Toshiba Personal Computer

Satellite L20 Series

Maintenance Manual

TOSHIBA CORPORATION

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Toshiba Personal Computer Satellite L20 Series Maintenance Manual

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Disclaimer

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Preface

This maintenance manual describes how to perform hardware service maintenance for the Toshiba Personal Computer Satellite L20 Series.

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

SAFETY PRECAUTIONS

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

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

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

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

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

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

- Be sure to fasten screws securely with the right screwdriver. If a screw is not fully fastened, it could come loose, creating a danger of a short circuit, which could cause overheating, smoke or fire.
- If you replace the battery pack or RTC battery, be sure to use only the same model battery or an equivalent battery recommended by Toshiba. Installation of the wrong battery can cause the battery to explode.

The manual is divided into the following parts:

Chapter 1 Hardware Overview describes the Satellite L20 system unit and each FRU.

Chapter 2 Troubleshooting Procedures explains how to diagnose and resolve FRU problems.

Chapter 3 Test and Diagnostics describes how to perform test and diagnostic operations for maintenance service.

Chapter 4 Replacement Procedures describes the removal and replacement of the FRUs.

Appendices The appendices describe the following:

- Handling the LCD Module
- Board layout
- Pin assignments
- Keyboard scan/character codes
- Key layout
- Wiring diagrams
- BIOS Rewrite Procedures
- EC/KBC Rewrite Procedures
- Reliability

Conventions

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

Acronyms

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

Read Only Memory (ROM)

Keys

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

Key operation

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

User input

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

DISKCOPY A: B:

The display

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

```
Format complete
System transferred
```

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Chapter 2 Troubleshooting Procedures

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Chapter 1

Hardware Overview

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1.1 Features

The Satellite L20 (ATI Platform) series are 2 spindle PCs running a Intel ® Celeron®-M processor.

The features are listed below.

θ Microprocessor

Microprocessor that is used will be different of the model.

it supports Celeron-M as follows

Intel ® Celeron ®-M	350 (1.30GHz)
	360 (1.40GHz)
	370 (1.50GHz)
	380 (1.60GHz)

L1 cache : 64KB (32KB + 32KB)
L2 cache : 1MB

Front side Bus : 400MHz

θ Memory

Two DDRII 533 SO-DIMM slots. Memory modules can be installed to provide a maximum of 2GB. Memory modules are available in 256MB, 512MB and 1GB sizes.

For ATI RC410MB/SB400 Platform , DDRII 533 Module ran at DDRII 400.

θ VRAM

Shared with System RAM.

θ HDD

40GB, 60GB , 80GB and 100GB internal drives. 2.5 inch x 9.5mm height.

θ USB FDD (Option)

USB FDD supports 720KB and 1.44MB.

- Display

  LCD

  Built-in 15.0-inch, XGA (1024 x 768 dots), 262,144 colors, amorphous silicon TFT color display.

  CRT

  Supported via a RGB connector.

  TV-out

  S-VIDEO OUT port supported.

- Keyboard

  An-easy-to-use 84(US)/85(Euro)-key keyboard provides a numeric keypad overlay for fast numeric data entry . The keyboard also includes two keys that have special functions in Microsoft® Windows® XP. It supports software that uses a 101- or 102-key enhanced keyboard.

- PC card slot

  The PC card slot (PCMCIA) accommodates one 5mm Type II card. The slot support 16-bit PC cards and Card Bus PC cards. CardBus supports 32-bit PC cards.

- Optical devices

  A DVD-ROM & CD-R/RW drive or DVD Super Multi drive is equipped.

- Battery

  The RTC battery is equipped inside the computer.
  The main battery is a detachable lithium ion battery (4,300mAh:Li-Ion, 8cell).

- USB (Universal Serial Bus)

  Three USB ports are provided. The ports comply with the USB2.0 standard, which enables data transfer speeds 40 times faster than USB1.1 standard. USB1.1 is also supported.

- Sound system

  An internal stereo speaker, external monaural microphone connector, stereo headphone connector is also equipped.

- Wireless LAN (Mini PCI slot) (BTO)

  The wireless LAN is equipped on the mini PCI slot.

- LAN/MODEM

  Connectors for LAN and Modem are separately mounted.

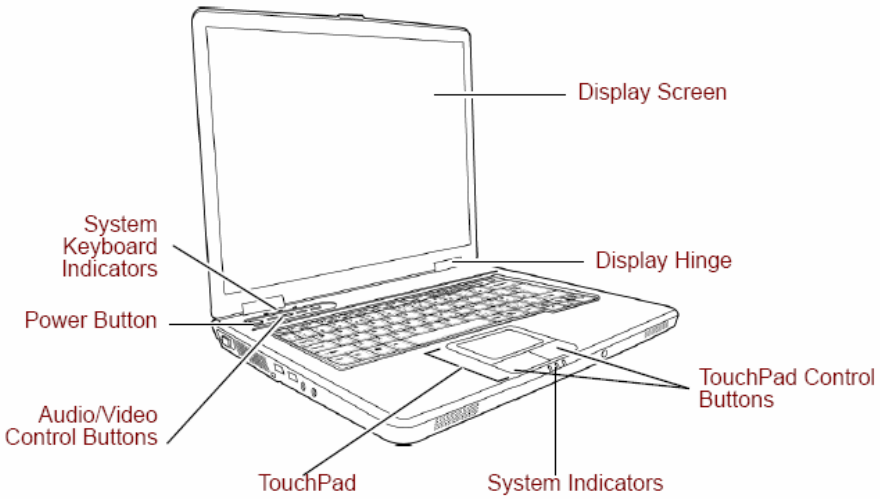


Figure 1-1 (ATI Platform))Front of the computer and the system units configuration

1.2 System Block Diagram

Figure 1-2 a/b shows the system block diagram.

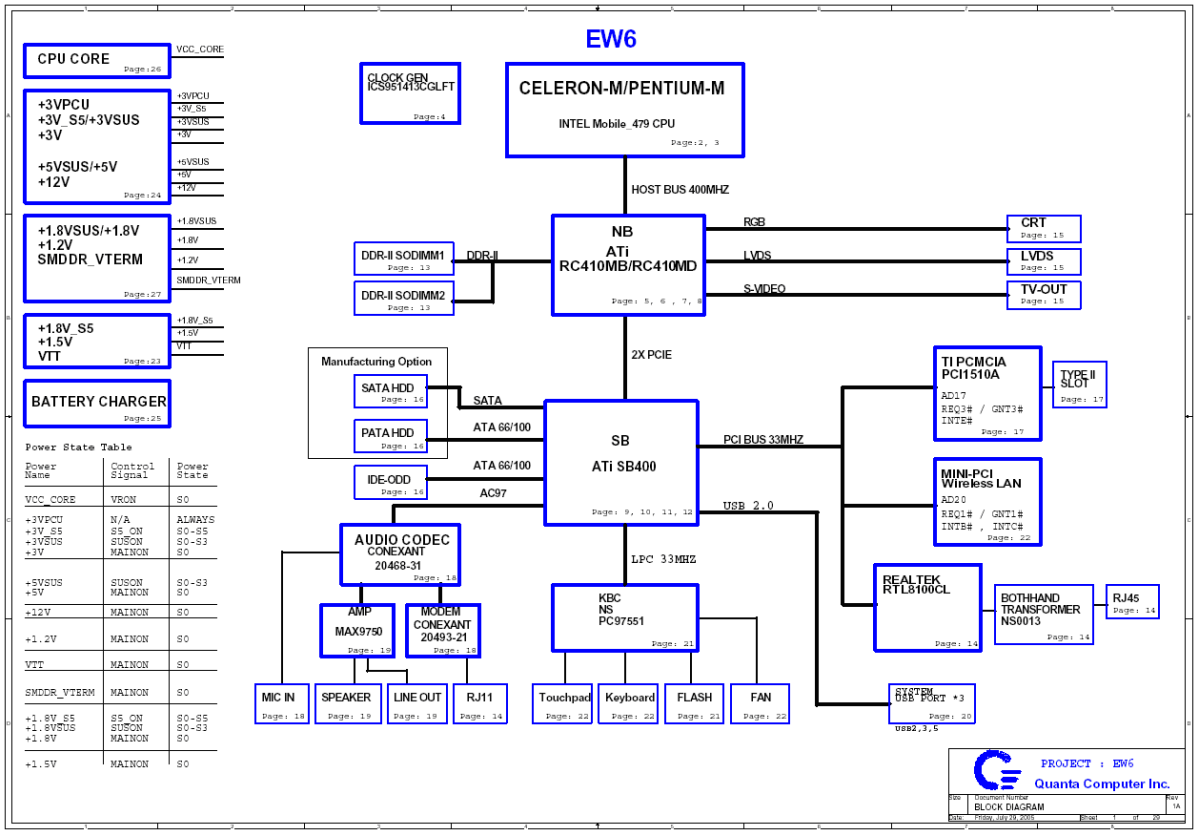


Figure 1-2 System block diagram for ATI 410MB Platform

The PC contains the following components.

θ CPU

θ it supports Celeron-M CPU as follows

Intel ® Celeron ®-M 350 (1.30GHz)
360 (1.40GHz)
370 (1.50GHz)
380 (1.6GHz)

L1 cache : 64KB (32KB + 32KB)
L2 cache : 1MB

FSB : 400MHz Core voltage : 1.26V

θ Memory

Two memory slots capable of accepting DDRII-SDRAM 256MB, 512MB or 1GB memory modules for a maximum of 2GB.

- 200-pin SO-DIMM
- 1.8V operation
- PC4200 support

θ BIOS ROM (Flash memory)

- 4Mbit (512K×8-bit chip)

θ Chipset

This gate array has the following elements and functions.

- North Bridge ATI RC410MB for Celeron-M Platform
  - Celeron-M processor System Bus support
  - DRAM Controller : DDRII 400/533 support
  - A-Link Express Interface
  - 707-ball 31mmx31mm FC-BGA Package

- South Bridge
  - ATI SB400 for Celeron-M Platform
    - PCI slot
    - IDE controller
    - SATA controller
    - DMA controller
    - USB host interface
    - USB 2.0 host controller
    - Interrupt controller
    - SM Bus interface
    - ACPI Power management
    - Low Pin count (LPC) interface
    - Real time clock
    - AC'97 Rev. 2.3 interface
    - 564-pin 31mmx31mm BGA Package

θ PC card controller (PCI1510, Texas Instrument-made)

- PCI Interface (PCI Rev. 2.3)
- PC Card Controller

θ VGA controller

- Intel VGA
  - VRAM 32MB/64MB
  - LVDS
- Or ATI
  - VRAM 32MB/64MB/128MB
  - LVDS

θ Other main system chips

- Clock Generator (ICS made ICS) for ATI Platform
- EC/KBC (NS97551 x 1)
- AC97-CODEC (Conexant 20468-51 x1)
- Audio AMP (Maxim 9750x1)
-

θ Mini PCI

Wireless LAN card (BTO)

2.4GHz DSSS/OFDM LAN card is equipped. Conformity with IEEE 802.11b/g . Transfer speed is maximum of 54Mbit/sec. Supports 128bit WEP.

θ LAN (Realtek RT8100CL x 1)

Controls LAN.
Supports 100Base-TX and 10Base-T.

θ MODEM (Conexant 20493-21x 1)

Supported by on board Modem + DAA daughter card.
Data and FAX transmission is available.
Supports ITU-TV.90.
The transfer speed of data receiving is 56kbps, of data sending is 33.6kbps and of FAX is 14.4kbps. Actual speed depends on the quality of the line used.
Connected to telephone line through RJ11 MODEM jack.

1.3 2.5-inch Hard Disk Drive

A compact, high-capacity HDD with a height of 9.5mm. Contains a 2.5-inch magnetic disk and magnetic heads.

Figure 1-3 shows a view of the 2.5-inch HDD and Tables 1-1 and 1-2 list the specifications.

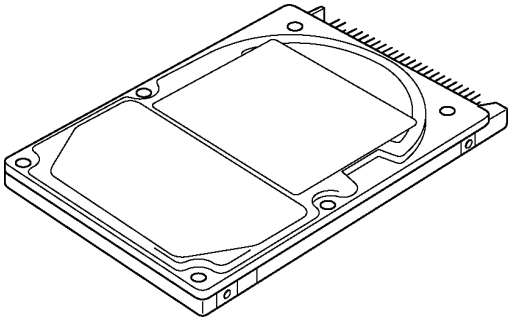


Figure 1-3 2.5-inch HDD

Table 1-1 2.5-inch HDD dimensions

Toshiba 40G 4200rpm PLUTO MK4025GAS

Parameter		Standard value			
		Fujitsu MHV2100AT	**Fujitsu MHV2080AT**	**Fujitsu MHV2060AT**	**Fujitsu MHV2040AT**
Outline dimensions	Width (mm)	70.0			
	Height (mm)	9.5			
	Depth (mm)	100.0			
	Weight (g)	100(max.)			96(max)

Parameter		Standard value			
		Fujitsu MHV2100AH	**Fujitsu MHV2080AH**	**Fujitsu MHV2060AH**	
Outline dimensions	Width (mm)	70			
	Height (mm)	9.5			
	Depth (mm)	100.0			
	Weight (g)	101			

Parameter	Standard value

		Toshiba MK1031GAS	**Toshiba MK8025GAS**	**Toshiba MK6025GAS**	**Toshiba MK4025GAS**
Outline dimensions	Width (mm)	69.85			
	Height (mm)	9.5			
	Depth (mm)	100.0			
	Weight (g)	99 (max.)			95(max)

Parameter		**Standard value**			
		Toshiba MK1032GAX	**Toshiba MK8026GAX**	**Toshiba MK6026GAX**	**Toshiba MK4026GAX**
Outline dimensions	Width (mm)	70.0			
	Height (mm)	9.5			
	Depth (mm)	100.0			
	Weight (g)	101 (max.)			96(max)

Table 1-2 2.5-inch HDD Specifications

Parameter	Specification			
	Fujitsu MHV2100AT	**Fujitsu MHV2080AT**	**Fujitsu MHV2060AT**	**Fujitsu MHV2040AT**
Storage size (formatted)	100GB	80GB	60GB	40GB
Speed (RPM)	4,200			
Data transfer speed (Mbits/s)	350			
Interface transfer rate (MB/s)	100 (Ultra DMA Mode)			
Average random seek time (read) (ms)	12(typ.)			
Average random seek time (write) (ms)	-			
Power-on-to-ready (sec)	3.5 (typ.)			

Parameter	Specification			
	Fujitsu MHV2100AH	**Fujitsu MHV2080AH**	**Fujitsu MHV2060AH**	
Storage size (formatted)	100GB	80GB	60GB	
Speed (RPM)	5,400			
Data transfer speed (Mbits/s)	475			
Interface transfer rate (MB/s)	100 (Ultra DMA Mode)			
Average random seek time (read) (ms)	12			
Average random seek time (write) (ms)	-			
Power-on-to-ready (sec)	4			

Parameter	Specification			
	Toshiba MK1031GAS	**Toshiba MK8025GAS**	**Toshiba MK6025GAS**	**Toshiba MK4025GAS**
Storage size (formatted)	100GB	80GB	60GB	40GB
Speed (RPM)	4,200			
Data transfer speed (Mbits/s)	170-373	175-342	202-308	175-342
Interface transfer rate (MB/s)	100 (Ultra DMA Mode)			
Average random seek time (read) (ms)	12			
Average random seek time (write) (ms)	-			
Power-on-to-ready (sec)	4 (typical)/10 sec (Max)			

Parameter	Specification			
	Toshiba MK1032GAX	**Toshiba MK8026GAX**	**Toshiba MK6026GAX**	**Toshiba MK4026GAX**
Storage size (formatted)	100GB	80GB	60GB	40GB
Speed (RPM)	5,400			
Data transfer speed (Mbits/s)	235-445	233-446	258-394	233-446
Interface transfer rate (MB/s)	100 (Ultra DMA Mode)			
Average random seek time (read) (ms)	12			
Average random seek time (write) (ms)	-			
Power-on-to-ready (sec)	4 (typical)/10 sec (Max)			

1.4 Optical Drive

1.4.1 DVD-ROM & CD-R/RW Drive

The DVD-ROM & CD-R/RW drive accommodates either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVD-ROM and CD-R/RW. It is a high-performance drive that reads DVD at maximum 8-speed and CD at maximum 24-speed.

The DVD-ROM & CD-R/RW drive is shown in Figure 1-4. The dimensions and specifications of the DVD-ROM & CD-R/RW drive are described in Table 1-3, Table 1-4.

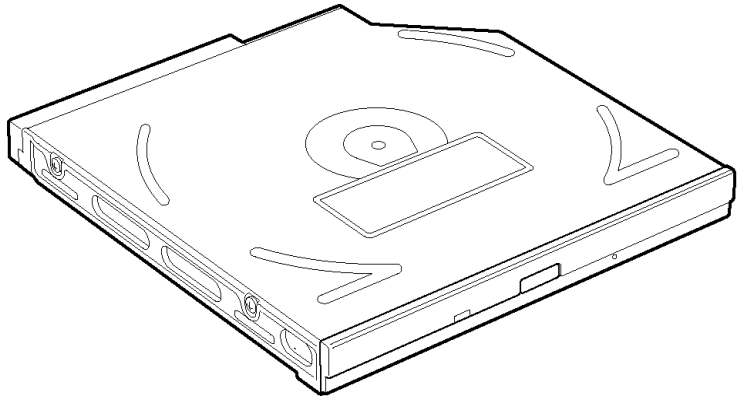


Figure 1-4 DVD-ROM & CD-R/RW drive

Table 1-3 DVD-ROM & CD-R/RW drive outline dimensions

Parameter		Standard value		
Outline dimensions	Maker	**MATSUSHITA (UJDA770TT-A)**	**HLDS (GCC-4244N.ATAKN0)**	**TSST (TS-L462C/TOHJ.I,)**
	Width (mm)	128		
	Height (mm)	12.7 (excluding projections)		
	Depth (mm)	129	127	127
	Mass (g)	180±10g	160±10g	180g

Table 1-4 DVD-ROM & CD-R/RW drive specifications (1/3)

Parameter		Drive Specification
		MATSUSHITA (UJDA770TT-A)
Data transfer speed	Read (KB/s)	DVD-ROM MAX 8X CAV (MAX 10800 kB/s) CD-ROM MAX 24X CAV (MAX 3600 kB/s)
	Write	CD-R 4X , 8X (CLV), 16XZCLV, MAX. 24X(CAV) CD-RW 4X (CLV) High Speed CD-RW 4X, 8x, 10X (CLV) Ultra Speed CD-RW 8x,10X(CLV), MAX. 24X (CAV)
	ATAPI interface (MB/s)	16.6 MB/s :PIO mode4 16.6 MB/s :Multi word mode2 33.3 MB/s :Ultra DMA mode2
Access time (ms) (Random)	CD-ROM	130ms
	DVD-ROM	180ms
Buffer memory		2MB
Supported disk format	CD	CD-DA, CD-ROM, CD-R, CD-RW CD-ROM XA , Disc. PhotoCD(Muilti Session) Video CD,CD-Extra(CD+),CD-text
	DVD	DVD-ROM, DVD-Video DVD-RAM(2.6GB/4.7GB) DVD-R, DVD-RW (Ver. 1.1) (Supporting Multi Border) DVD+R, DVD+RW (Supporting Multi Session)

Table 1-4 DVD-ROM & CD-R/RW drive specifications (2/3)

Parameter		Drive Specification
		HLDS (GCC-4244N.ATAKN0)
Data transfer speed	Read (KB/s)	**DVD-ROM** Single Layer3.3x -8x (CAV):Approx. 4,710 r/min Dual Layer3.3x -8x (CAV): Approx. 5,180 r/min **DVD-Video** 1.7x -4x (CAV): Approx. 2,600r/min **DVD-R** 3.95GB1.7x -4x (CAV): Approx. 2,600 r/min 4.7GB1.7x -4x (CAV): Approx. 2,360 r/min **DVD-RW** 4.7GB 1.7x -4x (CAV): Approx. 2,360 r/min **DVD-RAM** 2.6GB2x (ZCLV): Approx. 2,120 -4,700 r/min 4.7GB2x (ZCLV): Approx. 1,400 -3,230 r/min **DVD+R** Single Layer1.7x -4x (CAV): Approx. 2,360 r/min Double Layer1.7x -4x (CAV): Approx. 2,360 r/min **DVD+RW** 1.7x -4x (CAV): Approx. 2,360 r/min **CD-ROM** 10.3x -24x (CAV): Approx. 4,860 -5,670 r/min **CD-R** 10.3x -24x (CAV): Approx. 4,860 -5,200 r/min- **CD-RW** 10.3x -24x (CAV): Approx. 4,860 -5,200 r/min
	Write	**CD-R** 4xCLV, 10xCLV, 10-16xPCAV, 24xMAX.CAV **CD-RW** Normal Disc4xCLV High speed Disc4x, 10xCLV Ultra speed Disc10xCLV, 10-16xPCAV, 24xMAX.CAV **Rotational Speed (CD-R/RW)4xCLV:** Approx. 800 -2,020 r/min10xCLV: Approx. 2,000-5,050 r/min24xMAX.CAV: Approx. 4,860 -5,200 r/min
	ATAPI interface (MB/s)	33.3 Mbytes/s max. (Ultra DMA Mode 2) 16.6 Mbytes/s max. (DMA MW Mode 2) 16.6 Mbytes/s max. (PIO Mode 4)

Access time (ms) (Random)	CD-ROM	110ms (typ.)
	DVD-ROM	120ms (typ.)
Buffer memory		2MB
Supported disk format	CD	CD-ROM Mode1&2S CD-ROM XA Modo2 (Form1&2) CD-DA, CD-I, CD-Extra/CD-Plus, Video-CD
	DVD	DVD-ROM DVD Video DVD-R (General, Authoring) DVD-RW (Single/Multi-boarder, Packet) DVD-RAM DVD+R/RW

Table 1-4 DVD-ROM & CD-R/RW drive specifications (3/3)

Parameter		Drive Specification
		TSST (TS-L462C/TOHJ,I.)
Data transfer speed	Read (KB/s)	**CD-ROM** Max. 24X (3,600 KB/sec) CAV 24X **CD-RW** Max. 24X (3,600 KB/sec) CAV 24X **DVD-Single** Max 8X (10,800 KB/sec) **DVD-Dual** Max 6 (10,800 KB/sec)
	Write	**CD-R** Max. 24X (3,600 KB/sec) P-CAV 24X/20X/16X CLV 0X/8X/4X **CD-RW** Max. 4X (600 KB/sec) CLV 4X **HS CD-RW** Max. 10X (1,500 KB/sec) CLV 10X **US CD-RW** Max. 24X (3,600 KB/sec) P-CAV 24X/16X
	ATAPI interface (MB/s)	PIO Mode4 Max 16.6 MB/sec DMA Multiword Mode2 Max 16.6 MB/sec ULTRA DMA Mode2 Max 33.2 MB/sec
Access time (ms) (Random)	CD-ROM	130ms (typ.)
	DVD-ROM	150ms (typ.)
Buffer memory		2MB
Supported disk format	CD	CD-DA (Red Book) - Standard Audio CD & CD-TEXT CD-ROM (Yellow Book Mode1 & 2) - Standard Data CD-ROM XA (Mode2 Form1 & 2) - Photo CD, Multi-Session CD-I (Green Book, Mode2 Form1 & 2, Ready, Bridge) CD-Extra/ CD-Plus (Blue Book) - Audio & Text/Video Video-CD (White Book) - MPEG1 Video CD-R (Orange Book Part II) CD-RW & HSRW (Orange Book Part III Volume1 & Volume2) Super Audio CD (SACD) Hybrid type US & US+ RW
	DVD	DVD-ROM (Book 1.02), DVD-Dual DVD-Video (Book 1.1) DVD-R (Book 1.0, 3.9G) DVD-R (Book 2.0, 4.7G) - General & Authoring DVD+R (Version 1.0), DVD+R DL DVD+RW DVD-RW (Non CPRM & CPRM)

1.4.2 DVD Super Multi Drive

The DVD Super Multi drive accommodates either 12 cm (4.72-inch) or 8 cm (3.15-inch) CD/DVD-ROM, CD-R/RW, DVD±R/±RW and DVD-RAM. It is a high-performance drive that reads DVD-ROM at maximum 8-speed and CD at maximum 24-speed. Write speed of DVD±R/±RW and DVD-RAM is different depending on the drive.

The DVD Super Multi drive is shown in Figure 1-5. The dimensions and specifications of the DVD Super Multi drive are described in Table 1-5, Table 1-6.

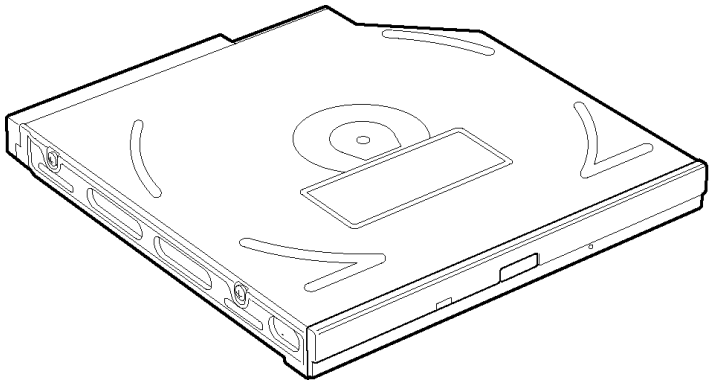


Figure 1-5 DVD Super Multi drive

Table 1-5 DVD Super Multi drive outline dimensions

Parameter		**Standard value**			
Outline dimensions	Maker	**MATSUSHITA (UJ-841BTQ-A)**	**HLDS (GSA-4082N.ATAKN0)**	**Pioneer (DVR-K16TBA)**	**TEAC (DV-W28EA)**
	Width (mm)	128			
	Height (mm)	12.7			
	Depth (mm)	129.0	127	127	129.4
	Mass (g)	190±10g	185±7g	190±10g	190±10g

Table 1-6 DVD Super Multi drive specifications (1/4)

Parameter		Drive Specification
		MATSUSHITA (UJ-841BTQ-A)
Data transfer speed	Read(KB/s)	**DVD-ROM** MAX 8X CAV (MAX 10800 kB/s) **CD-ROM** MAX 24X CAV (MAX 3600 kB/s)
	Write	**CD-R** 4X , 8X (CLV) , MAX. 12x, 16x, 24X (ZCLV) **CD-RW** 4X (CLV) **HS-RW** 4X, 8X, 10X (CLV) **US-RW** 8x, 10X (CLV) **DVD-R** 1X, 2X (CLV), MAX.4x, 6x, 8X (ZCLV) DVD-R for General **DVD-R** DL 2X (CLV) **DVD-RW** 1X, 2X (CLV), MAX.4X (ZCLV) **DVD+R** 2.4X (CLV), MAX.4x, 6x, 8X (ZCLV) **DVD+R** DL 2.4X (CLV) **DVD+RW** 2.4X (CLV), MAX.4X (ZCLV) **DVD-RAM** 2X, 3X,3X-5X (ZCLV)
	ATAPI interface (MB/s)	**PIO mode** 16.6 MB/s :PIO mode4 **DMA mode** 16.6 MB/s :Multi word mode2 **Ultra DMA mode** 33.3 MB/s :Ultra DMA mode2
Access time (ms)	CD-ROM	150 (Random)
	DVD-ROM	180 (Random)
Buffer memory		2MB
Supported disk format	CD	CD-DA,CD-ROM,CD-ROM XA PhotoCD(muiltiSession) Video CD,Cd-Extra(CD+),CD-text Hybrid SACD
	DVD	DVD-VIDEO, DVD-ROM, DVD-R(3.9GB, 4.7GB), DVD-R DL DVD-R:3.9GB Read Only DVD-RW(Ver.1.1) , DVD-RAM DVD-RAM:2.6GB:Read Only DVD+R, DVD+R DL, DVD+RW

Table 1-7 DVD Super Multi drive specifications (2/4)

Parameter		Drive Specification
		HLDS (GSA-4082N.ATAKN0)
Data transfer speed	Read(KB/s)	**DVD-R/RW/ROM** 8x/8x/8x max. **DVD-RAM** (Ver.1.0)2x (Ver.2.2)2x, 3x, 5x **DVD-Video** (CSSCompliant Disc)4x max.(Single/Dual layer) **DVD+R/+RW** 8x/8xmax. **DVD+R** DL4xmax. **CD-R/RW/ROM** 24x/24x/24x max. **CD-DA** (DAE) 20x max.
	Write	**DVD-R** 2x CLV, 4x ZCLV, 8x CAV **DVD-R** DL2x CLV **DVD-RW** 1x, 2x CLV, 4x ZCLV **DVD-RAM** 2x, 3x ZCLV, 5x PCAV(Ver.2.2) **DVD+R** 2.4x CLV, 4x ZCLV, 8x PCAV **DVD+R** DL2.4x CLV **DVD+RW** 2.4x, 3x CLV, 4xZCLV **CD-R** 10x CLV, 16x, 24x ZCLV **CD-RW** 4x, 10x CLV (High Speed: 10x) (Ultra Speed and Ultra Speed Plus: 10x)
	ATAPI interface (MB/s)	33.3 Mbytes/s max. (Ultra DMA Mode 2) 16.6 Mbytes/s max. (DMA MW Mode 2) 16.6 Mbytes/s max. (PIO Mode 4)
Access time (ms)	CD-ROM	140 (Random)
	DVD-ROM	160 (Random)
Buffer memory		2MB
Supported disk format	CD	**CD-ROM**, **CD-ROM** XA, **CD-I**, **Video CD**, **CD-Extra** and **CD-Text**, **Photo CD** (Single and Multi session), **CD-DA** **Super Audio CD** (Compatible layer in Hybrid type) **CD-R** discs conforming to “Orange Book Part 2 **CD-RW** discs conforming to “Orange Book Part 3
	DVD	**DVD-ROM**, **DVD-R**(Ver.1.0, Ver. 2.0 for Authoring) , **DVD-RAM**(Ver.1.0) **DVD-R**(Ver. 2.1 for General), **DVD-R** DL, **DVD-RW**, **DVD-RAM**(Ver.2.2),**DVD+R**(SL/DL) and **DVD+RW**

Table 1-8 DVD Super Multi drive specifications (3/4)

Parameter		Drive Specification
		Pioneer(DVR-K16TBA)
Data transfer speed	Read(KB/s)	8X CAV at DVD-ROM (Single Layer),DVD-R/ RW and +R / RW 6X CAV at DVD-ROM (DualLayer), DVD-R DL and +R DL 5X Zone CLV at DVD-RAM 24XCAV at CD-ROM andCD-R/ RW
	Write	8X Zone CLV at DVD-R / +R and +RW 6X Zone CLV at DVD-RW 5X Zone CLV at DVD-RAM 4X Zone CLV at DVD-R DL (Dual Layer) and +R DL (Double Layer) 24X Zone CLV at CD-R / RW
	ATAPI interface (MB/s)	SFF-8020,SFF-8090 Ver.5 IDE Data Transfer Mode PIO Mode 4, Multi Word DMA Mode 2, UltraDMA Mode2)
Access time (ms)	CD-ROM	130 (Random)
	DVD-ROM	150 (Random)
Buffer memory		2MB
Supported disk format	CD	KODAK Photo CD Single and Multi-session CD Extra (CD PLUS) Video CD CD text data (Read / Write) CD-R discs (Read/ Write) CD-RW discs (Read/ Write)
	DVD	DVD-ROM DVD-R Ver.2.00 for General(Read/ Write) DVD-R DL Ver.3.0 (Read/Write) DVD-RW Ver.1.0 &1.1 &1.2(Read/ Write) DVD+R Ver.1.0 & 1.11& 1.2 (Read/Write) DVD+RDL Ver1.0(Read / Write) DVD+RW Ver.1.1& 1.2 (Read/Write) DVD+RW high speed Ver.1.0 (Read/Write) DVD-RAM Ver.2.0 &2.1 (Read/ Write)

Table 1-9 DVD Super Multi drive specifications (4/4)

Parameter		Drive Specification
		TEAC (DV-W28EA)
Data transfer speed	Read(KB/s)	8X CAV at DVD-ROM (Single Layer),DVD-R/ +R 4X CAV at DVD-RW/ +RW 4X CAV at DVD+R (Dual Layer), DVD-R DL and +R DL 3X-5X Zone CLV at DVD-RAM 24XCAV at CD-ROM 20XCAV at CD-R/ RW
	Write	CD-R 10-24X (ZCLV),10X(CLV),4X(CLV) CD-RW 10X(CLV) DVD-R 2-8X (ZCLV),2X(CLV),1X (CLV) DVD-RW 2-4X (ZCLV), 2X(CLV),1X (CLV) DVD-RAM 35X (ZCLV),2.4X(CLV) DVD+R 2.4-8X (ZCLV),2.4X(CLV) DVD+R(Double layer) 2.4(CLV) DVD+RW 2.4-4X (ZCLV),2.4X (CLV)
	ATAPI interface (MB/s)	SFF-8020,SFF-8090 Ver.5 IDE Data Transfer Mode PIO Mode 4, Multi Word DMA Mode 2, UltraDMA Mode2
Access time (ms)	CD-ROM	130 (Random)
	DVD-ROM	130 (Random)
Buffer memory		2MB
Supported disk format	CD	CD-DA CD-ROM Mode 1,Mode 2 CD-ROM XA Mode2 (Form 1, Form 2) Photo CD (signal/multi-session) Enhanced CD, CD-tEXT
	DVD	DVD-ROM DVD-R (General .Authoring) DVD-RW DVD-Video DVD-RAM (4.7G,2.6GB) DVD+R,DVD+R (Double layer),DVD+RW

1.5 Keyboard

A keyboard which consists of 84(US)/85(Euro) keys is mounted on the system unit. The keyboard is connected to membrane connector on the system board and controlled by the keyboard controller.

Figure 1-6 is a view of the keyboard.

Figure 1-6 Keyboard

See Appendix E for details of the keyboard layout.

1.6 TFT Color Display

The TFT color display is 15.0 inch and consists of LCD module and FL inverter board.

1.6.1 LCD Module

The LCD module used for the TFT color display uses a backlight as the light source and can display a maximum of 262,144 colors with 1,024 x 768 resolution.

Figure 1-8 shows a view of the LCD module and Table 1-9 lists the specifications.

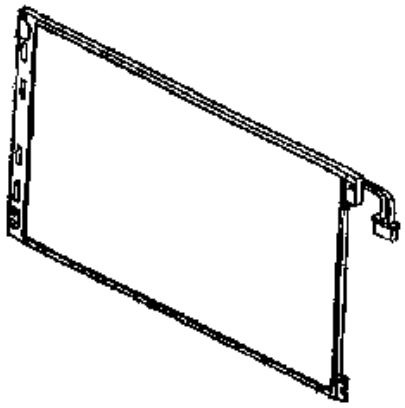


Figure 1-7 LCD module

Table 1-7 LCD module specifications

Item	Specifications				
	LG-Philips LP150X08-TLA2	**SHARP LQ150X1LHS2**	**SHARP LQ150X1-LBS2**	**AU B150XG01 V.7**	**AU B150XG01 V.8**
Number of Dots	1,024(W) × 768(H)				
Dot spacing (mm)	0.297(H)× 0.297(V)				

1.6.2 FL Inverter Board

The FL inverter board supplies a high frequency current to illuminate the LCD module FL.

Table 1-10 lists the FL inverter board specifications.

Table 1-8 FL inverter board specifications

Item		Specifications	
		PI FL9030	**SUMIDA IV002**
Input	Voltage (V)	8 ~ 20	7.5 ~ 21
	Power (W)	5	
Output	Voltage (Vrms)	1500	1500 ~ 1900
	Current (f=55KHz) (mArms)	6	

1.7 Power Supply

The power supply supplies 23 different voltages to the system board.

The power supply microcontroller has the following functions.

1. Judges if the DC power supply (AC adapter) is connected to the computer.
2. Detects DC output and circuit malfunctions.
3. Controls the battery icon, and DC IN icon.
4. Turns the battery charging system on and off and detects a fully charged battery.
5. Turns the power supply on and off.
6. Provides more accurate detection of a low battery.
7. Calculates the remaining battery capacity.
8. Controls the transmission of the status signal of the main battery.

Table 1-11 lists the power supply output specifications.

Table 1-9 Power supply output rating

Name	Power supply (Yes/No)

	Voltage [V]	Power OFF Suspend mode	Power OFF Boot mode	No Battery	Object
VCC_CORE	1.484 - 0.748	No	No	No	CPU
VTT	1.05	No	No	No	CPU, 915GM, ICH4-M
+1.8V	1.8	No	No	No	CPU, 915GM,ICH4-M
+1.5V	1.2	No	No	No	915GM,ICH4-M
+0.9V	0.9	**Yes**	No	No	DDR2-SDRAM
+1.8VSUS	1.8	**Yes**	No	No	RC410MB, DDR2-SDRAM
+1.5V_S5	1.8	**Yes**	**Yes**	No	SB400
USBPWR0	5	**Yes**	No	No	USB
USBPWR1	5	**Yes**	No	No	USB
USBPWR2	5	**Yes**	No	No	USB
AVDD	5	No	No	No	MAX9750
+3V	3.3	No	No	No	Clock Generator, Thermal Sensor, Mini-PCI, SDRAM(SPD), 915GM, SB400, FWH, LAN, LCD, PCMCIA, EC, LED, Audio Codec
+5V	5	No	No	No	Mini-PCI, HDD, ODD, TP, CRT, PCMCIA, FAN
3VSUS	3.3	**Yes**	No	No	Card Cont, Mini-PCI, MDC
5VSUS	5	**Yes**	No	No	PC-Card, USB
3V_S5	3.3	**Yes**	**Yes**	No	ICH4-M
3VPCU	3	**Yes**	**Yes**	No	EC/KBC, System LED
VCCRTC	2.0 -3.6	**Yes**	**Yes**	**Yes**	ICH4-M (RTC)
+2.5V	2.5	NO	NO	NO	915GM

1.8 Batteries

The PC has the following two batteries.

- θ Main battery
- θ Real time clock (RTC) battery

Table 1-12 lists the specifications for these two batteries.

Table 1-10 Battery specifications

Battery Name		Battery Element	Output Voltage	Capacity
Main battery	Panasonic CGR-B/8B9BE 8 Cells	Lithium ion	14.4V	4,300mAh
	Sanyo 8 cell			4200-4400mAh
	Panasonic CGR-B/438 4 cells		14.4V	2,150-2250mAh
	Sanyo 4 Cells		14.4V	1900-2000mAh
Real time clock (RTC) battery	ML1220EI2	Nickel hydrogen	3V	14mAh

1.8.1 Main Battery

The main battery is the primary power supply for the computer when the AC adapter is not connected. In Standby, the main battery maintains the current status of the computer.

1.8.2 Battery Charging Control

Battery charging is controlled by a power supply microprocessor. The power supply microprocessor controls power supply and detects a full charge when the AC adaptor and battery are connected to the computer.

θ Battery Charge

When the AC adapter is connected, normal charging is used while the system is turned on and quick charge is used while the system is turned off. Refer to the following Table 1-11.

Table 1-11 Time required for charges of main battery

Condition	Charging Time
Power On Charge	About 6 hours
Power Off Charge	About 3 hours

Charge is stopped in the following cases.

1. The main battery is fully charged
2. The main battery is removed
3. Main battery or AC adapter voltage is abnormal
4. Charging current is abnormal

θ Data preservation time

When turning off the power in being charged fully, the preservation time is as following Table 1-12.

Table 1-12 Data preservation time

Condition	preservation time
Standby	About 3 days
Hibernation	About 1 month

1.8.3 RTC Battery

The RTC battery provides the power supply to maintain the date, time, and other system information in memory.

Table 1-13 lists the Time required for charges of RTC battery and data preservation time.

Table 1-13 Time required for charges of RTC battery

Condition	Time
Power ON (Lights Power LED)	About 24 hours
Data preservation tome (Full-charged)	About a month

1.9 AC Adapter

The AC adapter is used to charge the battery.

Table 1-14 lists the AC adapter specifications.

Table 1-14 AC adapter specifications

Parameter	**Specification**	
	DELTA SADP-65KB BFG	**LITE-ON PA-1650-02QT**
Power	65W	
Input voltage	AC 100V/240V	
Input frequency	50Hz/60Hz	
Input current	≦ 1.5A	≦ 1.8A
Output voltage	DC 19V	
Output current	3.42A	

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:

1. System board
2. 2.5-inch HDD
3. Keyboard
4. Display
5. ODD drive
6. LAN
7. Speaker
8. IEEE 1394
9. Cooling module

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

The following tools are required to perform the diagnostic procedures:

1. Diagnostics (maintenance test program) disk
2. Phillips screwdrivers (2 mm, 2.5 mm)
3. Cleaning disk kit (for ODD drive cleaning)
4. Bootable CD
5. PC Card loopback connector
6. Multimeter
7. External monitor
8. Headphone
9. Microphone
10. A-BEX TEST DVD
11. Music CD
12. 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 PAD2 , then turn the computer power on. When booted, the computer overrides password protection and automatically erases the current password.
- Make sure the Windows® XP Home 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.

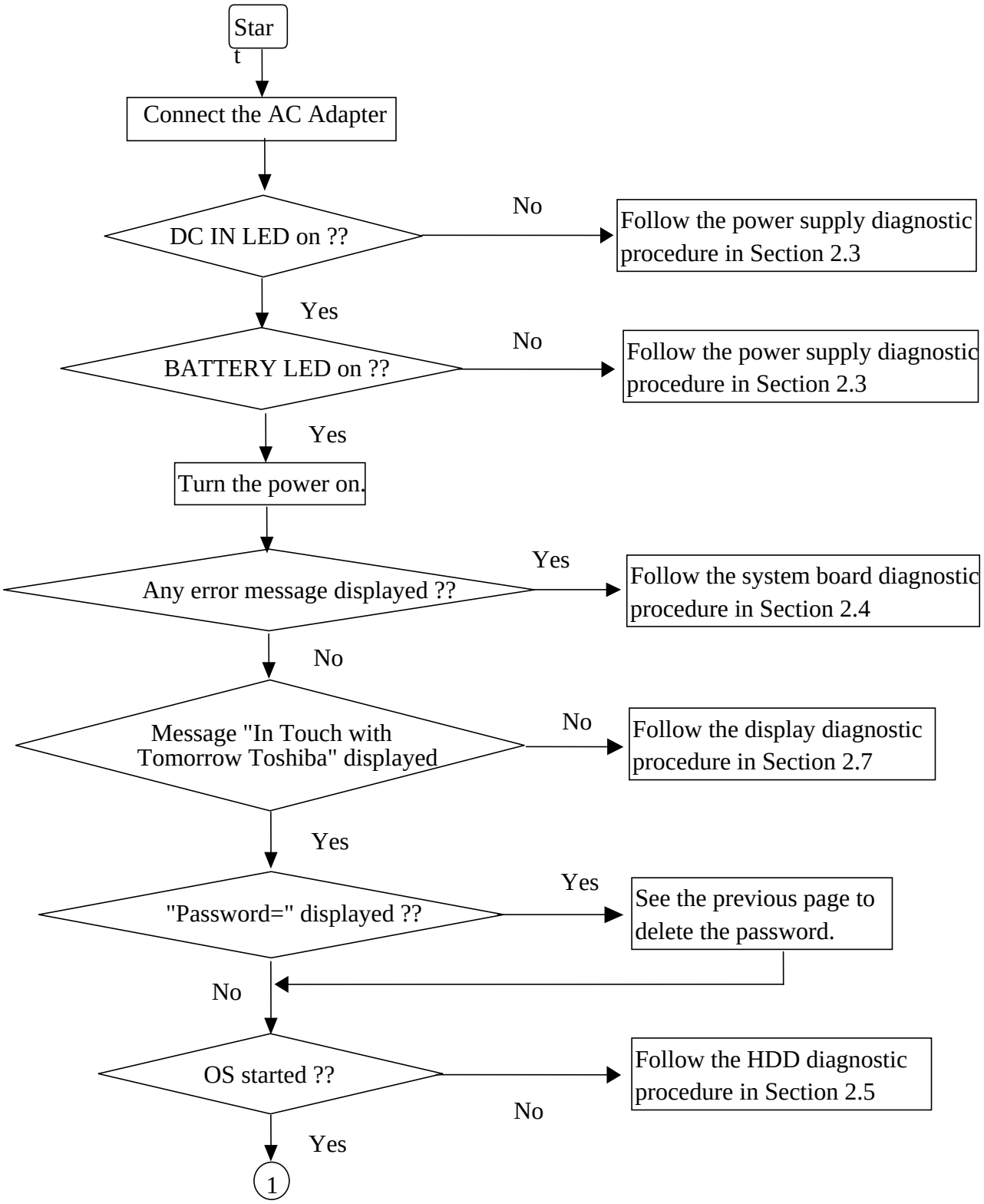


Figure 2-1 Basic flowchart(1/2)

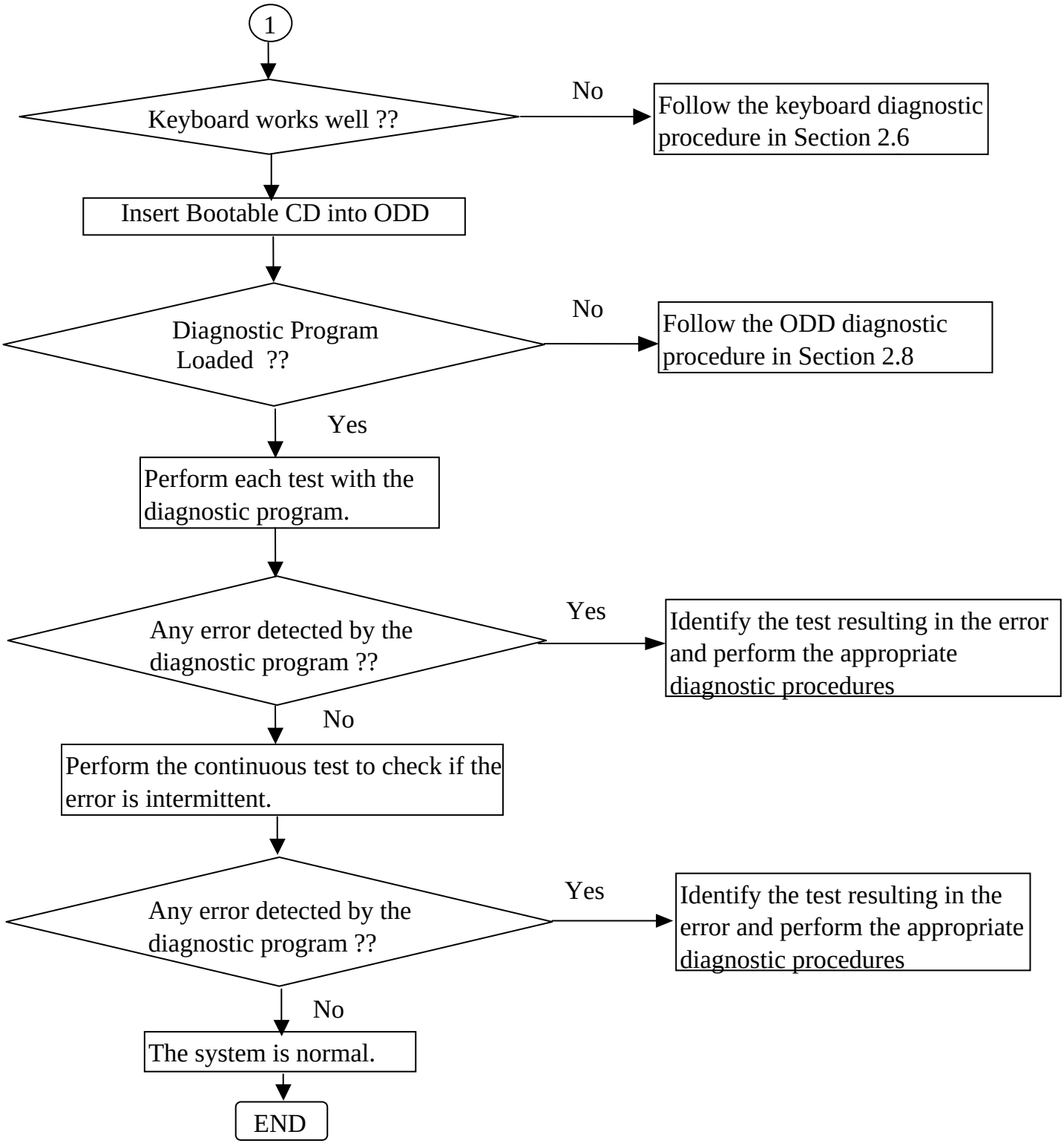


Figure 2-1 Basic flowchart (2/2)

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

1. If an error is detected by the System test, Memory test, Async test, Printer test, Sound test, or Real Timer test, follow the system board troubleshooting procedures in Section 2.4.
2. If an error is detected by the Hard Disk test, follow the HDD troubleshooting procedures in Section 2.5.
3. If an error is detected by the Keyboard test, follow the keyboard troubleshooting procedures in Section 2.6.
4. If an error is detected by the Display test, follow the display troubleshooting procedures in Section 2.7.
5. If an error is detected by the ODD test, follow the ODD troubleshooting procedures in Section 2.8.
6. If an error is detected by the LAN test, follow the LAN troubleshooting procedures in section 2.9.
7. If an error is detected by the Speaker test, follow the Speaker troubleshooting procedures in section 2.10.
8. If an error is detected by the IEEE 1394 test, follow the IEEE 1394 troubleshooting procedures in section 2.11.
9. If an error is detected by the Fan On/Off test, follow the cooling module troubleshooting procedures in Section 2.12.

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 Icon Check

Procedure 2 Connection Check

Procedure 3 Replacement Check

Procedure 1 Power Icon Check

The following two power LEDs indicate the power supply status:

- Battery LED
- DC IN LED

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

- Battery LED

Battery LED	Power supply status
On in Amber	Battery being charged
On in Blue or Green	Battery fully charged, with AC adapter connected
Blinking in Amber (at equal intervals)	Battery low *1 while driving the computer
Off	Else

- DC IN LED

DC IN LED	Power supply status
On in Blue or Green	DC power being supplied (from the AC adapter)
Off	Battery damage and can't charge during DC-in.
Off	Else

If the DC IN LED off, follow the steps below:

1. Remove the battery pack and the AC adapter to shut off power supply to the computer.
2. Attach the battery and AC adapter back again.

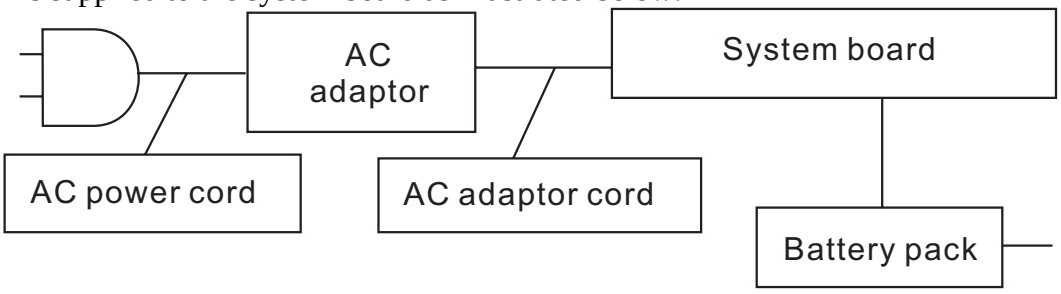
If the LED still off, follow the steps below:

Check 1 Make sure the DC IN LED goes on in Blue. If it does not, go to Procedure 2.

Check 2 Make sure the Battery LED goes on in Amber or Blue. If it does not, go to Procedure 3.

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 19V 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 DC IN LED does not go on, go to Procedure 3.
- If the battery LED does not go on, perform Check 3.

Check 3 **Make sure the battery pack has been correctly installed in the computer. If the battery LED does not go on while the battery pack has been installed correctly, go to Procedure 3.**

Procedure 3 Replacement Check

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

Check 1 **Replace the power supply board with a new one. If the battery pack is still not working properly, perform Check 2.**

Check 2 **Replace the system board with a new one. If the battery pack is still not working properly, perform Check 3.**

Check 3 **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 MS-DOS or Windows XP Home Edition 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 SETUP 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
9. LAN test

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 2.5-inch HDD

To check if the 2.5-inch 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 Connector Check and Replacement Check

> ***CAUTION:*** *The contents of the 2.5-inch HDD will be erased when the HDD 2.5-inch 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 3.**

```
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

Enter the MS-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 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 MS-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 XP Home edition 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 2.5-inch HDD is formatted using the low-level format program and the MS-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 not generated and the problem still exists, go to Procedure 5.

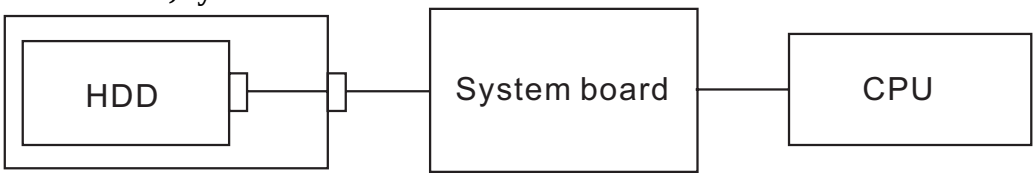
Table 2- 1 HDD error code and status

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 Connector Check and Replacement Check

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

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



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 HDD 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 System 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 CPU may be damaged. Replace it with a new one following the disassembling instructions in Chapter 4.**

2.6 Keyboard

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

Procedure 1 Test Program Check

Procedure 2 Connector Check and Replacement Check

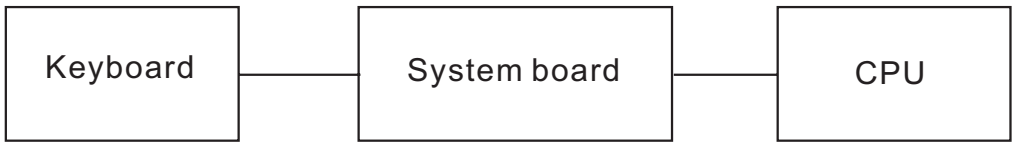
Procedure 1 Test Program Check

Execute the Keyboard 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 keyboard 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 keyboard cable 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 **The keyboard 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 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 4.**

Check 4 **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 5.**

Check 5 **The CPU may be faulty. Disassemble the computer following the steps described in Chapter 4 and replace the CPU with a new one.**

2.7 Display

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

Procedure 1 External Monitor Check

Procedure 2 Test Program Check

Procedure 3 Connector Check and Replacement Check

Procedure 1 External Monitor Check

Connect an external monitor to the computer's external monitor port, then boot the computer. The computer automatically detects the external monitor even if resume mode is enabled.
If the external monitor works correctly, the internal LCD, LCD/FL cable, or FL may be faulty. Go to Procedure 3.
If the external monitor appears to have the same problem as the internal monitor, the system board may be faulty. Go to Procedure 2.

Procedure 2 Test Program Check

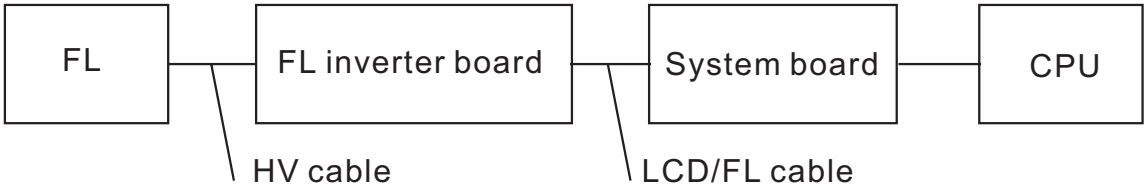
Insert the diagnostics bootable CD in the computer's CD ROM, turn on the computer and run the test. See Chapter 3 for information on how to perform the test.
If an error is detected in the test, go to Procedure 3. If no error is detected, the display itself is normal.

Procedure 3 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.**



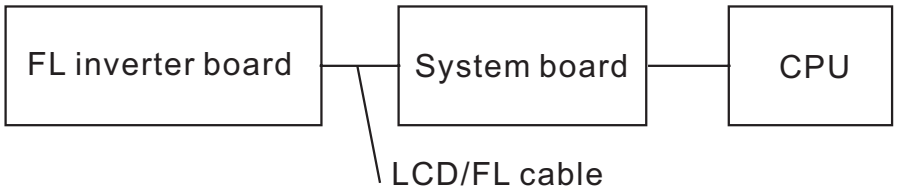
If any of the cables is loose or off, reconnect it firmly and return to Procedure 3. If there is still an error, perform Check 2.

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

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

Check 4 **The FL inverter board may be faulty. Replace it with a new one and return to Procedure 3. If there is still an error, perform Check 5.**

Check 5 **Make sure the LCD/FL 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 3. If there is still an error, perform Check 6.

Check 6 **The LCD/FL inverter cable may be faulty. Replace it with a new one and return to Procedure 3. 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 3. 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 CPU may be faulty. Replace it with a new one following the instructions in Chapter 4.**

Check 10 **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 10.**

2.8 ODD (Optical Disk 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 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.

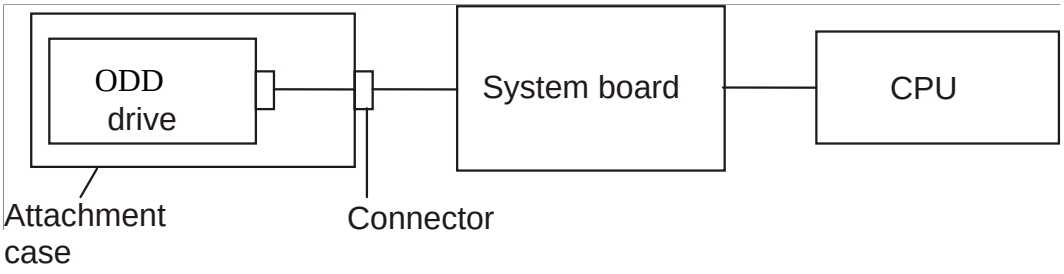
Procedure 2 Test Program Check

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 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 connector may be faulty. Replace the connector with a new one following the steps in Chapter 4. If the ODD drive is still not functioning properly, perform Check 3.**

Check 3 **The ODD drive may be faulty. Replace the ODD drive with a new one following the steps in Chapter 4. If the ODD drive is still not functioning properly, perform Check 4.**

Check 4 **The system board may be faulty. Replace it with new one following the instructions in Chapter 4. If the ODD drive 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 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 3.**

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 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.**

2.10 Audio Test

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

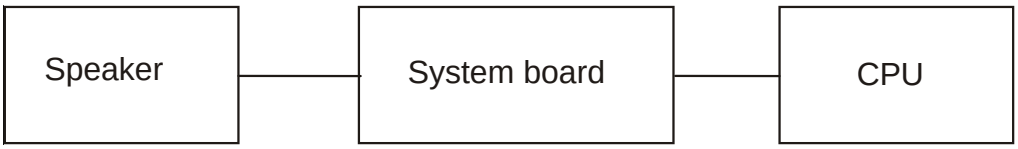
Procedure 1 Test Program Check

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 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 **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 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 4.**

Check 4 **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 5.**

Check 5 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 IEEE 1394 Test(Optional)

To check if the computer's IEEE 1394 is defective or malfunctioning, follow the troubleshooting procedures below as instructed.

Procedure 1 Test Program Check

Procedure 2 Connector Check

Procedure 1 Test Program Check

Execute the IEEE 1394 test program available as part of the maintenance test program. This program checks the IEEE 1394. Insert the Bootable CD into the 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

The IEEE 1394 connector is mounted on the system board. If the IEEE 1394 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 IEEE 1394 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 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.**

2.12 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

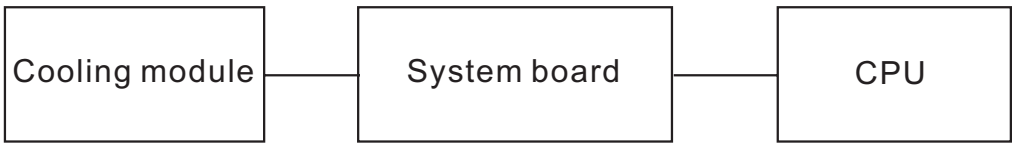
Procedure 1 Test Program Check

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 persist, perform Check 4.**

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

Chapter 3
Diagnostic Programs

Chapter 3 Contents

3.1 Tests and Diagnostics Software Overview

This chapter explains how to use the Tests and Diagnostics Software for the Satellite L20/L25 and Satellite Pro L20/L25 computer systems.

> ***NOTES**: Before starting the Tests and Diagnostics software:*
>
> 1. *Check all cables for loose connections.*
> 2. *Exit any application and close Windows.*

The Diagnostics Menu consists of the following options:

- Diagnostic Test
- Running Test
- DMI Information
- Log Utilities
- System Configuration
- Option

The Diagnostic Test Menu consists of the following functional tests:

- System Test
- Memory Test
- Keyboard Test
- Display Test
- Floppy Disk Test
- Hard Disk Test
- Real Time Clock Test
- Cache Memory Test
- High Resolution Display Test
- Multimedia Test
- Memory2 Test
- FDD & HDD Error Retry Count Set

The following equipment is required to perform some of the diagnostic test programs:

- The Diagnostics Disk (all tests)
- A formatted working disk for the floppy disk drive test (all tests)
- A CD test media (Toshiba Backup CD ROM for the CD-ROM test)

The following sections detail the tests contained within the Diagnostic Test Menu. Refer to Sections 3.18, 3.19, 3.20 and, 3.21 for detailed information on the remaining functions of the Tests and Diagnostics software.

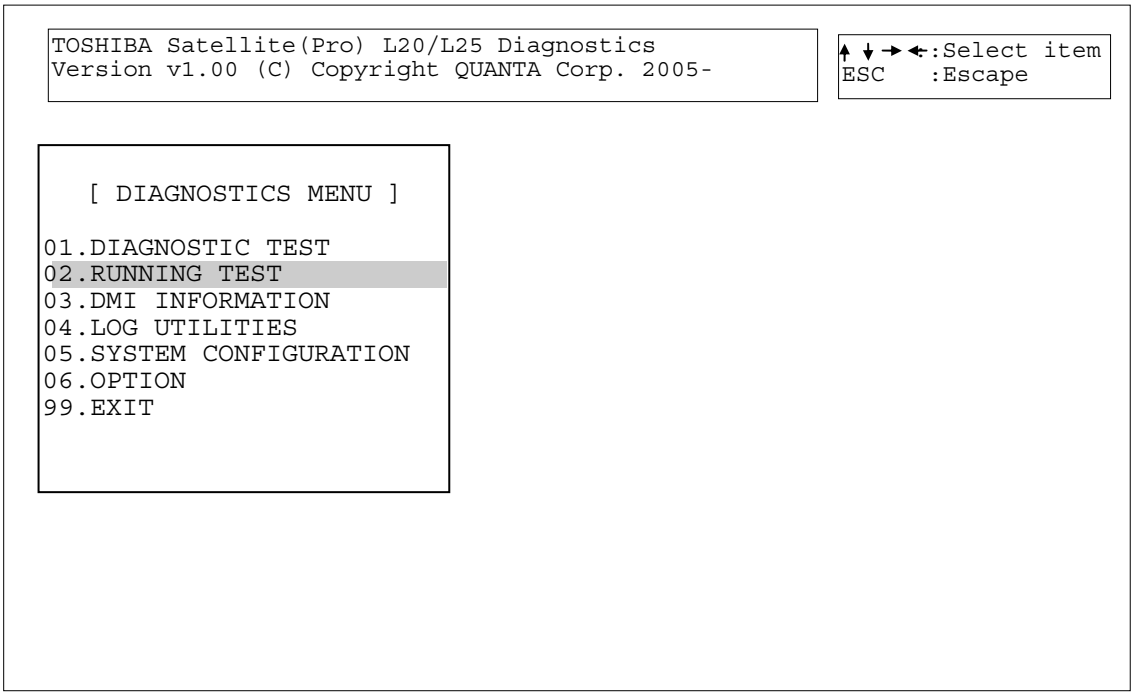
3.2 Executing the Diagnostic Test

MS-DOS is required to run the Diagnostics Program. To start the programs follow these steps:

1. Create a DOS bootable disk and copy all the files from the Tests and Diagnostics software to the disk.

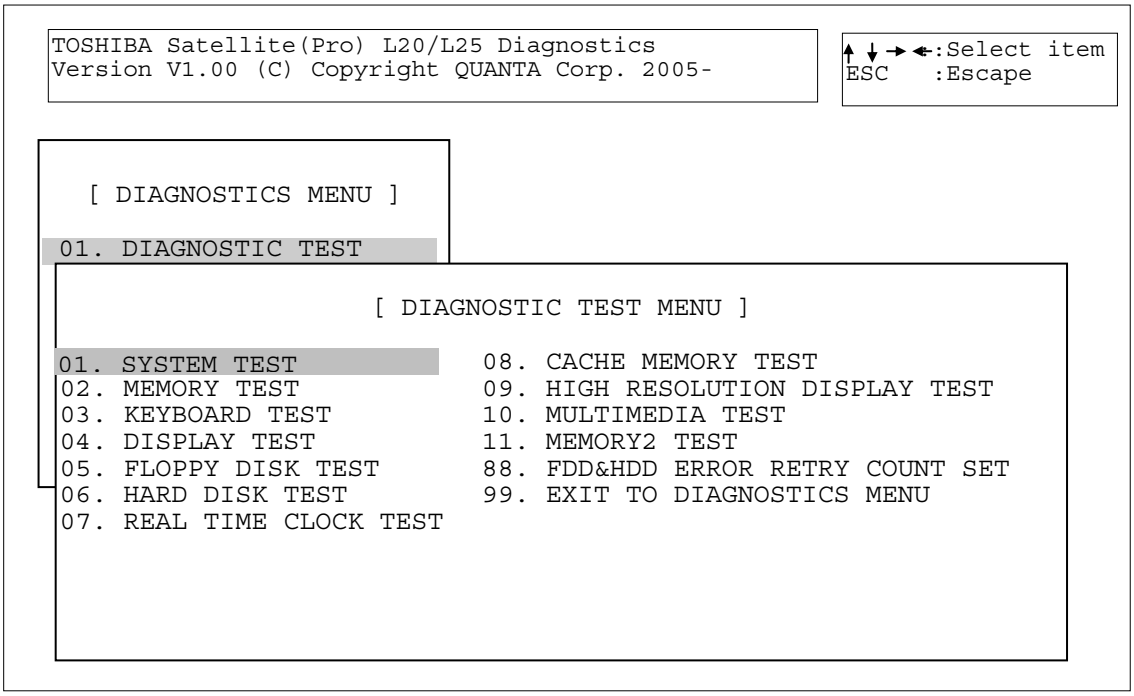
2. Insert the boot disk into the computer's floppy disk drive and turn on the computer.

   The following screen displays:



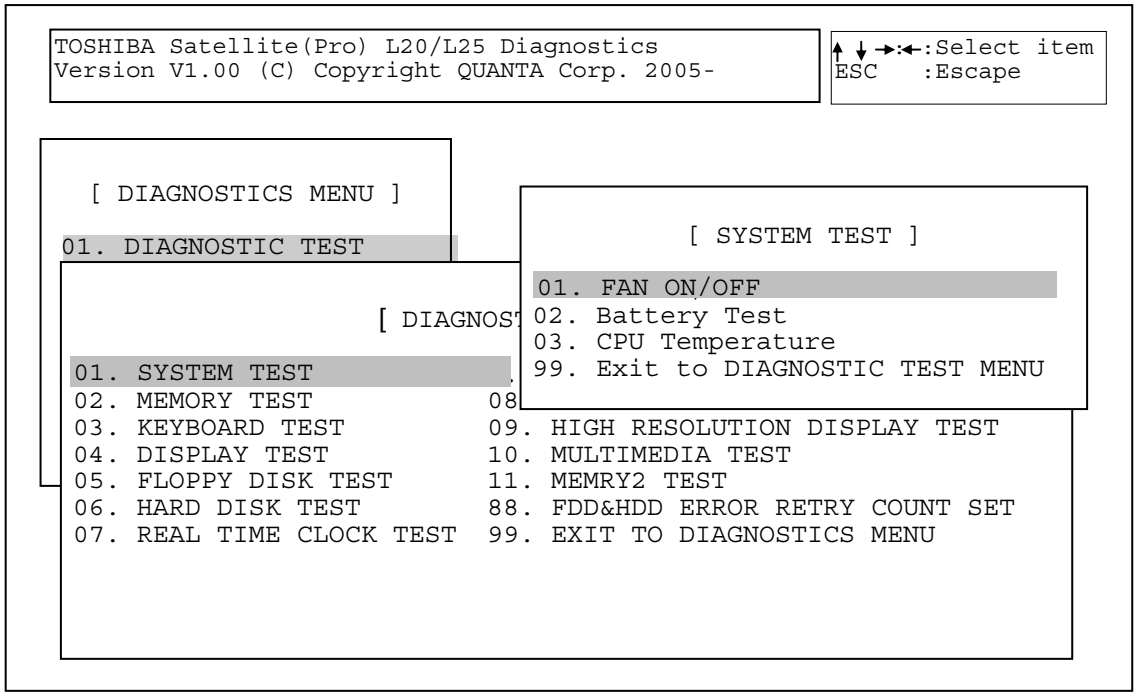
3. To select the Diagnostic Test from the Diagnostics Menu use the arrow keys to set the highlight bar to **01** and press **Enter**.

The following menu displays:

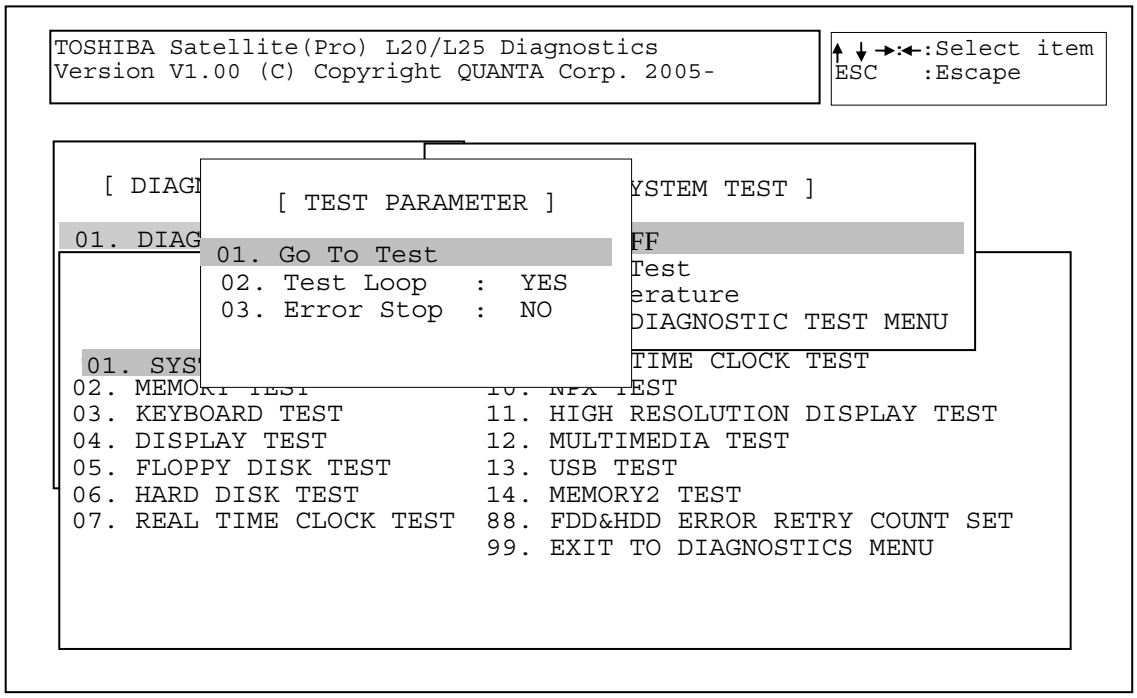


Refer to Sections 3.4 through 3.14 for detailed descriptions of Diagnostics Tests 1 through 11. Item 88 sets the floppy disk drive and hard disk drive error retry count. Item 99 exits the submenu of the Diagnostic Test and returns to the Diagnostics Menu.

4. Select the subtest you want to execute and press **Enter**. The following menu displays:



5. Select the desired test from the subtest menu and press **Enter**. The following Test Parameter menu displays:



Use the arrow keys to highlight the desired option and press **Enter**.

Go To Test
Move the highlight bar to *Go To Test* and press **Enter** to start executing the test.

Test Loop
Select **NO** to return the screen to the subtest menu after the test is complete.
Select **YES** to set the test to run continuously until it is halted by the user.

Error Stop
Select **NO** to keep the test running even if an error is found.
Select **YES** to stop the test program when an error is found and display the HALT OPERATION screen as shown below:

```
[[ HALT OPERATION ]]
  1: Test end
  2: Continue
  3: Retry
```

These three selections have the following functions:

1: Terminates the test program and exits to the subtest menu.
2: Continues the test from the error.
3: Restarts the test from the beginning.

Use the arrow keys to move the cursor to the desired option and press **Enter**.
Table 3-1 in Section 3.3 lists the function of each test on the subtest menu. Table 3-2 in Section 3.15 lists the error codes and error status for each error.

3.3 Subtest names

Table 3-1 lists the subtest names for each test program in the Diagnostic Test menu.

Table 3-1 Subtest Names(1/3)

No.	Test Name	No.	Subtest Name
01	SYSTEM TEST	01	FAN ON/OFF check
		02	Battery TEST
		03	CPU Temperature
02	MEMORY TEST	01	Conventional Memory
		02	Protected Mode
		03	Protected Mode (32MB-MAX)
		04	RAM Refresh
		05	Stress Test
03	KEYBOARD TEST	01	Pressed Key Display [88]
		02	Pressed Key Display [85]
		03	Pressed Key Display [84]
		04	Hot Key Display [4 Key]
		05	Hot Key Display [5 Key]
		06	Keyboard LED
		07	PS/2 Mouse (Pointing 2Button)
04	DISPLAY TEST	01	Character Attributes
		02	Character Set
		03	80* 25 Character Display
		04	320* 200 Graphics Display
		05	640* 200 Graphics Display
		06	640* 480 Graphics Display
		07	Display Page
		08	“H” Pattern Display
		09	Video DAC Register W/R/C
		10	Color Graphics Display
		11	Color Attributes Display
		12	Color Tiling

Table 3-1 Subtest Names(2/3)

No.	Test Name	No.	Subtest Name
05	FLOPPY DISK TEST	01	Sequential Read
		02	Sequential W/R/C
		03	Random Address/Data
		04	Write Specified Address
		05	Read Specified Address
06	HARD DISK TEST	01	Sequential Read
		02	Address Uniqueness
		03	Random Address Data
		04	Cross Talk and Peek Shift
		05	Write Specified Address
		06	Read Specified Address
		07	Sequential Write
		08	W-R-C Specified Address
07	REAL TIME CLOCK TEST	01	Real Time
		02	Backup Memory
		03	Real Time Carry
08	CACHE MEMORY TEST	01	Constant Data Test
		02	Address Pattern Test
		03	Increment/Decrement Test
		04	Bit Shift Pattern Test
		05	*Write Disturb Test
		06	Checker Board Test
		07	Marching Test
		08	Working Data Test
09	HIGH RESOLUTION DISPLAY TEST	01	VRAM W/R/C Test
		02	640* 480 Mode Display
		03	800* 600 Mode Display
		04	1024* 768 Mode Display
		05	“H” Pattern Display
		06	Focus Test (“E” Pattern)

Table 3-1 Subtest Names(3/3)

No.	Test Name	No.	Subtest Name
10	MULTIMEDIA TEST	01	Sequential Read Test
		02	Random Read Test
		03	Read Specified Address Test
		04	1 point W/R/C Test
11	MEMORY2	01	All one/zero
		02	Walking 1/Walking 0(Left)
		03	Walking 1/Walking 0(Right)
		04	Walking 1/Walking 0(Left /Right)

**This test cannot support.*

3.4 System Test

To execute the System Test select **01** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The System Test contains two subtests. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 FAN ON/OFF Checking

Select 1,2,3 to control FAN on/off , 1=Fan on , 2=Fan off , 3=Exit .

[EW5FAN.EXE] Program Version : 1.0
1: Fan On 2: Fan Off 3: Exit
Fan Status On FanRPM : 4250 or Fan Status OFF FanRPM : 0

Subtest 02 Battery Test

This will display battery information for check , press [ESC] to exit .

voltage	: 16664 mV	Remaining capacity alarm	: 0 mAh
temperature	: 29.4 ‘C	Remaining time alarm	: 10 min
current	: 0 mA	Battery mode	: 0
average current	: 0 mA	AtRate	: 0 mA
relative state of charge	: 99 %	At rate time to full	: 65535 min
absolute state of charge	: 99 %	At rate time to empty	: 65535 min
remaining capacity	: 4074 mAh	At rate O. K.	: FFFF
full charge capacity	: 4109 mAh	Maximun error	: 0 %
run time to empty	: -1 min.	Charging current	: 0 mA
average time to empty	: -1 min.	Charging voltage	: 0 mA
average time to full	: -1 min.	Manufacturer name	: Panasonic
cycle count	: 2 times	Device name	: PA3420U1BRS
design capacity	: 4300 mAh	Device chemistry	: LION
design voltage	: 14800 mV	Manufacturer data	: 0
specification information	: 3.1	Manufacture date	: 11/26/2004
serial no.	: 4488		
STATUS	: INIT DISK FULL_CHG		

Press [ESC] KEY to exit

Subtest 03 CPU Temperature

This will display CPU Temperature for check , press [ESC] to exit .

CPU Temperature : XX

3.5 Memory Test

To execute the Memory Test select **02** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Memory Test contains five subtests that test the computer's memory. Move the highlight bar to the subtest you want to execute and press **Enter**.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter menu, the Test Status screen displays while the test is executing. When the test is complete the Memory Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter menu, the Test Status screen displays while the test is executing. Press **Ctrl + break** to return to the Memory Test menu.*

Subtest 01 Conventional Memory

This subtest first writes test data patterns to conventional memory (0 to 640 KB), then reads the new data and compares the result with the original data patterns.

If a compare error occurs, the write data, read data, and test address display on the screen. Addresses are displayed in 4KB increments during the test.

Test Process:

1. Byte Enable Test
   One bit write/ 8 bit read" is executed and the new data is compared with the original data.
   Test data = CCAA5533H, 80000000H

2. Byte Enable Test
   "One bit write/16 bit read" is executed and the new data is compared with the original data.
   Test data = CCAA5533H, 80000000H

3. Data bus test
   "One bit write/16 bit read" is executed and the new data is compared with the original data.
   Test data = 1H, 2H, 4H, 8H, 10H, through 80000000H.

4. Fixed data test
   "16 bit write/ 16 bit read" is executed and the new data is compared to the original data.
   Test data = FFFFFFFFH, 00000000H, 80018001H

5. Address pattern test
   "16 bit write and 16 bit read" of address pattern data is executed and the new data is compared with the original data.
   Test data = 0000H, 0004H, 0008H, 000CH,...8000H, 8004H, through FFECH

Subtest 02 Protected Mode

This subtest first writes data patterns and address data from 1 to 32 MB, then reads the new data and compares the result with the original data patterns. Addresses are displayed in 64KB increments during the test.

. **Test Process:**

1. Switch to Protected Mode. (INT 15H)

2. Tests 256KB - 640KB and 1MB to 32MB of installed memory. Executes Step 1 through Step 5 of Subtest 1. The test data is the same as Subtest 1.

Subtest 03 Protected Mode [32MB - MAX]

This subtest first writes data patterns and address data from 32MB to the maximum installed memory, reads the new data, and then compares the result with the original data patterns. Addresses are displayed in 64KB increments during the test.

Test Process:

1. Switch to Protected Mode. (INT 15H)

2. Tests from 32MB to the maximum installed memory (extended memory). Executes Step 1 through Step 5 of Subtest 1. The test data is the same as Subtest 1.

Subtest 04 RAM Refresh

This subtest writes a data pattern (CCAA5533H) in 4KB from 0 to the maximum installed memory, then waits for a memory refresh cycle (16 ms or more), reads the new data, and compares the result with the original data pattern.

Test Process:

1. Checks the memory size to determine the maximum size of installed memory.

2. Tests memory addresses 0 to the maximum installed.

3. Writes, reads, and compares test data after a memory refresh cycle (16ms or more).

> ***NOTE:*** *There may be a short delay between write and read operations, depending on the memory size.*

Subtest 05 Stress Test

This subtest writes the following 16KB data patterns to the Write/Read Buffer in conventional memory.

```
data:   FFFFFFFFFFFFFFFF0000000000000000
        5555555555555555AAAAAAAAAAAAAAAA
        CCCCCCCCCCCCCCCC3333333333333333
        0000000000000000FFFFFFFFFFFFFFFF
        AAAAAAAAAAAAAAAA5555555555555555
        3333333333333333CCCCCCCCCCCCCCCC
        FFFFFFFFFFFFFFFF0000000000000000
        0000000000000000FFFFFFFFFFFFFFFF
        5555555555555555AAAAAAAAAAAAAAAA
        AAAAAAAAAAAAAAAA5555555555555555
        CCCCCCCCCCCCCCCC3333333333333333
        3333333333333333CCCCCCCCCCCCCCCC
```

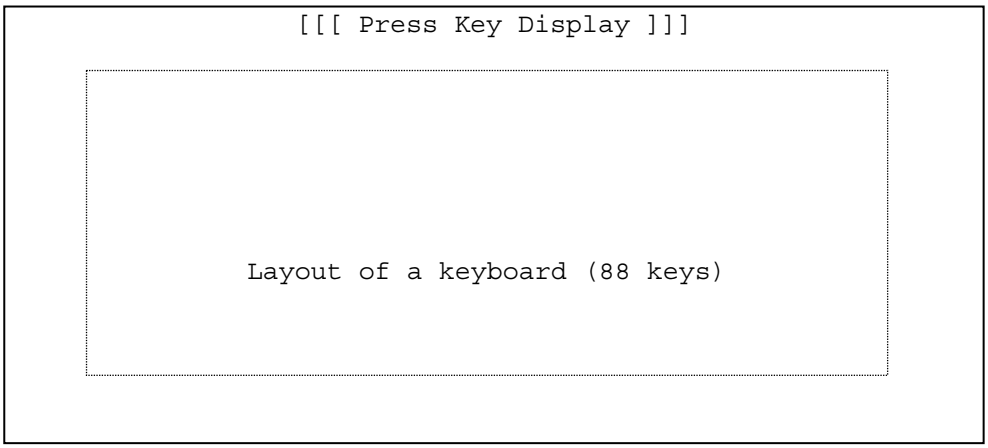
3.6 Keyboard Test

To execute the Keyboard Test select **03** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Keyboard Test contains seven subtests that test the computer's keyboard and mouse actions. Move the highlight bar to the subtest you want to execute and press **Enter**.

***NOTE**: The Test Loop and Error Stop parameters are not enabled for the Keyboard test.*

Subtest 01 Pressed Key Display [88 Keyboard]

When you execute this subtest, the keyboard layout is drawn on the display. When any key is pressed, the corresponding key on the screen changes from light to dark. Holding a key down enables the auto-repeat function which causes the key's display character to blink.



Subtest 02 Pressed Key Display [85 Keyboard]

This subtest is used for the 85 keyboard and functions the same as Subtest 1.

Subtest 03 Pressed Key Display [84 Keyboard]

This subtest is used for the 84 keyboard and functions the same as Subtest 1.

Subtest 04 Hot Key Display [4 Key]

This subtest is used for the 4 hot key and functions the same as Subtest 1.

Subtest 05 Hot Key Display [5 Key]

This subtest is used for the 5 hot key and functions the same as Subtest 1.

Subtest 06 Keyboard LED

The LED display for **Num Lock**, **Caps Lock**, and **Scroll Lock** (in that order) will flash repeatedly. Confirm this visually. The following screen displays while this test executes.

```
Keyboard LED "ON" CHECK !


Press ANY KEY
```

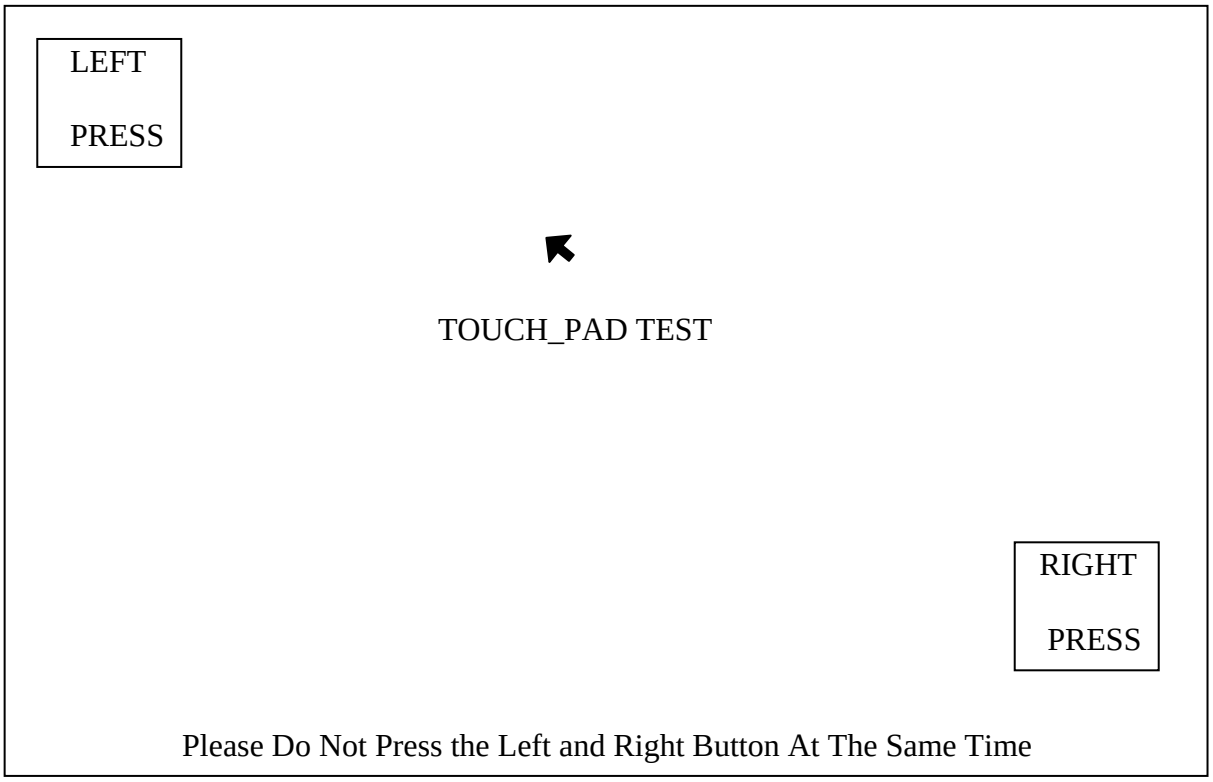
Subtest 07 PS/2 Mouse (Pointing)

This subtest checks the function of mouse as shown below.

A) Pointing device (mouse)
B) Mouse buttons

Please move cursor to upper left and press left button , screen will display <PRESS> in left rectangle , move cursor to lower right and press right button , screen will display <PRESS> in right rectangle , the program exit .

If left and right button short , screen will display <Left and Right Button maybe short > , the program exit .

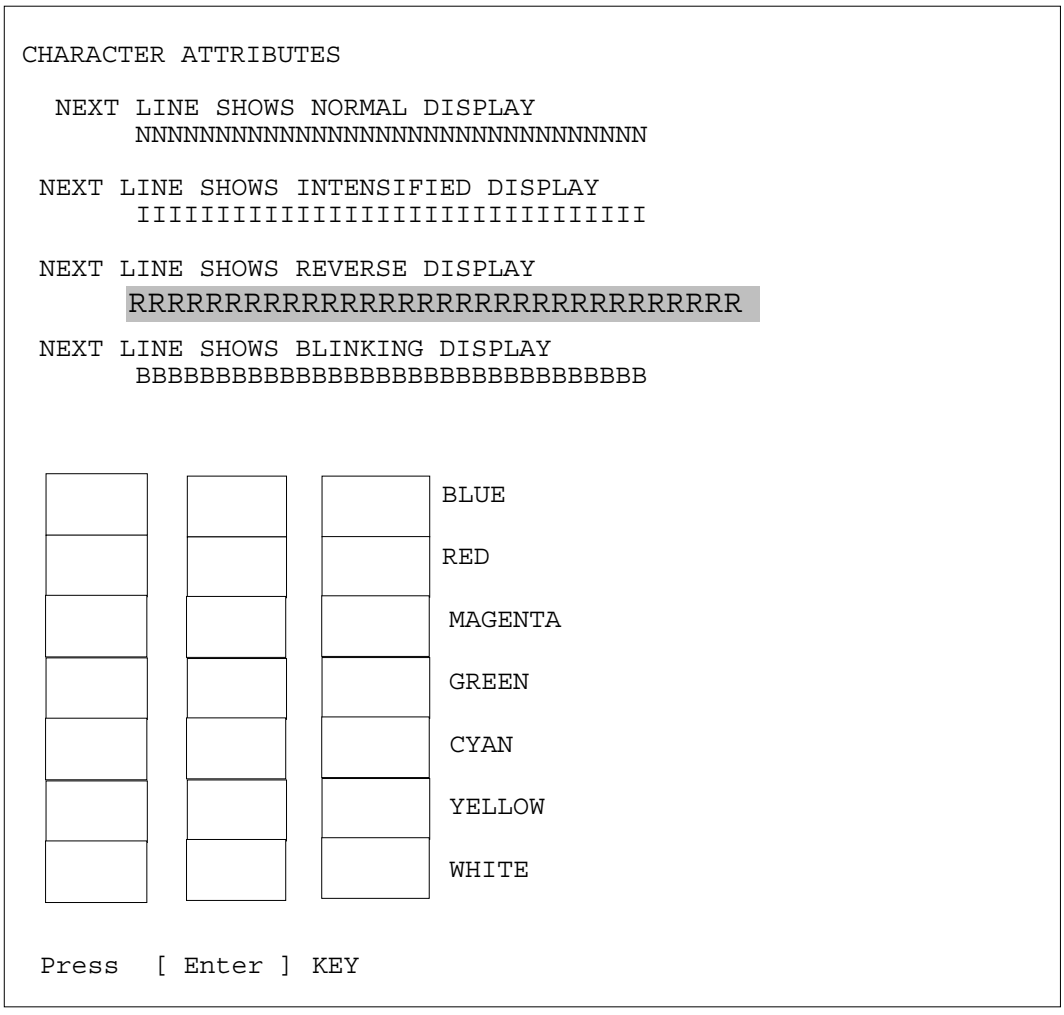

LEFT
PRESS
TOUCH_PAD TEST
RIGHT
PRESS
Please Do Not Press the Left and Right Button At The Same Time

3.7 Display Test

To execute the Display Test select **04** from the Diagnostic Test Menu, press **Enter** and follow the directions displayed on the screen. The Display Test contains twelve subtests that test the display in various modes. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Character Attributes

This subtest displays character attributes and color attributes. The character attributes are: normal, intensified, reverse, and blinking. The color attributes are: blue, red, magenta, cyan, yellow, and white. These seven colors each display a background color, foreground color and high resolution color. The screen below displays when this subtest is executed.

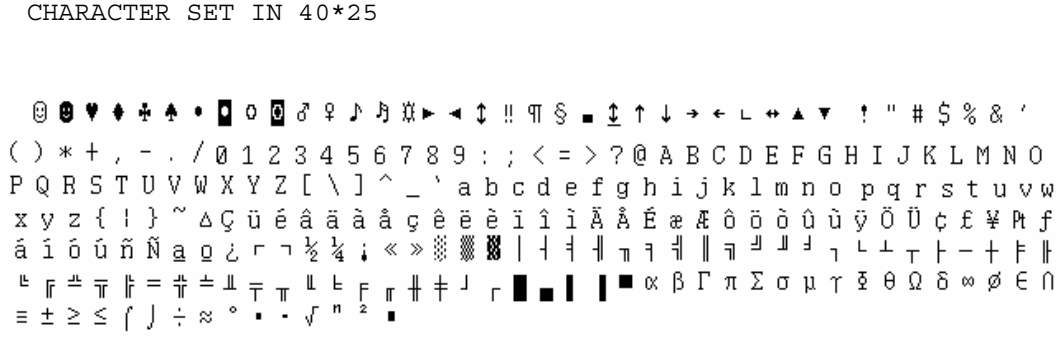


To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 02 Character Set

This subtest displays the character codes 00H - FFH, using Mode 01H (40*25). The screen below displays when this subtest is executed.



To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 03 80 * 25 Character Display

This subtest uses 80*25 video resolution to display character codes 20H - 7EH using Mode 03H (80*25). The data displayed is shifted 1 byte to the left for each line as shown below.

```
 80*25 CHARACTER DISPLAY
 0123456789012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789
  !"#$%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmno
!"#$%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjkl mnop
"#$%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmnopq
#$%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmnopqr
$%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmnopqrs
%&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmnopqrst
&'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjkl mnopqrstu
'()*=,.-/0123456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghIjklmnopqrstuv

              Shifted to the left one letter by one letter.

23456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdef gh I j k l mnopqrst
3456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdef gh I j k l mnopqrst
456789:;⇔?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdef gh I j k l mnopqrst

 Press [Enter] KEY
```

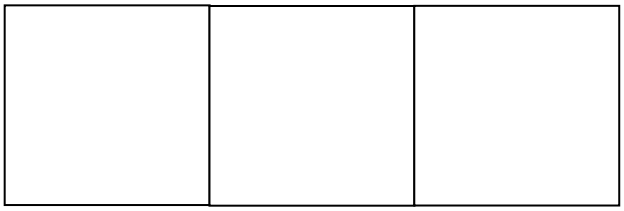
To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

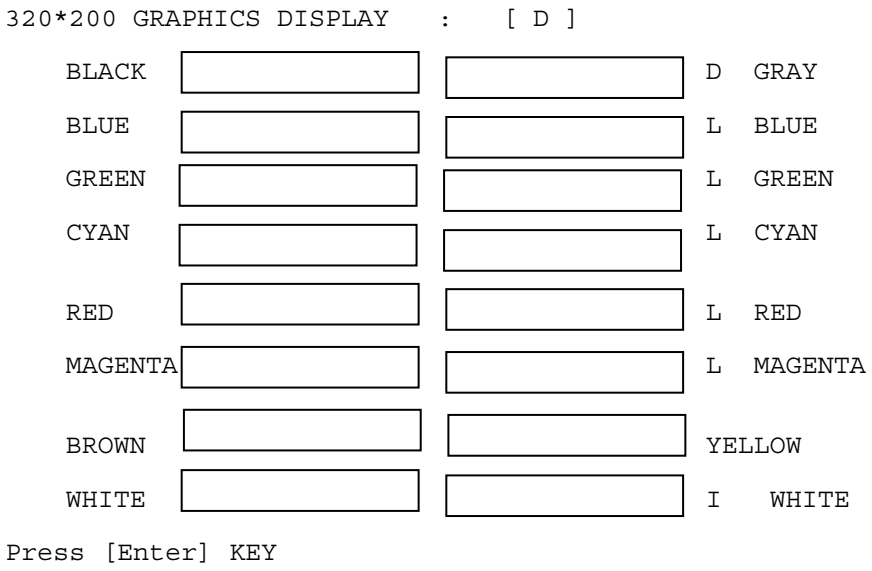
Subtest 04 320 * 200 Character Display

This subtest uses 320*200 video resolution to display green, red and yellow followed by cyan, magenta, and white. The screen below shows the displays when this subtest is executed.

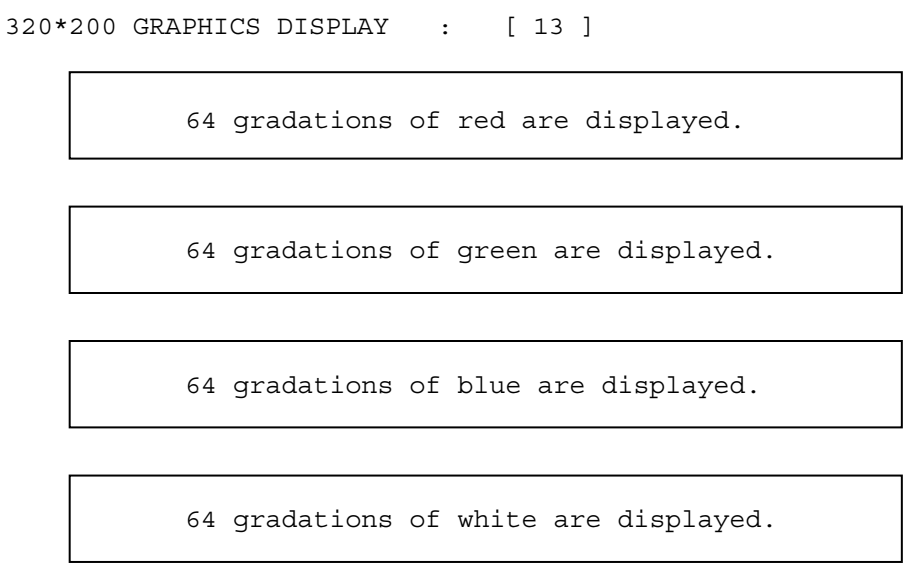
```
320 * 200 GRAPHICS DISPLAY

   COLOR SET 0 : [ 4 ]

          GREEN          RED          YELLOW
          CYAN         MAGENTA        WHITE
```



Press **ENTER** to display the following sixteen colors: black, blue, green, cyan, red, magenta, brown, white, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and intensified white.



Press **ENTER** to display 64 gradations of red, green, blue and white on the screen



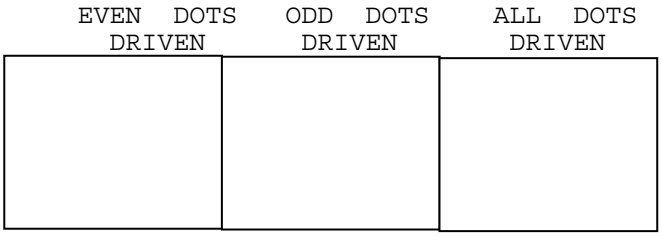
To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 05 640 * 200 Character Display

This subtest uses 640*200 video resolution to display three windows, each window drives a different set of dots: even dots, odd dots and all dots. The screen below displays when this subtest is executed.

```
640 * 200 GRAPHICS DISPLAY  : [ 6 ]
```



Press **ENTER** to display the following 16 colors: black, blue, green, cyan, red, magenta, brown, white, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and intensified white.

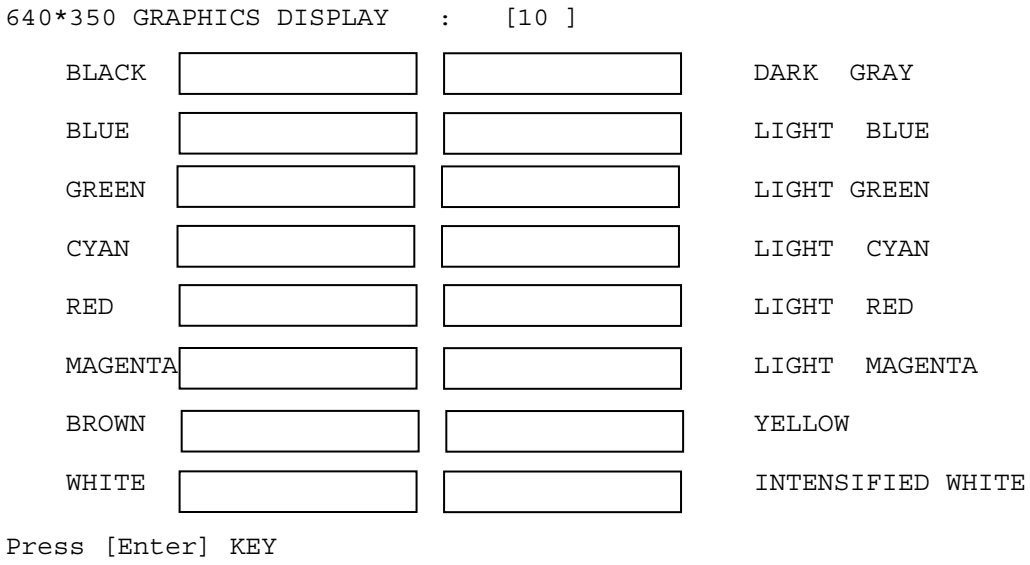
```
640*200 GRAPHICS DISPLAY   :   [ E ]

   BLACK                                  DARK  GRAY
   BLUE                                   LIGHT  BLUE
   GREEN                                  LIGHT GREEN
   CYAN                                   LIGHT  CYAN
   RED                                    LIGHT  RED
   MAGENTA                                LIGHT  MAGENTA
   BROWN                                  YELLOW
   WHITE                                  INTENSIFIED WHITE

Press [Enter] KEY
```

To exit this subtest and return to the Display Test menu:

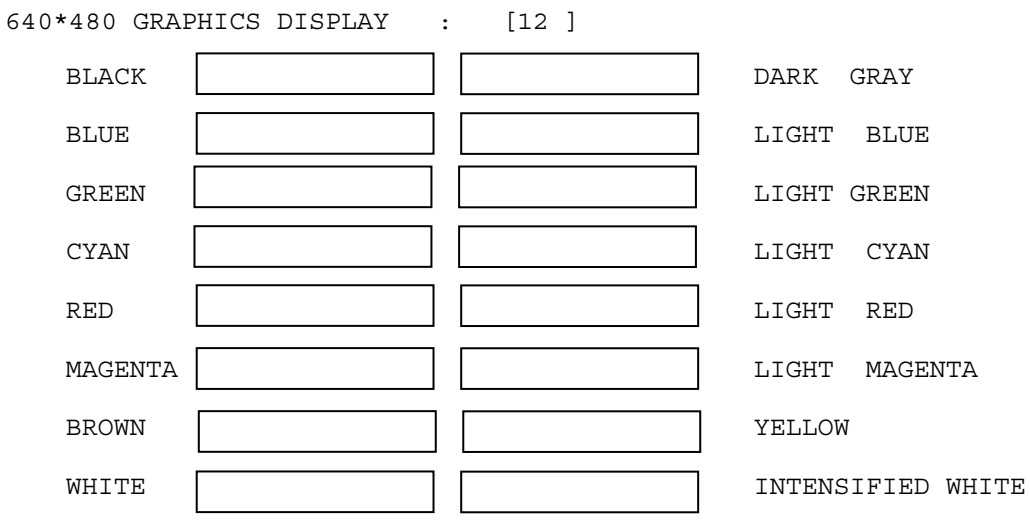
Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 06 640 * 480 Character Display

This subtest uses 640*350 video resolution to display 16 colors: black, blue, green, cyan, red, magenta, brown, white, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and intensified white. The screen below displays when this subtest is executed.



Press **ENTER** to display the following 16 colors: black, blue, green, cyan, red, magenta, brown, white, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and intensified white using 640*480 video resolution.



To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 07 Display Page

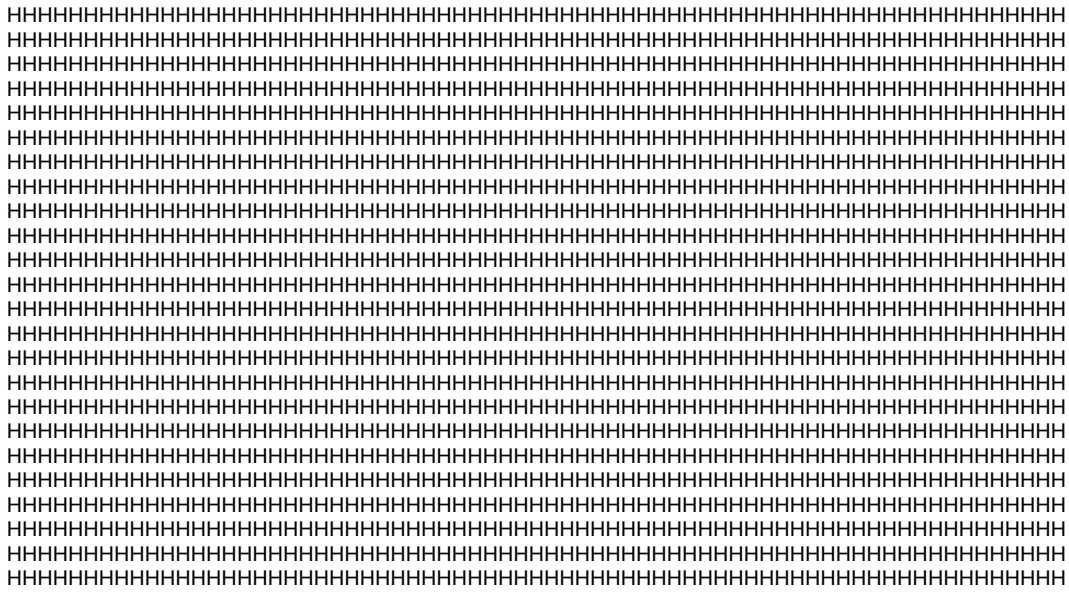
This subtest displays video pages zero through seven.

To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 08 "H" Pattern Display

This subtest displays a full screen of "H" patterns.



To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 9 Video DAC Register W/R/C

This subtest writes data patterns to the Video DAC register lookup table (PEL Address register), then reads the new data, and compares the result to the original data patterns. The original content of the Video DAC register is saved in RAM and restored after the test is completed.

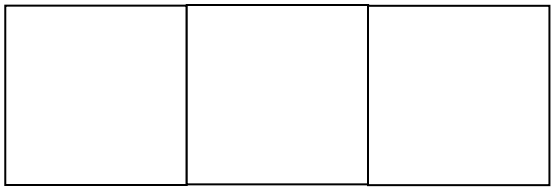
The test data patterns are 00H,15H, 2AH and 3FH.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter menu, "Screen will remain blank" displays on the screen while the test is executing. When the test is complete the Display Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter menu, "The Screen will remain blank" displays on the screen and then the screen flickers due to the fast screen refresh while the test is executing. Press **Ctrl + break** to return to the Display Test menu.*

Subtest 10 Color Graphics Display

This subtest displays three colors, cyan, white and yellow on the screen as shown below.

```
640 * 480 GRAPHICS DISPLAY

          CYAN        WHITE       YELLOW
```



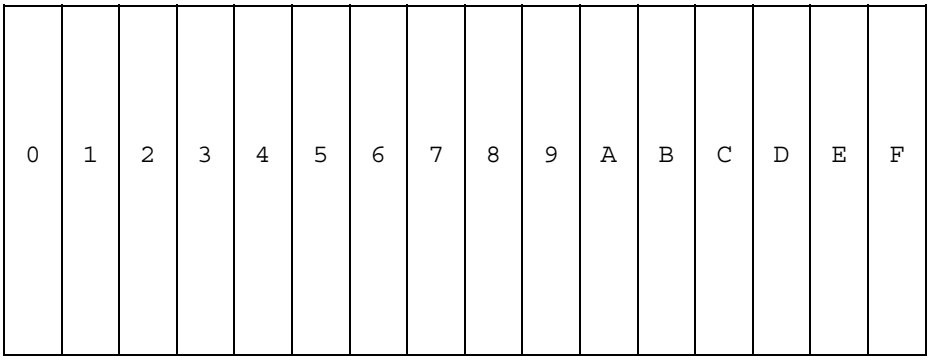
To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 11 Color Attributes Display

This subtest displays 16 colors: black, blue, green, cyan, red, magenta, brown, white, dark gray, light blue, light green, light cyan, light red, light magenta, yellow, and intensified white. The screen below displays when this subtest is executed.

```
640*480 COLOR ATTRIBUTE DISPLAY
```

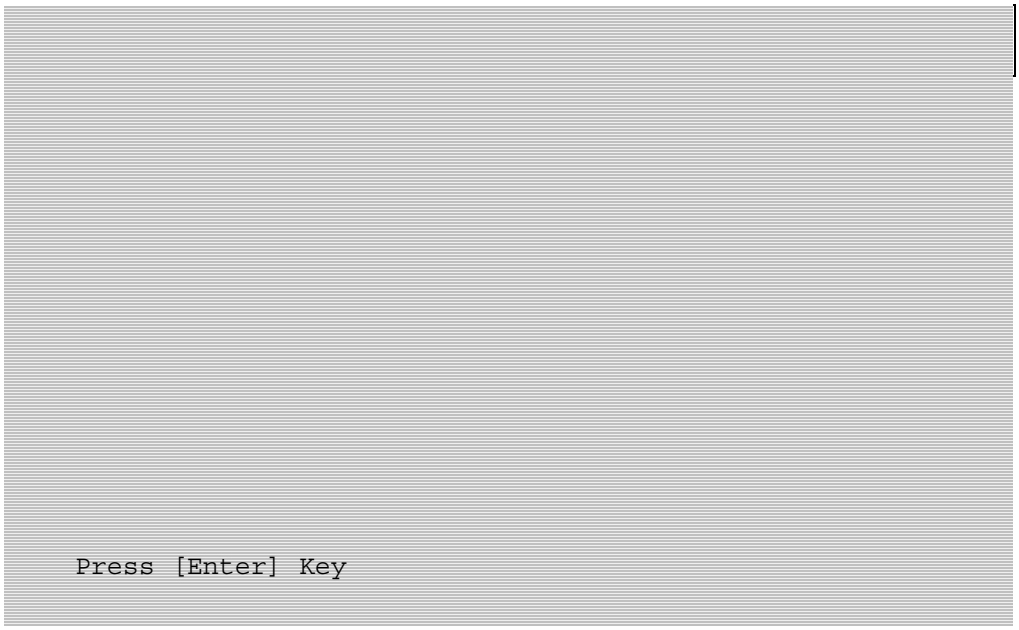



```
Press [Enter] Key
```

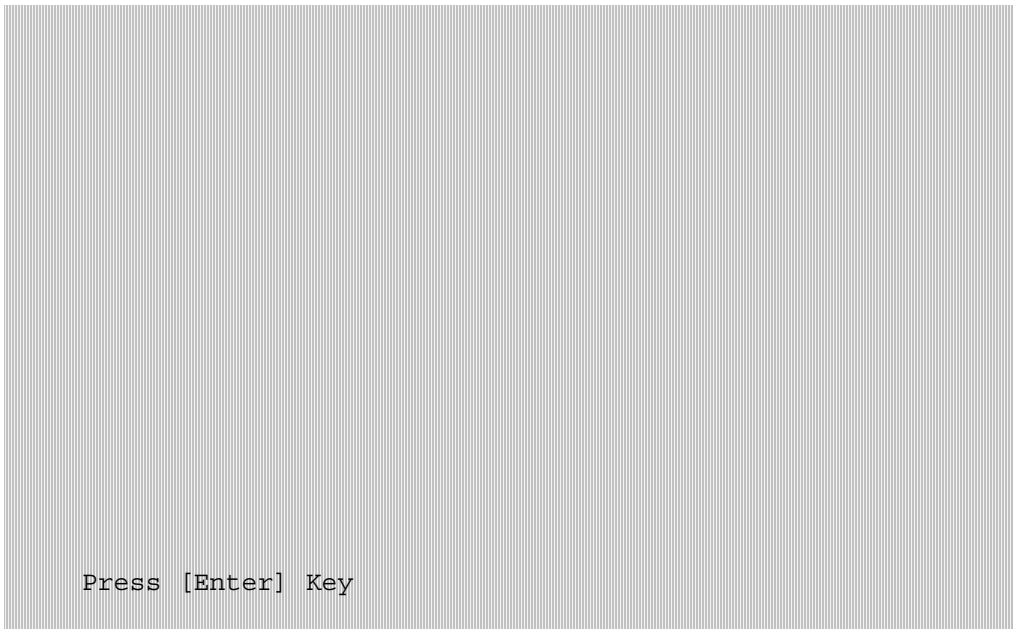
Pressing **Enter** executes VRAM mapping test which indicates vertical lines

Press **Enter** to execute the VRAM mapping test which displays a horizontal line at one dot intervals using Mode 12.

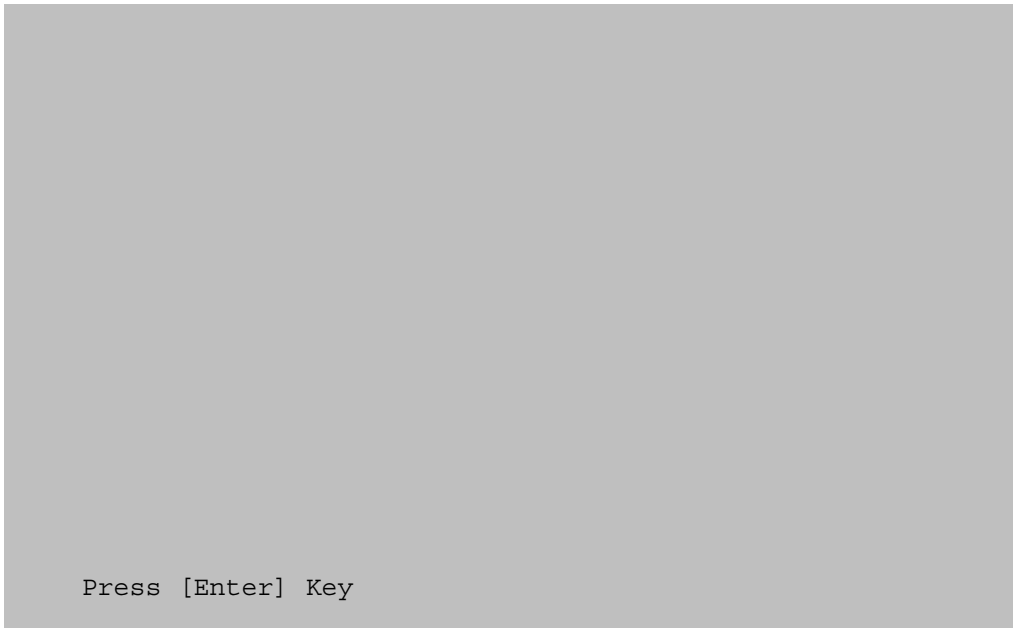
NOTE: *The following screen does not display correctly. It will be amended in the next version.*



Press **Enter** to execute the VRAM mapping test which displays a vertical line at four dot intervals using Mode 12.



Press **Enter** to display VRAM mapping test using the all dots Mode.



To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 12 Color Tiling

This subtest displays black, gray, white, and 3 gradations of red, green, and blue as shown in the following display.

Black	Red	Green	Blue
Gray	Red Gradation	Green Gradation	Blue Gradation
White	Red Gradation	Green Gradation	Blue Gradation

To exit this subtest and return to the Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

3.8 Floppy Disk Test

> ***CAUTION**: Before running the floppy disk test, prepare a formatted work disk. Remove the diagnostics disk and insert the work disk into the FDD. The contents of the floppy disk will be erased.*

To execute the Floppy Disk Test select 0**5** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Floppy Disk Test contains five subtests that test the FDD. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Sequential Read

This subtest sequentially reads all the tracks (Tracks 0 to 79)on the floppy disk.

Subtest 02 Sequential W/R/C

This subtest continuously writes the data pattern B5ADADh to all the specified tracks selected in Subtest 01. The data pattern is then read and compared to the original data.

Subtest 03 Random Address/Data

This subtest writes random data to random addresses on all tracks defined in Subtest 01. The data is then read and compared to the original data.

Subtest 04 Write Specified Address

> ***NOTE****: The first two digits of the ADDRESS indicate which track is being tested, the next two digits indicates the head, and the last two digits indicate the sector.*

This subtest allows you to verify the errors from Subtest 02. It writes specified data to a specified track and head. Use the Log Utilities (see Section 3.21) to specify the track number and head number where the error(s) occurred during Subtest 02. The following message displays on the screen to enter the test data, track number, and head number.

```
TEST DATA  ??
TRACK NO (00~79) ??
HEAD NO (0~1) ?
```

Subtest 05 Read Specified Address

This subtest reads data from a specified track and head.

The following message displays on the screen to enter the test track number and head number.

```
TRACK NO (00~79) ??
HEAD NO (0~1) ?
```

3.9 Hard Disk Test

To execute the Hard Disk Test select **06** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Hard Disk Test contains eight subtests that test the functions of the hard disk drive. Move the highlight bar to the subtest you want to execute and press **Enter**.

> ***NOTES****: The contents of the hard disk will be erased when subtest 02, 03, 04, 05, 07 or 08 is executed. Before running the test, transfer the contents of the hard disk to other disk.*
>
> *A password is necessary to execute the Hard Disk Test. The password is:* **hard disk**

Subtest 01 Sequential Read

This subtest sequentially reads all the tracks on the HDD starting at track 0. When all tracks have been read, the test starts at the maximum track and reads sequentially back to track 0.

Subtest 02 Address Uniqueness (This subtest need very long time)

This subtest writes unique address data to each sector of the HDD track-by-track. The data written to each sector is then read and compared with the original data. There are three ways the HDD can be read:

- Forward sequential
- Reverse sequential
- Random

Subtest 03 Random Address Data

This subtest writes random data to 1000 different random addresses on the HDD. This data is then read and compared to the original data.

Subtest 04 Cross Talk and Peak Shift

This subtest writes eight of the most likely to fail data patterns (shown below) to a cylinder on the HDD, then reads the data while moving from cylinder to cylinder.

Data Pattern
B5ADADH
4A5252H
EB6DB6H
149249H
63B63BH
9C49C4H
2DB6DBH
D24924H

Subtest 05 Write Specified Address

> ***NOTE:*** *This subtest is designed to run with the Test Loop set to* ***NO****. This subtest is a debug tool and the operator should enter the Test Parameters each time.*

.

This subtest allows you to verify the errors from Subtest 01. It writes specified data to a specified LBA. Use the Log Utilities (see Section 3.18) to specify the LBA number where the error(s) occurred during Subtest 01. The following message displays on the screen to enter the test data, and Sector count.

```
TEST DATA        ??
SECTOR COUNT (01~39) ??
START ADDRESS (00000000~MAX Address) ?
```

Subtest 06 Read Specified Address

> ***NOTE:*** *This subtest is designed to run with the Test Loop set to* ***NO****. This subtest is a debug tool and the operator should enter the Test Parameters each time.*

This subtest allows you to verify the errors from Subtest 01. It reads specified data (Subtest 06) from a specified LBA. Use the Log Utilities (see Section 3.18) to specify the LBA number where the error(s) occurred during Subtest 01. The following message displays on the screen to enter the test sector count.

```
SECTOR COUNT (01~39) ??
START ADDRESS (00000000~MAX Address) ?
```

Subtest 07 Sequential Write

This subtest writes specified data to all cylinders on the HDD. The following message displays on the screen to enter the test data.

```
TEST DATA  ????(=37b3H)
```

Subtest 08 W-R-C Specified Address

This subtest writes specified data to a specified sector count, then reads and compares the result. The following message displays on the screen to enter the test data, sector count.

```
TEST DATA   ????(=37b3H)
SECTOR COUNT (01~39) ??
START ADDRESS (00000000~Max Address) ?
```

3.10 Real Time Clock Test

To execute the Real Time Clock Test select **07** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Real Time Clock Test contains three subtests that test the computer's real time functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 Real Time

This subtest allows you to change the date and time. To execute the Real Time Subtest, follow these steps:

1. Select Subtest **01** and the following displays:

```
                    [ REAL TIME TEST  ]
  Current date : mm-dd-yyyy
  Current time : hh:mm:ss

  Enter new date : mm-dd-yyyy
  Enter new time : hh:mm:ss


 Press [Enter] key to exit test
```

2. If the current date is not correct, enter the correct date at the "Enter new date" prompt and press **Enter**. The following prompt displays:

```
Enter new time :
```

3. If the current time is not correct, enter the correct time using a 24-hour format and press **Enter**.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter menu, the Real Time Clock Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter menu, the screen above displays and the test is executed again. Press **Ctrl + break** to return to the Real Time Clock Test menu.*

Subtest 02 Backup Memory

This subtest writes 50 bytes of test data (FFH, AAH, 55H, and 00H) to the CMOS 14th address, then reads the new data and compares it to the original data.

Subtest 03 Real Time Carry

> ***CAUTION**: When this subtest is executed, the current date and time are reset.*

This subtest checks the clock's carry function.

```
                    [ REAL TIME CARRY TEST  ]

   Current date : 12-31-1999

   Current time : 23:59:55

 Press [Enter] key to exit test
```

The following is the display after the date carry function is executed.

```
                    [ REAL TIME CARRY TEST  ]

   Current date : 01-01-2000

   Current time : 00:00:01

 Press [Enter] key to exit test
```

To exit this subtest and return to the Real Time Clock menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

3.11 Cache Memory Test

To execute the Cache Memory Test select **08** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Cache Memory Test contains eight subtests that test the computer's cache memory. Move the highlight bar to the subtest you want to execute and press **Enter**.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter menu, the screen will remain blank while the subtest is executing. When the test is complete the Cache Memory Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter menu, the Test Status screen displays while the subtest is executing. Press **Ctrl + break** to return to the Cache Memory Test menu.*

Subtest 01 Constant Data Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes constant data (FFFFH, AAAAH, 5555H, 0101H, 0000H), reads the new data and compares the result with the original data pattern. The original cache memory content is then restored to the cache memory.

Subtest 02 Address Pattern Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes address data patterns (0000H, 0001H, 0002H, through 3FFDH, 3FFEH, 3FFFH), reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

Subtest 03 Increment/Decrement Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the increment data (00H, 01H, 02H, through FDH, FEH, FFH), reads the new data and compares the result with the original data. After comparing the incremental data, decrement data (FFH, FEH, FEH, through 02H, 01H, 00H) is written and the new data is read and compared with the original data. The original cache memory content is then restored to the cache memory.

Subtest 04 Bit Shift Pattern Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the bit shift data patterns (1 bit shifted every 4 bytes), reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

Subtest 05 Write Disturb Test (We can't support this time)

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the "write disturb data," reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

Subtest 06 Checker Board Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the "checker board data," (data which is inverted front/back and left/right) reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

Subtest 07 Marching Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the "marching data," (00H through 01H and 01H through 00H) reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

Subtest 08 Working Data Test

This subtest reads the contents of cache memory and saves it into RAM. The subtest then writes the "working data," reads the new data and compares the result with the original data. The original cache memory content is then restored to the cache memory.

3.12 High Resolution Display Test

To execute the High Resolution Display Test select **09** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The High Resolution Display Test contains six subtests that test the computer's high resolution video display. Move the highlight bar to the subtest you want to execute and press **Enter**.

Subtest 01 VRAM W/R/C Test

This subtest writes address and data patterns to Video RAM, then reads the values from the Video RAM and compares them to the original test patterns. During the execution of this test 13 different color screens display: black, green, green, blue, blue, red, red, red, black, white, pink, cyan, and black.

Test Process:

1. Sets the video display to 1024*768 mode

2. Bank change test
   Writes 1 byte data in order 0, 1, through Fh, and compares the result, at every bank, to the original data patterns.

3. Bit shift data test
   Writes 01h data into addresses A000:0000h through A000:FFFFh for each bank, reads the new data and, then compares the results with the original data. Data is then shifted 1 bit to the left, and all bits (01h, 02h, 04h, 08h, through 80h) are tested again.

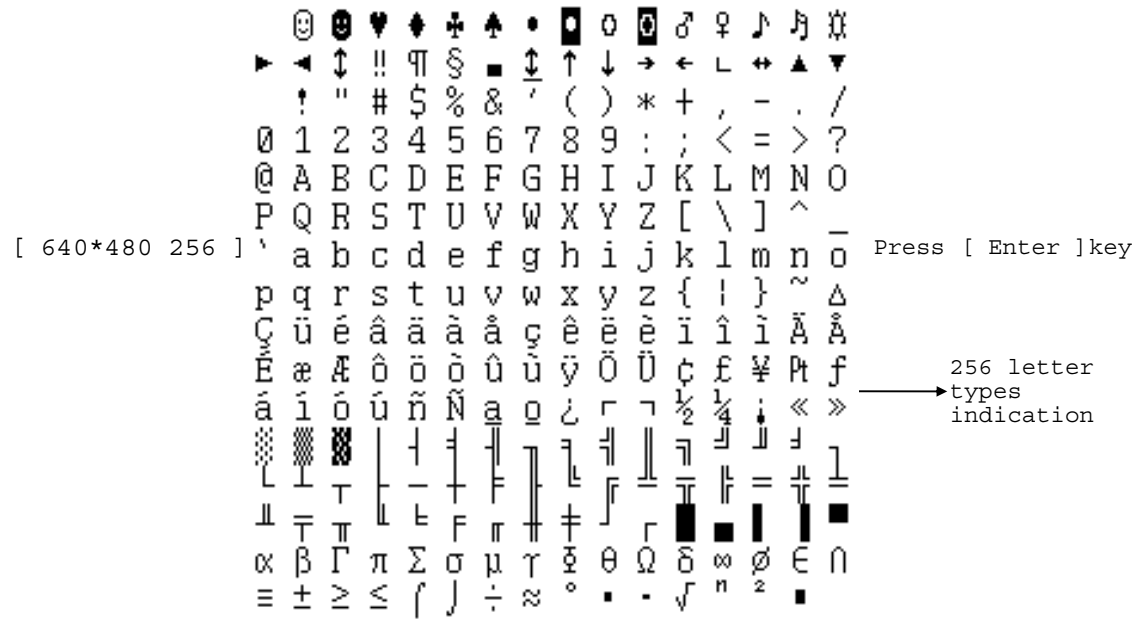
4. Fixed data test
   Writes test data (in order FFh, AAh, 55h, 00h) into addresses A000:0000h through A000:FFFFh for each bank by, reads the new data and, then compares the results with the original data. Data is then shifted 1 bit to the left, and all bits are tested again

NOTE: *If **NO** is selected for Test Loop on the Test Parameter menu, the screen displays the colors listed above and then the High Resolution Display Test menu displays.*

*If **YES** is selected for Test Loop on the Test Parameter menu, the screen displays the colors listed above. Press **Ctrl + break** to return to the High Resolution Display Test menu.*

Subtest 02 640*480 Mode Display

This subtest uses 640*480 video resolution to display a high resolution white frame, 256 letter types (8*16 pixels) and 64 gradations of white, red, green, and blue as shown below.



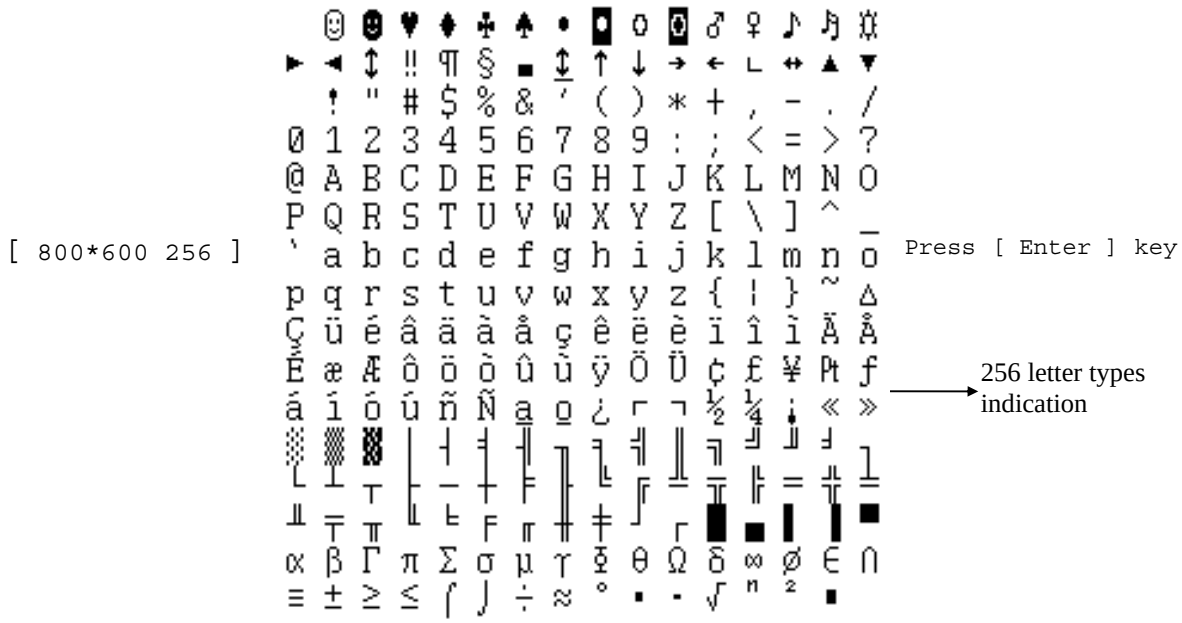
	0---+---1---+---2---+---3---+---4---+---5---+---6---
WHITE	64 gradations
RED	64 gradations
GREEN	64 gradations
BLUE	64 gradations

To exit this subtest and return to the High Resolution Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 03 800 * 600 Mode Display

This subtest uses 800*600 video resolution to display a high resolution white frame, 256 letter types (8*16 pixels) and 256 gradations of white, red, green, and blue as shown below.



0---+---1---+---2---+---3---+---4---+---5---+---6---

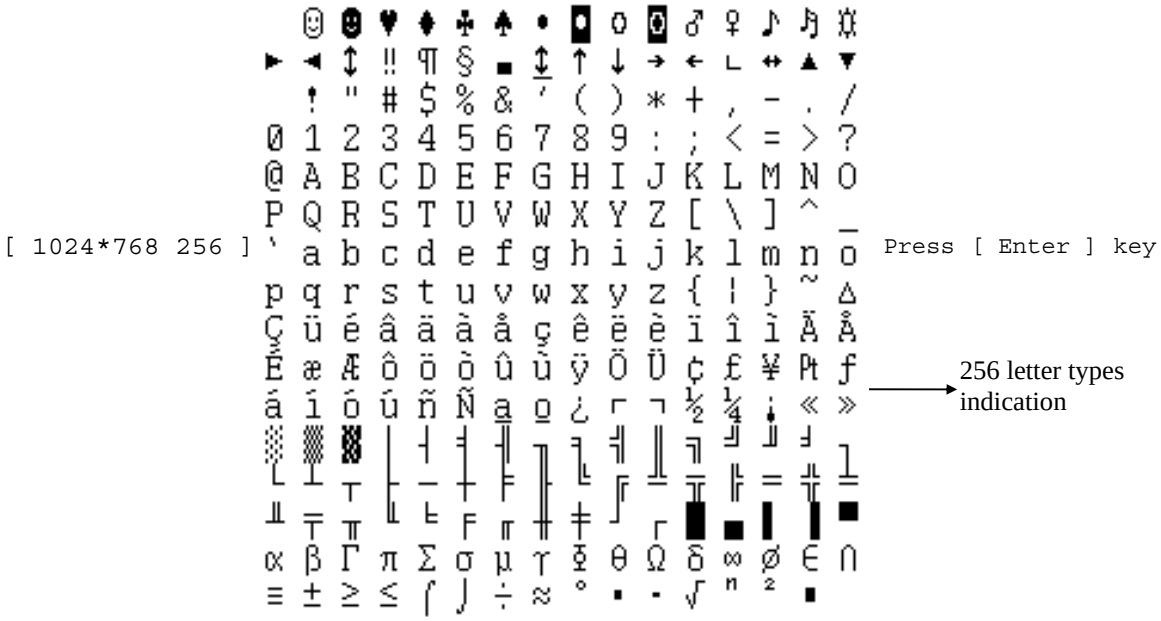
WHITE	64 gradations
RED	64 gradations
GREEN	64 gradations
BLUE	64 gradations

To exit this subtest and return to the High Resolution Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu

Subtest 04 1024* 768 Mode Display

This subtest uses 1024*768 video resolution to display a high resolution white frame, 256 letter types (8*16 pixels) and 64 gradations of white, red, green, and blue as shown below.




```
0---+---1---+---2---+---3---+---4---+---5---+---6---
```

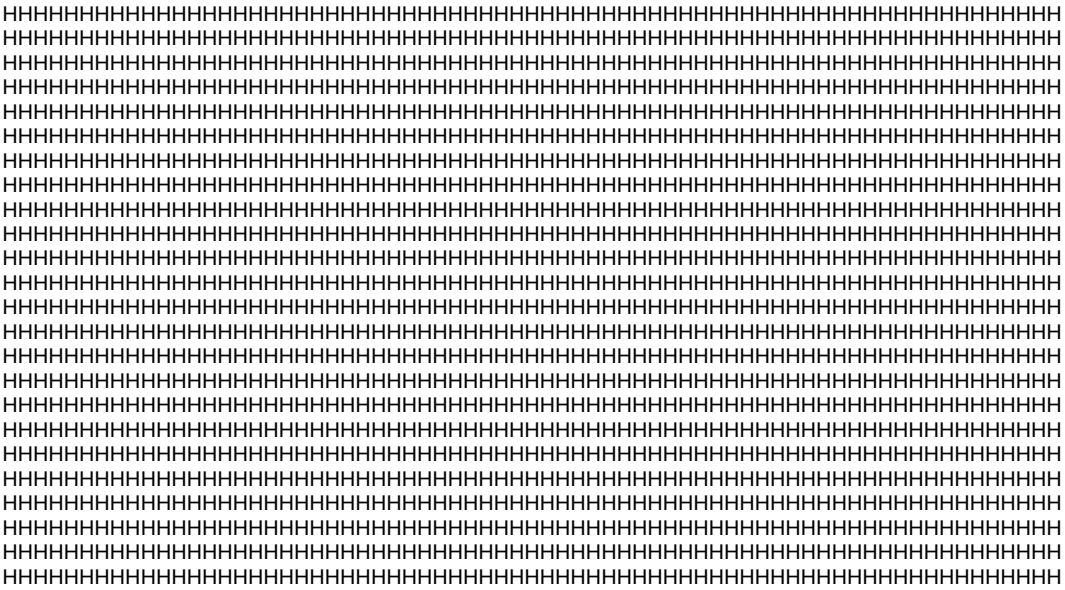
WHITE	64 gradations
RED	64 gradations
GREEN	64 gradations
BLUE	64 gradations

To exit this subtest and return to the High Resolution Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 05 “H” Pattern Display

This subtest uses the 1024*768 Mode to display a high resolution white frame, “H” letters (8*16 pixels fonts), at 128 letters by 48 lines.

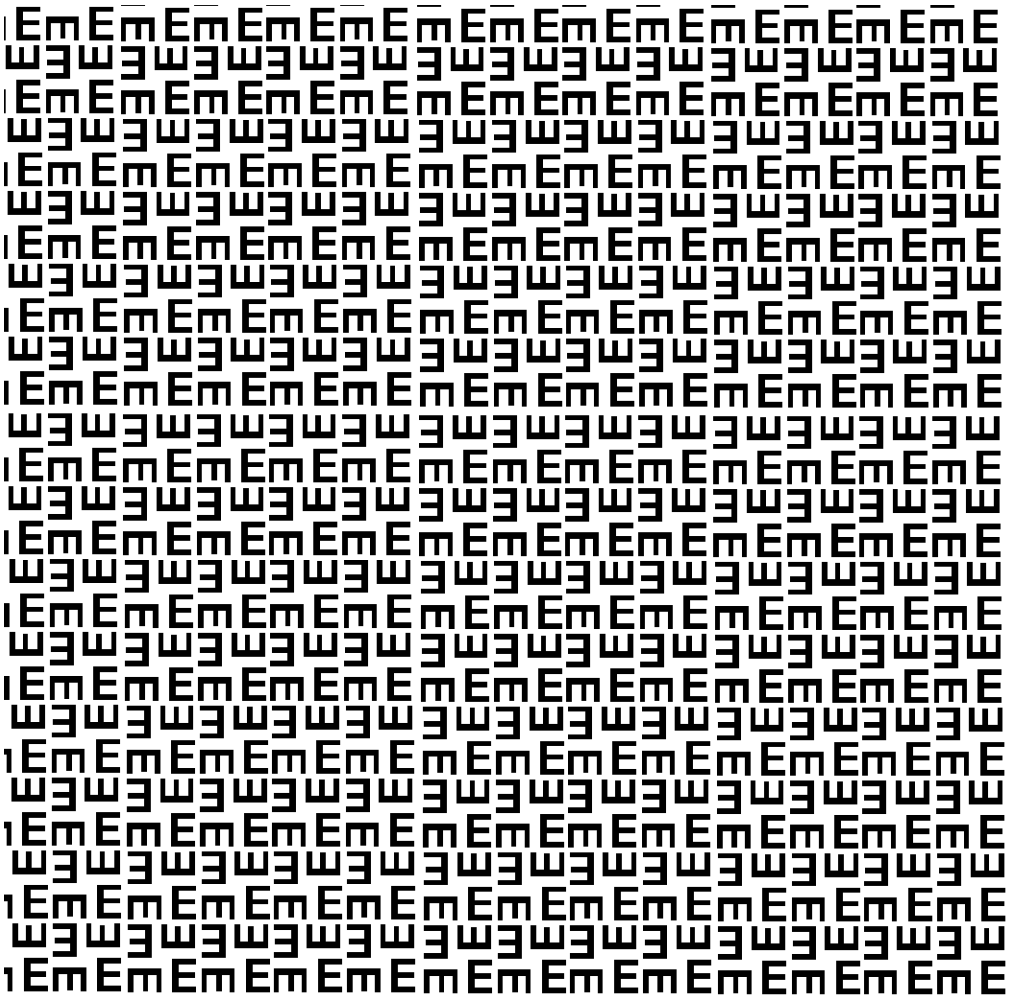


To exit this subtest and return to the High Resolution Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

Subtest 06 Focus Test (“E” Pattern)

This subtest sets the 1024*768 Mode and displays “E” patterns (18*18 dot fonts), at 56 letters *42 lines surrounded by a high resolution white frame.



To exit this subtest and return to the High Resolution Display Test menu:

Press **Enter** if **NO** was selected for *Test Loop* on the Test Parameter Menu.
Press **Ctrl** + **break** if **YES** was selected for *Test Loop* on the Test Parameter Menu.

3.13 Multimedia Test

To execute the Multimedia Test select **10** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The Multimedia Test contains four subtests that test the computer's multimedia functions. Move the highlight bar to the subtest you want to execute and press **Enter**.

> ***NOTE**: Use the Toshiba Backup CD-ROM for Subtests 01, 02, and 03.*

Subtest 01 Sequential Read Test

This subtest sequentially reads one block unit (2K bytes) of all logical addresses from the test CD.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter Menu, the screen will remain blank while the subtest is executing. When the test is complete the Multimedia Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter Menu, the Test Status screen displays while the subtest is executing. Press **Ctrl + break** to return to the Multimedia Test menu.*

Subtest 02 Random Read Test

This subtest randomly reads all addresses.

Subtest 03 Read Specified Address Test

This subtest reads data from a specified block of addresses.

The following message displays on the screen to enter the start and end block addresses:

```
START BLOCK ADDRESS ?
END BLOCK ADDRESS   ?
```

Subtest 04 1 Point W/R/C (R/RW Media)

> ***NOTE**: Use CD-R or CD-RW, the CD-ROM and DVD cannot be used for this subtest, and some DVD-dual can't support this test.*

This subtest writes specified data to a specified block count, then reads and compares the result.

3.14 MEMORY2 Test

To execute the Expansion Test select **11** from the Diagnostic Test Menu, press **Enter** and follow the directions on the screen. The MEMORY2 Test contains four subtests that test the computer's. Move the highlight bar to the subtest you want to execute and press **Enter**.

> ***NOTE**: If **NO** is selected for Test Loop on the Test Parameter menu, the Test Status screen displays while the test is executing. When the test is complete the Memory Test menu displays.*
>
> *If **YES** is selected for Test Loop on the Test Parameter menu, the Test Status screen displays while the test is executing. Press **Ctrl + break** to return to the Memory Test menu*

Subtest 01 All one/All zero test

This subtest performs pseudorandom data read/write. The data consists of “all ones”/”all zero” patterns produced by pseudorandom sequence generator. The test checks address error.

```
FFFFFFFFFFFFFFFF0000000000000000
0000000000000000FFFFFFFFFFFFFFFF
```

Subtest 02 Walking 1/Walking 0 test (Left)

This subtest uses “running one”/”running zero” patterns. This test sequence allows also to checking system bus in maximum noise conditions. The following test sequence is written.

```
7FFF7FFF7FFF7FFF8000800080008000
BFFFBFFFBFFFBFFF4000400040004000
```

After all the memory being tested is filled with the pattern, it is read in descanting direction and compared with reference data. As the memory is read, the data is replaced with inverse test pattern. After all the memory is read and replaced with inverted pattern, it is read in descanting direction and compare with new reference data. As the memory is read, the data is replaced with next pattern, which is like first one shifted to right.

Subtest 03 Walking 1/Walking 0 test (Right)

Tee test method is the same as Subtest2. However, the data to be used differs.

```
8000800080008000FFF7FFF7FFF7FFF
4000400040004000BFFFBFFFBFFFBFFF
```

Subtest 04 Walking 1/Walking 0 test (Left/ Right)

Tee test method is the same as Subtest2. However, the data to be used differs.

```
7FFF7FFF7FFF7FFF8000800080008000
BFFFBFFFBFFFBFFF4000400040004000
DFFFDFFFDFFFDFFF2000200020002000


FFFBFFFBFFFBFFFB0004000400040004
FFFDFFFDFFFDFFFD0002000200020002
FFFEFFFEFFFEFFFE0001000100010001
8000800080008007FFF7FFF7FFF7FFF
4000400040004000BFFFBFFFBFFFBFFF


0004000400040004FFFBFFFBFFFBFFFB
0002000200020002FFFDFFFDFFFDFFFD
0001000100010001FFFEFFFEFFFEFFFE
```

3.15 Error Codes and Error Status Names

The following table lists the error codes and error status names for the Diagnostic Tests.

Table 3-2 Error codes and error status names (1/2)

Device Name	Error Code	Error Status Name
(Common)	FF	Data Compare Error
Memory	02	Protected Mode Not Changed
	??	Other Error
FDD	01	Bad Command Error
	02	Address Mark Not Found
	03	Write Protected
	04	Record Not Found
	06	Media Change Line Error
	08	DMA Overrun Error
	09	DMA Boundary Error
	0C	Select Media Error
	10	CRC Error
	20	FDC Error
	40	Seek Error
	80	Time Out Error
	??	Other Error
HDD	01	Bad Command Error
	02	Bad Address Mark Error
	04	Record Not Found
	05	HDC Not Reset Error
	07	Drive Not Initialized
	09	DMA Boundary Error
	0A	Bad Sector
	0B	Bad Track Error
	10	ECC Error
	11	ECC Recover Enabled
	20	HDC Error
	40	Seek Error
	80	Time Out Error
	AA	Drive Not Ready

Table 3-2 Error codes and error status names (2/2)

Device Name	Error Code	Error Status Name
HDD	BB	Undefined Error
	CC	Write Fault
	E0	Status Error
	F0	No Sense Error
	??	Other Error
Cache Memory	02	Protect Mode Error
	03	Caching Error
	??	Other Error
Multimedia	01	Write Error
	0F	Invalid Drive
	15	Drive Not Ready
	??	Other Error

NOTE: *If error status name is* ***Other Error*** *, please reference the* ***Error Code*** *for error information*

3.16 Running Test

***NOTES**:*

1. *You may add or delete subtests using the Running Test Edit Item function, see Section 3.20.*
2. *Do not forget to insert a work disk in the FDD. If a work disk is not inserted an error will be generated during the Floppy Disk Test.*
3. *If the test completes successfully an "PASS" sign with blue letters displays on the screen.*
4. *If the test fails or is interrupted before completion an "FAIL" sign with red letters displays on the screen.*
5. *If running item not select an "NOITEM" sign with green letters display on the screen.*
6. *All errors which occur during execution of the Running Test are logged in the Log File.*
7. *This program is executed according to the* Count Loop *number selected in the Running Test Edit Item, see Section 3.20. To terminate the program, press* ***Ctrl* + *Break*.**

3.17 DMI INFOEMATION

Select **03** from the Diagnostics Menu and press **Enter** to Check or Write DMI Information Data:

3.17.1 Check DMI Information

The Check DMI Configuration program contains the following configuration information for the computer:

> ***NOTE:*** *Please set the media of DVD before starting a test.*

System information (Type 1)

1. Manufacture : TOSHIBA
2. Product Name : Satellite XXXXXX
3. Version :(TOSHIBA Part Number)
4. Serial Number : Serial Number
5. UUID Number: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

OEM Strings (Type 11)

1. OEM String : xxxxxxxxxxxxxxxxxxxxxxxxxxxx

On Board LAN MAC

1. MAC ADR : xxxxxxxxxxxx

DVD Region Code

1. User Change Time : X
2. Region Code : X

3.17.2 Write DMI Information

The Write DMI Information program contains the following information for the computer :

1. Manufacture Name (TOSHIBA)
2. Product Name (Satellite XXXXXX)
3. Part Number (PSL20X-XXXXXX)
4. Serial Number (12345678W)
5. OEM String (PSL20X-XXXXX,SXXXXXXXXXX)

Select 1 ~ 5 to keyin new data , select 6 to exit program , program will compare input data length with the max length , if over will retry keyin

Note : Please Check New DMI Information After System Restart !!

1. **** Manufacture Name (TOSHIBA) - (15)
2. **** Product Name (Satellite XXXXXX) - (31)
3. **** Part Number (PSL20X-XXXXXX) - (15)
4. **** Serial Number (12345678W) - (9)
5. **** OEM String (PSL20X-XXXXX,SXXXXXXXXXX) - (31)
6. **** Exit

Please Select (1 ~ 5) To Modify DMI String :

Current Data of EEPROM : Toshiba
1. Enter the Manufacture Name : TOSHIBA
Your Keyin is : TOSHIBA …… This is your keyin data
EEPROM return : TOSHIBA ……. This is read from eeprom back

Press any key to continue
Note : Please Check New DMI Information After System Restart !!

If Keyin length too long will retry :

Current Data of EEPROM : 12345678W
4. Enter the Serial Number : 12345678901234
Your Keyin String Length Not Correct 14 > 9 !!!

Current Data of EEPROM : 12345678W
4. Enter the Serial Number :

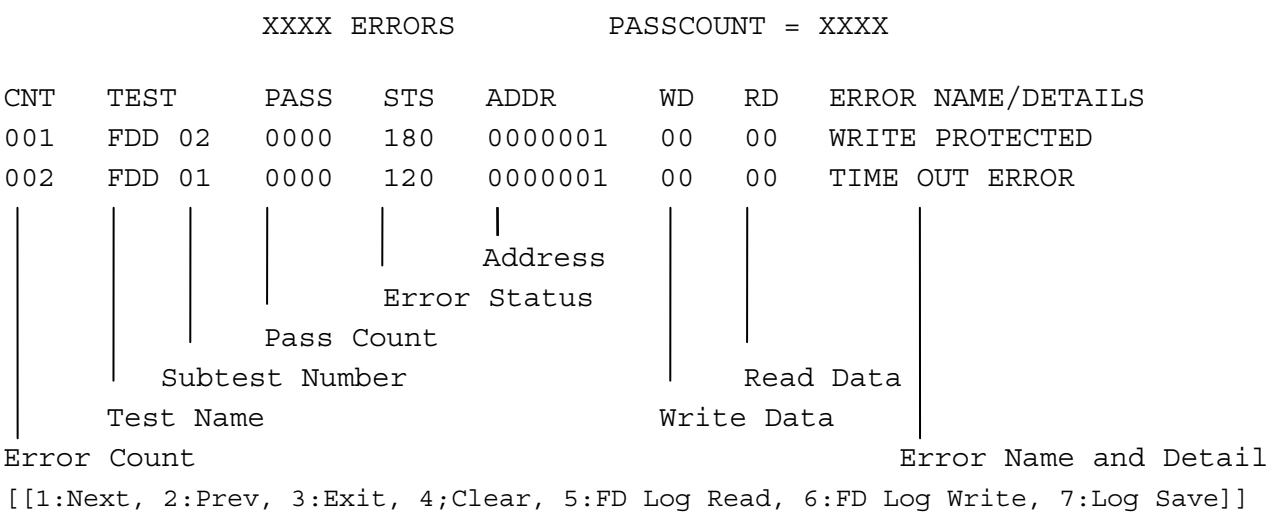
3.18 Log Utilities

This function logs error information generated while a test is in progress and stores the results in RAM (Maximum error log : 500 times). This function can store data on a floppy disk. If the power switch is turned off, the error information will be lost. Error information is displayed in the following order:

1. Error count (CNT)
2. Test name and subtest number (TEST)
3. Pass count (PASS)
4. Error status (STS)
5. FDD/HDD or memory address (ADDR)
6. Write data (WD)
7. Read data (RD)
8. Error Name (ERROR NAME/DETAILS)

3.18.1 Operations

1. Select **04** and press **Enter** in the Diagnostics Menu to log error information into RAM or onto a floppy disk. Error information is displayed in the following format:



2. Error information displayed on the screen can be manipulated with the following number keys:

   The **1** key scrolls the display to the next page.
   The **2** key scrolls the display to the previous page.
   The **3** key returns to the Diagnostics Menu.
   The **4** key erases all error log information in RAM.
   The **5** key reads the log information from a floppy disk.
   The **6** key writes the log information to a floppy disk.
   The **7** key save the log information to a floppy disk.

The following are the test abbreviations for each Diagnostics Test.

Test Name	**Test Abbreviations**
System Test	ROM
Memory Test	RAM
Keyboard Test	KBD
Display Test	CRT
Floppy Disk Test	FDD
Hard Disk Test	HDD
Real Time Clock Test	RTM
Cache Memory Test	CAH
Height Resolution Display Test	KIF
Multimedia Test	MLT
Memory2 Test	RAM

3.19 System Configuration

Select **05** from the Diagnostics Menu and press **Enter** to display the following system configuration:

```
SYSTEM CONFIGURATION :

   * - BIOS VER = VX.XX  KBC VER = XXXX
   * - MAC ADDRESS : XXXXXXXXXXXX
   * - 0 ASYNC ADAPTER
   * - 1 HDD DRIVE(S):XXXXXXXXXXXXXXXXXXXXXXXXX
           FW Rev.:XXXXXXXX
           CUR LBA:XXXXXXXX  ORG LBA:XXXXXXXX
   * - BATTERY TYPE:XXXXXXXXXX
   * - XXXMB MEMORY SIZE
   * - XXX CPU
   * - 1 Vedio Chip XXXXXXXXXXXXX
   * - 1 ODD DRIVE(S):XXXXXXXX
              FW Rev.:XXXX
```

Press **Enter** to return to the Diagnostics Menu.

3.20 Running Test Edit Item

3.20.1 Function Description

Function description lets you add or delete the subtests used to execute the Running Test. The following screen displays after pressing the **Tab** key to edit an item in the Running Test.

```
KEY OPERATION

↓      Cursor Down
↑      Cursor Up
PgDn   Page Down
PgUp   Page Up
Home   Top of ITEM
End    End of ITEM
Ins    Insert ITEM
Del    Delete ITEM
Enter  End
```

3.20.2 Operation Description

Select **05** from the Diagnostics Menu and press **Enter** to display the following:

```
                              Test Item Editor                    [RUNNING TEST]

Loop Count (1-65535, 0 = infinity) 00000              Error Stop  NO

T-No        Test Name                S-No          Subtest Name
01          System Test              Subtest 01    ROM Checksum
02          Memory Test              Subtest 01    Conventional Memory
02          Memory Test              Subtest 02    Protect Mode
02          Memory Test              Subtest 03    Protect Mode (32MB Max)
02          Memory Test              Subtest 04    RAM Refresh
04          Display Test             Subtest 01    VRAM W/R/C
04          Display Test             Subtest 02    Character Attribute Set
04          Display Test             Subtest 03    Character Set
04          Display Test             Subtest 04    80 * 25 Character Display
04          Display Test             Subtest 05    320 * 200 Graphics Display
04          Display Test             Subtest 06    640 * 200 Graphics Display
04          Display Test             Subtest 07    640 * 480 Graphics Display
04          Display Test             Subtest 08    Display Page
05          Floppy Disk Test         Subtest 02    Sequential W/R/C
08          Hard Disk Test           Subtest 01    Sequential Read
08          Real Time Clock Test     Subtest 02    Backup Memory Test

                          Tab: HELP (Key Operation)
```

1. Enter a **number** or **0** for **Loop Count** and press **Enter**.

Select a number from 1 to 65535 to define the number of times the Running Test executes.
Select 0 to run the test continuously until halted by the user.

2. Select the **NO** or **YES** for **Error Stop** and press **Enter**.

   Select **NO** to keep the test running even if an error is found.
   Select **YES** to stop the test program when an error is found.

> ***NOTE:*** *All errors which occur during execution of the Running Test are logged in the Log File.*

3. Press **Insert** to add a subtest.

4. Press **Delete** to remove the selected subtest.

5. Press **Enter** when you have finished editing the Running Test list.

6. The following message displays:

```
Do you want to save the data?

   Save to disk
   Do not save
```

7. Select the option and press **Enter**.

8. Select **03** from the Diagnostics Menu and press **Enter** to execute the Running Test.

> ***NOTE:*** *If press **Ctrl+break** in the runin process, please press more one any key to exit.*

3.21 Common Tests and Operation

3.21.1 How to operate a window

To input parameters, or open a window use the following keys.

↑ ↓ → ← key	: to move a highlight bar
[Enter] key	: to select an item at the highlight bar
[Esc] key	: to close the current window and go back to the previous window

3.21.2 How to Stop the Test Program

To stop a test:

[**Ctrl**]+[**Break**] Press the Ctrl key and the Break key simultaneously.

3.21.3 Test Status Screen

> ***NOTE**: The Test Status Screen does not display during all the tests. See the specific test description Sections 3.4 through 3.14.*

The following Test Status screen displays during most tests. See the description of each test Sections 3.4 through 3.14 for specific screen information.

```
      Test Name

Sub Test     :0101
Pass Count   :00000      Error Count   :00000
Write Data   :00         Read Data     :00
Address      :00000000   Status        :00
```

Test Name — Displays the name of the test being executed.

Subtest No. — Displays the Subtest number in the following format:

ffgg
- ff = Subtest No.
- gg = Step Number (Will be blank if the test does not have a Step Number.)

Pass Count	Displays the number of times the test has been executed.
Error Count	Displays the number of errors which have occurred during the test.
Write Data	Displays only the test data that has failed to compare during the test while being written during the test.
Read Data	Displays test data that has failed to compare during the test while being read during the test.
Test Address	Displays the Test Address. (The format differs for each test.)
Error Status	Displays the error status.
Error Name	Displays the name of the error.

3.21.4 Test Stop Display

If an error occurs during a Subtest and YES is selected for Error Stop, the following message displays:

```
[HALT OPERATION]

    1.Test end
    2.Continue
    3.Retry
```

* Select 1, 2, or 3

The three selections have the following functions:
1: Terminates the test program and exits to the subtest menu.
2: Continues the test from the error.
3: Restarts the test from the beginning.

Use the arrow keys to move the cursor to the desired option and press Enter.

3.21.5 How to enter data

Letters which must be entered are always shown in [ ]. Simultaneous entries are displayed by a "+" mark. For example:

[a] [Enter]
Press the "a" key, then press the [Enter] key.

[Ctrl] + [c]
Press the [Ctrl] key and the "c" key simultaneously.

Chapter 4

Replacement Procedures

Chapter 4 Contents

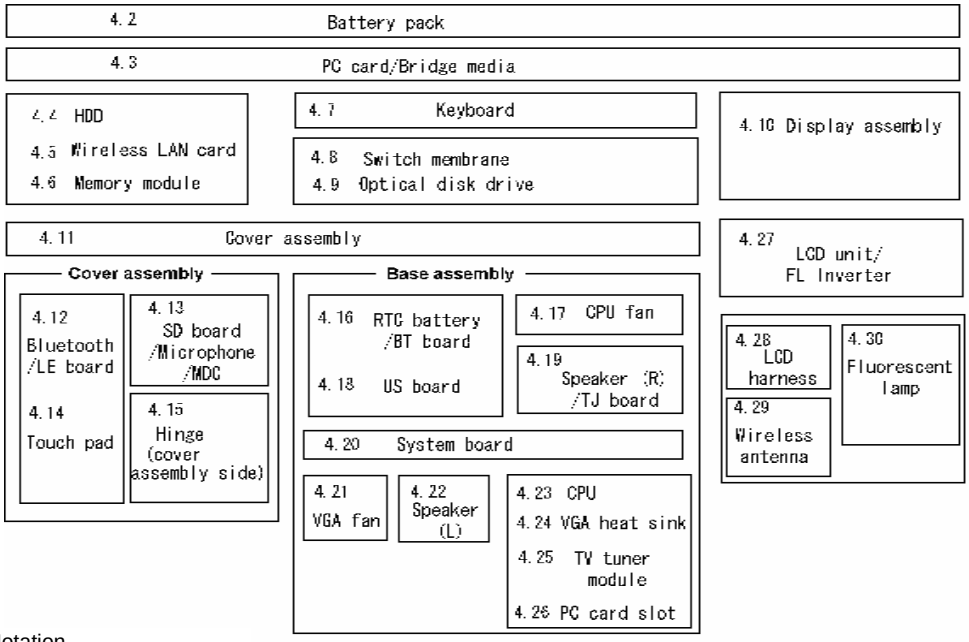
Figures

4.1 Overview

This chapter describes the procedure for removing and replacing the field replaceable units (FRUs) in the PC. It may not be necessary to remove all the FRUs in order to replace one. The chart below provides a guide as to which other FRUs must be removed before a particular FRU can be removed. The numbers in the chart indicate the relevant section numbers in this manual.

In all cases when removing an FRU, the battery pack must also be removed. When repairing an FRU that is the potential cause of a computer fault, use the chart to determine the order in which FRUs need to be removed.

The tilt stand, if it is installed, can be removed without any other FRUs removed.

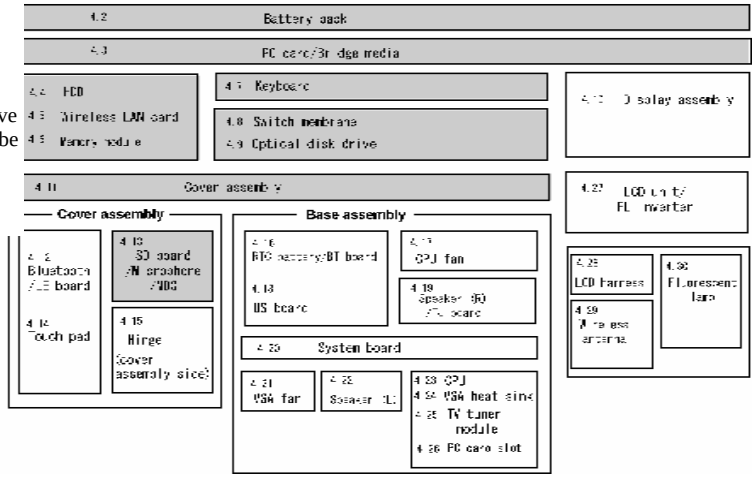


• Chart Notation

The chart shows the case for the following example:

• Removing a MDC

All FRUs down to the "4.2 Battery pack" to "4.11 Cover assembly" above a SD board/Microphone/MDC must be removed.



Safety Precautions

Please read the following safety instructions before disassembling the computer and always follow the instructions while working on the computer.

DANGER:

1. *In the case of the battery, always use authentic parts or equivalent parts approved by Toshiba. Other batteries may have different specifications that are incompatible with the computer and may result in fire or explosion.*
   Due to the risk of alkali fluid leaks, never attempt to heat or disassemble the battery. Similarly, due to the risk of explosion, never expose the battery to flame.
2. *Some parts including the power supply and FL inverter generate high voltages. If you need to turn on the power while disassembling the computer, do not touch any connectors or other components due to the risk of electric shock. Also, do not disassemble individual parts when performing routine maintenance.*

WARNING:

1. *To prevent electric shock, turn off the power unplug the AC adapter from the power source.*
2. *As the battery installed to the computer is typically already charged, the risk of electric shock remains even when the AC adapter is unplugged from the socket. To prevent electric shock, always take off any metal jewelry or accessories such as necklaces, bracelets or rings before working on the computer. Never work with wet or moist hands.*
3. *Take care not to injury yourself on any edges or corners.*

CAUTION:

1. *Confirm that replacement parts have compatible specifications before replacing on the computer. Never use incorrect parts as these may cause faults on the computer.*
2. *To prevent internal damage such as short circuits or burning, do not allow any screws, paper clips, or other metal objects to fall into the computer. When removing screws, always replace with the same size screw. Ensure that all screws are fully tightened. Loose screws may result in short circuits leading to overheating, smoke or flame.*
3. *To prevent electric shock, check that you have disconnected all cables from a part before removing the part.*
4. *When connecting to the AC power supply, use only an AC adapter and cable approved by Toshiba.*
5. *To prevent electric shock, ensure that all replacement parts are compatible with the computer and that all cables and connectors are securely connected.*

Before You Begin

Take note of the following points before starting work. Always remove the AC adapter and battery pack before commencing any of the procedures. The procedure for removing the battery pack is described in section “4.2.1 Battery Pack”.

1. Do not disassemble the computer unless it is operating abnormally.
2. Use the designated tools.
3. Ensure that the environment for working on and storing parts does not contain any of the following.
   - Dust or dirt
   - Static electricity
   - Extremely hot, cold or humid conditions
4. Perform the diagnostic tests described in Chapter 2 to determine which FRU is the cause of the fault.
5. Do not perform any unnecessary work. Always work in accordance with the disassembly and reassembly procedures in this manual.
6. Keep parts removed from the computer in a safe place away from the computer where they will not be damaged or interfere with your work.
7. Disassembling requires the removal of a large number of screws. Keep removed screws in a safe place such that you can determine which screws belong to which part.
8. When reassembling, ensure that you use the correct screws and fit parts in the correct position. Screw sizes are noted in the text and figures.
9. As all parts have sharp edges and corners, take care not to cut yourself.
10. After replacing an FRU, check that the computer and replaced part operate correctly.

Disassembly Procedure

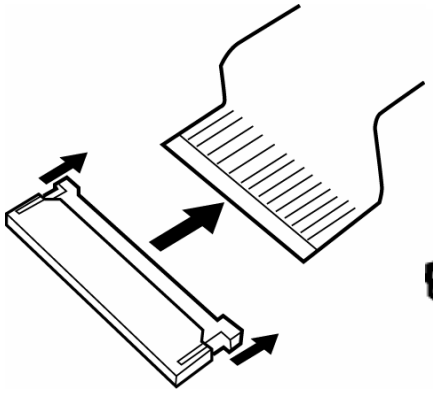
Three main types of cable connector are used.

- Pressure plate connector
- Spring connector
- Normal pin connector

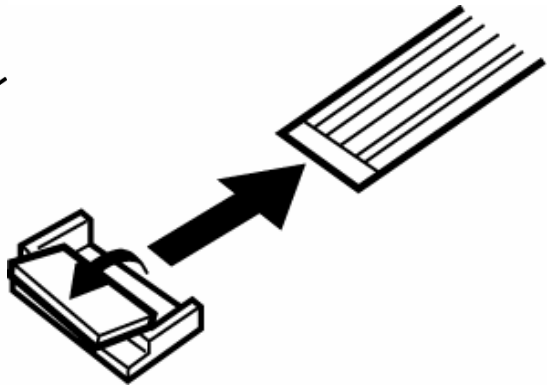
When disconnecting a pressure plate connector, lift up the tag on one side of the plastic pressure plate on the connector and pull the cable out from the connector. When reconnecting a cable to a pressure plate connector, lift up the pressure plate to a suitable height and insert the cable into the connector. Press down on both sides of the pressure plate such that both sides of the plate and connector are at the same height and that the cable is fixed in the correct position. Pull the cable to ensure that it is securely connected. If the cable is disconnected from the connector, reconnect it making sure that you lift the pressure plate high enough to insert fully the cable.

For spring connectors, lifting up the stopper frees the cable and allows it to be pulled out. To reconnect, hold the stopper in the up position and insert the cable, then lower the stopper to secure the cable.

Normal pin connectors are used for all other cables. Simply pull out or push in these connectors to disconnect or reconnect.



Pressure plate connector



Spring connector

Assembly Procedure

After the computer has been disassembled and the part that caused the fault has been repaired or replaced, the computer must be reassembled.

Take note of the following general points when assembling the computer.

- Take your time and follow the instructions carefully. Hurrying the assembly work will only introduce new problems.
- Check that all cables and connectors are securely connected.
- Before fastening FRUs or other parts in place, ensure that no cables are caught on screws or the FRU.
- Check that all latches are securely closed.
- Ensure that you have installed all FRUs correctly and do not have any screws left over. Using an incorrect screw may damage the thread or screw head and result in the FRU not being securely fastened in place.

After installing FRUs, check that the computer operates correctly.

Tools and Equipment

For your safety and the safety of the people around you, it is important that you use Electrostatic Discharge (ESD) equipment. Correctly utilizing of the equipment increases the percentage of successful repairs and saves on the cost of damaged or destroyed parts. The following equipment is required for disassembly and assembly.

- One Philips screwdriver with type 0 bit (for THIN HEAD screws)
- One Philips screwdriver with type 1 bit (for screws other than above)
- Tweezers (for lifting screws)
- ESD mats (lay on work table or floor)
- An ESD wrist strap and heel grounder
- Anti-static carpet or flooring

Screw Tightening Torque

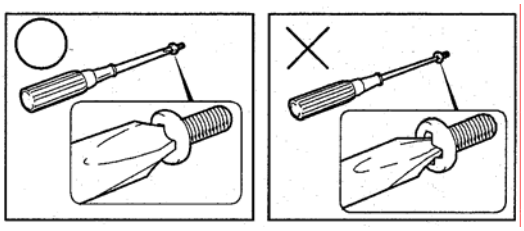
Use the following torque when tightening screws.

***CAUTION**: Overtightening may damage screws or parts. Undertightening may allow screws to loosen (and possibly fall out) causing a short circuit or other damage.*

***NOTE**: To tighten screws quickly and accurately, an electric screwdriver is recommended.*

- M2 (2mm) 0.167 N·m (1.7 kgf·cm)
- M2.5 (2.5mm) 0.245 N·m(2.5 kgf·cm)
- M2.5 (2.5mm) 0.392 N·m(4.0 kgf·cm) for Hinge support
- M3.0 (3mm) 0.245 N·m (2.5 kgf·cm)

***NOTE:** To prevent damage to THIN HEAD screws, press along the axis of the screwdriver while turning the screw. This is because the contact area between the screw and driver is less than for a pan head screw (standard pan-shaped screw head).*



Grip Color

Some screws have a colored grip area to help you determine the length of the screw.

- Even numbered length screws: Brown
- Odd numbered length screws: White
- Special length screw: Blue

"Special length screw" means screws whose length is indicated in an integral number to the first decimal places such as 2.5 mm, 2.8 mm and so on.

Screw Notation

To make maintenance of the computer easier, markings of the kinds of the screws including the types and lengths of the screws are indicated on the computer body.

Format:

Screw shape + Screw length (mm)

Screw shape

B: Bind screw
F: Thin head screw
S: Super thin head screw
T: Tapping screw
U: Other screws (Unique screws: pan head, stud, etc.)

Example: B6 … 6mm bind screw

4.2 Battery pack

Removing the battery pack

The following describes the procedure for removing the battery pack (See Figure 4-1).

> ***CAUTION:*** *Take care not to short circuit the terminals when removing the battery pack. Similarly, do not drop, knock, scratch, disassemble, twist, or bend the battery pack.*

1. Turn off the power of the computer.
2. Disconnect the AC adapter and all external devices from the computer.
3. Turn the computer upside down.
4. Slide and hold the battery release latch(2) to free the battery pack after moving the battery release lock (2) into it unlock position – the slide the battery pack out of the computer.

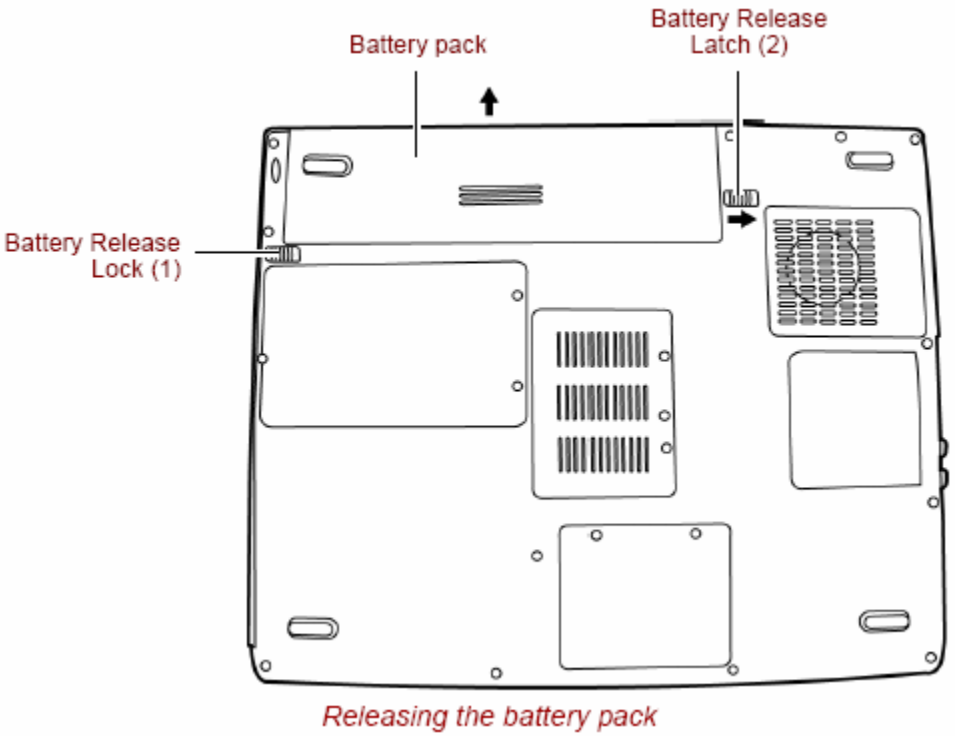


Figure 4-1 Removing the battery pack

***NOTE**: Dispose of the used battery pack in accordance with the laws and ordinances of your local authority.*

Installing the battery pack

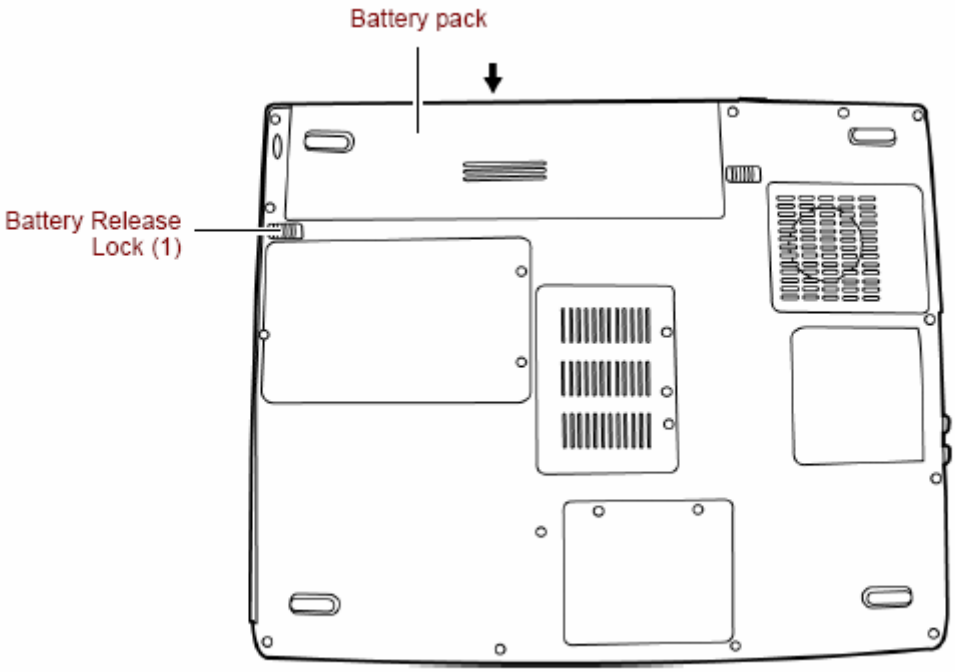
The following describes the procedure for installing the battery pack (See Figure 4-1).

***CAUTION:** There is a danger that the lithium ion battery pack may explode if not fitted, operated, handled, or disposed correctly. Dispose always the used battery pack in accordance with the laws and ordinances of your local authority. Use only the batteries approved by Toshiba.*

***NOTE:** Check visually the battery terminals and clean off any dirt with a dry cloth.*

1. Turn off the power of the computer.

2. Disconnect the AC adapter and all external devices from the computer.
3. Attach the **battery cover** to the **battery pack**.
4. Insert the battery pack
5. Ensure the battery release lock (1) is moved into its locked position



Securing the battery pack

4.3 PC card

Removing a PC card

The following describes the procedure for removing a PC card (See Figure 4-2).

> ***CAUTION:*** *Insert or remove a PC card in accordance with any instructions in a PC card manual or the manuals of the computer system you are using.*

1. Push the **eject button**. It will pop out when you release it. Then press the eject button once more to eject a PC card.
2. Grasp a **PC card** and remove it.

> ***NOTE:*** *If a PC card is not inserted all the way, the eject button may not pop out. Be sure to push a PC card firmly and press the eject button again.*

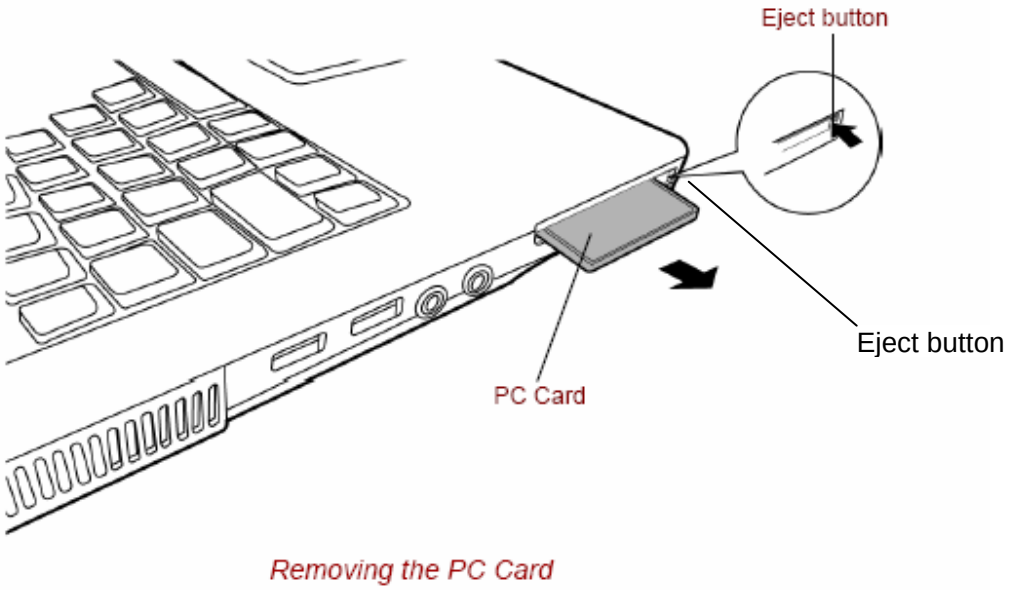


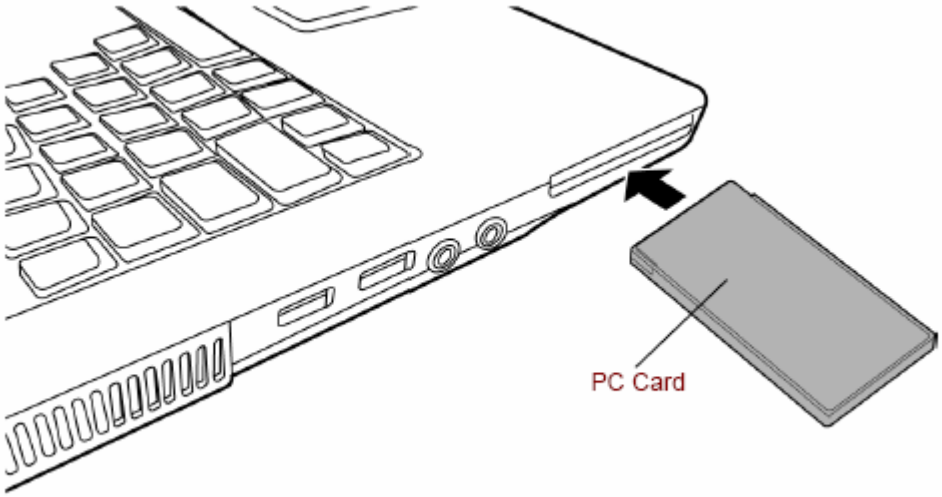
Figure 4-2 Removing a PC card

Installing a PC card

The following describes the procedure for inserting a PC card (See Figure 4-2).

1. Make sure the **eject button** does not stick out.

2. Insert a **PC card** and press it until it is securely connected.



Inserting the PC Card

4.4 HDD

Removing a HDD

The following describes the procedure for removing a HDD (See Figure 4-4 to 4-5).

> ***CAUTION:*** *Take care not to press on the top or bottom of a HDD. Pressure may cause data loss or damage to the device.*

1. Turn the computer upside down.
2. Remove the following **screws** securing a HDD slot cover and remove a **HDD slot cover**.
    - M2.5×4.0B FLAT BIND screw x2
3. Remove the following **screws** securing the **HDD assembly**.
    - M2.5×4.0B FLAT BIND screw x 1
4. Disconnect the **HDD assembly** from the connector on the system board **CN18.**

CAUTION: *When a HDD is installed, they are installed in the position as the following figure.*

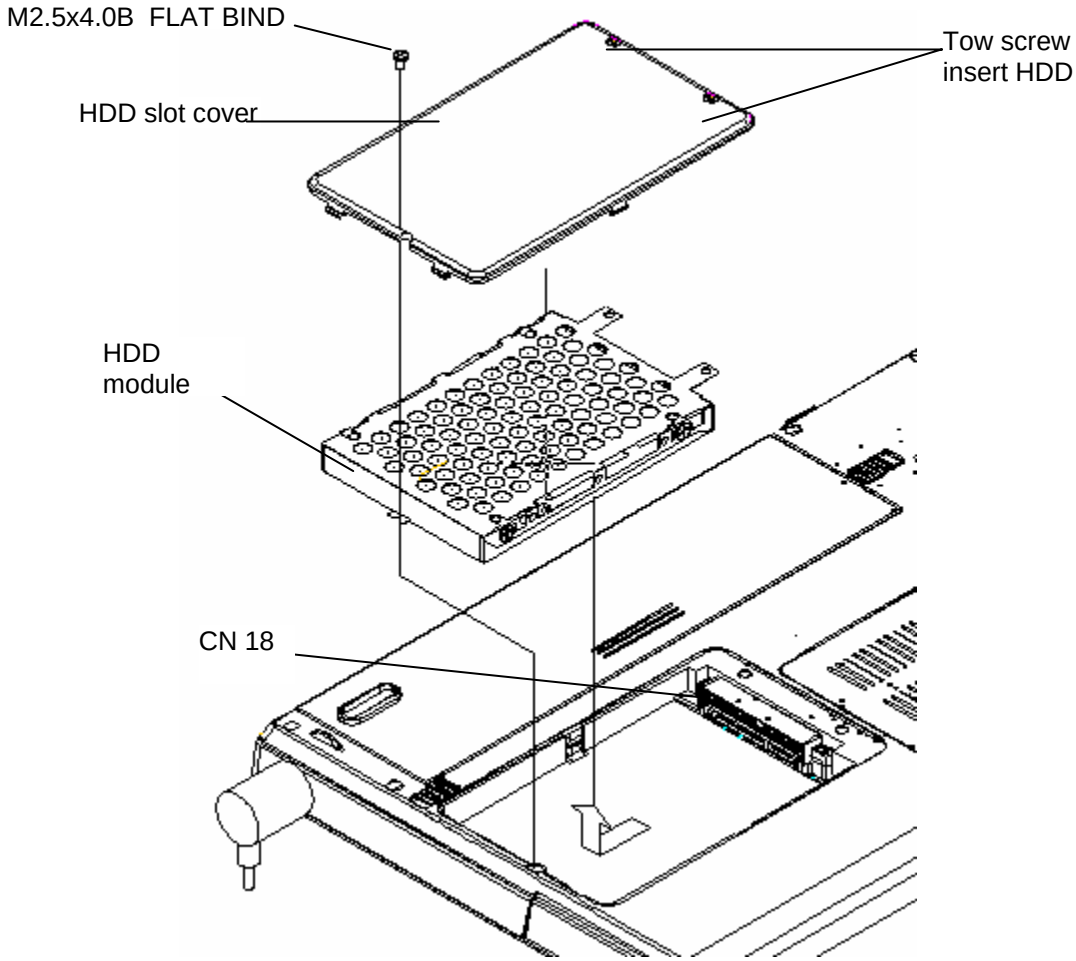


Figure 4-3 Removing the HDD assembly

5. Remove the following **screws** securing the HDD holder and remove the **HDD holder**.

   - M3.0×4.0B FLAT BIND screw x4

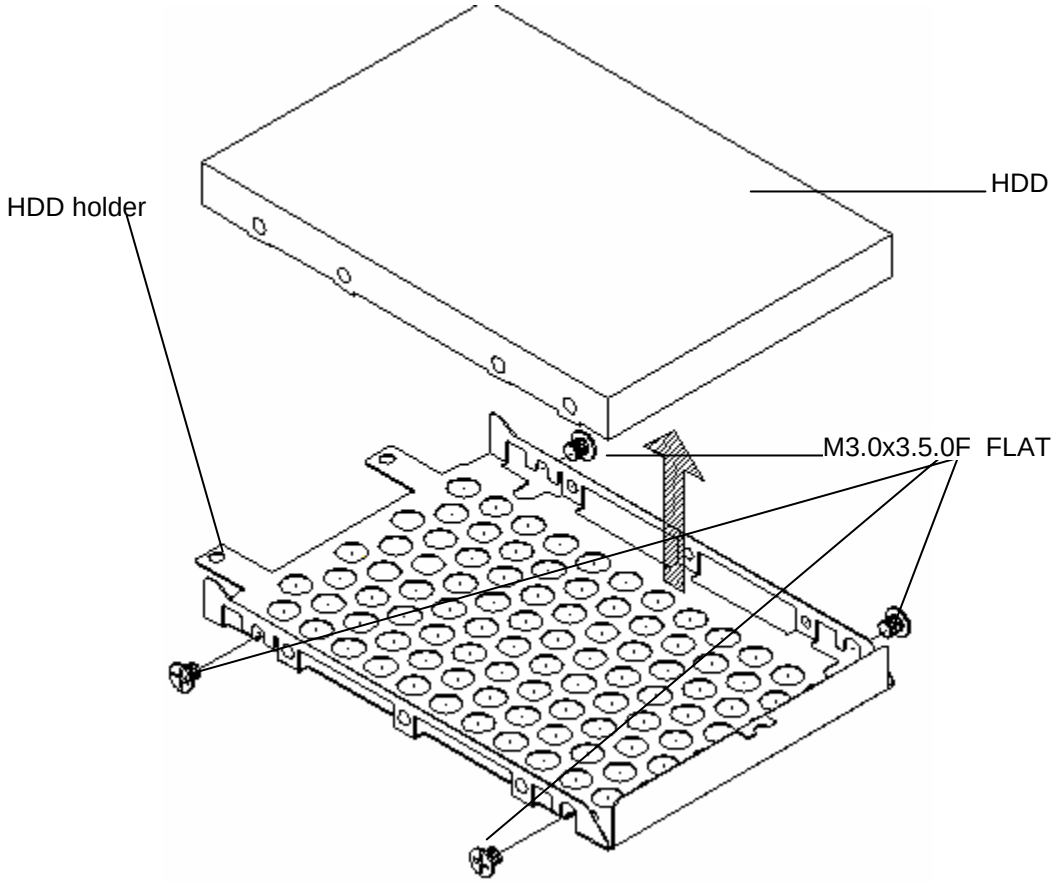


Figure 4-4 Removing a HDD

Installing a HDD

The following describes the procedure for installing a HDD (See Figure 4-4 to 4-5).

1. Install a HDD to the **HDD holder** and secure it with the following **screws**.

    - M3.0×3.5F FLAT BIND screw x4

> ***NOTE:*** *Although they are 3mm head screws, screw torque must be set in 2.5kg-cm for four screws securing the HDD holder.*

2. Insert the **HDD assembly** into the HDD slot and connect it carefully to the **CN18** on the system board.

3. Secure the **HDD assembly** with the following **screw**.

    - M2.5×4.0B FLAT BIND screw x1

4.5 Wireless LAN card

Removing a Wireless LAN card

The following describes the procedure for removing a Wireless LAN card (See Figure 4-6).

1. Remove the following **screw** of wireless cover securing **wireless LAN card cover** and remove it.

   - 2.5.0 x 4.0B BIND screw x2

2. Disconnect the **wireless LAN antenna cable Main** (Black cable) and **AUX** (White cable) from the connectors on a wireless LAN card.

3. Open the left and right latches holding a wireless LAN card and remove a **wireless LAN card** from the **connector CN27** on the system board.

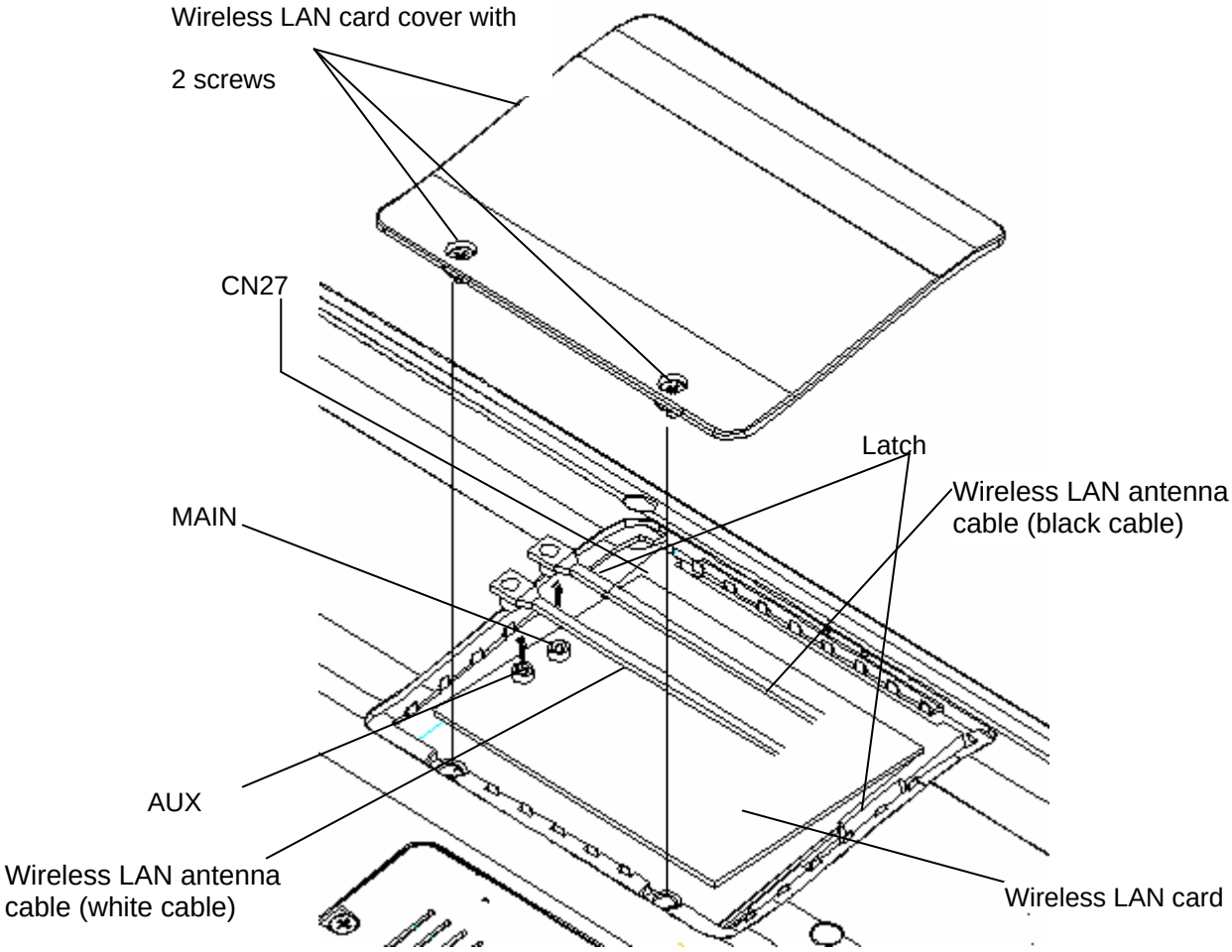


Figure 4-5 Removing a wireless LAN card

Installing a Wireless LAN card

The following describes the procedure for installing a Wireless LAN card (See Figure 4-7).

1. Insert a **wireless LAN card** terminals slantwise into the connector **CN27** on the computer and press a wireless LAN card until it is securely in place.

2. Connect the **wireless LAN antenna cables** (black and white) to the terminals on a wireless LAN card.

3. Install the **wireless LAN card cover** and secure it with the following **screw**.

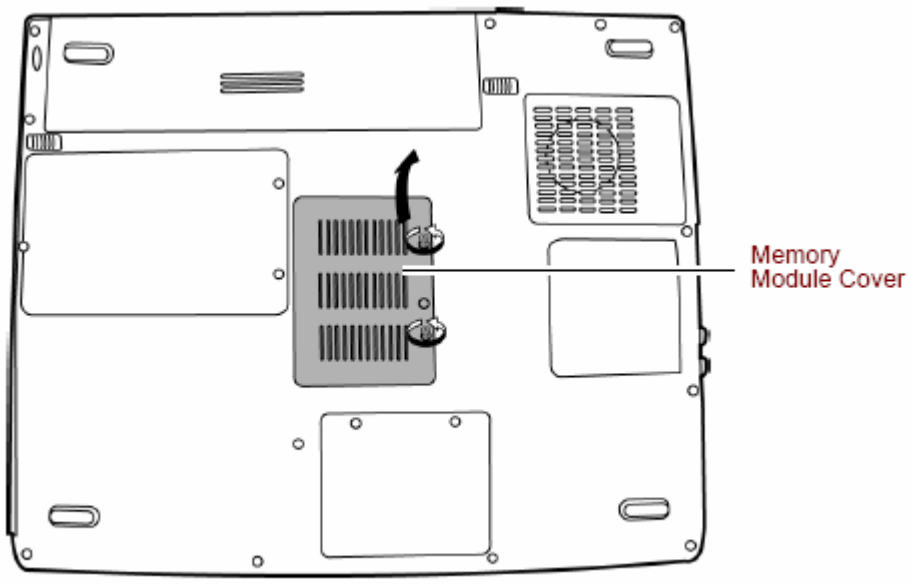
4.6 Memory module

> ***CAUTION:*** *The power of the computer must be turned off when you remove a memory module. Removing a memory module with the power on risks damaging the module or the computer itself.*
>
> *Do not touch memory module terminals. Any dirt on the terminals may cause memory access problems.*
>
> *Never press hard or bend a memory module.*

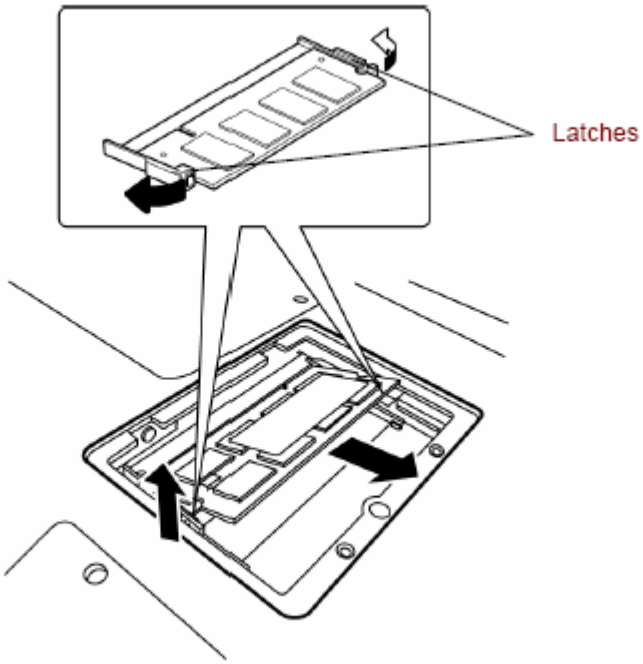
Removing a memory module

To remove a memory module, confirm that the computer is in boot mode. Then perform the following procedure (See Figure 4-8).

1. Loose the **screw** securing the **memory slot cover**.
2. Remove the **memory slot cover**.
3. Open the left and right **latches** and remove a **memory module**.



Removing the memory module cover



Removing the memory module

Figure 4-6 Removing a memory module

Installing a memory module

To install a memory module, confirm that the computer is in boot mode. Then perform the following procedure (See Figure 4-8).

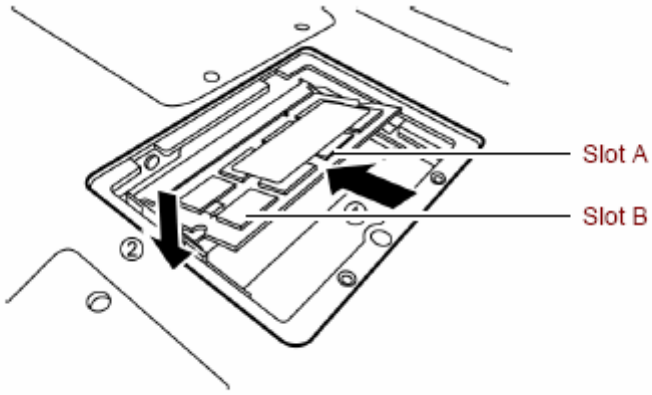
1. Insert a **memory module** into the connector of the computer slantwise (terminal side first) and press it to connect firmly.

> ***CAUTION:*** *The power must be turned off when you insert a memory module. Inserting a memory module with the power on might damage the module or the computer itself.*
>
> *Never press hard or bend a memory module.*

2. Install the **memory slot cover** and secure it with the **screw**.

3. When the power of the computer is turned on, the computer checks automatically the memory size. Confirm that the new memory is detected correctly.

4. If the memory is not detected, check that it is connected correctly.



Installing the memory module

4.7 Keyboard

Removing the keyboard

The following describes the procedure for removing the keyboard (See Figure 4-9 to 4-11).

> ***CAUTION:*** *As the keycap may fall out, when handling the keyboard always hold it by the frame and do not touch the keycap.*

1. Turn the computer upside down
2. Loose the **screw** securing KBD cover.

   M2.0x3.0B Flat BIND screws x2

3. Loose the **screw** securing keyboard.

   M2.5x6.0B Flat BIND screws X2

4. Upside down the computer.
5. Open the display.
6. Remove KBD cover. Insert your finger into the slot between the keyboard cover and the keyboard. Then, lift up the **keyboard cover** to remove it.
7. Insert your finger into the keyboard slot and keyboard. Then lift up the keyboard to remove it.
8. Disconnect keyboard cable.

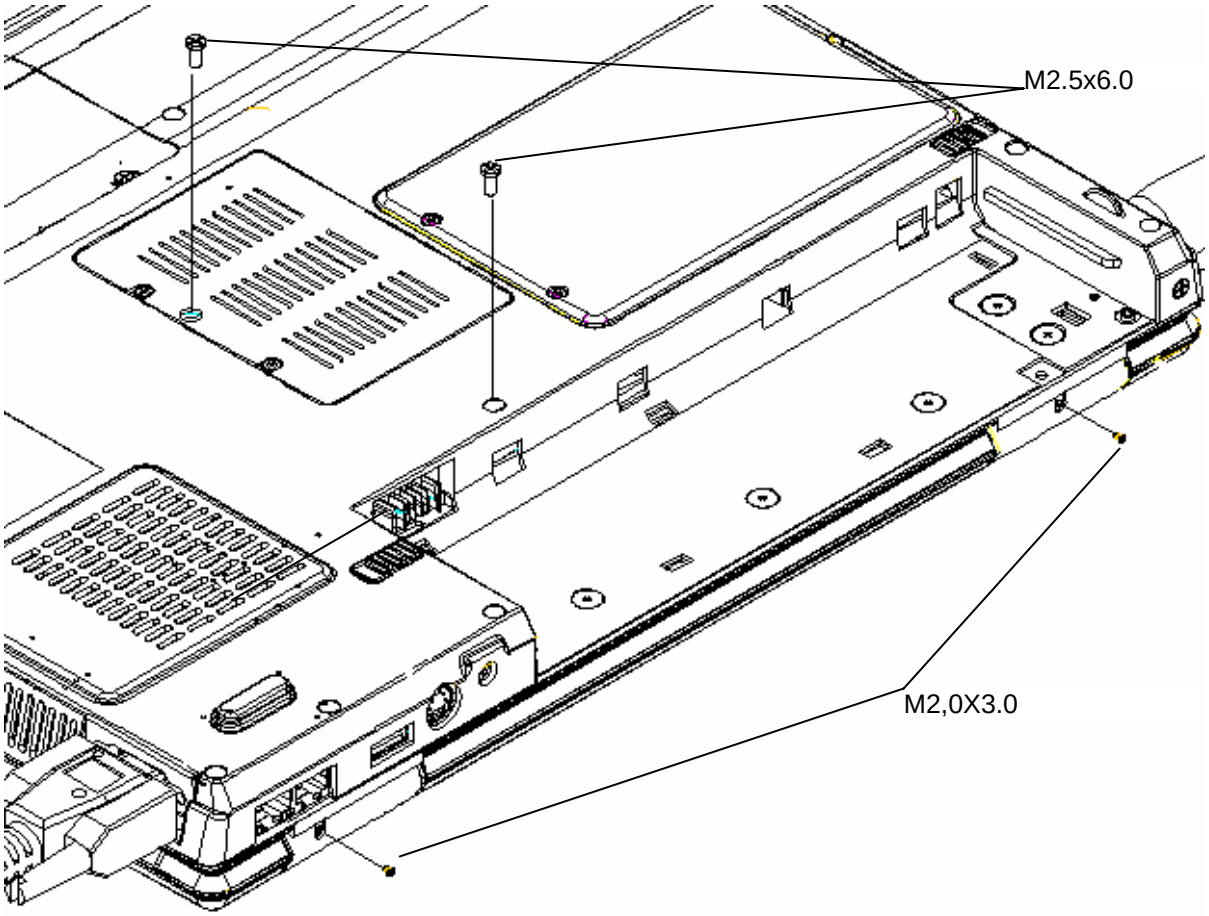


Figure 4-7 Removing screws for KBD cover/keyboard

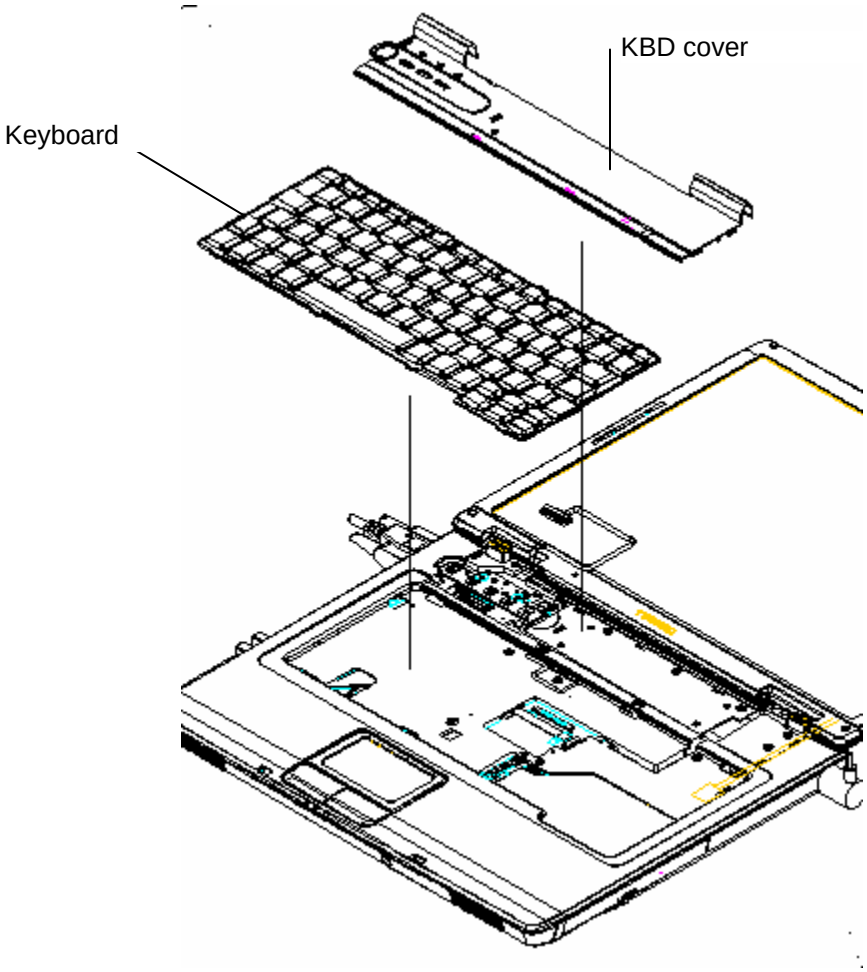


Figure 4-8 Removing the keyboard/KBD cover

Installing the keyboard

The following describes the procedure for installing the keyboard (See Figure 4-9 to 4-110).

1. Turn the **keyboard** upside down and place it on the palm rest as its face down. Connect the **keyboard flexible cable** to the connector **CN3200** on the system board.

2. Install the **keyboard support plate** and secure it with the following **screws**.

    - M2.5×8.0B FLAT BIND screw x2

3. Turn the **keyboard** face up and put it on the computer. Make sure that there is no space between the keyboard and the computer.

4. Secure the keyboard with the following **screws.**

    - M2.5×2.8B FLAT BIND screw x2

5. Slide and set the **speaker cover assembly** and secure it with the following **screw**.

    - M2.5×4.0B FLAT BIND screw x1

6. Install the **keyboard brace** by pressing it from the topside.

4.8 LED Board

Removing the LED Board

The following describes the procedure for removing the LED board (See Figure 4-12).

1. Remove the following **screw** securing the switch membrane.

   - M2.5×3.0B FLAT BIND screw x2

2. Push up the **LED board** to the arrow direction and remove it.

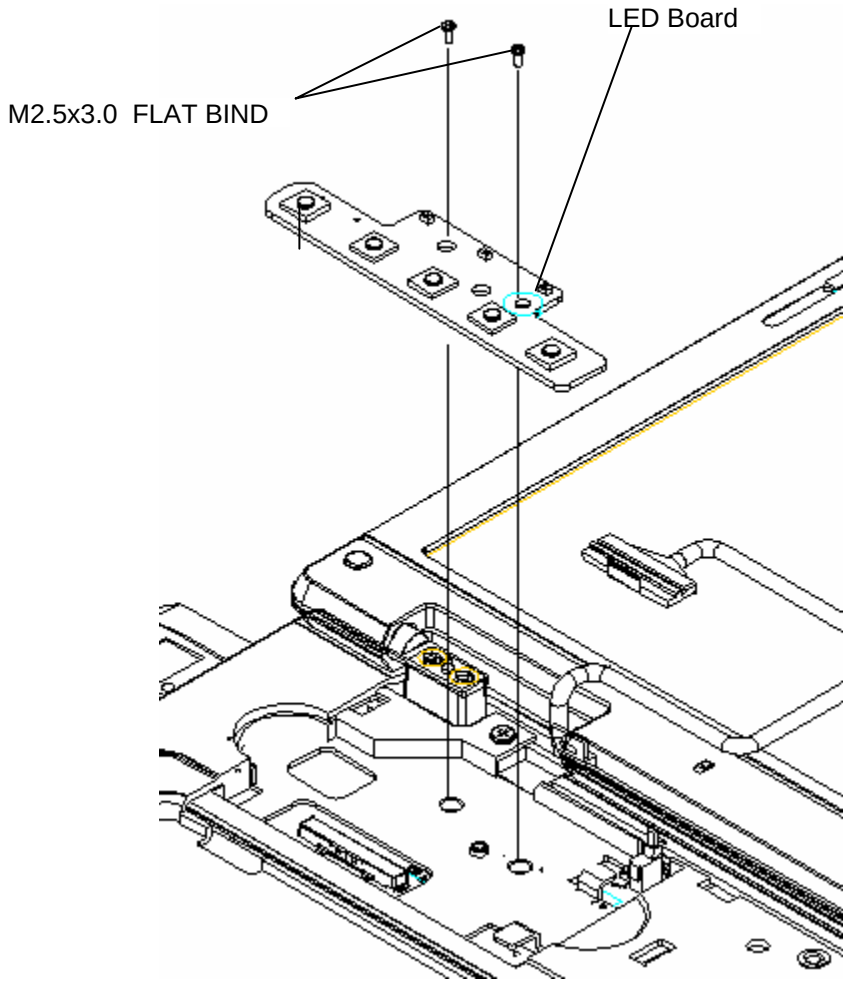


Figure 4-9 Removing the LED board

Installing the LED Board

The following describes the procedure for installing the switch membrane (See Figure 4-12).

1. Press LED board in the computer.
2. Secure the LED board with the following **screw**.
    - M2.5×3.0B FLAT BIND screw x2

4.9 Optical disk drive

NOTE:	*Do not apply excessive force to the top of an optical disk drive.* *Do not touch the shaded portion of the figure below, when the drive is removed or installed.*

Removing an optical disk drive

The following describes the procedure for removing an optical disk drive (See Figure 4-13 and 4-14).

1. Turn over the computer and remove the following **screws** securing an optical disk drive.

   - M2.5×6.0B FLAT BIND screw x1

2. Upside down the computer.

3. Remove the following **screw** securing the ODD driver.

   M2.5×6.0B Flat BIND screw x1

3. Disconnect an **optical disk drive** toward the arrow direction from the connector **CN25** on the system board.

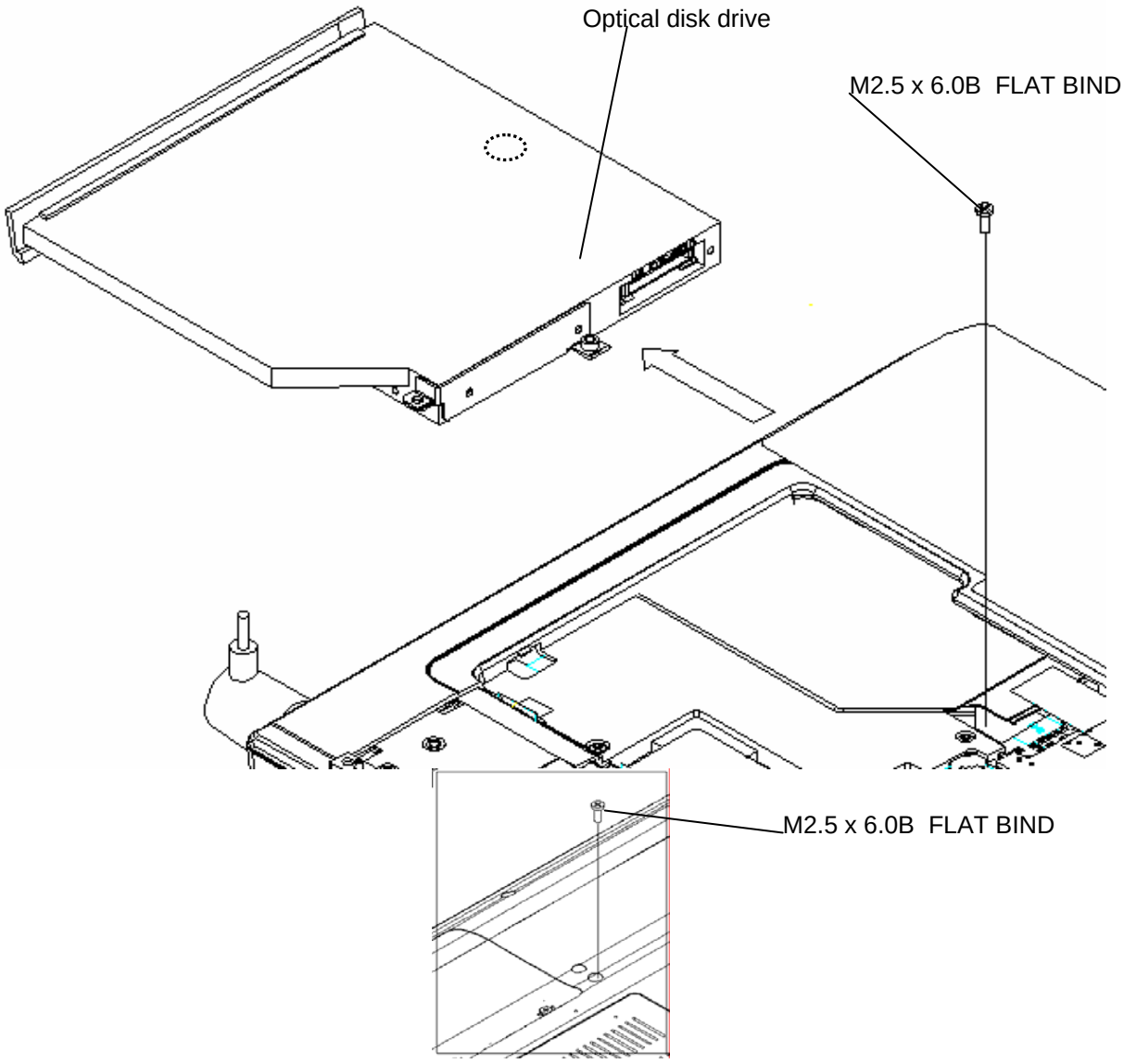


Figure 4-10 Removing an optical disk drive

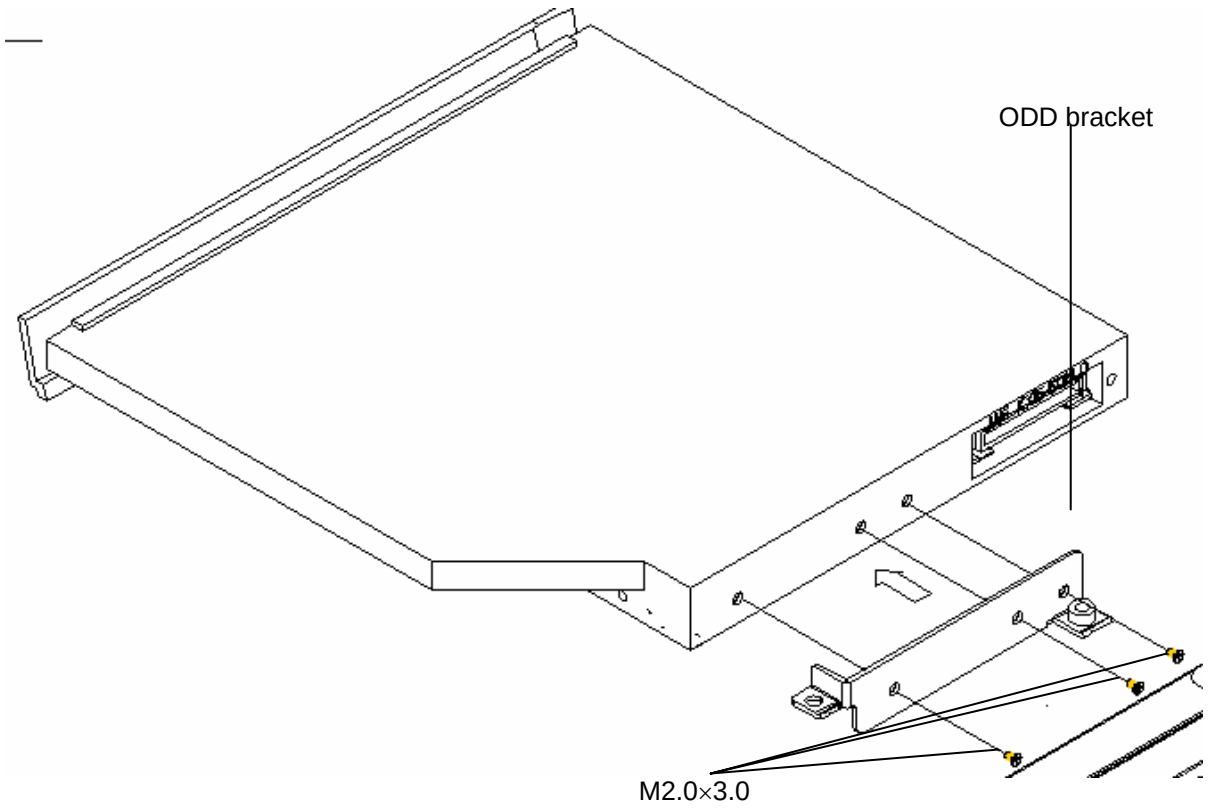


Figure 4-11 Disassembling the ODD bracket

Installing an optical disk drive

The following describes the procedure for installing an optical disk drive (See Figure 4-13 and 4-14).

1. Attach the **ODD bracket** to an optical disk drive and secure it with the following **screws**.

   - M2.0×3.0 Flat BIND screw x3

2. Insert an optical disk drive assembly into the slot and connect it to the connector **CN25** on the system board.

3. Secure the ODD drive with the following **screw**.

   M2.5X6.0 Flat BIND screw X1

4. Turn over the computer and secure **an optical disk drive** with the following **screws**.

- M2.5×6.0B FLAT BIND screw x1

4.10 Display assembly

Removing the display assembly

The following describes the procedure for removing the display assembly (See Figure 4-15 to 4-20).

1. Close the display and turn the computer upside down .
2. Remove the following **screws** from the k/b cover of the computer.
    - M2.0×3.0 FLAT BIND screw x2 (Locktight)
    - M2.5×6.0 FLAT BIND screw x2 (Locktight)

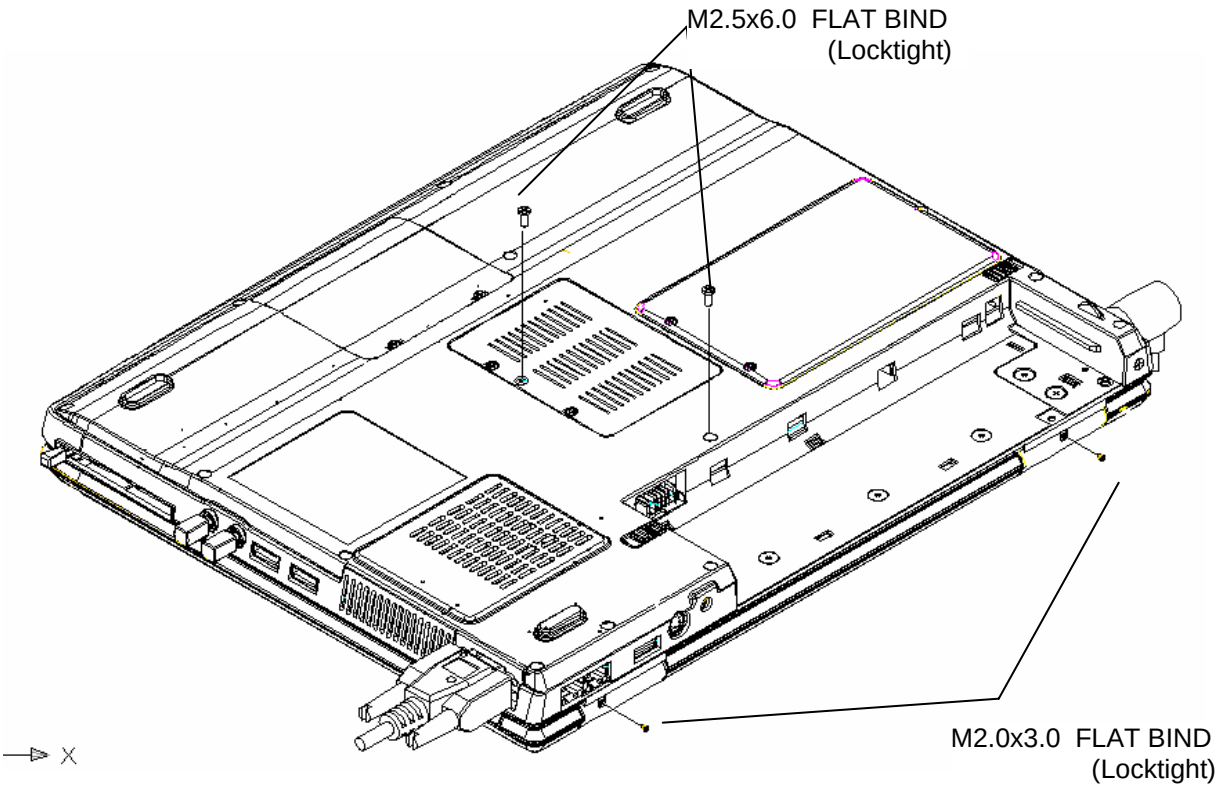


Figure 4-12 Removing the screws (securing display assembly)

.

3. Open the **MINIPCI Door** and remove the **wireless LAN antenna connector** .

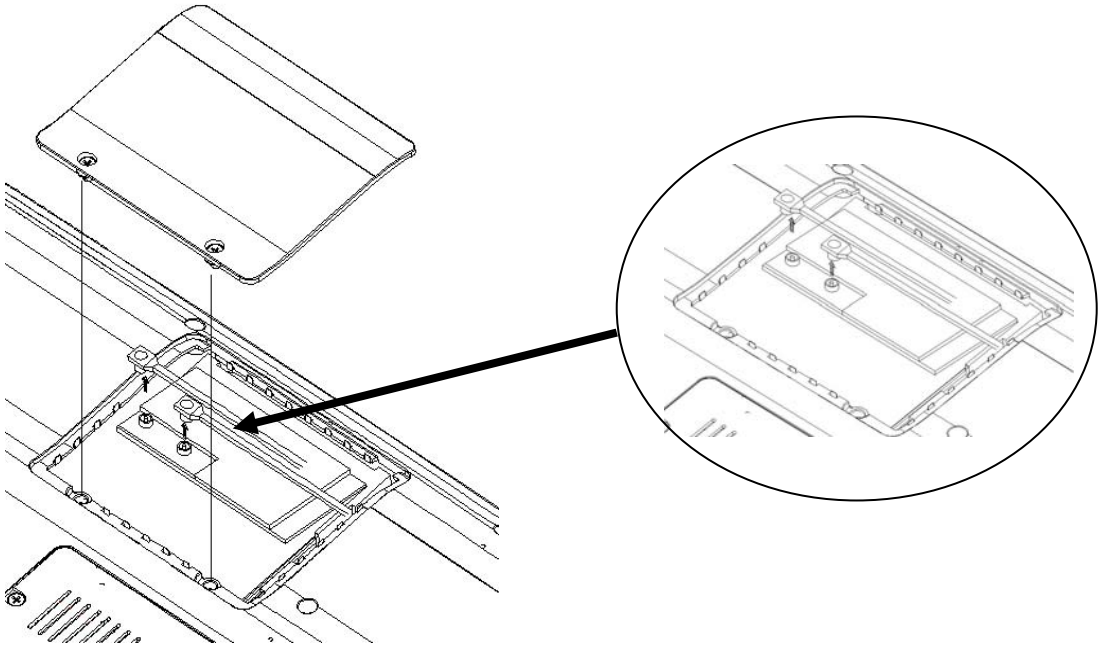


Figure 4-13 Removing the MINIPCI door and connetor (back)

4. Open the display and removing the **k/b cover** and **keyboard** .

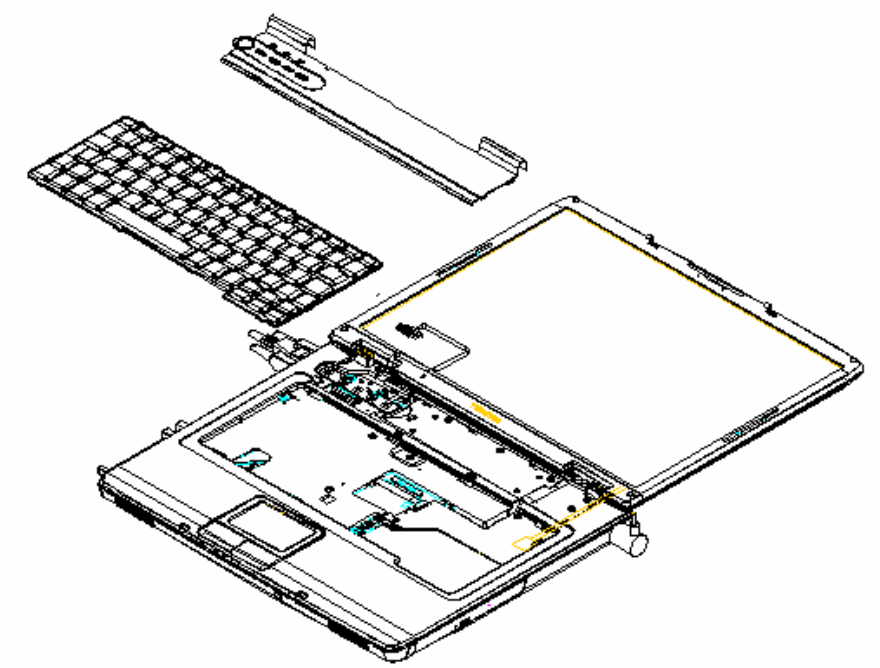


Figure 4-17 Removing the cables (back)

5. Pull out the **wireless LAN antenna cables** from the guide

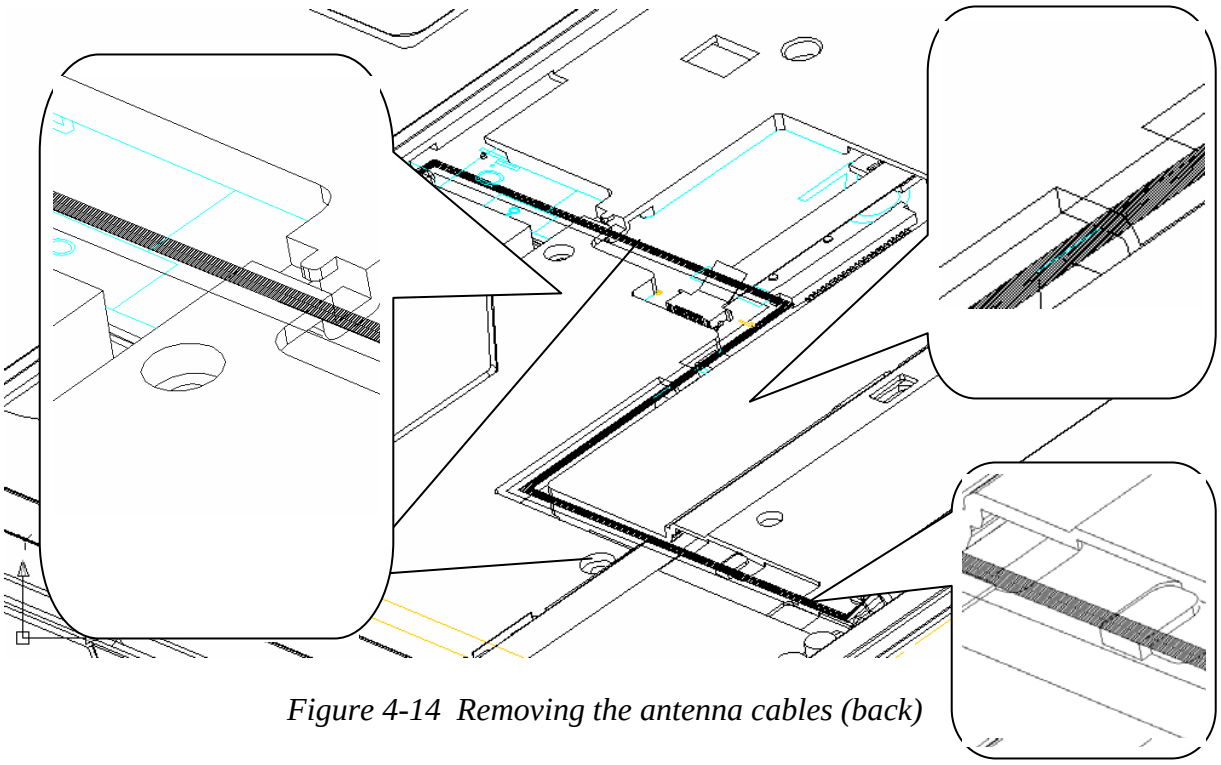


Figure 4-14 Removing the antenna cables (back)

6. Opening the display to 180 degree, and remove the hinge screw .

- M2.3×6.0 FLAT BIND screw x4 (Locktight)

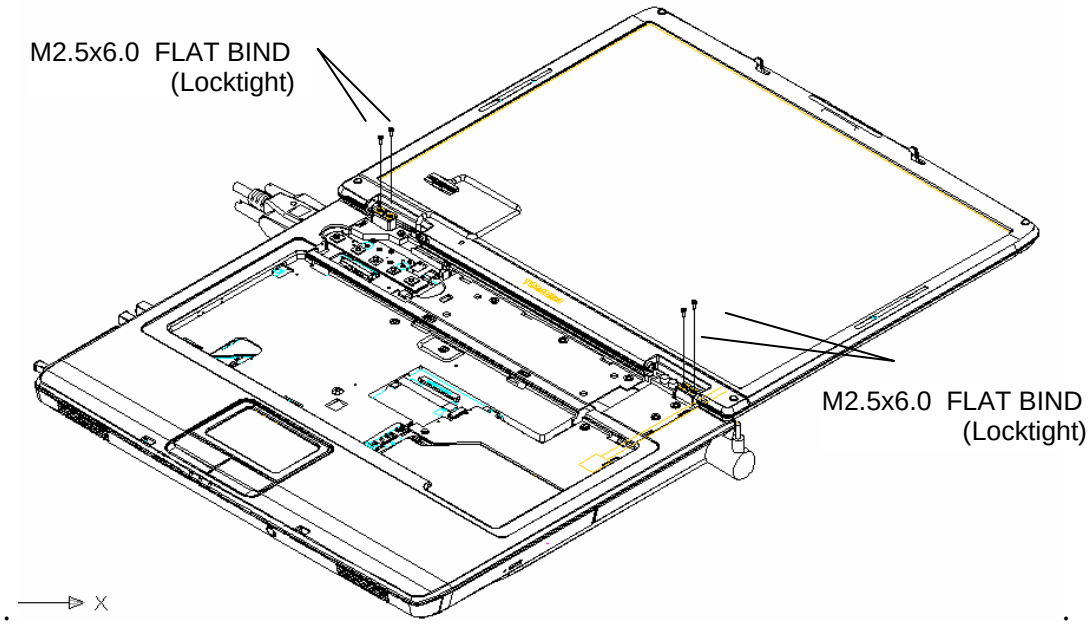


Figure 4-15 Removing the hinge screw (back)

[back]

7. Remove the **LCD harness** from the connector on the system board and Pulling out the **pole of hinge** from the **hole** of hinge assembly, remove the **display assembly** from the base assembly.

.

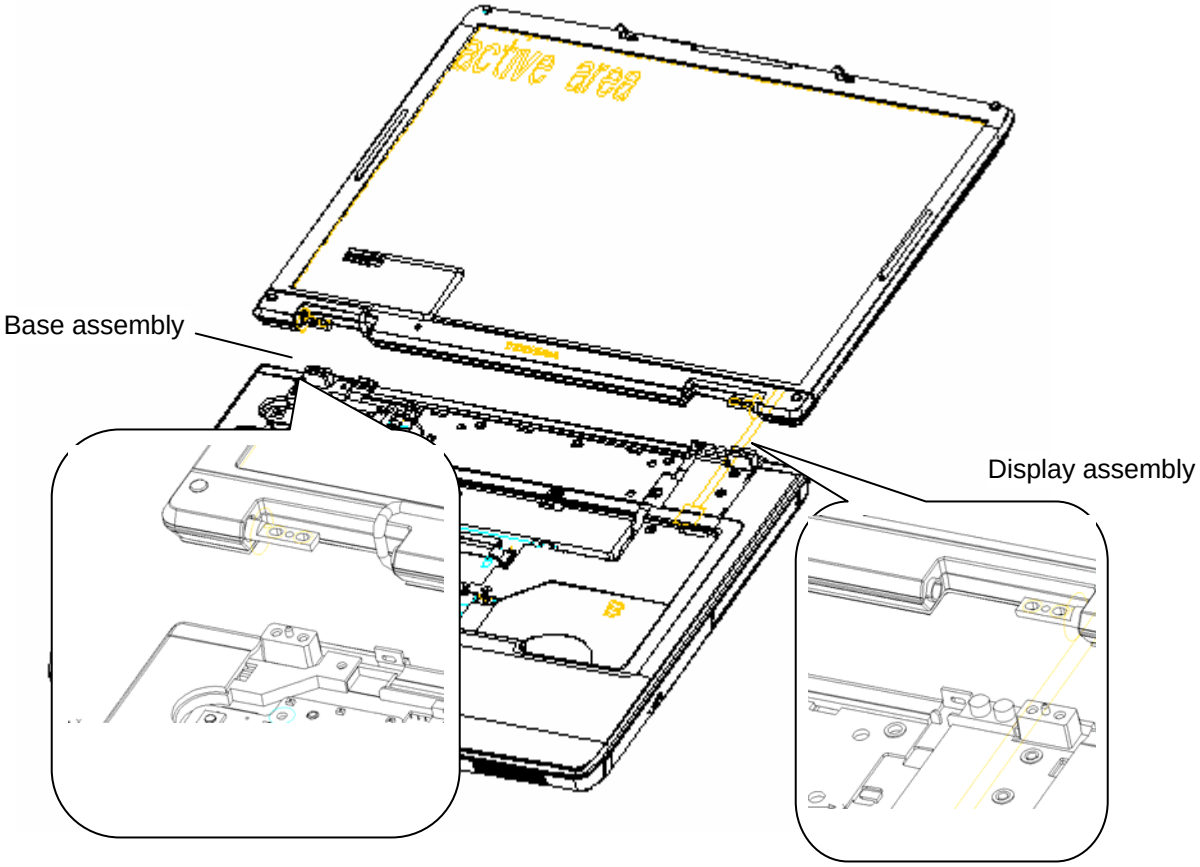


Figure 4-16 Removing the LCD harness and remove display assembly

Installing the display assembly

The following describes the procedure for installing the display assembly (See Figure 4-15 to 4-20).

1. Inserting the **pole of hinge** to the **hole** of hinge assembly, set the **display assembly** on the base assembly.

2. Secure the **hinges** with the following **screws ,** Secure the **display mask** with the following **screws** and stick the **mask seal** on them.

    - M2.5×6.0B FLAT BIND screw (Locktight) x4

***NOTE**: Be sure to apply the locktight to the screws instructed in the figure above.*

3. Connect the **LCD harness** to the connector on the system board.

4. Arrange the wireless antenna cables along the guide (front) and secure them with **guide**.

5. Pass the cables to the back of computer through the **slot**.

6. Install the keyboard and k/b cover of the system .

7. Arrange the **wireless LAN antenna cables** along the guide and contact with the connector .

8. Secure the display assembly from the back of computer with the following **screws**.

    - M2.5×6.0B FLAT BIND screw (Locktight) x4

4.11 Cover assembly

Removing the cover assembly

The following describes the procedure for removing the cover assembly (See Figure 4-21 to 4-24).

1. Turn over the computer.
2. Remove the following **screws** securing the cover assembly from the back and bottom of computer.

    - M2.5×6.0B FLAT BIND screw x18
    - M2.5×2.0 FLAT BIND screw x3

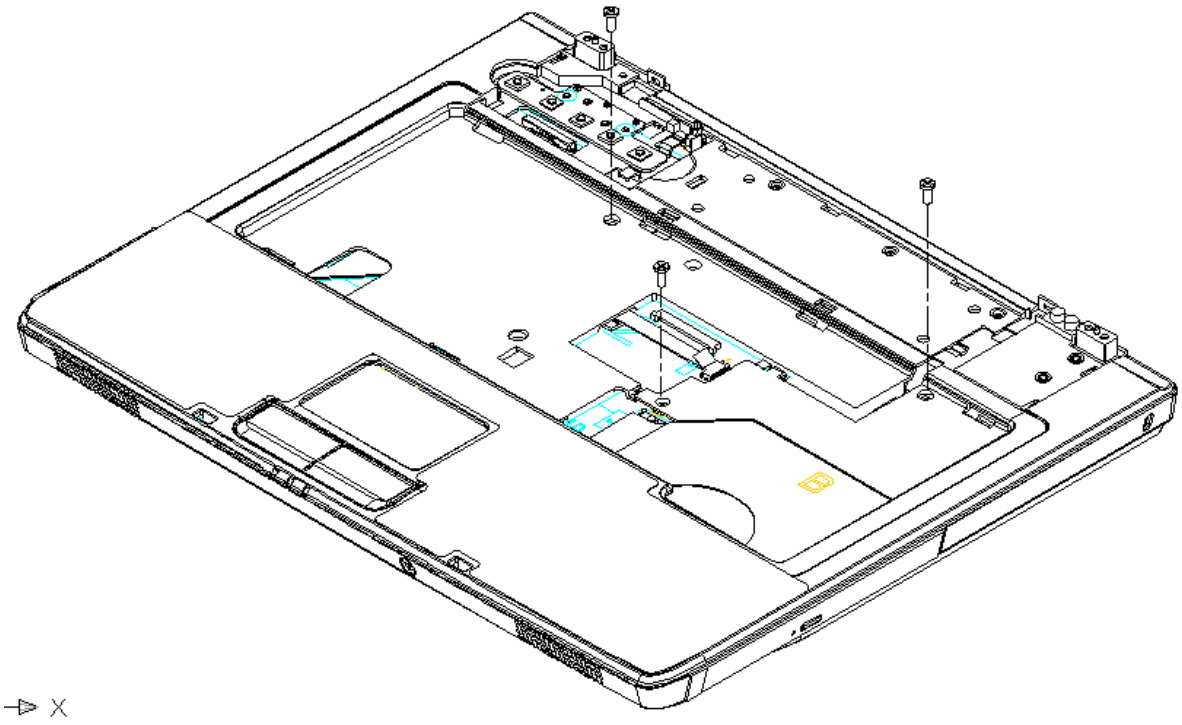


Figure 4-17 Removing the screws (back)

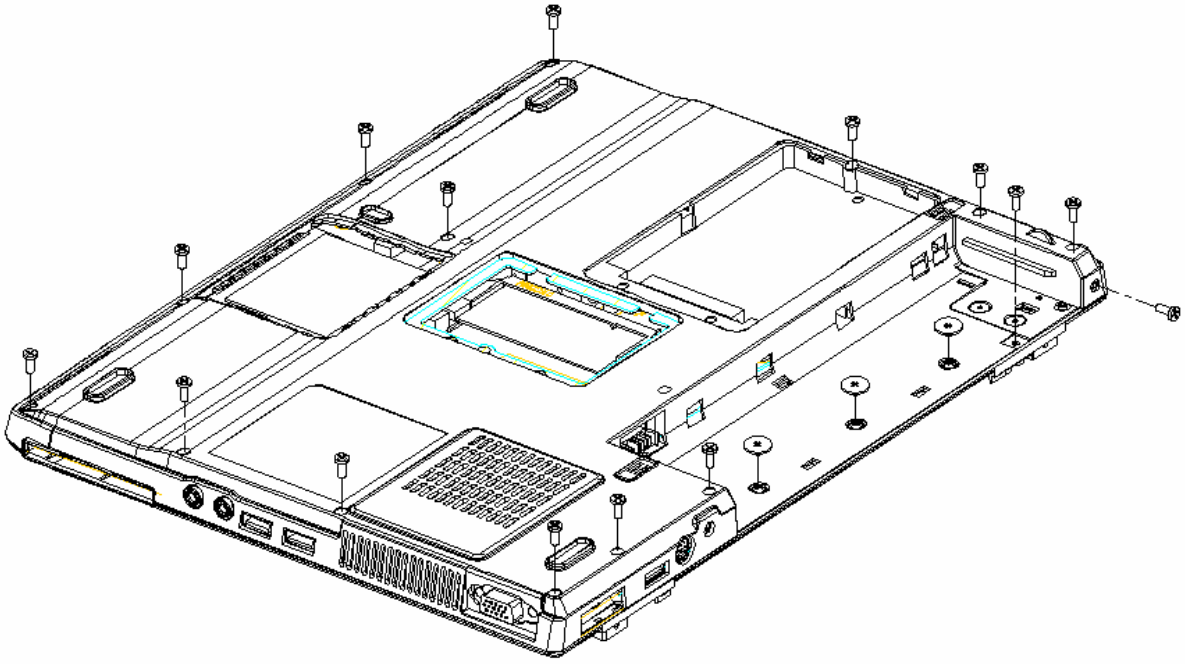


Figure 4-17 Removing the screws (back)

3. Disconnect the **touch pad flat cable** from the connector on the system board.
4. Removing the screw from power board and remove the power board .

M2.5×3.0B	FLAT BIND screw	x2

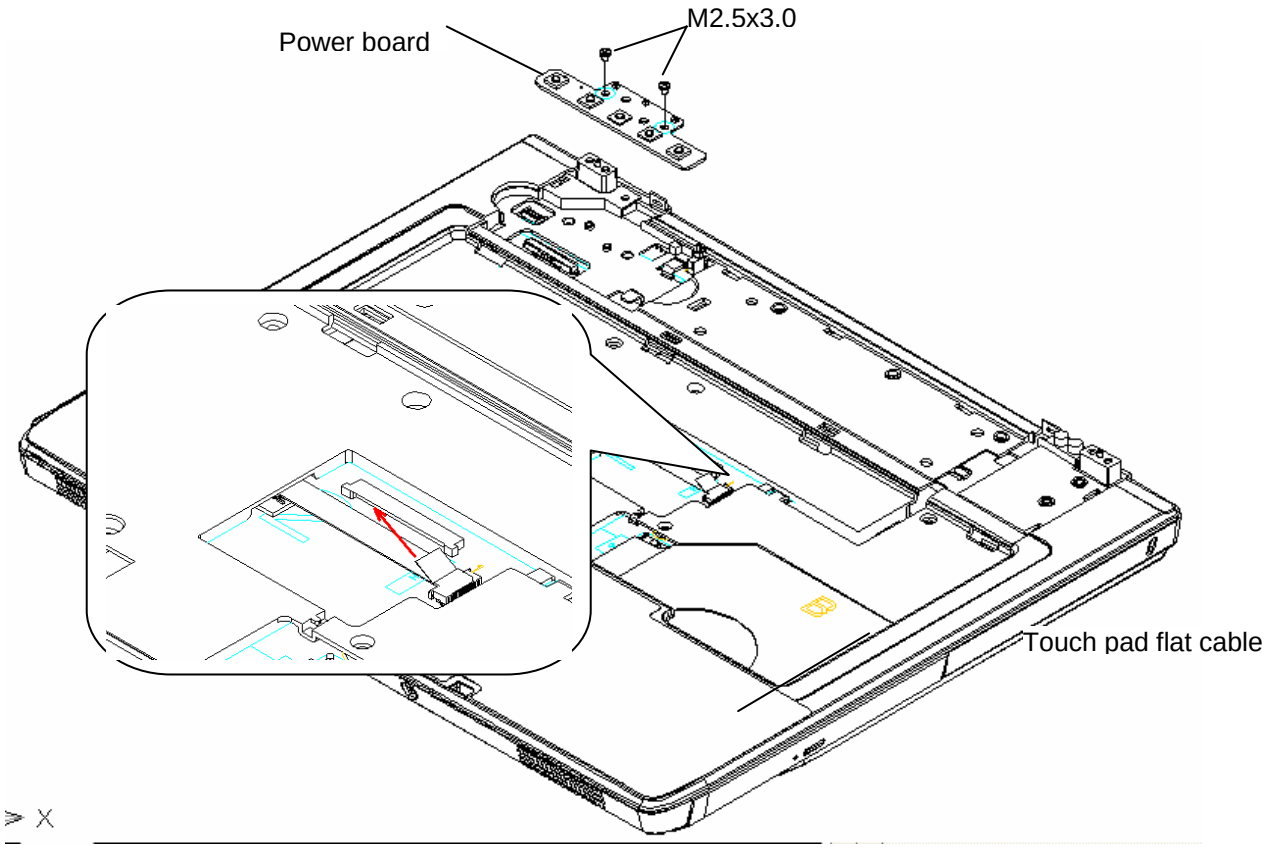


Figure 4-18 Removing the screws & cables (front)

5. Pull up and remove the **cover assembly** from the **base assembly**.

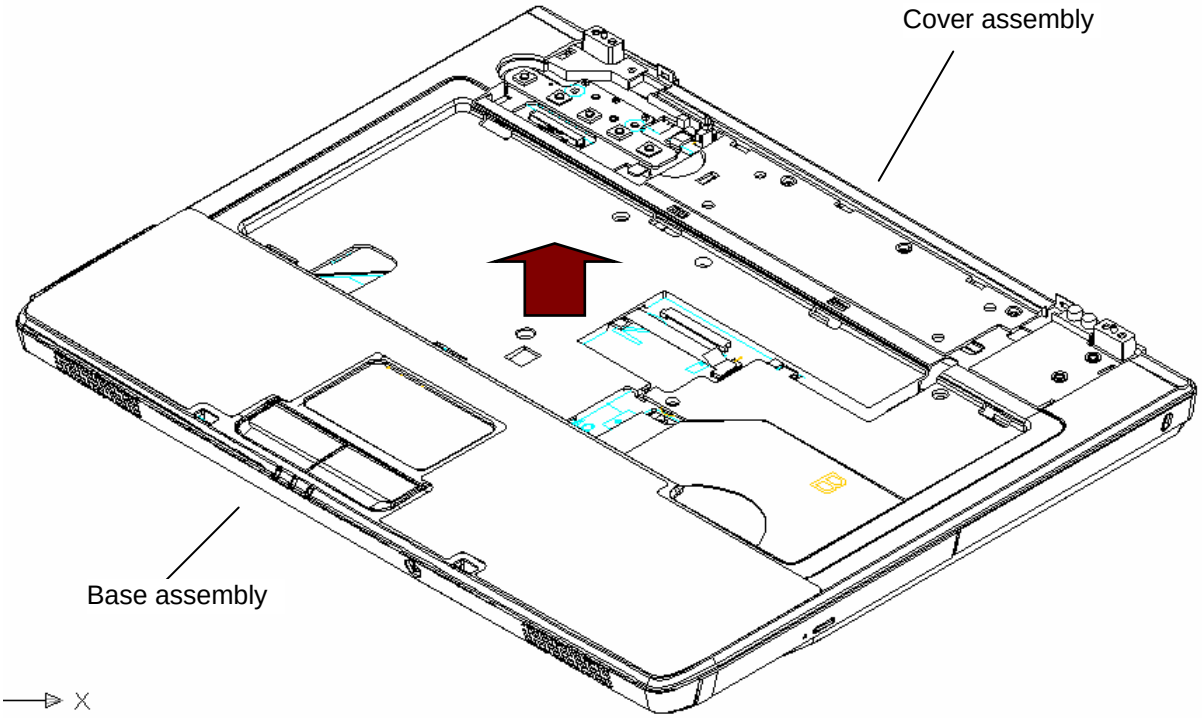


Figure 4-19 Removing the cover assembly

Installing the cover assembly

The following describes the procedure for installing the cover assembly (See Figure 4-21 to 4-24).

1. Install the **cover assembly** to the base assembly.

***NOTE**: Be careful not to catch the cables between cover assembly and base assembly.*

2. Connect the **touch pad flat cable** to the connector on the system board.

3. Secure the cover assembly with the following **screws** from the back and bottom of computer.

    - M2.5×2.0B FLAT BIND screw x3
    - M2.5×6.0B FLAT BIND screw x18
    - M2.5×3.0B FLAT BIND screw x2

4.12 Touch pad

Removing the touch pad

The following describes the procedure for removing the touch pad (See Figure 4-31).

1. Peel off the **glass tape** and disconnect the **touch pad flat cable** from the connector on the touch pad and peel the al foil .
2. Remove the following **screws** securing the touch pad plate.
    - M2.5×3.0B SUPER THIN HEAD screw x5
3. Turning up the **insulator**, remove the **touch pad plate**.
4. Peel off and remove the **touch pad** from the cover assembly.

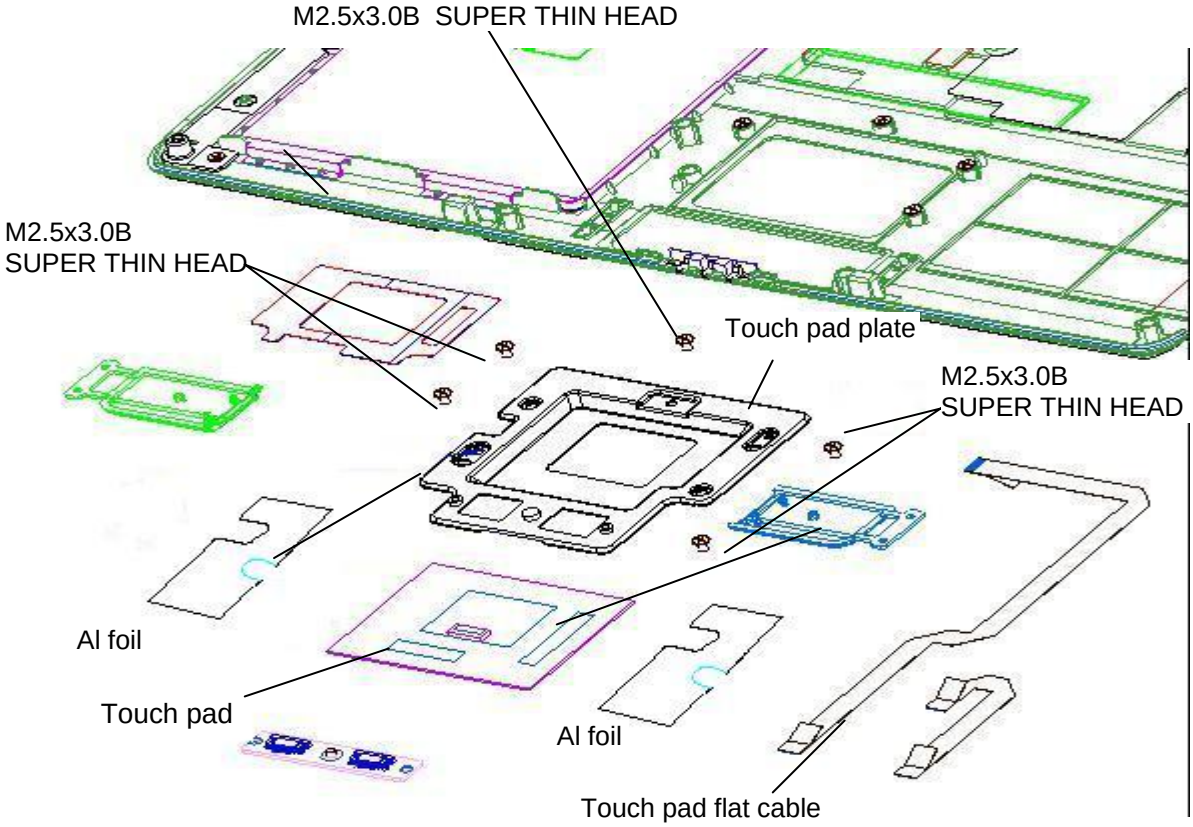


Figure 4-20 Removing the touch pad

Installing the touch pad

The following describes the procedure for installing the touch pad (See Figure 4-31).

1. Peel off the separator covering on the sensor portion of a new touch pad.

> ***NOTE:*** *Do not reuse the touch pad so that it can not be used after peeling off from the computer. Be sure to stick a new touch pad.*
>
> *When stickimg the touch pad, be careful not to get the bubbles under the touch pad.*

2. Stick and install the **touch pad** on the cover assembly.
3. Install the **touch pad plate** and secure it with the following **screws**.
    - M2.5×3.0B SUPER THIN HEAD screw x5
4. Stick the **insulator** on the touch pad plate.
5. Connect the **touch pad flat cable** to the connector on the touch pad and stick the **glass tape** on the connector.

4.20 System board

CAUTION: *1. When handling the system board, always hold by the edges. Do not touch the printed circuit face.*

2. If replacing with a new system board, execute the subtest01 Initial configuration in section 3.3 "Setting of the hardware configuration". Also update with the latest BIOS as described in Appendix G "BIOS Rewrite Procedures" and with the latest EC/KBC as described in Appendix H "EC/KBC Rewrite Procedures".

Removing the system board

The following describes the procedure for removing the system board (See Figure 4-41).

1. Disconnect the **speaker cable** from the connector **CN11** on the system board.
2. Remove the following **screws** securing the system board and remove the **system board**.

- M2.5×4.0 BIND screw x2

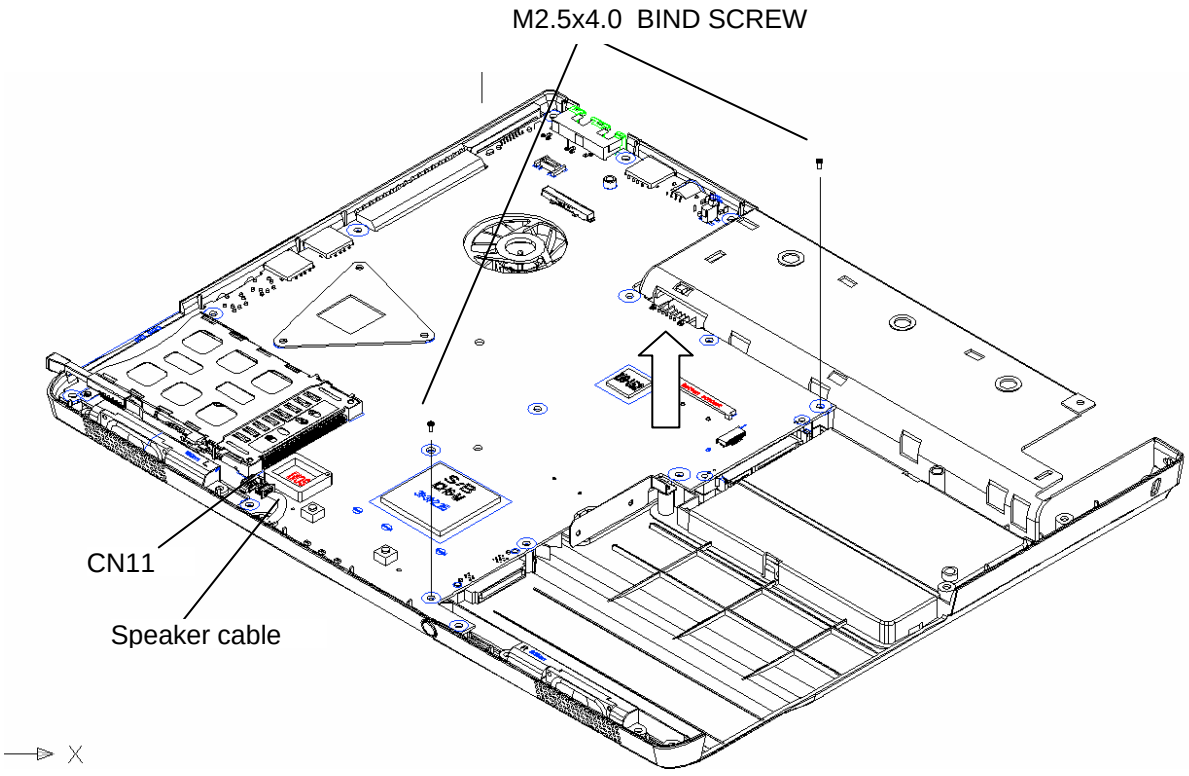


Figure 4-21 Removing the system board

Installing the system board

The following describes the procedure for installing the system board (See Figure 4-41).

1. Secure the system board with the following **screws**.

    - M2.5×4.0 BIND screw x2

2. Connect the **speaker cable** to the connector **CN 11** on the system board.

4.21 CPU

Removing the CPU

The following describes the procedure for removing the CPU heat sink (See Figure 4-44).

1. Disconnect the **Heat sink cable** from the connector **CN15** on the system board
2. Remove the following **screws** securing the heat sink holder along 1 to 7.

    - M2.5×4.0 BIND screw x7

NOTE:	*When removing the heat sink holder, be sure to remove the screws in the reverse order of the number marked on the holder.*

3. Remove the **CPU heat sink** .

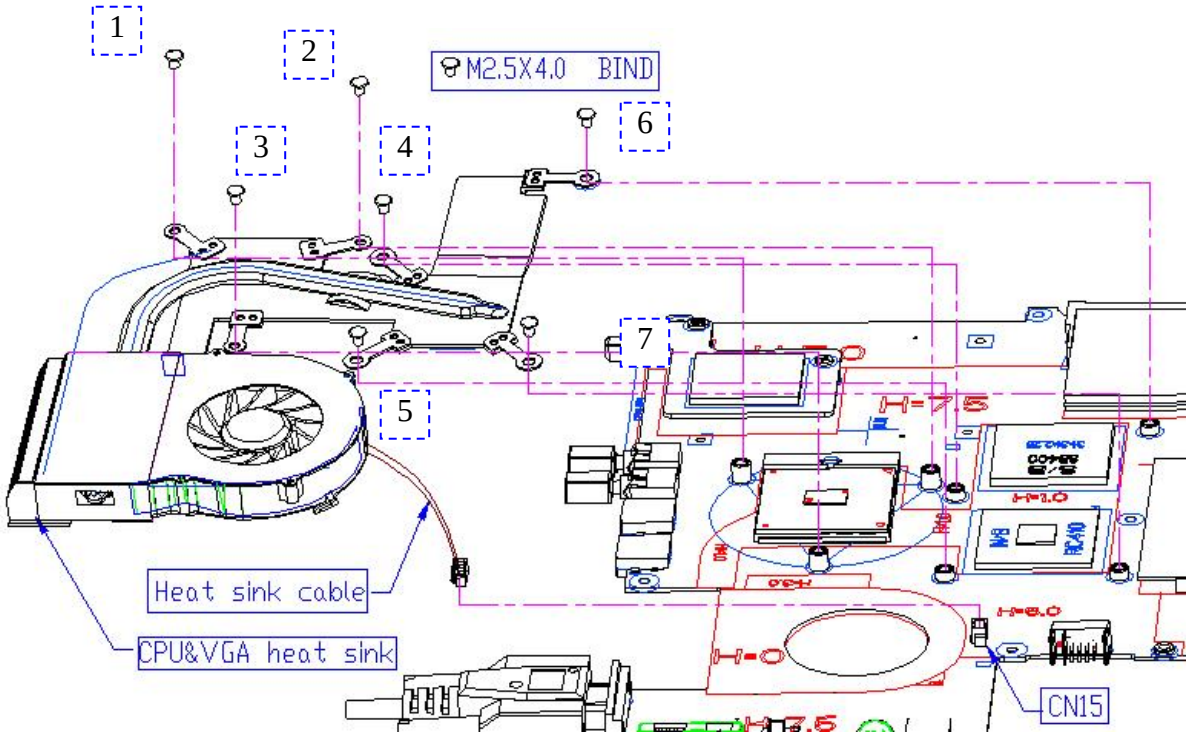


Figure 4-22 Removing the CPU&VGA heat sink

4. Unlock the **CPU** by rotating the **cam** on the CPU socket 120 degrees to the counterclockwise with a flat-blade screwdriver.

5. Remove the **CPU**.

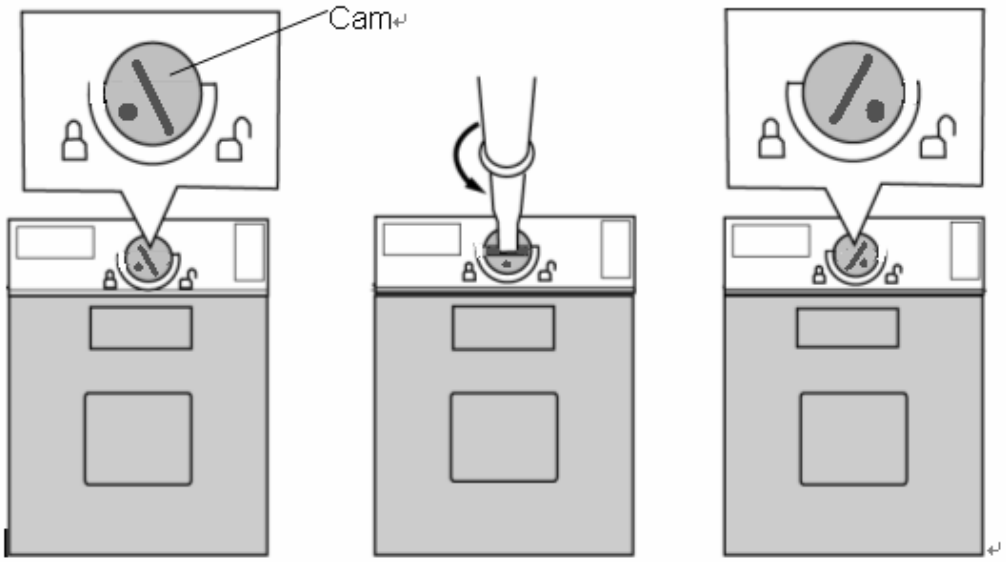


Figure 4-23 Removing the CPU

Installing the CPU&VGA heat sink

The following describes the procedure for installing the CPU (See Figure 4-44to 4-46).

1. Check that the mark of cam is in the unlocking position.

2. Attach the **CPU** to the correct position in the **CPU socket**.

3. Fix the **CPU** by rotating the cam 120 degrees to the clockwise with a flat-blade screwdriver.

4. If there is already silicon grease on the CPU chip and the VGA chip, clean it with a cloth.
   Using a special applicator, apply silicon grease so that the CPU chip and VGA chip on them are completely covered.

NOTE: *Apply the silicon grease enough to cover the chip surface using the special applicator.*

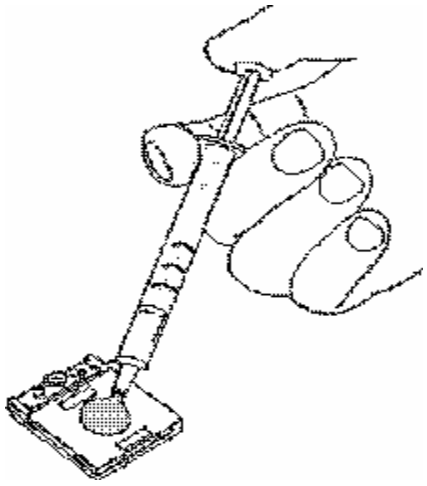


Figure 4-24 Applying silicon grease

5. Install the **CPU&VGA heat sink** and **heat sink holder** and secure them with the following **screws** along 1 to 7.

   M2.5×4.0BIND screw x7

6. Connect the **Heat sink cable** to the connector **CN 15**on the system board

NOTE: *When securing the heat sink holder, be sure to secure the screws in the order of the number marked on the holder and first secure the screws of 1 to 3.*

LCD unit / FL inverter

> ***CAUTION:*** *When replacing a LCD, it is required that SVP parameter is set. Update with the latest EC/KBC as described in Appendix H "EC/KBC Rewrite Procedures".*

Removing the LCD unit / FL inverter

The following describes the procedure for removing the LCD unit and FL inverter (See Figure 4-52 to 4-55).

1. Remove Screw rubber cover X4
2. Remove the following **screws** securing the display mask

   M2.5×6.0 BIND screw X4

3. Insert your finger between the edge of the display mask and the **LCD**, and remove the **display mask** while releasing the latches of display mask.

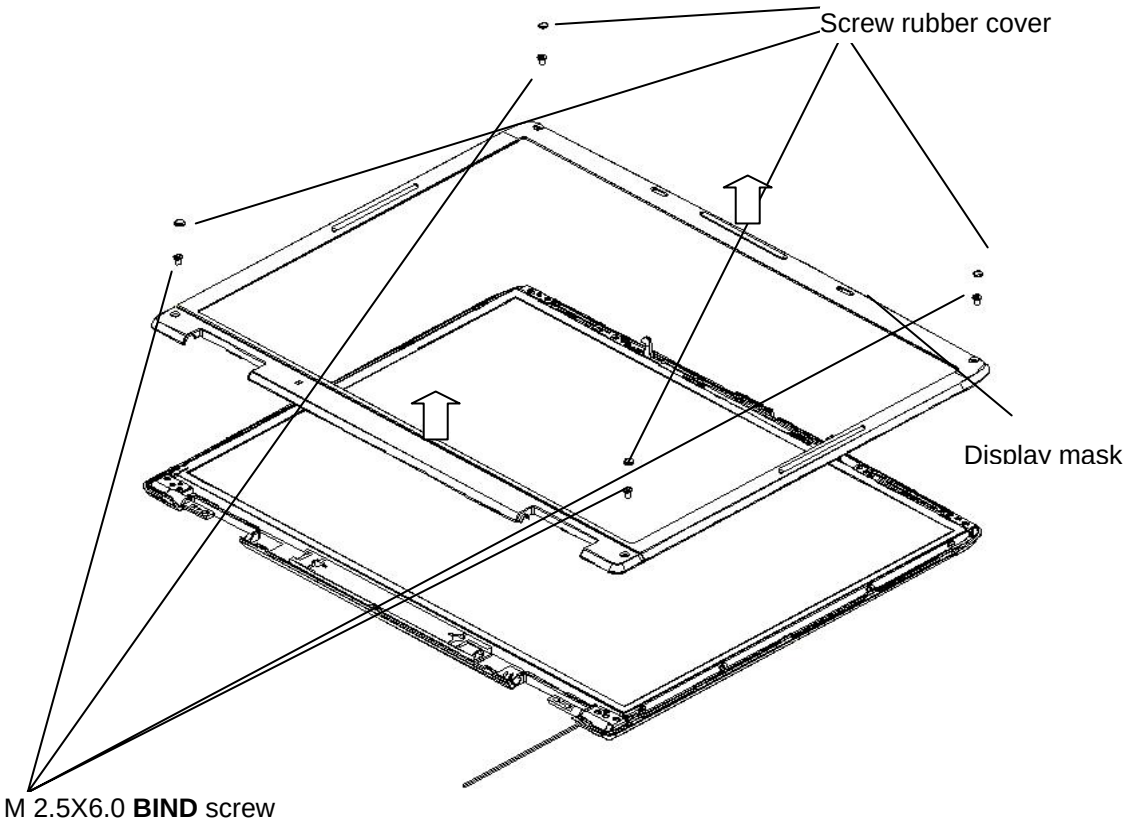


Figure 4-25 Removing the display mask

4. Pull out one **insulator** and peel off the other one adhered to the FL inverter.
5. Disconnect the **LCD harnesses** from the connectors **CN1** on the FL inverter.
6. Disconnect the **HV harnesses** from the connectors **CN2** on the FL inverter.
7. Remove the **FL inverter** while peeling off the **double-sided tape**.

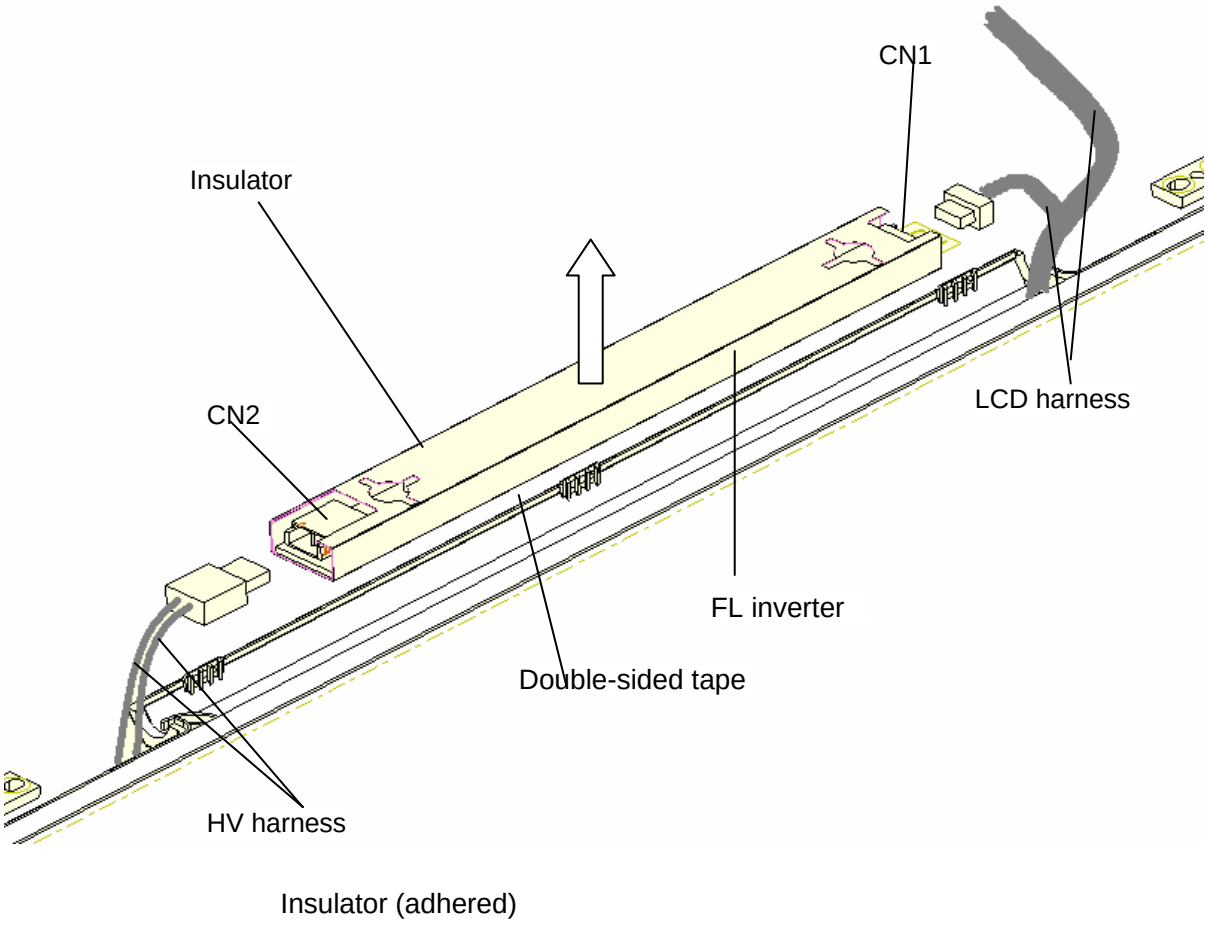


Figure 4-26 Removing the FL inverter

8. Remove the following **screws** securing the LCD unit.

    - M2.5x4.0 BINK HEAD screw x6

9. With the bottom edge of the LCD unit on the display cover, lift only the top edge of the LCD unit. After peeling off the **CONDUTIVE tape**, disconnect the LCD harness from the connector on the back of the LCD.

10. Remove the **LCD unit**.

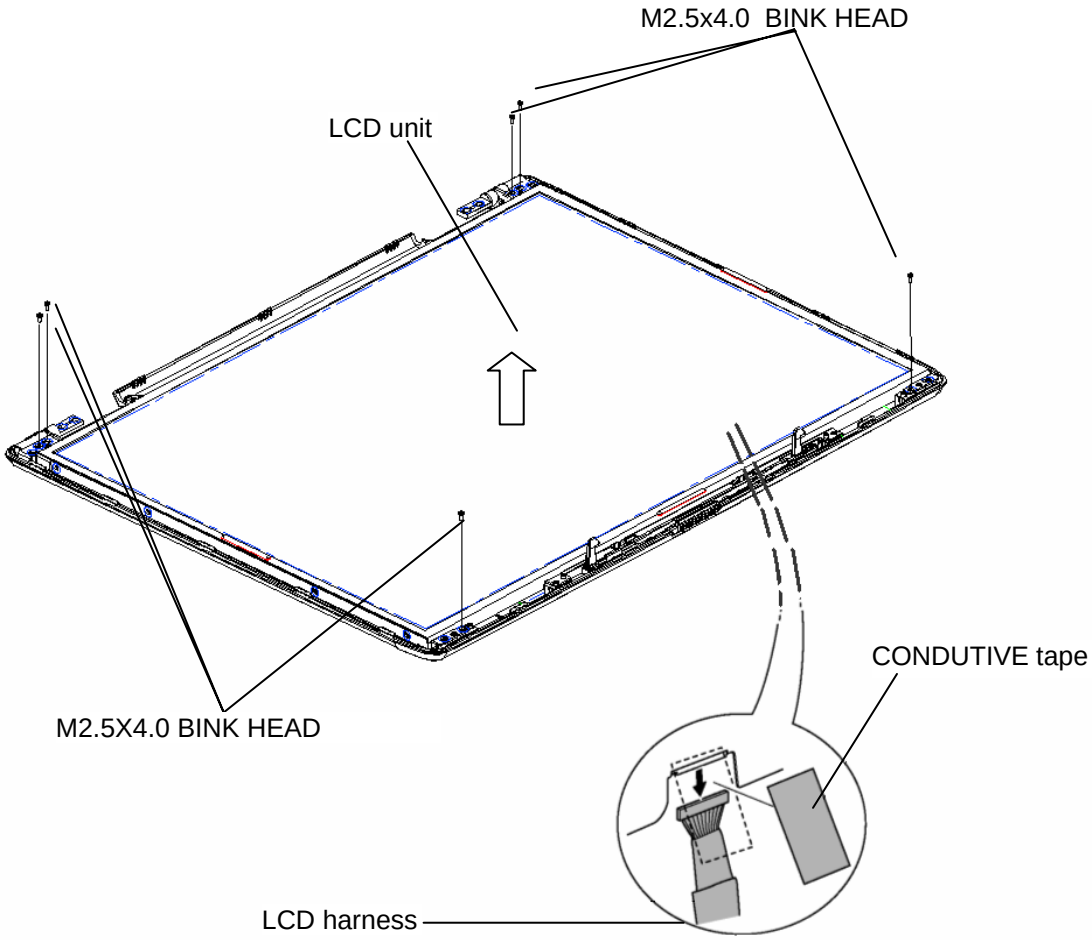


Figure 4-27 Removing the LCD unit

11. Remove the following **screws** securing the LCD support (LCD unit side) and remove the **LCD supports** from the LCD unit.

    - M2.0x3.0 BINK screw x8

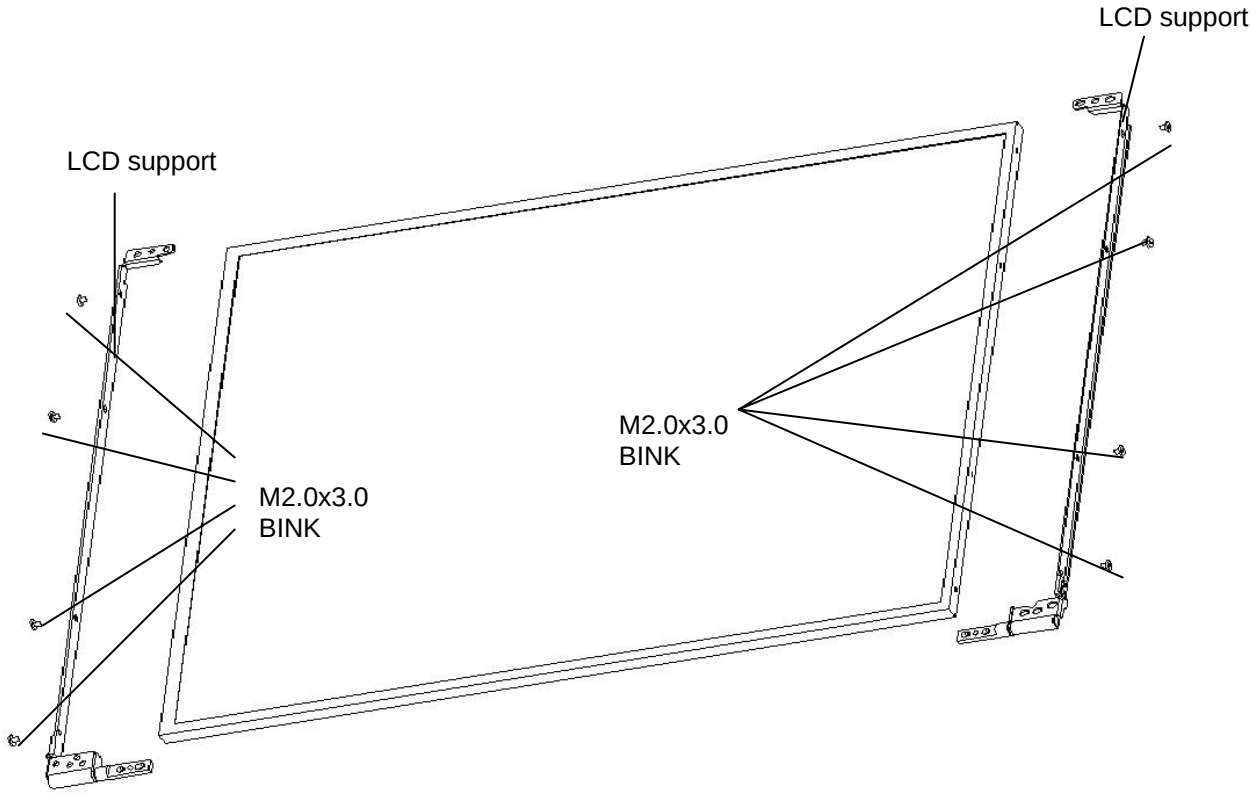


Figure 4-28 Removing the LCD supports

Installing the LCD unit/FL Inverter

The following describes the procedure for installing the LCD unit and FL inverter (See Figure 4-52 to 4-55).

1. Install the LCD supports (LCD unit side) to the LCD and secure them with the following **screws**.

    - M2.0×3.0 BINK screw x8

2. Stand the **LCD unit** on the display cover and connect the **LCD harness** to the connector on the back of LCD.

3. Stick the **conductive tape** on the connector of LCD harness.

4. Secure the LCD unit with the following **screws**.

    - M2.5×4.0 BINK screw x6

5. Connect **LCD harnesses** to the connector **CN1** of the FL inverter.

CAUTION: *Be careful not to connect the LCD harnesses to the wrong connectors of FL inverter.*

6. Connect **HV harnesses** to the connector **CN2** of the FL inverter.

7. Install the **display mask** while fitting the latches.

8. Secure the display mask with following **screws**

    M2.5×6.0 BIND screw X4

9. Cover screws with Screw rubber cover X4

NOTE: *When installing the display mask, make sure there is no gap between the display mask and the display cover.*

Appendices

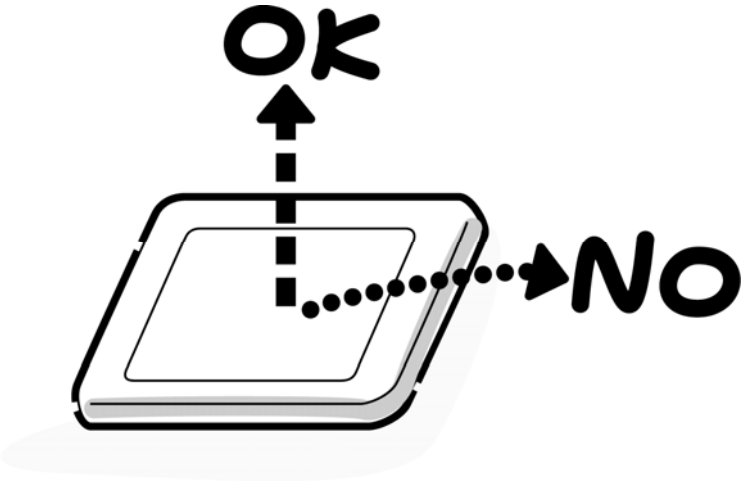
Appendix Contents

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

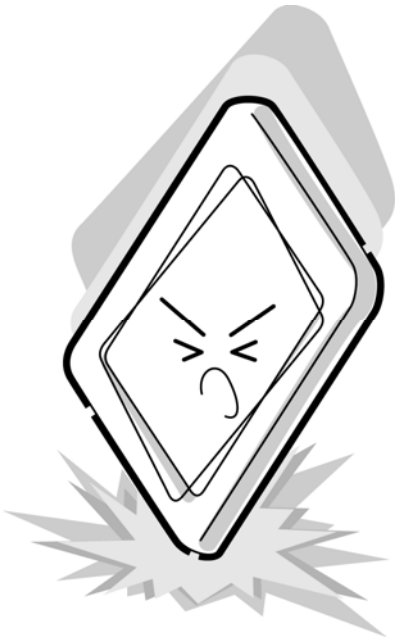
   Also, the panel's polarized surface is easily scarred, so be careful when handling it.

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.

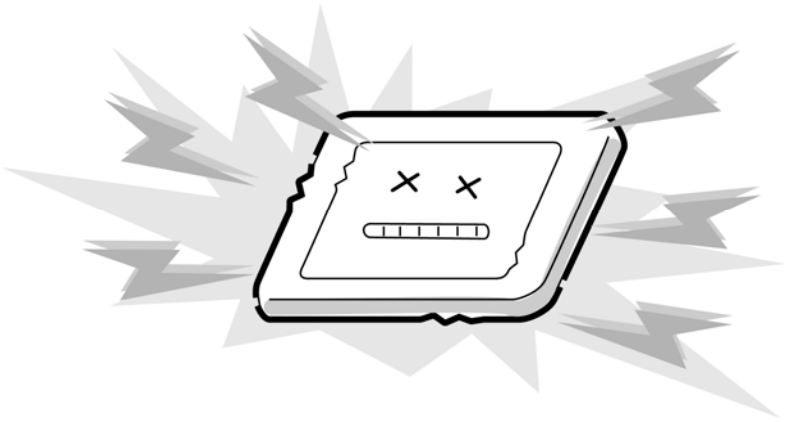
   If the surface is very dirty, we recommend a CRT cleaning agent. Apply the agent to a cloth and then wipe the panel's surface. Do not apply cleanser directly to the panel.

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.

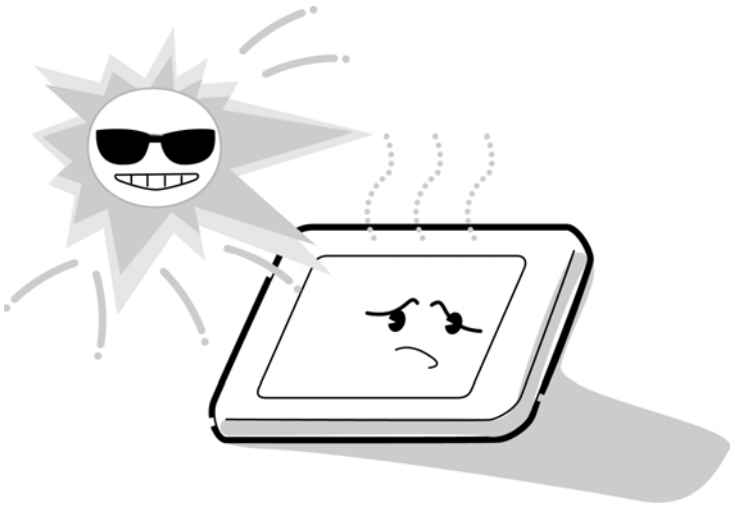
5. Glass is used in the panel, so be careful not to drop it or let it strike a hard object, which could cause breakage or cracks.



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.

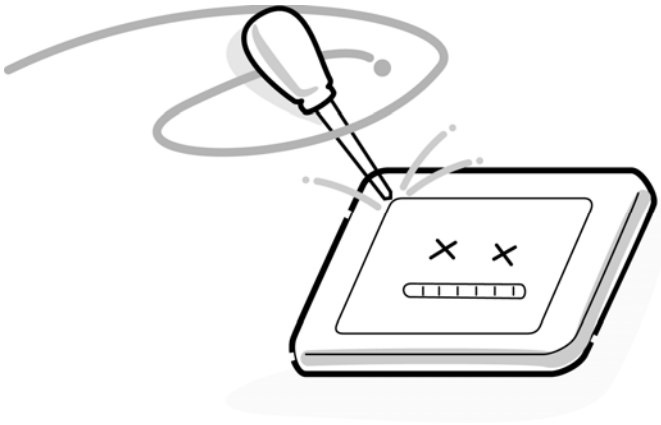


7. Do not expose the module to direct sunlight or strong ultraviolet rays for long periods.

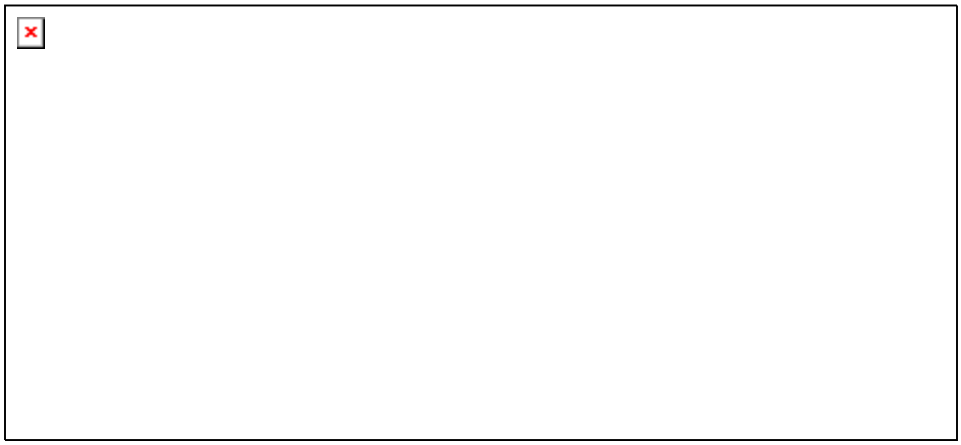


8. Do not store the module at temperatures below specifications. Cold can cause the liquid crystals to freeze, lose their elasticity or otherwise suffer damage.

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.



Appendix B Board Layout

B.1 System Board Front View

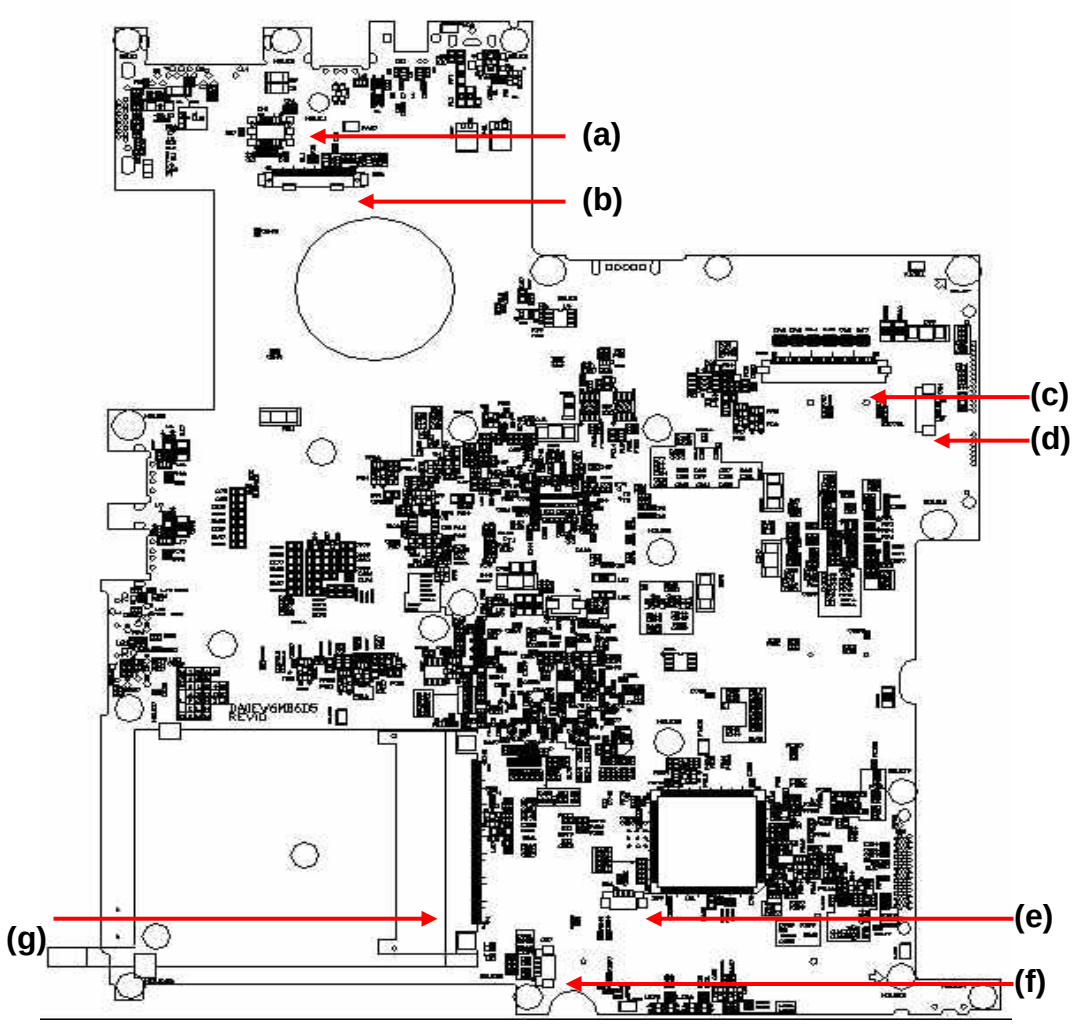


Figure B-1 System board layout (front)

Table B-1 System board ICs and connectors (front)

Mark	Number	Name
(a)	CN1	LED Board Connector
(b)	CN2	LCD I/F Connector
(c)	CN3	Keyboard I/F Connector
(d)	CN4	Touch Pad Connector
(e)	CN6	EC Debug Port Connector (reserved)
(f)	CN7	System Speaker Connector
(g)	CN5	PC Card Connector

B.2 System Board Back View

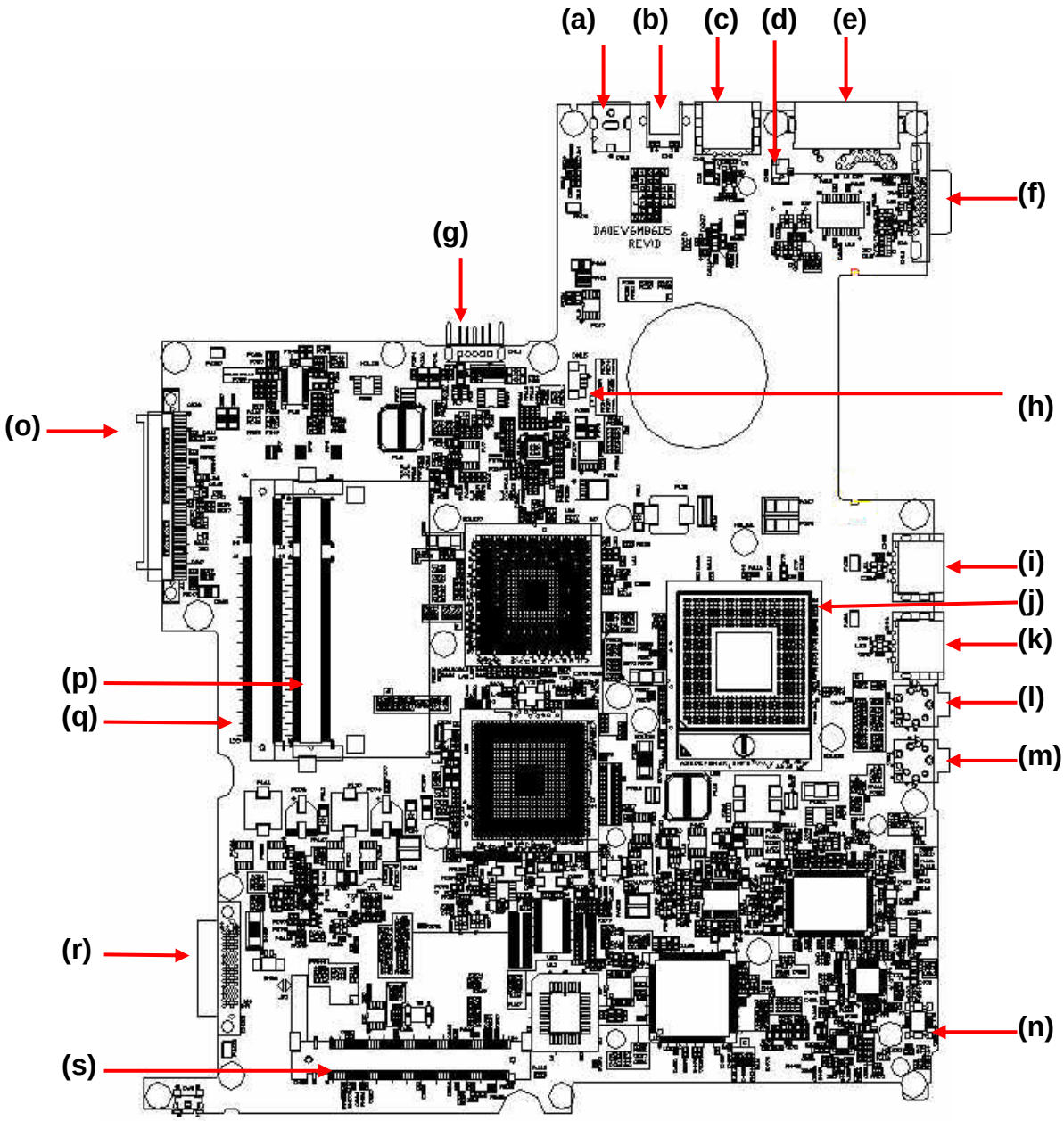


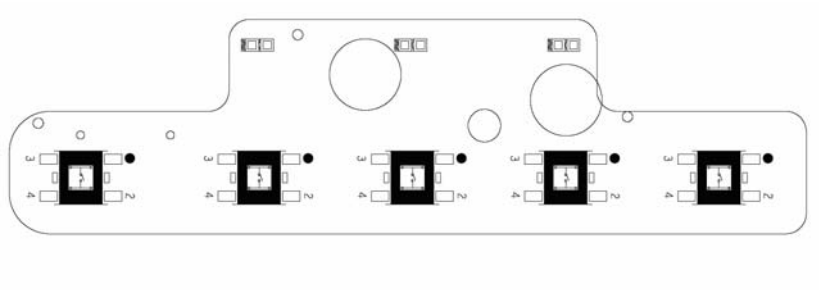
Figure B-2 System board layout (Back)

Table B-2 System board ICs and connectors (back)

Mark	Number	Name
(a)	CN10	DC Power Jack
(b)	CN8	S-VIDEO OUT connector
(c)	CN11	USB Connector
(d)	CN2	Phone Signal Connector
(e)	CN9	RJ11 + RJ45 Connector
(f)	CN13	CRT Connector
(g)	CN14	System Battery Connector
(h)	CN15	CPU Fan Connector
(i)	CN18	USB Connector
(j)	U18	CPU Socket
(k)	CN19	USB Connector
(l)	CN20	External MIC Connector
(m)	CN21	Headphone Out Connector
(n)	CN24	Modem Board Connector
(o)	CN16	HDD Connector
(p)	J2	DDR SO-DIMM 0
(q)	J1	DDR SO-DIMM 1
(r)	CN22	ODD Connector
(s)	CN25	MINI PCI Connector

B.3 LED board

<Front layout>



<Back layout>

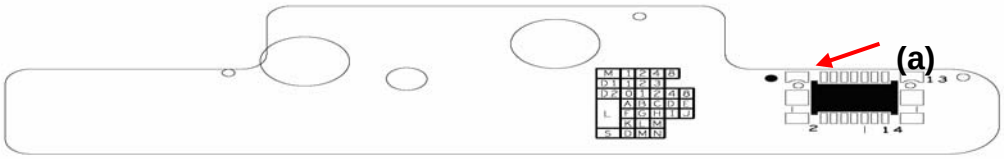


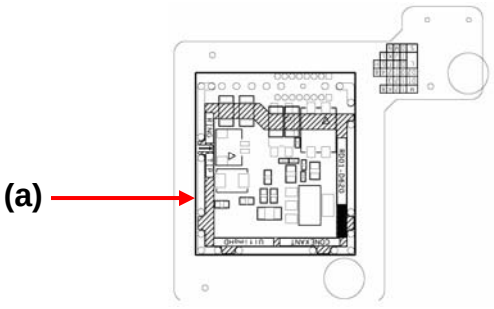
Figure B-3 LED board layout

Table B-3 LED board connectors

Mark	Number	Name
(a)	CN1	LED Board Connector

B.4 Modem board

<Front layout>



<Back layout>

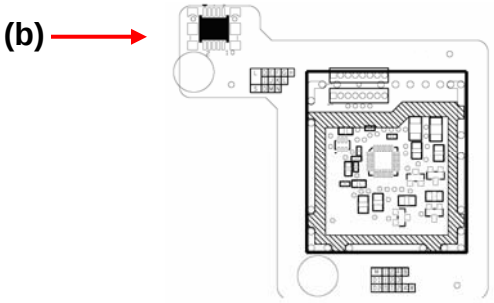


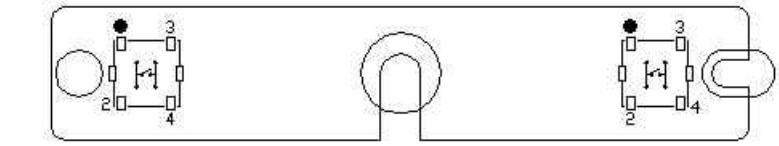
Figure B-4 Modem board layout

Table B-4 Modem board connectors

Mark	Number	Name
(a)	MJ2	Phone Signal Connector
(b)	CN1	Modem I/F Connector

Touch Pad Board

<Front layout>



<Back layout>

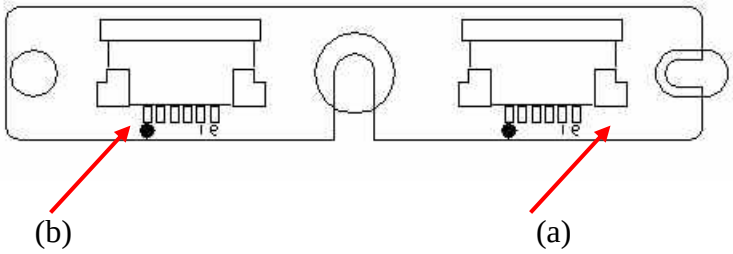


Table B-5 Touch pad board connectors

Mark	Number	Name
(a)	CN1	Lift key
(b)	CN2	Right key

Appendix C Pin Assignment

System Board

C.1 CN9 RJ11+RJ45 Connector (18-PIN)

Table C-11 RJ11+RJ45 connector (18-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	100MBPS#	O	2	N.C.	-
3	RJ45_MX3-	I	4	RJ45_MX3+	I
5	RJ45_MX1-	I	6	RJ45_MX2-	O
7	RJ45_MX2+	O	8	RJ45_MX1+	I
9	RJ45_MX0-	O	10	RJ45_MX0+	O
11	N.C.	-	12	+3V	-
13	TIP_C	I/O	14	RING_C	I/O
15	+3V	-	16	GND	-
17	GND	-	18	ACT#	O

C.2 CN12 Phone Signal Connector (2-PIN)

Table C-22 Phone Signal connector (2-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	TIP_C	I/O	2	RING_C	I/O

C.3 CN1 LED Board Connector (14-PIN)

Table C-3 LED Board connector (14-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	GND	-	2	GND	-
3	GND	-	4	GND	-
5	BT4#	I	6	NBSWON#	I
7	BT3#	I	8	NUMLED	O
9	BT2#	I	10	CAPSLED	O
11	BT1#	I	12	IDE_LED	O
13	N.C.	-	14	EMAIL_LED	I

C.4 CN2 LCD I/F Connector (40-PIN)

Table C-43 LCD I/F connector (40-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	+3V	-	2	+3V	-
3	LCDID2	I	4	GND	-
5	+5V	-	6	+5V	-
7	LCD3V	-	8	LCD3V	-
9	LCDID1	I	10	LCDID0	I
11	DISPON	O	12	VADJ	O
13	INVCC0	-	14	INVCC0	-
15	GND	-	16	TXUOUT1+	O
17	TXUOUT1-	O	18	GND	-
19	TXUOUT2+	O	20	TXUOUT2-	O
21	PHL_DATA	I/O	22	PHL_CLK	O
23	GND	-	24	TXLCLKOUT+	O
25	TXLCLKOUT-	O	26	GND	-
27	TXLOUT0+	O	28	TXLOUT0-	O
29	GND	-	30	TXLOUT1+	O
31	TXLOUT1-	O	32	GND	-
33	TXLOUT2+	O	34	TXLOUT2-	O
35	GND	-	36	TXUOUT0+	O
37	TXUOUT0-	O	38	GND	-
39	TXUCLKOUT+	O	40	TXUCLKOUT-	O

C.5 CN3 Keyboard I/F Connector (25-PIN)

Table C-5 Keyboard I/F connector (25-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	MX7	O	2	MX6	O
3	MX5	O	4	MY0	O
5	MY1	O	6	MY2	O
7	MX4	O	8	MY3	O
9	MY4	O	10	MY5	O
11	MY6	O	12	MY7	O
13	MY8	O	14	MX3	O
15	MY9	O	16	MX2	O
17	MX1	O	18	MY10	O
19	MY11	O	20	MX0	O
21	MY12	O	22	MY13	O
23	MY14	O	24	MY15	O
25	N.C.	-			

C.6 CN4 Touch PAD I/F Connector (6-PIN)

Table C-6 Pad I/F connector (6-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	+5V_TP	-	2	GND	-
3	TP_DATA	I/O	4	TP_CLK	O
5	GND	-	6	GND	-

C.7 CN5 PC Card I/F Connector (68-PIN)

Table C-7 PC Card I/F connector (68-PIN) (1/2)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	GND	-	2	A_CAD0	I/O
3	A_CAD1	I/O	4	A_CAD3	I/O
5	A_CAD5	I/O	6	A_CAD7	I/O
7	A_CC/BE0#	I/O	8	A_CAD9	I/O
9	A_CAD11	I/O	10	A_CAD12	I/O
11	A_CAD14	I/O	12	A_CC/BE1#	I/O
13	A_CPAR	I/O	14	A_CPERR#	O
15	A_CGNT#	I	16	A_CINT#	O
17	VCCCB	-	18	AVPP	-
19	A_CCLK1	I	20	A_CIRDY#	O
21	A_CC/BE2#	I/O	22	A_CAD18	I/O
23	A_CAD20	I/O	24	A_CAD21	I/O
25	A_CAD22	I/O	26	A_CAD23	I/O
27	A_CAD24	I/O	28	A_CAD25	I/O
29	A_CAD26	I/O	30	A_CAD27	I/O
31	A_CAD29	I/O	32	A_CRSVD/D2	I/O
33	A_CCLKRUN#	O	34	GND	-
35	GND	-	36	A_CCD1#	I/O
37	A_CAD2	I/O	38	A_CAD4	I/O
39	A_CAD6	I/O	40	A_RSVD/D14	I/O
41	A_CAD8	I/O	42	A_CAD10	I/O
43	A_CVS1#	I/O	44	A_CAD13	I/O
45	A_CAD15	I/O	46	A_CAD16	I/O
47	A_CRSVD/A18	I/O	48	A_CBLOCK#	I/O
49	A_CSTOP#	O	50	A_CDEVSEL#	I/O
51	VCCCB	-	52	AVPP	-
53	A_CTRDY#	I/O	54	A_CFRAME#	I/O
55	A_CAD17	I/O	56	A_CAD19	I/O
57	A_CVS2#	I/O	58	A_CRST#	I
59	A_CSERR#	O	60	A_CREQ#	O

Table C-7 PC card I/F connector (68-PIN) (2/2)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
61	A_CC/BE3#	I/O	62	A_CAUDIO	O
63	A_CSTSCHG	I/O	64	A_CAD28	I/O -
65	A_CAD30	I/O	66	A_CAD31	I/O -
67	A_CCD2#	I/O	68	GND	-

C.8 CN23 RTC Battery Connector (2-PIN)

Table C-8 RTC battery connector (2-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	3VRTC	O	2	GND	-

C.9 CN7 System Speaker Connector (4-PIN)

Table C-9 System Speaker connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	INSPKL-N	O	2	INSPKL+N	O
3	INSPKR+N	O	4	INSPKR-N	O

C.10 CN8 S-Video I/F Connector (4-PIN)

Table C-10 S-Video I/F connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	GND	-	2	GND	-
3	TV-LUMA	O	4	TV-CHROMA	O

C.11 CN10 DC IN Connector (4-PIN)

Table C-4 DC IN connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	VA	I	2	GND	-
3	GND	-	4	GND	-

C.12 CN11 USB I/F Connector (4-PIN)

Table C-5 USB I/F connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	USB5POWER	-	2	BUSBP3-	I/O
3	BUSBP3+	I/O	4	GND	-

C.13 CN13 CRT I/F Connector (15-PIN)

Table C-13 CRT I/F connector (15-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	CRT_R1	O	2	CRT_G1	O
3	CRT_B1	O	4	N.C.	-
5	GND	-	6	GND	-
7	GND	-	8	GND	-
9	+5V_CRT2	-	10	GND	-
11	N.C.	-	12	CRTDDAT	I/O
13	CRTHSYNC	O	14	CRTVSYNC	O
15	CRTDCLK	O			

C.14 CN14 System Battery Connector (5-PIN)

Table C-64 USB I/F connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	GND	-	2	MBDATA	I/O
3	MBCLK	O	4	TEMP_MBAT	O
5	MBAT+	-			

C.15 CN15 CPU Fan Connector (3-PIN)

Table C-75 CPU FAN connector (3-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	FAN_PWR	-	2	GND	-
3	FANSIG	I			

C.16 CN16 HDD I/F Connector (44-PIN)

Table C-16 HDD I/F connector (44-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	N.C.	-	2	GND	-
3	+5V	-	4	+5V	-
5	GND	-	6	HDLED#	O
7	PDCS3#	I	8	PDCS1#	I
9	PDA2	I	10	PDA0	I
11	PDIAG	I	12	PDA1	I
13	N.C.	-	14	IRQ14	I
15	GND	-	16	PDDACK#	I
17	PSEL	I	18	PHDRDY	I
19	GND	-	20	PDIOR#	I
21	GND	-	22	PDIOW#	I
23	GND	-	24	PDDREQ	I
25	N.C.	-	26	GND	-
27	PDD15	I/O	28	PDD0	I/O
29	PDD14	I/O	30	PDD1	I/O
31	PDD13	I/O	32	PDD2	I/O
33	PDD12	I/O	34	PDD3	I/O
35	PDD11	I/O	36	PDD4	I/O
37	PDD10	I/O	38	PDD5	I/O
39	PDD9	I/O	40	PDD6	I/O
41	PDD8	I/O	42	PDD7	I/O
43	GND	-	44	-RST_HDD0	I

C.17 CN18 USB I/F Connector (4-PIN)

Table C-17 USB I/F connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	USB3POWER	-	2	BUSBP1-	I/O
3	BUSBP1+	I/O	4	GND	-

C.18 J1 Memory Connector 0 (200-PIN)

Table C-18 Memory connector 0 (200-PIN) (1/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	DDR_VREF	-	2	GND	-
3	GND	-	4	MDQ50	I/O
5	MDQ55	I/O	6	MDQ51	I/O
7	MDQ54	I/O	8	GND	-
9	GND	-	10	M_DM6	I/O
11	M_DQS#6	I/O	12	GND	-
13	M_DQS6	I/O	14	MDQ53	I/O
15	GND	-	16	MDQ49	I/O
17	MDQ52	I/O	18	GND	-
19	MDQ48	I/O	20	MDQ12	I/O
21	GND	-	22	MDQ8	I/O
23	MDQ13	I/O	24	GND	-
25	MDQ9	I/O	26	M_DM1	I/O
27	GND	-	28	GND	-
29	M_DQS#1	I/O	30	M_CLKOUT1	I/O
31	M_DQS1	I/O	32	M_CLKOUT1#	I/O
33	GND	-	34	GND	-
35	MDQ14	I/O	36	MDQ10	I/O
37	MDQ11	I/O	38	MDQ15	I/O
39	GND	-	40	GND	-
41	GND	-	42	GND	-
43	MDQ1	I/O	44	MDQ5	I/O
45	MDQ4	I/O	46	MDQ0	- I/O
47	GND	-	48	GND	-
49	M_DQS#0	I/O	50	NC	I/O
51	M_DQS0	I/O	52	M_DM0	I/O
53	GND	-	54	GND	-
55	MDQ7	I/O	56	MDQ3	I/O
57	MDQ2	I/O	58	MDQ6	I/O
59	GND	-	60	GND	-
61	MDQ20	I/O	62	MDQ17	I/O

Table C-18 Memory connector 0 (200-PIN) (2/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
63	MDQ21	I/O	64	MDQ16	I/O
65	GND	-	66	GND	-
67	M_DM2	I/O	68	M_DQS#2	I/O
69	NC	-	70	M_DQS2	I/O
71	GND	-	72	GND	-
73	MDQ18	I/O	74	MDQ19	I/O
75	MDQ23	I/O	76	MDQ22	I/O
77	GND	-	78	GND	-
79	M_CKE0	I	80	M_CKE1	I/O
81	+1.8VSUS	-	82	+1.8VSUS	-
83	N.C.	-	84	N.C	-
85	MA17	I	86	MA14	I
87	+1.8VSUS	-	88	+1.8VSUS	-
89	MA12	I	90	MA11	I
91	MA9	I	92	MA7	I
93	MA8	I	94	MA6	I
95	+1.8VSUS	I	96	+1.8VSUS	-
97	MA5	I	98	MA4	I
99	MA3	I	100	MA2	I
101	MA1	I	102	MA0	I
103	+1.8VSUS	-	104	+1.8VSUS	-
105	MA10	I	106	MA16	I
107	MA15	I	108	M_RAS#	I
109	M_WE#	I	110	M_CS#0	I
111	+1.8VSUS	-	112	+1.8VSUS	I
113	M_CAS#	I	114	M_ODT0	I
115	M_CS#1	I	116	MA13	I
117	+1.8VSUS	-	118	+1.8VSUS	I
119	M_ODT2	I	120	NC	I
121	GND	-	122	GND	-
123	MDQ25	I/O	124	MDQ29	I/O
125	MDQ24	I/O	126	MDQ28	I/O
127	GND	-	128	GND	I/O
129	M_DQS#3	I/O	130	M_DM3	I/O
131	M_DQS3	I/O	132	GND	-
133	GND	-	134	MDQ30	I/O

Table C-18 Memory connector 0 (200-PIN) (3/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
135	MDQ27	I/O	136	MDQ26	I/O
137	MDQ31	I/O	138	GND	-
139	GND	-	140	MDQ32	I/O
141	MDQ33	I/O	142	MDQ37	I/O
143	MDQ36	I/O	144	GND	-
145	GND	-	146	M_DQS#4	I/O
147	M_DM4	I/O	148	M_DQS4	I/O
149	GND	-	150	GND	-
151	MDQ39	I/O	152	MDQ38	I/O
153	MDQ35	I/O	154	MDQ34	I/O
155	GND	-	156	GND	-
157	MDQ41	I/O	158	MDQ44	I/O
159	MDQ40	I/O	160	MDQ45	I/O
161	GND	-	162	GND	-
163	NC	-	164	M_CLKOUT3	I
165	GND	-	166	M_CLKOUT3#	I
167	M_DQS#5	I/O	168	GND	-
169	M_DQS5	I/O	170	M_DM5	I/O
171	GND	-	172	GND	-
173	MDQ43	I/O	174	MDQ46	I/O
175	MDQ47	I/O	176	MDQ42	I/O
177	GND	-	178	GND	-
179	MDQ57	I/O	180	MDQ56	I/O
181	MDQ61	I/O	182	MDQ60	I/O
183	GND	-	184	GND	-
185	M_DM7	I/O	186	M_DQS#7	I/O
187	GND	-	188	M_DQS7	I/O
189	MDQ59	I/O	190	GND	-
191	MDQ63	I/O	192	MDQ58	I/O
193	GND	-	194	MDQ62	I/O
195	SDATA	I/O	196	GND	-
197	SCLK	I/O	198	+3V	-
199	+3V	-	200	+3V	-

C.19 J2 Memory connector 1 (200-PIN)

Table C-19 Memory connector 1 (200-PIN) (1/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	DDR_VREF	-	2	GND	-
3	GND	-	4	MDQ50	I/O
5	MDQ55	I/O	6	MDQ51	I/O
7	MDQ54	I/O	8	GND	-
9	GND	-	10	M_DM6	I/O
11	M_DQS#6	I/O	12	GND	-
13	M_DQS6	I/O	14	MDQ53	I/O
15	GND	-	16	MDQ49	I/O
17	MDQ52	I/O	18	GND	-
19	MDQ48	I/O	20	MDQ12	I/O
21	GND	-	22	MDQ8	I/O
23	MDQ13	I/O	24	GND	-
25	MDQ9	I/O	26	M_DM1	I/O
27	GND	-	28	GND	-
29	M_DQS#1	I/O	30	M_CLKOUT1	I/O
31	M_DQS1	I/O	32	M_CLKOUT1#	I/O
33	GND	-	34	GND	-
35	MDQ14	I/O	36	MDQ10	I/O
37	MDQ11	I/O	38	MDQ15	I/O
39	GND	-	40	GND	-
41	GND	-	42	GND	-
43	MDQ1	I/O	44	MDQ5	I/O
45	MDQ4	I/O	46	MDQ0	- I/O
47	GND	-	48	GND	-
49	M_DQS#0	I/O	50	NC	I/O
51	M_DQS0	I/O	52	M_DM0	I/O
53	GND	-	54	GND	-
55	MDQ7	I/O	56	MDQ3	I/O
57	MDQ2	I/O	58	MDQ6	I/O
59	GND	-	60	GND	-
61	MDQ20	I/O	62	MDQ17	I/O

Table C-19 Memory connector 1 (200-PIN) (2/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
63	MDQ21	I/O	64	MDQ16	I/O
65	GND	-	66	GND	-
67	M_DM2	I/O	68	M_DQS#2	I/O
69	NC	-	70	M_DQS2	I/O
71	GND	-	72	GND	-
73	MDQ18	I/O	74	MDQ19	I/O
75	MDQ23	I/O	76	MDQ22	I/O
77	GND	-	78	GND	-
79	M_CKE0	I	80	M_CKE1	I/O
81	+1.8VSUS	-	82	+1.8VSUS	-
83	N.C.	-	84	N.C	-
85	MA17	I	86	MA14	I
87	+1.8VSUS	-	88	+1.8VSUS	-
89	MA12	I	90	MA11	I
91	MA9	I	92	MA7	I
93	MA8	I	94	MA6	I
95	+1.8VSUS	I	96	+1.8VSUS	-
97	MA5	I	98	MA4	I
99	MA3	I	100	MA2	I
101	MA1	I	102	MA0	I
103	+1.8VSUS	-	104	+1.8VSUS	-
105	MA10	I	106	MA16	I
107	MA15	I	108	M_RAS#	I
109	M_WE#	I	110	M_CS#0	I
111	+1.8VSUS	-	112	+1.8VSUS	I
113	M_CAS#	I	114	M_ODT0	I
115	M_CS#1	I	116	MA13	I
117	+1.8VSUS	-	118	+1.8VSUS	I
119	M_ODT2	I	120	NC	I
121	GND	-	122	GND	-
123	MDQ25	I/O	124	MDQ29	I/O
125	MDQ24	I/O	126	MDQ28	I/O
127	GND	-	128	GND	I/O
129	M_DQS#3	I/O	130	M_DM3	I/O
131	M_DQS3	I/O	132	GND	-
133	GND	-	134	MDQ30	I/O

able C-19 Memory connector 1 (200-PIN) (3/3)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
135	MDQ27	I/O	136	MDQ26	I/O
137	MDQ31	I/O	138	GND	-
139	GND	-	140	MDQ32	I/O
141	MDQ33	I/O	142	MDQ37	I/O
143	MDQ36	I/O	144	GND	-
145	GND	-	146	M_DQS#4	I/O
147	M_DM4	I/O	148	M_DQS4	I/O
149	GND	-	150	GND	-
151	MDQ39	I/O	152	MDQ38	I/O
153	MDQ35	I/O	154	MDQ34	I/O
155	GND	-	156	GND	-
157	MDQ41	I/O	158	MDQ44	I/O
159	MDQ40	I/O	160	MDQ45	I/O
161	GND	-	162	GND	-
163	NC	-	164	M_CLKOUT3	I
165	GND	-	166	M_CLKOUT3#	I
167	M_DQS#5	I/O	168	GND	-
169	M_DQS5	I/O	170	M_DM5	I/O
171	GND	-	172	GND	-
173	MDQ43	I/O	174	MDQ46	I/O
175	MDQ47	I/O	176	MDQ42	I/O
177	GND	-	178	GND	-
179	MDQ57	I/O	180	MDQ56	I/O
181	MDQ61	I/O	182	MDQ60	I/O
183	GND	-	184	GND	-
185	M_DM7	I/O	186	M_DQS#7	I/O
187	GND	-	188	M_DQS7	I/O
189	MDQ59	I/O	190	GND	-
191	MDQ63	I/O	192	MDQ58	I/O
193	GND	-	194	MDQ62	I/O
195	SDATA	I/O	196	GND	-
197	SCLK	I/O	198	+3V	-
199	+3V	-	200	+3V	-

C.20 CN19 USB I/F connector (4-PIN)

Table C-20 USB I/F connector (4-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	USB2POWER	I	2	BUSBP0-	I/O
3	BUSBP0+	I/O	4	GND	-

C.21 CN20 External MIC Connector (8-PIN)

Table C-21 External MIC connector (8-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	AUDGND	-	2	SYS_MIC_1	I
3	MBIAS	O	4	AUDGND	-
5	AUDGND	-	6	N.C.	-
7	AUDGND	-	8	AUDGND	-

C.22 CN21 Headphone OUT Connector (8-PIN)

Table C-22 Headphone OUT connector (8-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	AUDGND	-	2	SPKL_SYS	O
3	SPKR_SYS	O	4	AUDGND	-
5	HPS_PLUGIN	I	6	N.C.	-
7	AUDGND	-	8	AUDGND	-

C.23 CN22 ODD I/F Connector (50-PIN)

Table C-23 ODD I/F connector (50-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	N.C.	-	2	N.C.	-
3	N.C.	-	4	GND	-
5	-RST_RBAY0	O	6	SDD8	I/O
7	SDD7	I/O	8	SDD9	I/O
9	SDD6	I/O	10	SDD10	I/O
11	SDD5	I/O	12	SDD11	I/O
13	SDD4	I/O	14	SDD12	I/O
15	SDD3	I/O	16	SDD13	I/O
17	SDD2	I/O	18	SDD14	I/O
19	SDD1	I/O	20	SDD15	I/O
21	SDD0	I/O	22	SDDREQ	I
23	GND	-	24	SDIOR#	O
25	SDIOW#	O	26	GND	-
27	SDIORDY	I	28	SDDACK#	O
29	IRQ15	I	30	N.C.	-
31	SDA1	O	32	N.C.	O
33	SDA0	O	34	SDA2	O
35	SDCS1#	O	36	SDCS3#	O
37	CDLED#	O	38	+5V	-
39	+5V	-	40	+5V	-
41	+5V	-	42	+5V	-
43	GND	-	44	GND	-
45	GND	-	46	GND	-
47	RCSEL_R	-	48	GND	-
49	N.C.	-	50	N.C	-

C.24 CN24 Modem Board connector (10-PIN)

Table C-24 Modem Board connector (10-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	PWRCLKN1	O	2	GND	-
3	PWRCLKP1	O	4	GND	-
5	N.C.	-	6	GND	-
7	DIB_DATAP	I/O	8	GND	-
9	DIB_DATAN	I/O	10	GND	-

C.25 CN25 MINI-PCI connector (124-PIN)

Table C-25 MINI-PCI connector (124-PIN) (1/2)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	N.C.	-	2	N.C.	-
3	N.C.	-	4	N.C.	-
5	N.C.	-	6	N.C.	-
7	N.C.	-	8	N.C.	-
9	N.C.	-	10	N.C.	-
11	N.C.	-	12	N.C.	-
13	RF_EN	I	14	N.C.	-
15	N.C.	-	16	N.C.	-
17	INTC#	I	18	+5V	-
19	+3V	-	20	INTB#	O
21	N.C.	-	22	N.C.	-
23	GND	-	24	3VSUS	-
25	PCLK_MINI	I	26	PCIRST#	O
27	GND	-	28	+3V	-
29	REQ1#	I	30	GNT1#	O
31	+3V	-	32	GND	-
33	AD31	I/O	34	PME#	O
35	AD29	I/O	36	N.C.	-
37	GND	-	38	AD30	I/O
39	AD27	I/O	40	+3V	-
41	AD25	I/O	42	AD28	I/O
43	N.C.	O	44	AD26	I/O
45	CBE3#	I/O	46	AD24	I/O
47	AD23	I/O	48	AD20	I/O
49	GND	-	50	GND	-
51	AD21	I/O	52	AD22	I/O
53	AD19	I/O	54	AD20	I/O
55	GND	-	56	PAR	I/O
57	AD17	I/O	58	AD18	I/O
59	CBE2#	I/O	60	AD16	I/O
61	IRDY#	I/O	62	GND	-

Table C-25 MINI-PCI connector (124-PIN) (2/2)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
63	+3V	-	64	FRAME#	I/O
65	CLKRUN#	I/O	66	TRDY#	I/O
67	SERR#	I	68	STOP#	I/O
69	GND	-	70	+3V	-
71	PERR#	I/O	72	DEVSEL#	I/0
73	CBE1#	I/O	74	GND	-
75	AD14	I/O	76	AD15	I/O
77	GND	-	78	AD13	I/O
79	AD12	I/O	80	AD11	I/O
81	AD10	I/O	82	GND	-
83	GND	-	84	AD9	I/O
85	AD8	I/O	86	CBE0#	I/O
87	AD7	I/O	88	+3V	-
89	+3V	-	90	AD6	I/O
91	AD5	I/O	92	AD4	I/O
93	N.C.	-	94	AD2	I/O
95	AD3	I/O	96	AD0	I/O
97	+5V	-	98	N.C.	-
99	AD1	I/O	100	SERIRQ	I
101	GND	-	102	GND	-
103	RLAD0.	-	104	N.C.	-
105	RLAD1	-	106	RLDRQ#	-
107	RLAD2	-	108	SDIN1_MINI	O
109	RLAD3	-	110	RKBSMI#	-
111	RLFRAME#	-	112	N.C.	-
113	GND	-	114	GND	-
115	RLRESET#	-	116	RRPCLK_SIO	-
117	GND	-	118	GND	-
119	GND	-	120	GND	-
121	N.C.	-	122	N.C.	-
123	+5V	-	124	3VSUS	-

LED Board

C.26 CN1 LED Board connector (14-PIN)

Table C-26 LED Board connector (14-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	GND	-	2	GND	-
3	GND	-	4	GND	-
5	BT4#	I	6	NBSWON#	I
7	BT3#	I	8	NUMLED	O
9	BT2#	I	10	CAPSLED	O
11	BT1#	I	12	IDE_LED	O
13	N.C.	-	14	N.C.	-

Modem Board

C.27 CN1 Modem Signal connector (10-PIN)

Table C-27 Modem Signal connector (10-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	PWRCLKN	O	2	GND	-
3	PWRCLKP	O	4	GND	-
5	N.C.	-	6	GND	-
7	DIB_DATAP	I/O	8	GND	-
9	DIB_DATAN	I/O	10	GND	-

C.28 MJ2 Phone Signal connector (2-PIN)

Table C-28 Phone Signal connector (2-PIN)

PIN No.	Signal name	I/O	PIN No.	Signal name	I/O
1	RING_1	I/O	2	TIP_1	I/O

Appendix D Display Codes

D.1 Display Codes

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

Cap No.	Keytop	Code set 1		Code set 2			Note
		Make	Break	Make	Break		
01	‘ ~	29	A9	0E	F0	0E	
02	1 !	02	82	16	F0	16	
03	2 @	03	83	1E	F0	1E	
04	3 #	04	84	26	F0	26	
05	4 $	05	85	25	F0	25	
06	5 %	06	86	2E	F0	2E	
07	6 ^	07	87	36	F0	36	
08	7 &	08	88	3D	F0	3D	*2
09	8 *	09	89	3E	F0	3E	*2
10	9 (	0A	8A	46	F0	46	*2
11	0)	0B	8B	45	F0	45	
12	- _	0C	8C	4E	F0	4E	
13	= +	0D	8D	55	F0	55	
15	BkSp	0E	8E	66	F0	66	
16	Tab	0F	8F	0D	F0	0D	
17	Q	10	90	15	F0	15	
18	W	11	91	1D	F0	1D	
19	E	12	92	24	F0	24	
20	R	13	93	2D	F0	2D	
21	T	14	94	2C	F0	2C	
22	Y	15	95	35	F0	35	
23	U	16	96	3C	F0	3C	*2
24	I	17	97	43	F0	43	*2
25	O	13	98	44	F0	44	*2
26	P	19	99	4D	F0	4D	*2
27	[{	1A	9A	54	F0	54	
28	] }	1B	9B	5B	F0	5B	

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

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

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

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

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

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

Notes:

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

Table D-2 Scan codes with left Shift key

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

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

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

Table D-3 Scan codes in Numlock mode

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

Table D-4 Scan codes with Fn key

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

Table D-5 Scan codes in overlay mode

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

Table D-6 No.124 key scan code

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

Table D-7 No.126 key scan code

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

*: This key generates only make codes.

Appendix E Keyboard Layout

E.1 United States (US) Keyboard

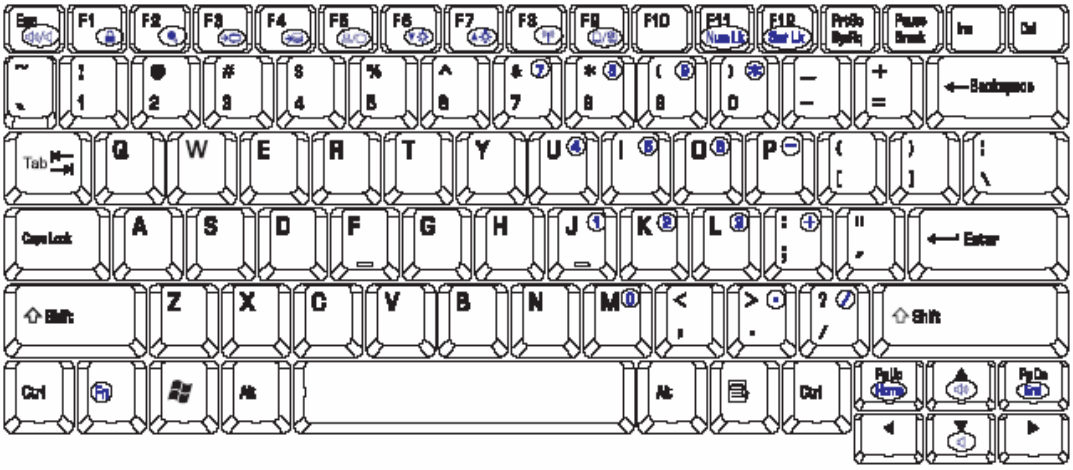


Figure E-1 US Keyboard layout

E.2 United Kingdom (UK) Keyboard

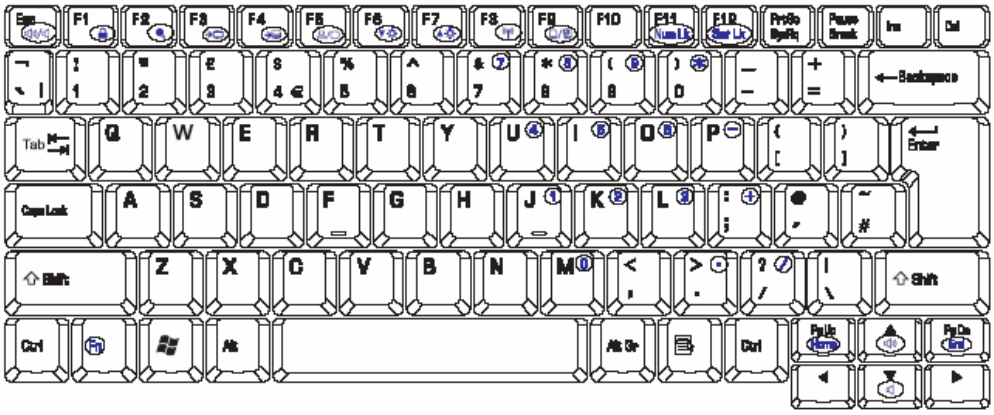


Figure E-2 UK Keyboard layout

E.3 Arabia (AR) Keyboard

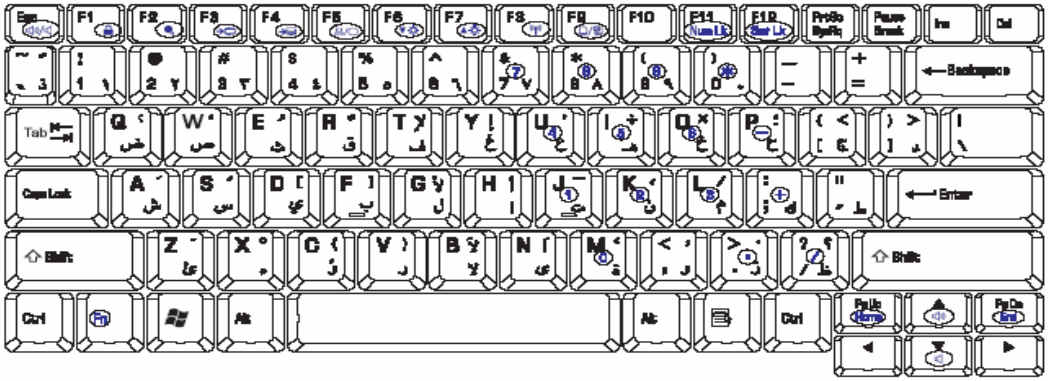


Figure E-3 AR Keyboard layout

E.4 Belgium (BB) Keyboard

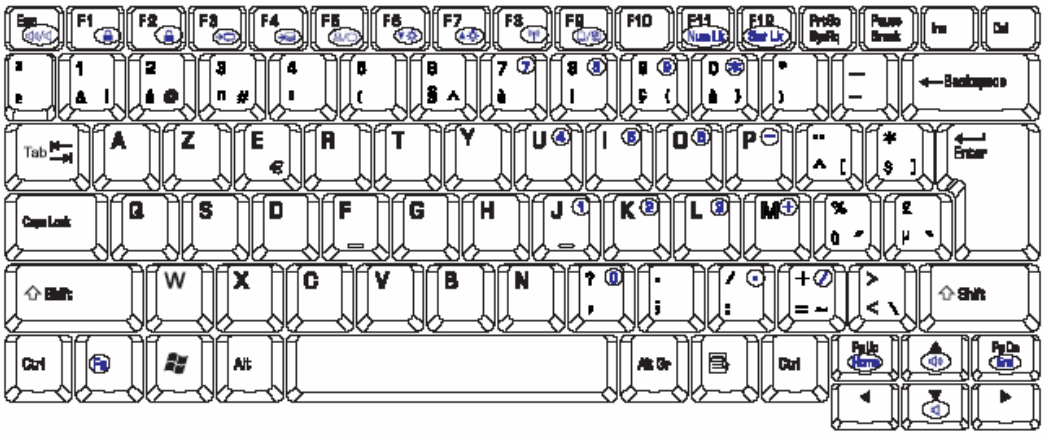
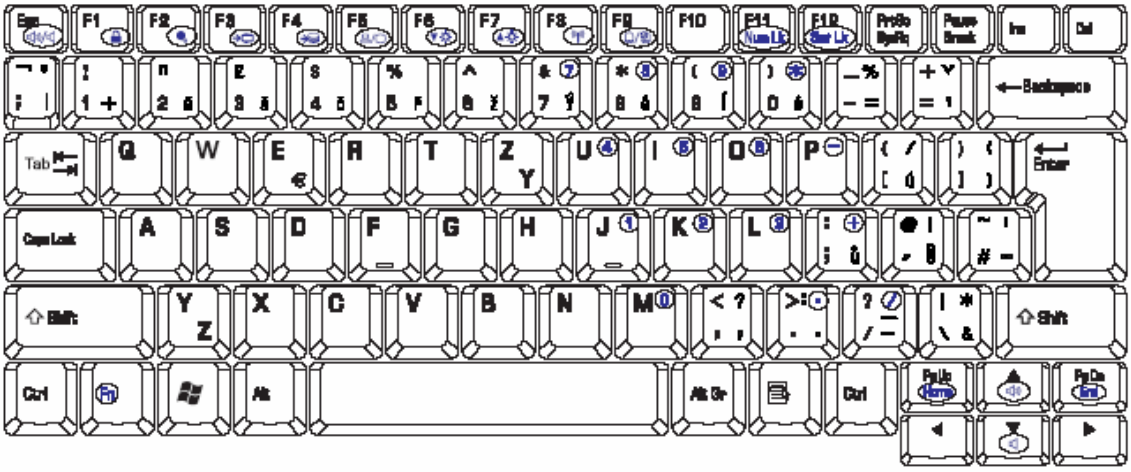


Figure E-4 BB Keyboard layout

E.5 Czech (CZ) Keyboard



FigureE-5 CZ Keyboard layout

E.6 German (GR) Keyboard

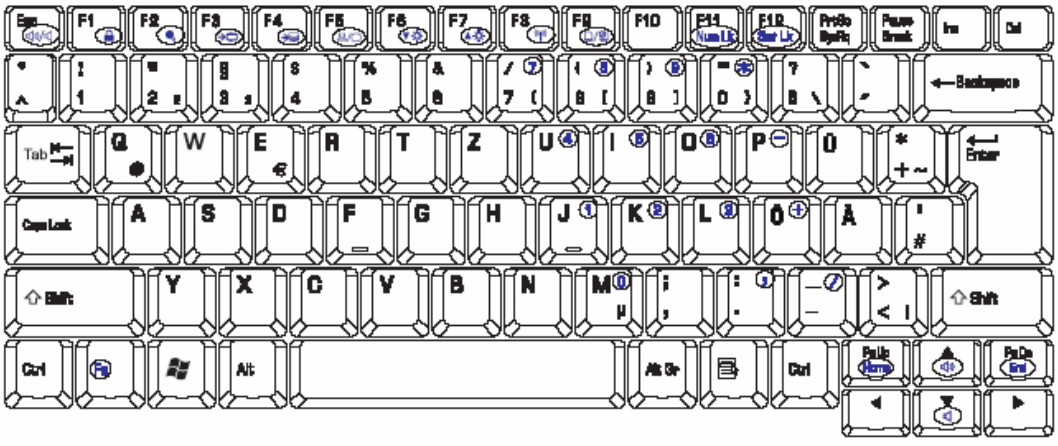


Figure E-6 GR Keyboard layout

E.7 Danish (DK) Keyboard

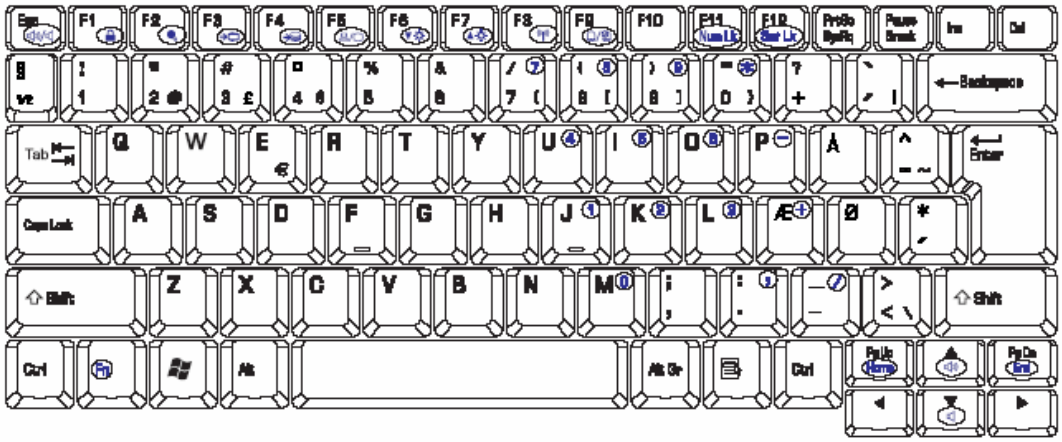


Figure E-7 DK Keyboard layout

E.8 Spanish (SP) Keyboard

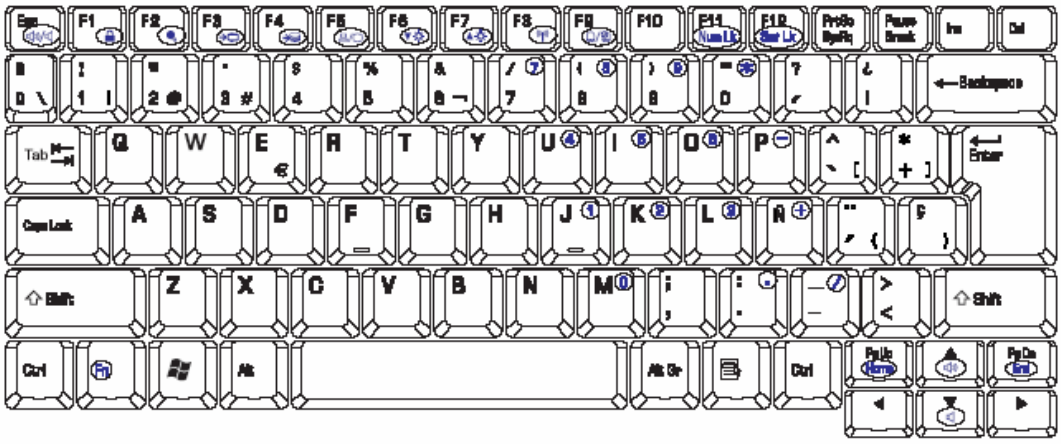


Figure E-8 SP Keyboard layout

E.9 French (FR) Keyboard

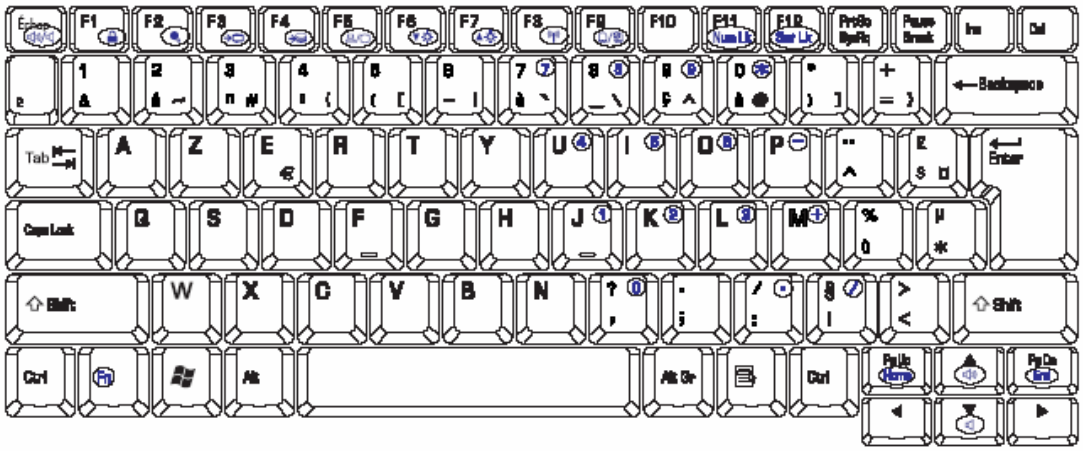


Figure E-9 FR Keyboard layout

E.10 Hungary(HU) Keyboard

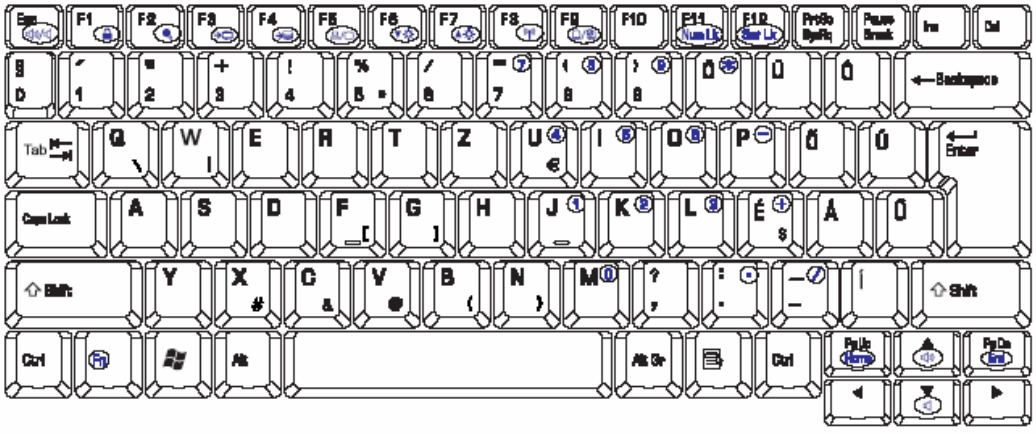


Figure E-10 HUR Keyboard layout

E.11 Italian (IT) Keyboard

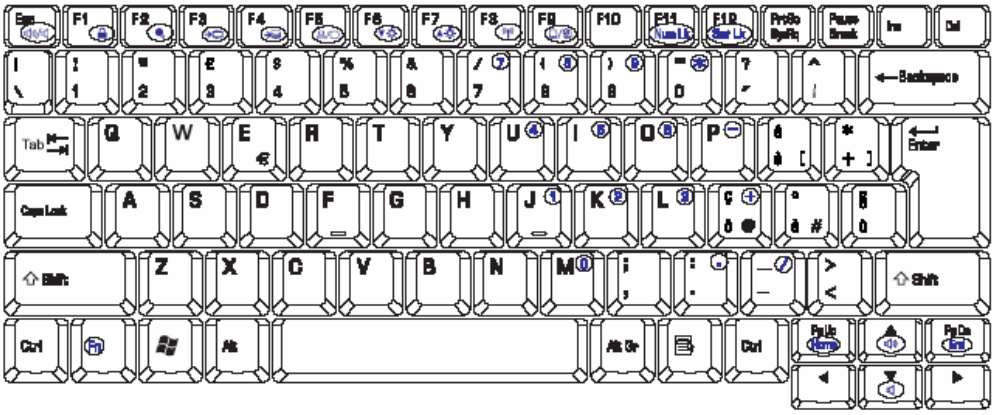


Figure E-11 IT Keyboard layout

E.12 Korean (KR) Keyboard

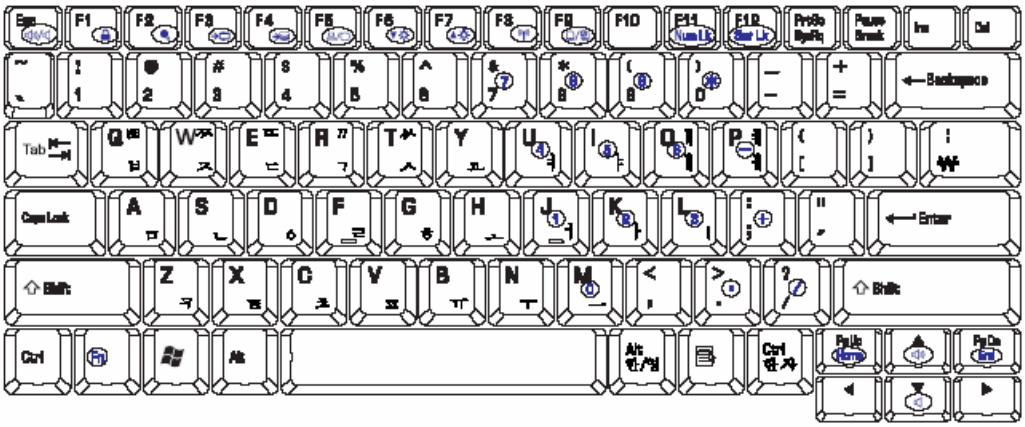


Figure E-12 KR Keyboard layout

E.13 Norwegian (NO) Keyboard

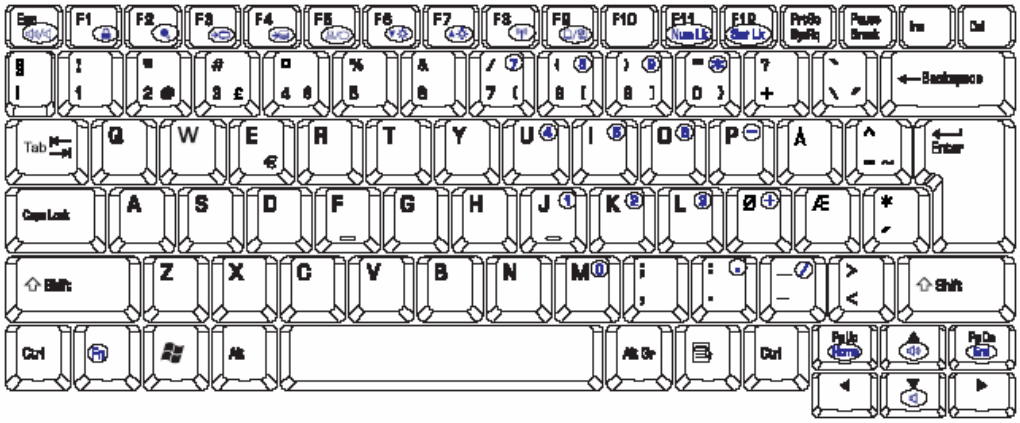


Figure E-13 NO Keyboard layout

E.14 Portuguese (PT) Keyboard

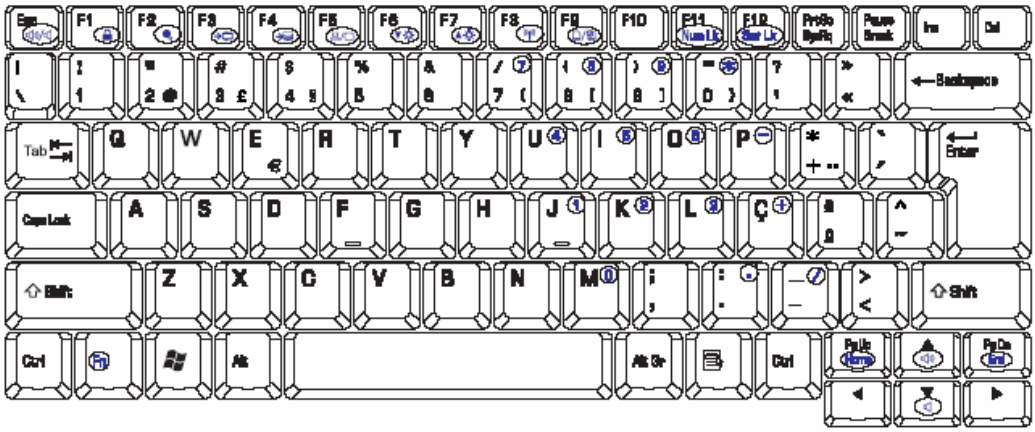


Figure E-14 PT Keyboard layout

E.15 Traditional Chinese (TC) Keyboard

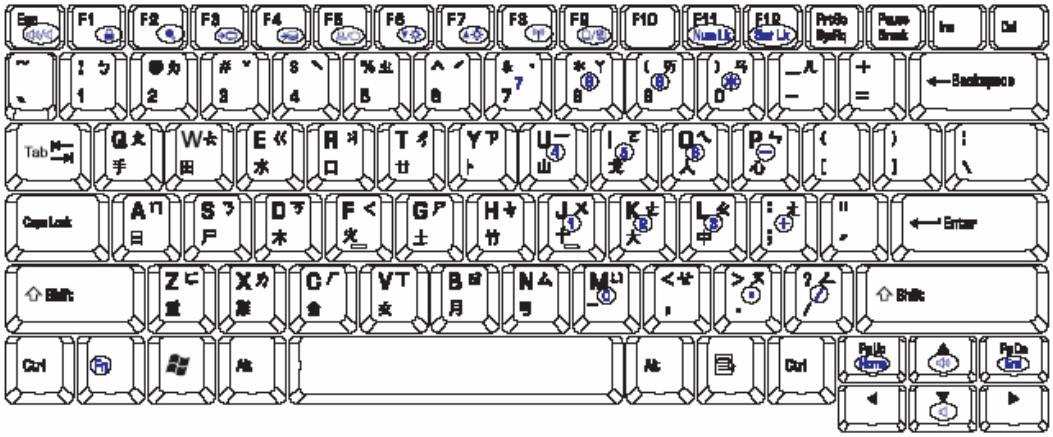


Figure E-15 TC Keyboard layout

E.16 Swedish (SW) Keyboard

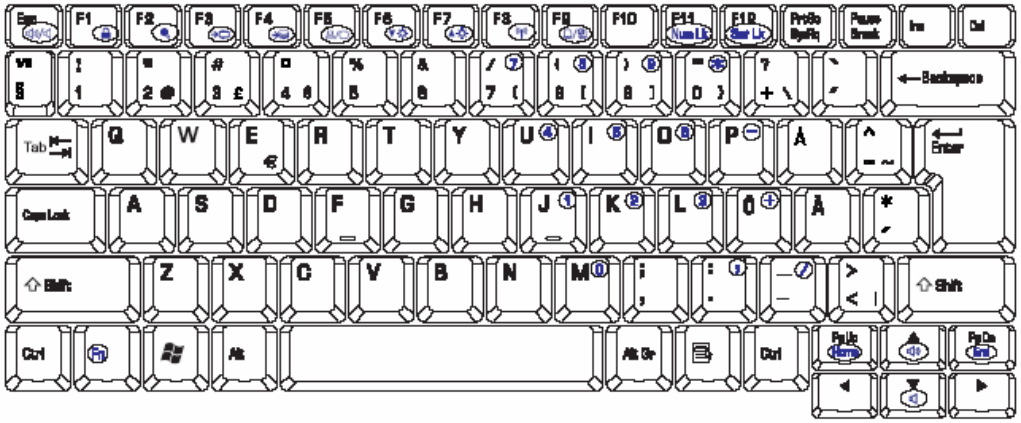


Figure E-16 SW Keyboard layout

E.17 Russian (RU) Keyboard

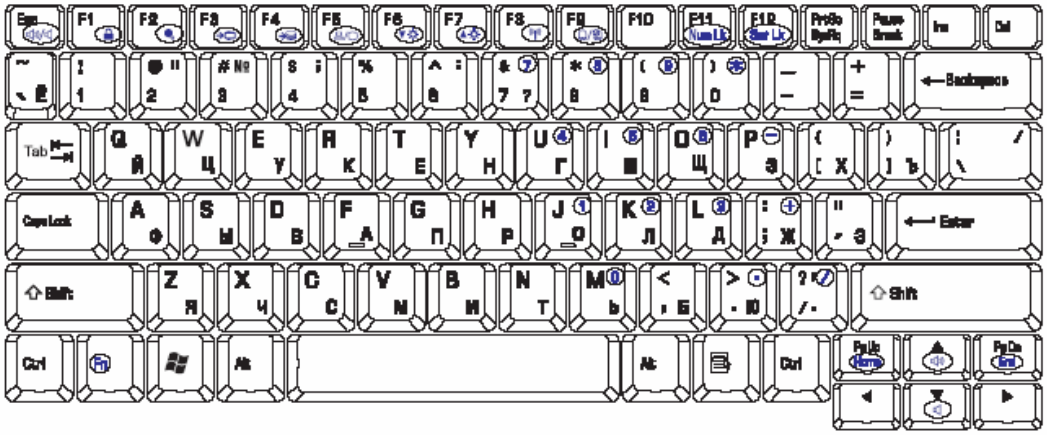


Figure E-17 RU Keyboard layout

E.18 Turkish (TR) Keyboard

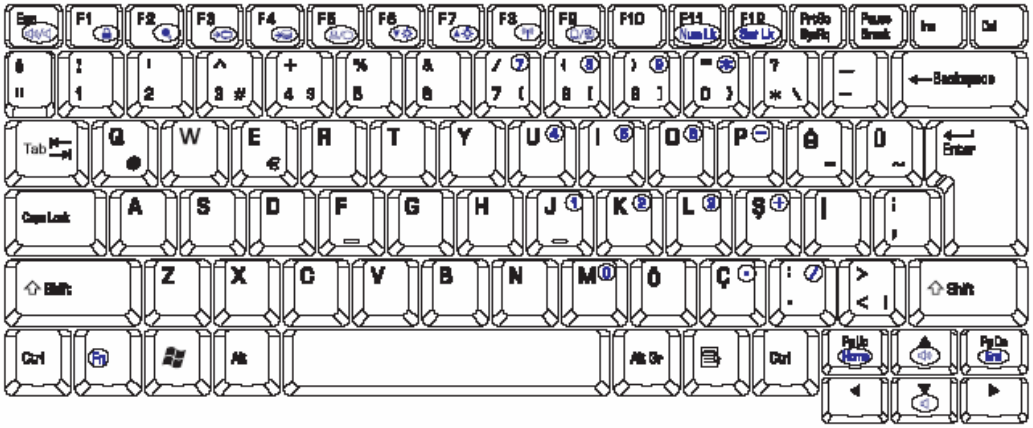


Figure E-18 TR Keyboard layout

E.19 Japanese (JP) Keyboard

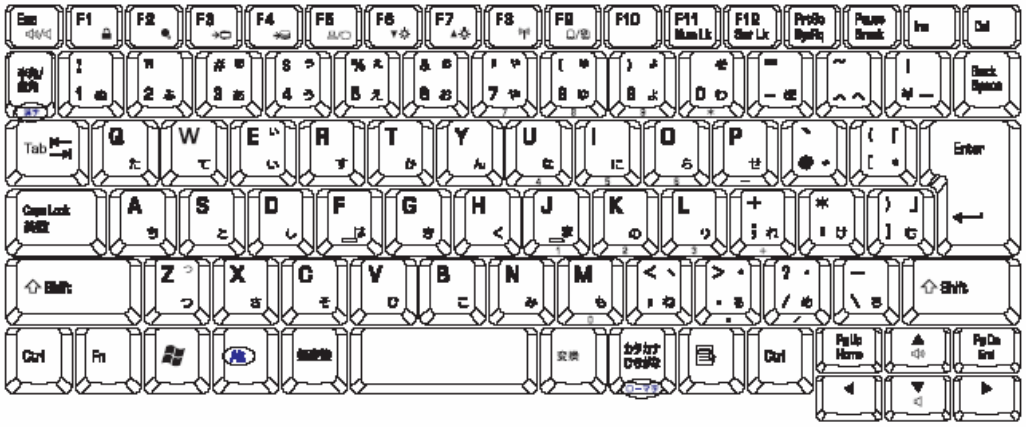


Figure E-19 JP Keyboard layout

E.20 Swiss-German(SL) Keyboard

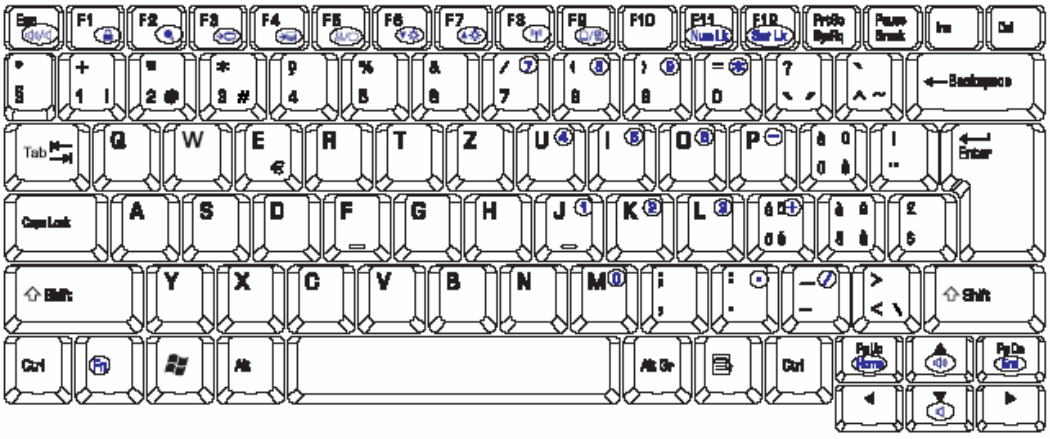


Figure E-20 SL Keyboard layout

Appendix F Wiring Diagrams

F.1 RGB Monitor ID Wraparound connector

Figure F-1 RGB Monitor ID Wraparound connector (15PIN to 15PIN)

F.2 LAN Loopback Connector

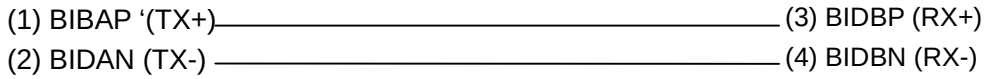


Figure F-2 LAN loopback connector

Appendix G BIOS Rewrite Procedures

This Appendix explains how to rewrite the system BIOS program when you update the system BIOS.

Tools

To rewrite the BIOS, you need the following tool:

- ❑ BIOS/EC/KBC rewriting disk
- ❑ USB doggle

Rewriting the BIOS

1. Set the system to boot mode.
2. Turn off the power to the computer.
3. Remove the external cables and cards.
4. Connect an external FDD and insert the BIOS rewriting disk into the external FDD.
5. Connect the USB doggle special for BIOS rewrite
6. Turn on the power
7. The BIOS rewriting starts.
8. When the process is completed, it beeps and the system automatically reboots.

NOTE:
1. *Connect the AC adaptor to the computer when you rewrite the BIOS.*
2. *Do not turn off the power while you are rewriting the BIOS. If the rewrite fails, it might be impossible to start up the computer.*
3. *If you fail to rewrite BIOS, then when you next turn on the power, a message may be displayed that the contents of the BIOS have been erased or system can not boot . In this case, insert the BIOS rewriting disk, and the BIOS will be rewritten.*

Appendix H EC/KBC Rewrite Procedures

Same as BIOS rewrite Procedures, please refer appendix G