Data at 6x speed, and write CD-R at 24x speed, CD-RW at 4x speed, High Speed CD-RW at 10x speed, Ultra Speed CD-RW at 16x speed, DVD-R at 8x speed, DVD+R at 8x speed, DVD-R DL at 4x speed, DVD+R DL at 4x speed, DVD-RW at 6x speed, DVD+RW at 8x speed, DVD-RAM at 5x speed, BD-R at 6x speed and BD-RE at 2x speed.

Blue-Ray Writer Drive is shown in Figure 1-7 and its specifications are listed in Table 1-3.

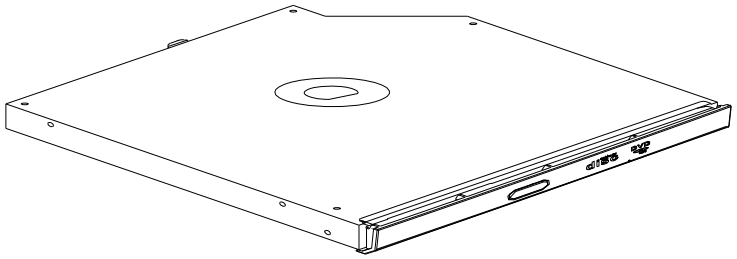


Figure 1-7 Blue-Ray Writer Drive

Table 1-2 Blue-Ray Writer Drive Specifications

Item	BD-ROM Mode	DVD-ROM Mode	CD-ROM Mode
SATA Interface	150 MB/s		
Average Random Access Time	300 ms	190 ms	180 ms
Buffer Memory Size (Mbytes)	2MB		
Formats Supported	BD: BD-ROM, BD-R, BD-RE. DVD: DVD-VIDEO, DVD-ROM, DVD-R, DVD-RW, DVD-R DL, DVD-RAM, DVD+R, DVD+RW, DVD+R DL. CD: CD-DA, CD-ROM, CD-R, CD-RW, CD-ROMXA, Photo CD (Multi-Session), Video CD, CD-Extra (CD+), CD-Text.		

1.6 Power Supply

The power supply unit provides many different voltages for the system board and performs the following functions:

1. Power input monitor
   - Checks whether the DC power supply (AC adapter) is connected to the computer.
   - Monitors the DC power supply input voltage (AC Adapter output voltage).
2. Power supply's internal control
   - 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
   - Power on: White.
   - Power off and DC connected: Amber.
   - Standby: Blinking Amber.
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 supply voltage from the AC adapter.

1.7 Keyboard, Mouse and Receiver Dongle Outline

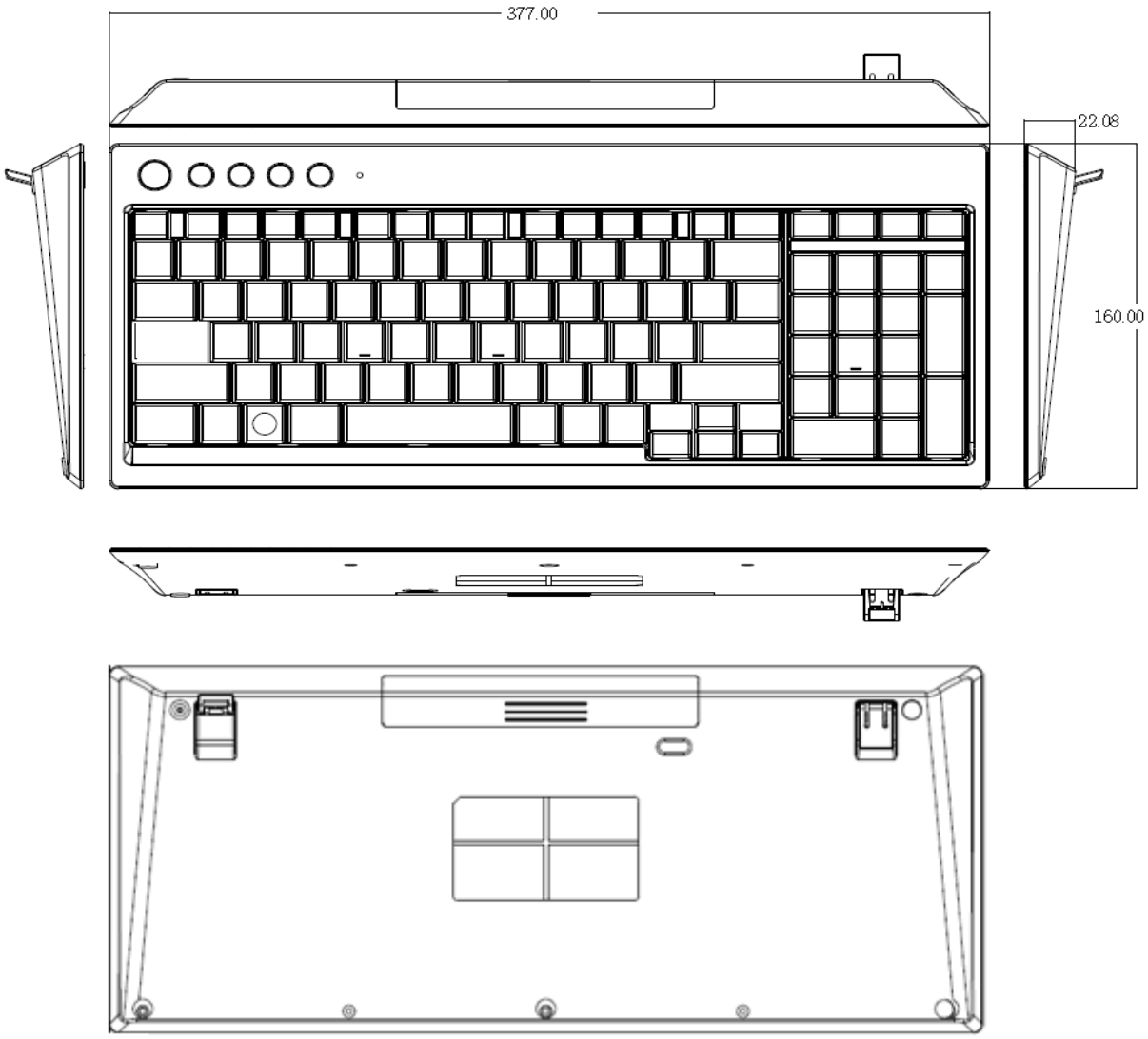


Figure 1-8 Keyboard

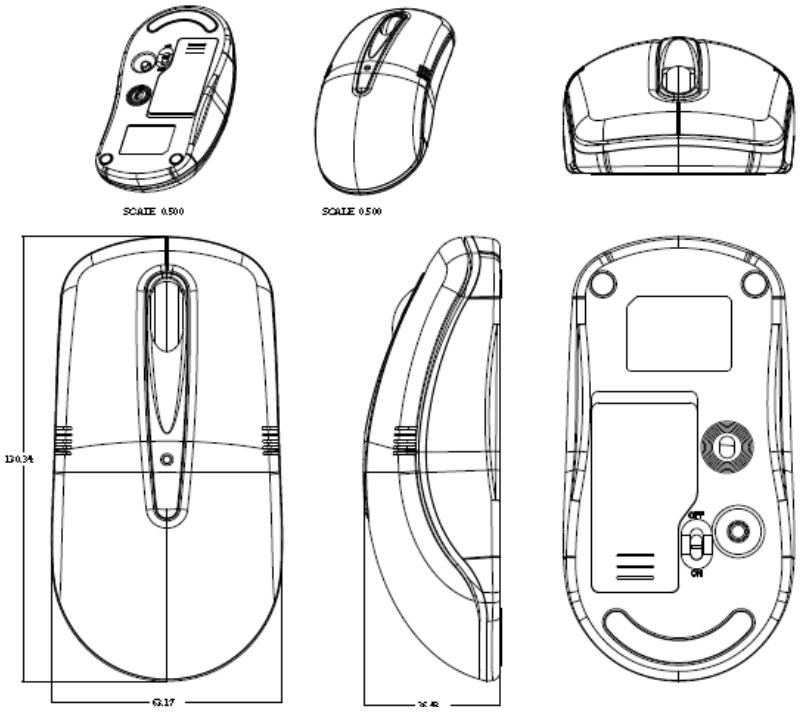


Figure 1-9 Mouse

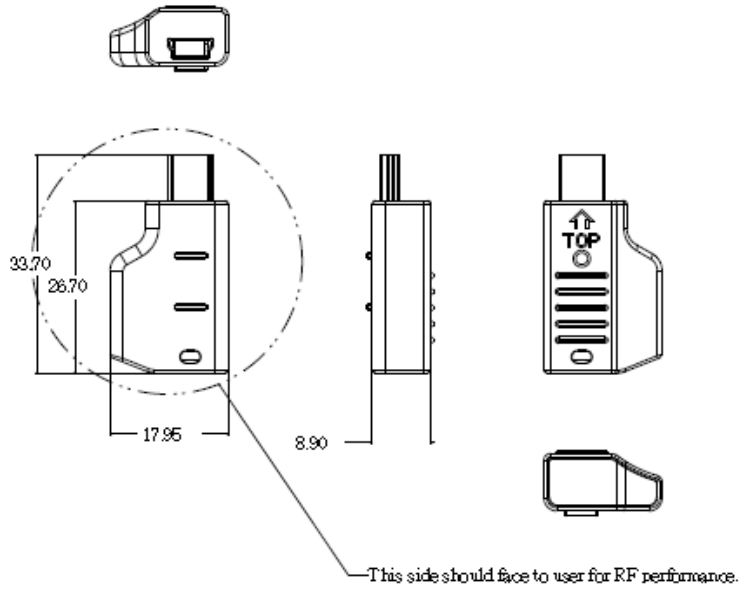


Figure 1-10 Receiver Dongle

Chapter 2
Troubleshooting

Chapter 2 Contents

Figures

Tables

2.1 Outline

This chapter describes the fault diagnosis procedures for field replaceable units (FRUs) in the computer.

The FRUs covered here are as follows:
2.3 Power Supply: AC Adapter, Power cord, Power button board (Power LED), System board
2.4 System Board: System board, CPU
2.5 Keyboard / Mouse / Receiver: System Board
2.6 HDD: HDD, SATA connector board, SATA cable, HDD / ODD power cable, Power button board (Access LED)
2.7 Display: Panel, LVDS cable, Scalar board, Inverter board and related cables.
2.8 ODD (Optical Disk Drive / Blue-Ray Drive): ODD, SATA connector board, SATA cable, HDD/ODD power cable, Power Button Board (Access LED)
2.9 LAN: LAN chip, MAC address, System board
2.10 Audio Test: Speaker, system board.
2.11 Cooling Module: Fan
2.12 Webcam Module
2.13 Scalar board: HDMI, D-port, Line-in, Inverter board, Scalar board, Display control board, Power button board (Display off LED), LVDS cable.
2.14 Wireless LAN Module
2.15 TV Tuner Module
2.16 CIR and Remote Controller: Power button board
2.17 USB Ports: System Board
2.18 MIC and Earphone Jack: Audio chip, MIC and Earphone jack
2.19 Spurs Board
2.20 3 in1 Card Reader: System Board
2.21 Hotkey Board: System Board
2.22 Instant TV: System Board
2.23 Touch Screen Module

See Chapter 4 for procedures to replace FRUs and Chapter 3 for procedures to use test programs.

The following tools are required to perform the diagnostic procedures:

1. Diagnostics (maintenance test program) disk
2. Screwdrivers (2.0mm, 2.5mm)
3. Cleaning disk kit (for ODD drive cleaning)
4. Bootable CD
5. Multi-meter
6. External monitor
7. Remote Controller
8. Headphone and Microphone
9. A-BEX TEST DVD
10. Music CD
11. DVD TSD-1 (TOSHIBA EMI DVD Test Media)

2.2 Basic Flowchart

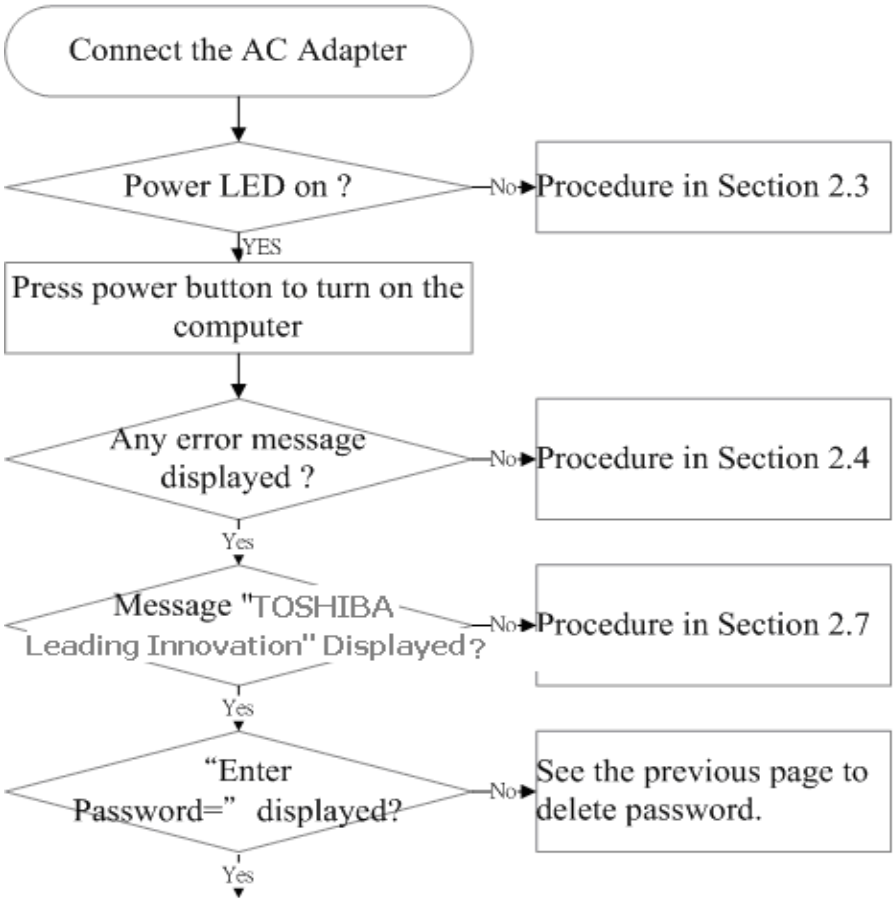
The basic flowchart in Figure 2-1 serves as a guide for identifying a possibly faulty FRU.

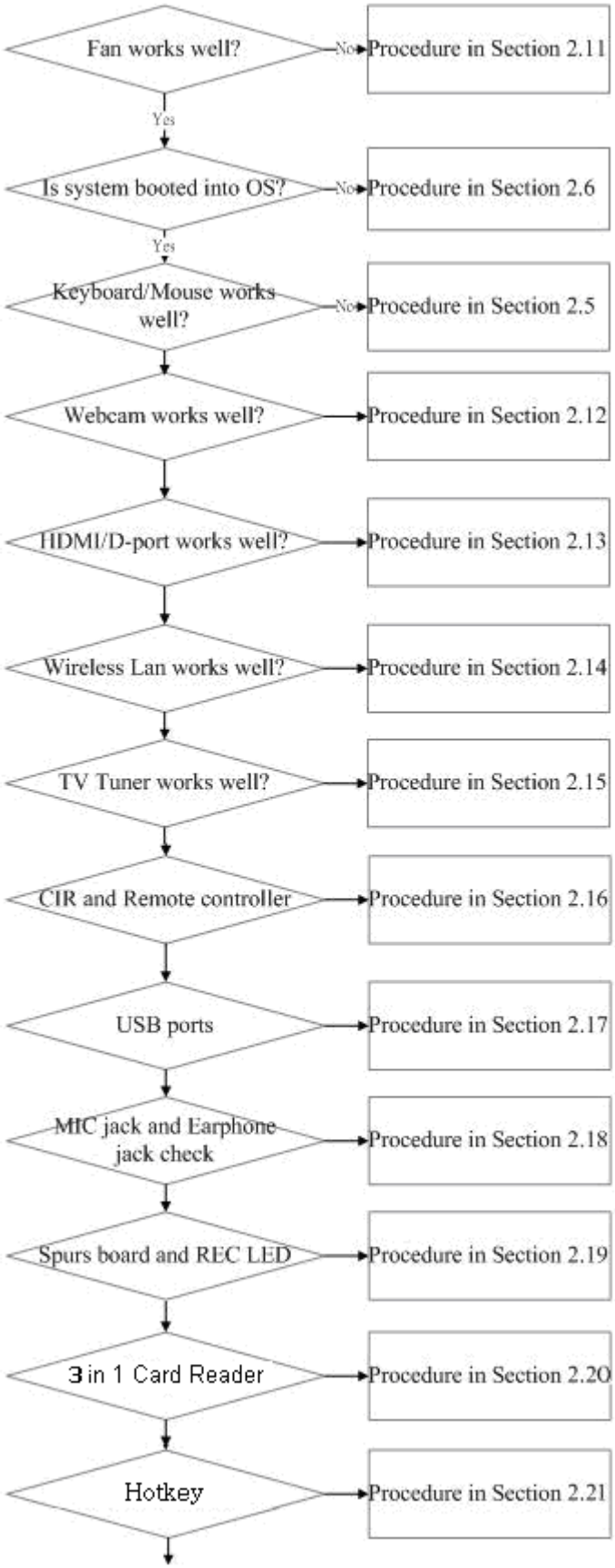
Before going through the diagnostic flowchart steps, verify the following:

Ask the user if a password has been registered and, if so, ask him or her to enter the password. If the user has forgotten the system password, use a jump wire to make a short circuit on M/B **B1** location, then turn the computer power on. When booted, the computer overrides password protection and automatically erases the current password.

Make sure the Windows 7 Home Premium / Professional Edition has been installed on the HDD. Any other operating system can cause the computer to malfunction.

Make sure any piece of optional equipment has been installed.




Fan works well?
No
Procedure in Section 2.11
Yes
Is system booted into OS?
No
Procedure in Section 2.6
Yes
Keyboard/Mouse works well?
No
Procedure in Section 2.5
Webcam works well?
Procedure in Section 2.12
HDMI/D-port works well?
Procedure in Section 2.13
Wireless Lan works well?
Procedure in Section 2.14
TV Tuner works well?
Procedure in Section 2.15
CIR and Remote controller
Procedure in Section 2.16
USB ports
Procedure in Section 2.17
MIC jack and Earphone jack check
Procedure in Section 2.18
Spurs board and REC LED
Procedure in Section 2.19
3 in 1 Card Reader
Procedure in Section 2.20
Hotkey
Procedure in Section 2.21

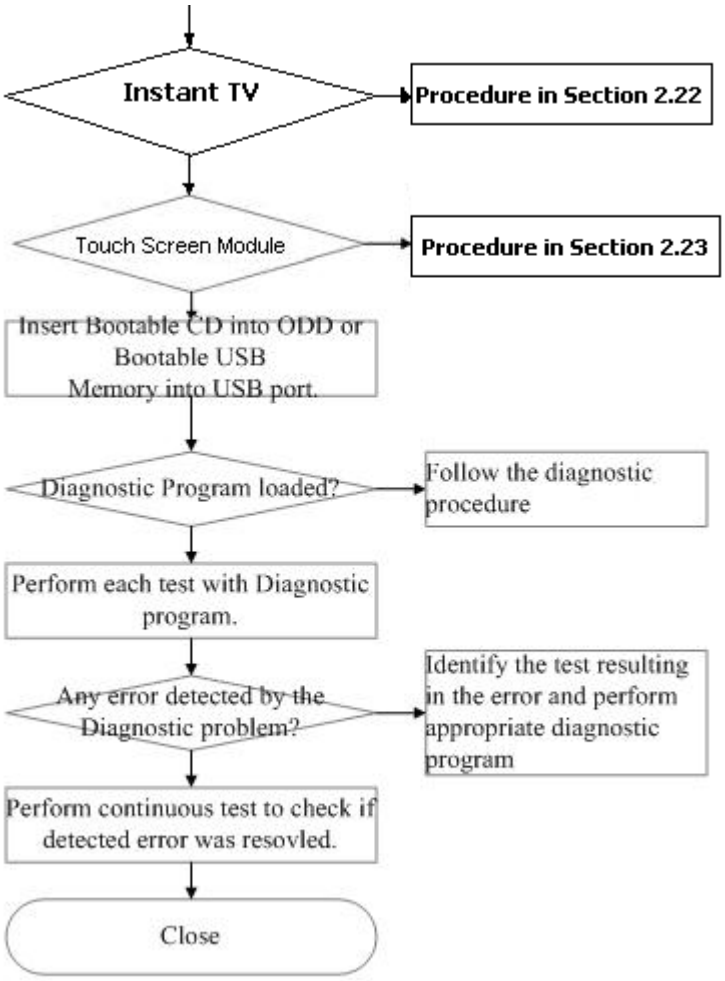


Figure 2-1 Basic Flowchart

If diagnostic program cannot detect an error, error may be intermittent. Run continuous test program repeatedly to isolate the problem. Check log utilities function to confirm which diagnostic test detected the error, perform appropriate troubleshooting procedures as follows:

1. If an error is detected by the System test, Memory test, Sound test, or Real Timer test, follow the system board troubleshooting procedures in Section 2.4.
2. If an error is detected by Keyboard Test, follow Keyboard troubleshooting procedures in Section 2.5.
3. If an error is detected by HDD Test, follow HDD troubleshooting procedures in Section 2.6.
4. If an error is detected by Display Test, follow Display troubleshooting procedures in Section 2.7.
5. If an error is detected by ODD Test, follow ODD troubleshooting procedures in Section 2.8.
6. If an error is detected by LAN Test, follow LAN troubleshooting procedures in Section 2.9.
7. If an error is detected by Speaker Test, follow Speaker troubleshooting procedures in Section 2.10.
8. If an error is detected by Fan On / Off Test, follow Cooling module troubleshooting procedures in Section 2.11.

And some components can't be tested and verified by the diagnostic programs, please execute the specified Function Programs in Windows for these components, then perform the appropriate troubleshooting procedures as described in Section 2.12 to Section 2.23 for these components.

2.3 Power Supply

The power supply in the computer controls many functions and components. To check if the power supply is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Power LED Check

Procedure 2 Connection Check

Procedure 3 Replacement Check

Procedure 1 Power Icon Check

The following LED indicates the power supply status:

DC IN LED 

The power supply controller displays the power supply status through the PC Power LED as in the tables below.

PC Power LED	Power supply status
White	Computer is in power-on status.
On in Amber	AC adapter is connected and computer is in power-off status.
Blinking in Amber	Computer is in standby status.
Off	AC adapter is not connected and computer is in power-off status.

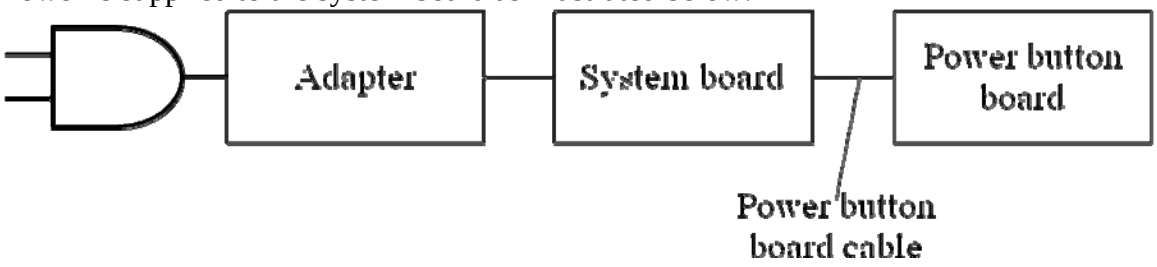
If the PC Power LED off, follow the steps below:

1. Remove the AC adapter to shut off power supply to the computer.

Check 1 Make sure the PC Power LED goes on. If it does not, go to Procedure 2.

Procedure 2 Connection Check

Power is supplied to the system board as illustrated below:



Follow the steps below to check whether each connector has been connected correctly:

Check 1 Make sure the AC adaptor and AC power cord have been firmly plugged into the DC IN socket and wall outlet respectively. When they have been connected correctly, perform Check 2.

Check 2 Connect a new AC adaptor and AC power cord.

If the Battery LED / DC IN LED does not go on in Amber, perform Check 3.

Check 3 Follow steps in chapter 4 to disassemble computer to check the connection of cable between system board and power button board.

If the Battery LED / DC IN LED do not go on, go to check 4.

Check 4 Press Power button to turn on the computer.

If the Battery LED / DC IN LED do not go on, go to Procedure 3.

Procedure 3 Replacement Check

The system board, power button board, cable or CPU may be faulty. Disassemble the computer according to Chapter 4 and follow the steps below:

Check 1 Replace the power button board with a new one, if the computer is still not working properly, perform Check 2.

Check 2 Replace the power button board cable with a new one, if the computer is still not working properly, perform Check 3.

Check 3 Replace the system board with a new one, if the computer is still not working properly, perform Check 4.

Check 2 Replace the CPU with a new one.

2.4 System Board

To check if the system board is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Message Check

Procedure 2 Test Program Check

Procedure 3 Replacement Check

Procedure 1 Message Check

When the power is turned on, the system performs the self-diagnostic Power On Self Test (POST) embedded in the BIOS ROM. The POST tests and initializes each IC on the system board.
If an error message appears on the display, perform Check 1.

If there is no error message, go to Procedure 2.

If FREE-DOS or Windows 7 is loaded normally, go to Procedure 3.

Check 1 If the following error message is displayed on the screen, press the F1 key as prompted. These errors occur when the system configuration preserved in the RTC memory (generally called CMOS memory) does not match the actual configuration or when the data is lost.
If you press the F1 key as prompted by the message, the TSETUP screen appears to set the system configuration. If the error message appears frequently when the power is turned on, replace the RTC battery. If any other error message is displayed, perform Check 2.

```
*** Bad RTC battery ***
Check system.  Then press [F1] key
```

Check 2 If the following error message is displayed on the screen, press any key as prompted by the message.
The error message appears when either data stored in RAM to be resumed is lost because the battery has been exhausted or the system board is faulty.

***** Resume failure and press any key to continue *****

Procedure 2 Test Program Check

The maintenance test program contains several programs for diagnosing the system board and CPU. Execute the following test programs using the procedures described in Chapter 3.

1. System test
2. Memory test
3. Keyboard test
4. Display test
5. Hard Disk test
6. Mouse test
7. ODD test
8. Sound test
   a. Speaker test
   b. Record test
   c. Line-in and earphone test
9. DMI read
10. DMI Write
11. LAN test
12. BIOS version check
13. CPU thermal
14. System information

If an error is detected during these tests, go to Procedure 3.

Procedure 3 Replacement Check

The system board, memory, or CPU may be defective. Disassemble the computer following the steps described in Chapter 4 and replace the system board, memory module or CPU with a new one.

2.5 Keyboard / Mouse / Receiver

To check if the Keyboard, mouse and receiver are defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

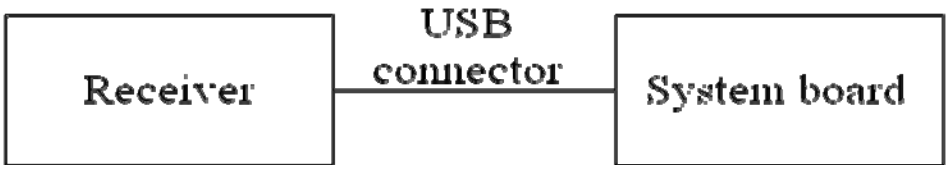
Procedure 1 Test Program Check

Execute the Keyboard and mouse test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to Procedure 2. If no error is detected, the keyboard itself is normal.

Procedure 2 Connector Check and Replacement Check

The wireless receiver and system board may be disconnected or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the receiver has been firmly connected to the system board.



If the cable is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 Press connect button on the bottom of mouse and wait 15 seconds. Follow steps in Chapter 3 and execute mouse test. If the problem persists, perform Check 3.

Check 3 The mouse may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 4.

Check 4 Press connect button on the receiver and wait 15 seconds. Follow steps in Chapter 3 and execute keyboard test. If the problem persists, perform Check 5.

Check 5 The keyboard may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 6.

Check 6 The receiver may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 7.

Check 7 The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the keyboard is still not functioning properly, perform Check 1.

2.6 HDD

To check if the HDD is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Message Check

Procedure 2 Partition Check

Procedure 3 Format Check

Procedure 4 Test Program Check

Procedure 5 HDD / ODD / Media Bridge Access LED Check

Procedure 6 Connector Check and Replacement Check

CAUTION: The contents of the HDD will be erased when the HDD diagnostic test or formatting is executed. Save the required contents of the HDD to floppy disks or other storage drive in advance.

Procedure 1 Message Check

When the computer's HDD does not function properly, some of the following error messages may appear on the display. Follow the steps below to check the HDD.

Check 1 If either of the following messages appears, go to Procedure 2. If the following messages do not appear, perform Check 2.

```
Insert system disk in drive
Press any key when ready .....
or
Non-System disk or disk error
Replace and press any key
```

Check 2 Check SETUP to see if the Hard Disk option has been set to "Not used". If so, choose another setting and restart the computer. If the problem persists, go to Procedure 2.

Procedure 2 Partition Check

Boot from the Free-DOS system. Perform the following checks:

Check 1 Type C: and press the Enter key. If you cannot change to drive C, perform Check 2. If you can change to drive C, perform Check 3.

Check 2 Type FDISK and press the Enter key. Choose "Display partition information" from the FDISK menu. If drive C is listed, perform Check 3. If drive C is not

listed, return to the FDISK menu and choose the option to create a Free-DOS partition on drive C. Then restart the computer.. If the problem persists, go to Procedure 3.

Check 3 **If drive C is listed as active in the FDISK menu, perform Check 4. If drive C is not listed as active, return to the FDISK menu and choose the option to set the active partition for drive C. Then restart the computer. If the problem persists, perform Check 4.**

Check 4 **Enter DIR C: and press the Enter key. If the following message is displayed, go to Procedure 3. If contents of drive C are listed on the display, perform Check 5.**

```
Invalid media type reading drive C
Abort, Retry, Fail?
```

Check 5 **Use the SYS command in the Free-DOS system to install system files. If the following message appears on the display, the system files have been transferred to the HDD. Restart the computer. If the problem persists, go to Procedure 3.**

```
System transferred
```

> ***NOTE****: If the computer is running Windows 7 Home Premium and the hard disk capacity is more than 512 MB, the FDISK program will ask if you need support for a partition larger than 2 GB. Select Y for large partition support; however, be sure to read the precaution regarding access by other operating systems.*

Procedure 3 Format Check

The 3.5-inch HDD is formatted using the low-level format program and the FREE-DOS FORMAT program. Using these programs, follow the steps below to format the HDD.

Check 1 **Enter FORMAT C:/S/U to format the HDD and transfer system files. If the following message appears on the display, the HDD has been formatted.**

```
Format complete
```

If you cannot format the HDD using the test program, go to Procedure 4.

Procedure 4 Test Program Check

Run the HDD test program stored on the maintenance test program disk for all test items. See Chapter 3 for details on how to use the test program.

If an error is detected during the HDD test, an error code and status will be displayed. The error codes and their status names are listed in Table 2-1. If an error code is generated and the problem still exists, go to Procedure 6.

Table 2-1 HDD Error Code and Status

Code	Status
1	Get Parameter Fail !
2	Read Old Data Error
3	Write Pattern Error
4	Read Back Data Error
5	Data Compare Error
6	Restore Data Error
7	Read Verify Error
9	Seek Error
10	Disk Controller Self Test Failed
11	Disk Controller Test unexpected interrupt Failed
12	Disk Controller action Test Failed
13	Disk dos not support SMART
14	Disk read attribute threshold error
15	Disk read attribute value error
16	Disk SMART attribute value error

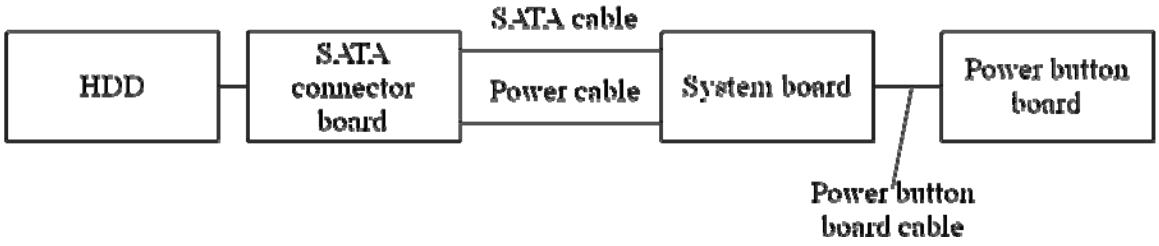
Procedure 5 HDD / ODD / Media Bridge Access LED Check

Run the HDD test program stored on the maintenance test program disk for all test items. See Chapter 3 for details on how to use the test program.
If the access LED doesn't light or blink during the HDD test, go to Procedure 6.

Procedure 6 Connector Check and Replacement Check

The HDD, system board or CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure following connectors and cables have been firmly connected to the HDD, system board.



If any connector is loose or off, reconnect it firmly and return to Procedure 1.
If there is still an error, perform Check 2.

Check 2 The power button board or its cable may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 3.

Check 3 The SATA connector board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 4.

Check 4 The HDD may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 5.

Check 5 The System board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 6.

Check 6 The CPU may be damaged. Replace it with a new one following the disassembling instructions in Chapter.

2.7 Display

To check if the computer's display is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

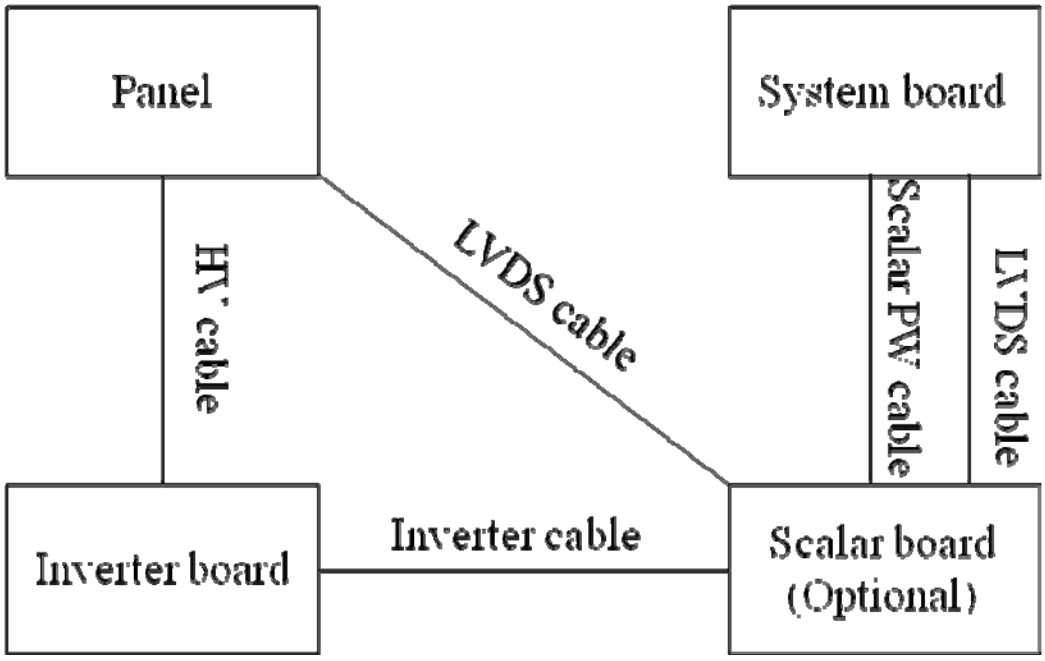
Insert the diagnostics bootable CD in the computer's CD ROM, turn on the computer and run the test. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to Procedure 3. If no error is detected, the display itself is normal.

Procedure 2 Connector Check and Replacement Check

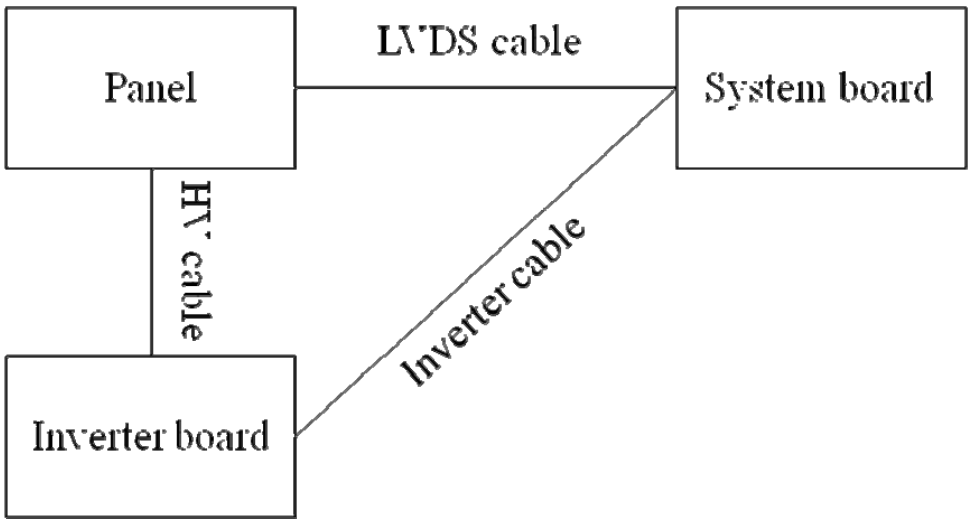
The display unit has an LCD module, Fluorescent lamp (FL), panel close switch and FL inverter board. Any of the components or their connections may be defective. Disassemble the computer following the steps described in Chapter 4, then perform the following checks:

(1) If the FL does not light, perform Check 1.
(2) If characters or graphics are not displayed normally, perform Check 5.
(3) If the FL remains lit when the display is closed, the panel close switch may be defective. Perform Check 8.

Check 1 Make sure the following cables have been firmly connected to the system board and FL inverter board.



System with Scalar board



System without Scalar board

If any of the cables is loose or off, reconnect it firmly and return to Procedure 2. If there is still an error, perform Check 2.

Check 2 **The Inverter cable may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 2.**

Check 3 **The Inverter board may be faulty. Replace it with a new one and return to Procedure 2. If there is still an error, perform Check 4.**

Check 4 **The Scalar board may be faulty. Replace it with a new one and return to Procedure 2. If there is still an error, perform Check 7.**

Check 5 **Make sure the LVDS cable has been firmly connected to the system board and LCD module.**
If the cable is loose or off, reconnect it firmly and return to Procedure 2. If there is still an error, perform Check 6.

Check 6 **The Scalar PW cable may be faulty. Replace it with a new one and return to Procedure 2. If there is still an error, perform Check 7.**

Check 7 **The LCD module may be faulty. Replace it with a new one and return to Procedure 2. If there is still an error, perform Check 8.**

Check 8 **The System board may be faulty. Replace it with a new one. If there is still an error, perform Check 9.**

Check 9 **The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 10.**

Check 10 **The CPU may be faulty. Replace it with a new one following the instructions in Chapter 4.**

2.8 ODD (Optical Disk Drive / Blue-Ray Drive)

To check if the internal ODD drive is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 ODD Cleaning Check

Procedure 2 Test Program Check

Procedure 3 HDD/ODD/Media bridge access LED Check

Procedure 4 Connector Check and Replacement Check

Procedure 1 ODD Cleaning Check

1. Turn off the power to the computer.
2. Open the ODD tray by inserting a slender object such as a straightened paper clip into the eject hole. The object must be long enough to activate the eject mechanism.
3. Clean the laser pickup lens with a lens cleaner. Apply the cleaner to a cloth and wipe the lens.
4. If the ODD drive still does not function properly after cleaning, go to Procedure 2.

Procedure 2 Test Program Check

Execute the ODD drive test program available as part of the maintenance test program. Insert the diagnostics CD in the computer's CD, turn on the computer and run the test. Then insert a test ODD (Toshiba-EMI DVD-ROM TEST DISK TSD-1) into the ODD drive. See Chapter 3 for information on how to perform the test.
If any error is detected by the test, go to Procedure 3.

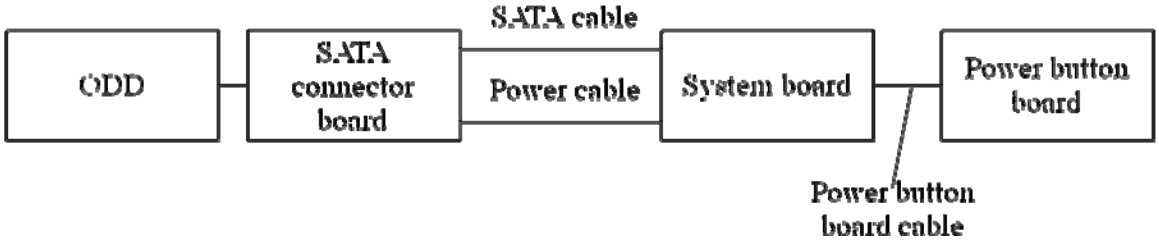
Procedure 3 HDD / ODD / Media Bridge Access LED Check

Execute the ODD drive test program available as part of the maintenance test program. Insert the diagnostics CD in the computer's CD, turn on the computer and run the test. Then insert a test ODD (Toshiba-EMI DVD-ROM TEST DISK TSD-1) into the ODD drive. See Chapter 3 for information on how to perform the test.
If the access LED doesn’t light or blink during the ODD test, go to Procedure 4.

Procedure 4 Connector Check and Replacement Check

The ODD drive is connected to the system board by the connector. The connector may be disconnected from the system board or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the following connector has been firmly connected to the ODD drive and the system board.



If the connector is loose or off, reconnect it firmly and return to Procedure 2.
If there is still an error, perform Check 2.

Check 2 The power button board or its cable may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 3.

Check 3 The SATA connector board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 4.

Check 4 The ODD may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 5.

Check 5 The System board may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4. If the problem persists, perform Check 6.

Check 6 The CPU may be damaged. Replace it with a new one following the disassembling instructions in Chapter.

2.9 LAN

To check if the computer's LAN is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

Execute the LAN check program available as part of the maintenance test program. This program will check the LAN. Insert the Bootable CD into the CD. Turn on the computer and run the check program. See Chapter 3 for information on how to perform the check.
If any abnormal is detected by the check, go to Procedure 2

Procedure 2 Connector Check and Replacement Check

The LAN connector (RJ45) is mounted on the system board. If the LAN malfunctions, the system board or CPU might be faulty.
Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 The system board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the LAN is still not functioning properly, perform Check 2.

Check 2 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 3.

Check 3 The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

2.10 Audio Test (Speaker and Internal MIC)

To check if the computer's Speaker is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

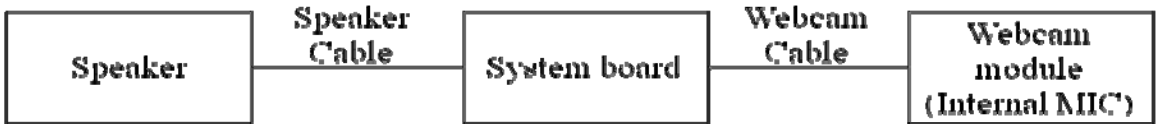
Procedure 1 Test Program Check

Execute the Audio test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to Procedure 2. If no error is detected, the Audio itself is normal.

Procedure 2 Connector Check and Replacement Check

The Audio or system board may be disconnected or faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the Speaker cable and webcam cable have been firmly connected to the system board.



If the cable is loose or off, reconnect it firmly and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The Speaker may be faulty. Replace it with a new one following the instructions in Chapter 4. If the problem persists, perform Check 3.

Check 3 The webcam module or webcam cable may be faulty. Replace it with a new one following the instructions in Chapter 4. If the intenal MIC is still not functioning properly, perform Check 4.

Check 4 The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the Audio is still not functioning properly, perform Check 5.

Check 5 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persist, perform Check 6.

Check 6 The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

2.11 Cooling Module

To check if the computer's cooling module is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

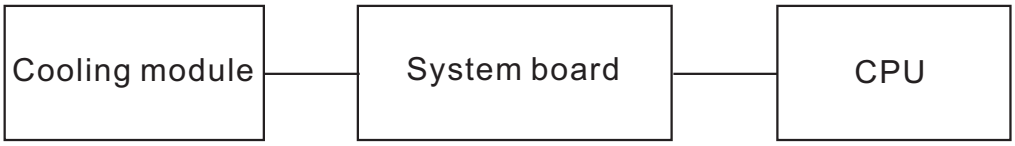
Execute the Fan On/off test program available as part of the maintenance test program. This test program checks the cooling module. Insert the diagnostics bootable CD in the computer's CD, turn on the computer and run the test. See Chapter 3 for information on how to perform the test. If any error is detected by the test, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The cooling module is connected to the system board. If the cooling module malfunctions, there may be a bad connection between the cooling module and the system board or either might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the cooling module has been firmly connected to the connector on the system board. Also make sure that the tape is not stuck to any part of the fan and that the fan is free of foreign matter.



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If the tape is stuck to any part of the fan, stick it back to the specified point. If a foreign matter is found in the fan, remove it and then return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The cooling module may be faulty. Replace it with a new one following the steps in Chapter 4. If the cooling module is still not functioning properly, perform Check 3.

Check 3 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problem persists, perform Check 4.

Check 4 CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

2.12 Webcam Module

To check if the webcam is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Toshiba Utility check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Toshiba Utility Check

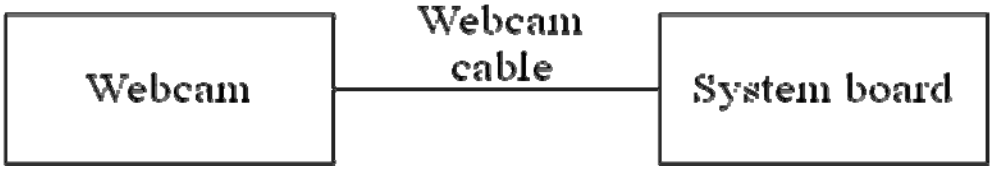
Use a HDD with TOSHIBA DX preload image to boot into OS. Execute the Toshiba Utility, "Web Camera Application" and check if webcam led and webcam work normal. If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The webcam module is connected to the system board. If the webcam module malfunctions, there may be a bad connection between the webcam module and the system board or either might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the webcam cable has been firmly connected to the connector on the system board and webcam module..



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The webcam module may be faulty. Replace it with a new one following the steps in Chapter 4. If the webcam module is still not functioning properly, perform Check 3.

Check 3 The webcam cable may be defective. Replace the webcam cable with a new one following the steps described in Chapter 4. If the problem persists, perform Check 4.

Check 4 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.13 Scalar Board (HDMI / D-Port / Audio Line-In)

To check if the scalar board is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Display check by device with HDMI/D-port/Line-In output

Procedure 2 Connector Check and Replacement Check

Procedure 3 Display off LED Check

Procedure 1 Test Program Check

Execute the "System information" available as part of the maintenance test program to check firmware version of Scalar board. Insert the Bootable CD into the CD. Turn on the computer and run the check program. See Chapter 3 for information on how to perform the check.
If any abnormal is detected by the check, go to Procedure 2

Procedure 2 Display check by device with HDMI/D-port/Line-In output

Connect a device with HDMI/D-port/Line-in output source to system. Press "Display off" and "AV select" button to turn on the display function and select signal resource. Try to adjust volume, brightness and turn on/off the display. If any abnormal symptom is detected, go to Procedure 3.

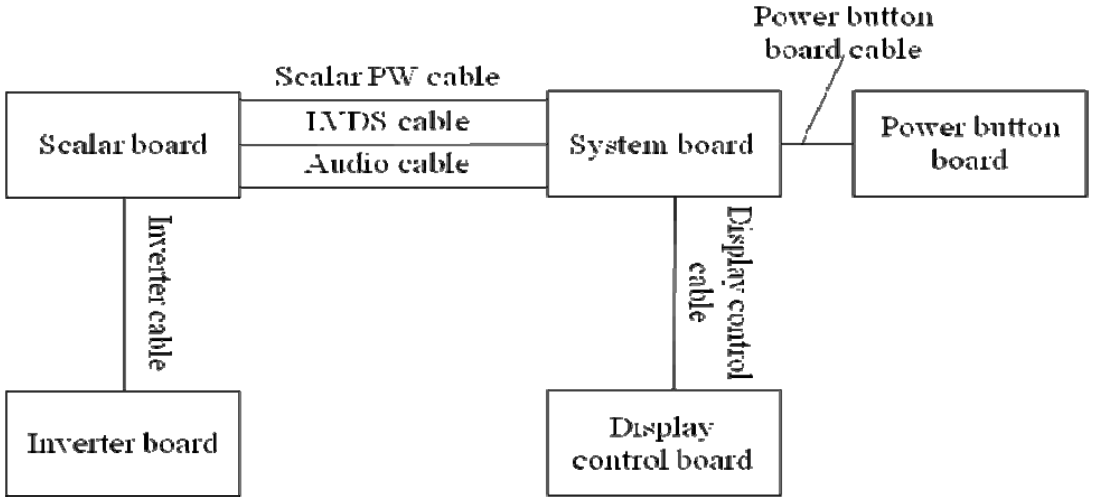
Procedure 3 Display off LED Check

Press Display off button to turn off display in PC mode, D-port and HDMI mode.
If the display off LED doesn't light after turning off display, go to Procedure 4.

Procedure 4 Connector Check and Replacement Check

The scalar board and display control board are connected to the system board. If the scalar board and display control board malfunctions, there may be a bad connection between the scalar board , display control board, Inverter board and the system board or either might be faulty.
Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the below cables have been firmly connected to the connector on the system board, scalar board, inverter board and display control board..



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The power button board or its cable may be faulty. Replace it with a new one following the steps in Chapter 4. If the display off LED on power button board is still not functioning properly, perform Check 7.

Check 3 The scalar board may be faulty. Replace it with a new one following the steps in Chapter 4. If the scalar board and display control board is still not functioning properly, perform Check 4.

Check 4 The display control board may be faulty. Replace it with a new one following the steps in Chapter 4. If the scalar board and display control board is still not functioning properly, perform Check 5.

Check 5 The inverter board may be faulty. Replace it with a new one following the steps in Chapter 4. If the scalar board and display control board is still not functioning properly, perform Check 6.

Check 6 The cables may be defective. Replace the new cable with a new one following the steps described in Chapter 4. If the problem persists, perform Check 7.

Check 7 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.14 Wireless LAN Module

To check if the wireless LAN is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Toshiba Utility check

Procedure 2 Connector Check and Replacement Check

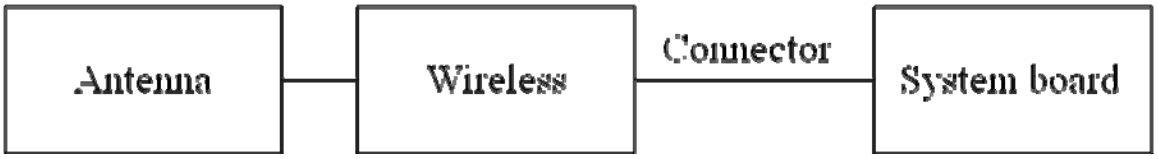
Procedure 1 Toshiba Utility Check

Use a HDD with TOSHIBA DX preload image to boot into OS. Execute the NETWORK test in Toshiba Utility, "PC diagnostic tool" and check if result is passed. If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The wireless LAN module is connected to the system board and antennas. If the wireless LAN module malfunctions, there may be a bad connection between the wireless LAN module, antennas and the system board or either might be faulty.
Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the wireless antennas have been firmly connected to the connector on the system board and wireless module..



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The wireless LAN module may be faulty. Replace it with a new one following the steps in Chapter 4. If the wireless module is still not functioning properly, perform Check 3.

Check 3 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.15 TV Tuner Module and B-CAS Board

For Japan Area:

To check if the TV Tuner is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Toshiba Utility check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Toshiba Utility Check

Use a HDD with TOSHIBA DX preload image to boot into OS. Execute TOSHIBA AV center to receive TV program in accordance with these steps as below.

In case of ISDB-T single tuner:

Step 1 Watch any TV channels.

If any abnormal symptom is detected, go to Procedure 2.

In case of ISDB-T double tuner:

Step 1 Select "D1" on TOSHIBA AV Center and Watch TV program.

Step 2 Select "D2" on TOSHIBA AV Center and Watch TV program.

If any abnormal symptom is detected, go to Procedure 2.

In case of ISDB-T/BS/CS double tuner:

This TV tuner has 4 tuner ICs. 2 tuners for ISDB-T and other 2 tuners for BS and CS. Input ISDB-T signal and BS/CS signal to check. Combine ISDB-T signal and BS/CS signal to one coaxial cable to input it to PC.

It's difficult to check all TV ICs and data streams because user cannot select tuners explicitly. And keep the steps as below.

Step 0 Stop all recording, if recording is working.
And Turn OFF antenna power by TOSHIBA AV Center Setting Dialog.

Step 1 Select "地上D" to Watch and Check ISDB-T TV program (ISDB-T A).

Step 2 Record ISDB-T program (ISDB-T A) you're watching to push record button.

Step 3 Change to other ISDB-T program (ISDB-T B) without stopping recording.

Step 4 Watch and Check ISDB-T TV (ISDB-T B).

Step 5 Select "BS" and change to BS TV program. (BS/CS A) Watch and check.

Step 6 Record BS (BS/CS A) TV you're watching to push record button.

Step 7 Change to ISDB-T program (ISDB-T B) you're cording.
Step 8 Stop ISDB-T programs (ISDB-T B) recording.

Step 9 Select Change from ISDB-T you're watching to BS program (BS/CS B). Watch and Check.
If any abnormal symptom is detected in from Step 1 to Step 9, go to Procedure2.

Step10 Turn ON Antenna Power by TOSHIBA AV Center Setting Dialog. Check if 15.7V is applied between signal line in Coaxial Cable and GND.
If voltage of Coax is not proper (>13.5V or <16.5V), go to Procedure 2.

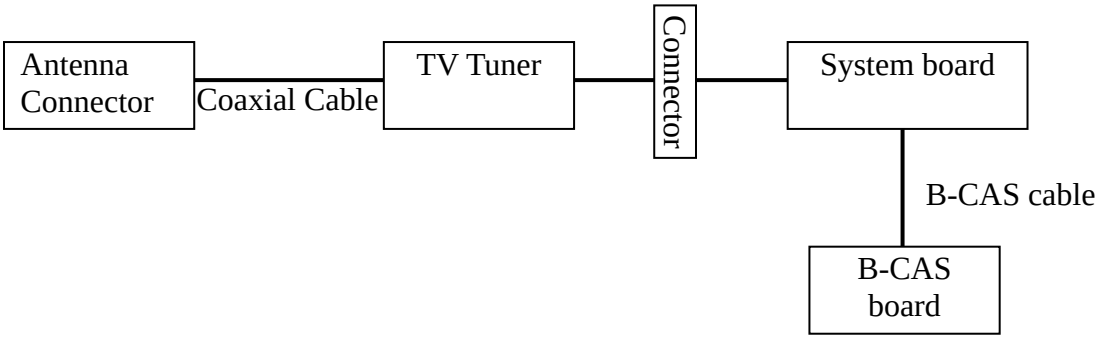
Before finishing Procedure 1 or going to Procedure 2, turn off Antenna Power.

If you leave it ON, tuner or system board will be broken easily by mis-connect or unconsidered touch.

Procedure 2 Connector Check and Replacement Check

The TV Tuner module is connected to the system board and antenna. If the TV Tuner malfunctions, there may be a bad connection between the TV Tuner module, antennas system board or either might be faulty.
Disassemble the computer following the steps described in Chapter 4 and perform the checks:

Check 1 Make sure the TV Tuner antennas has been firmly connected to on the connector the TV Tuner module and the TV tuner and B-CAS board cable has been firmly connected to the connector on the system board.



If the connector is disconnected, connect it firmly to the system board to Procedure 1. If there is still an error, perform Check 2.

Check 2 The TV Tuner module may be faulty. Replace it with a new one following steps in Chapter 4. If the TV Tuner module is still not functioning properly, perform Check 3.

Check 3 The B-CAS board may be faulty. Replace it with a new one following the Chapter 4. If the TV Tuner module is still not functioning properly, perform Check 4.

Check 4 The system board may be faulty. Disassemble the computer following the described in Chapter 4 and replace the system board with a new one.

For Non Japan Area:

To check if the TV Tuner is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Function check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Function Check

Use a HDD with preload image to boot into OS. Execute TV program to receive DVBT or PAL TV single in accordance with these steps as below.

Step 1 Watch any TV channels.

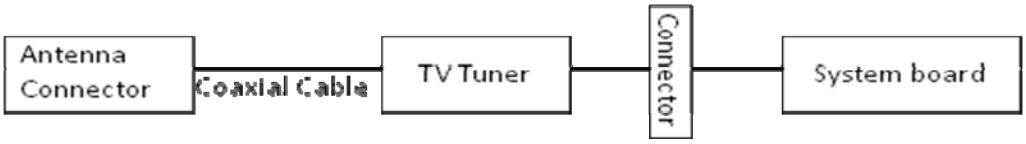
If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The TV Tuner module is connected to the system board and antenna. If the TV Tuner malfunctions, there may be a bad connection between the TV Tuner modules, antennas system board or either might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the checks:

Check 1 Make sure the TV Tuner antennas has been firmly connected to the connector of TV Tuner module and the TV tuner has been firmly connected to the connector of the system board.



If the connector is disconnected, connect it firmly to the system board to Procedure 1. If there is still an error, perform Check 2.

Check 2 The TV Tuner module may be faulty. Replace it with a new one following steps in Chapter 4. If the TV Tuner module is still not functioning properly, perform Check 3.

Check 3 The system board may be faulty. Disassemble the computer following the described in Chapter 4 and replace the system board with a new one.

2.16 CIR and Remote Controller

To check if the CIR and remote controller are defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Power on check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Power on Check

Press button ”PC 電源” on the remote controller to power on system. If system can’t be powered on, go to check 1.

Check 1 The remote controller module may be low battery. Replace new battery and try to power on system again. If the system is still not powered on properly, go to check 2.

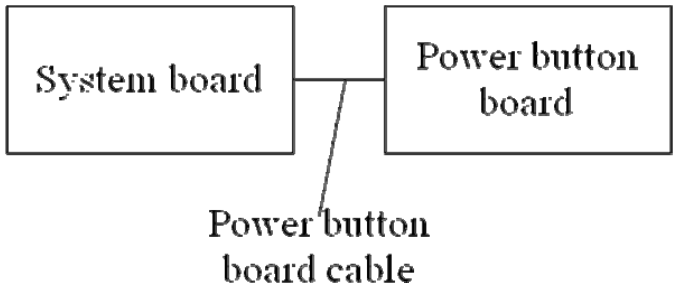
Check 2 The remote controller module may be faulty. Replace it with a new one and try to power on system again. If the system is still not powered on properly, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The CIR is on the power button board that connects system board with a cable. If the CIR and remote controller module malfunctions, there may be a bad connection between power button board and system board or either might be faulty.

Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure the power button board and system board have been firmly connected with power button cable.



If the connector is disconnected, connect it firmly to the system board and return to Procedure 1. If there is still an error, perform Check 2.

Check 2 The power button board or cable may be faulty. Replace it with a new one following the steps in Chapter 4. If CIR is still not functioning properly, perform Check 3.

Check 3 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.17 USB Ports

To check if the USB ports are defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 USB flash driver Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 USB Flash Driver Check

Use a HDD with TOSHIBA DX preload image to boot into OS. Plug a USB flash driver to each USB port and try to add and delete a file in it. Re-plug the USB flash driver if system can't cognize it. If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

All USB ports are in the system board. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.18 MIC Jack and Earphone Jack

To check if the computer's Speaker is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

Execute the Audio loop test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to check 1. If no error is detected, the Audio itself is normal.

Check 1 The System board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the Audio is still not functioning properly, perform Check 2.

Check 2 The memory may be defective. Replace the memory module with a new one following the steps described in Chapter 4. If the problems persist, perform Check 3.

Check 3 The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.

2.19 Spurs Board and REC LED

To check if the Spurs board and REC LED are defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 TOSHIBA AV center Check

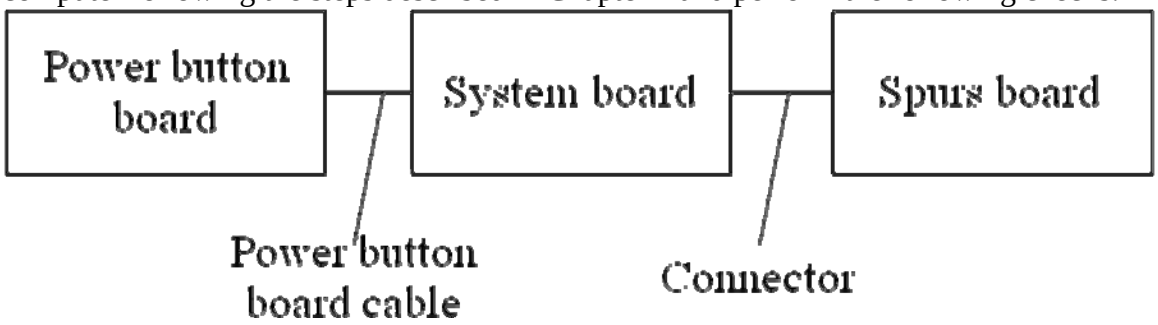
Procedure 2 Connector Check and Replacement Check

Procedure 1 USB Flash Driver Check

Use a HDD with TOSHIBA DX preload image to boot into OS. Execute TOSHIBA AV center and play TV and try to record TV program. If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

Spurs board will be activated in recording TV program by TOSHIBA AV center. REC LED that will light is on the power button board. If the Spurs board and REC LED malfunction, there may be a bad connection between these boards and cables or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:



Check 1 If REC LED malfunctions, the power button board or cable may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one. If REC LED is still not functioning properly, perform Check 4.

Check 2 If Spurs board malfunctions, the connection of Spurs board or Fan may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the thermal module or Fan with a new one. If Spurs is still not functioning properly, perform Check 3.

Check 3 If Spurs board malfunctions, the Spurs board or cable may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one. If Spurs is still not functioning properly, perform Check 3.

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

2.20 3 in 1 Card Reader

To check if the card reader is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Memory card check

Procedure 2 Connector Check and Replacement Check

Procedure 1 Memory Card Check

Use a HDD with TOSHIBA DX preload image to boot into OS. Plug-in memory card to the 5 in 1 card reader and try to add and delete a file in it. Re-plug the memory card if system can't recognize it. If any abnormal symptom is detected, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The 5 in 1 card reader is in the system board. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:

Check 1 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.21 Hotkey Board

To check if the computer's hotkey board is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

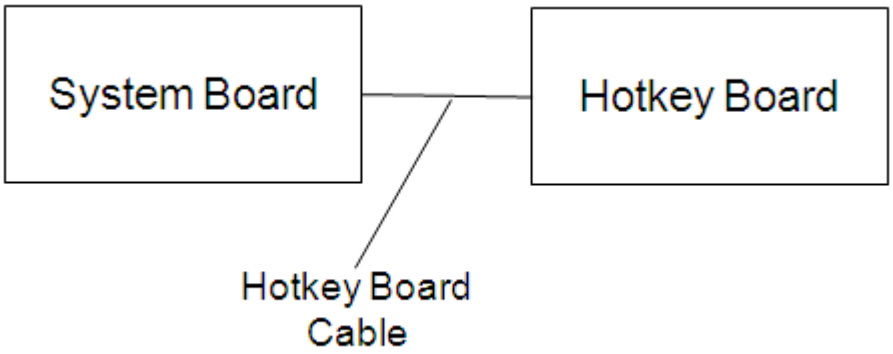
Procedure 2 Connector Check and Replacement Check

Procedure 1 Test Program Check

Execute the hotkey test available as part of the maintenance test program. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to Procedure 2.

Procedure 2 Connector Check and Replacement Check

The hotkey board is connected to the system board. If the hotkey board malfunctions, there may be a bad connection between the hotkey board and the system board or either might be faulty. Disassemble the computer following the steps described in Chapter 4 and perform the following checks:



Check 1 The hotkey board may be faulty. Replace it with a new one following the instructions in Chapter 4. If the hotkeys are still not functioning properly, perform Check 2.

Check 2 The hotkey board cable may be defective. Replace the hotkey board cable with a new one following the steps described in Chapter 4. If the problems persist, perform Check 3.

Check 3 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

2.22 Instant TV

The Instant TV function is only for Japan. To check if it is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Function Check

Procedure 2 Connector Check and Replacement Check

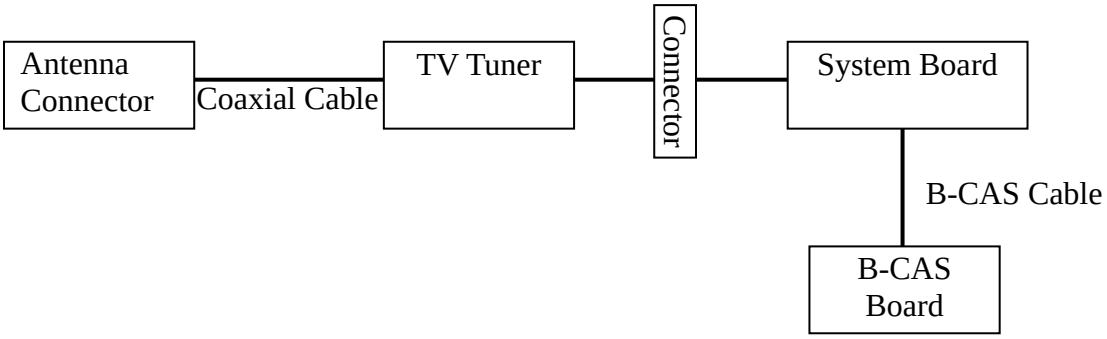
Procedure 1 Function Check

Turn on PC TV by Remote Controller "Start TV" Button, PC will show TV programs within seconds. If the function doesn't work, go to Procedure 2. If the function works, the Instant TV function is normal.
Please also notice Instant TV function only supports ISDB-T tuner with mini B-CAS card.

Procedure 2 Connector Check and Replacement Check

If this Instant TV malfunctions, there may be a bad connection between TV Tuner module, antennas and system board or either might be faulty.
Disassemble PC following the steps described in Chapter 4 and perform the following checks:

Check 1 Make sure TV Tuner antennas has been firmly connected to the connector on the TV Tuner module and the TV tuner and B-CAS board cable has been firmly connected to the connector on the system board.



If the connector is disconnected, connect it firmly to the system board and go to Procedure 1. If there is still an error, perform Check 2.

Check 2 TV Tuner module may be faulty. Replace it with a new one following steps in Chapter 4. If the Instant TV is still not functioning properly, perform Check 3.

Check 3 B-CAS board may be faulty. Replace it with a new one following steps in Chapter 4. If the Instant TV is still not functioning properly, perform Check 4.

Check 4 System Board may be faulty. Disassemble PC following the described in Chapter 4 and replace System Board with a new one.

2.23 Touch Screen Module

To check if the computer's touch screen module is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Function Check

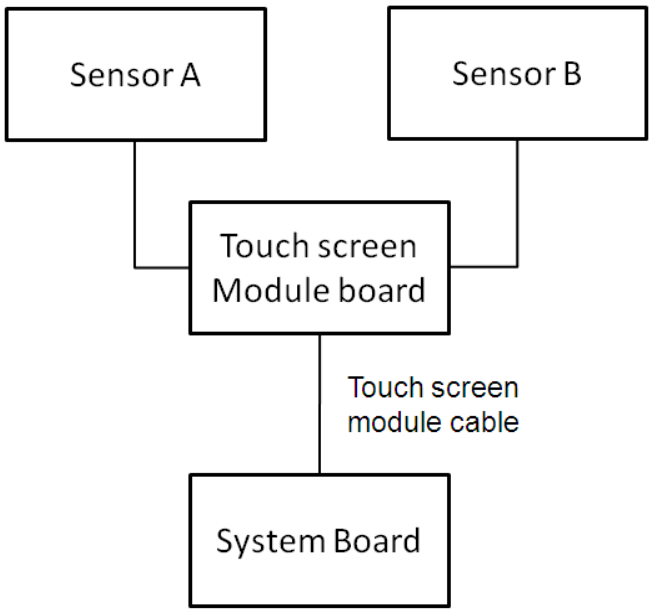
Procedure 2 Connector Check and Replacement Check

Procedure 1 Function Check

Enter the OS and install the touch module driver again. After reboot the computer, test the touch screen function in the OS. If the function is not work, go to Procedure 2. If the function can work, the touch screen module is normal.

Procedure 2 Connector Check and Replacement Check

The touch screen module contains 2 sensors and a touch screen board. They were connect to the system board by touch screen module. Any if the components or there may be defective. Disassemble the computer following the steps described in Chapter4, and then perform following checks:



Check 1 The sensors may be defect, replace them with new ones following the instructions in Chapter 4. If the touch sensor function is still not work, perform Check 2.

Check 2 The touch screen board may be defect. Replace the touch screen board with a new one following the steps described in Chapter 4. If the problems persist, perform Check 3.

Check 3 The touch screen board cable may be defective. Replace the touch screen board cable with a new one following the steps described in Chapter 4. If the problems persist, perform Check 4.

Check 4 The system board may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the system board with a new one.

Chapter 3

Diagnostic Programs

Chapter 3 Contents

3.1 General

This chapter explains the diagnostic programs which tests and diagnoses the functions of the hardware components of this computer. The diagnostic programs can be classified into two types: OPTION and DIAGNOSTIC TEST.

NOTE 1: *This Diagnostic supports Mckinley 10R/10RG*

NOTE 2: *Before test must set SATA Controller Mode to "Compatibility" in BIOS Advanced setting, when finished test set it to "AHCI"*

NOTE 3: *Before running a test, be sure to:*

1. Check that all the cables are connected securely.

2. Exit the application that is currently running and close Windows.

The OPTION includes the following functions:

- Select All Items
- Test Select Items
- Edit Batch Parameters
- Load Batch Parameters
- Save Batch Parameters
- Log Parameters
- Specify Log Viewer
- Display Error Log File
- DOS Shell
- Exit to Free-DOS

The DIAGNOSTIC TEST Devices include the following tests:

- System Test
- Memory Test
- Storage Test
- Video Test
- Communication Test
- Peripheral Test
- Keyboard Layout Test
- Audio Play Test
- Audio Record Test
- DMI Read
- DMI Write
- System Information

Before running the diagnostic programs, get the following tools prepared:

- A Service Diagnostic BOOT CD or USB Flash Memory
- A Formatted FLOPPY DISK
- A Test Media CD (A-BEX TEST CD-ROM TCDR-702)(for CD-ROM test)
- A Test Media DVD (Toshiba-EMI DVD-ROM TEST DISK TSD-1)
- An External Monitor (for DISPLAY test)
- A CD-ROM Driver (for CD-ROM test)
- Audio Line for audio record test
- A Data CD (for CD-ROM test)

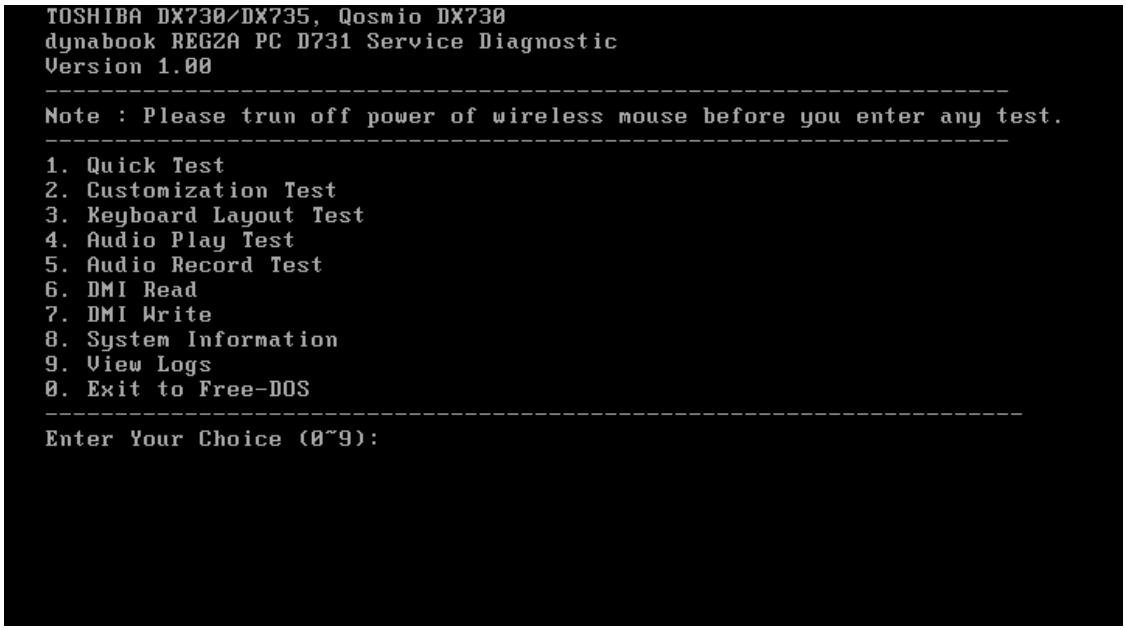
The following chapters describe all the test details. The test items could be selected from the DIAGNOSTIC TEST menu.

Note:

When booting up the unit for the first time, the system will automatically select the location of the result log file. If a USB floppy drive is connected, and there is an unprotected floppy diskette with more then 50KB spare space in the drive, system will save all log files into the root directory the diskette; otherwise, system will save all log files in the root directory of RAM disk.

3.2 Quick Start

When the system is booting from Service Diagnostic CD or USB Flash Memory, the following screen will be displayed:



Please select a test item or select **0** to exit to Free-DOS:

3.2.1 Quick Test

When this item is selected, the system will run the configured test items and generate a test report automatically.

When the test is completed, a file named Quick.log would be saved in the defined location.

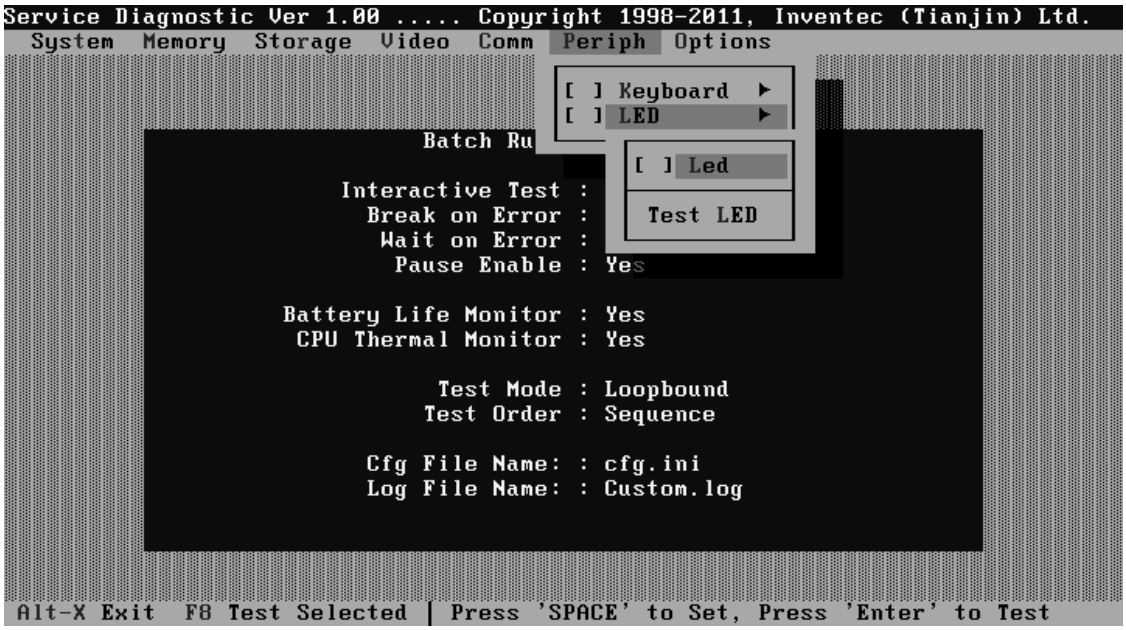
When Quick.log is being created, meanwhile, a file named quick.log has already existed, the system will automatically rename Quick.log to Quick.old for the backup purpose of the log file.

For the detail of test item, please refer to Quick Test Item List.

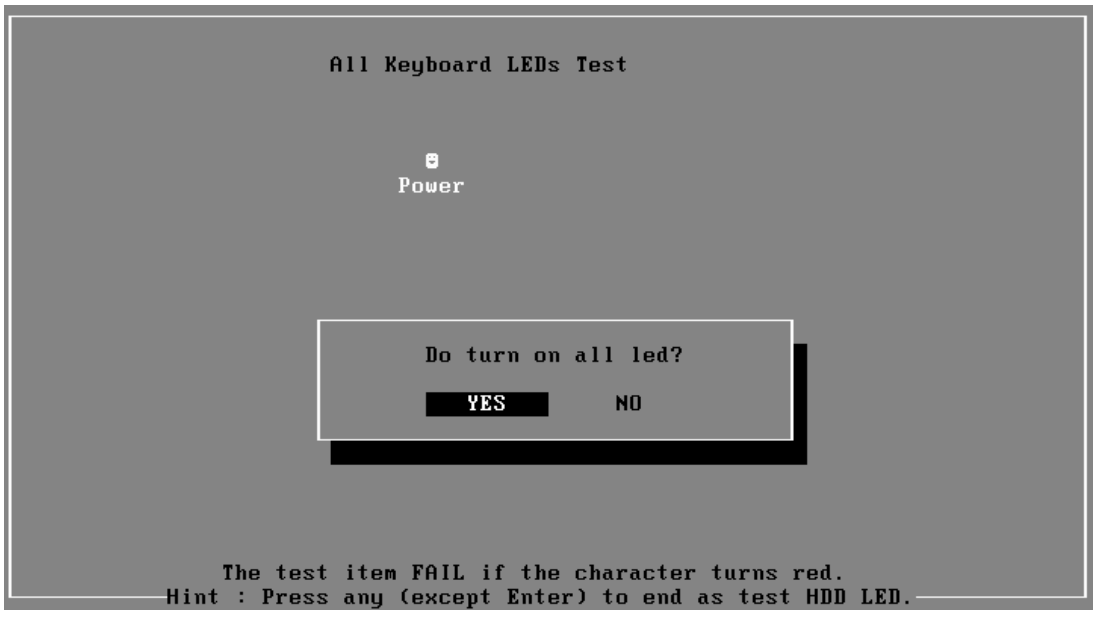
3.2.2 Customization Test

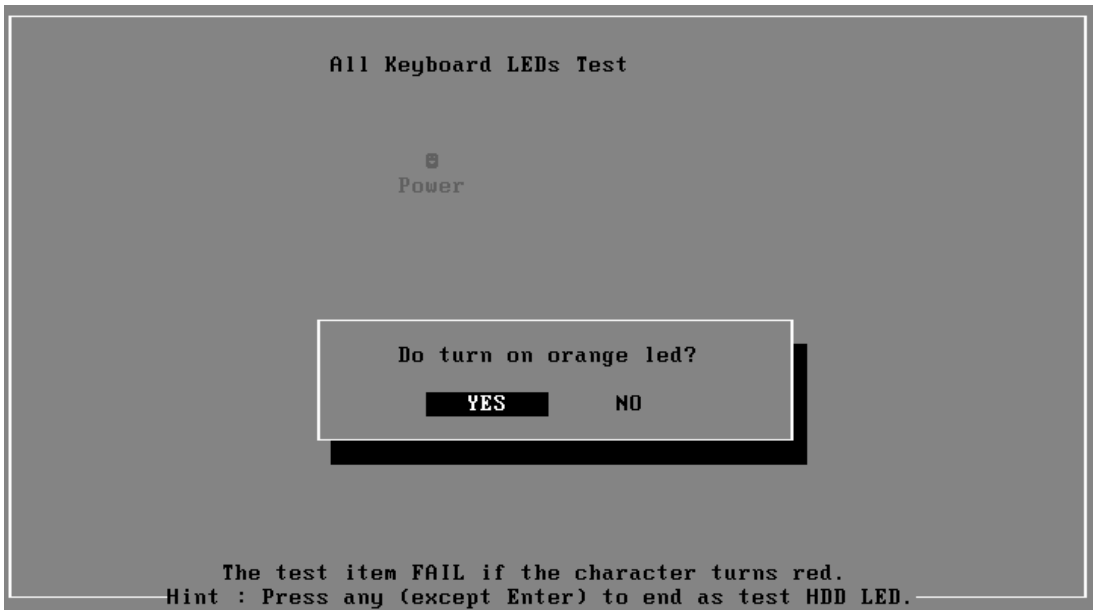
When this item is selected, the system will run the diagnostic programs according to the procedures you defined. When the test is completed, a file named Custom.log will be saved in the defined location. Please see the following example--Led test.

1. Use arrow key to select 'Led' item on 'Peripheral' in the menu, then press **Space** key to select it. (When it is being selected, there is a **X** marked in the [ ])

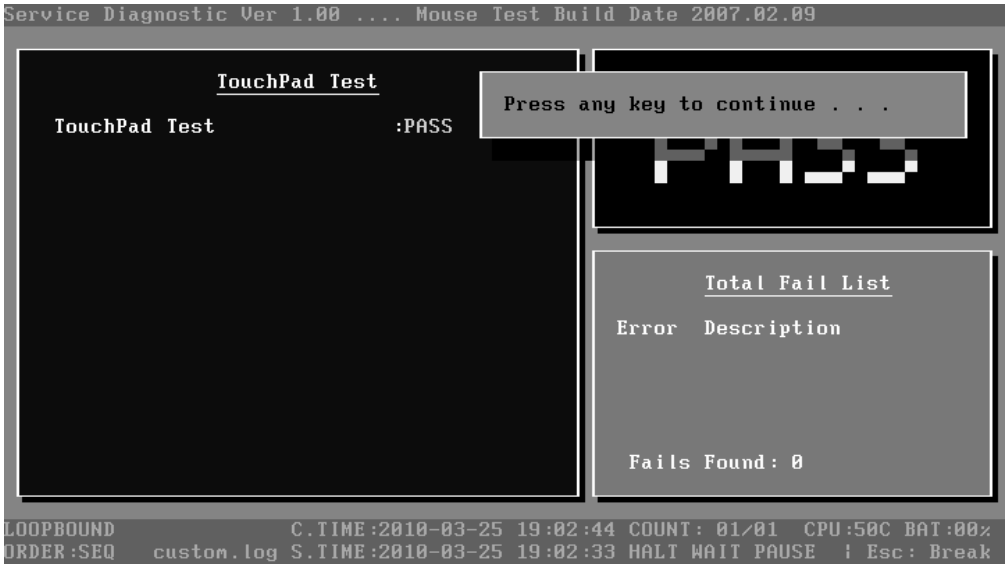


Select 'Led' or press **F8** to run the test. The prompt information would be displayed in the screen as below. This test item needs user to verify whether the mouse works normally.





The test result will be displayed in the following screen:

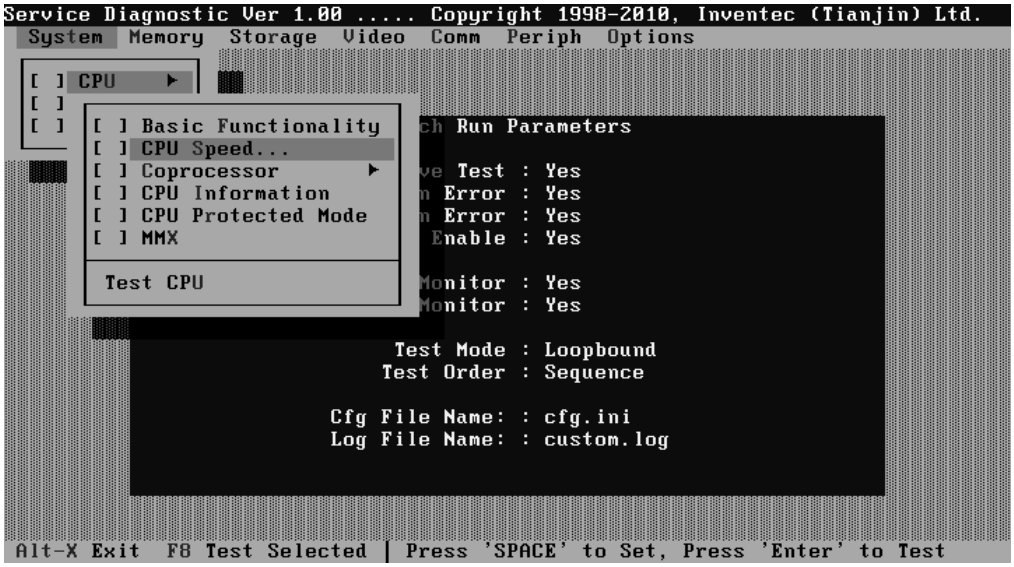


Here is another method to run the test: Highlight a test item by using arrow keys, then, press **Enter** to start. If there are parameters provided, user should set parameters in the parameter dialog window.

CPU Speed Test (Step by Step):

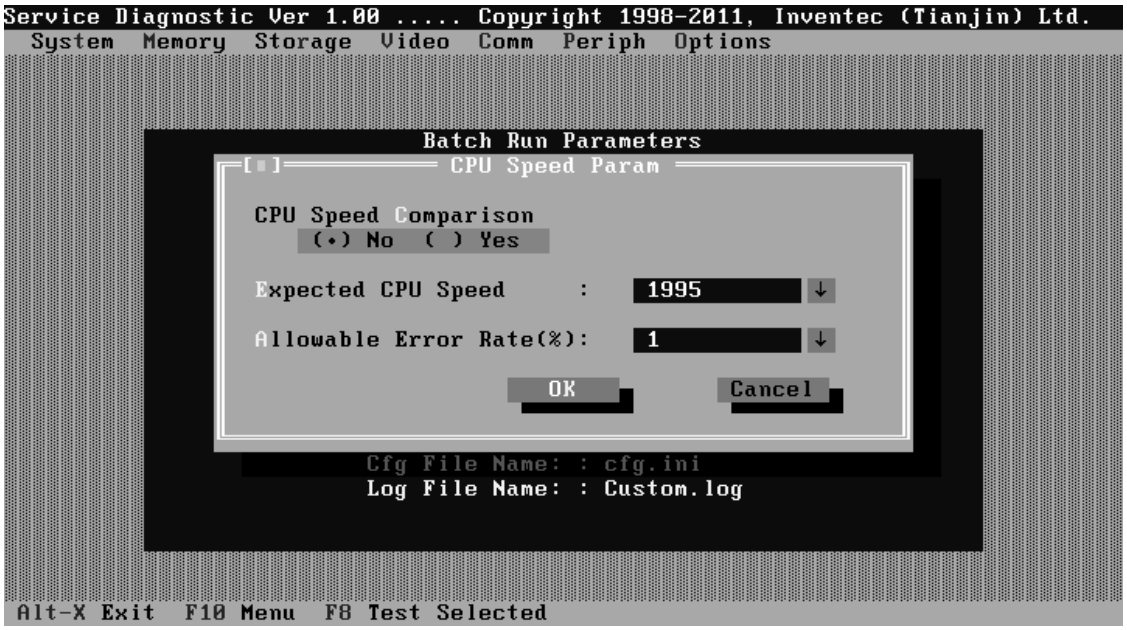
1. Select test item:

Select **System—CPU—CPU Speed**, then, press the **Enter** key.



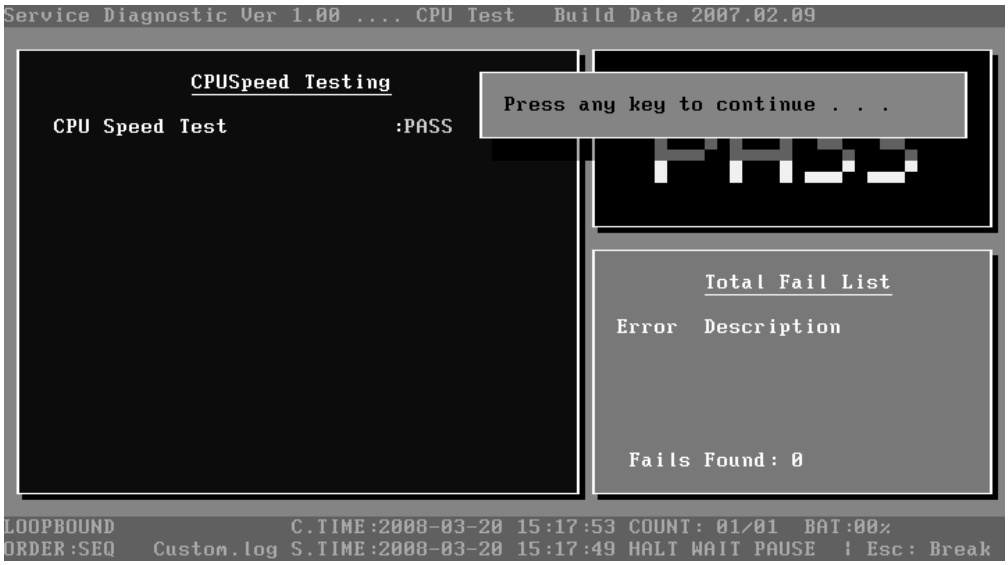
2. Parameters Setting

Choose the **OK** button after you set the proper parameters in the following window.



3. Test Result

System will automatically run and display the test result as follows:



Following is the comparison report of the two testing methods mentioned above:

1) Configuration and Running

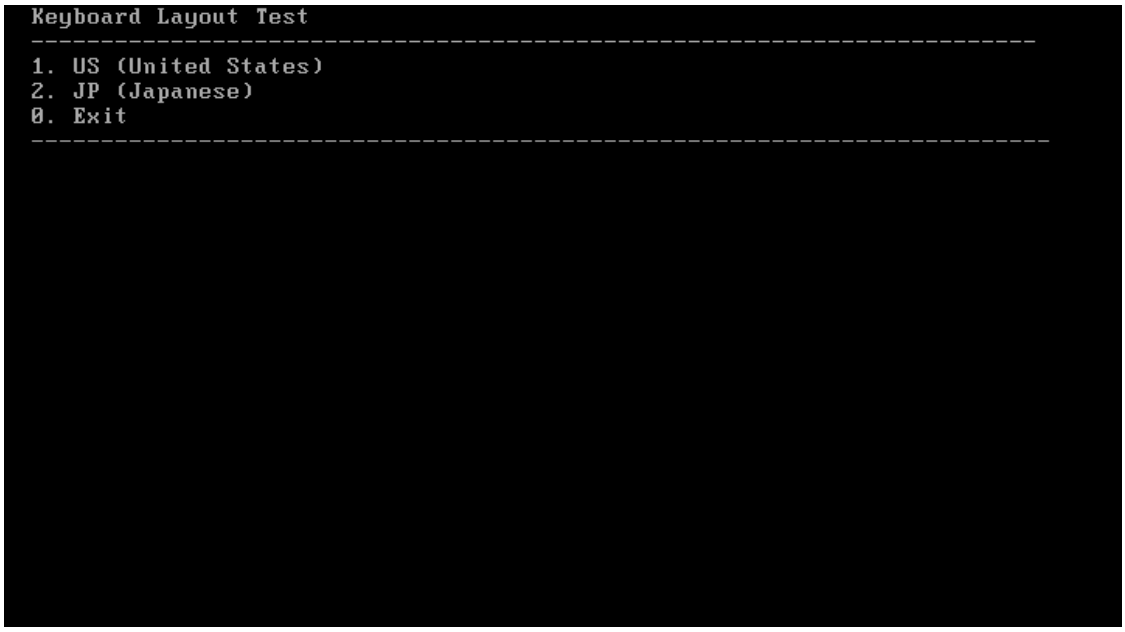
As to the method used in Mouse test, the user is required to select test items by pressing **Space** key and set the parameters artificially, (See 3.3.3 Item's Parameters Configuration) Then press **F8** to start the test. User should configure each parameter in advance; otherwise the default parameters would be used. Using this method, user is allowed to select more than one test item at one time.

2) Running the current test item

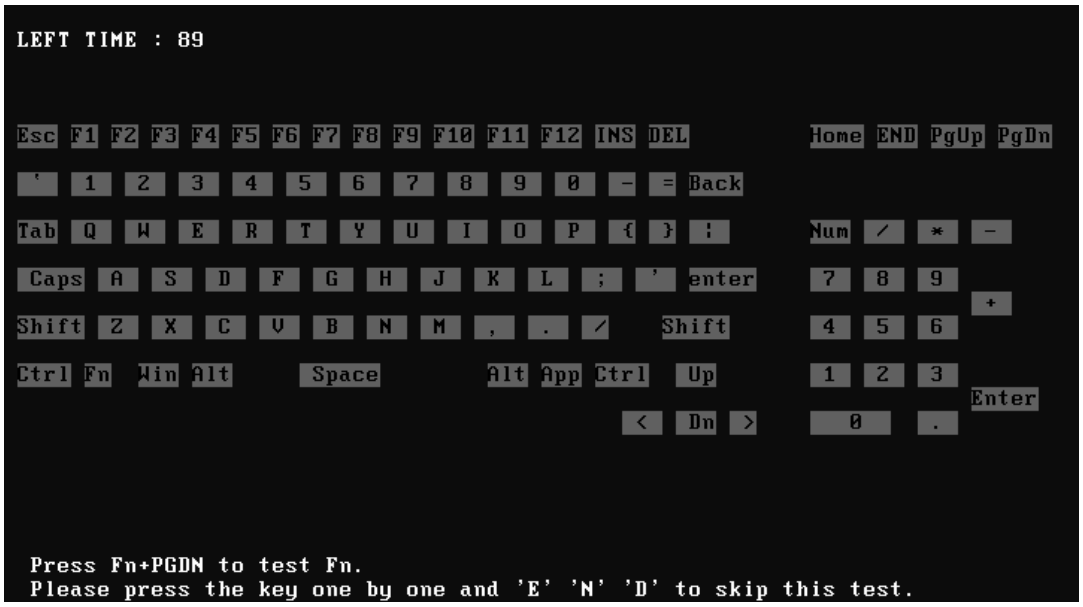
As to the method adopted in CPU Speed test, user should highlight the test item and press **Enter** to start testing. And the user has to setup the parameters every time before running the test. Using this method, only one test item would be tested at one time.

3.2.3 Keyboard Layout test

The test purpose is to check whether 2 kinds of keyboards run well during the test procedure. When users choose the item, the names of these countries will be displayed on the screen for user choice. User press any index of token in ASCII, and the program will test the kind of keymap of the country.



The test screen would be shown as below:



It requires user to press the key and check whether the key in the screen changes color or not. User can terminate test by typing '**END**'. When testing the '**Fn**' key, it must press the '**PGDN**' (**at right top corner**) key at the same time.

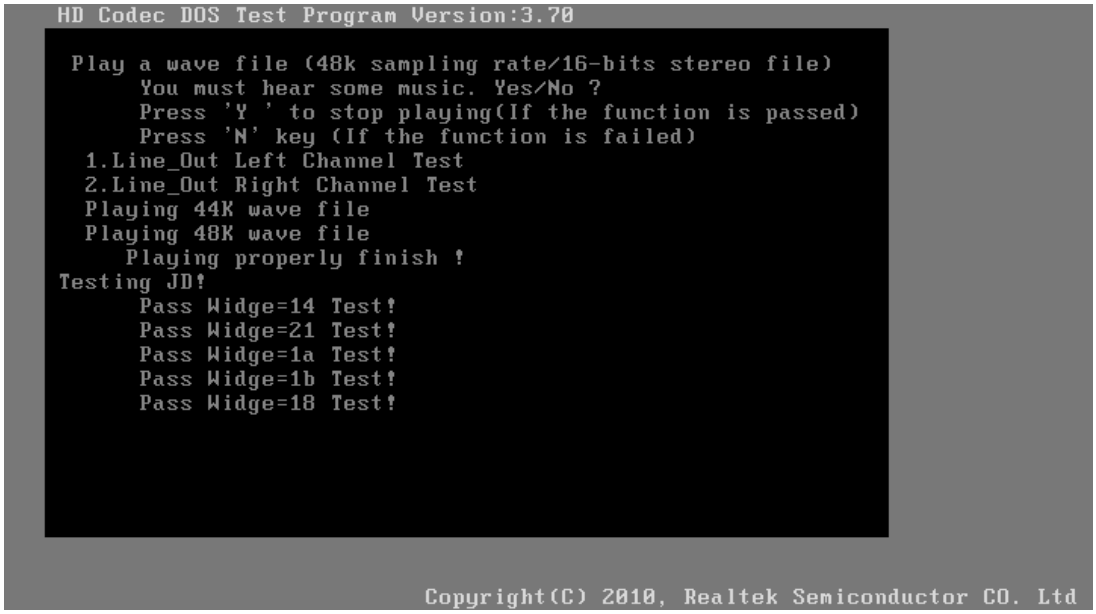
When the user has checked all the keys and all the keys in the screen have changed color, the diagnostics program would automatically end the test and report the pass information.

If keyboard test fails, program will terminate the test and report the fail information when it is time to timeout.

The test will end when all keys are pressed or test time is out after 90 seconds.

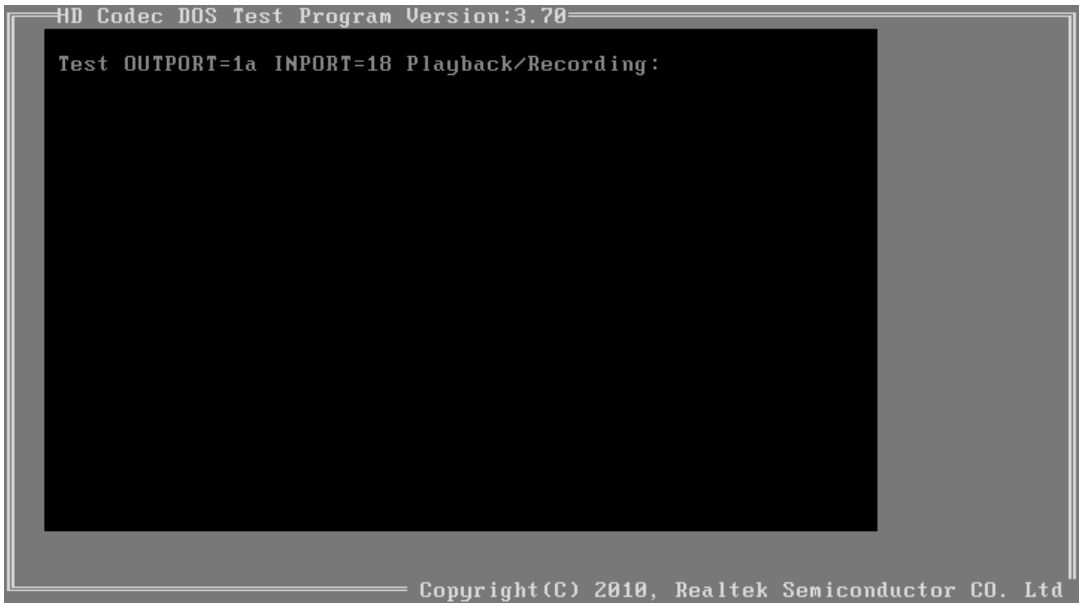
3.2.4 Audio Play Test

Check whether the system could playback audio normally. When the test is completed, a file named Audio_p.log will be saved in the defined location.



3.2.5 Audio Record Test

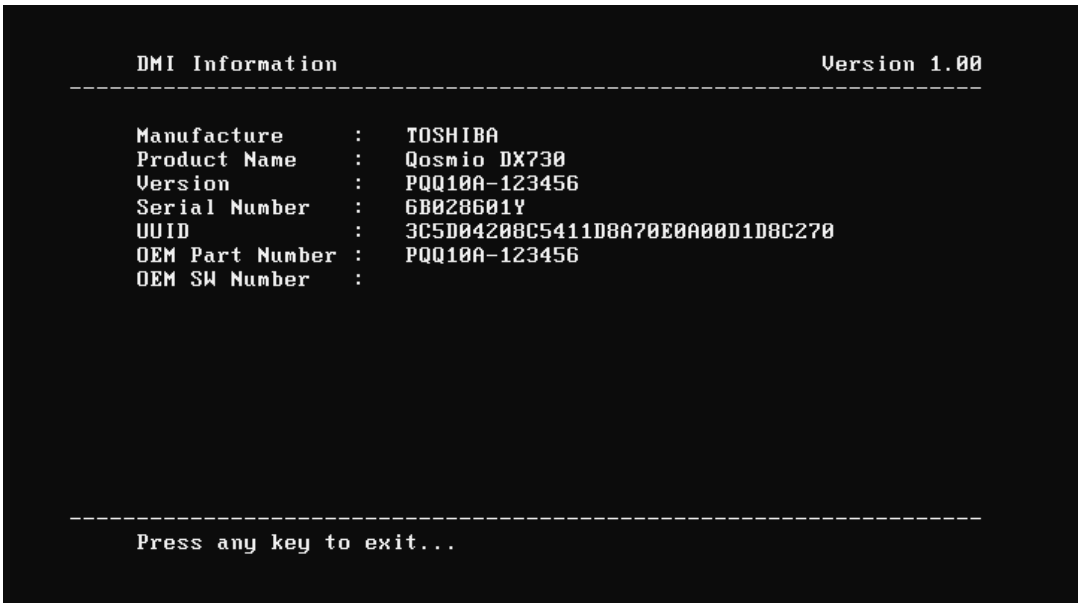
Check whether the system could record the sound normally. If there is no error during the whole test, Pass; otherwise, Fail. When the test is completed, a file named Audio_r.log will be saved in the defined location.



NOTE 1: *Please insert audio loopback cable before run this test*

3.2.6 DMI Read

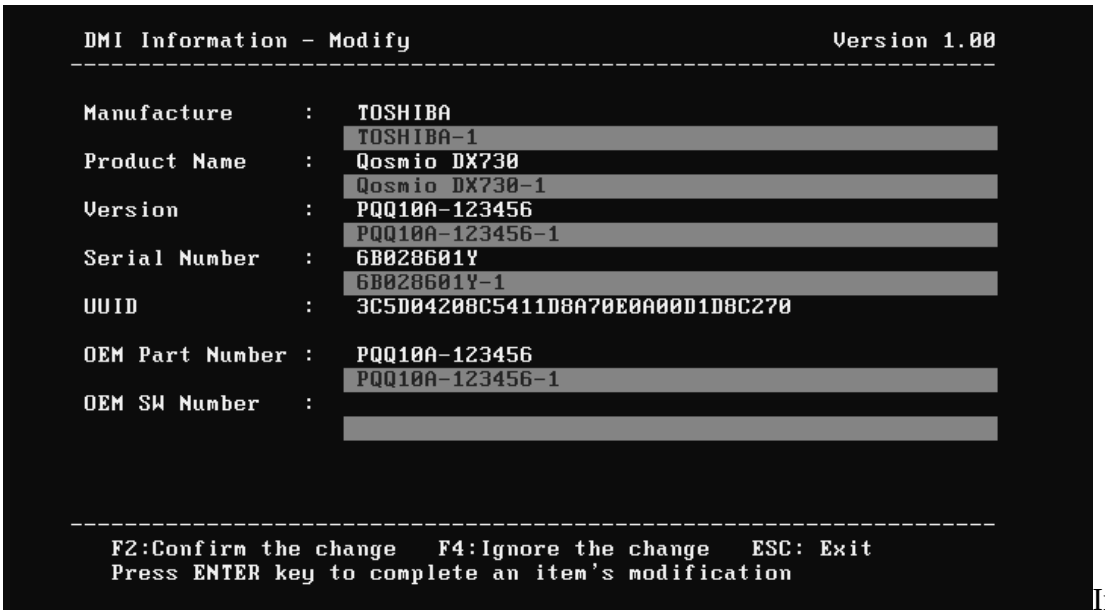
Read the information from the system's SMBIOS and display it in the screen as follows:



User can press any key to exit the program.

3.2.7 DMI Write

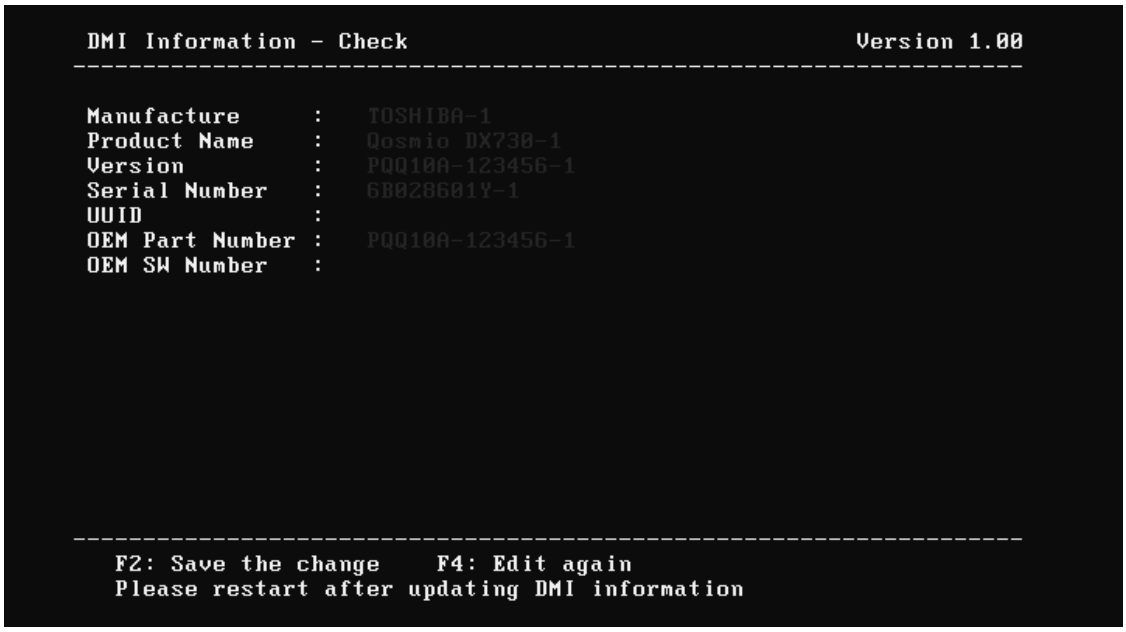
In addition to reading the DMI information, **DMI Write** also permits attributes editing and updating: Manufacture, Product Name, Version, Serial Number, and OEM Part Number, etc. The following screen will be displayed:



In this screen, there are two lines which attribute could be edited and updated. The 1st line (the font in yellow with blue background) shows the attribute's value that is read from the current system and the 2nd line (the font in red with turquoise background) shows the same value as that in the 1st line before user's editing. User can modify the attribute's value in the 2nd line and press **Enter** to confirm the current edition and continue editing the next attribute.

During the editing, user could press **F2** to confirm the DMI attribute update or press **F4** to ignore the modification. Press **ESC** to exit the program of DMI Write.

The confirmation screen is as below:



The attributes that have been modified would be marked in red; otherwise in yellow. User could press **F2** to save the changes, or press **F4** to ignore and exit the current program.

3.2.8 System Information

This function is used to read the system information. When the test is completed, a file named System.log will be saved in the defined location. During the reading process, the following screen will be displayed to indicate that the progress is in detection:

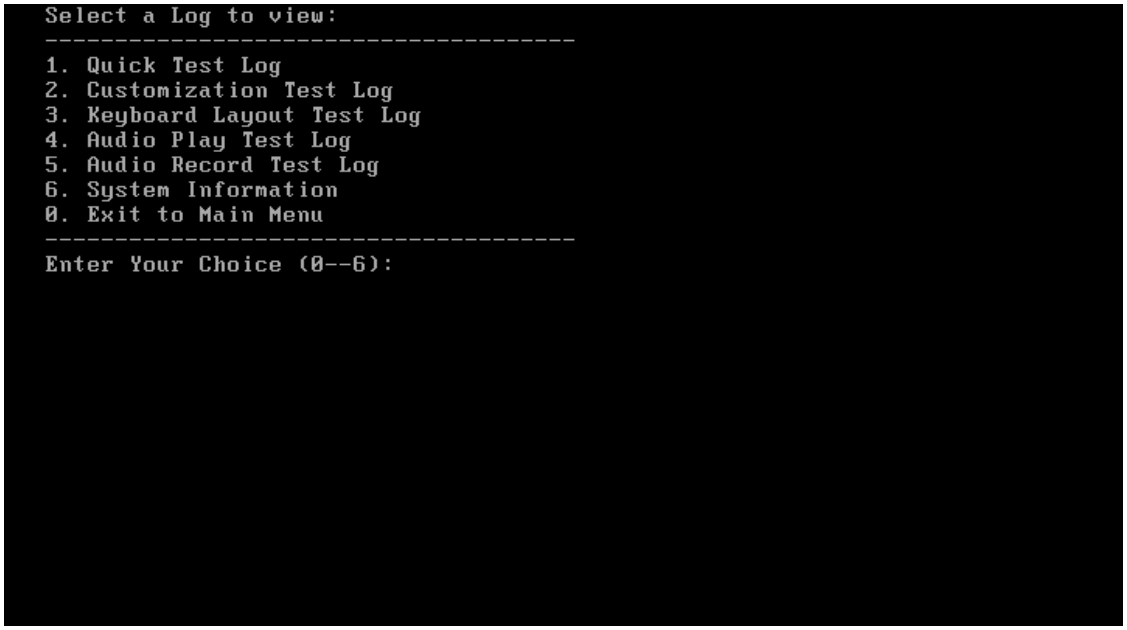
On the left column of the above screen, the detected hardware components are listed. The corresponding information of the detected hardware components is displayed on the right of the screen. It displays the current running status information of the check program. The name of the program is marked on the top of the screen. At the bottom, the function keys are listed for user operation. During the detection, keyboard operation is invalid.

When the detection is finished, the hardware components information will be displayed as follows:

User can use function keys listed on the bottom of the screen to display the configuration of the component or exit the current program. On the left column, the components information is listed and user can use arrow keys or **PgUp/PgDn** to view the list and highlight the chosen component. On the right column, the configuration information of the highlighted component is listed. Press **ESC** to exit this program.

3.2.9 View Logs

User can enter one choice to view a log file in the screen as follows.

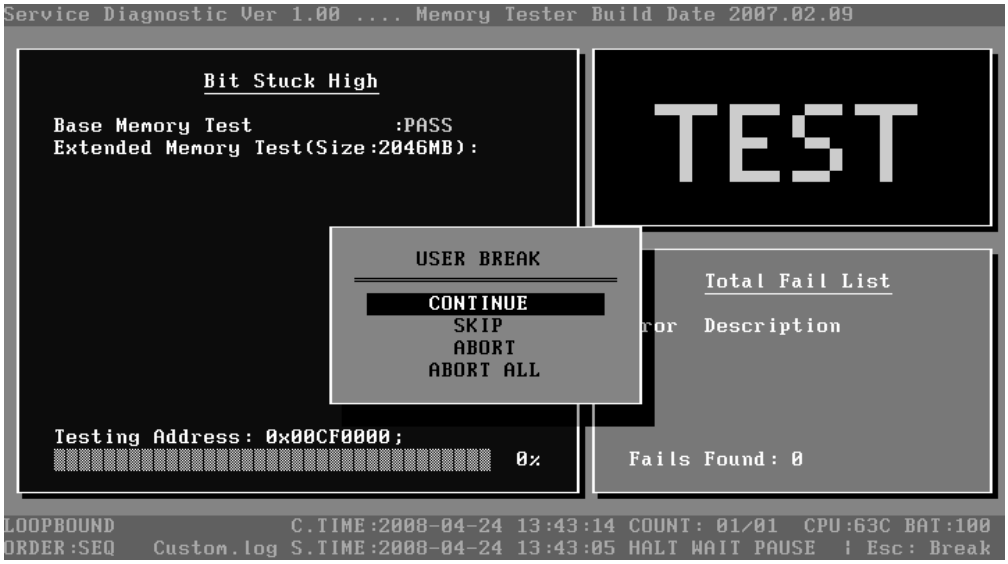


3.2.10 Exit to Free DOS

Select this item to exit to Free DOS.

3.2.11 The Diagnostics Screen Explanation

Below is an example of running a test item. It includes the following parts: Diagnostics Windows, Test Status Area, Progress Bar, Error List, Test Item's Title, Status Bar and Message Box.



1. Diagnostics Windows

When a test item is running, a Diagnostics Windows is displayed in full screen. It consists of the following parts: Title Bar, Test Running Status and Report Panel, Status Bar. There would prompt a message box called USER BREAK in the central of the window whether user press **ESC** to interrupt the test.

2. Test Running Status and Report Panel

Test Running Status and Report Panel are located on the middle of Diagnostics Windows.

- ◆ Test item name, test process and test result are displayed in the left;
- ◆ Test status and result are displayed in the upper right corner of the screen. It displays the test status of the current test item – TEST (in testing), PASS (test finished and its result is passed), FAIL (test finished and its result is failed) and SKIP (test skipped).
- ◆ The error list of each test module is displayed at the lower right corner of the screen. It would display the total error quantity found in the test, the most recent five error codes and description would be shown here. Detailed error report could be viewed with Logview.exe.

◆ When pressing **ESC** key during the test process, a User Break Windows will be popped up for the user to select.

3. USER BREAK

Pressing **ESC** key to interrupt the test, USER BREAK message box would be prompted out in the central of Diagnostics Window for the user to select the following actions:

◆ **CONTINUE**---- Continue the test;

◆ **SKIP**---- Stop the sub-item of current test item to go to the next item's test;

◆ **ABORT**----Stop the current test item to test the next module.

◆ **ABORT ALL**---- Stop all the selected test items. User could use the hot key **Ctrl+D** to achieve the same operation. When the user calls ABORT ALL, the following message box will prompt for his selecting.

4. Title Bar:

Title Bar located at the top of the window, it includes information as follows:

◆ **Program Name and Its Version:** Service Diagnostic Ver1.10;

◆ **Test Module Name:** Label the name and version of the test module. For example, in the above screen, the name of the test module is 'Memory Tester Build Date 2007.02.09'.

◆ **Status Bar:** Located at the bottom of the screen as follows:

The status bar is used to indicate the current script setting and test status. It consists of two lines that includes the information as follows:

◆ **Test Mode**: TIMEBOUND or LOOPBOUND, e.g. LOOPBOUND in the above screen;

◆ **Script File Name**: Script file name, e.g. 'Custom.INI' in the above screen;

◆ **Current Time(C. TIME)**: Current system time, e.g. 'C.TIME:2008-02-16 00:42:40' in the above screen;

- **Test Time Remaining (LEFT)**: In TIMEBOUND mode, it would display the remaining test time at the same location as Current TIME (C. TIME) in the above screen;
- **Current Loop Count**: In LOOPBOUND mode, it will display the total LOOP number planning to execute and the current LOOP number have been finished, e.g. 'COUNT: 01/01' in the above screen;
- **CPU Temperature**: Detect the temperature in the current CPU, e.g. 'CPU: 56C' in the above screen;
- **Remaining Battery Capacity**: Remaining Battery Capacity detected in the current Battery, e.g. 'BAT: 46%';
- **Test Order**: Define the test sequence. There is two sequence modes: Sequential Test Mode and Random Test Mode. The default mode is Sequential Test Mode, it would displays 'ORDER: SEQ' as in the above screen;
- **LOG File Name**: Display the file name of the test log, e.g. Custom.Log in the above screen;
- **Start Test Time** (S.TIME): Display the test start time for the current test item or the test script, e.g. 'S.TIME: 2008-02-16 00:42:28' in the above screen;
- **Break On Error**: Display 'HALT' as shown in the above screen when 'Break On Error' is enabled;
- **Wait On Error**: Display 'WAIT' as shown in the above screen when 'Wait On Error' is enabled;
- **Pause Enable**: Display 'PAUSE' when "Pause Enable" is enabled;
- **Manual Interrupt Method**: Display 'Esc: Break' to tell the user how to manually interrupt the test process.

3.3 Options

3.3.1 Overview

In Service Diagnostics, with the **Options** menu user can configure the batch parameters, test item's parameters and those parameters created by the LOG file.

Options Menu Notes:

- Select All/None Items

Switch between selecting all test items and selecting none. The hot key is **F6**.

- Test Selected Items

Execute all selected test items in this editor. The hot key is **F8**.

If "Interactive" option in batch parameters has not been selected, a warning message would be shown as below:

- Edit Batch Parameters

  Configure batch parameters and all the test item's parameters.

- Load Batch Parameters

  Upload all the test items and the parameters to the *.ini file.

- Save Batch Parameters

  Save all the parameters and the test items that are configured in the editor to a specified file.

- Log Parameters

  Configure LOG parameters.

- Specify LOG Viewer

  Specify the viewer for the LOG file.

- Display Error Log File

  Load the LOG file viewer specified in the Specify Log Viewer to view the LOG file.

- DOS Shell

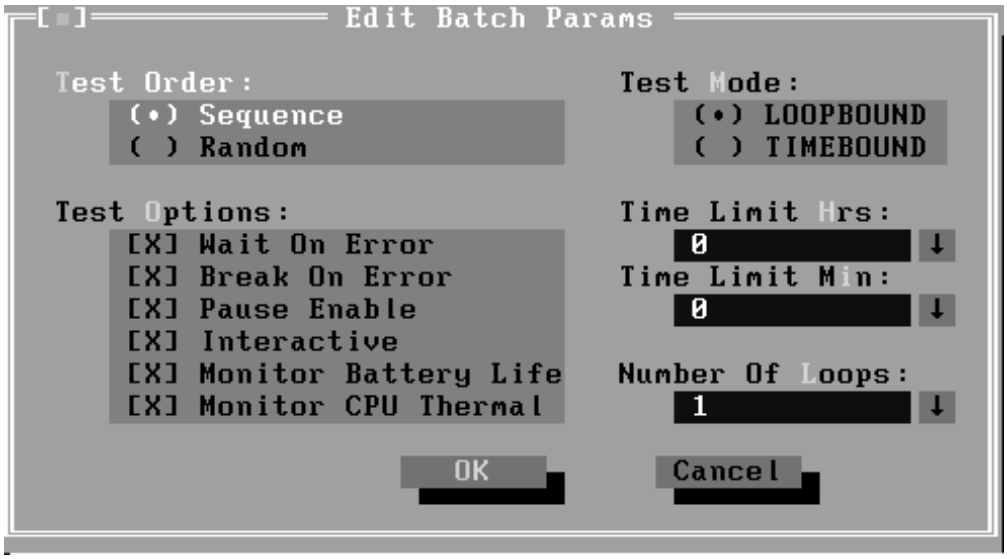
  Enter the DOS Shell and execute the DOS programs. You can also exit to the Service Diagnostics Editor by the command of **EXIT**.

- Exit to DOS

  Exit the Service Diagnostics Editor and back to DOS.

3.3.2 Batch Parameters Configuration

The batch parameters configuration screen can be accessed through Service Diagnostics/OPTIONS -> EDIT BATCH PARAMETERS -> BATCH PARAMETERS:



- **Test Order**

  Specify the order of the test items. Choose 'Sequence' to adopt the sequential mode; choose 'Random' to run the test items in random sequence.

- **Test Options**

  Choose one of the following options:

✓ **Wait On Error**

Wait for further confirmation while an error occurs.

✓ **Break On Error**

Stop the test when a test item fails.

✓ **Pause Enable**

Pause at the end of each test items and wait for the user to response with the test items that requires the user to assist the test processes, such as the keystroke test.

✓ **Interactive**

If the item is enabled during the test, the test items that need user to response can run normally, such as Mouse test; If it is disabled, those test items will report FAIL.

When the option here is enabled, it would affect all the test items while the same option in “Item Parameters Configuration” only affect that test item.

✓ **Monitor Battery Life**

Monitor the remaining battery capacity (percent).

✓ **Monitor CPU Thermal**

Monitor the CPU temperature.

- **Test Mode**

✓ **LOOPBOUND**

The chosen test items will run repeatedly according to the times specified in the 'Number of Loops'.

✓ **TIMEBOUND**

The chosen test items will run for an extent time specified in 'Time Limit Hrs' and 'Time Limit Min'.

- **Time Limit Hrs**

Specify the hours whether 'TIMEBOUND' is chosen under the batch mode.

- **Time Limit Min**

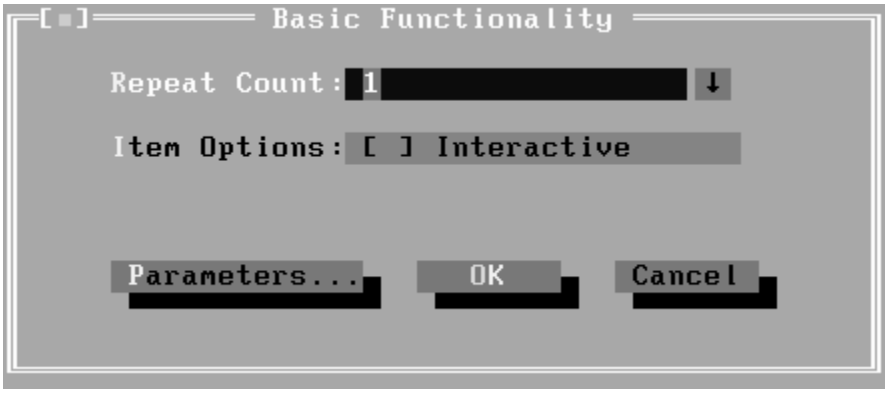
Specify the minutes whether 'TIMEBOUND' is chosen under the batch mode.

- **Number Of Loops**

Specify the repeating times when 'Loop Bound' is chosen under the batch mode.

3.3.3 Item's Parameters Configuration

The test items' parameters configuration screen can be accessed through Service Diagnostics/Options -> Edit Batch Parameters -> Item's Parameters-> System->CPU-> Basic Functionality:



- **Repeat count**

Repeat times of the test item.

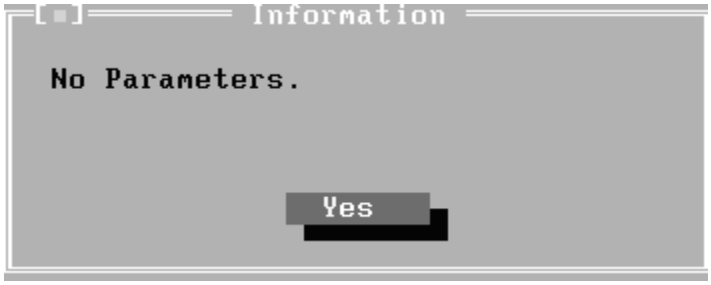
- **Interactive**

  If the item is enabled during the test, the test items that need user to response can run normally, such as PS2 Mouse test; If it is disabled, those test items will report FAIL.

  Whether the option here is enabled, it only affects the current test item.

- **Parameters**

  For the test items with specific parameters, this option will call the related configuration screens. Otherwise, the program will show the following dialogue window:

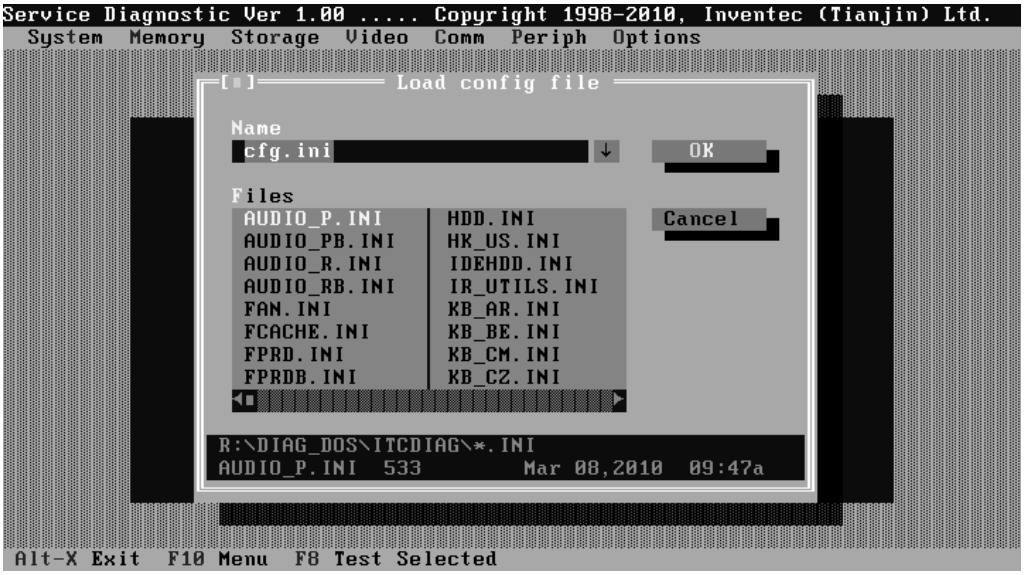


  Parameters for the specific test items:

  Some test items (Memory, HDD, e g...) have their individual parameters, which can be configured in their parameters setting window.

3.3.4 Load Batch Parameters

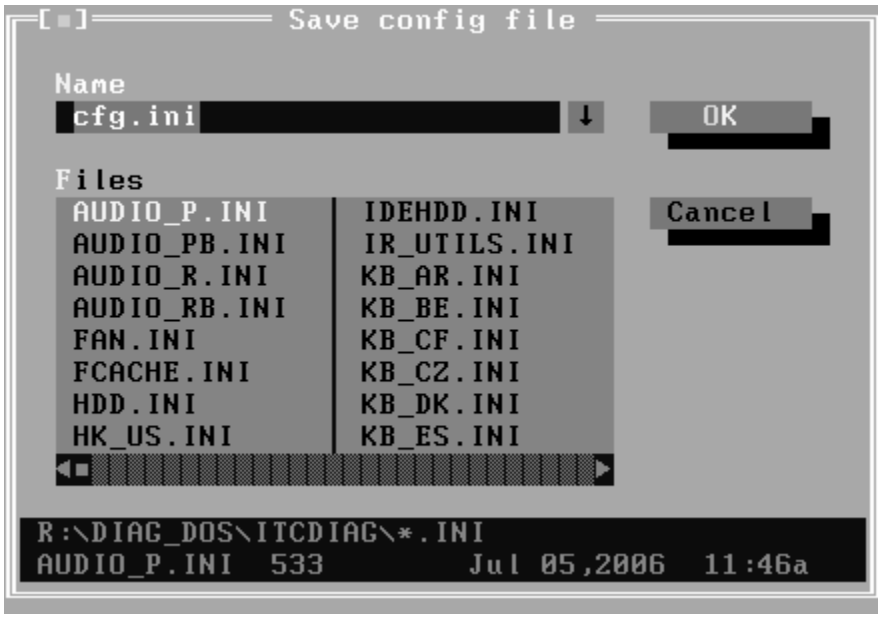
Batch parameter is saved in the script file whose extension name is INI (*.INI). Below is the screen shot of “Load Batch Parameters”.



In this window, you can specify the .INI files that you wanted to be edited or modified.

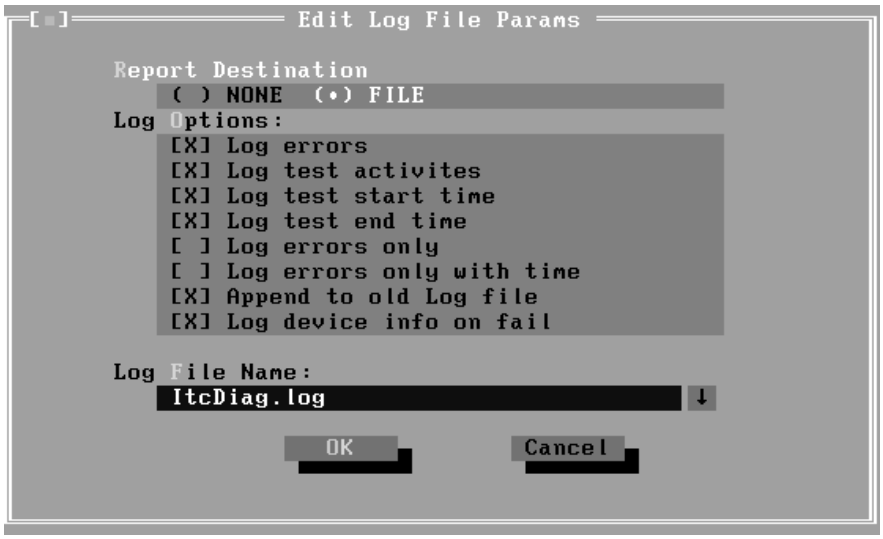
3.3.5 Save Batch Parameters

Here you can save the edited or modified content to the batch parameters files.



3.3.6 LOG Parameters Setting

You can access the Log Parameters screen through Service Diagnostics\Options - Generate Report.



- **Report Destination**

  If selecting 'NONE', no log file will be generated; if selecting 'FILE', a log file with the name specified in 'Log File Name' will be generated.

- **Log Options**

✓ **Log Errors**

If selecting this parameter, errors will be recorded when the test fails.

✓ **Log Test Activities**

If selecting this parameter, the subtest results will be recorded.

✓ **Log Test Start Time**

If selecting this parameter, the start time of the test will be recorded.

✓ **Log Test End Time**

If selecting this parameter, the end time of the test will be recorded.

✓ **Log Errors Only**

If selecting this parameter, errors will be recorded only when the test fails.

✓ **Log Errors Only with Time**

If selecting this parameter, errors and time will be recorded only when the test fails.

✓ **Append to Old Log File**

If selecting this parameter, the new log will be added to the old one.

✓ **Log Device Info on Fail**

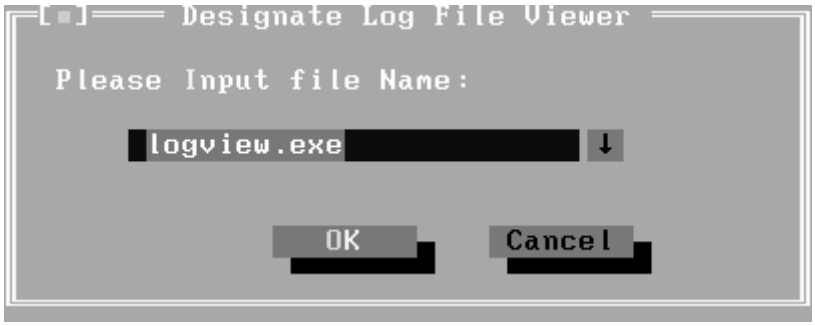
If selecting this parameter, details of the failed test will be recorded.

- **Log file Name**

Specify the Log file name. You can input the detail path of the file. System will show the detail path of the file.

3.3.7 Specify LOG Viewer

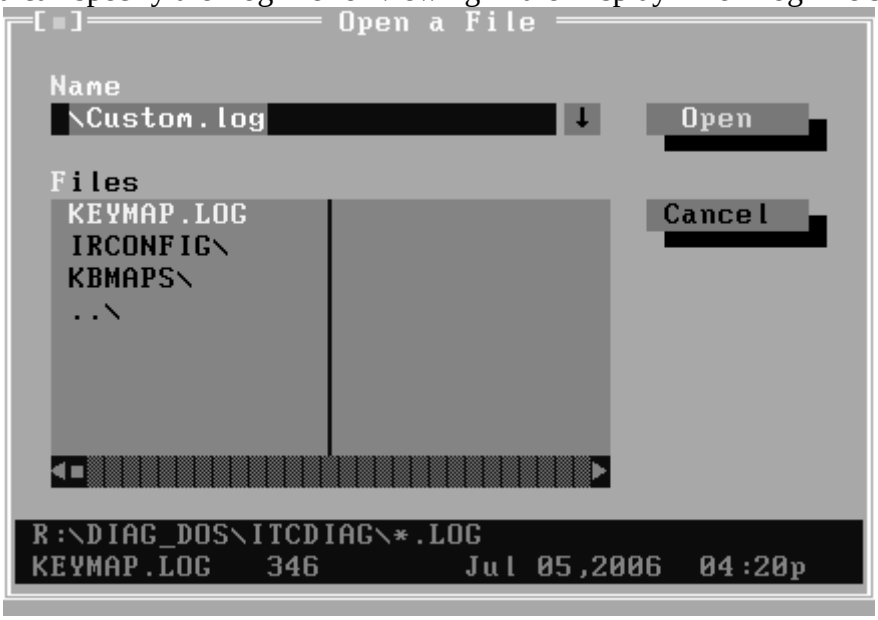
You can specify the Log file viewer in the Specify Log Viewer screen.



The default viewing program of Service Diagnostics is **LogView.exe.**

3.3.8 Display LOG File

You can specify the Log file for viewing in the Display Error Log File screen.



In this screen, you can specify a Log file and view it with the viewer designated in Specify LOG Viewer.

3.3.9 LOG Viewer

Service Diagnostic Log viewer:

- ↑, ↓

  Scroll a line backward or forward on the screen.

- **Page Up, Page Down**

  Scroll a page backward or forward on the screen.

- **Esc**

  Exit the Log viewer.

- **F1**

  Display the Help information about the Log viewer operations and the functional keys.

- **Ctrl+Home**

  Go to the start of the log file.

- **Ctrl+End**

  Go to the end of the log file.

- **Ctrl+F3**

Prompt the search dialogue for the user to input the string to be looked for and specify the searching method.

- **F3**

  Find the next corresponding strings given.

3.3.10 LOG File Sample

Log file is a test result file, which records the following information: Test module name, Test item name, Start/End time and the test result (including PASS, FAIL, SKIP and ABORT). When a failure is found, both the error code and the error information were recorded.

In the Log file, we use **Test Items** as the test item name, which could not be modified in the whole time. And we use the **Internal Name** as name in the program's UI, which corresponds to the test item name and could be modified according to the user's favorite.

The following section is a sample of log file:

DIAG REPORT

<Module Name>: Service Diagnostic Ver 1.00 ... Memory Tester Build Date 2006.01.10

[Walk High]

Begin Time: Wed Jul 05 10:45:36 2006

Base Memory Test : PASS

Extended Memory Test : PASS

End Time: Wed Jul 05 10:47:51 2006

<Module Name>: Service Diagnostic Ver 1.00 ... Mouse Test Build Date 2006.01.10

[MSTPad]

Begin Time: Wed Jul 05 10:48:54 2006

Touch Pad Test : FAIL

ITEM TEST FAIL

Function ID :502

Error Code :50202

Error Message :Touch Pad Test Fail

End Time: Wed Jul 05 10:49:16 2006

3.4 Subtests

Test Group	Sub Item ID	Subtest	Test ID	Test items	Internal Name
System	01	CPU	01	Basic Functionality Test	[CPUBasicFun]
			02	CPU Speed	[CPUSpeed]
			03	Coprocessor NPU Basic Functions	Coprocessor [NPUFun]
			04	CPU Information	[CPUInformation]
			05	CPU Protected Mode	[Protect]
			06	MMX	[MMX]
	02	Board	01	DMA Controller	[DMACtrl]
			02	Interval Timer	[Timer]
			03	Clock / Calendar	[RealClock]
			04	PCI System	[PCI]
			05	Plug and Play	[PnP]
			06	ACPI Test	[ACPI]
	03	FAN	01	CPU Fan Speed Test	[FANSpeed]
Memory	01	BIOS ROM			[BIOSROM]
	02	Pattern	01	Bit Stuck High Test	[BSHigh]
			02	Bit Stuck Low Test	[BSLow]
			03	Checker Board Test	[ChkBd]
			04	CAS Line Test	[CASLine]
			05	Incremental Test	[Incrment]
			06	Decremental Test	[Decrment]
			07	Incremental Decremental Test	[Idcrment]
	03	Extended Pattern	01	Write/Read Cycle Test	[XWRCycle]
			02	Read Cycle Test	[XRCycle]
	04	Walking 1's Test			[WalkHigh]
	05	Walking 0's Test			[WalkLow]
	06	Memory Address			[Address]
	07	Refresh Test			[Refresh]
	08	Cache Memory			[CacheOne]
	09	Random Memory	01	Randomize Test	[Random]
			02	Random Increment Read/Write	[RandIncr]

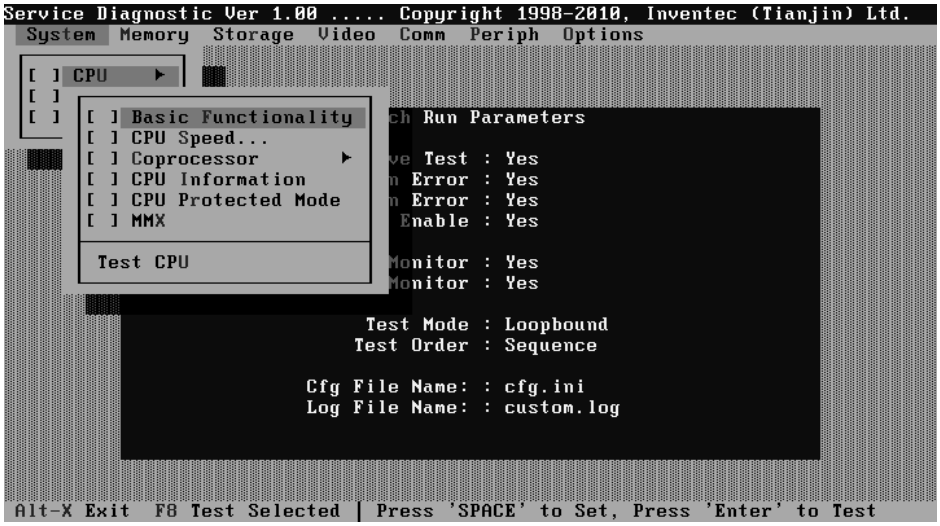
	10	Data Bus Test			[DataBus]
	11	Bus Noise			[BusNoise]
	12	Memory Speed Test			[MemSpeed]
Storage	01	HDD	01	Sequential/Random R/W	[SeqRdRW1]
			02	Sequential/Random Seek	[Seek1]
			03	Performance	[Perform1]
			04	Controller Check	[Controller1]
			05	Diagnostic Read/Write	[DiagRW1]
			06	SMART Test	[SMART1]
	02	ODD	01	Controller Test	[CDRWController]
			02	Data Transfer Rate	[CDRWTransRate]
			03	Data CD Butterfly Seek	[CDRWButterfly]
			04	Data CD Random Seek	[CDRWSeek]
			05	Data CD Sequence Seek	[CDRWSFSeek]
			06	Tray Eject Test	[CDRWTray]
Video	01	Text Mode	01	Character Test	[CharTest]
			02	Text Attribute	[Attribut]
			03	Text Page Selection	[PageSel]
			04	Text Color	[Color]
			05	80*25 Text Mode	[Text Mode]
	02	640*480 VGA Mode			[VGAMode]
	03	VESA Video Modes	01	640X480 Video Modes VESA 640x480x256 Mode VESA 640x480x32K Mode VESA 640x480x64K Mode VESA 640x480x16K Mode VESA 640x480x32bit Mode	[V640480_15] [V640480_16] [V640480_24] [V640480_32]
			02	800X600 Video Modes VESA 800x600x256 Mode VESA 800x600x64K Mode VESA 800x600x32K Mode VESA 800x600x16K Mode VESA 800x600x32bit Mode	[V800600_15] [V800600_16] [V800600_24] [V800600_32]
			03	1024X768 Video Modes VESA 1024x768x256 Mode VESA 1024x768x64K Mode	[V1024768_15] [V1024768_16] [V1024768_24]

				VESA 1024x768x32K Mode VESA 1024x768x16K Mode VESA 1024x768x32bit Mode	[V1024768_32]
	04	VESA Video Memory			[VESAMEM]
	05	AGP Test			[AGP]
	06	LCD Panel Test			[LCDPanel]
	07	Register Test			[Register]
	08	Color Purity Test			[ColPurity]
	09	Direct Color Test			[DirectColor]
	10	DAC/Palette Address			[DACPalAddr]
	11	Bitblt Engine Test			[Bitblt]
COMM	01	LAN Card	01	Device ID Detection	[DeviceID]
			02	Vendor ID Detection	[VendorID]
			03	Mac Address Detection	[MAC Address]
Peripheral	01	Keyboard	01	Keyboard Data Line	[KBDataLn]
			02	Keyboard Clock Line	[KBClokLn]
	02	Led	01	Device Led	[KBLED]

3.5 System Test

Move arrow keys and press the **Space** key to select CPU test item from Service Diagnostic menu, then highlight **CPU** and press the **Enter** to run this test item.

Subtest 01 CPU

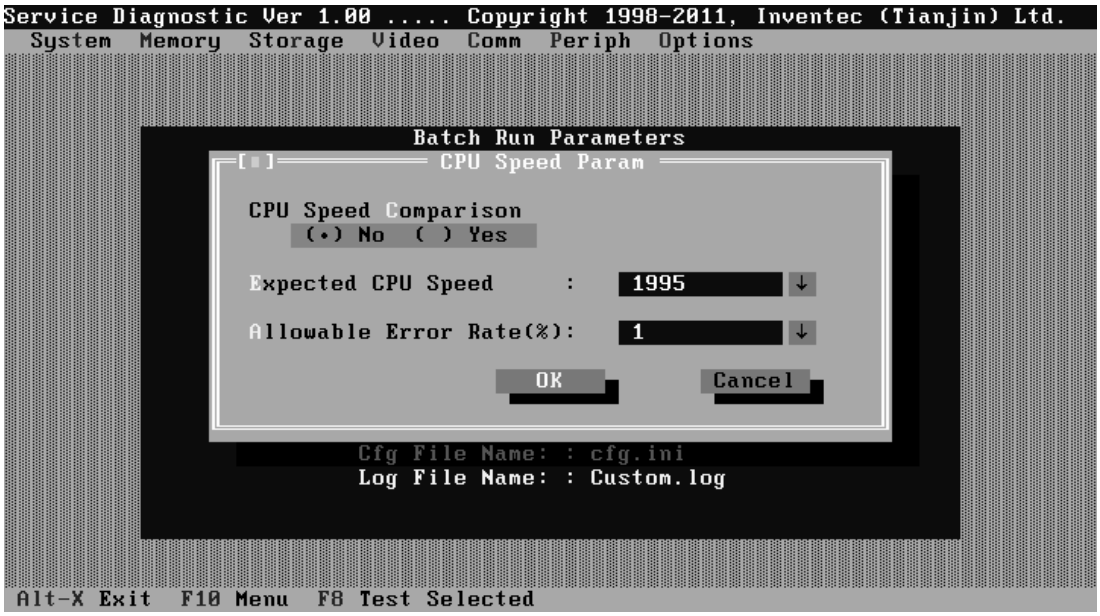


1. Basic Functionality Test

   This test item is to check whether the CPU works normally through math and logic calculation, which means verifying the general registers, math registers and logic registers.

2. CPU Speed

   This test item is to detect the work frequency of the current CPU. User should change the parameters setting in the following window before the test:



CPU Speed Comparison--Whether you want to make a comparison of the CPU speed with the value set in 'Expected CPU Speed', you should choose 'Yes'; otherwise, 'No'.

Expected CPU Speed--Specify the expected CPU Speed value you want for further comparison.

Allowable Error Rate-- Specify the Allowable Error Rate value you want for further comparison.

3. Coprocessor

✓ **NPU Basic Functions Test**

This test item is to check whether the precision of the numeric processor in the float calculation is up to the IEEE standards.

4. CPU Information

This test item is used for getting & showing CPU Information. It will be displayed as follows:

5. CPU Protected Mode Test

   This test item is to check whether CPU protected mode instruction works normally.

6. MMX

   The test item is to confirm whether the CPU supports MMX instructions.

Subtest 02 Boards

1. DMA Controller

   This test item is to check whether the DMA controller works normally.

2. Interval Timer

   This test item is to check whether the Interval Timer (18.2Hz, 55ms) works normally.

3. Clock/Calendar

   This test item is to check whether the system clock/calendar works normally.

4. PCI System

   This test item is to check whether the bus number, device number and function number in PCI bus are valid.

5. Plug and Play

This test item is to check:
1. Whether the current system supports Plug-n-Play;
2. Whether there is an ESCD (Extended System Configuration Data) in the BIOS;
3. Whether there is PCI-to-ISA bridge in the system;
4. Whether there is PCI bus in the system.

6. ACPI Test

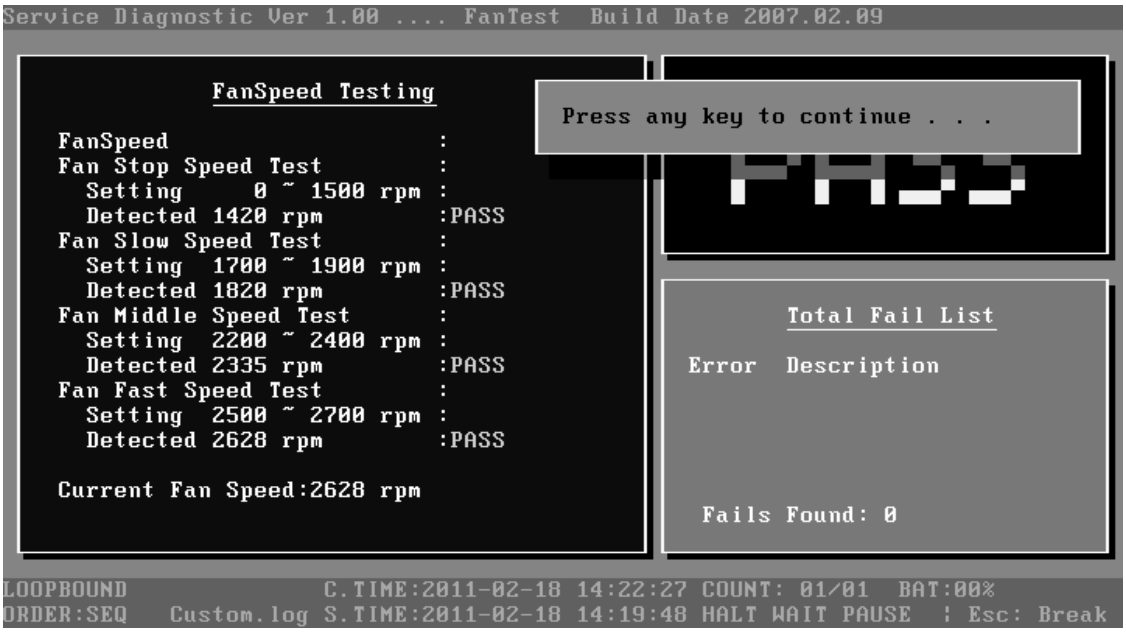
ACPI test includes two sub-items as below:
System Address Map Test: Check the correctness of ACPI system memory map, and whether its mapping scope is within real memory.
ACPI Table Test: Check the correctness of ACPI relative configuration tables in the current system.

Subtest 03 FAN Speed Test

1. CPU Fan Speed Test

This test item is to check whether the CPU fan currently used works normally in the different speeds of stop, slow, middle and fast.

It will be displayed as follows:


Service Diagnostic Ver 1.00 .... FanTest Build Date 2007.02.09
FanSpeed Testing
FanSpeed :
Fan Stop Speed Test :
Setting 0 ~ 1500 rpm :
Detected 1420 rpm :PASS
Fan Slow Speed Test :
Setting 1700 ~ 1900 rpm :
Detected 1820 rpm :PASS
Fan Middle Speed Test :
Setting 2200 ~ 2400 rpm :
Detected 2335 rpm :PASS
Fan Fast Speed Test :
Setting 2500 ~ 2700 rpm :
Detected 2628 rpm :PASS
Current Fan Speed:2628 rpm
Press any key to continue . . .
PASS
Total Fail List
Error Description
Fails Found: 0
LOOPBOUND C.TIME:2011-02-18 14:22:27 COUNT: 01/01 BAT:00%
ORDER:SEQ Custom.log S.TIME:2011-02-18 14:19:48 HALT WAIT PAUSE ! Esc: Break

3.6 Memory Test

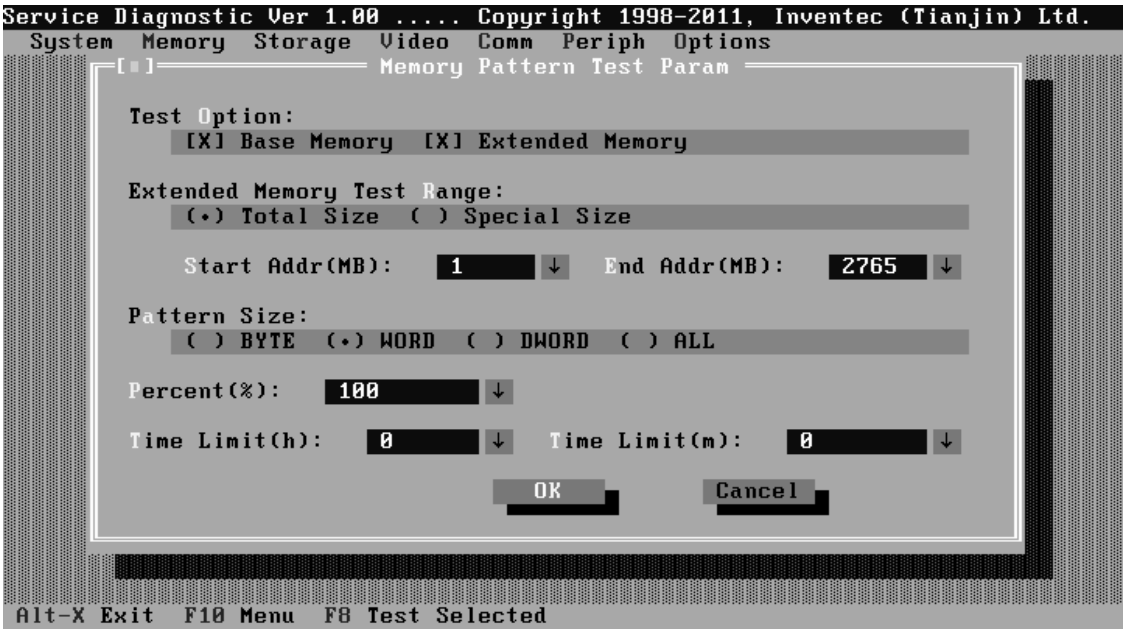
This test module is to check whether the memory chip works normally.

Subtest 01 BIOS ROM

This test item is to check the validity of BIOS ROM that includes two sub-items -- ROM Read and ROM Write Protection. ROM Read is to check whether BIOS ROM could be correctly read out, ROM Write Protect is to check whether BIOS ROM is write-protected.

Subtest 02 Patterns

This test item is to check whether the system memory includes base memory and extended memory that could be accessed correctly through writing and reading with a series of designed pattern data. Below is the parameter setting dialog window.



Test Option: Choose the Memory part to take the test– Base Memory or Extended Memory.

Extended Memory Test Range: Specify the test coverage range of Extended Memory. If user chooses Total Size, it means that the whole Extended Memory will be tested. Although user can input the parameter into other select box, but the selected result is invalid. If user chooses Special Size, the test of Extended Memory will be taken according to the coverage range that user chooses or time.

Extended Memory Start Address (MB) & Extended Memory End Address (MB): Set the range of extended memory that is to be tested, the test coverage would be based on the setting and the value in 'Percent (%) mentioned at below.

Pattern Size: Choose the pattern size – BYTE, WORD, DWORD or ALL.

Percent (%): Choose the percentage of the defined range of the memory to be tested.

Time Limit(h): Choose or Input the time (hour) of the defined range of the memory to be tested.

Time Limit(m): Choose or Input the time (minute) of the defined range of the memory to be tested.

1. Bit Stuck High Test

   Data pattern: Every bit is '1' (Each bit is high)

2. Bit Stuck Low Test

   Data pattern: Every bit is '0'(Each bit is low);

3. Checker Board Test

   Data pattern: Lo-byte and hi-byte are composed with 0101(0x5) and 1010 (0xA);

4. CAS Line Test

   Data pattern: Lo-byte and hi-byte are composed with 0000 (0x0) and 1111(0xF);

5. Incremental Test

   Data pattern: A series of increasing data from 0 by adding 1 each time;

6. Decrement Test

   Data Pattern: A series of decreasing data from the maximum (e.g. 0xFFFF) by subtracting 1 each time;

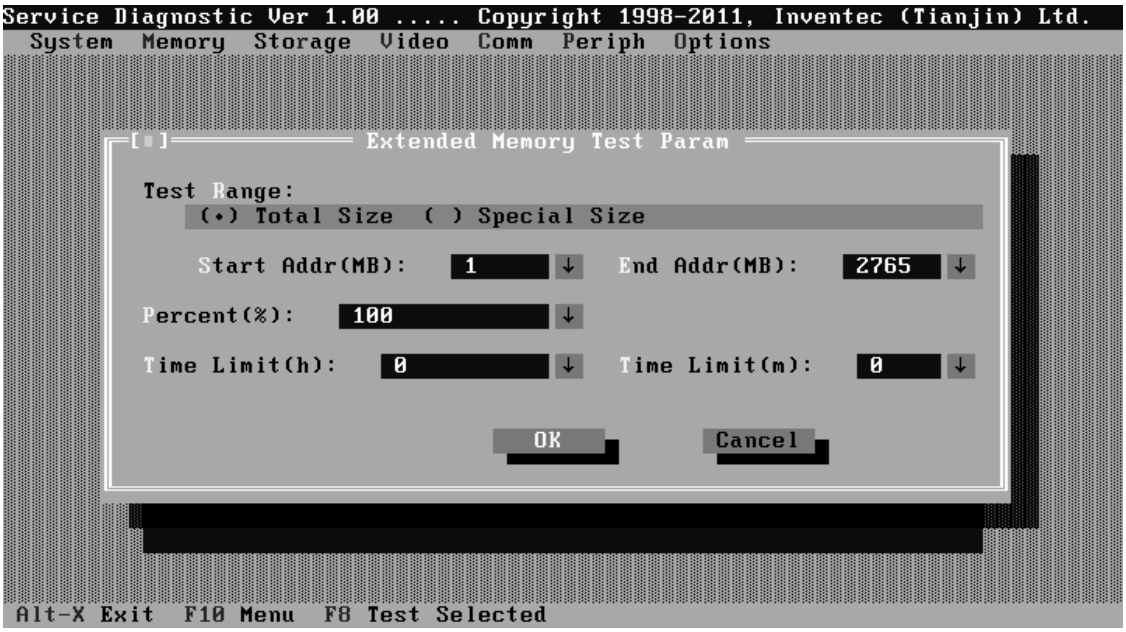
7. Incremental / Decrement Test

   Data Pattern is a series of data whose low byte is increasing data from 0x00 and high byte is decreasing data from 0xFF.

Subtest 03 Extended Pattern

In addition to the above pattern test of the memory, there is Read/Write Cycle test and Read Cycle Test for the extended memory.

Below is the parameter dialog window of the extended pattern test.



Test Range: Specify the test coverage range of Extended Memory. If user chooses Total Size, it means that the whole Extended Memory will be tested. Although user can input the parameter into other select box, but the selected result is invalid. If user chooses Special Size, the test of Extended Memory will be taken according to the coverage range that user chooses or time.

Extended Memory Start Address and Extended Memory End Address (MB): Set the range of extended memory that is to be tested. The test coverage will be according to the value setting in 'Percent (%)' mentioned at below.

Percent (%): Choose the percentage of the defined range of the memory to be tested.

Time Limit(h): Choose or Input the time (hour) of the defined range of the memory to be tested;

Time Limit(m): Choose or Input the time (minute) of the defined range of the memory to be tested.

1. Write/Read Cycle Test

Test by using both read and write instructions.

2. Read Cycle Test

Test by using read instructions.

Subtest 04 Walking 1's Test

The test item is to ensure that there is no short circuitry issue in memory chip. The parameter dialog window is the same as that in 'Subtest 02 Pattern'.

Subtest 05 Walking 0's Test

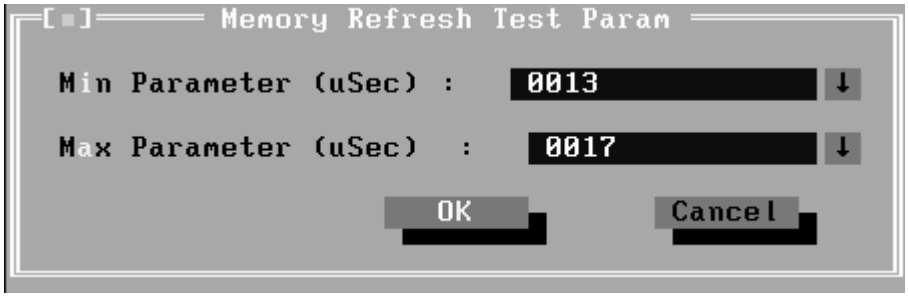
The test item is to ensure that there is no open circuitry issue in memory chip. The parameter dialog window is the same as that in 'Subtest 02 Pattern'.

Subtest 06 Memory Address

This test item is to check short and open issue on memory address lines**.**

Subtest 07 Refresh Test

This test item is to check whether the memory refresh works normally. The parameter dialog window is as follows:



Subtest 08 Cache Memory

The test item is to check whether the CPU internal cache memory could be accessed correctly.

Subtest 09 Random Memory

Random Memory test includes the following two test items: Randomize Test and Random Incremental Read/Write Test. The parameter dialog window is the same as that in 'Subtest 03 Extended Pattern'.

1. Randomize Test

This test item is to check whether the memory could be correctly accessed with randomized data and randomized memory address.

2. Random Increment Read/Write

   This test item is to check whether the memory could be correctly accessed with randomized memory address and a series of incremental data.

Subtest 10 Data Bus Test

This test item is to check whether the data bus works normally.

Subtest 11 Bus Noise Test

This test item is to check whether the bus noise works normally.

Subtest 12 Memory Speed Test

This test item is to check the data-transferring rate for the cache memory and the system memory.

3.7 Storage

Subtest 01 HDD

This test item runs on IDE hard disks. It checks the functions and performance of IDE hard disk.

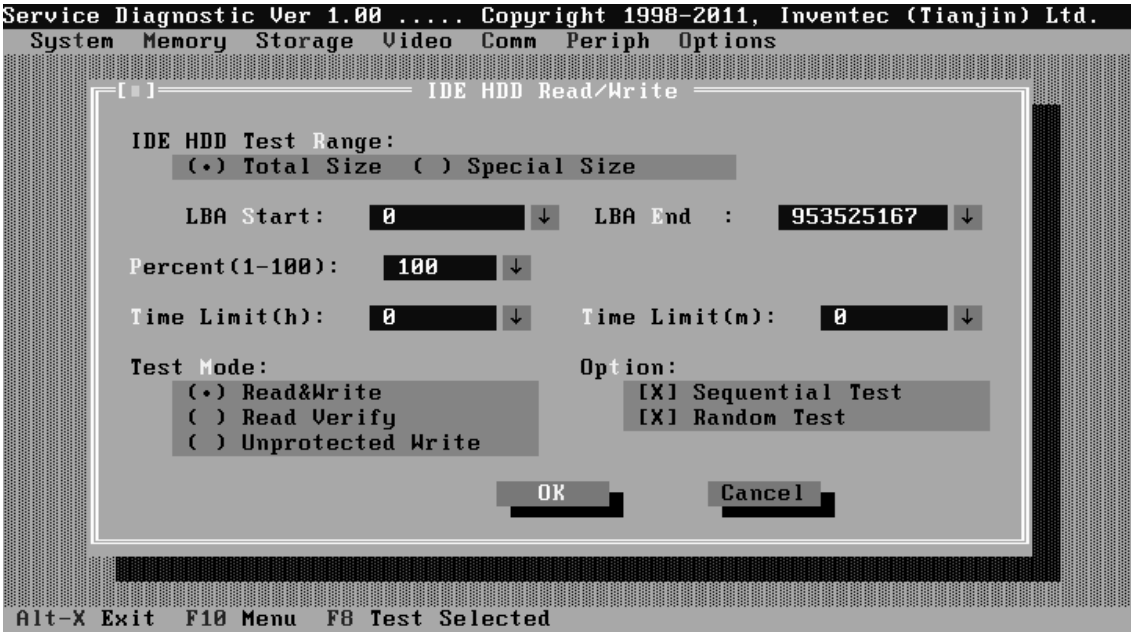
In order to protect user's HDD data, the password must be verified before the HDD test. The screen is as follows:

Password：hard disk

1. Sequential/Random R/W

   This test item is to check the HDD's Read/Write function through data writing and reading to HDD.

   This test item needs user to submit the parameters:



IDE HDD Test Range-- Specify the test coverage range of IDE HDD. If user chooses Total Size, it means that the whole IDE HDD will be tested. Although user can input the parameter into other select box, but the selected result is

invalid. If user chooses Special Size, the test of IDE HDD will be taken according to the coverage range that user chooses or time.

LBA Start, LBA End--Specify the start and end byte in LBA (Large Block Address).

Percent—Specify the coverage rate in percentage of the total disk.

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested.

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested.

Test Mode—Choose test mode from the following options:

(1) Read & Write –Write data on the disk, then read it out and compare the two value;

(2) Read Verify —Read data only;

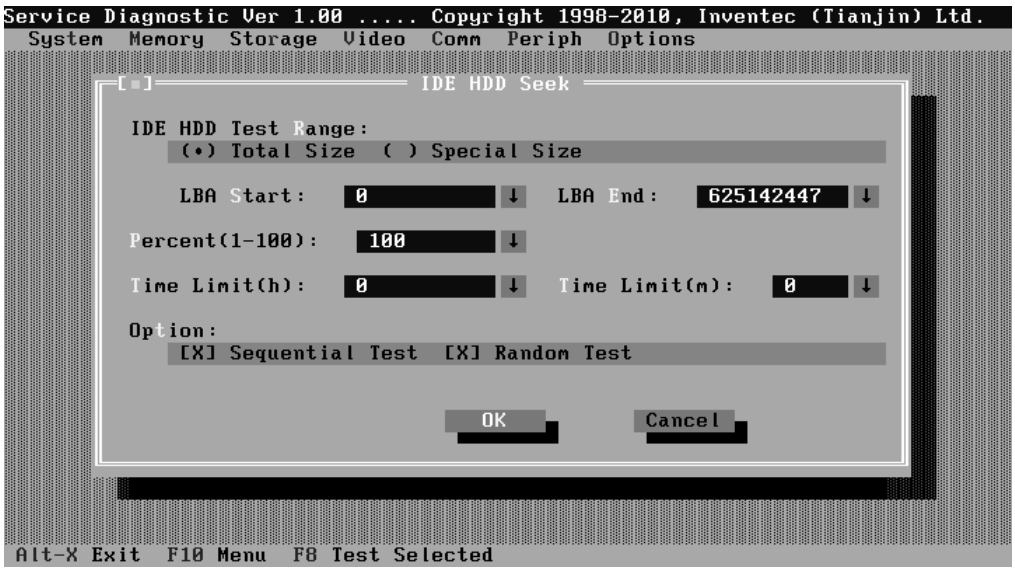
(3) Unprotected Write—Write data on the disk without backup original data.

Option—Select sequential test or random test

2. Sequential/Random Seek

The test item is to check the correctness of the HDD's sector's seeking function.

This test item involves the following parameters:



IDE HDD Test Range—is same as the description of the upper item.

LBA Start, LBA End-- specify start and finish byte in LBA(Large Block Address);

Option-- Select sequential test or random test;

Percent-- Specify the coverage rate in percentage of the total disk.

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested;

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested.

3. Performance

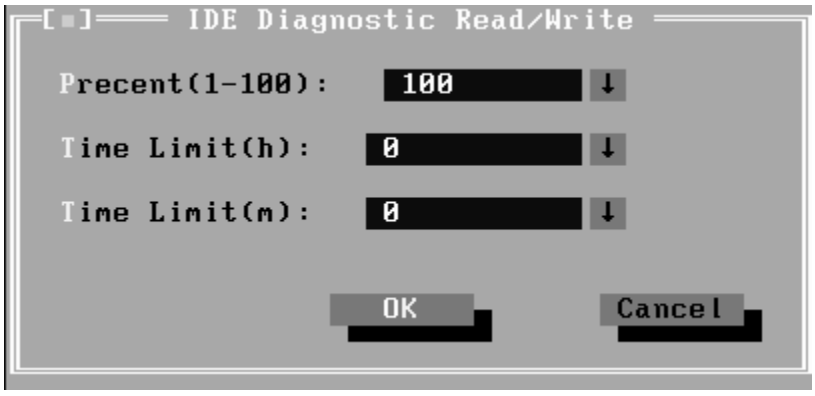
   Check the HDD's seeking speed and transfer the data rate.

4. Controller Check

   Check the HDD controller's status, including HDD interrupt and unexpected interrupt.

5. Diagnostic Read/Write

   This test item is a quick test to verify whether the HDD could be correctly accessed and the user could specify the percentage in the below dialog.



Percent (1-100)-- Specify the coverage rate in percentage of the total disk.

Time Limit(h): Choose or Input the time (hour) of the defined range of the total disk to be tested;

Time Limit(m): Choose or Input the time (minute) of the defined range of the total disk to be tested;

6. SMART Test

   SMART stands for Self-Monitoring, Analysis and Reporting Technology. SMART test will compare the attribute values with the threshold value in the HDD's controller to confirm whether there is any failure in the HDD

Subtest 02 ODD

The ODD test runs on IDE CDROM/DVD-ROM & CD-RW. It will check the ODD driver's functionality and performance.

1. Controller Test

   Check the CDROM controller's status.

2. Data Transfer Rate

   Check the data transfer rate of the ODD drive. It will read data from the ODD disc and calculate the data transfer rate. This test needs a data CD.

3. Data CD Butterfly Seek

   Check the seek function of the ODD drive. It will perform a serial of seeking operations. First, locate the minimum LBA address, then the maximum, the sub-minimum, the sub-maximum and meet at center point. This test needs a data CD.

4. Data CD Random Seek

   Check the random seek function of ODD drive. Random access will reflect the performance of the heads' random movement and seek. It tests for 1000 times.

5. Data CD Sequence Seek

   Check the sequential seek function of ODD drive. Perform location test to CD-RW under LBA mode with the location address increasing in sequence.

6. Tray Eject Test

   Check the eject function of the ODD. It will eject the ODD and ask the user to confirm if the operation succeeds.

3.8 Video

This test item tests the video by:

1. displaying the figures in different graphic modes.
2. displaying the property and color of the characters in different text modes.

User will confirm whether each video mode works normally by judging whether the display is correct. It checks whether the video memory works normally by writing data into the video memory, then reading it out and comparing the two value.

Subtest 01 Text Mode

1. Character Test

   Tests two types of font patterns.

   Font 9*14

   Font 9*16

   It requires the user to check whether all characters of each font type displayed correctly by answering the questions prompted on screen. It will be displayed as follows:.

2. Text Attribute

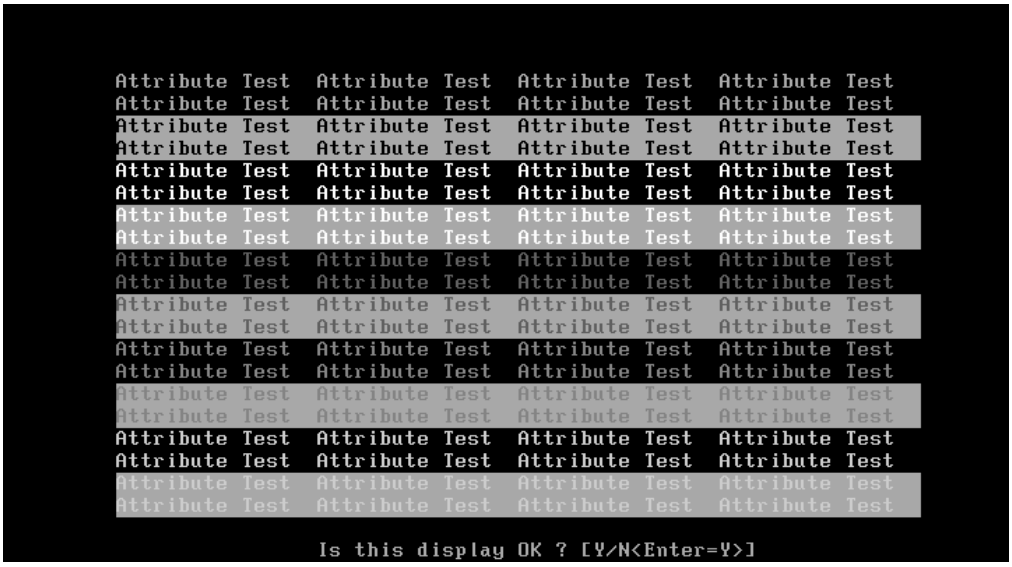
   This test item is to check whether the text attribute of normal, hi-intensity, inverse, and blinking in VGA text mode could be correctly displayed on the screen.

It would display the below texts of the different attributes in the screen:

1. Text in normal attribute;
2. Text in blinking normal attribute;
3. Text in inverse attribute;
4. Text in blinking inverse attribute;
5. Text in hi-intensity attribute;
6. Text in blinking hi-intensity attribute;

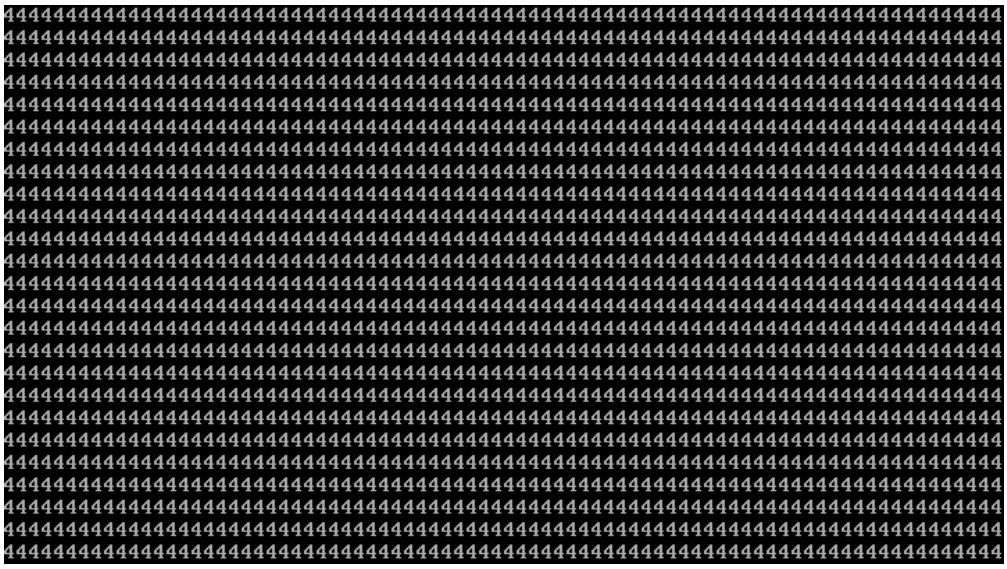
Users need to check whether all texts displayed correctly in the above six attributes and key in the answer 'Y' or 'N' to the prompts 'Is this display OK? [Y/N<Enter=Y>]'.

Below is the test screen of Text Attribute.



3. Text Page Selection

This test item is to check whether the video memory could be correctly written and read in VGA text mode. According to the comparison of written data with read data, the program would report PASS or FAIL.



4. Text Color

   This test item is to check whether all 16 colors foreground and all 8 colors background works normally in VGA text mode.

   The bit4-6 of the attribute byte of a character defines 8 background colors (black, blue, green, cyan, red, brown, magenta, and light gray), and the bit0-3 defines 16 foreground colors (dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and white besides the above 8 colors).

   In the test, user is required to respond according to the instruction in the screen.

5. 80 * 25 Text Mode

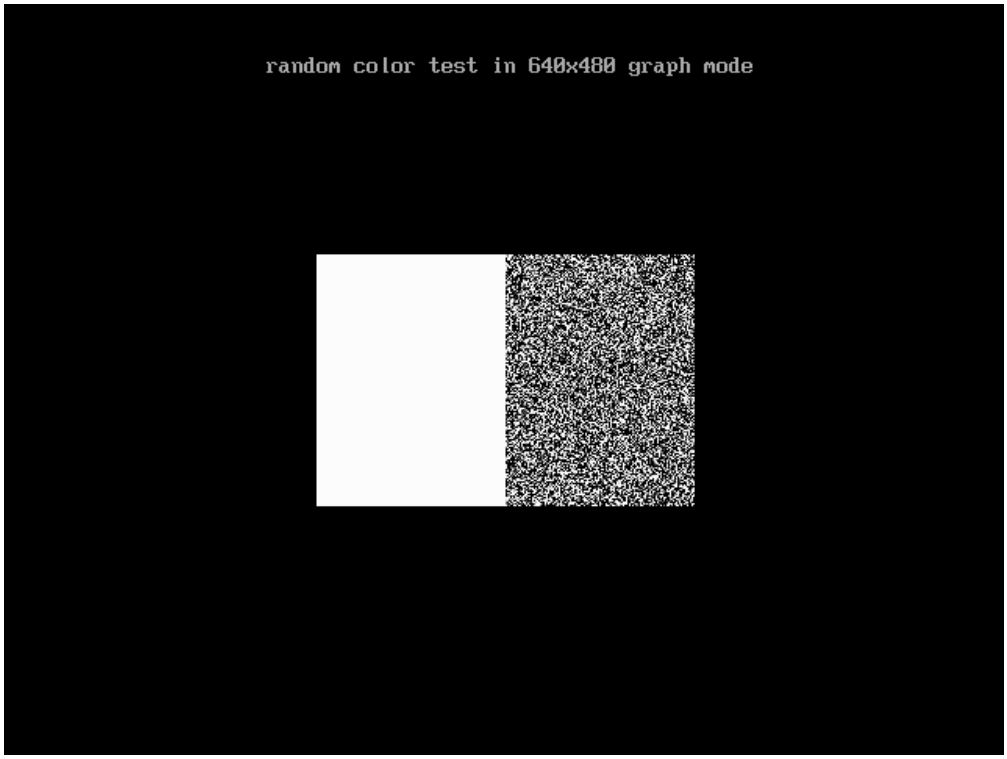
This test item is to check whether 80*25 Text Mode works normally.

In the test, user is required to respond according to the instruction in the screen.

Subtest 02 640 * 480 VGA Mode

This test item is to check whether 680*480 VGA Text mode works normally.

In the test, user is required to respond according to the instruction in the screen.

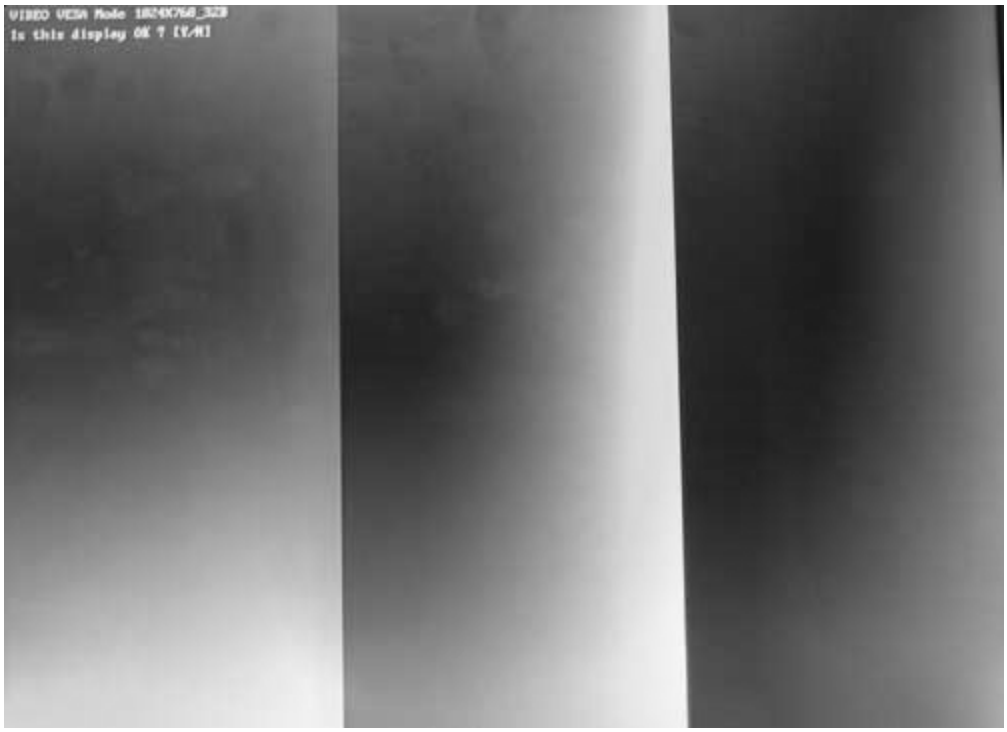


Subtest 03 VESA Video Modes

This test item is to check whether all the video modes supported by the video card works normally.

In the test, user is required to respond following the instruction in the screen.

1. 640X480 Video Modes Test

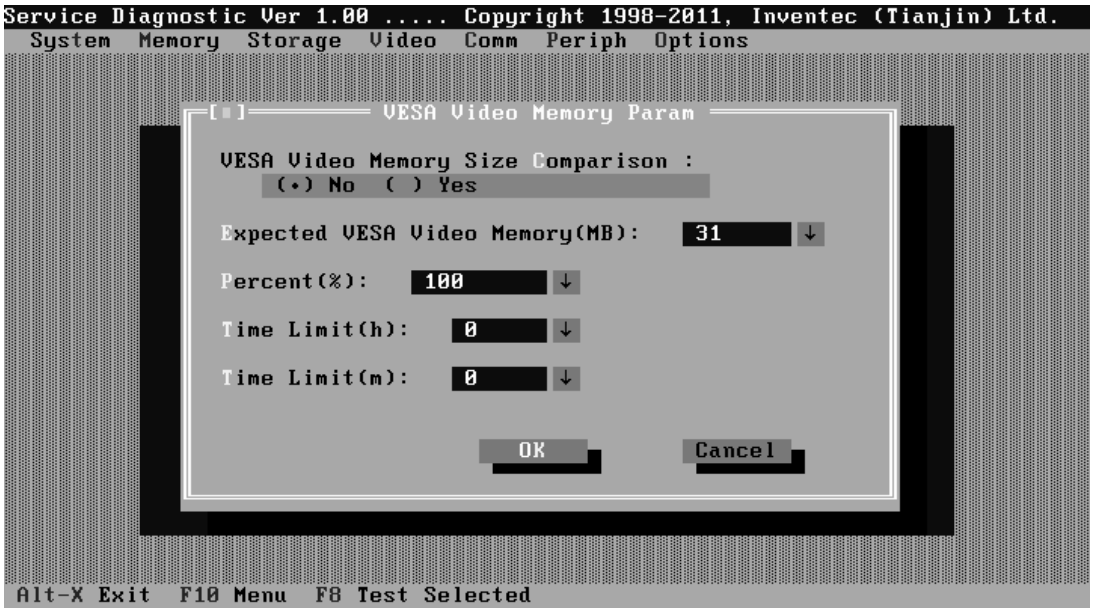


2. 800X600 Video Modes Test

3. 1024X768 Video Modes Test

Subtest 04 VESA Video Memory

This test item is to check whether VESA video memory could be correctly accessed (write data & read data). Below is the test item's parameter dialog window:



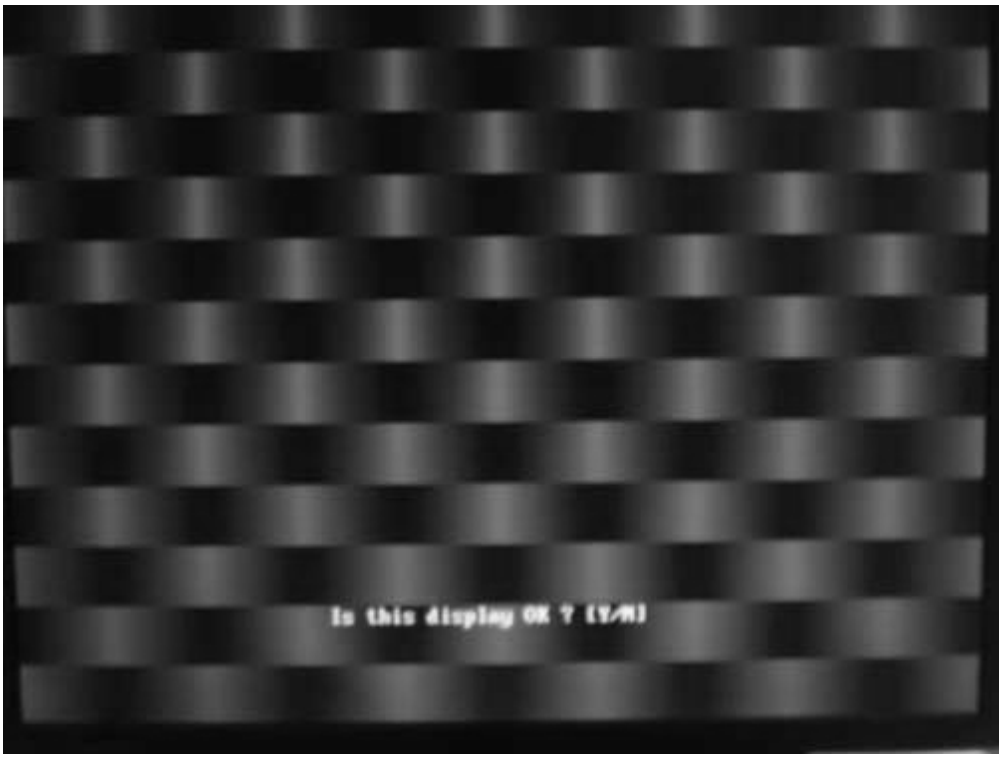
If press Ctrl+Break to force the test to terminate during execution of VESA Video Memory, the test program will not operate and display properly in further tests.

Subtest 05 AGP Test

This test item is to report the system's Accelerated Graphics Port status and check whether AGP registers works normally.

Subtest 06 LCD Panel Test

This test item is to check whether there is any fault in its resolution by displaying the RGB gradient color screens.



Subtest 07 Register Test

This test item is to check whether the registers of the video adapter works normally.

Subtest 08 Color Purity Test

This test item is to check whether the system (the video adapter and the display) could display the purity color of red, green, blue, black and white.

In the test, user is required to respond according to the instruction in the screen.

Subtest 09 Direct Color Test

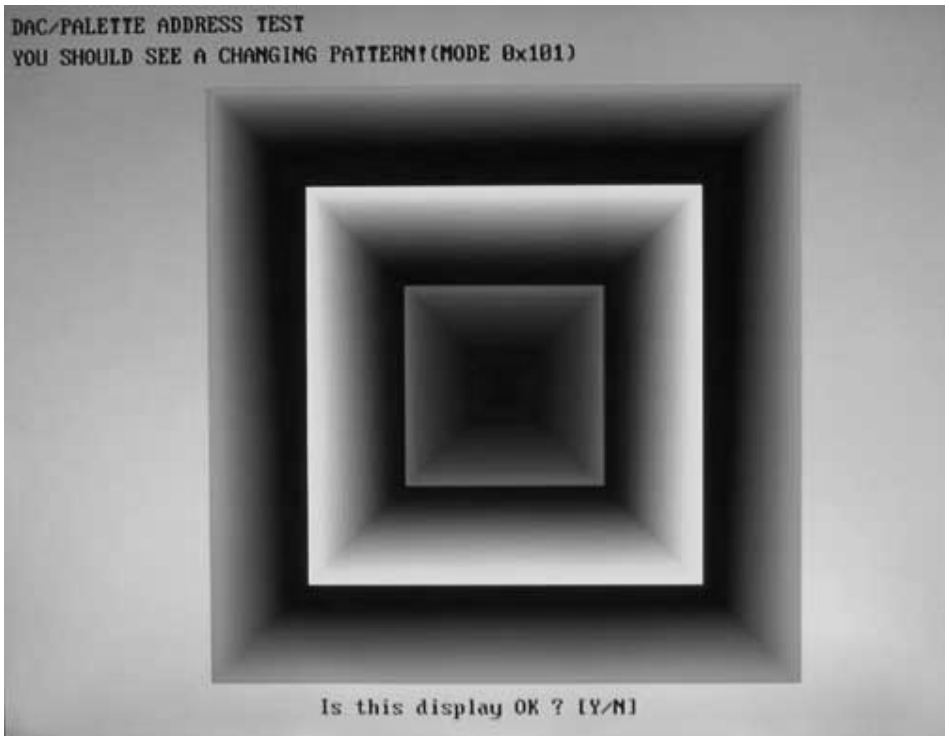
This test item is to check the video adapter's composing ability of direct color in high and true color mode.

In the test, user is required to respond according to the instruction in the screen.

Subtest 10 DAC/Palette Address

This test item is to check the function of DAC registers and Palette registers.

In the test, user is required to respond according to the instruction in the screen.



3.9 Communication (COMM)

Subtest 01 LAN Card

This test item is to check whether the module can detect the existence of the network card and display its related information.

1. Device ID Detection

   Detect the device ID of the network card.

2. Vendor ID Detection

   Detect the vendor ID of the network card.

3. MAC Address Detection

   Detect the MAC address of the network card.

3.10 Peripheral

Subtest 01 Keyboard

This test item is to check whether the keyboard works normally.

1. Keyboard Data Line Test

   Check whether the keyboard data line works normally.

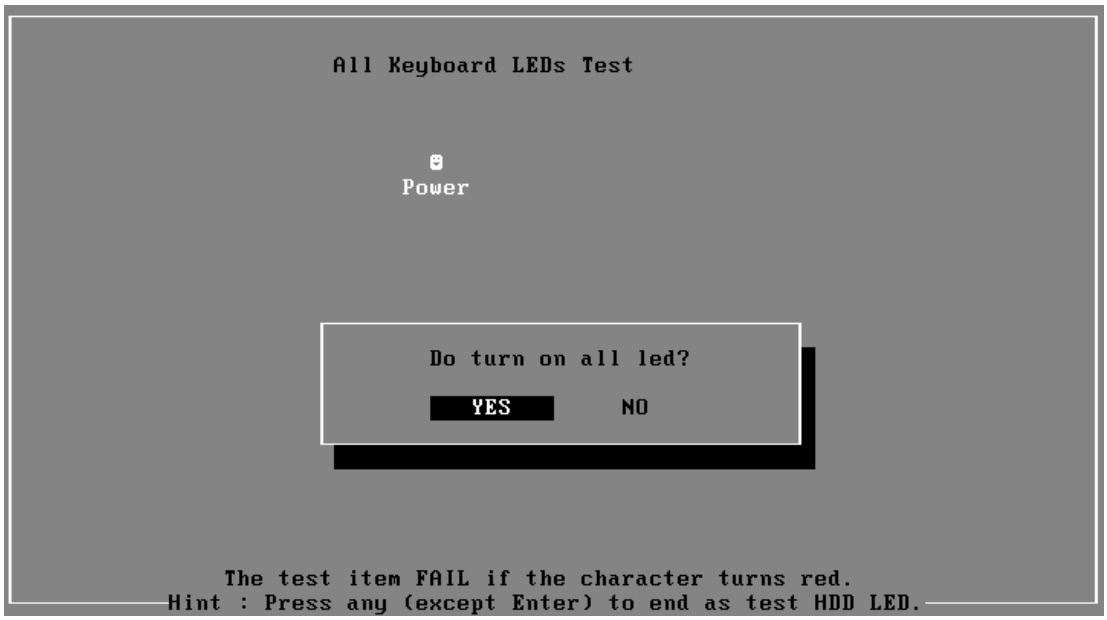
2. Keyboard Clock Line Test

   Check whether the keyboard clock line works normally.

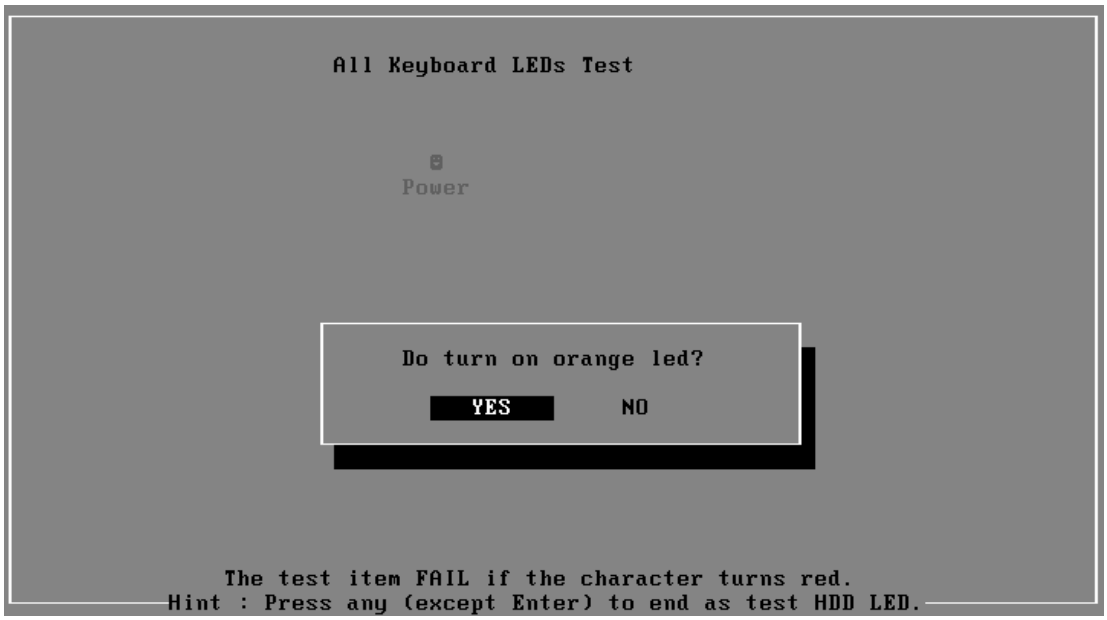
Subtest 02 Led Test

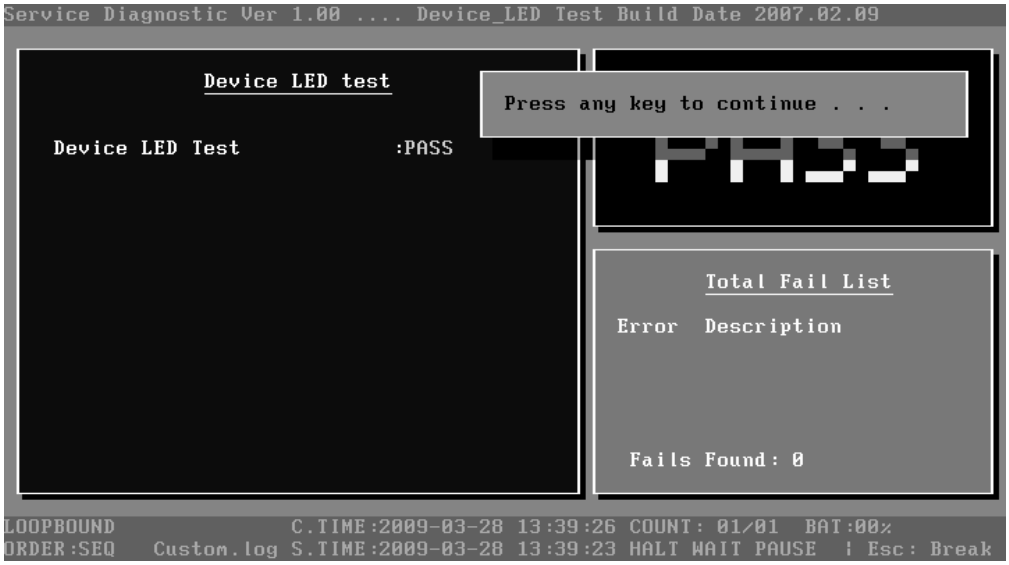
1. Led Test

Check whether the white led works normally.



Check whether the orange led works normally.


All Keyboard LEDs Test
Power
Do turn on orange led?
YES
NO
The test item FAIL if the character turns red.
Hint : Press any (except Enter) to end as test HDD LED.


Service Diagnostic Ver 1.00 .... Device_LED Test Build Date 2007.02.09
Device LED test
Press any key to continue . . .
Device LED Test :PASS
PASS
Total Fail List
Error Description
Fails Found: 0
LOOPBOUND C.TIME:2009-03-28 13:39:26 COUNT: 01/01 BAT:00%
ORDER:SEQ Custom.log S.TIME:2009-03-28 13:39:23 HALT WAIT PAUSE ¦ Esc: Break

3.11 Error Codes and description

The format of 'Error Code' is 'ddxxee', and 'dd' is the device ID (1~2 chars), 'xx' is test function ID of device (2 chars), 'ee' is the error code of device (2 chars); the range of error code is from 01 to 99 in each device (the common error codes in all device are set to 99 and spanned).

Device	Error Code	Description	Cause	Action
ddxx	**ee**	**Common Error**		
	94	Interactive Mode Needed	The test is not under interactive mode.	Check whether the interactive test mode is adopted.
01xx		**CPU**		
	01	CPU General Function Error	The CPU General Function register is damaged.	Replace the CPU.
	02	CPU Arithmetic Error	The CPU Arithmetic Register is damaged.	As above.
	03	CPU Logic Error	The CPU Logic Register is damaged.	As above.
	04	CPU Type Error	The CPU Type is not supportable.	Check whether the CPU is Intel CPU.
	05	CPU Speed Error	The CPU speed differs from the expected value.	Check the CPU speed and the set expected speed.
	06	NPU General Function Error	The NPU arithmetic unit is damaged.	Replace the CPU.
	07	NPU Interrupt Error	The NPU is damaged.	As above.
	08	CPU Information Error	Information of the CPU cannot be acquired.	Check whether the CPU is Intel CPU.
	09	Protected Instruction Error	The CPU is damaged.	Replace the CPU.
	21	MMX Test Error	The CPU MMX register is damaged.	Replace the CPU.
02xx		**Memory**		
	01	Read Error	The ROM BIOS has Physical problems.	Test this unit on multiple machines.
	02	Write-Protect Error	The ROM BIOS has Physical problems.	As above.
	03	Base Memory Error Address	The test pattern read out from the base memory is different from the one that has been written in this address.	Test this memory chip on multiple machines.

	04	(XMS)Memory Problem	The test pattern read out from the extension memory is different from the one that has been written in this address.	As above.
	05	(XMS) Out Of Range	Wrong parameters setup.	Check and reset the parameters.
	06	Address Test Error	Interference between different address channels.	Test this memory chip on multiple machines.
	07	Toggle Bit Error	Errors with the timer chip.	As above.
	08	Interval Error	The acquired refreshing frequency is out of the estimated range.	Reset the estimated range.
	09	L1 Cache test Error	The pattern read out from the L1 Cache is different from the one that has been written in the same address.	Test this unit on multiple machines.
	12	Data Bus Error	Interference between different data channels.	As above.
	14	Speed Error	Failure during the transfer speed test.	As above.
03xx		**Board**		
	01	DMA Test Error	DMA channel cannot transfer data normally.	Repeat multiple times. Whether there is always the same error, replace the board.
	04	Interval Timer Error	The difference between the actual precision of the interval timer and its theory value is out of the permitted range. The timer counts imprecisely.	As above.
	05	Periodic Faster Error	The frequency is beyond the standard.	As above.
	06	Periodic Slower Error	The frequency is below the standard.	As above.
	07	Update-ended Interrupt Error	R/W errors with the RTC refreshing interrupt controller.	As above.
	08	RTC Alarm Error	The PC speaker's sound source --counter/timer 8253 cannot produce corresponding timing signal.	As above.
	13	PCI Bus Error	No PCI.	Check the board.
	14	PCI Bus Scan Error	PCI test fails.	As above.
	15	PCI Device Access Error	PCI access fails.	As above.
	16	PCI Config Verification Error	Wrong PCI configuration.	Check PCI configuration on main board or PCI Device

				configuration.
	17	PCI to ISA Bridge Error	PCI-ISA bridge errors.	Repeat multiple times. If there is always the same error, replace the board.
	18	ESCD Error	ESCD errors.	As above.
	53	ACPI Table Test Error	Errors with the ACPI table test.	As above.
34xx		**FAN**		
	01	Fan Slow Speed Test Fail	The fan slow speed test fails.	Check the FAN connection.
	02	Fan Stop Test Fail	The fan stop test fails.	As above.
	03	Fan Fast Speed Test Fail	The fan fast speed test fails.	As above.
04xx		**Video**		
	01	Text Attribute Error	Physical problems with the video card.	Check whether there is any physical problem with the video card.
	02	Text Page Selection Error	As above.	As above.
	03	Text Color Error	As above.	As above.
	04	Text Mode Error	As above.	As above.
	05	VGA Mode Error	1) Physical problems with the video card. 2) Physical problems with the monitor.	1) Check whether there is any physical problem with the video card. 2) Check whether there is any physical problem with the monitor.
	06	Character Test Error	Physical problems with the video card.	Check whether there is any physical problem with the video card.
	07	DAC/Palette Address Test Error	As above.	As above.
	08	Color Purity Test Error	Physical problems with the video card or the monitor.	Check whether there is any physical problem with the video card or the monitor.
	09	VESA Mode 15bits Direct Color Test Error	As above.	As above.
	10	VESA Mode 16bits Direct Color Test Error	As above.	As above.
	11	VESA Mode 24bits Direct Color Test Error	As above.	As above.
	12	Get the PCX graphics map Error	Failure in getting PCX graphics map.	Check for the PCX graphics map.
	13	Bitblt Engine Test Error	Physical problems with the video card.	Check and see whether the video card has any physical problem.
	14	VESA Video Memory Test Error	As above.	As above.

	15	VESA VRAM Test Error	Physical problems with the video card or the monitor.	Check whether there is any physical problem with the video card or the monitor.
	16	AGP Test Error	AGP configuration register errors.	Check and see whether the AGP video card has any physical problem.
	17	LCD Panel Test Error	Lower LCD color resolution.	Replace the LCD.
	19	Register Test Error	Physical problems with the video card.	Check and see whether the video card has any physical problem.
	20	Adapter not support DDC	The video card doesn't support DDC.	
	21	Monitor not support DDC	The monitor doesn't support DDC.	
	21	8bits Text and Attribute Test Error	1) Physical problems with the video card. 2) Physical problems with the monitor.	1) Check and see whether the video card has any physical problem. 2) Check and see whether the monitor has any physical problem.
	26	8bits Video Mode Test Error	As above.	As above.
	27	15bits Video Mode Test Error	As above.	As above.
	28	16bits Video Mode Test Error	As above.	As above.
	29	24bits Video Mode Test Error	As above.	As above.
	30	32bits Video Mode Test Error	As above.	As above.
31xx		**Audio**		
	01	Audio Play Fail	Cannot play music.	Check the Audio connection, replace the external fixture, and repeat the test.
	02	Record Fail	Cannot record.	As above.
08xx		**LAN Card**		
	01	PCI bus Error during device ID test	Don’t Scan PCI device	Don’t support PCI BIOS
	02	PCI Ethernet card not present during device ID test	Don’t find Net card	Please insert Net cad
	03	Intel PCI Ethernet card not present during MAC test	Don’t found Net Card, This Card can’t be Read MAC by this method	Please update net card or use other method
09xx		**Keyboard**		

	01	Keyboard Map & Stroke Test Fail	Keyboard Map & Stroke Test fails.	Check the KBD connection and repeat the test.
	03	Clock Line Test Fail	Clock Line Test fails.	As above.
	04	Data Line Test Fail	Data Line Test fails.	As above.
05xx		**Mouse**		
	01	Touch Pad Test Fail	Touch Pad Test Fail	Check the mouse connection and repeat the test.
20xx		**IDE-HDD**		
	01	Get Parameter Fail !	Wrong test parameters are input by user.	Reinput the correct parameters.
	02	Write Pattern Error	HD is damaged.	Send the HD for repair.
	03	Data Compare Error	HD is damaged.	As above.
	04	Read Verify Error	HD is damaged.	As above.
	05	Seek Error	HD is damaged.	As above.
	06	Disk Controller Self Test Failed	The HD controller is damaged.	As above.
	07	Disk Controller Test unexpected interrupt Failed	The HD controller is damaged.	As above.
	09	Disk Controller action Test Failed	The HD controller is damaged.	As above.
	10	Disk dos not support SMART	Disk dos not support SMART	Change HD which supported SMART and test again
	11	Disk read attribute threshold error	Disk read attribute threshold error	Send the HD for repair.
	12	Disk read attribute value error	Disk read attribute value error	As above.
	13	Disk SMART attribute value error	Disk SMART attribute value error	As above.
21xx		**ODD**		
	01	No Disk in CDROM	No disk is found in the CD-ROM.	Insert a disk into the CD-ROM.
	02	The Disk in CDROM is not Data Disk	The disk in the CD-ROM is not Data Disk.	Insert a DATA CD.
	03	IDE-CD Controller Error	Functional errors with the CD-ROM.	Send the CD-ROM for repair.
	04	CD Read Error	Either the disk or the CD-ROM is damaged.	Replace the disk or send the CD-ROM for repair.
	07	CD Seek Error	Either the disk or the CD-ROM is damaged.	Replace the disk or send the CD-ROM for repair.
	09	Eject Error	Wrong CD-ROM drive.	Exit from the wrong drive.

3.12 Quick Test Item List

Device	Test Items	Comment
CPU	Basic Functionality	
	NPU Basic Functions	
	CPU Information	
Memory	BIOS ROM	
	Cache Memory	
	Bit Stuck High Test	10% or 3 minutes
	Bit Stuck Low Test	10% or 3 minutes
	Address Test	
Board	Interval Timer	
	Clock / Calendar	
	ACPI Test	
FAN	FAN Speed	
Video	1024X768 Video Modes Test: VESA 1024x768x64K Mode VESA 1024x768x32bit Mode	
	VESA Video Memory	10% or 3 minutes
	Color Purity Test	
	Direct Color Test	
	LCD Panel	
HDD	Sequential/Random Read	25% or 3 minutes
	SMART Check	
LAN Card	Device ID Detection	
	Vendor ID Detection	
	Mac Address Detection	

Chapter 4

Replacement Procedures

Chapter 4 Contents

Figures

4.14 Power Board

Removing the Power Board

Remove the power board according to the following procedures and Figure 4-15.

1. Release two M3x5 black flat head screws securing the power board.
2. Remove the power board shield from the power board.
3. Disconnect power board cable from CN3000 on the power board.
4. Remove the power board.

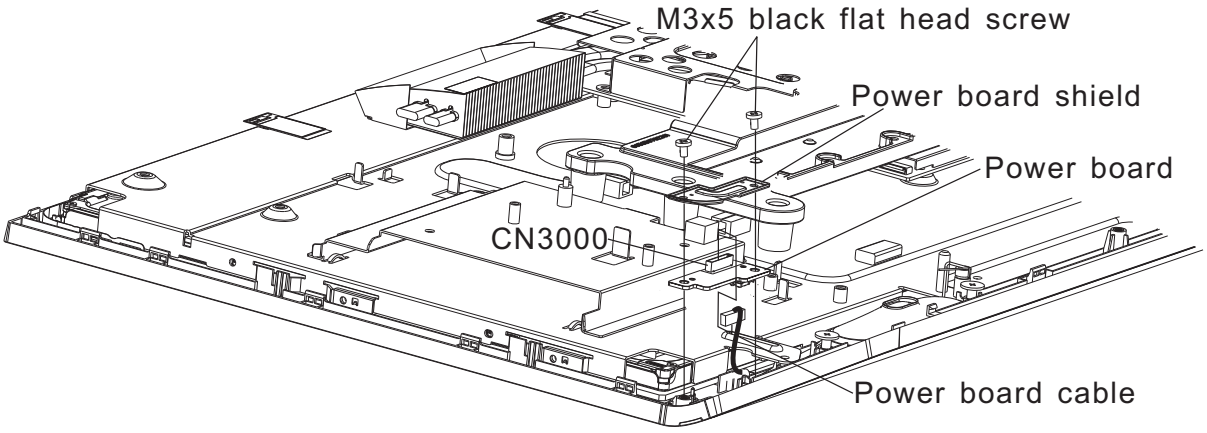


Figure 4-15 Removing the power board

Installing the Power Board

Install the power board according to the following procedures and figure 4-15.

1. Connect power board cable to CN3000 on the power board.
2. Seat the power board shield and power board in the correct position.
3. Secure two M3x5 black flat head screws.

4.15 Speakers

Removing the Speakers

Remove the speakers according to the following procedures and Figure 4-16.

1. Remove two M3x3 black flat head step screws securing the left speaker.
1. Remove two M3x3 black flat head step screws securing the right speaker.
2. Disconnect speaker cable from CN26 on the system board.
3. Remove the left and right speakers.

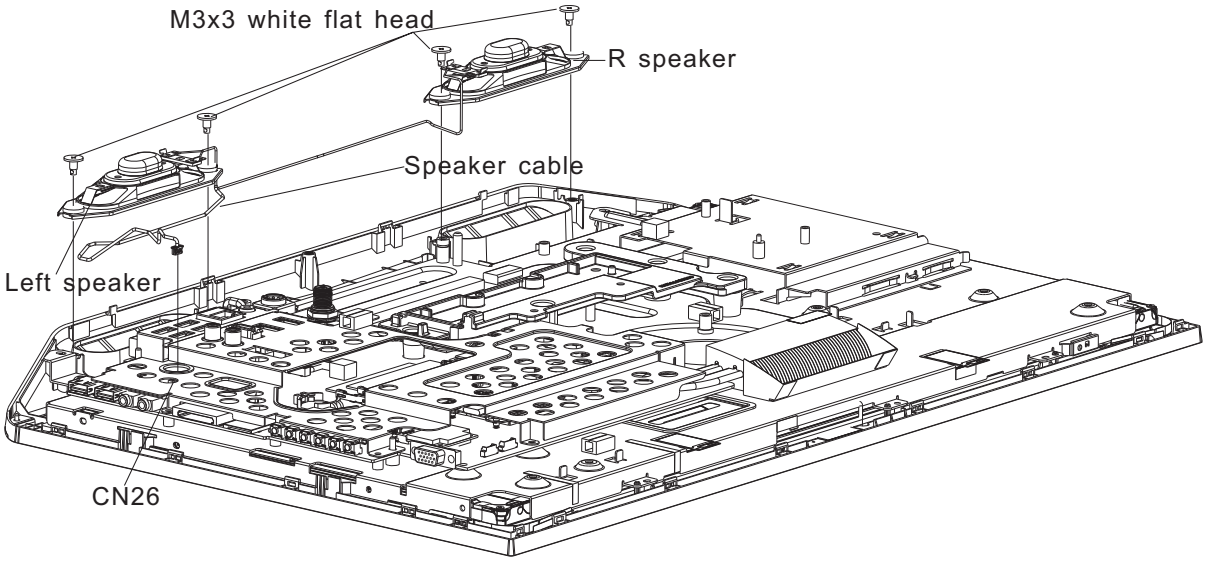


Figure 4-16 Removing the speakers

Installing the Speakers

Install the Speakers according to the following procedures and figure 4-16.

1. Seat the left and right speaker in the correct position.
2. Connect speaker cable to CN26 on system board.
3. Secure the left speaker with two M3x3 black flat head screws.
4. Secure the right speaker with two M3x3 black flat head screws.

4.16 Hinge Base and Main Board Shield

Removing the Hinge Base and Main Board Shield

Remove the Hinge Base and Main Board Shield according to the following procedures and Figure 4-17.

1. Release five M4x6 black round head screws securing the hinge base.
2. Remove the hinge base.
3. Release eleven M3x5 black flat head screws securing the main board shield.
4. Remove the main board shield.

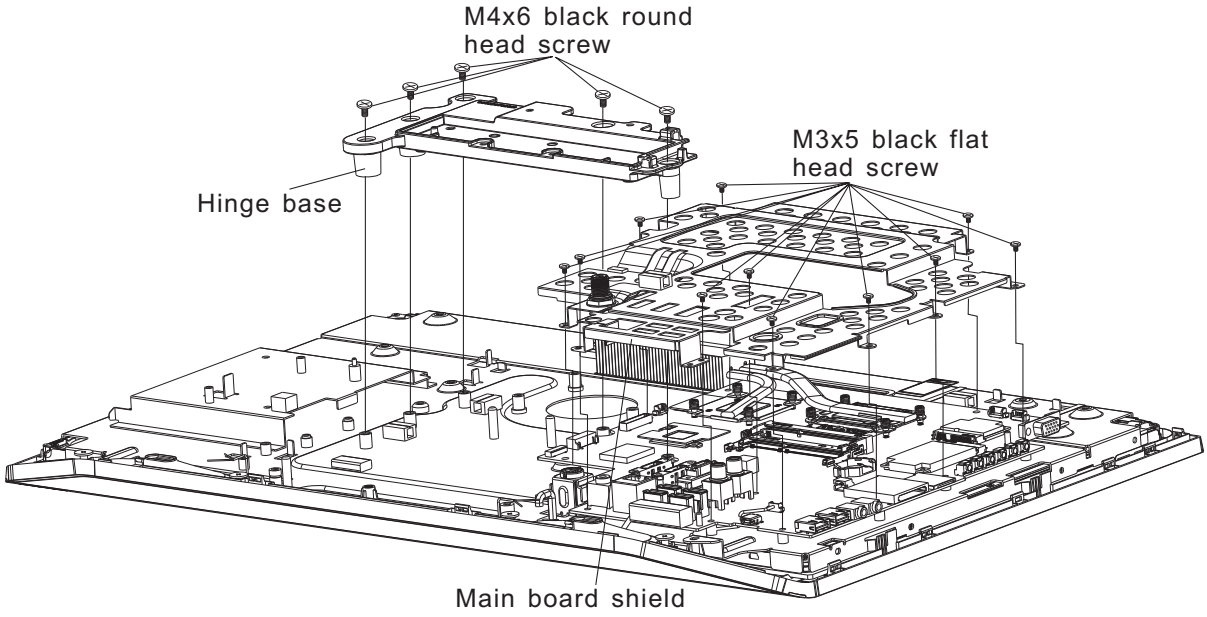


Figure 4-17 Removing the Hinge Base and Main Board Shield

Installing the Hinge Base and Main Board Shield

Install the Hinge Base and Main Board Shield according to the following procedures and figure 4-17.

1. Seat the main board shield in the correct position and securing eleven M3x5 black flat head screws.

2. Seat the hinge base in the correct position and securing five M4x6 black round head screws.

4.17 Wireless LAN card

Remove the Wireless LAN card

Remove the wireless LAN card according to the following procedures and Figures 4-18.

1. Disconnect AUX and Main antenna cable on the wireless LAN card.
2. Release one M2x2 black flat head screw securing the wireless LAN card.
3. Remove the wireless LAN card from CN24 on system board.

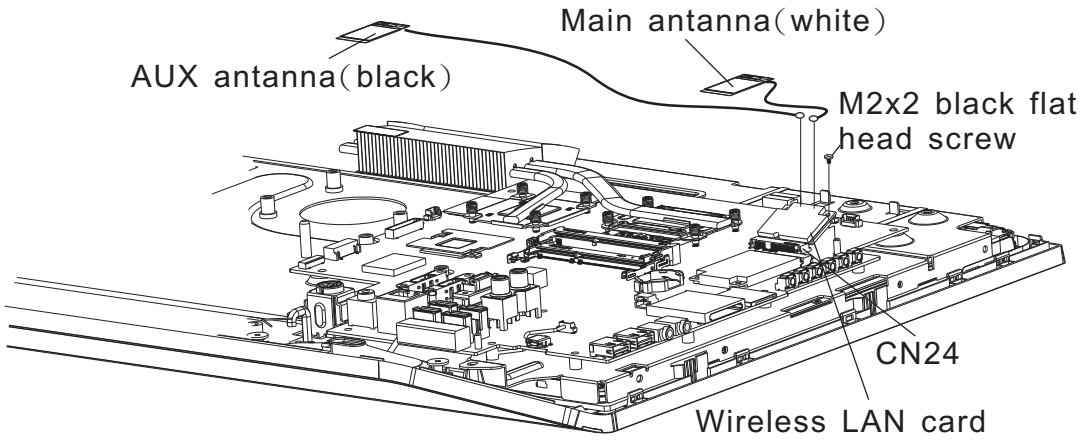


Figure 4-18 Removing the wireless LAN card

Installing the Wireless LAN card

Install the wireless LAN card according to the following procedures and Figures 4-18.

1. Install the wireless LAN card into the connecter CN24 on the system board.
2. Securing wireless LAN card with one M2x2 black flat head screw.
3. Connect the antenna to wireless LAN card.

4.18 TV tuner

Remove the TV tuner

Remove the TV tuner according to the following procedures and Figures 4-19.

1. Release one M2x2 black flat head screw securing the TV tuner.
2. Remove the wireless TV tuner from CN23 on system board.

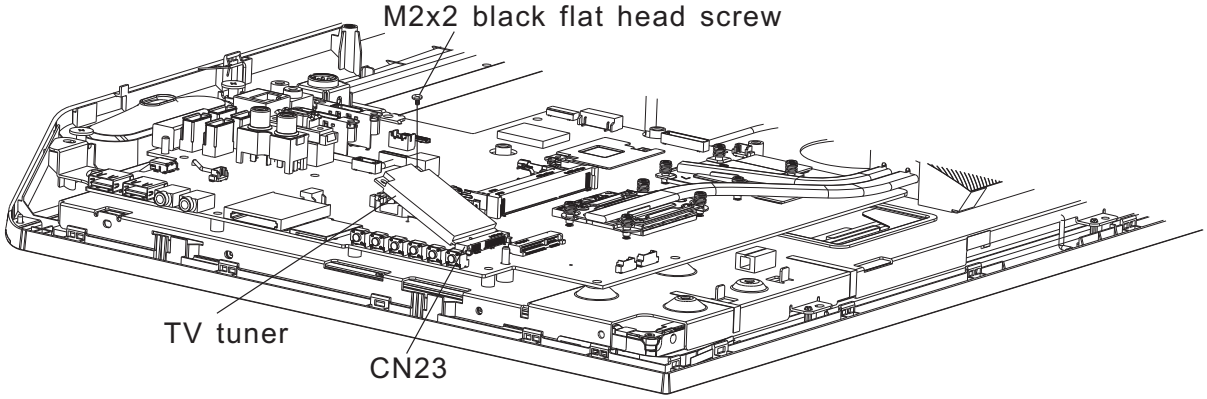


Figure 4-19 Removing the TV tuner

Installing the TV tuner

Install the TV tuner according to the following procedures and Figures 4-19.

1. Install the TV tuner into CN23 on the system board.
2. Securing TV tuner with one M2x2 black flat head screw.

4.19 CPU Cooling Module

CAUTION: When removing the cooling module, keep the following in mind:

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

Do not touch or cause damage to the fan in the cooling module.

4.19.1 For non-VGA model

Remove the CPU cooling module

Remove the CPU cooling module according to the following procedures and Figures 4-20, 4-21.

1. Release four CPU cooling module securing screws in the order shown on the CPU cooling module.
2. Remove the CPU cooling module.

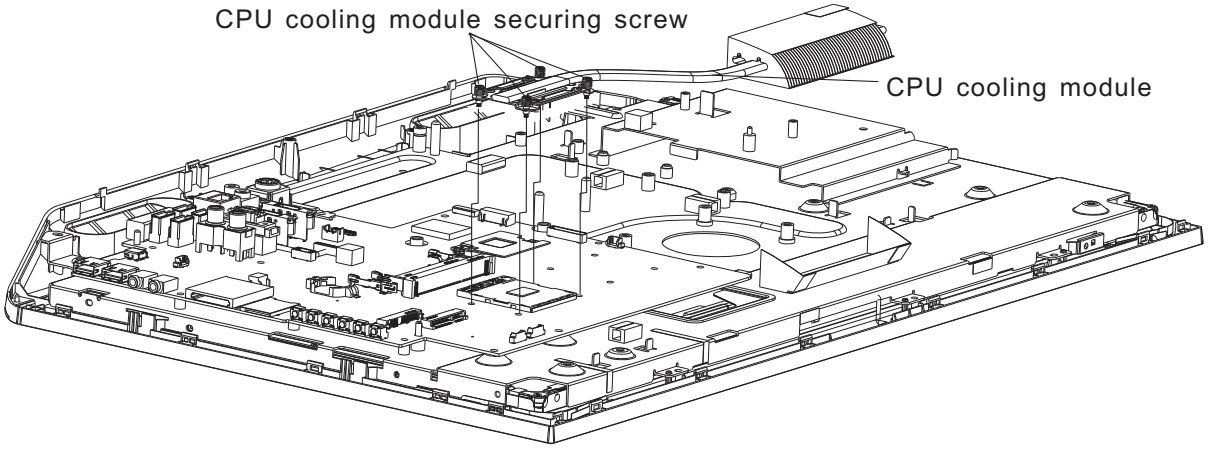


Figure 4-20 Removing the CPU cooling module

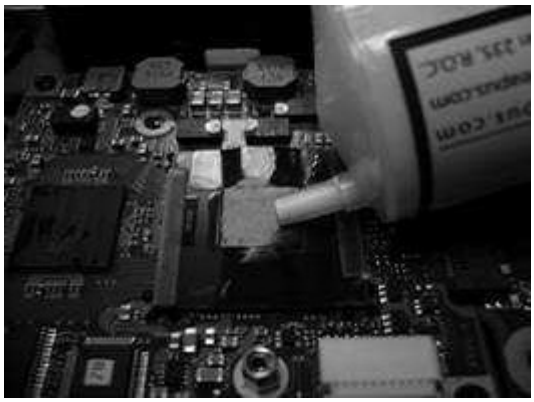


Figure 4-21 Applying silicon grease

Installing the CPU Cooling Module

Install the CPU cooling Module according to the following procedures and Figures 4-20, 4-21.

CAUTION: When installing the cooling module, keep the following in mind:

1. *Be sure to confirm the correct position for the module.*
2. *Secure the relevant screws on the main board according to the number sequence sealed on the heat sink module.*

NOTE: Apply silicon grease with a special syringe to cover the surface of the CPU chip completely.

1. If silicon grease is already applied to the CPU and CPU cooling module, wipe it off with a cloth.
   By using a special syringe, apply silicon grease G7762 to the CPU chip center so that the entire CPU chip is covered with the grease G7762.

2. Install the CPU cooling module into the correct position on the system board.

3. Securing CPU cooling module with it's own screws.

4.19.2 For VGA model

Remove the CPU cooling module

Remove the CPU cooling module according to the following procedures and Figures 4-22, 4-23.

1. Release eight CPU cooling module securing screws in the order shown on the CPU cooling module.

2. Remove the CPU cooling module.

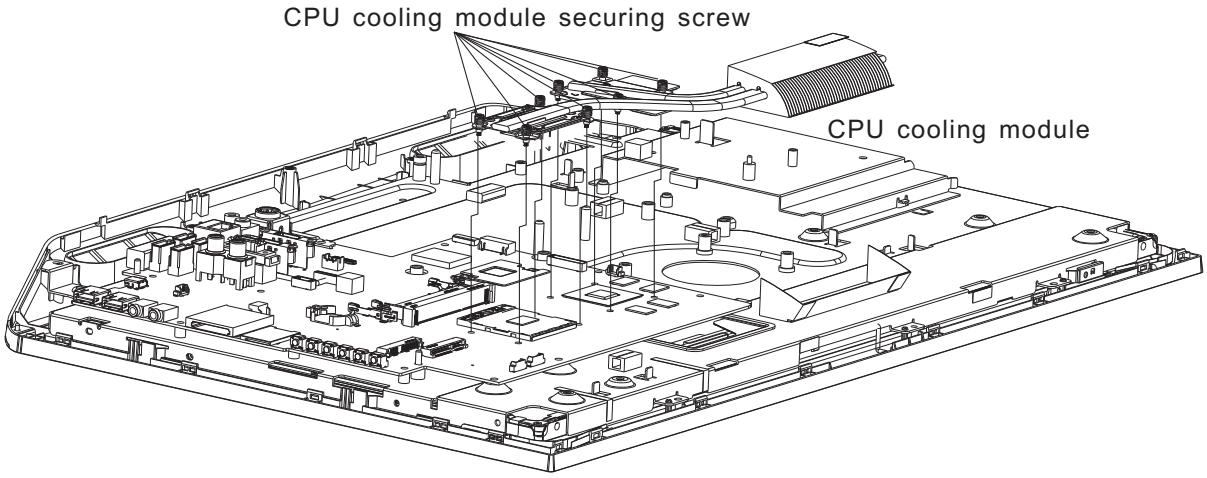


Figure 4-22 Removing the CPU cooling module

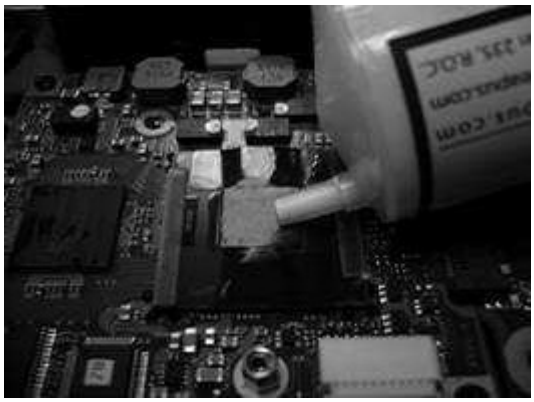


Figure 4-23 Applying silicon grease

Installing the CPU Cooling Module

Install the CPU cooling Module according to the following procedures and Figures 4-22, 4-23.

CAUTION: When installing the cooling module, keep the following in mind:

1. *Be sure to confirm the correct position for the module.*
2. *Secure the relevant screws on the main board according to the number sequence sealed on the heat sink module.*

NOTE: Apply silicon grease with a special syringe to cover the surface of the CPU chip completely.

1. If silicon grease is already applied to the CPU and CPU cooling module, wipe it off with a cloth.
   By using a special syringe, apply silicon grease G7762 to the CPU chip center so that the entire CPU chip is covered with the grease G7762.

2. Install the CPU cooling module into the correct position on the system board.

3. Securing CPU cooling module with it's own screws.

4.20 CPU

Removing the CPU

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.

Remove the CPU according to the following procedures and Figures 4-24, 4-25 and 4-26.

NOTE: FOXCONN CPU socket will be 180 degrees to the right.

1. Unlock the CPU by rotating the cam on the CPU socket 120 degrees to the left with a flat-blade screwdriver (in the order shown in the figure below).

2. Tear off CPU Mylar and remove the CPU.

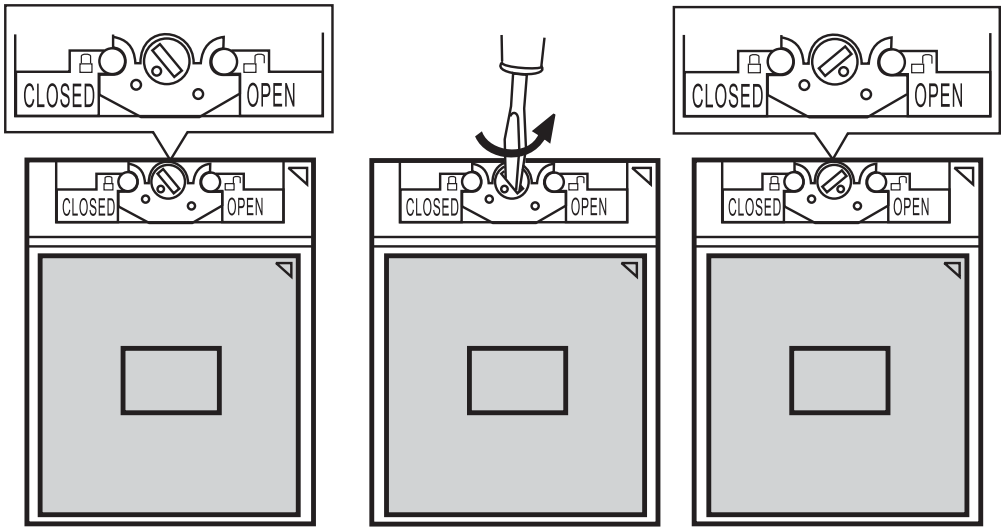


Figure4-24 Removing the CPU

Installing the CPU

Install the CPU according to the following procedures and Figures 4-24, 4-25 and 4-26.

1. Stick CPU Mylar and check that the triangle on the cam is in the unlock position.
2. Attach the CPU to the correct position in the CPU socket. Align the CPU with the CPU socket by using the triangle as a guide.

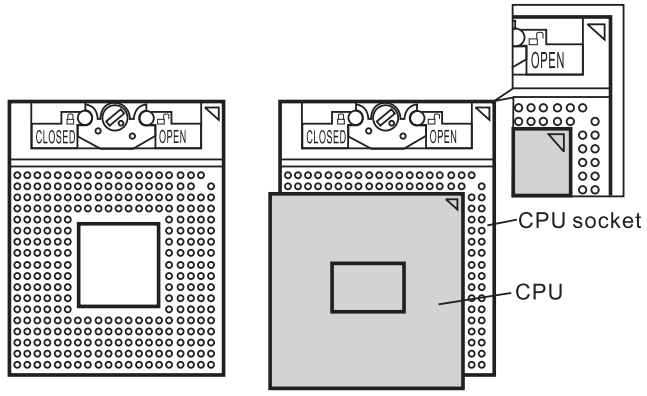


Figure 4-25 Installing the CPU

CAUTION: Seat the CPU by aligning the triangle with the shaded area.

3. Secure the CPU by rotating the cam 120 degrees to the right with a flat-blade screwdriver.

NOTE: FOXCONN CPU socket will be 180 degrees to the left.

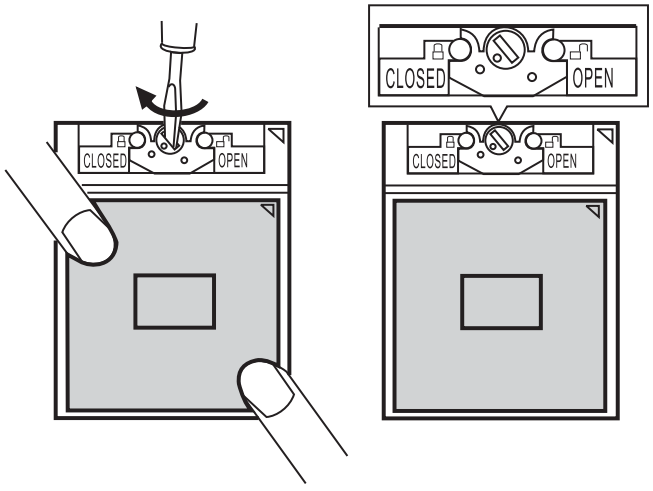


Figure 4-26 Securing the CPU.

4.21 System Board

Removing the System Board

Disassemble the System Board according to the following procedures and Figure 4-27.

1. Disconnect ODD board cable from CN16 on the system board.
2. Disconnect converter cable from CN22 on the system board.
3. Disconnect HDD cable from CN17 on the system board.
4. If there is HW TV tuner cable on system board, disconnect HW TV tuner cable from CN8010 on the system board.
5. Disconnect power board cable from CN14 on the system board.
6. If there is sub woofer cable on system board, disconnect sub woofer cable from CN37 on the system board.
7. Remove the LCM cable from CN8002 on the system board.
8. Disconnect DC-IN cable from CN6000 on the system board.
9. Remove the one M3x5 black flat head screw securing the DC-IN cable.
10. Remove the one M3x3 black flat head screw securing the DC-IN bracket.
11. Remove the DC-IN cable.
12. Remove the two M3x5 black flat head screw securing the system board.
13. Remove the system board.

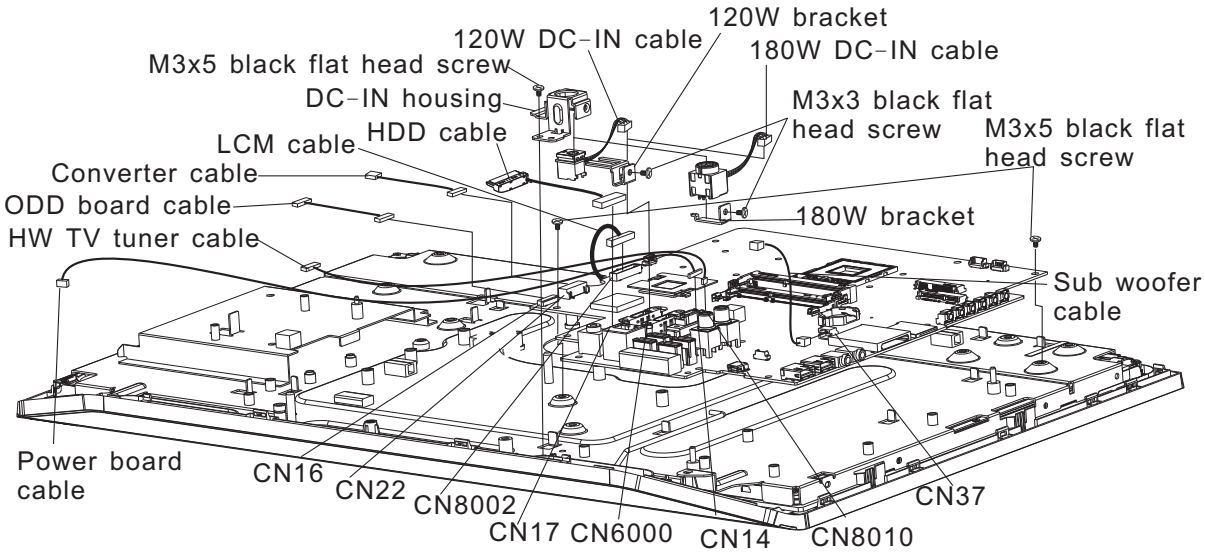


Figure 4-27 Removing the system board

Installing the System Board

Install the system board according to the following procedures and Figure 4-27.

1. Install the system into the correct position.
2. Secure the system board with two M3x5 black flat head screws.
3. Connector LCM cable to CN8002 on system board.
4. Install the DC-IN cable into the DC-IN housing.
5. Secure the DC-IN bracket with one M3x3 black flat head screws to DC-IN housing.
6. Install the DC-IN cable the correct position and securing one M3x5 black flat hand screw on system board.
7. Connect DC-IN cable to CN6000 on system board.
8. Connect ODD board cable to CN16 on the system board.
9. Connect converter cable to CN22 on the system board.
10. Connect HDD cable to CN17 on the system board.
11. If there is HW TV connecter on system board, connect HW TV tuner cable to CN8010 on the system board.
12. Connect power board cable to CN14 on the system board.
13. If there is sub woofer connecter on system board, connect sub woofer cable to CN37 on the system board.

4.22 LCD Module

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

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

NOTE: *The LED cable must be carefully peeled away before disconnecting it from the module.*

Removing the LCD Module

Remove the LCD Module according to the following procedures and Figures 4-28.

1. Disconnect the LCD cable.
2. Release the two latches on each side securing the LCD module from front Bezel.
3. Remove two M3x5 black flat head screws on right side securing the main frame.
4. Remove two M3x5 black flat head screws and LCM bracket on left side securing the main frame.
5. Remove one M3x5 black flat head screws and LCM bracket on top side securing the main frame.
6. Remove the main frame.

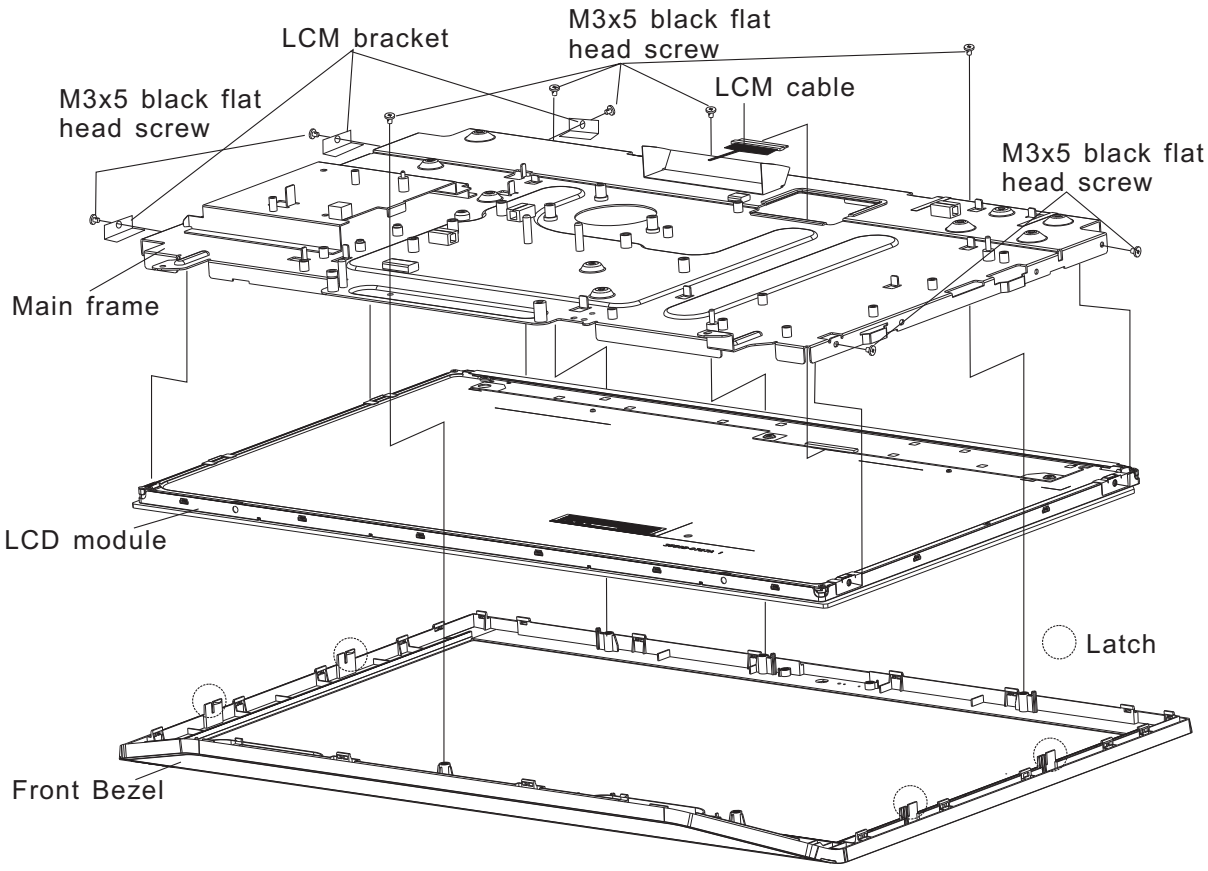


Figure 4-28 Removing the LED module and screws

Installing the LCD Module

NOTE: *LCD cable must be carefully peeled away before disconnecting it from the module.*

Install the LCD Module according to the following procedures and Figures 4-28.

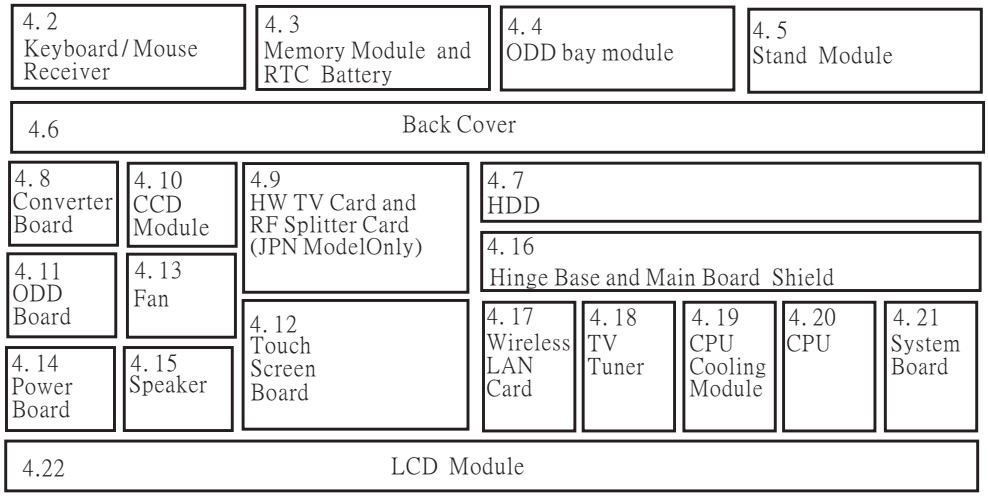
1. Assembly the main frame and LCD module in the correct position and secure it with two M3x5 black flat head screws on right side.
2. Secure two M3x5 black flat head screws and LCM bracket to right side on main frame.
3. Secure one M3x5 black flat heat screw and LCM bracket to top side on main frame.
4. Connect the LCD cable to LCD module connector.

CAUTION: *When installing the LCD module, please follow below instruction:*

When plug in LCD cable into LCD module connector, need to plug horizontally. For Sharp panel, if LCD cable connector is not plugged horizontally, it may be damaged.

4.1 General

This chapter explains how to disassemble the computer 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.



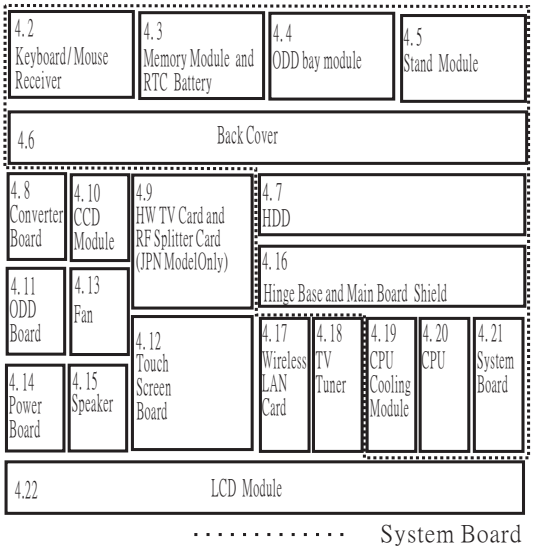
How to use the chart (two examples):

- For removing the System Board:

First, remove the top cover with the display assembly. Then, remove the HDD, selectable bay module, Bluetooth card, keyboard, and wireless LAN card, all of which are shown above the top cover with the display assembly.

- For removing the LCD Module:

First, remove the display mask and FL inverter board, both of which are shown above the LCD module.



Safety Precautions

Before you begin to 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 computer. 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 FL inverter carry high voltages. When you partially disassemble the computer 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 computer off and remove the AC adapter from the electrical outlet.***
2. ***Because the battery in the computer 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 computer 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 computer or Toshiba-recommended equivalents.***
5. ***To avoid the risk of electrical shock, make sure that all the replacement components meet the specifications of the computer 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 disassembly the computer, 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 computer only when an abnormality has occurred.

Use only the recommended tools.

To run and store the computer, 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 computer 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 computer, 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 computer 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 comes 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 computer after you have disassembled the computer and fixed the component that caused the problem.

When reassembling the computer, 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 computer 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.

- M2 (2 mm) 0.22 N·m (2.2 kgf·cm)
- M2.5 (2.5 mm) 0.36 N·m (3.5 kgf·cm)
- M3 (3 mm) 0.51 N·m (5.0 kgf·cm)
- M2.5x4 PSP TITE screws 0.204 N·m (2.0 kgf·cm)
- 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 even-numbered length Brown
- 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, such as 2.5 mm and 2.6 mm.

Symbols of Screws on the Computer Body

For easy maintenance, the screw types are shown on the computer 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 Keyboard/Mouse Receiver

Removing the Keyboard/Mouse Receiver

Remove the Keyboard/Mouse receiver according to the following procedures and Figure 4-1.

CAUTION: When handling the KB/Mouse Receivers, be careful not to short circuit the terminals. Do not drop, hit, twist, or bend the KB/Mouse Receivers.

1. Press down the catch on the top of receiver door and pull out the receiver door.
2. Pull down KB/Mouse receiver.

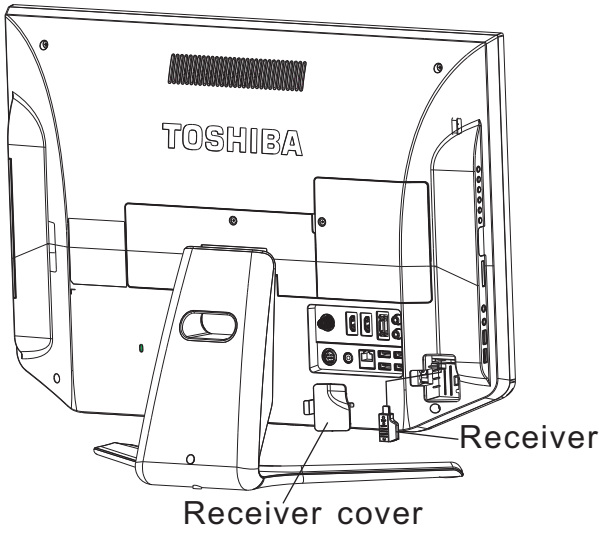


Figure 4-1 Removing the Keyboard/Mouse receiver

Installing the Keyboard/Mouse Receiver

Install the keyboard/mouse receiver according to the following procedures and Figure 4-1.

NOTE: Visually check the Keyboard/Mouse receiver terminals. If they are dirty, clean them with a dry cloth.

1. Gently insert a new or repaired KB/Mouse Receiver into USB port. Make sure the receiver is inserted into USB port completely and firmly.

2. Buckle the door into back case by the button hook of the door.

3. Press down the top of door and lock the door.

4.3 Memory Module and RTC Battery

Memory Module and RTC Battery

Remove the memory module and RTC battery according to the following procedures and Figures 4-2, after checking that the computer is turned off in boot mode.

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

1. Release one memory module cover securing the screw.
2. Remove the memory module cover.

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

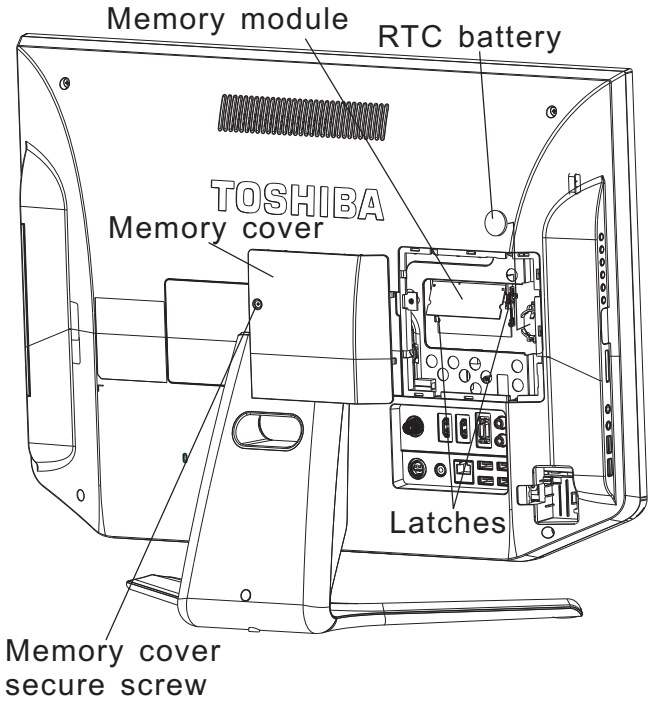


Figure 4-2 Removing the memory module and RTC battery

3. Spread out the two memory lock latches so that the memory module pops up.
4. Pull the memory module up and out at an angle, using care to avoid touching the connectors.
5. Release RTC battery with spread out the RTC battery latch.
6. Remove RTC battery.

Installing the Memory Module and RTC battery

Install the memory module and RTC battery according to the following procedures and Figures 4-2, after checking that the computer is turned off in boot mode.

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

1. Place RTC battery in battery locker in the correct position.
2. Insert the memory module into the connector at an angle of 45 degrees.
3. Press down on the memory module so that it is secured with both memory lock latches.
4. Reinstall the optional memory cover.
5. Secure the optional memory cover with the optional memory cover securing screw.

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

4.4 ODD Bay Module

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 Figures 4-3.

1. Release one stand cover securing the screw.
2. Remove the stand cover.
3. Remove the M3x3 black flat head screw.
4. Push out on the ODD bay module.

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

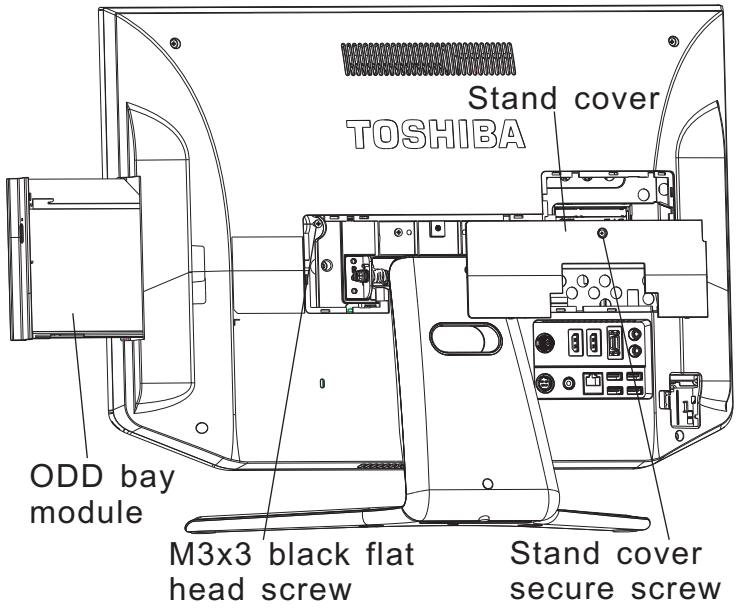


Figure 4-3 Removing the ODD bay module

Installing the ODD Bay Module

Install the ODD bay module according to the following procedures and Figures 4-3.

1. Place the ODD bay module in the correct position and slide it in.
2. Push it in until it clicks into place.
3. Secure the ODD bay module with one M3x3 black flat head screw.
4. Reinstall the stand cover.
5. Secure the stand cover with the stand cover securing 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 4-4.

1. Release the slot ODD bezel.
2. Remove two M2x2.5 black flat head screws.
3. Remove the ODD bracket.
4. Remove four M2x2.5 black flat head screws from L and R ODD bracket.
5. Remove L and R ODD bracket.

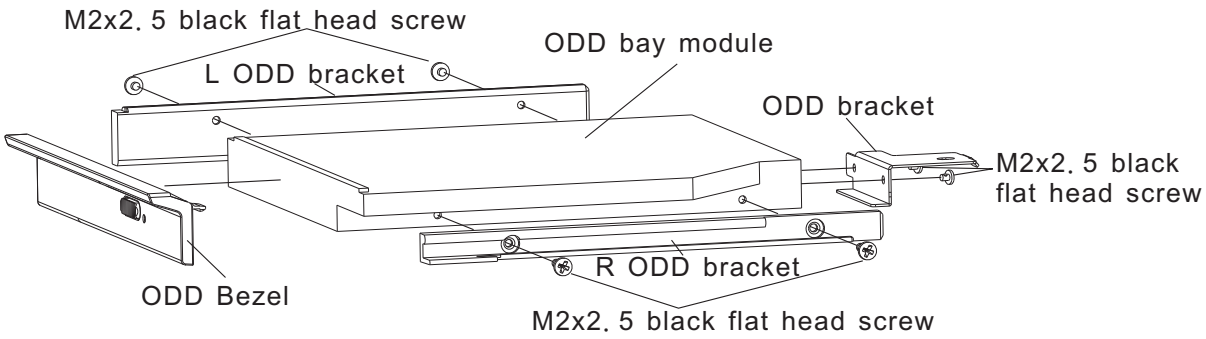


Figure 4-4 Removing the bracket from the ODD drive

Assembling the ODD Drive

Assemble the ODD drive according to the following procedures and Figure 4-4.

1. Seat the L and R ODD bracket and secure it with four M2x2.5 black flat head screws.
2. Seat the ODD bracket and secure it with two M2x2.5 black flat head screws.
3. Place the slot ODD bezel in the correct position and secure it.

4.5 Stand Module

Removing Stand Module

Remove the Stand Module according to the following procedures and Figure 4-5.

1. Please put computer on the work desk and make the LCD side face toward the desk.
2. If there is sub woofer speaker in Stand Module, disconnect the sub woofer speaker cable.
3. Remove four M4x6 black round head screws on the stand module.
4. Remove the stand module.
5. Remove four M4x12 black flat head screws on the hinge module.
6. Remove the hinge.

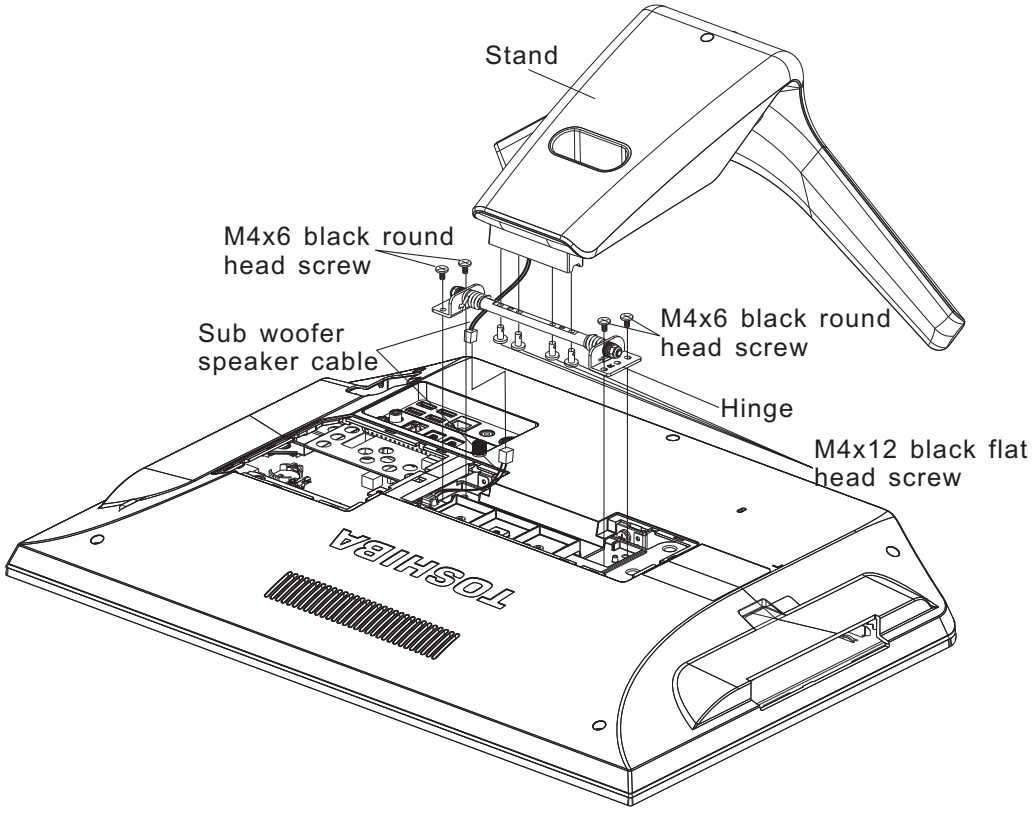


Figure 4-5 Removing the stand module

Installing the Stand Module

Install the Stand Module according to the following procedures and Figure 4-5.

1. Place hinge in the correct position and securing the hinge with four M4x12 black flat head screws.

2. Place stand module the correct position and securing the stand module with four M4x6 black round head screws.

3. If there is sub woofer speaker in Stand Module, connect the sub woofer speaker cable.

4.6 Back Cover

Removing Back Cover

Remove the Back Cover according to the following procedures and Figure 4-6.

1. Remove seven M3x5 black flat head screws on the back cover.

2. Release the following 19 latches on the keyboard cover, in that order:
   - Five latches on right side and five latches on left sides.
   - Four bottom latches.
   - Five front latches.

3. Remove the back cover.

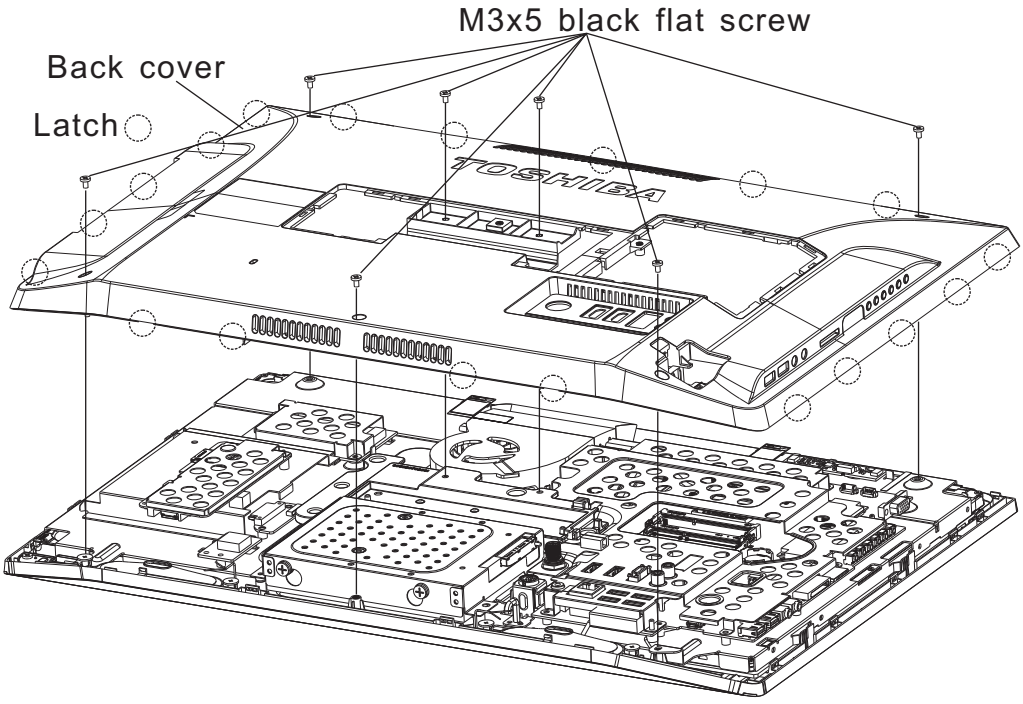


Figure 4-6 Removing the back cover

Installing the Back Cover

Install the back cover according to the following procedures and Figure 4-6.

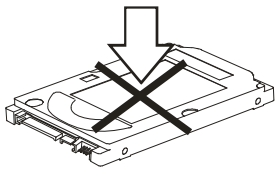
1. Place the back cover in the correct position and secure the following 19 latches, in that order:
   - Five latches on right side and five latches on left side.
   - Four bottom latches.
   - Five front latches.

2. Secure the back cover with seven M3x5 black flat head screws.

4.7 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.



Remove the HDD (hard disk drive) according to the following procedures and Figures 4-7, 4-8.

1. Remove the four M3x5 black flat head screws securing the HDD pack.

2. Remove the HDD pack by pulling the pack and disconnect the HDD cable on HDD pack.

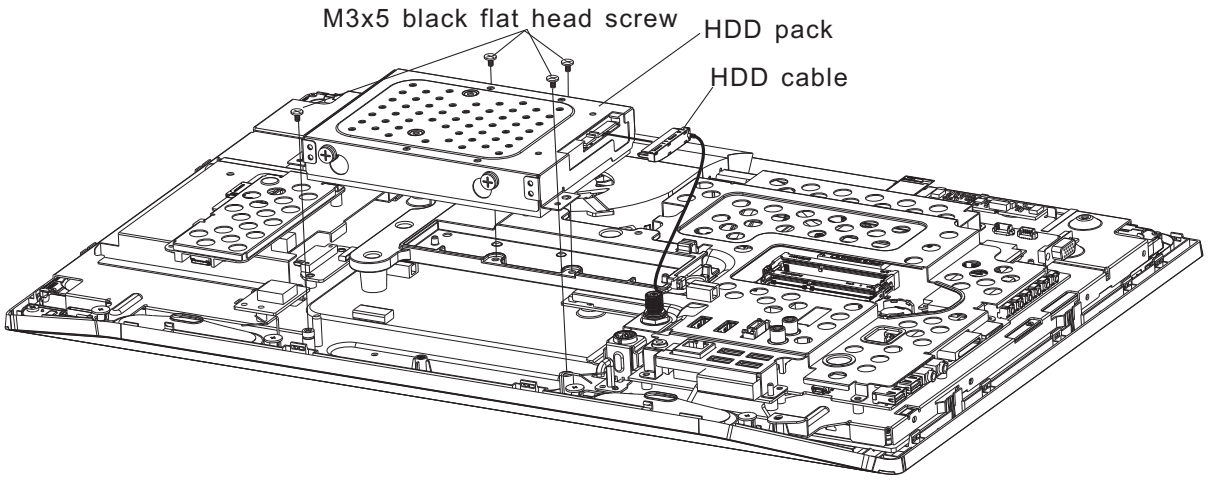


Figure 4-7 Removing the HDD pack

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), and remove the four HDD securing screws and four rubber cushions.

4. Place the HDD pack on a flat surface (such as a desk), and remove the chassis.

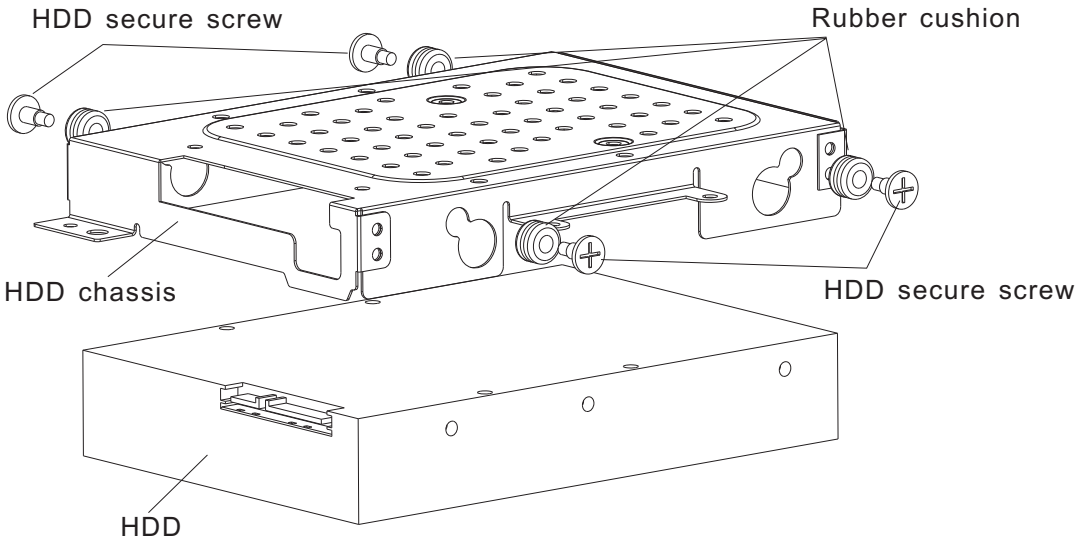


Figure 4-8 Removing the HDD chassis

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

Installing the HDD

Install the HDD according to the following procedures and Figures 4-7, 4-8.

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

1. Attach the HDD chassis.
2. Secure the HDD and its chassis with the four HDD securing screws and four rubber cushions.

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

3. Connect the HDD cable on the HDD. Install the HDD pack into the correct position in the computer.
4. Secure the HDD pack with four M3x5 black flat head screws.

4.8 Converter Board

Removing the Converter Board

Remove the converter board according to the following procedures and Figures 4-9.

1. Pull out the Aluminum foil from the converter FFC.

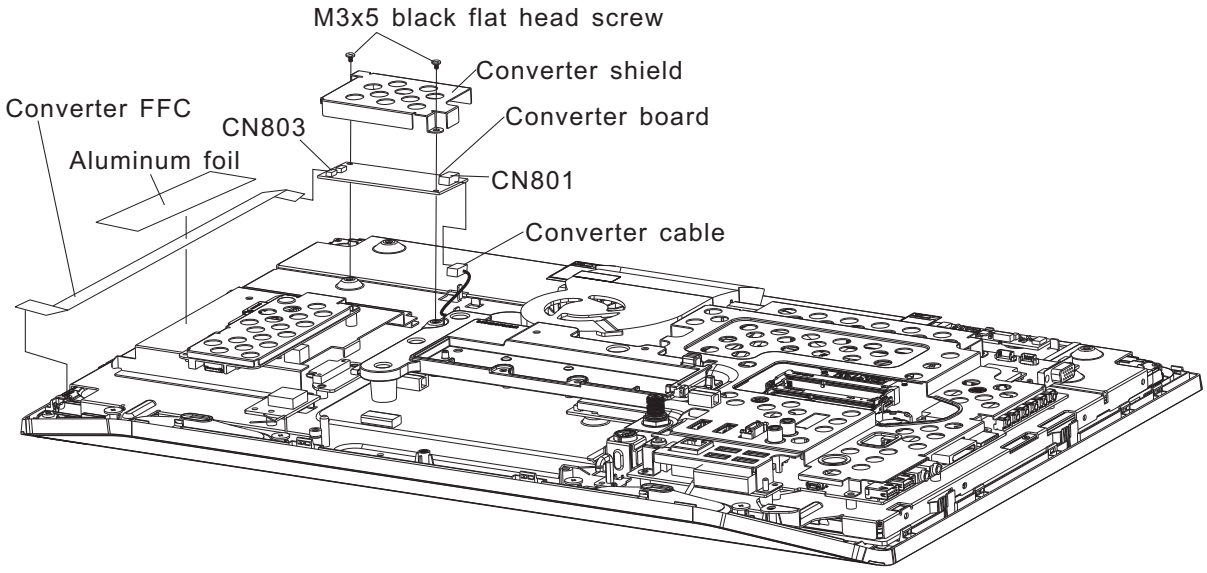


Figure 4-9 Removing the converter board

2. Disconnect the converter FFC from CN803 on the converter board and LCD module.
3. Remove two M3x5 black flat head screws on the converter shield.
4. Lift up the converter shield.
5. Lift up the converter board and disconnect the converter cable from CN801.

Installing the Converter Board

Install the converter board according to the following procedures and Figures 4-9.

1. Connect the converter cable to CN801 on the converter board.
2. Seat the converter board and converter shield, adjusting its position.
3. Secure the converter board and converter shield with two M3x5 black flat head screws.
4. Connect the converter FFC to CN803 on the converter board and LCD module.
5. Stick the Aluminum foil on the converter FFC and fix it in correct position.

4.9 HW TV card and RF Splitter card (JPN Model Only)

Removing the HW TV card and RF Splitter card

Remove the HW TV card and RF Splitter card according to the following procedures and Figures 4-10.

1. Remove two M3x5 black flat head screws securing the HW TV card shield and HW TV card.
2. Lift up the HW TV card shield and HW TV card.
3. Disconnect the TV card cable and HW TV tuner cable on the HW TV card.
4. Remove two M3x5 black flat head screws securing RF splitter card.
5. Lift up the RF splitter card and disconnect the TV tuner cable and TV cable from the RF splitter card.

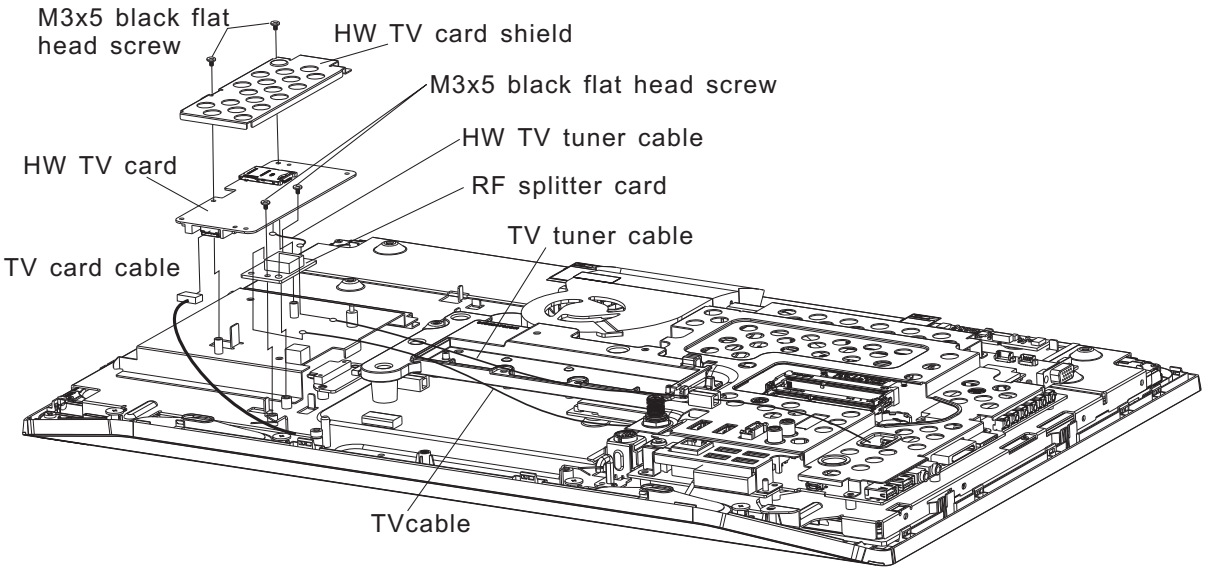


Figure 4-10 Removing the HW TV card and RF splitter card

Installing the HW TV card and RF Splitter card

Install the HW TV card and RF Splitter card according to the following procedures and Figures 4-10.

1. Connect the TV tuner cable and TV cable on the RF splitter.
2. Place the RF splitter card in the correct position.
3. Secure the RF splitter card with two M3x5 black flat head screws.
4. Connect the TV card cable and HW TV tuner cable on the HW TV card.
5. Place the HW TV card in the correct position.
6. Secure the HW TV card with two M3x5 black flat head screws.

4.10 CCD Module

Removing the CCD Module

Remove the CCD module according to the following procedures and Figure 4-11.

1. Release two M3x3 black flat head screws securing the CCD module.
2. Remove the CCD shield from the CCD module.
3. Disconnect CCD cable from CN19 on the system board and CCD module.
4. Remove the CCD bracket on the CCD module.

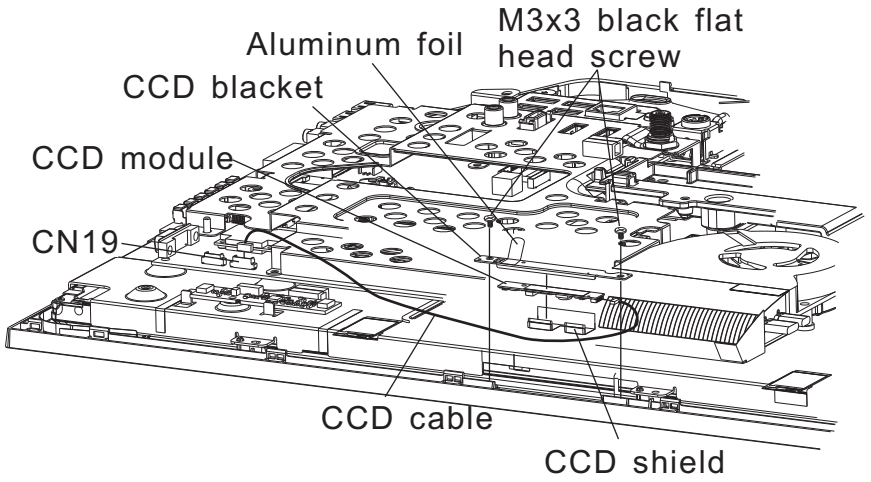


Figure 4-11 Removing the CCD module

Installing the CCD Module

Install the CCD Module according to the following procedures and figure 4-11.

1. Assembly the CCD module and CCD bracket.
2. Connect the CCD cable on the CCD module.
3. Assembly the CCD shield on the CCD module.
4. Seat the CCD module in the correct position.
5. Connect CCD cable to CN19 on the system board.
6. Securing the CCD module with two M3x5 black flat head screws.

4.11 ODD board

Removing the ODD board

Remove the ODD board according to the following procedures and Figure 4-12.

1. Release two M3x5 black flat head screw securing the ODD board.
2. Disconnect ODD cable from CN8021 on the ODD board.
3. Remove the ODD board.

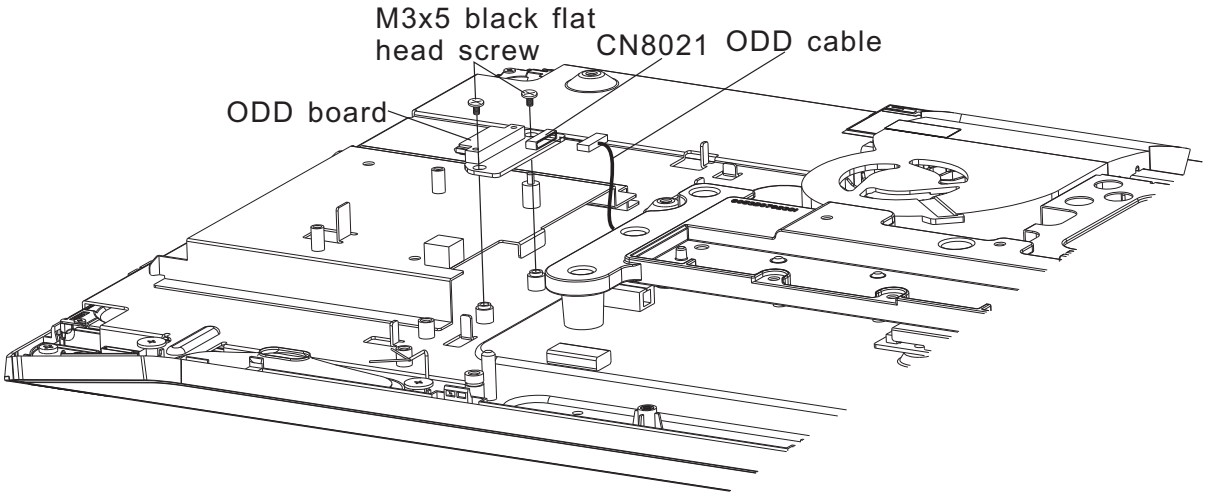


Figure 4-12 Removing the ODD board

Installing the ODD Board

Install the ODD board according to the following procedures and figure 4-12.

1. Connect the ODD cable to CN 8021 on the ODD board.
2. Seat the ODD board in the correct position and securing the ODD board with two M3x5 black flat head screws.

4.12 Touch Screen Board

Removing the Touch Screen Board

Remove the touch screen board according to the following procedures and Figure 4-13.

1. Release one M3x5 black flat head screw securing the touch screen board.
2. Disconnect touch screen cable from CN20 on the system board.
3. Disconnect sensor FFC from CAM1 and CAM2 on the touch screen board.
4. Remove the touch screen board.

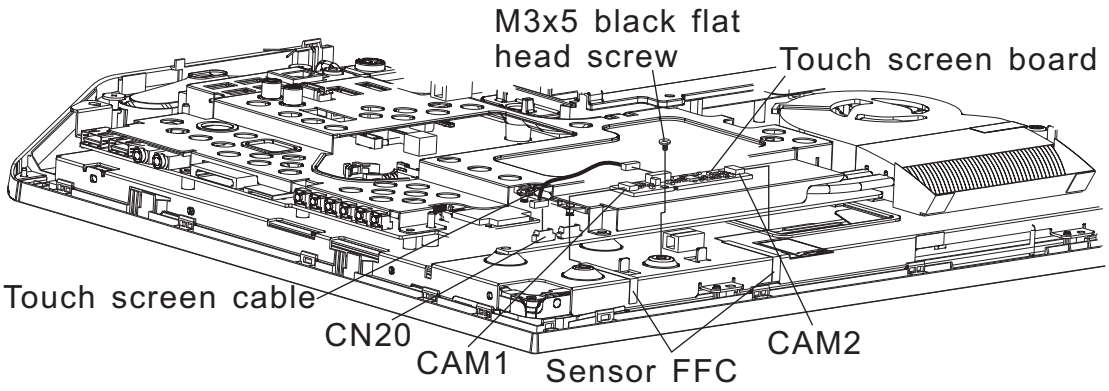


Figure 4-13 Removing the Touch screen board

Installing the Touch Screen Board

Install the touch screen board according to the following procedures and figure 4-13.

1. Connect the sensor cable to CAM1 and CAM2 on the touch screen board.
2. Connect the touch screen cable to CN20 on the system board.
3. Seat the touch screen board in the correct position and securing one M3x5 black flat head screw.

4.13 Fan

Remove the Fan

Remove the Fan according to the following procedures and Figures 4-14.

1. Remove the fan cable from CN9 on system board.
2. Release three M3x5 black flat head screws securing the fan.
3. Remove the fan.

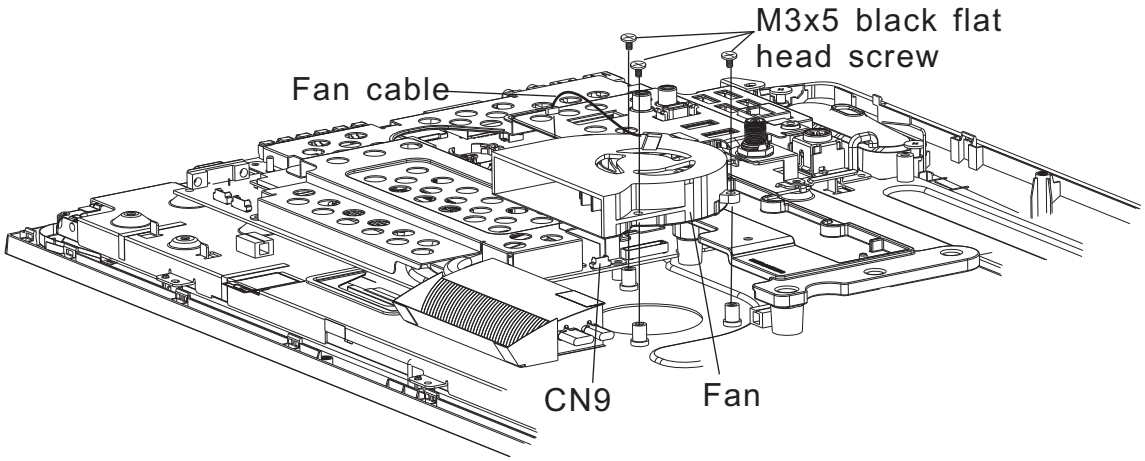


Figure 4-14 Removing the fan

Installing the Fan

Install the fan according to the following procedures and Figures 4-14.

1. Install the fan into the correct position on the system board.
2. Securing fan with three M3x5 black flat head screws.
3. Connect the fan cable to CN9 on the system board.

Appendices

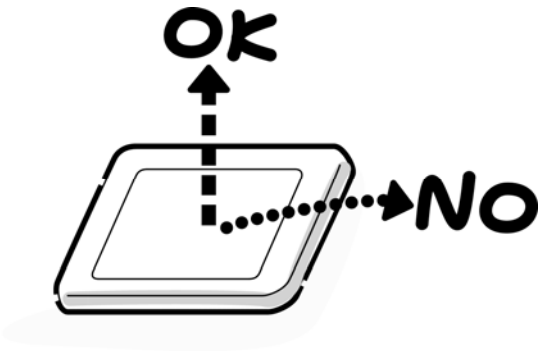
Appendix Contents

Appendix A Handling the LCD Module

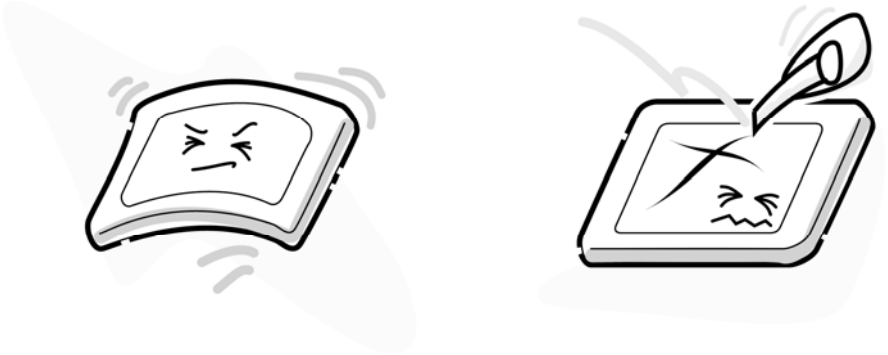
Precautions for handling the LCD module

The LCD module can be easily damaged during assembly or disassembly. Observe the following precautions when handling the LCD module:

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



2. Be careful to align the four holes at the right side and left side of the LCD module with the corresponding holes in the LCD cover before securing the module with four screws. Do not force the module into place, because stress can affect its performance. Also, the panel's polarized surface is easily scarred, so be carefully when handling it.

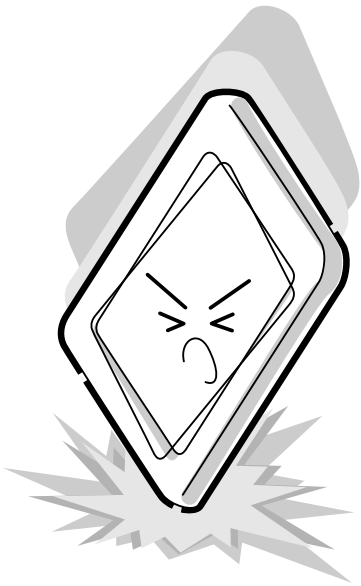


3. If the panel's surface gets dirty, wipe it with cotton or a soft cloth. If it is still dirty, try breathing on the surface to create a light condensate and wipe it again.

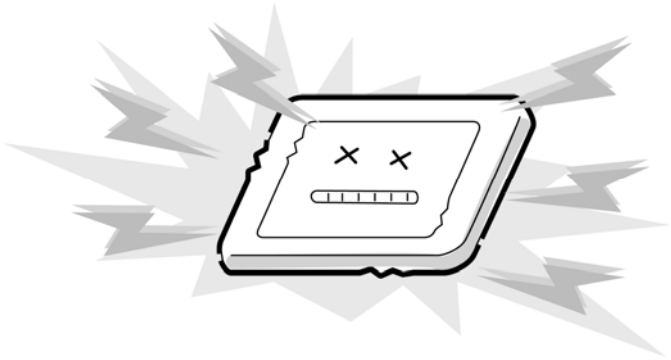
   If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel. Also, never scratch the surface.

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

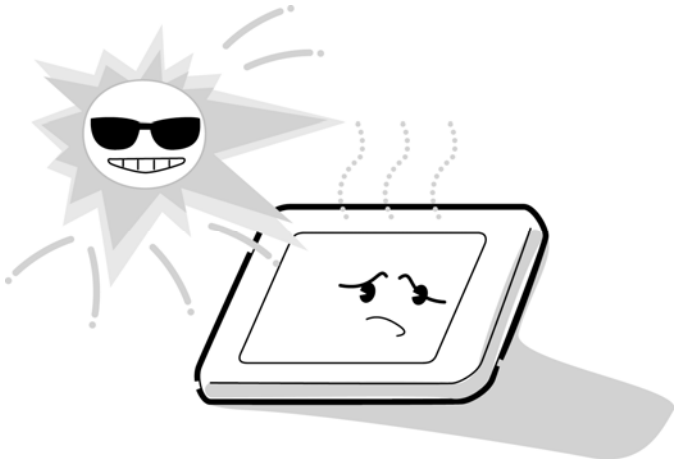
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



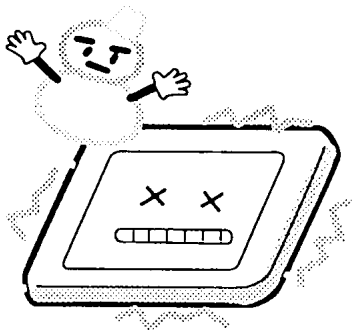
6. CMOS-LSI circuits are used in the module, so guard against damage from electrostatic discharge. Be sure to wear a wrist or ankle ground when handling the module.

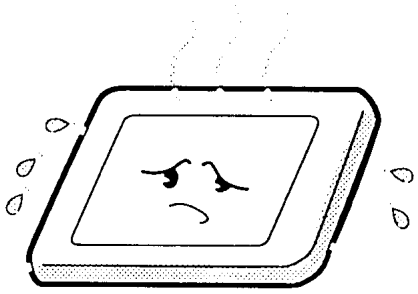


7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.

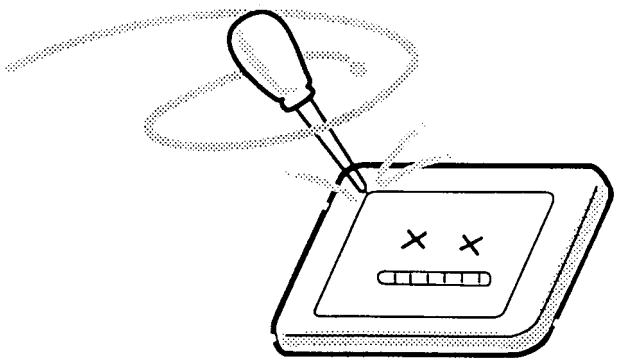


8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.

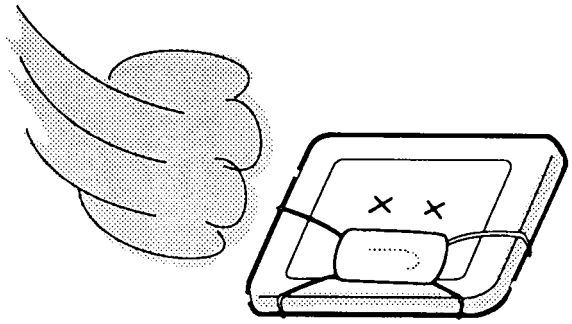




9. Do not disassemble the LCD module. Disassembly can cause malfunctions.



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



11. For the module with touch screen function, please be careful about the retro type around the LCD bezel. If the retro is broken or dirty, the function of touch screen will be effect.

Appendix B Board Layout

B.1 System Board Front View

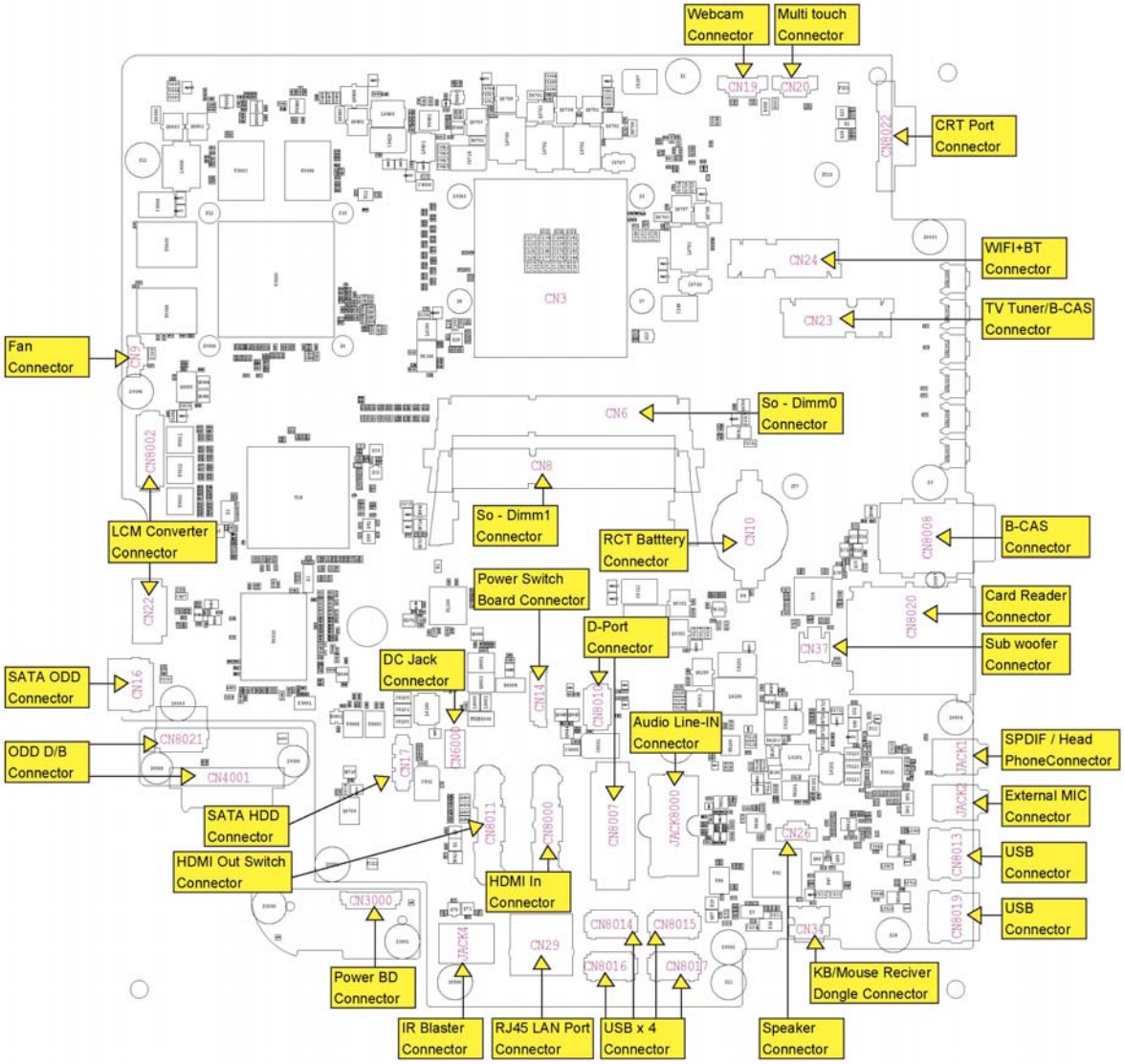


Figure B-1 Board Layout (Front)

Appendix C Keyboard Scan/Character Codes

USB HID to PS/2 Scan Codes Translation Table (1/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
System Power	01	81	E0 5E	E0 DE	E0 37	E0 F0 37
System Sleep	01	82	E0 5F	E0 DF	E0 3F	E0 F0 3F
System Wake	01	83	E0 63	E0 E3	E0 5E	E0 F0 5E
No Event	07	00	None	None	None	None
Overrun Error	07	01	FF	None	00	None
POST Fail	07	02	FC	None	FC	None
ErrorUndefined	07	03	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
a A	07	04	1E	9E	1C	F0 1C
b B	07	05	30	B0	32	F0 32
c C	07	06	2E	AE	21	F0 21
d D	07	07	20	A0	23	F0 23
e E	07	08	12	92	24	F0 24
f F	07	09	21	A1	2B	F0 2B
g G	07	0A	22	A2	34	F0 34
h H	07	0B	23	A3	33	F0 33
i I	07	0C	17	97	43	F0 43
j J	07	0D	24	A4	3B	F0 3B
k K	07	0E	25	A5	42	F0 42
l L	07	0F	26	A6	4B	F0 4B
m M	07	10	32	B2	3A	F0 3A
n N	07	11	31	B1	31	F0 31
o O	07	12	18	98	44	F0 44
p P	07	13	19	99	4D	F0 4D
q Q	07	14	10	90	15	F0 15
r R	07	15	13	93	2D	F0 2D
s S	07	16	1F	9F	1B	F0 1B
t T	07	17	14	94	2C	F0 2C
u U	07	18	16	96	3C	F0 3C
v V	07	19	2F	AF	2A	F0 2A
w W	07	1A	11	91	1D	F0 1D
x X	07	1B	2D	AD	22	F0 22
y Y	07	1C	15	95	35	F0 35
z Z	07	1D	2C	AC	1A	F0 1A

USB HID to PS/2 Scan Codes Translation Table (2/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
1 !	07	1E	02	82	16	F0 16
2 @	07	1F	03	83	1E	F0 1E
3 #	07	20	04	84	26	F0 26
4 $	07	21	05	85	25	F0 25
5 %	07	22	06	86	2E	F0 2E
6 ^	07	23	07	87	36	F0 36
7 &	07	24	08	88	3D	F0 3D
8 *	07	25	09	89	3E	F0 3E
9 (	07	26	0A	8A	46	F0 46
0)	07	27	0B	8B	45	F0 45
Return	07	28	1C	9C	5A	F0 5A
Escape	07	29	01	81	76	F0 76
Backspace	07	2A	0E	8E	66	F0 66
Tab	07	2B	0F	8F	0D	F0 0D
Space	07	2C	39	B9	29	F0 29
- _	07	2D	0C	8C	4E	F0 4E
= +	07	2E	0D	8D	55	F0 55
[{	07	2F	1A	9A	54	F0 54
] }	07	30	1B	9B	5B	F0 5B
\ |	07	31	2B	AB	5D	F0 5D
Europe 1 (Note 2)	07	32	2B	AB	5D	F0 5D
; :	07	33	27	A7	4C	F0 4C
' "	07	34	28	A8	52	F0 52
` ~	07	35	29	A9	0E	F0 0E
, <	07	36	33	B3	41	F0 41
. >	07	37	34	B4	49	F0 49
/ ?	07	38	35	B5	4A	F0 4A
Caps Lock	07	39	3A	BA	58	F0 58
F1	07	3A	3B	BB	05	F0 05
F2	07	3B	3C	BC	06	F0 06
F3	07	3C	3D	BD	04	F0 04
F4	07	3D	3E	BE	0C	F0 0C
F5	07	3E	3F	BF	03	F0 03
F6	07	3F	40	C0	0B	F0 0B
F7	07	40	41	C1	83	F0 83

USB HID to PS/2 Scan Codes Translation Table (3/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
F8	07	41	42	C2	0A	F0 0A
F9	07	42	43	C3	01	F0 01
F10	07	43	44	C4	09	F0 09
F11	07	44	57	D7	78	F0 78
F12	07	45	58	D8	07	F0 07
Print Screen(Note 1)	07	46	E0 37	E0 B7	E0 7C	E0 F0 7C
Scroll Lock	07	47	46	C6	7E	F0 7E
Break(Ctrl-Pause)	07	48	E0 46 E0 C6	None	E0 7E E0 F0 7E	None
Pause	07	48	E1 1D 45 E1 9D C5	None	E1 14 77 E1 F0 14 F0 77	None
Insert (Note 1)	07	49	E0 52	E0 D2	E0 70	E0 F0 70
Home (Note 1)	07	4A	E0 47	E0 C7	E0 6C	E0 F0 6C
Page Up (Note 1)	07	4B	E0 49	E0 C9	E0 7D	E0 F0 7D
Delete (Note 1)	07	4C	E0 53	E0 D3	E0 71	E0 F0 71
End (Note 1)	07	4D	E0 4F	E0 CF	E0 69	E0 F0 69
Page Down(Note 1)	07	4E	E0 51	E0 D1	E0 7A	E0 F0 7A
Right Arrow(Note 1)	07	4F	E0 4D	E0 CD	E0 74	E0 F0 74
Left Arrow(Note 1)	07	50	E0 4B	E0 CB	E0 6B	E0 F0 6B
Down Arrow(Note 1)	07	51	E0 50	E0 D0	E0 72	E0 F0 72
Up Arrow(Note 1)	07	52	E0 48	E0 C8	E0 75	E0 F0 75
Num Lock	07	53	45	C5	77	F0 77
Keypad /(Note 1)	07	54	E0 35	E0 B5	E0 4A	E0 F0 4A
Keypad *	07	55	37	B7	7C	F0 7C
Keypad -	07	56	4A	CA	7B	F0 7B
Keypad +	07	57	4E	CE	79	F0 79
Keypad Enter	07	58	E0 1C	E0 9C	E0 5A	E0 F0 5A
Keypad 1 End	07	59	4F	CF	69	F0 69
Keypad 2 Down	07	5A	50	D0	72	F0 72
Keypad 3 PageDn	07	5B	51	D1	7A	F0 7A
Keypad 4 Left	07	5C	4B	CB	6B	F0 6B
Keypad 5	07	5D	4C	CC	73	F0 73
Keypad 6 Right	07	5E	4D	CD	74	F0 74
Keypad 7 Home	07	5F	47	C7	6C	F0 6C
Keypad 8 Up	07	60	48	C8	75	F0 75

USB HID to PS/2 Scan Codes Translation Table (4/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
Keypad 9 PageUp	07	61	49	C9	7D	F0 7D
Keypad 0 Insert	07	62	52	D2	70	F0 70
Keypad . Delete	07	63	53	D3	71	F0 71
Europe 2 (Note 2)	07	64	56	D6	61	F0 61
App	07	65	E0 5D	E0 DD	E0 2F	E0 F0 2F
Keyboard Power	07	66	E0 5E	E0 DE	E0 37	E0 F0 37
Keypad =	07	67	59	D9	0F	F0 0F
F13	07	68	64	E4	08	F0 08
F14	07	69	65	E5	10	F0 10
F15	07	6A	66	E6	18	F0 18
F16	07	6B	67	E7	20	F0 20
F17	07	6C	68	E8	28	F0 28
F18	07	6D	69	E9	30	F0 30
F19	07	6E	6A	EA	38	F0 38
F20	07	6F	6B	EB	40	F0 40
F21	07	70	6C	EC	48	F0 48
F22	07	71	6D	ED	50	F0 50
F23	07	72	6E	EE	57	F0 57
F24	07	73	76	F6	5F	F0 5F
Keyboard Execute	07	74	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Help	07	75	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Menu	07	76	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Select	07	77	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Stop	07	78	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Again	07	79	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Undo	07	7A	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Cut	07	7B	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Copy	07	7C	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Paste	07	7D	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Find	07	7E	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Mute	07	7F	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Volume Up	07	80	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Volume Dn	07	81	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Locking Caps Lock	07	82	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED

USB HID to PS/2 Scan Codes Translation Table (5/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
Keyboard Locking Num Lock	07	83	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Locking Scroll Lock	07	84	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keypad , (Brazilian Keypad .)	07	85	7E	FE	6D	F0 6D
Keyboard Equal Sign	07	86	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Int'l 1 ろ (Ro)	07	87	73	F3	51	F0 51
Keyboard Intl'2 かたかな ひらかな ロ―マ字 (Katakana/Hiragana)	07	88	70	F0	13	F0 13
Keyboard Int'l 2 ¥ (Yen)	07	89	7D	FD	6A	F0 6A
Keyboard Int'l 4 前候補 変換(次候補) 全候補 (Henkan)	07	8A	79	F9	64	F0 64
Keyboard Int'l 5 無変換 (Muhenkan)	07	8B	7B	FB	67	F0 67
Keyboard Int'l 6 (PC9800 Keypad ,)	07	8C	5C	DC	27	F0 27
Keyboard Int'l 7	07	8D	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Int'l 8	07	8E	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Int'l 9	07	8F	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Lang 1 한/영 (Hanguel/English)	07	90	F2	None	F2	None
Keyboard Lang 2 한자 (Hanja)	07	91	F1	None	F1	None
Keyboard Lang 3 かたかな (Katakana)	07	92	78	F8	63	None

USB HID to PS/2 Scan Codes Translation Table (6/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
Keyboard Lang 4 ひらかな (Hiragana)	07	93	77	F7	62	None
Keyboard Lang 5 半角/全角 (Zenkaku/Hankaku)	07	94	76	F6	5F	None
Keyboard Lang 6	07	95	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Lang 7	07	96	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Lang 8	07	97	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Lang 9	07	98	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Alternate Erase	07	99	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard SysReq/Attention	07	9A	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Cancel	07	9B	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Clear	07	9C	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Prior	07	9D	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Return	07	9E	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Separator	07	9F	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Out	07	A0	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Oper	07	A1	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard Clear/Again	07	A2	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard CrSel/Props	07	A3	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Keyboard ExSel	07	A4	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
RESERVED	07	A5-DF	RESERVED	RESERVED	RESERVED	RESERVED
Left Control	07	E0	1D	9D	14	F0 14
Left Shift	07	E1	2A	AA	12	F0 12
Left Alt	07	E2	38	B8	11	F0 11
Left GUI	07	E3	E0 5B	E0 DB	E0 1F	E0 F0 1F
Right Control	07	E4	E0 1D	E0 9D	E0 14	E0 F0 14
Right Shift	07	E5	36	B6	59	F0 59
Right Alt	07	E6	E0 38	E0 B8	E0 11	E0 F0 11
Right GUI	07	E7	E0 5C	E0 DC	E0 27	E0 F0 27
RESERVED	07	E8-FFFF	RESERVED	RESERVED	RESERVED	RESERVED
Scan Next Track	0C	00B5	E0 19	E0 99	E0 4D	E0 F0 4D

USB HID to PS/2 Scan Codes Translation Table (7/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
Scan Previous Track	0C	00B6	E0 10	E0 90	E0 15	E0 F0 15
Stop	0C	00B7	E0 24	E0 A4	E0 3B	E0 F0 3B
Play/ Pause	0C	00CD	E0 22	E0 A2	E0 34	E0 F0 34
Mute	0C	00E2	E0 20	E0 A0	E0 23	E0 F0 23
Bass Boost	0C	00E5	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Loudness	0C	00E7	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Volume Up	0C	00E9	E0 30	E0 B0	E0 32	E0 F0 32
Volume Down	0C	00EA	E0 2E	E0 AE	E0 21	E0 F0 21
Bass Up	0C	0152	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Bass Down	0C	0153	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Treble Up	0C	0154	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Treble Down	0C	0155	UNASSIGNED	UNASSIGNED	UNASSIGNED	UNASSIGNED
Media Select	0C	0183	E0 6D	E0 ED	E0 50	E0 F0 50
Mail	0C	018A	E0 6C	E0 EC	E0 48	E0 F0 48
Calculator	0C	0192	E0 21	E0 A1	E0 2B	E0 F0 2B
My Computer	0C	0194	E0 6B	E0 EB	E0 40	E0 F0 40
WWW Search	0C	0221	E0 65	E0 E5	E0 10	E0 F0 10
WWW Home	0C	0223	E0 32	E0 B2	E0 3A	E0 F0 3A
WWW Back	0C	0224	E0 6A	E0 EA	E0 38	E0 F0 38
WWW Forward	0C	0225	E0 69	E0 E9	E0 30	E0 F0 30
WWW Stop	0C	0226	E0 68	E0 E8	E0 28	E0 F0 28
WWW Refresh	0C	0227	E0 67	E0 E7	E0 20	E0 F0 20
WWW Favorites	0C	022A	E0 66	E0 E6	E0 18	E0 F0 18
DO NOT USE	DO NOT USE	DO NOT USE	00	80	DO NOT USE	DO NOT USE
DO NOT USE	DO NOT USE	DO NOT USE	60	E0	47	F0 47
DO NOT USE	DO NOT USE	DO NOT USE	61	E1	4F	F0 4F
DO NOT USE	DO NOT USE	DO NOT USE	7A	FA	65	F0 65
DO NOT USE	DO NOT USE	DO NOT USE	7C	FC	68	F0 68
DO NOT USE	DO NOT USE	DO NOT USE	7F	FF	6E	F0 6E
DO NOT USE	DO NOT USE	DO NOT USE	E0 60	E0 E0	E0 47	E0 F0 47
DO NOT USE	DO NOT USE	DO NOT USE	E0 61	E0 E1	E0 4F	E0 F0 4F
DO NOT USE	DO NOT USE	DO NOT USE	E0 7A	E0 FA	E0 65	E0 F0 65
DO NOT USE	DO NOT USE	DO NOT USE	E0 7B	E0 FB	E0 67	E0 F0 67
DO NOT USE	DO NOT USE	DO NOT USE	E0 7C	E0 FC	E0 68	E0 F0 68
DO NOT USE	DO NOT USE	DO NOT USE	E0 7D	E0 FD	E0 6A	E0 F0 6A

USB HID to PS/2 Scan Codes Translation Table (8/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
DO NOT USE	DO NOT USE	DO NOT USE	E0 7E	E0 FE	E0 6D	E0 F0 6D
DO NOT USE	DO NOT USE	DO NOT USE	E0 7F	E0 FF	E0 6E	E0 F0 6E
UNASSIGNED	UNASSIGNED	UNASSIGNED	54	D4	7F	F0 7F
UNASSIGNED	UNASSIGNED	UNASSIGNED	54	D4	84	F0 84
UNASSIGNED	UNASSIGNED	UNASSIGNED	55	D5	60	F0 60
UNASSIGNED	UNASSIGNED	UNASSIGNED	5A	DA	17	F0 17
UNASSIGNED	UNASSIGNED	UNASSIGNED	5B	DB	1F	F0 1F
UNASSIGNED	UNASSIGNED	UNASSIGNED	62	E2	56	F0 56
UNASSIGNED	UNASSIGNED	UNASSIGNED	63	E3	5E	F0 5E
UNASSIGNED	UNASSIGNED	UNASSIGNED	64	E4	08	F0 08
UNASSIGNED	UNASSIGNED	UNASSIGNED	65	E5	10	F0 10
UNASSIGNED	UNASSIGNED	UNASSIGNED	66	E6	18	F0 18
UNASSIGNED	UNASSIGNED	UNASSIGNED	67	E7	20	F0 20
UNASSIGNED	UNASSIGNED	UNASSIGNED	68	E8	28	F0 28
UNASSIGNED	UNASSIGNED	UNASSIGNED	69	E9	30	F0 30
UNASSIGNED	UNASSIGNED	UNASSIGNED	6A	EA	38	F0 38
UNASSIGNED	UNASSIGNED	UNASSIGNED	6B	EB	40	F0 40
UNASSIGNED	UNASSIGNED	UNASSIGNED	6C	EC	48	F0 48
UNASSIGNED	UNASSIGNED	UNASSIGNED	6D	ED	50	F0 50
UNASSIGNED	UNASSIGNED	UNASSIGNED	6E	EE	57	F0 57
UNASSIGNED	UNASSIGNED	UNASSIGNED	6F	EF	6F	F0 6F
UNASSIGNED	UNASSIGNED	UNASSIGNED	71	F1	19	F0 19
UNASSIGNED	UNASSIGNED	UNASSIGNED	72	F2	39	F0 39
UNASSIGNED	UNASSIGNED	UNASSIGNED	74	F4	53	F0 53
UNASSIGNED	UNASSIGNED	UNASSIGNED	75	F5	5C	F0 5C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 01	E0 81	E0 76	E0 F0 76
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 02	E0 82	E0 16	E0 F0 16
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 03	E0 83	E0 1E	E0 F0 1E
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 04	E0 84	E0 26	E0 F0 26
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 05	E0 85	E0 25	E0 F0 25
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 06	E0 86	E0 2E	E0 F0 2E
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 07	E0 87	E0 36	E0 F0 36
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 08	E0 88	E0 3D	E0 F0 3D
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 09	E0 89	E0 3E	E0 F0 3E
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0A	E0 0A	E0 46	E0 F0 46

USB HID to PS/2 Scan Codes Translation Table (9/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0B	E0 0B	E0 45	E0 F0 45
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0C	E0 0C	E0 4E	E0 F0 4E
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0D	E0 0D	E0 55	E0 F0 55
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0E	E0 0E	E0 66	E0 F0 66
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 0F	E0 0F	E0 0D	E0 F0 0D
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 11	E0 91	E0 1D	E0 F0 1D
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 12	E0 92	E0 24	E0 F0 24
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 13	E0 93	E0 2D	E0 F0 2D
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 14	E0 94	E0 2C	E0 F0 2C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 15	E0 95	E0 35	E0 F0 35
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 16	E0 96	E0 3C	E0 F0 3C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 17	E0 97	E0 43	E0 F0 43
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 18	E0 98	E0 44	E0 F0 44
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 1A	E0 9A	E0 54	E0 F0 54
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 1B	E0 9B	E0 5B	E0 F0 5B
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 1E	E0 9E	E0 1C	E0 F0 1C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 1F	E0 9F	E0 1B	E0 F0 1B
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 23	E0 A3	E0 33	E0 F0 33
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 25	E0 A5	E0 42	E0 F0 42
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 26	E0 A6	E0 4B	E0 F0 4B
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 27	E0 A7	E0 4C	E0 F0 4C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 28	E0 A8	E0 52	E0 F0 52
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 29	E0 A9	E0 0E	E0 F0 0E
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 2A	E0 AA	E0 12	E0 F0 12
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 2B	E0 AB	E0 5D	E0 F0 5D
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 2C	E0 AC	E0 1A	E0 F0 1A
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 2D	E0 AD	E0 22	E0 F0 22
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 2F	E0 AF	E0 2A	E0 F0 2A
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 31	E0 B1	E0 31	E0 F0 31
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 33	E0 B3	E0 41	E0 F0 41
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 34	E0 B4	E0 49	E0 F0 49
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 36	E0 B6	E0 59	E0 F0 59
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 39	E0 B9	E0 29	E0 F0 29
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3A	E0 BA	E0 58	E0 F0 58
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3B	E0 BB	E0 05	E0 F0 05
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3C	E0 BC	E0 06	E0 F0 06

USB HID to PS/2 Scan Codes Translation Table (10/10)

Key Name	HID Usage Page	HID Usage ID	PS/2 Set 1		PS/2 Set 2	
			Make	Break	Make	Break
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3D	E0 BD	E0 04	E0 F0 04
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3E	E0 BE	E0 0C	E0 F0 0C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 3F	E0 BF	E0 03	E0 F0 03
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 40	E0 C0	E0 0B	E0 F0 0B
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 41	E0 C1	E0 02	E0 F0 02
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 42	E0 C2	E0 83	E0 F0 83
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 43	E0 C3	E0 0A	E0 F0 0A
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 44	E0 C4	E0 01	E0 F0 01
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 45	E0 C5	E0 09	E0 F0 09
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 4A	E0 CA	E0 7B	E0 F0 7B
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 4C	E0 CC	E0 73	E0 F0 73
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 4E	E0 CE	E0 79	E0 F0 79
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 54	E0 D4	E0 7F	E0 F0 7F
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 54	E0 D4	E0 84	E0 F0 84
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 55	E0 D5	E0 60	E0 F0 60
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 56	E0 D6	E0 61	E0 F0 61
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 57	E0 D7	E0 78	E0 F0 78
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 58	E0 D8	E0 07	E0 F0 07
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 59	E0 D9	E0 0F	E0 F0 0F
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 5A	E0 DA	E0 17	E0 F0 17
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 62	E0 E2	E0 56	E0 F0 56
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 64	E0 E4	E0 08	E0 F0 08
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 6E	E0 EE	E0 57	E0 F0 57
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 6F	E0 EF	E0 6F	E0 F0 6F
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 70	E0 F0	E0 13	E0 F0 13
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 71	E0 F1	E0 19	E0 F0 19
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 72	E0 F2	E0 39	E0 F0 39
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 73	E0 F3	E0 51	E0 F0 51
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 74	E0 F4	E0 53	E0 F0 53
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 75	E0 F5	E0 5C	E0 F0 5C
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 76	E0 F6	E0 5F	E0 F0 5F
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 77	E0 F7	E0 62	E0 F0 62
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 78	E0 F8	E0 63	E0 F0 63
UNASSIGNED	UNASSIGNED	UNASSIGNED	E0 79	E0 F9	E0 64	E0 F0 64

Note 1	In PS/2 mode, Scan Set 1, these keys have special codes prepended or appended depending upon the state of one or more modifier keys. These codes are documented in WHQLKEYS.DOC, available from Microsoft.
Note 2	These keys have various legends depending upon the locale for which the keyboard is manufactured. Europe 1 is typically in AT-101 Key Position 42 next to the Enter key. Europe 2 is typically in AT-101 Key Position 45, between the Left Shift and Z keys
	Under all Microsoft operating systems, all PS/2 keyboards actually transmit Scan Code Set 2 values down the wire from the keyboard to the keyboard port. These values are translated to Scan Code Set 1 by the i8042 port chip. The rest of operating systems, and all applications that handle scan codes export the values to be form Scan Code Set 1.

Appendix D Key Layout

D.1 Japanese (JP) Keyboard

Figure D-1 Japanese keyboard

D.2 American (USA) Keyboard

Figure D-2 American keyboard