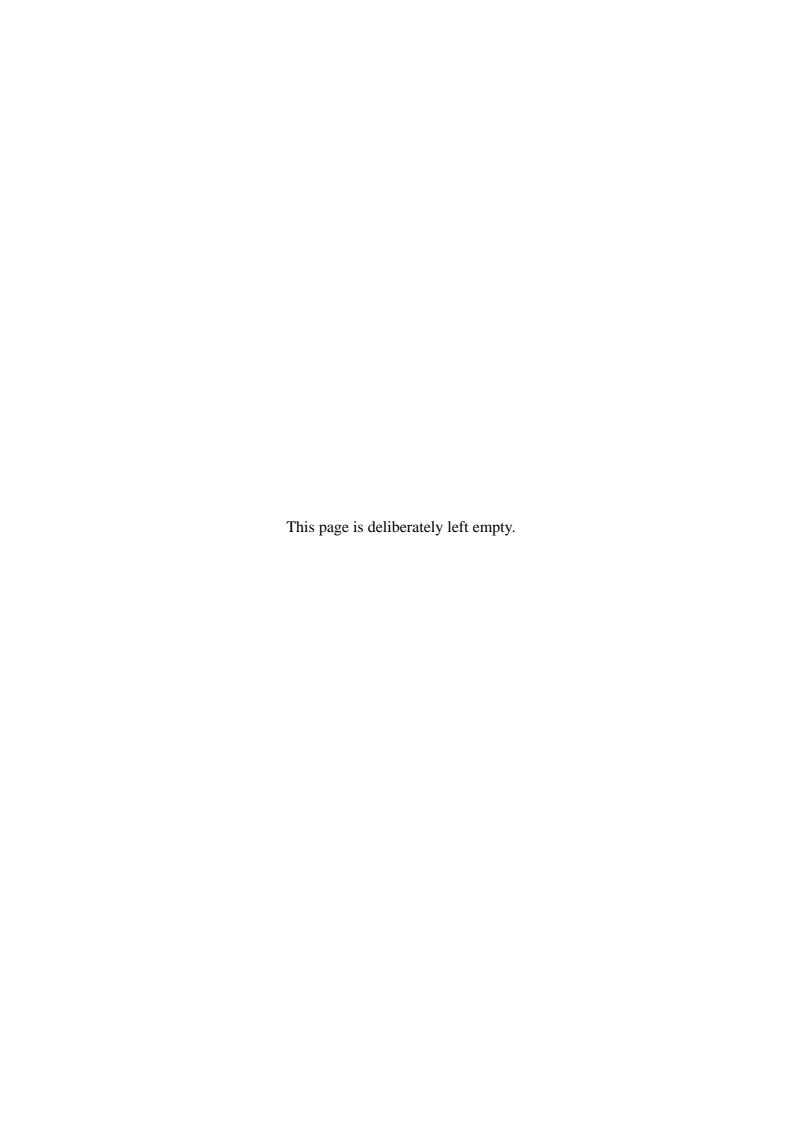
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rev 1.0 April 2007

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## **Text Conventions**

This guide uses the following text conventions.

Warnings, cautions, and notes have the following meanings:



Warnings alert you to situations that could result in serious personal injury or loss of life.

## **A** Caution

Cautions indicate situations that can damage the system hardware or software.

**Notes**: give important information about the material being described.

- Names of keyboard keys are printed as they appear on the keyboard. For example, **Ctrl**, **Alt**, or **Enter**.
- Text or keystrokes that you enter appear as boldface type. For example, type **abc123** and press **ENTER**.
- File names are printed in upper case letters. For example, AUTOEXEC.BAT.

# Safety Notices

## **⚠** Caution

To reduce the risk of electric shock which could cause personal injury, follow all the safety notices.

Symbols are shown in your documentation and on your equipment to indicate safety hazards.

## **Regulatory Information**

## **European Notice**

Products with the CE marking comply with both the Electromagnetic Compatibility Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) - modified by the Directive 93/68/EEC - issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Standards:

- EN55022: Radio Frequency Interference
- EN55024 (1998+A1:2001): Immunity characteristics
- EN6100-3-2: Limits for harmonic current emissions
- EN6100-3-3: Limitation of voltage fluctuation and flicker in low-voltage supply system
- EN60950-1 (2001): Product Safety

## **A** Warning

This is a Class A product. In domestic environment this product may cause radio interference in which case the user may be required to take adequate measures (EN55022).

If your system includes a telecommunication network board, the input/output socket is classified as Telecommunication Network Voltage (TNV-3).

#### **USA and Canada Notice**

Products with UL marking comply with the following UL standards:

■ UL 1950 (3rd edition 1998)

Products with FCC marking comply with the following FCC standards

■ FCC part 15

The model type/ref. used for UL and FCC certification can be found on the regulatory labels stuck on your system.

The equipment has been tested and found to comply with the limits for a Class A or B digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

#### Modifications to the Product

#### CE and FCC Marking

We cannot be held responsible for modifications made by the User and the consequences thereof, which may alter the conformity of the product with the CE or FCC Marking.

#### Connections and Remote Earths

#### PELV (Protected Extra Low Voltage)

To ensure the extra-low voltage integrity of the equipment, only connect equipment with mains-protected electrically-compatible circuits to the external ports.

#### SELV (Safety Extra Low Voltage)

Every input and output of this product is classified as Safety Extra Low Voltage.

#### Remote Earths

To prevent electrical shock, connect all local (individual office) systems and system support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.

#### **Building Supply**

Only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the U.K., those are the IEE regulations.

## **Power Supply and Cables**

#### Power Supply

The DC push-button on/off switch on the front panel does not turn off the system AC power. +5vdc is present on the system board whenever the AC power cords are connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis. Failure to disconnect power before opening your system can result in personal injury and equipment damage.

Under no circumstances should the user attempt to disassemble the power supply. The power supply has no user-replaceable parts. Inside the power supply are hazardous voltages that can cause serious personal injury. A defective power supply must be returned to your dealer.

#### Cables

- In the U.S.A. and Canada, the power cord must be a UL-listed detachable power cord (in Canada, CSA-certified), type ST or SJT, 16 AWG, 3-conductor, provided with a moulded-on NEMA type 5-15 P plug cap at one end and a moulded-on cord connector body at the other end. The cord length must not exceed 9 feet (2.7 meters).
- Outside the U.S.A. and Canada, the plug must be rated for 250 VAC, 10 amp minimum, and must display an international agency approval marking. The cord must be suitable for use in the end-user country. Consult your dealer or the local electrical authorities if you are unsure of the type of power cord to use in your country. The voltage change occurs via a switch in the power supply.
- The detachable power supply cords are intended to serve as the disconnect devices.
- For PLUGGABLE EQUIPMENT, the socket-outlet shall be installed near the equipment and shall be easily accessible.
- This equipment has a 3-wire, grounded power cords. To prevent electrical hazards, do not remove or defeat the ground prong on the power cords. Replace a power cord if it gets damaged. Contact your dealer for an exact replacement.

#### **Batteries**

Lithium batteries can be dangerous. Improper handling of lithium batteries may result in an explosion. Dispose of lithium batteries as required by local ordinance. Also <u>see</u> "<u>Product Disposal" on page 14</u>

## Chassis Cover Removal and Replacement

When servicing your system, make sure to replace the chassis cover and secure it with the screws before plugging in the power cable and turning it on. The chassis cover ensures proper airflow and cooling.

### Laser Compliance Statement

The optical devices are tested and certified to be compliant with International Electrotechnical Commission IEC60825-1 and European EN60825-1 standards for Class 1 laser products.

Class 1 laser products are not considered hazardous. The optical devices are designed such that there is never human access to laser radiation above a Class 1 level during normal operation or prescribed maintenance conditions.

The optical devices installed in your system are designed for use solely as a component of such electronic product and therefore do not comply with the appropriate requirements of Code of Federal Regulation Sec. 1040.10 and Sec. 1040.11 for **COMPLETE** laser products

## Warning - Hazardous Voltage!

Hazardous voltage is present inside your system when it is connected to an AC supply even when the system's power switch is off. Exposure to Hazardous Voltage could cause personal injury. To reduce the risk of electric shock which could cause personal injury, follow all safety notices. The symbols shown are used in your documentation and on your equipment to indicate safety hazards.

## Warning -Avoid Electrostatic Discharge!

Circuit cards and integrated circuits can be easily damaged by static electricity. To reduce risk of damage, store them in protective packaging whenever they are not installed in your system.

Before you install or remove memory modules, video memory, disk drives, circuit cards or other devices, protect them from static electricity. To do so, make sure your system's power switch is **OFF**. Then, unplug the system's AC power cord(s). Wear an anti-static wrist strap (available at electronic supplies stores) to handle the device you want to install. Be sure to connect the wrist strap to an unpainted metal portion of the system chassis.

As an alternative, you can dissipate electrostatic buildup by touching an unpainted metal portion of the system chassis with one hand. Handle the device you are installing with the other hand, and maintain continuous contact with the unpainted portion of the chassis until it is installed in the system.

## **Product Disposal**



The Waste Electrical and Electronic Equipment (WEEE) Directive requires that used electrical and electronic products must be disposed of separately from normal household waste in order to promote reuse, recycling and other forms of recovery and to reduce the quantity of waste to be eliminated with a view to reducing landfill. WEEE includes

accessories such as keyboard, mouse, remote control, speakers, etc. When you dispose of such products, please follow the agreement made between you and us and/or your distributor.

# System Features

The Bull NovaScale R410 system is designed to offer the highest levels of performance for the price range.

Its main features are:

- The Intel® 3000 chipset.
- The Intel® processor, either an Intel® Pentium® 4, Intel® Pentium® D, Intel® Celeron D, or an Intel® Xeon®.
- The onboard RAID technology, offering support for RAID0 and RAID1 on the Microsoft® Windows® operating systems.
- A rackable chassis that can be installed into a standard EIA 19-inch rack cabinet.

To get comfortable with your computer, we recommend you read this user guide. Keep it in a safe place for future reference.

## **Related Documents**

In the ExpressBuilder disc in which you found this User's Guide, you can also find several other documents relevant to your system, options and accessories.

Some printed documents may also have been shipped with your system.

We recommend you read these additional documents as it becomes necessary when setting up, using or upgrading your system.

## **System Chassis Features**

#### **Front View**

The following figure shows the location of the front system features.



Figure 1: Front View (with Front Bezel)
A: Key Lock

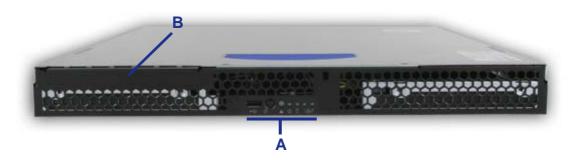


Figure 2: Front View (without Front Bezel)

A: Control Panel B: Optical Disc Drive Bay

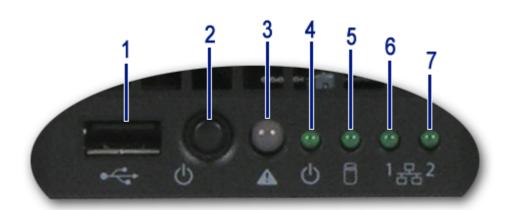


Figure 3: Control Panel (Front View detail)

#### 1. USB Port.

One Universal Serial Bus (USB) port allows you to connect USB-equipped peripheral devices such as printers.

#### **2.** Power button.

Press this switch to turn on/off the power. Refer to the 'Powering On your System', 'Powering Off your System' and 'Forcing a Power Shutdown' sections hereafter for details.

#### 3. Not used.

#### **4.** Power/Sleep lamp.

Indicates whether the computer is on or off.

A steady green lamp indicates the system is on or in sleep state S0. An unlit lamp means that the system is in sleep state S5.

#### **5.** Disk Access lamp.

Lights up when a hard disk drive is active, reading or retrieving data.

#### **6.** Network Interface Card (NIC) 1 LED.

Shows the Local Area Network (LAN) 1 access status.

#### 7. Network Interface Card (NIC) 2 LED.

Shows the Local Area Network (LAN) 2 access status.

#### Rear View

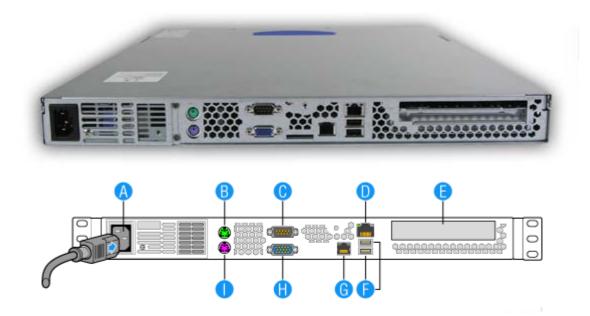


Figure 4: Rear View

#### A AC power connector

Connect the power cord to this socket.

#### B Mouse Port

Connect the mouse included with the system.

#### C Serial Port A

Connect any peripheral with a serial interface.

#### D Network Interface Card (NIC) 1

Connect the system to a LAN allowing the following transfer speeds: 1000BASE-T/100BASE-TX/10BASE-T.

#### E PCI Add-in card slot

Additional ports are available if an optional card is installed.

#### F USB Ports

Connect any peripherals with an USB interface.

#### G Network Interface Card (NIC) 2

Connect the system to a LAN allowing the following transfer speeds: 1000BASE-T/100BASE-TX/10BASE-T.

#### H Video

Connect a compatible monitor.

#### I Keyboard

Connect the keyboard included with the system.

The NIC (Network Interface Card) LEDs at the right and left of each NIC provide the following information.

**Table 1: NIC LED Descriptions** 

LED	LED State	Description
Left	Off No network connection	
	Solid Amber	Network connection in place
	Blinking Amber	Transmit/receive activity
Right	Off	10 Mbps connection (if left LED is on or blinking)
	Solid Amber	100 Mbps connection
	Solid Green	1000 Mbps connection

#### Internal View

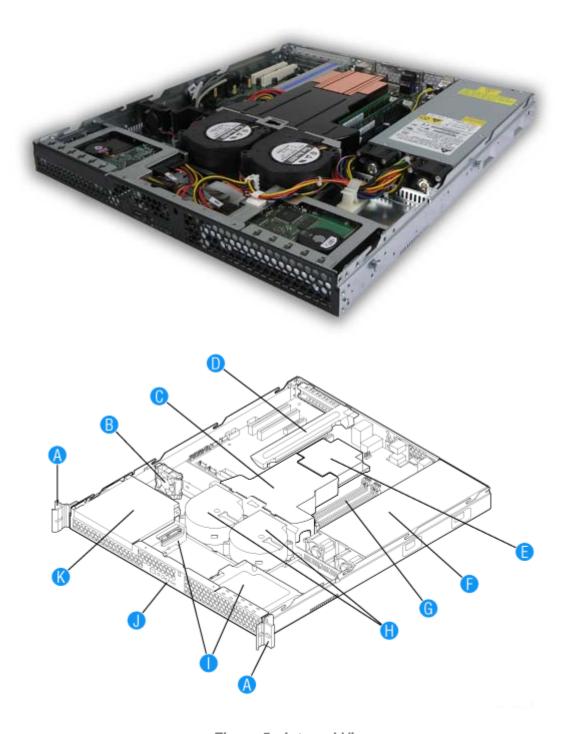


Figure 5: Internal View

- A. Rack Handles (two)
- B. PCI Cooling Fan
- C. Processor Air Duct
- D. PCI Add-in Card Bracket
- E. Processor and Heat Sink
- F. Power Supply

- G. System Memory DIMM Sockets
- H. System Blower Fans (two)
- I. Front Panel Board
- J. Control Panel
- K. Slimline Optical Drive Bay

## **Motherboard**

## **Motherboard Layout**

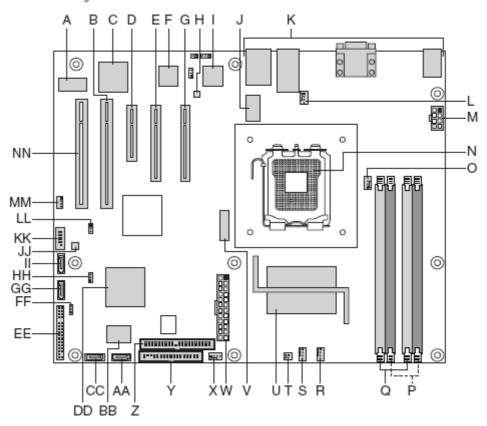


Figure 6: Motherboard Layout

**Table 2: Server Board Connector and Component Locations** 

A: Video Memory	B: PCI 32/33 Slot 2	C: ATI ES1000 Video Controller
D: PCle x4 Slot 3	E: PCle x4 Slot 4	F: Intel® 82545PI LAN Controller
G: Intel® Adaptive Slot x8 - Slot 6	H: LAN SPI Flash	I: Intel® 82573E LAN Controller
J: Clock Generator	K: Back Panel connectors	L: Rear System fan
M: 2x4 Power connector	N: Processor socket	O: Processor Fan
P: DIMM sockets (2A & 2B)	Q: DIMM sockets (1B & 1A)	R: System Front DIMM Blower header
S: System Front Processor Blower header	T: Chassis Intrusion header	U: Intel® S3000 MCH
V: Battery	W: 2x12 Main Power Connector	X: Front System fan
Y: Floppy Connector	Z: PATA IDE connector	AA: SATA Port 3
BB: SMSC SCH5027 Super IO	CC: SATA Port 2	DD: Intel® 82801 ICH7R
EE: Front Panel connector	FF: SCSI HDD LED header	GG: SATA Port 1
HH: Clear CMOS jumper	II: SATA Port 0	JJ: BIOS SPI Flash
KK: External USB connector	LL: SPI/FWH Select header	MM: SMBus connector
NN: PCI 32/33 Slot 1		
	•	•

## **Motherboard Jumpers**

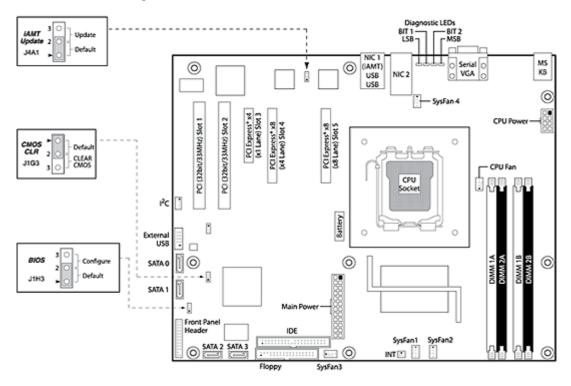


Figure 7: Motherboard Jumpers

**Table 3: Motherboard Jumpers Description** 

Jumper Name	Jumper Purpose
IAMT Update	Reserved for the manufacturer.
CMOS Clear	If pins 2-3 are jumpered, the CMOS settings will be cleared on the next reset. These pins should be jumpered on 1-2 for normal operation.
BIOS Recovery	If pins 2-3 are jumpered, the BIOS in the lower bank will be selected on the next reset. These pins should be jumpered on 1-2 for normal operation.

#### Clearing the CMOS

If you are not able to access the BIOS setup screens, the CMOS Clear jumper will need to be used to reset the configuration RAM.

- 1. Power down the system and disconnect the AC power.
- 2. Open the server.
- **3.** Move the jumper (J1G3) from the normal operation position (pins 1 and 2) to pins 2 and 3 (Clear CMOS position).
- **4.** Reconnect the AC power, power up the system.
- 5. When the system begins beeping, power it down and disconnect the AC power.
- **6.** Replace the jumper on pins 1 and 2.
- 7. Close the server chassis.
- **8.** Reconnect the AC power and power up the system.

#### Recovering the BIOS

This jumper is used to select the BIOS image from which the system will boot.

**Table 4: BIOS Recovery Jumper Descriptions** 

Pins	Jumper Purpose	
1-2	System is configured for normal operation (bank 1) (Default)	
2-3	On the next reset, the BIOS in the lower bank will be selected.	

Note: for more information on the BIOS Update process, please refer to "Updating BIOS" on page 241.

## **Back Panel Connectors**

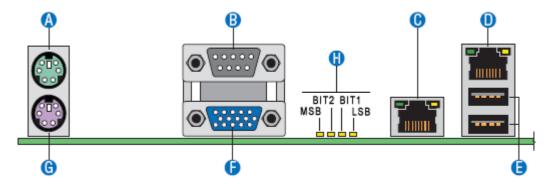


Figure 8: Back Panel Connectors

**Table 5: Back Panel Connectors** 

A. Mouse	B. Serial Port B
C. NIC 1 (10/100/1000 Mb)	D. NIC 2 (10/100/1000 Mb) IAMT compliant
E. USB 0-1	F. USB Video
G. Keyboard	H. Diagnostic LEDs

The NIC (Network Interface Card) LEDs at the right and left of each NIC provide the following information.

**Table 6: NIC LED Descriptions** 

LED	LED State	Description
Left	Off	No network connection
	Solid Amber	Network connection in place
	Blinking Amber	Transmit/receive activity
Right	Off	10 Mbps connection (if left LED is on or blinking)
	Solid Amber	100 Mbps connection
	Solid Green	1000 Mbps connection

## **Memory Configuration**

The server board provides four DIMM sockets across two channels, Channel A and Channel B.

- Channel A consists of DIMM sockets 1A and 2A.
- Channel B consists of DIMM sockets 1B and 2B.

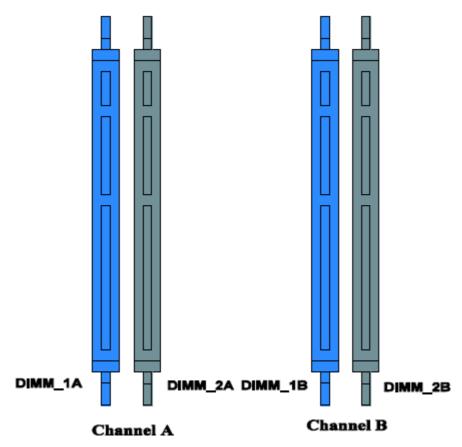


Figure 9: Memory Channels

#### **DIMM Population Rules**

To ensure the dual channel operating mode, install either:

- two modules, in the slots DIMM\_1A and DIMM\_1B,
- or four modules.



- The installation of three modules is not supported.
- The motherboard BIOS supports single DIMM mode operation although this is generally not recommended for "performance" applications. This configuration is only supported with a 512MB DIMM installed in DIMM slot 1A.

Use DIMMs of identical size and speed.

#### Supported memory

DIMMs must meet the following requirements:

- Use only DIMMs with DDR2 DRAM technology.
- Use only DDR2-533 and DDR2-667 stacked DIMM modules.

## **Standard Features**

#### **Processor**

The system board can accommodate either an Intel® Pentium® 4, Intel® Pentium® D, Intel® Celeron D, or an Intel® Xeon®.

## **Memory**

The system board provides four 240-pins DIMM slots each supporting DDR2 533 or DDR2 667 ECC memory. You may install a minimum of 512MB and as much as 8GB (4 x 2GB).

Your system supports dual-channel memory architecture. Refer to <u>"Memory Configuration"</u> on page 26 for details.

## **Expansion Slot**

The system provides one full-length x8 PCI Express connector.

#### Video

The motherboard features an on-board ATI ES1000 video controller with 16MB external video memory.

### **Network Controller**

■ Note: To ensure EMC product regulation compliance, the system must be used with a shielded STP/FTP LAN cable.

The motherboard features two network port controllers, which both feature 10/100/1000 Mbit per second Ethernet LAN connectivity:

- The Intel® 82573E dual port controller.
- The Intel<sup>®</sup> 82541PI dual port controller.

The NIC2 port supports the iAMT feature. Refer to <u>"Rear View" on page 19</u> to identify these ports.

#### **ACPI**

The motherboard supports the Advanced Configuration and Power Interface (ACPI) as defined by the ACPI 2.0 specifications. An ACPI aware operating system can put the system into a state where the hard drives spin down, the system fans stop, and all processing is halted. However, the power supply will still be on and the processors will still be dissipating some power, so the power supply fans will still run.

The system board supports sleep states s0, s1, s4, and s5:

- s0: Normal running state.
- s1: Processor sleep state. No context will be lost in this state and the processor caches will maintain coherency.
- s4: Hibernate. Your working environment is Saved To Disk
- s5: Shutdown.

### Keyboard and Mouse

The keyboard/mouse controller is PS/2-compatible.

## Peripheral Bays

Your system features one 5,25-inch bay that you can use with an optical device.

## **RAID Support**

The motherboard features two onboard controllers providing RAID support for S-ATA configurations.

- Intel controller
  - RAID0 and RAID1 support.
  - Microsoft Windows support.
  - Set-up with the Intel Matrix Storage Manager configuration utility. Refer to "RAID Configuration using Intel Matrix Storage Manager" on page 71.
- LSI controller
  - RAID0 and RAID1 support.
  - For Linux applications.
  - Set-up with the Intel Embedded RAID configuration utility. Refer to <u>"RAID Configuration using the Intel® Embedded Server RAID BIOS Configuration Utility" on page 74</u>.

Refer to the <u>"IDE Controller Submenu" on page 208</u> for more information on how to select the controller that will be active in your system.

## Intel® Active Management Technology (Intel AMT) Support

The Intel® Active Management Technology (Intel AMT), which is a feature of Intel® vPro<sup>TM</sup> technology, is a new step toward greater Information Technology efficiency. Using built-in platform capabilities and popular third-party management and security applications, Intel AMT allows IT to better discover, heal, and protect their networked computing assets.

Refer to <u>"Intel® Advanced Management Technology (AMT) Web Interface" on page 145</u> for more information, and to <u>"Rear View" on page 19</u> to identify the IAMT compliant network ports on your system.

## Peripheral Bays

The system supports a variety of standard PC AT-compatible peripheral devices. The chassis includes these peripheral bays:

■ One slimline 5.25-inch file bay for the installation of an optical drive.

■ Two hard disk drive bays for the installation of SATA drives.

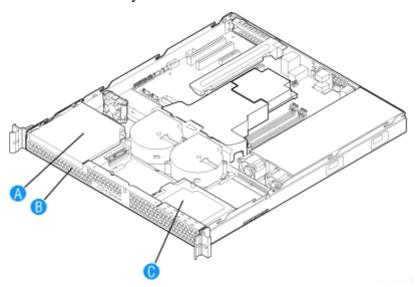


Figure 10: Peripheral Bays

A: Slimline Optical Drive Bay B: Hard Disk Drive Bay HDD0 C: Hard Disk Drive Bay HDD1

## **Optional Features**

You will find hereafter information about the optional components that may be installed in your system.

This is not an exhaustive list, some options may not be available any more, others may have been added.

#### **DVD Writer Combination Drive**

#### Features

- ATAPI / E-IDE Half-Height internal DVD+R / DVD+RW / DVD-R / DVD-RW / DVD+R DL / DVD-R DL / DVD-ROM / CD-R / CD-RW / CD-ROM / HS-RW / US-RW combination drive.
- Supports both 8 cm and 12 cm CD and DVD discs.
- Transfer modes: PIO mode 4, DMA mode 2 and Ultra DMA mode 4.
- Slim factor.

#### Specifications

- Speed
  - CD-R: 24x max (write)
  - CD-RW: 4x max (re-write)
  - HS-RW: 10x max (write)
  - US-RW: 16x max (write)
  - DVD-R: 8x max (write)
  - DVD-R DL: 4x max (write)
  - DVD-RW: 6x max (re-write)
  - DVD+R: 8x max (write)
  - DVD+R DL: 4x max (write)
  - DVD+RW: 8x max (re-write)
  - CD-ROM: 24x max (read)
  - DVD-ROM: 8x max (read)
- Buffer size: 2 MB
- Access time: 180ms
- Power requirements: +5v +/-5% and less than 100 mVp-p ripple voltage

## Intel Pro/1000 PT Single Port LAN Board

The Intel PRO/1000 PT Server Adapter provides the dedicated input/output (I/O) bandwidth of PCIe, without bus sharing, for Gigabit Ethernet connectivity in Category-5 networks.

- High-performance, self-configuring 10/100/1000 Mbps connection for PCI Express slots
- Multi-Gigabit scalability and increased uptime through advanced server features
- Load balancing on multiple CPUs: Increases performance on multi-processor systems by efficiently balancing network loads across CPU cores.
- Interrupt moderation: Delivers increased performance while significantly reducing CPU utilization.
- Compatible with x1, x4, x8, and x16 full-height and low-profile PCI Express slots.
- Remote management support.
- Intel® PROSet Utility for Microsoft Device Manager: Provides point-and-click power over individual adapters, advanced adapter features, connection teaming, and VLAN configuration.
- Advanced cable diagnostics: Dynamically tests and reports network problems (error rate, cable length) and automatically compensates for cable issues (crossover cable, wrong pin-out/polarity).

#### Intel Pro/1000 PT Dual Port LAN Board

Two gigabit copper server connections in a single PCI Express slot.

#### Interface

■ PCI Express.

#### Connectors

■ Two RJ-45.

#### IEEE standards / network topology:

■ 10BASE-T, 100BASE-TX, 1000BASE-T.

#### **Features**

- Intel® PROSet Utility and Intel® PRO Intelligent Install for easy installation.
- Intel® lead-free1 technology.
- Plug and play specification support Standard.
- Auto-negotiation, full-duplex capable.
- Integrated media access control (MAC) and physical layer (PHY).
- Includes a full-height bracket.
- Cable distance: 100m in Category-5 for 100/1000 Mbps and Category-3 for 10 Mbps.

#### Network Management

- Wired for Management (WfM) baseline v2.0 enabled for servers.
- DMI 2.0 support, Windows Management Instrumentation (WMI) and SNMP-manageable SMBus support.
- Remote Installation Services (RIS).
- Diagnostics (loopback, testability, PHY register access).
- Advanced Configuration and Power Interface (ACPI) 1.0 power management.
- Wake on LAN support over PCI Express.
- PXE 2.0 enabled through boot read-only memory (ROM).

#### Advanced Software Features

- Adapter Fault Tolerance (AFT).
- Switch Fault Tolerance (SFT).
- Adaptive Load Balancing (ALB).

- Fast EtherChannel (FEC).
- Gigabit EtherChannel (GEC).
- Teaming support : Scales up to 8 connections.
- Multiple teams: Supports 4 separate teams, maximum.
- IEEE 802.3ad (link aggregation control protocol).
- PCIe Hot Plug/Active peripheral component interconnect (PCI).
- IEEE 802.1Q VLANs.
- $\blacksquare$  IEEE 802.3 (z, ab, u, x) flow control support.
- TCP checksum offload transmission control protocol (TCP), user datagram protocol (UDP), Internet protocol (IP).
- IEEE 802.1p.
- TCP segmentation/large send offload.
- Interrupt moderation.

#### Promise SuperTrack EX4350 RAID Controller (SATA)

**Motes**: For more information, refer to the documentation included on the ExpressBuilder CD.

#### **Features**

■ 4-Ports Serial ATA (SATA) RAID controller.

The SuperTrak EX4350 RAID controller provides support for SATA drives and meets the needs of disk-to-disk backup, NAS storage, security and surveillance, video editing, and near-line storage.

- PCI-Express x 4 Host Bus Interface, allowing for up to 1GB throughput per second.
- $\blacksquare$  Support RAID levels 0, 1, 5, and 10.
- Additional battery support to operate in write-back mode.
- Automatic detection of faulty drives.
- Easy to manage through the Web-based Promise Array Manager (WebPAM) software, a browser-based graphical user interface.

#### Specifications

- Hardware Specifications:
  - Eight SATA ports at 3.0Gb/s (300MB/sec).
  - PCI-Express x 4 host bus interface.
  - 64MB SDRAM on-board controller cache.
- RAID Levels Supported: RAID 0,1,5 and 10.
- Web-based Promise Array Manager:
  - Creates, deletes, expands, and converts disk arrays remotely.
  - Array synchronization and rebuild scheduling.
  - Monitors drive, array, and enclosure status and provides online event logging.
  - E-mail notification of drive, array, controller or enclosure events (e.g. error or degrade conditions).

#### ■ BIOS:

- Array configuration utility at the BIOS level.
- BIOS Boot Specification support: boot system from any array.

# Setting Up Your System

This chapter describes how to select a site, unpack the system, make cable connections, and power on the system units. Information on front and rear panel features, switches and LEDs are also included in this chapter.

### **Unpacking the System**

When you receive your system, inspect the shipping containers prior to unpacking. If the shipping boxes are damaged, note the damage, and if possible, photograph it for reference.

Remove the contents of the containers, and keep the cartons and the packing materials.

If the contents appear damaged when you unpack the boxes, file a damage claim with the carrier immediately.

The carton contains various accessories, as well as the system itself. If you find any component missing or damaged, contact your service representative.

Store the provided accessories in a designated place for your convenience. You will need them to install an optional device or troubleshoot your system, as well as to set it up.

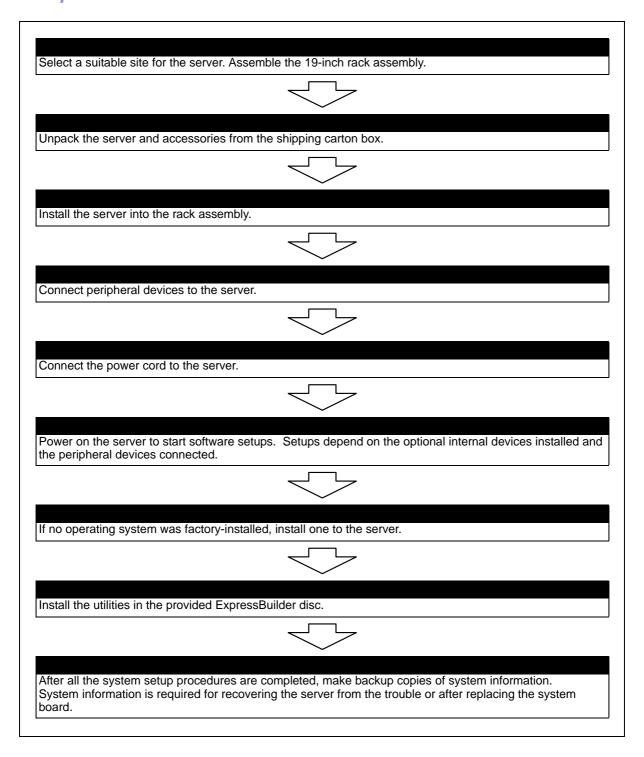
Make a backup copy of each provided discs, if any. Store the original disc as the master disc in a designated place, and use its copy.

Improper use of any provided disc may alter your system environment. If you find anything unclear, immediately ask your service representative for help.

# **Setting Up Your Server (Rack)**

This chapter describes how to select a site, unpack the system, make cable connections, and power on the system units. Information on front and rear panel features, switches and LEDs are also included in this chapter.

#### Setup Flow.



#### Selecting Server Site

To use the server, install it on a standard EIA 19-inch rack assembly.

Refer to the documentation attached to the rack or contact your sales agent for the installation of the server on the rack.

### **A** Warning

Observe the following instructions to use the server safely. Failure to follow these instructions may result in death or serious personal injury. See <u>"General Safety Information" on page 86</u> for details.

- Do not use the server in any unapproved place.
- Do not connect the ground line to a gas pipe.

### **!** Caution

Observe the following instructions to use the server safely. Failure to follow these instructions may cause a fire, personal injury, or property damage. See "General Safety Information" on page 86 for details.

- Do not carry or install the server only by a single person.
- Do not install the server where the load may be concentrated on a specific point.
- Do not install any component on the server only by a single person.
- Do not pull out a device from the rack if the rack is unstable.
- Do not leave more than one device being pulled out from the rack.
- Do not provide the wiring exceeding the rating power.

Do not install the rack in the places listed below. Installing the rack or mounting the server on the rack in such a place may cause some malfunction to occur.

- Narrow space from which devices cannot be pulled out from the rack completely
- Place that cannot bear the total weights of the rack and devices mounted on the rack
- Place where stabilizers cannot be installed or where the rack can be installed only after the practice of proper earthquake-resistant construction
- Place of uneven or slanting floor
- Place of drastic temperature change (near a heater, air conditioner, or refrigerator)
- Place where intense vibration may be generated

■ Place where corrosive gas is generated, chemicals are nearby, or chemicals may be accidentally sprayed over

- Place where a carpet not subject to anti-static process is laid.
- Place where some objects may be fallen on the rack
- Place near a device generating intense magnetic field (such as a TV, radio, broadcast/communication antenna, power transmission wire, and electromagnetic crane) is placed (If unavoidable, contact your sales agent to request proper shield construction.)
- Place where the power cord of the server must be connected to an AC outlet that shares the outlet of another device with large power consumption.
- Place near equipment that generates power noise (e.g., contact spark at power-on/power-off of commercial power supply through a relay). If you must install the server close to such equipment, request your sales agent for separate power cabling or noise filter installation.

# **Rack Installation Kit Assembly**

This section provides the assembly instructions for mounting the server into a standard 19-inch rack cabinet.

Two rack-mount kits are available for your server:

- Rack-mount kit with short rails (standard).
- Rack-mount kit with long rails (optional). A cable arm can be installed when these sliding rails are fitted.

Read the general information on installing a system into a rack, and then jump to the installation instructions for the kit you have at your disposal.

#### **Before You Begin**

Before you begin, please review the following cautions, warnings, and general guidelines.



Be sure that power to the system is turned off and unplugged. All voltage is removed only when the power cords are unplugged.

- Avoid excessive vibration and shock. Dropping an electronic component can cause serious damage.
- Do not disconnect or remove parts other than those specified in the procedure.
- Do not touch I/O connector pins.
- All screws are Phillips-head, unless otherwise specified.
- On completion of any assembly or reassembly, perform a power-on test. If a fault occurs, verify that the assembly or reassembly was performed correctly. If the problem persists, *see "Solving Problems" on page 198*.

#### Static Precautions

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an anti-static wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

#### Inserting a System into a Rack

Before you begin, select an appropriate location in your rack cabinet for the rackmount server. To improve rack stability, mount heavier items towards the bottom of the rack cabinet.

Note: When planning your system configuration for the rack cabinet you should consider the length of the cables that interconnect system components.

### **A** Warning

- ANCHOR THE EQUIPMENT RACK: The equipment rack must be anchored to an unmovable support to prevent it from falling over when one or more servers are extended in front of it on slide assemblies. You must also consider the weight of any other device installed in the rack.
- MAIN AC POWER DISCONNECT: You are responsible for installing an AC power disconnect for the entire rack unit. This main disconnect must be readily accessible, and it must be labelled as controlling power to the entire unit, not just to the server(s).
- GROUNDING THE RACK INSTALLATION: To avoid the potential for an electrical shock hazard, you must include a third wire safety grounding conductor with the rack installation. If a server power cord is plugged into an AC outlet that is part of the rack, then you must provide proper grounding for the rack itself. If server power cords are plugged into wall AC outlets, the safety grounding conductor in each power cord provides proper grounding only for the server. You must provide additional, proper grounding for the rack and other devices installed in it.

### **⚠** Caution

**Temperature**: The operating temperature of the server, when installed in an equipment rack, must not go below 5 °C or rise above 35 °C. Extreme fluctuations in temperature can cause a variety of problems in your server.

**Ventilation**: The equipment rack must provide sufficient airflow to the front of the server to maintain proper cooling. It must also include ventilation sufficient to exhaust the total sum of the Btu's per hour for the servers installed in the rack. The rack selected and the ventilation provided must be suitable to the environment in which the server will be used.

**Note:** For vertical reference, every three screw holes on the vertical mounting rail are equal to 1U (1.75 inches).

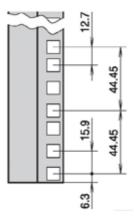


Figure 11: 1U specifications (in millimeters)

Mounting holes in the vertical mounting rails of equipment racks are commonly spaced in a  $5/8 \times 5/8 \times 1/2$ -inch sequence. Perform the following steps carefully; brackets must be mounted with precision to allow room for the next server you install in a rack.

#### Installing and Removing the Rack Handles

#### Installing the Rack Handles

**1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).

- **2.** If applicable, disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Attach the rack handle to the server system with two screws as shown in the figure below.

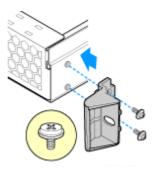


Figure 12: Installing the Rack Handle

- **4.** Repeat step 3 on the opposite side of the server.
- **5.** Plug all peripheral devices and the AC power cable into the server.

#### Removing the Rack Handles

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** If applicable, disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the two screws holding the rack handle in place, and remove the rack handle from the server system as shown in the figure below.

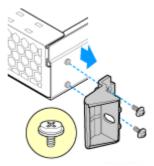


Figure 13: Removing the Rack Handle

- **4.** Repeat step 3 on the opposite side of the server.
- **5.** Plug all peripheral devices and the AC power cable into the server.

#### Installing a Rack Mount Kit with the Basic Rails

#### Kit Contents

Each rack mount kit contains the following:

- Outer rail slide assembly (2) letter "A" on the picture below.
- Inner rail slide (2) letter "B" on the picture below.
- Rail safety stop (one each on inner slides) letter "C" on the picture below.
- Outer slide rail screws (8 #10-32 x 1/2), inner slide rail screws (8 #6-32 x 1/4), and rack screws (2 #10-32 x 3/4) letter "D" on the picture below.

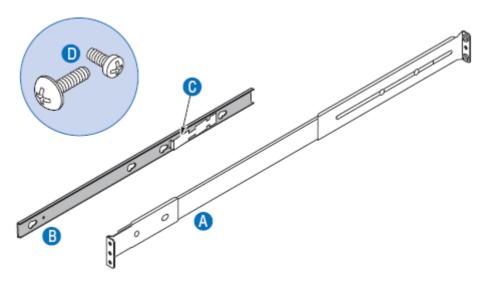


Figure 14: Rack Mount Kit Contents

- Rail extensions (2), to be used if the rack depth is superior to 765 mm.



Figure 15: Rails Extensions

- Washerplates (4), to be used with M5 screws (8).



#### Assembly

**1.** Power down the server and unplug all peripheral devices and the AC power cable.

- **2.** Remove the inner rail from the rail assembly.
  - **a.** Extend the inner rail until it locks (letter "A").
  - **b.** Depress the spring safety lock to release the inner rail (letter "B").
  - **c.** Remove the inner rail from the rail assembly (letter "C").

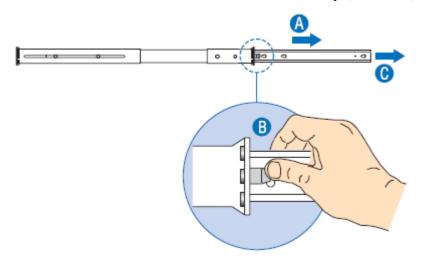


Figure 16: Removing the Inner Rail from the Rail Assembly

**3.** Optional: fix an extension to the rear of each slide rail.

Note: Use extensions only if the rack depth is superior to 765 mm.

Attach the bracket with square holes (see letter "B") to the rear of the outer rail using two  $10-32 \times 1/2$  screws.

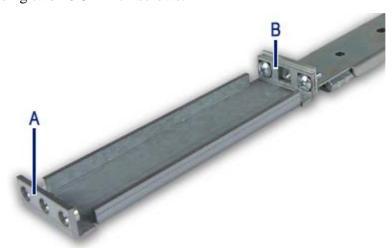


Figure 17: Attaching the Extension to the Rail

A: Bracket with square holes B: Bracket with round holes

- **4.** Determine the position in which you wish to install the system into the rack.
- **5.** Attach the outer rail slides to the vertical mounting rails using:
  - two  $\#10-32 \times 1/2$  screws at the front mounting rails,
  - two M5 screws and one washerplate (it only fits one way) at the rear mounting rails.

**Note:** The rail flanges mount to the inside of each post.

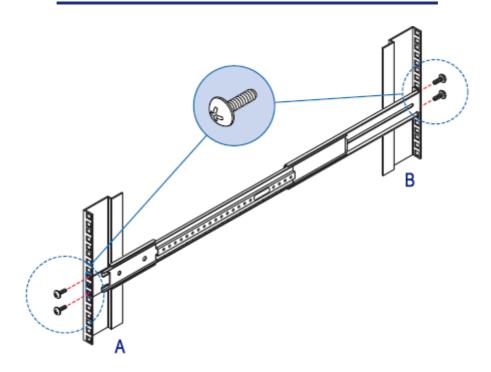


Figure 18: Installing the Outer Rail to the Mounting Rails

A: Front of the rack B: Rear of the rack

- **6.** Attach the inner rails to the server chassis sidewalls
  - **a.** Insert the inner rails over the server chassis sidewall studs (letter "A").
  - **b.** Slide the inner rails toward the front of the server chassis (letter "B").

c. Secure the inner rails with one  $\#6-32 \times 1/4$  screw for each rail (letter "C").

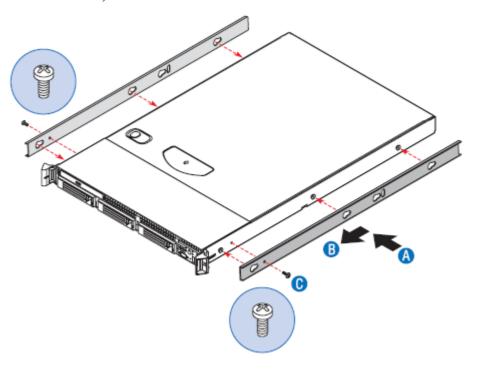


Figure 19: Attaching the Inner Rails to the Chassis

- 7. Install the server chassis into the rack.
  - **a.** Align the inner rails (attached to the server chassis) with the outer rail assemblies (attached to the rack). See letter "A".

**Note:** The inner slides must be positioned all the way forward in the rails to ensure proper installation of the server.

**b.** Engage the matching rails and slide the server chassis into the rack (letter "B") until the two safety stops lock into position (letter "C").

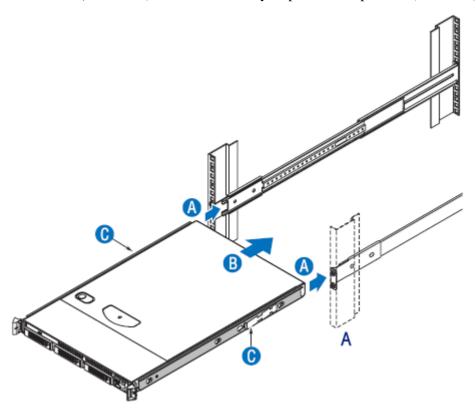


Figure 20: Installing the Server Chassis into the Rack (step 1)

A: Front of the rack

- **c.** Depress the two safety locks -one on each side- (letter "A").
- **d.** Slide the server chassis all the way into the rack (letter "B").

**e.** Use the rack screws (#10-32 x 3/4) to secure the chassis and rack handles into the rack (letter "C").

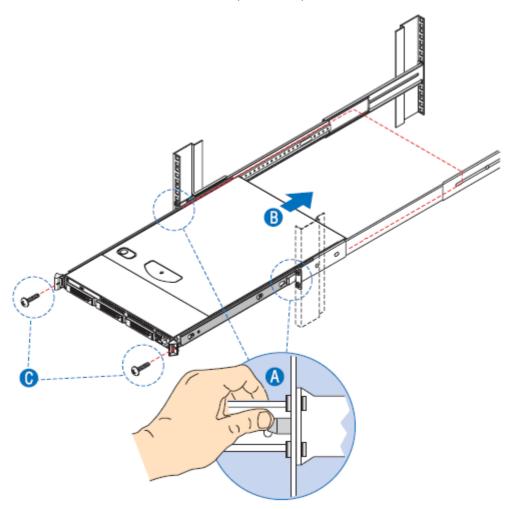


Figure 21: Installing the Server Chassis into the Rack (step 2)

#### Installing a Rack Mount Kit with Sliding Rails (option)

#### Kit Contents

Each rack mount kit contains the following:

- Slide rail assemblies (2)

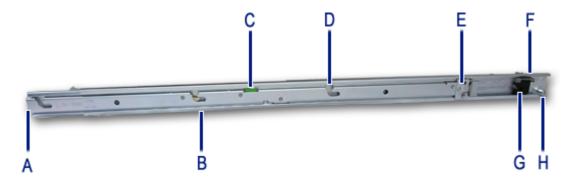


Figure 22: Slide Rail Description

A: Front multi-pin adapter and bracket

B: Component release lever

C: Slide extension release lever

D: Component mounting channel (3 per rail)

E: Front (sliding) cable arm mount

F: Rear multi-pin adapter and bracket

G: Anti-sag bar slider

H: Rear (fixed) cable arm mount

- Rail extensions (2), to be used if the rack depth is superior to 760 mm.



Figure 23: Rail Extensions

- Washerplates (4), to be used with M5 screws (8).



- Cabling straps (6)

- Spacer block (1)



Figure 24: Spacer Block

- Screws (not used)



Figure 25: Screws

- Extensions 2 x 2 (not used)



Figure 26: Extensions

#### Assembly

**1.** Power down the server and unplug all peripheral devices and the AC power cable.

**2.** Set the multi-pin adapter for the rack-type.



Figure 27: Front Multi-Pin Adapter and Bracket (set with square pins)

The multi-pin adapters allow the slide rails to be used in racks that have square or round mounting holes.

☐ Note: The sliding rails are shipped with the multi-pin adapters set for square holes. If you are equipped with an NEC rack or another rack with square mounting holes, skip this step.

Reverse the multi-pin adapter position to match the rack mounting hole type (if necessary) as described in the following steps:

- **a.** Rotate the swivel lock to the "up" position (letter "A").
- **b.** Press the mounting pins together, and then pull completely out the multi-pin adapter from the multi-pin bracket (letter "B").

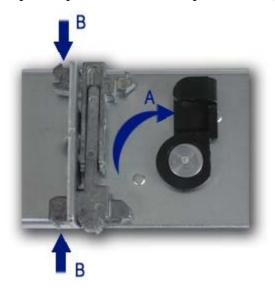


Figure 28: Changing the Adapter Pins Set

c. Install the multi-pin adapter with the round pins facing out. Press the pins together while inserting the adapter into the bracket.

Note: the multi-pin adapter is keyed to prevent incorrect insertion. Turn it around if it does not squarely fit.

## **A** Caution

The multi-pin adapter must be fully locked in the bracket. Make certain both mounting pins on the multi-pin adapters are fully engaged in the multi-pin bracket.

- **d.** Lock the multi-pin adapter in place using the swivel lock.
- **e.** Repeat steps a through d for both ends of each slide rail.
- **3.** Optional: fix an extension to the rear of each slide rail.

Note: Use extensions only if the rack depth is superior to 760 mm.

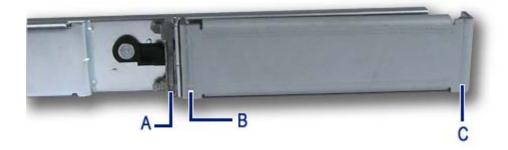


Figure 29: Attaching the Extension to the Rail

A: Multi-pin adapter
B: Bracket with square holes
C: Bracket with round holes

- **a.** Press together the round pins of the multi-pin adapter and insert the bracket with the square holes on the round pins.
- **b.** Release the round pins of the multi-adapter.
- **4.** Determine the position in which you wish to install the system into the rack.
- 5. Align the left slide rail with its mounting holes.
- **6.** Hold the slide rail in the desired rack-mounting position.
- 7. Depending on whether you are using, or not, the extensions:
  - With the extensions: use a washerplate and 2 M5 screws (it only fits one way) to secure the rear bracket of the rail to the mounting rail.
  - Without the extensions: press the multi-pin adapter mounting pins (see Figure 27) together and secure the rear bracket of the rail to the mounting rail.

**Note:** Ensure the slide rail is level.

- **8.** Fully extend the slide rail to its fully extended (locked) position.
- **9.** Press the slide extension release levers to release the lock.
- **10.** Move the slide rail in and out throughout its entire range of motion and make certain it does not bind.



If you notice any binding, recheck the mounting positions.

11. Repeat steps 5 through 10 for the right slide rail, ensuring that it is parallel and level with the left slide rail.

- **12.** If you wish to install a cable arm, follow the instructions in <u>"Installing a Cable Arm (with Sliding Rails Only)" on page 59</u> before going to step 13
- 13. Extend both slide rails into the fully extended (locked) position.
- **14.** Align the mounting studs with the component mounting channels on the slide rails.
- **15.** Carefully place the component mounting studs in the component mounting channels on the slide rails.

Allow the component mounting studs to fully seat in the component mounting channels (letter "D" on Figure 22). The component release levers (one on each slide rails) pivot out of the way and then back in place whent the studs are fully engaged in the mounting channels.

Ensure that the component release levers are in locked position.

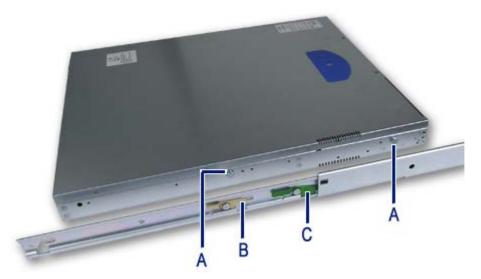


Figure 30: Placing the System on the Rails

A: Mounting studs
B: Slide extension release lever
C: Component release lever

- **16.** Use two rack screws (#10-32 x 3/4) to secure the chassis and rack handles into the rack.
- **17.** Press and hold the left and right slide extension release levers and slowly slide the component and side rails into the fully retracted position.

### Installing a Cable Arm (with Sliding Rails Only)

#### Description

The cable arm pivots at its rear mounting position, and slides along its front mounting position with the sliding rail track.

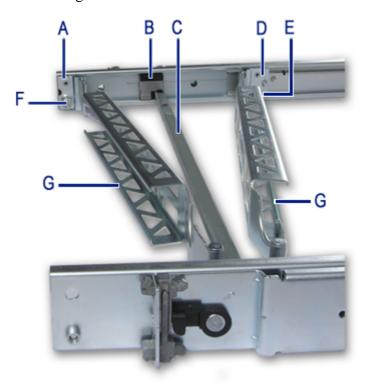


Figure 31: Cable Arm Description

A: Rear (pivoting) end

B: Anti-sag bar slider

C: Anti-sag bar

D: Front (sliding) end

E & F: Captive thumbscrew

G: Cabling channel

#### Installation Requirements

The cable arm can be installed either on the left sliding rail, or on the right sliding rail (the mounting tabs on either end are identical). Regardless of the selected position, the cable arm must be oriented as shown below to properly function.

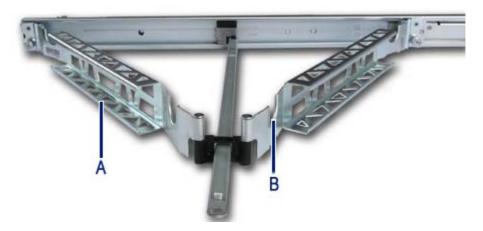


Figure 32: Installing the Cable Arm on the Sliding Rails

A: The open side of the channels are facing out. B: The cabling cut-outs are facing up.

#### Installation

- 1. Pull the slide rails out to the fully extended (locked) position.
- **2.** Loosely position the cable arm in the mounting position, noting the placement requirements specified above.
- **3.** Install the spacer block (letter "B") in mounting position at the end of the cable arm chosen to be the rear (pivoting) end.

**Note:** The black spacer block is provided in the plastic bag with the cabling straps.

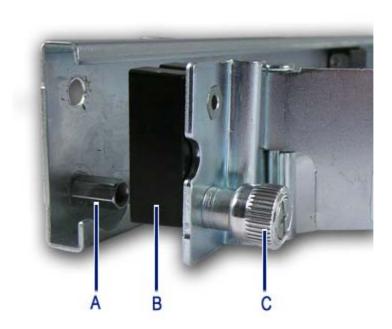


Figure 33: Installing the Spacer Block

A: Jackscrew B: Spacer block C: Captive thumbscrew

**4.** Attach the cable arm (along with the spacer block) to the rear of the sliding rail using the captive thumbscrews (letter "A" on Figure 33).

- 5. Open the locking clips on the anti-sag bar slider on both slide rails by lifting the silver tab.
- **6.** Attach the anti-sag bar to the anti-sag bar sliders on the left and right slide rails.



Figure 34: Attaching the Anti-Sag Bar

7. Place the ends of the anti-sag bar over the pins.



Figure 35: Closing the Anti-Sag Bar Slider

- **8.** Attach the front sliding end of the cable arm to the slide rail track using the captive thumbscrew.
- **9.** Press and hold the left and right slide extension release levers and slowly move the slide rails throughout their entire range of motion.

**Note:** Ensure the cable arm folds and expands without binding. If binding is noticed, recheck the mounting of the cable arm.

- **10.** Place and secure the cabling within the cable arm.
  - **a.** Install the system in the slide rails, as described in steps 13 to 16 of "Installing a Rack Mount Kit with Sliding Rails (option)" on page 53, and fully extend the slide rails until they lock.
  - **b.** Connect all the required cables to the component.
  - **c.** Place the cables in the cable cutouts and into the cabling channels.
  - **d.** Use the supplied straps to secure the cables within the cabling channels.

#### ■ Notes:

- Wrap the straps through the back of the cabling channels.
- Never wrap the straps around the bottom of the cable arm. Ensure that excess strap length is either cut off, or secured to the other straps and placed in the cabling channel with the cables.
- e. Press and hold the left and right slide extension release levers and slowly slide the component throughout its entire range of motion to ensure that cabling is not strained or restricting movement of the sliding rails.

**Note:** Make certain cabling is not pinched when the rails and cable arm are in the fully retracted position.

# **Making Connections**

Connect your keyboard, monitor, and mouse. Also connect any external peripheral devices such as a printer or scanner by following the instructions included with these devices.

# **A** Caution

Damage to the system may result if the keyboard/ mouse cable is inserted or removed when power is applied to the system.

Inserting a telephone line connector into a LAN RJ-45 port may result in personal injury and equipment damage.

# **Connecting the Power Cord**

Plug the female end of the AC power cord shipped with your system into the input receptacle on the rear of the power supply shipped with your system.

Plug the male end of the power cord into NEMA 5-15R outlet for 100-120 VAC or NEMA 6-15R outlet for 200-240 VAC.

If a power cord supplied with the system is not compatible with the AC wall outlet in your region, obtain a suitable power cord that meets the following criteria:

- The power cord must be rated for the available AC voltage and have a current rating that is at least 125% of the current rating of the system.
- The power cord connector that plugs into the wall outlet must be terminated in a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency acceptable in your region.
- The power cord connector that plugs into the system must be an IEC- type CEE-22 female connector.
- The power cord must be less than 1.8 meters (6.0 feet) long.

When connecting the power cord to a power control unit such as a UPS unit, confirm that the power control unit is powered OFF. Connecting the power cord while power is supplied to the power control unit may cause a failure.

# **A** Warning

A power cord is provided for the power supply shipped with your system. Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.

# Using the System

The following sections describe how to use this system properly and safely, including an explanation of the system power on/off sequences, what the POST program checks in the system, and how to perform a forced power shutdown.

When using the system the following precautions should be observed:

- Make sure you power off the system before connecting or disconnecting cables between the system and peripheral devices. Connecting or disconnecting the cables while the system is powered on may cause malfunction or failures within the system.
- Verify that the access lamp on the diskette drive is unlit before turning off the system or ejecting the floppy disk. Turning off the system or ejecting the floppy disk while the access lamp is lit may damage data being stored on the floppy disk.
- After turning off the system, wait at least 10 seconds before turning it on again. Cycling the power immediately may cause malfunction or failures of the system.
- Before relocating the system, turn off the power and unplug the power cord from the outlet. Moving the system when it is powered may cause malfunction or failures of the system.
- Clean the system regularly. Regular cleaning prevents failures of the system and its components.
- Lightning may cause a momentary voltage drop. To prevent this problem, an uninterruptible power supply unit is recommended.
- Only use options qualified for the system. A non-qualified option may be mounted or connected to the system, but it may fail to operate normally or even cause failures. These types of failures are not covered under warranty.

## **Powering On your System**

### **⚠** Caution

Never turn off the system before the characters following the Boot-BIOS logo are displayed on the screen.

Power on your system as follows.

1. Make sure all external devices, such as a video display, keyboard, and mouse (optional) have been connected, and the power cords are connected.

2. Power on the video display and any other external devices.

Note: If the system power cord(s) is connected to a power control unit such as an UPS (Uninterruptible Power Supply) make sure that the power control unit is powered on.

- **3.** If applicable, open the door behind which the power button is located.
- **4.** Press the POWER button to power on the system. The POWER lamp lights green. If it is does not light, make sure that the ac power cord is connected to a functional ac power source.

After a few seconds your system begins the internal Power-On Self Tests (POST). The POST automatically checks the system board, CPU(s), memory, keyboard, mouse, and most installed peripheral devices. It also displays the start messages of the BIOS setup utility during execution.

The POST check results should be especially monitored in the following cases:

- When the system is being used for the first time.
- When the system appears to fail.
- When the system beeps many times between power-on and the OS start-up.
- When an error message appears on the screen.

Note: For error messages that appear on the display unit, refer to "Error Messages" on page 218.

## **A** Caution

Always allow the POST to complete before powering down your system.

If you have problems powering on your system, see "Solving Problems" on page 198.

If an operating system was factory-installed on your system, you can start using it.

If not, insert the ExpressBuilder disc into the optical disc drive, reboot the system and follow the screen prompts to run ExpressBuilder.

# **Powering Off your System**

When the system is powered on, pressing the power on/off switch on the front panel of the system turns the power off.

To turn the system power off:

1. Shutdown the operating system (OS). In most cases, this will shut down the system after a few seconds (the POWER lam turns off). This is called a software power-off.

If necessary, press the POWER switch on the front of the computer chassis again to power off the system. The POWER lamp turns off.

**2.** Power off the peripheral devices.

Note: If the system power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

# Forcing a Power Shutdown

A forced power shutdown can be used when performing a soft power-off or pressing the power on/off switch does not power off the system.

To perform a forced power shutdown, press on the power on/off switch located on the front panel of the system for at least 4 seconds to force the system power off.

To power on after a forced shutdown, wait at least 10 seconds and then power on again.

# Configuring Your System

Configuration and setup utilities are used to change your system configuration.

#### ■ RAID Configuration Utilities

Depending on your configuration (SATA, SCSI, SAS, combination of these) and on your disk drive controller, one or several RAID Configuration Software Utilities may be available on your system. These software utilities may allow you to perform some of the following actions: configure the RAID level, setup arrays, format the drives, etc.

#### ■ BIOS Setup Utility

You can configure your system, as well as option boards you may add to your system, using the BIOS Setup Utility. Several unique system parameters are configured using the BIOS Setup, which is stored in the system FLASH memory.

If your system has been factory configured, the BIOS Setup Utility does not need to be run unless you want to change the password or security features, add certain types of option boards or devices, or upgrade your system board.

For more information about the BIOS Setup Utility, see "BIOS Setup Utility" on page 224.

# **Configuring RAID**

#### RAID Configuration Utility

The RAID (Redundant Array of Inexpensive Devices) option available for your system is either a RAID controller board, a RAID chipset on the motherboard, or both (depending on your configuration) which gives your system the added security of fault tolerance.

- If you want to change the RAID level or add additional hard disk drives to the array, use the RAID configuration utility. The RAID configuration utility is included with the RAID controller.
- If you are adding the RAID controller to an existing system, the RAID configuration utility allows you to configure your disk array before reinstalling your network operating system. The RAID controllers support various versions of RAID technology (referred to as RAID levels). To use any RAID level, you must configure the RAID controller using the RAID configuration utility prior to installing your Network Operating System.

For an explanation of this utility, check this user's guide for basic informations, and refer to the documentation that comes with the RAID controller (the manufacturer's documentation is generally included on the ExpressBuilder disc). It describes RAID technology and provides tips on making your array perform well in your specific application. It also covers array hardware preparation, configuration, and initialization. After completing the steps in the manual, you can install your Operating System.

#### **RAID Levels**

RAID Configuration	Number of required hard disk drives
RAID 0	2
RAID 1	2
RAID 10	4
RAID 5	3

#### RAID 0 and RAID 1

#### RAID0 (striping)

When a logical drive is striped, the read and write blocks of data are interleaved between the sectors of multiple disk drives. Performance is increased, since the workload is balanced between drives or "members" that form the logical drive.

Identical drives are recommended for performance as well as data storage efficiency. The logical drive's data capacity is equal to the number of drive members multiplied by the smallest logical drive member's capacity.

RAID 0 Stripe interleaves data across multiple drives For example, one 100GB and three 120GB drives will form a 400GB (4 x 100GB) logical drive instead of 460 GB.

## **A** Warning

- RAID0 does not have data redundancy. When a hard disk drive failure occurs, data cannot be restored.
- Logical capacity of the array becomes a multiple of the connected hard disk drive.

#### ■ RAID1 (mirroring)

When a logical drive is mirrored, identical data is written to a pair of disk drives, while reads are performed in parallel. The reads are performed using elevator seek and load balancing techniques where the workload is distributed in the most efficient manner. Whichever drive is not busy and is positioned closer to the data will be accessed first.

With RAID 1, if one disk drive fails or has errors, the other mirrored disk drive continues to function. This is called Fault Tolerance. Moreover, if a spare disk drive is present, the spare drive will be used as the replacement drive and data will begin to be mirrored to it from the remaining good drive.

Due to the data redundancy of mirroring, the capacity of the logical drive is only the size of the smallest disk drive. For example, two 100GB disk drives which have a combined capacity of 200GB instead would have 100GB of usable storage

when set up in a mirrored logical drive. Similar to RAID 0 striping, if disk drives of different capacities are used, there will also be unused capacity on the larger drive.

## **A** Warning

- RAID1 reads or writes data to/from the several hard disk drives at the same time. The disk access performance is lower than the single disk.
- Logical capacity of the array is equal to one hard disk drive connected.

#### Raid 10 & RAID 5

These RAID levels may also be available on your system. Browse through the next sections of this User's Guide for more information.

#### ■ RAID 10

Mirror/Stripe combines both of the RAID 0 and RAID 1 logical drive types. It can increase performance by reading and writing data in parallel while protecting data with duplication. At least four disk drives are needed for RAID 10 to be installed.

With a four-disk-drive logical drive, one drive pair is mirrored together then striped over a second drive pair.

The data capacity is similar to a RAID 1 logical drive, with half of the total storage capacity dedicated for redundancy. An added plus for using RAID 10 is that, in many situations, such a logical drive offers double fault tolerance. Double fault tolerance may allow your logical drive to continue to operate depending on which two disk drives fail.

#### RAID 5

RAID level 5 organizes data across the disk drives of the logical drive, and distributes parity information across the disk drives along with the data blocks.

This organization allows increased performance by accessing multiple disk drives simultaneously for each operation, as well as fault tolerance by providing parity data. In the event of a disk drive failure, data can be re-calculated by the RAID system based on the remaining data and the parity information.

The adjustable block size of the RAID 5 logical drive allows for performance tuning based on the typical I/O request sizes for your system. The block size must be set at the time the logical drive is created and cannot be adjusted dynamically.

RAID 5 makes efficient use of hard drives and is the most versatile RAID Level. It works well for file, database, application and web servers.

The capacity of a RAID 5 logical drive is the smallest disk drive size multiplied by the number of disk drives, less one. Hence, a RAID 5 logical drive with four 100 GB disk drives will have a capacity of 300 GB. A logical drive with two 120 GB disk drives and one 100 GB disk drive will have a capacity of 200 GB.

## RAID Configuration using Intel Matrix Storage Manager

## **Description**

The Intel Matrix Storage Manager software provides the following features:

- Serial ATA RAID driver providing high performance RAID 0, fault-tolerant RAID 1, high capacity & fault-tolerant RAID 5, high performance & fault-tolerant RAID 10, and matrix RAID for the benefits of two RAID volumes on a single array.
- Advanced Host Controller Interface support for RAID and non-RAID Serial ATA drives, providing Native Command Queuing performance benefits, as well as Native Hot Plug capability.
- Migration Feature, allowing migration from a single-drive (also known as "RAID Ready") configuration to a RAID 0, RAID 1, RAID 5, RAID 10, or matrix RAID configuration. The ability to migrate from a RAID 0, RAID 1, or RAID 10 configuration to RAID 5 is also available. The migrations do not require a reinstallation of the operating system.
- 3 and 4-drive RAID 0 support, allowing the user to continue to scale the performance benefits of RAID 0.

## Enabling RAID in the BIOS

RAID should first be enabled in the BIOS before you can configure it. Refer to "Using the BIOS Setup Utility" on page 224

## Entering the Intel Matrix Storage Manager

During the Power-On Self Test (POST), the following message will appear for a few seconds:

*Press CTRL+I to enter the Configuration Utility* 

Press the <Ctrl> and <i> keys simultaneously to enter the RAIDConfiguration Utility.

## Creating a RAID Volume

- 1. Select option 1 *Create RAID Volume* and press the **Enter** key.
- **2.** Type in a volume name and press **Enter**, or simply press **Enter** to accept the default name.
- **3.** Select the RAID level by scrolling through the available values (RAID 0, RAID 1, RAID 5, RAID 10) by using the arrows keys.
- **4.** Press **Enter** after you have selected the desired RAID level.
- 5. Unless you have selected RAID 1, select the strip value for the RAID array by scrolling through the available values by using the arrows keys and pressing Enter. The available values range from 4 KB to 128 KB in power of 2 increments. The strip value should be chosen based on the planned drive

- usage. The default selection is 128 KB for RAID 0 and RAID 10 volumes, and 64KB for RAID 5 volumes.
- **6.** Press **Enter** to select the physical disks. This will bring up another dialog.
- 7. Select the appropriate number of hard drives by scrolling through the list of available hard drives by using the arrows keys and pressing **Space** to select the drive. When you have finished selecting hard drives, press **Enter**.
- **8.** Select the volume size.
- **9.** At the Create Volume prompt, press **Enter** to create the volume. Confirm this selection by pressing **Enter** after the prompt.
- **10.** Scroll to option 4 *Exit* and press **Enter** to exit the RAID Configuration utility. Confirm the exit by pressing **Y**.

■ Note: To change any of the information before the volume creation has been confirmed, you must exit the Create Volume process and restart it. Press Esc to exit the Create Volume process.

## Deleting a RAID Volume



All data on the RAID drives will be lost unless the volume that is selected is a RAID 1 volume.

- **1.** Select option 2 *Delete RAID Volume* and press **Enter** to delete the RAID volume.
- **2.** Use the up and down arrow keys to select the volume you would like to delete.
- **3.** Press **Delete** to delete the RAID volume. Confirm the volume deletion by pressing **Y**.

## Resetting Disks to Non-RAID

Note: Possible reasons to 'Reset Disks to Non-RAID' could include issues such as incompatible RAID configurations, a failed volume or a failed member of a RAID 0 volume.

## **A** Warning

All data on the RAID drives and any internal RAID structures will be lost unless the drives are members of a RAID 1 volume. Resetting drives that are members of a RAID 1 volume to non-RAID will not result in the loss of data on those member drives.

- **1.** Select option 3 '*Reset Disks to Non-RAID*' and press **Enter** to delete the RAID set and remove any RAID structures from the drives.
- **2.** In the selection screen, use **Space** to select the drives you would like to reset. Press **Enter** after selecting the drives.
- **3.** Confirm the selection by pressing **Y.**

## RAID Configuration using the Intel® Embedded Server RAID BIOS Configuration Utility

#### **Description**

The Intel® Embedded Server RAID BIOS Configuration utility allows a user to:

- Create, add, modify, and clear logical drive configurations.
- Initialize or rebuild the configured drives.
- Set the boot drive.
- Create a global hotspare drive.
- View physical and logical drive parameters.
- View and set adapter properties, including consistency check and auto-resume.

SATA and SAS systems use different versions of the Intel Embedded Server RAID BIOS Configuration utility, but both versions use the same keystrokes and contain identical menus. The utility menus show limited help at the bottom of the screen and selections are chosen with the arrow keys and the space bar. A warning is displayed if there is no logical drive available to be configured.

The following menu and sub-options are available:

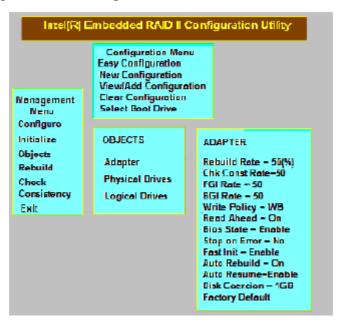


Figure 36: Intel(R) Embedded RAID II Configuration Utility Main Screen

## Enabling RAID in the BIOS

RAID should first be enabled in the BIOS before you can configure it. For more information, refer to "BIOS Setup Utility" on page 224.

## Entering the Intel Embedded Server RAID BIOS Configuration Utility

When the SATA RAID or SAS RAID options are enabled in the server BIOS, an option to enter the Intel Embedded Server RAID BIOS Configuration utility displays during the server boot process. To enter the utility, press the <Ctrl> + <E> when prompted.

■ Note: The onboard SAS and SATA RAID features are optional. Depending on your configuration, they may or may not be available on your system.

## Creating, Adding or Modifying a Logical Drive Configuration

Use the following steps to create, add, or modify a logical drive configuration.

- **1.** Boot the system.
- **2.** Press <Ctrl> + <E> when prompted to start the Intel® Embedded Server RAID BIOS Configuration utility.
- **3.** Select **Configure** from the *Main* Menu.
- **4.** Select a configuration method:
  - Easy Configuration does not change existing configurations, but allows new configurations.
  - New Configuration deletes any existing arrays and logical drives and creates only new configurations.
  - View/Add Configuration lets you view or modify an existing configura-

For each configuration method, a list of available physical drives is displayed. These drives are in the READY state. Information about each drive is displayed if you select it.

**5.** Use the arrow keys to move to a drive and press the space bar to add it to the array.

**Note**: The utility limits each drive to the size of the smallest drive.

The status for each selected drive that is added to an array changes status from **READY** to **ONLIN A[array#]-[drive#]**. For example, **ONLIN A00-01** means array 0, disk drive 1.

- **6.** (Optional) Create a global hotspare drive by highlighting a drive that is marked **READY** and press the <F4> key. Then select **Yes** from the pop-up menu.
- 7. Repeat step 5 and step 6 to create a second array if desired. When you have selected drives for all desired arrays, press the <F10> key.
- **8.** Select an array by highlighting it. Press the <Enter> key to set the properties.
- **9.** The logical drive configuration screen is displayed, This screen shows the:
  - Logical drive number.

- RAID level.
- Logical drive size.
- Number of stripes in the physical array.
- Stripe size.
- State of the logical drive.

To set these options, highlight a property and press the <Enter> key. The available parameters for that property are displayed for the selection.

- **10.** Select a RAID level: Select 0, 1, or 10 depending upon number of drives and the purpose.
- 11. Consider whether you need to override the default logical drive size. By default, all available space in the array is assigned to the current logical drive. For RAID 10 arrays, only one logical drive can be defined for the entire array.
- **12.** (Optional) Change the default Write Cache and Read Ahead policies. See "Setting the Write Cache and Read Ahead Policies" on page 82.
- **13.** When you have finished defining the current logical drive, select **Accept** and press the <Enter> key.
- **14.** Repeat step 8 through step 13 for all logical drives.
- **15.** Save the configuration when prompted, and press any key to return to the *Main* Menu.
- **16.** Select **Initialize** and use the space bar to highlight the logical drive to initialize.

## **A** Caution

All data on the logical drive will be erased during an initialization.

- **17.** Press the <F10> key. Select **Yes** at the prompt and press the <Enter> key to begin the initialization. A graph shows the progress of the initialization.
- **18.** After the initialization is complete, press the <Esc> key to return to the previous menu. Pressing the <Esc> key closes the current menu. If a process is running when you press the <Esc> key, you will be given the following options:
  - Abort: when **Abort** is selected, the task is stopped and will not resume. *Abort* does not restore data if an initialization had been started.
  - Stop: when **Stop** is selected, the current task stops. *Stop* is available only if auto resume is enabled on the adapter. See <u>"Auto Rebuild and Auto Resume" on page 83</u> for information.
  - Continue: the task continues normally. *Continue* cancels the press of the <Esc> key. If *AutoResume* is enabled, the task will resume from the point at which it was stopped.

## Setting the Write Cache and Read Ahead Policies

Read and write cache settings apply to all logical drives in an array. They may show as on/off; enable/disable; or as initials of the desired state, such as WB for Write Back. They appear in menus as *Write Policy* and *Read Policy* or as *Write Cache* and *Read Ahead*. These policies can be seen from the Adapter Properties or from the Logical Drive's View/Update Parameters.

The following are the cache policies:

If WC is on, or if Write Policy is WB, Write Back is enabled. In this mode, the data transfer is signaled as complete when the controller cache has received all the data.

## **⚠** Caution

Write Back mode will lose data if power fails before the cached data is written to the drive.

- If WC is off, Write Through is enabled. The data transfer is complete when the drive has received all the data.
- RA = ON allows the controller to read additional data and store that data into its cache. This improves performance on sequential reads.

To change cache policies:

- 1. Select Objects | Logical Drive | Logical Drive n | View/Update Parameters.
- **2.** Use the arrow key to select the option to change. Press the <Enter> key.
- **3.** Use the arrow key to select **Off** or **On**.
- **4.** Confirm the choice by using the arrow key to select **Yes** if asked to confirm the change. Press the <Enter> key to change the cache setting.

## Working with a Global Hotspare Drive

A global, but not dedicated, hotspare drive can be created to automatically replace a failed drive in a RAID 1 or RAID 10 array. For new arrays, the global hotspare should be created during the configuration process. See "Creating, Adding or Modifying a Logical Drive Configuration" on page 80.

#### Adding a Hot Spare Drive

To add a hot spare drive to an existing configuration, follow these steps:

**1.** Select **Objects** from the *Main* Menu.

- 2. Select **Physical Drive**. A list of physical drives is displayed.
- **3.** Select an unused drive from the list, and select **Make Hot Spare**. The screen changes to indicate HOTSP.

#### Removing a Hot Spare Drive

To remove a hotspare drive:

- **1.** Select **Objects** from the *Main* Menu.
- 2. Select Physical Drive. A list of physical drives is displayed.
- **3.** Select the disk that displays **HOTSP**, press the <Enter> key.
- **4.** Select **Force Offline** and press the <Enter> key. The status of the drive changes to READY. The drive can be used in another array.

#### Rebuilding a Drive

The Intel® Embedded Server RAID BIOS Configuration utility includes a manual rebuild option that rebuilds an individual failed drive in a RAID 1 or 10 array. RAID 0 drives are not redundant and cannot be rebuilt. A good drive (not physically failed) can also be rebuilt using the existing configuration data.

To rebuild a drive:

- 1. Select **Rebuild** from the *Main* Menu. The failed drives show the status **FAIL**.
- **2.** Press the arrow keys to highlight the physical drive that you want to rebuild. Press the space bar to select the drive.
- **3.** Press the <F10> key and select **Y** to confirm. The drive indicator shows **REBLD** as the rebuild process starts.
- **4.** When the rebuild is complete, press any key to continue.

#### Auto Rebuild and Auto Resume

To ensure data protection, enable *Auto Rebuild* and *Auto Resume* so that drives are automatically re-created to maintain redundancy.

■ In a pre-boot environment, auto rebuild starts only when you enter the BIOS utility.

■ Note: Hot plug support is not available in the pre-boot environment. For the system BIOS or the Intel® Embedded Server RAID BIOS Configuration utility to detect the physical drive, insert the drive when the system is off.

■ When the operating system is running, the auto rebuild starts if the system has a hotspare drive or if you replace the failed drive with a new drive.

The *Auto Rebuild* and *Auto Resume* options are available in the Intel® Embedded Server RAID BIOS Configuration utility from the menu that is displayed after you select Objects Adapter.

## Checking Data Consistency

The Check Consistency feature can be used on RAID 1 or RAID 10 drives to verify the data consistency between the mirrored drives. It can be set to only report or to both report and automatically fix the data.

- **1.** From the *Main* Menu, select Check Consistency and press the <Enter> key. A list of configured logical drives is displayed.
- 2. Use the arrow keys to choose the desired drive. Press the space bar to select the logical drive to check for consistency. (RAID 1 or 10 only).
- 3. Press the  $\langle F10 \rangle$  key.
- **4.** At the prompt, select **Yes** and then press the <Enter> key.

If the Report and Fix/Report options are not shown, select *Main* Menu | **Objects** | **Adapter** | **ChkCons** and **set Report only** or **Fix**\**Report**.

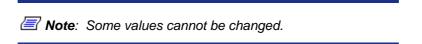
## Viewing and Changing Device Properties

The properties of adapters, logical drives, and physical drives can be viewed. Some adapter properties and the Write Cache and Read Ahead for Logical Drives can be changed.

- 1. From the *Main* Menu select **Objects**
- 2. Choose Adapter, Logical Drive, or Physical Drive.
- **3.** Select the device from the list and view the properties.
  - For logical drives choose View | Update Parameters.
  - For physical drives choose **Drive Properties**.

The numeric values of the rates settings are the percentage of system resources. FGI and BGI are abbreviations for foreground and background initialization rates.

**4.** To change a value, highlight the property and press the <Enter> key.



- **5.** Select or type a different value for the property and press the <Enter> key.
- **6.** When you are finished, press the <Esc> key until you return to the *Main* Menu.

## Forcing Drives Online or Offline

A drive can be forced offline so that a hot spare drive will replace it. Power failures may cause a drive to go offline and you must force it back online.

To force a drive online or offline, follow these steps:

1. On the *Main* Menu, select **Objects** and then **Physical Drive**.

**2.** Highlight a physical drive that is a member of an array and press the <Enter> key.

- **3.** From the menu, choose one of the following:
  - Force Offline to take the drive off line. If the drive was online, its status changes to FAIL.
  - Force Online to bring the drive on line. If the drive was offline, its status changes to ONLIN.

## Configuring a Bootable Logical Drive

Follow these steps to configure a bootable logical drive:

- **1.** From the *Main* Menu, select **Configure** | **Select Boot Drive**.
- 2. Select a logical drive from the list to be the designated boot drive.

■ Note: You should also check the system BIOS Setup utility for the boot order setting. To access the BIOS Setup utility, press the <F2> key when prompted during POST.

## Deleting (Clearing) a Storage Configuration



Before you clear a storage configuration, back up all the data you want to keep.

To clear a storage configuration, follow these steps:

- 1. On the *Main* Menu, select Configure | Clear Configuration.
- **2.** When the message appears, select Yes to confirm. All logical drives are deleted from the configuration.

## Upgrading Your System

## **General Safety Information**

## **A** Warning

The DC push-button on/off switch on the front panel does not turn off completely the system AC power. +5vdc is present on the system board whenever the AC power cord connects the system to an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cord from the back of the chassis.

Failure to disconnect the power cord before opening your system can result in personal injury and equipment damage.

## **⚠** Caution

Operating your system with the top covers removed can damage your system components.

For proper cooling and airflow, always replace the top covers before powering on your system.

## **A** Warning

Avoid burns: If the system has been running, any installed processor and heat sink on the processor board(s) will be hot.

To avoid the possibility of a burn, be careful when removing or installing components that are located near processors.

Contact your sales representative or dealer for a list of approved optional peripheral devices.

## **Static Precautions**

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can ensure some ESD protection by wearing an anti-static wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

## **Equipment Log**

Use the equipment log form located at the end of this manual to record the model and serial number of your system, all the installed options, and any other pertinent information specific to your system. You will need this information when configuring your system.

# Tools Recommended for Upgrading Your System

Depending on the upgrade, you will need one or more of the following tools:

- Phillips screwdriver (#1 bit and #2 bit)
- Flat-head screwdriver
- Small needle nose pliers
- Pen or pencil
- ESD workstation or anti-static wrist strap (recommended)

## **Preparing Your System for Upgrade**

To prepare your system for installation or removal of system components perform the following procedure:

- **1.** Observe the safety and ESD precautions listed under <u>"General Safety Information"</u> and <u>"Static Precautions"</u> at the beginning of this chapter.
- **2.** Shutdown the operating system (OS).
- **3.** If necessary, press the power on/off switch on the front panel of the system (<u>See "Powering On your System" on page 67.</u>). The power-on LED goes out.
- **4.** Power off the peripheral devices.
- **5.** Unplug the system power cord(s) from the AC wall outlet(s).

Note: If the system power cord is connected to a power control unit such as an UPS (Uninterruptible Power Supply), refer to the UPS user's guide for proper power-off procedures.

**6.** Unplug all the I/O cables connected to the rear panel of your system.

## Removing and Replacing the Front Bezel

Please note that the front bezel is optional.

## Removing the Front Bezel

- **1.** Follow the precautions listed in <u>"Preparing Your System for Upgrade" on page 87.</u>
- 2. Unlock the bezel.
- 3. Pull the bezel from the chassis.

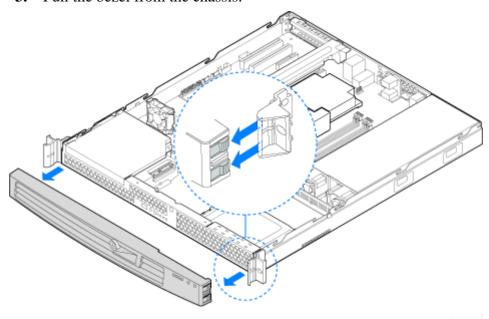


Figure 37: Removing the Front Bezel

## Installing the Front Bezel

**1.** At each end of the bezel, line up the center notch on the bezel with the center guide on the rack handles.

- **2.** Push the bezel onto the front of the server until it clicks into place.
- **3.** Lock the bezel.

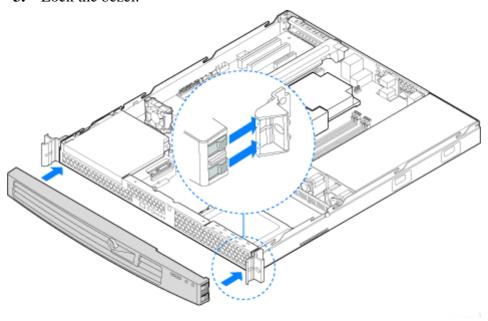


Figure 38: Installing the Front Bezel

## Removing or Installing the Server Cover

The server must be operated with the server cover in place to ensure proper cooling. Remove the cover to add or replace components inside of the server.

None of the internal components are hot-swappable.

Note: Use a nonskid surface or a stop behind the server to prevent it from sliding on your work surface.

#### Removing the Server Cover

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the two screws at the front of the chassis. See letter "A" in Figure 39.
- **4.** Loosen the screw at the rear of the chassis. See letter "B" in Figure 39.
- **5.** Push rearward on the blue grip point at the front of the server. Slide the cover back until it stops and then lift the cover upward to remove it. See letter "C" in the figure below.

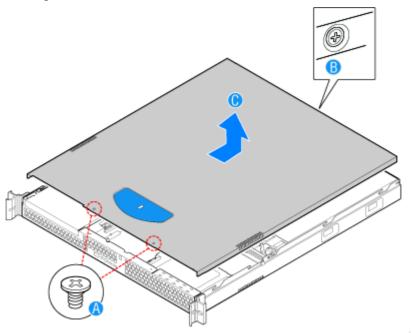


Figure 39: Removing the Server Cover

## **Installing the Server Cover**

1. Place the cover over the server so that the side edges of the cover sit just inside the server sidewalls. Slide the cover forward. See letter "A" in Figure 40.

- 2. Tighten the screw at the rear of the server. See letter "B" in Figure 40.
- 3. Install the two screws at the front of the server. See letter "C".

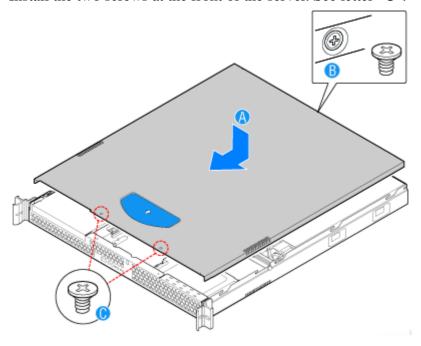


Figure 40: Installing the Server Cover

**4.** Reconnect all peripheral devices and the AC power cord.

## Removing or Installing the Processor Duct

Always operate your server with the processor air duct in place. The air duct is required for proper airflow within the server.

#### Removing the Processor Air Duct

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Lift the processor air duct from its location behind the two system blower fans.

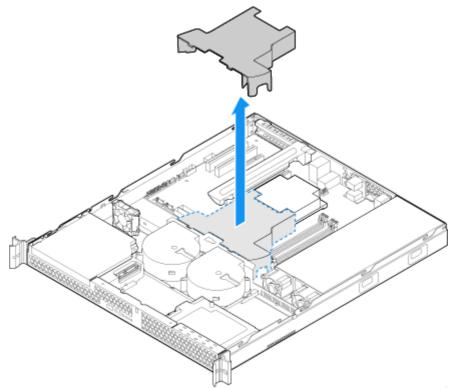


Figure 41: Removing the Processor Air Duct

#### Installing the Processor Air Duct

**1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).

- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Lower the air duct into place: insert the two hooks at the front of the processor air duct into the corresponding slots on the bracket behind the two system blower fans.

**Mote**: Use caution not to pinch or disengage cables that may be near or under the air duct.

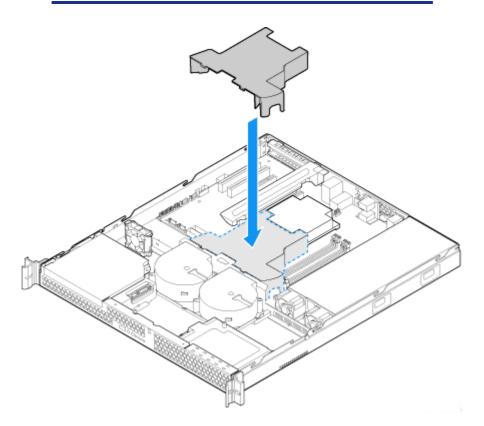


Figure 42: Installing the Processor Air Duct

**5.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.

## Installing or Removing a 5.25-inch Device

This section of the chapter describes how to add and remove 5.25-inch devices. You can install an optical disc drive, tape backup unit, or other 5.25-inch devices in the additional 5.25-inch bay.

See the installation instructions included with those items for specific installation information. Before installing a 5.25-inch device, read the section "<u>Preparing IDE</u> <u>Devices" on page 131</u>.

Note: Additional power and/or data cables may be included with your system. In this case, store them in a safe place, you will need them if you decide to add additional drives.

## Installing a Slimline Optical Device

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91.</u>
- **4.** Remove the bezel if it is installed. Refer to <u>"Removing the Front Bezel" on page 89.</u>
- 5. Note the orientation of the PCI cooling fan that is located behind the optical drive bay, then lift the fan from the mounting pegs. It is not necessary to disconnect the fan cable. See letter "A" in the figure below.

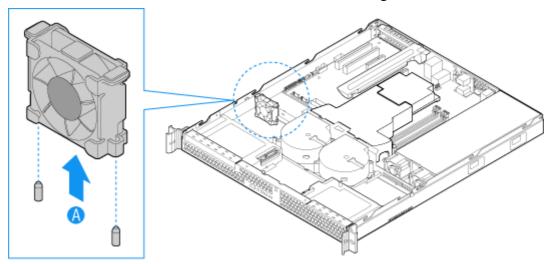


Figure 43: Lifting the PCI Cooling Fan from the Mounting Pegs

**6.** First time installation only: Remove the knock-out by rocking it back and forth. See letter "A" in the figure below. The knock-out cannot be reinstalled.

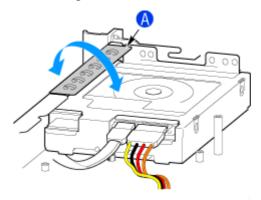


Figure 44: Removing the Knock-out from the Sheet Metal Panel

**7.** Attach the interposer board to the rear of the optical disc drive, using two screws, as shown by the following figure.

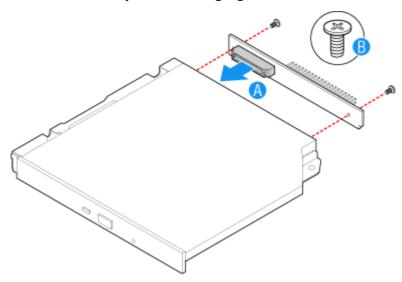


Figure 45: Attaching the Interposer Board

**8.** Attach the optical drive to the brackets using four screws.

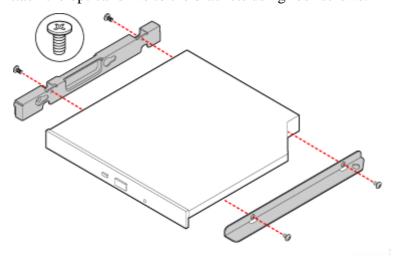


Figure 46: Attaching the Optical Drive to the Brackets

**9.** Slide the optical drive assembly in through the front of the chassis, as shown by letter "A in *Figure 47*.

- **10.** Reinstall the screw that you removed in step 6.
- **11.** A daisy chain cable is used for the hard disk drives and the optical drive. Connect the end connector on the daisy chain cable to the power connector on the optical drive. See letter "C" in *Figure 47*.
- **12.** Connect the data cable to the optical drive and to the IDE connector on the server board. See letter "D" in *Figure 47*.

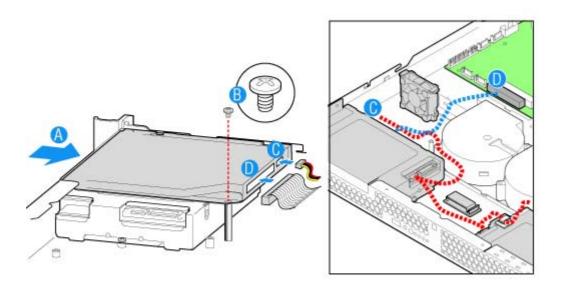


Figure 47: Installing the Optical Drive into the System

Note: For more information, see <u>"Cabling IDE Devices"</u> on page 124.

**13.** Insert the PCI cooling fan onto the mounting pegs that are located behind the optical drive bay. The fan label should face the rear of the system. See letter "A".

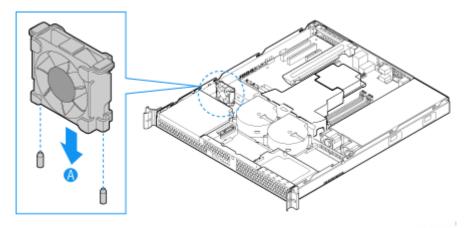


Figure 48: Installing the PCI Cooling Fan

- **14.** Optional: replace the front bezel. Refer to <u>"Installing the Front Bezel" on page 90</u>.
- **15.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.
- **16.** Plug all peripheral devices and the AC power cable into the server.

Note: If necessary, modify the BIOS Setup program to recognise the additional device. For additional information, refer to "BIOS Setup Utility" on page 224.

#### Removing a Slimline Optical Drive

**1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).

- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91.</u>
- **4.** Remove the bezel if it is installed. Refer to <u>"Removing the Front Bezel" on page 89.</u>
- 5. Note the orientation of the PCI cooling fan that is located behind the optical drive bay, then lift the fan from the mounting pegs. It is not necessary to disconnect the fan cable. See letter "A" in the figure below.

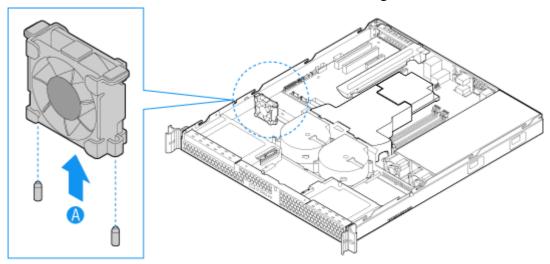
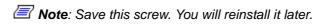


Figure 49: Lifting the PCI Cooling Fan from the Mounting Pegs

- **6.** Disconnect the optical drive power and data cables. See letters "A" and "B" in *Figure 50*.
- **7.** Remove the screw that holds the optical drive bracket to the server chassis. See letter "C" in *Figure 50*.



**8.** Slide the optical drive out through the front of the system. See letter "D" in the figure below.

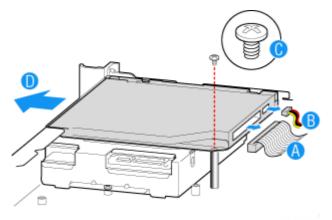


Figure 50: Removing the Optical Drive

**9.** Remove the four screws that hold the optical drive to the brackets as shown in the figure below. Save these screws for future use.

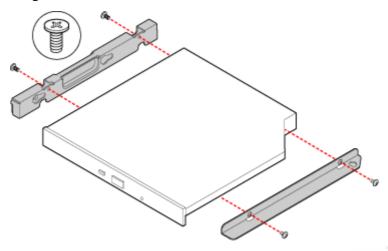


Figure 51: Attaching the Optical Drive Bracket to the Brackets

**10.** Remove the two screws at the back of the optical disc drive to detach the interposer board. See letter "A" in *Figure 52*.

11. Carefully pull the interposer board from the drive, detaching the interposer board connector from the drive. See letter "B" in the figure below.

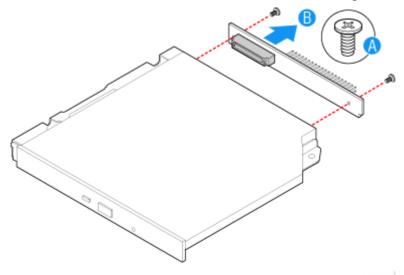


Figure 52: Removing the Interposer Board from the Optical Drive

Note: If you are installing a replacement optical drive, skip the rest of these steps and instead continue with "Installing a Slimline Optical Device" on page 95, step 8.

- **12.** Store the brackets and interposer board for future use.
- **13.** Insert the PCI cooling fan onto the mounting pegs that are located behind the optical drive bay. The fan label should face the rear of the system.

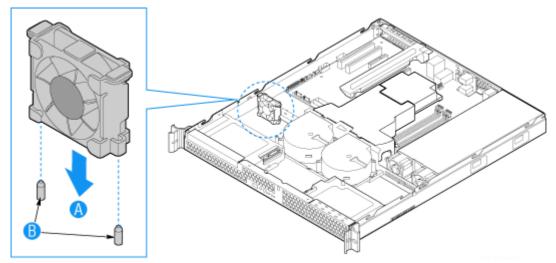


Figure 53: Installing the PCI Cooling Fan

- **14.** Optional: replace the front bezel. Refer to "Installing the Front Bezel" on page 90.
- **15.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.
- **16.** Plug all peripheral devices and the AC power cable into the server.

## **Installing or Removing Hard Disk Drives**

## **A** Caution

The hard drives are NOT hot swappable. Before removing or replacing a hard drive, you must first take the server out of service, turn off all peripheral devices connected to the system, turn off the system by pressing the power button, and unplug the AC power cord from the system or wall outlet.

Up to two SATA drives can be installed. The drives do not need to be installed in order; HDD1 can be installed before HDD0.

- The HDD0 drive bay is at the left side of the chassis, underneath the optional optical disc drive.
- The HDD1 drive bay is at the right side of the chassis.

## Installing a Hard Disk Drive

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Locate the drive position you want to use.

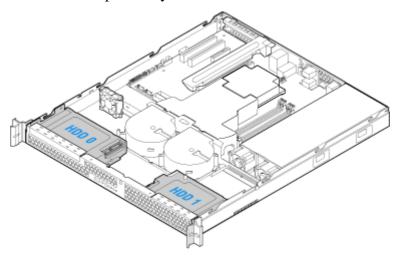


Figure 54: Locating Drive Positions

- HDD1 location only: Slide the power cables from the cable clip that is located on the top of the hard drive carrier.

**5.** Remove the screw that holds the hard drive bracket to the chassis. See letter "A" in the figure below.

**Note**: Save this screw. You will use it to reinstall the drive assembly later.

**6.** Lift the drive carrier from the chassis. See letter "B" in the figure.

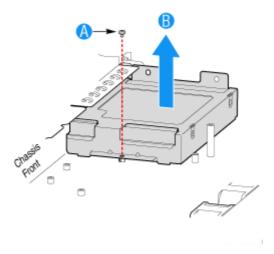


Figure 55: Removing the Drive Carrier

**7.** Position the drive with the drive connectors facing up, as shown by the figure below.

- **8.** Set the drive carrier over the drive, as shown by the letter "A" in the figure. The data and power connectors must be positioned so they are accessible through the cut-out, shown by letter "B".
- **9.** Use the four screws provided to attach the drive to the carrier. See letter "C" in the figure.

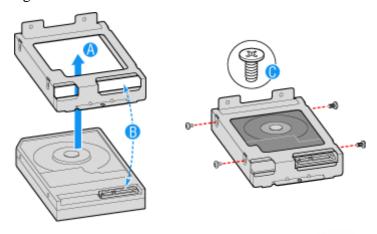


Figure 56: Installing the Drive into the Drive Carrier

## **⚠** Caution

Use the screws provided with the hard disk drive. Using screws longer than the required length may cause the hard disk drive to be damaged.

**10.** Set the drive assembly into place in the chassis. See letter "A" in the figure below.

11. Attach the drive assembly to the chassis with the screw that you removed in Step 6. See letter "B" in the figure below.

**Note**: The assembly that contains the optical drive bracket must be installed at the left side of the system.

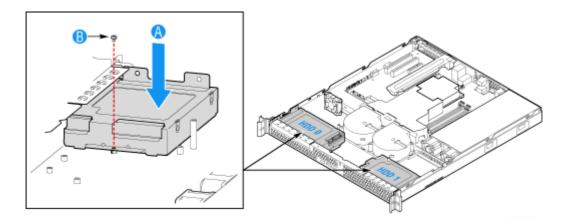


Figure 57: Installing the Drive Assembly

- HDD1 only: Route the power cable into the cable clip on the top of the hard drive bracket. See letter "A" in *Figure 58*.
- **12.** Connect the data cables to the drive(s).
  - If a drive is installed in the HDD0 carrier, connect the HDD0 data cable to the SATA 0 connector on the server board. See letter "B" in *Figure 58*.
  - If a drive is installed in the HDD1 carrier, connect the HDD1 data cable to the SATA 1 connector on the server board. See letter "C" in *Figure 58*.

Note: The data cables are factory routed underneath the fan module. Use caution to make sure you connect the connect cables between the server board and the hard drives. The cables are labeled at each end.

- **13.** Connect the power cables to the drive(s):
  - If a drive is installed in the HDD1 carrier, attach the connector on the daisy chain power cable that is closest to the power supply to the HDD1 connector. See letter "E" in *Figure 58*.

■ If a drive is installed in the HDD0 carrier, attach the middle connector on the daisy chain power cable to the HDD0 power connector. See letter "D" in *Figure 58*.

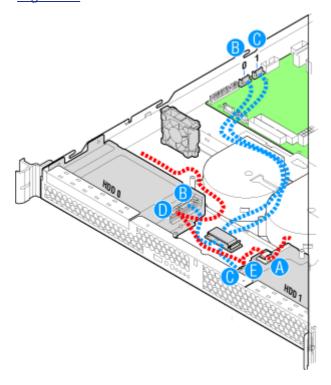


Figure 58: Connecting the Hard Drive Power and Data Cables

**14.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.

## Removing a Hard Disk Drive

**1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).

- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect the power and data cables from the drive.
  - HDD1 location only: Slide the power cable from the cable clip that is located on the top of the hard drive carrier.
- **5.** Remove the screw that holds the hard drive bracket to the chassis. See letter "A" in the figure below.

Ave: Save this screw. You will use it to reinstall the drive assembly later.

**6.** Lift the drive carrier from the chassis. See letter "B" in the figure.

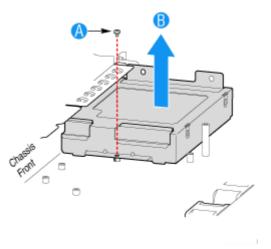


Figure 59: Removing the Drive Carrier

- 7. Remove the four screws that attach the hard drive to the drive carrier.
- **8.** Lift the drive from the carrier. Store the drive in an anti-static bag.

## **A** Caution

About data on the hard disk drive:

Be sure to take appropriate measures not to leak important data (e.g., customers' information or companies' management information) on the removed hard disk drive to any third parties.

Data seems to be erased when you empty the Windows "Recycle Bin" or execute the "format" command of the operating system. However, the actual data remains written on the hard disk drive, and can be restored by special software and used for unexpected purposes.

We strongly recommended you use special software or service for data erasure in order to avoid any troubles. For details on data erasure, ask your sales representative.

Note: If you are installing a new drive, skip the rest of these steps and instead see "Installing a Hard Disk Drive" on page 102, beginning with step 8.

- **9.** Insert the screws that held the drive in the carrier into the screw locations on the carrier for future use.
- **10.** Set the drive assembly into place in the chassis. See letter "A" in the figure below.
- 11. Attach the drive assembly to the chassis with the screw that you removed in Step 6. See letter "B" in the figure below.

**Note**: The assembly that contains the optical drive bracket must be installed at the left side of the system.

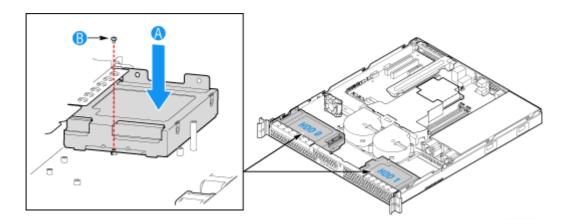


Figure 60: Installing the Drive Carrier

**12.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.

# Installing and Removing the PCI Riser Assembly

#### **⚠** Caution

The PCI riser assembly is NOT hot swappable.

#### Removing the PCI Riser Assembly

To remove the PCI riser assembly, use the following instructions.

- 1. Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect any cables attached to any add-in cards.
- **5.** Lift riser assembly up to remove it. Use caution to gently easy the riser card from the add-in card slot so you do not damage the slot or the riser card.

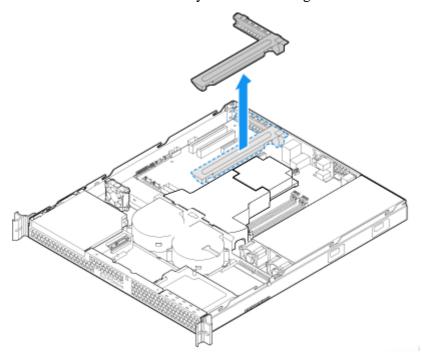


Figure 61: Removing the PCI Riser Assembly

**6.** If you need to add or replace a PCI riser connector, see <u>"Installing and Removing a PCI Riser Card" on page 111</u>.

- 7. If you need to add or replace a PCI add-in card, see <u>"Installing and Removing a PCI Add-in Card" on page 113.</u>
- **8.** If you removed the PCI riser assembly for another procedure, continue with that procedure.

#### Installing the PCI Riser Assembly

■ **Note**: For clarity, the figure in this series of instructions does not show an attached add-in card. If you are installing an add-in card, do so before installing the PCI riser assembly into your server.

- 1. Lower the riser assembly into place over the add-in card slot. See letter "A" in Figure 62.
- **2.** Align the three hooks in the riser assembly with the matching slots at the back of the server. See letter "B" in the figure below.

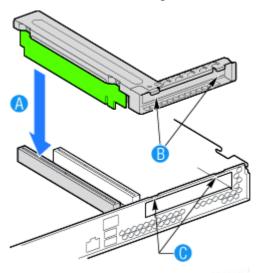


Figure 62: Installing PCI Riser Assembly

- **3.** Press down uniformly until the two hooks on the rear of the PCI riser assembly engage the server back panel slots. The riser cards will seat into the matching sockets on the server board.
- **4.** Connect any cables to add-in cards that require them. See your add-in card documentation for information and add-in card requirements.
- **5.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92.</u>

### Installing and Removing a PCI Riser Card

#### **⚠** Caution

The PCI riser card is NOT hot swappable.

You can install a full-height PCI Express riser with one PCI Express x8 slot.

Note: To avoid installing the replacement connector on the wrong side of the PCI riser assembly, replace one connector at a time.

#### Removing a PCI Riser Card

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect any cables attached to any add-in cards.
- **5.** Remove the PCI riser assembly. For instructions, see <u>"Removing the PCI Riser Assembly" on page 109.</u>
- **6.** Remove any add-in cards from the PCI riser connector. For instructions, see "Removing a PCI Add-in Card" on page 114.
- **7.** Remove the two screws that attach the riser card to the riser assembly. Save these screws to be used later.

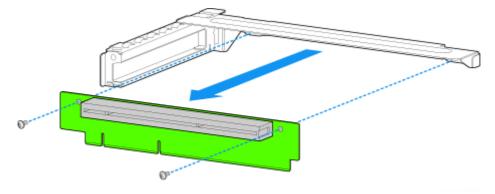


Figure 63: Removing the Riser Card from the Riser Assembly

**8.** Install the replacement riser connector, if desired. For instructions, see "Installing a PCI Riser Card" on page 112.

- **9.** Install the PCI riser assembly into the server. For instructions, see <u>"Installing the PCI Riser Assembly" on page 110</u>.
- **10.** Install the server cover. For instructions, see <u>"Installing the Server Cover" on page 92.</u>
- 11. Plug all peripheral devices and the AC power cable into the server.

#### Installing a PCI Riser Card

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Remove the processor air duct. Refer to <u>"Removing the Processor Air Duct"</u> on page 93.
- **5.** Disconnect any cables attached to any add-in cards.
- **6.** Remove the PCI riser assembly. Refer to <u>"Removing the PCI Riser Assembly"</u> on page 109.
- 7. Remove any add-in cards from the PCI riser connector. Refer to <u>"Removing a PCI Add-in Card" on page 114</u>.
- **8.** Use two screws to attach the riser card to the riser assembly.

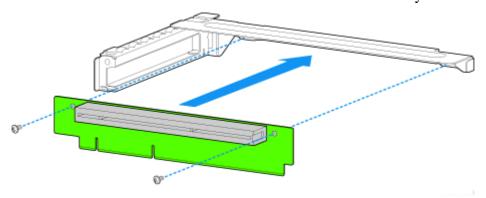


Figure 64: Installing the Riser Card onto the Riser Assembly

- **9.** Install a PCI add-in card if desired. Refer to "Installing a PCI Add-in Card" on page 113.
- **10.** Install the PCI riser assembly into the server. Refer to "Installing the PCI Riser Assembly" on page 110.
- 11. Connect any cables to add-in cards that require them. See your add-in card documentation for information and add-in card requirements.
- **12.** Re-install the processor air duct. Refer to <u>"Installing the Processor Air Duct"</u> on page 94.
- **13.** Install the server cover. Refer to "Installing the Server Cover" on page 92.
- **14.** Plug all peripheral devices and the AC power cable into the server.

### Installing and Removing a PCI Add-in Card

#### **⚠** Caution

The add-in cards are NOT hot swappable

#### Installing a PCI Add-in Card

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Remove the PCI riser assembly. Refer to <u>"Removing the PCI Riser Assembly"</u> on page 109.
- **5.** Remove the screw at the rear of the riser assembly. See letter "A" in Figure 65.

Note: Save this screw. You will reinstall it later.

**6.** If a filler panel is installed over the opening at the rear of the riser assembly lift it from the riser assembly. See letter "B" in Figure 65.

**Note**: Save the filler panel in case you later need to remove the add-in card.

- 7. Insert the add-in card into the socket in the riser assembly. Push the add-in card into place firmly until it seats in the riser card connector, but use caution so you do not twist or bend the card. See letter "C" in Figure 65.
- **8.** Re-install the screw you removed in step 5. See letter "A" in Figure 65.

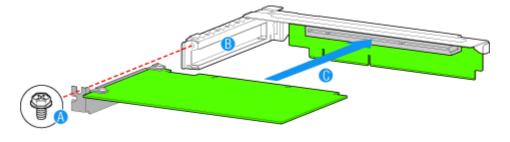


Figure 65: Installing an Add-In Card

**9.** Install the PCI riser assembly into the server. Refer to "Installing the PCI Riser Assembly" on page 110.

- **10.** Install the server cover. Refer to "Installing the Server Cover" on page 92.
- 11. Plug all peripheral devices and the AC power cable into the server.

#### Removing a PCI Add-in Card

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Remove the PCI riser assembly. Refer to <u>"Removing the PCI Riser Assembly"</u> on page 109.
- **5.** Remove the screw at the rear of the riser assembly. See letter "A" in Figure 66.
  - A Note: Save this screw. You will use it later.
- **6.** Pull the add-in card from the socket in the riser assembly. See letter "B" in Figure 66.

Note: You may need to wriggle the card from front to back to remove it, but use caution so you do not twist or bend the card.

- **7.** Install a filler panel over the opening at the rear of the riser assembly. See letter "C" in Figure 66.
- **8.** Re-install the screw you removed in step 5. See letter "A" in Figure 66.

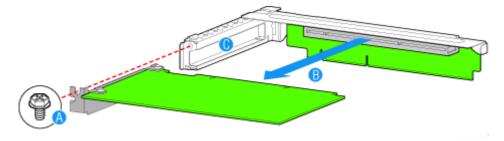


Figure 66: Removing a Full Height Add-In Card

Note: Make sure that all empty add-in card slots have filler panels installed.

**9.** Install the PCI riser assembly into the server. Refer to "Installing the PCI Riser Assembly" on page 110.

- **10.** Re-install the processor air duct. Refer to <u>"Installing the Processor Air Duct"</u> on page 94.
- 11. Install the server cover. Refer to "Installing the Server Cover" on page 92.
- 12. Plug all peripheral devices and the AC power cable into the server.

### **Upgrading Microprocessor**

Your system is fitted with a processor installed in a socket LGA 775.

#### Removing a Processor

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- 3. Remove the server cover. Refer to "Removing the Server Cover" on page 91.
- **4.** Disconnect the fan cable(s) from the processor fan connector(s) on the motherboard.
- **5.** Remove the processor heatsink:
  - **a.** Remove the four screws fastening the heatsink to the motherboard.
  - **b.** Remove the heatsink manually using a gentle rocking motion.
- **6.** Open the processor socket:
  - Use your right thumb to push down and outwards the lever in order to disengage it from the retention tab.

### **A** Caution

If you do not follow scrupulously these instructions, the lever can bounce back and cause bend contacts.

- Rotate the load lever to its fully open position at approximately 100°.

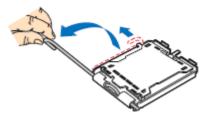


Figure 67: Opening the processor socket

- 7. Grasp the processor (use your index to hold the load plate side, and your thumb to hold the lever side).
- **8.** Lift the processor straight and away.
- **9.** Set the processor immediately in its protective cover.
  - Hold the CPU by three of its corners.
  - The chamber of the protective cover should match the connection 1 on the CPU.

- The rentention tabs on the cover and the processor contacts should point each other.

#### Installing a Processor

1. Remove the processor from its shipping materials, and, if applicable, remove its protective cover.



Figure 68: Removing from the shipping materials

#### **⚠** Caution

- Do not touch the processor sensitive contacts.
- Hold the processor by the substrate edges.
- **2.** Locate the connection 1 indicator and the two orientation key notches on the CPU and on the socket.
- **3.** Grasp the processor with your thumb and index finger by the orientation key notches.
- **4.** Carefully lower down the processor into the socket body.

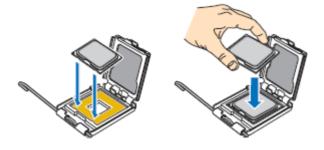


Figure 69: Installing the processor



Do not tilt the processor or shift it into place, doing so may damage the sensitive contacts.

**5.** Check that the orientation notches and the connection 1 indicator are properly fitted to the socket body.

- **6.** Close the soket:
  - Close the load plate.
  - Press gently on the load plate and engage the load lever.
  - Secure the load lever under its retention tab.
- 7. Remove the heatsink from its packaging materials.

### **A** Caution

The heat sink has Thermal Interface Material (TIM) located on the bottom of it. Use caution when you unpack the heat sink so you do not damage the TIM.

- **8.** Remove the protective cover from the TIM on the underside of the heat sink. Do not touch the TIM.
- **9.** Place the heatsink on the processor socket.
  - Ensure that the fan cable(s) are on the closest side to the fan(s) header(s) on the motherboard.
  - Align the screws with the screwholes on the motherboard.
  - Make sure that the heatsink is completely level with the motherboard.

#### **⚠** Caution

Check the following:

- No cables are trapped or interfere with the screws.
- The screws are perpendicular to the heatsink.

#### **10.** Secure the heatsink:

- Hold the heatsink to prevent it from tilting, and tighten the screws.

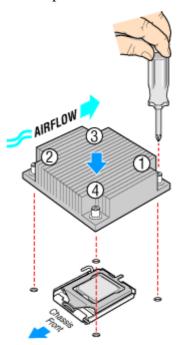


Figure 70: Securing the Heatsink

- **11.** Connect the fan cable(s) to the header(s) on the motherboard.
- **12.** Secure the excess cable with a tie-wrap to ensure that the cable does not interfere with fan operation or make contact with other components.
- **13.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92.</u>

### **Upgrading Random Access Memory (RAM)**

#### **Recommended Memory Configuration**

Refer to <u>"Specifications" on page 245</u> and to <u>"Memory Configuration" on page 26</u> for more information.

#### Removing and Replacing a DDR2 module



Figure 71: DDR2 Memory Module Sample

If your memory configuration requires the removal of a module, perform the following steps:

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices (printers, for instance) from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91.</u>

**4.** Locate the memory upgrade sockets on the motherboard.

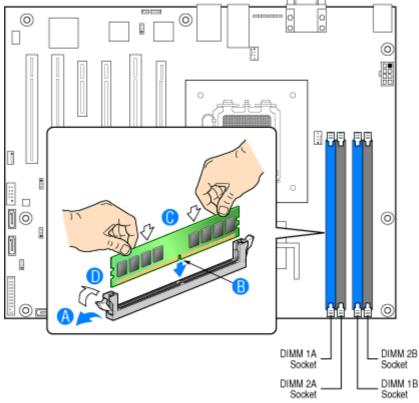


Figure 72: Upgrading the Memory

- **5.** Press the plastic clips at the outer edge of the socket away from the memory module. This ejects the memory module from the socket (see "A" on Figure 72). Do not touch the module's metal "fingers." Store the module in an anti-static bag (available at electronic supply stores) or a cardboard box.
- **6.** Align the new module with an empty memory socket. Make sure the notch on the module aligns with the key in the socket. The module is designed to install into the socket in only one way (see "B" on Figure 72).
- 7. Press the module firmly into the socket (see "C" on Figure 72). If you have difficulty installing a module, do not force it! Carefully remove the module, then check the alignment of the module's notch with the one in the socket. Then re-install the module.
- **8.** Make sure the locking clips at either end of the module click closed (see "D" on Figure 72). If the brackets do not secure themselves to the module, carefully remove the module, then reinstall it.
- **9.** Replace the server cover. Refer to "Installing the Server Cover" on page 92.

Note: The amount of installed memory will be automatically detected by the system.

### Installing or Removing the Motherboard

### **A** Warning

This procedure must only be performed by a service representative certified by Bull.

#### Removing the Motherboard

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- **2.** Disconnect the monitor and peripheral devices from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Remove the processor air duct. Refer to <u>"Removing the Processor Air Duct"</u> on page 93.
- **5.** Remove the PCI riser assembly. Refer to <u>"Removing the PCI Riser Assembly"</u> on page 109.
- **6.** Disconnect all cables attached to the motherboard.
- 7. Remove the heatsink and processor. Refer to <u>"Removing a Processor" on page 116.</u>
- **8.** Remove the memory modules. Refer to <u>"Removing and Replacing a DDR2" module" on page 120.</u>

**9.** Remove the nine screws from the server board (see letter "A") and lift the server board from the server (see letter "B").

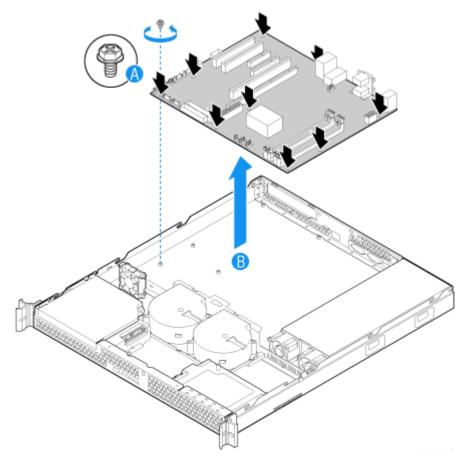


Figure 73: Removing the Server Board

**10.** Place the server board into the server as shown by letter "A" in Figure 74.

11. Attach the server board with nine screws. See letter "B" in the figure below.

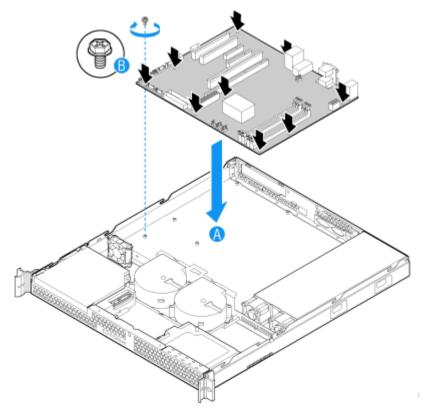


Figure 74: Installing the Server Board

- **12.** Install the processor. Refer to "Installing a Processor" on page 117.
- **13.** Install the DIMMs. Refer to <u>"Removing and Replacing a DDR2 module" on page 120</u>.
- **14.** Install the PCI riser assembly. Refer to "Installing the PCI Riser Assembly" on page 110.
- **15.** Reconnect all cables to the server board. For a full cabling diagram, refer to "Cable Routing" on page 139.
- **16.** Install the processor air duct. Refer to "Installing the Processor Air Duct" on page 94.
- 17. Replace the server cover. Refer to "Installing the Server Cover" on page 92.
- **18.** Plug all peripheral devices and the AC power cable into the server.

### **Replacing the Power Supply**

#### **A** Warning

This procedure must only be performed by a service representative certified by Bull.

### **A** Caution

The power supply is NOT hot swappable.

The power supply can be replaced if it fails or if one of the fans that is integrated into it fails. To replace the power supply, use the following instructions.

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- **2.** Disconnect the monitor and peripheral devices from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect all power cables connected to the server board and peripherals.
  - A: 2x4 power connector
  - B: 2x12 main power connector
  - C: Daisy-chain cable to:
    - Optical drive power connector, if an optical drive is installed.
    - HDD0 power connector, if a hard drive is installed here.

- HDD1 power connector, if a hard drive is installed here.

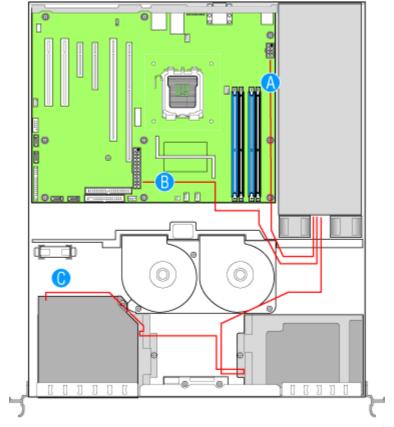


Figure 75: Disconnecting Power Cables

**5.** Remove the screw at the back of the server, next to the AC power input. Save this screw. You will re-insert it later. See letter "A" in Figure 76.

- **6.** Lift up slightly on the front of the power supply until it clears the foot at the bottom of the chassis. See letter "B" in Figure 76.
- 7. Slide the power supply forward (see letter "C") and then lift it from the chassis.

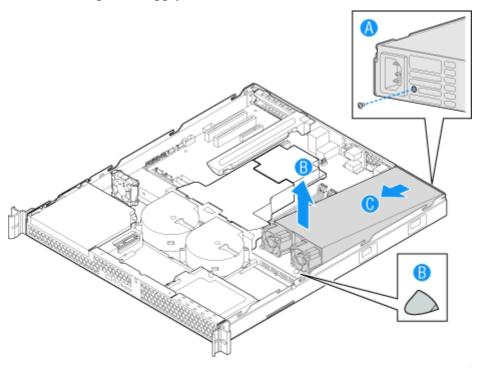


Figure 76: Removing the Power Supply from the System

**8.** Insert the replacement power supply at an angle into the server, sliding the power connector side in first to fit it through the cut-out area at the rear of the system. See letter "A" in Figure 77.

- **9.** Set the front of the power supply down pushing the power supply back so it fits behind the foot at the bottom of the chassis. See letter "B" in Figure 77.
- **10.** Insert the screw you removed in step 5 to attach the power supply to the server. See letter "C".

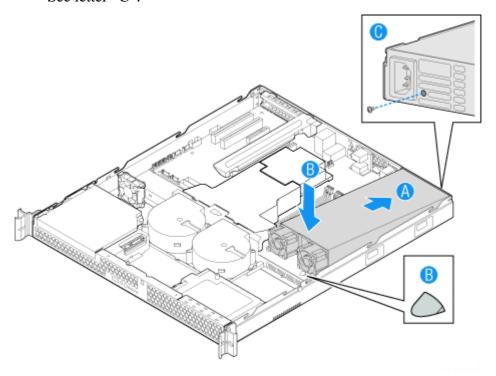


Figure 77: Installing Power Supply Module into the System

- 11. Connect the power supply cables to the server board and peripherals.
  - A: 2x4 power connector
  - B: 2x12 main power connector
  - C: Daisy chain cable to:
    - HDD1 power connector, if a hard drive is installed here. Use the connector on cable that is closest to power supply.
    - HDD0 power connector, if a hard drive is installed here. Use the center connector on the cable.

- Optical drive power, if an optical drive is installed. Use the end connector on the power supply.

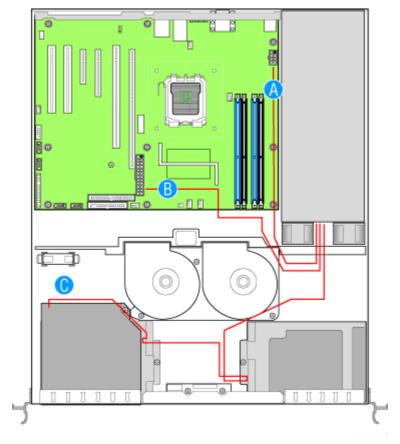


Figure 78: Connecting Power Cables

- 12. Replace the server cover. Refer to "Installing the Server Cover" on page 92.
- 13. Plug all peripheral devices and the AC power cable into the server.

### **Replacing the Front Panel Board**

### **A** Warning

This procedure must only be performed by a service representative certified by Bull.

### **A** Caution

The control panel is NOT hot swappable.

Your server must be operated with a control panel installed.

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see "General Safety Information" on page 86).
- 2. Disconnect the monitor and peripheral devices from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect the power and data cables connected to HDD1, at the right side of the system. It is not necessary to remove the HDD1 drive.
- **5.** Disconnect the front panel cable and the USB cable from the front panel board.
- **6.** Remove the two screws that attach the front panel board to the server. See letter "A" in Figure 79.

Note: Save these screws. You will re-install them later.

7. Lift the front panel board from the system. See letter "B" in the figure below.

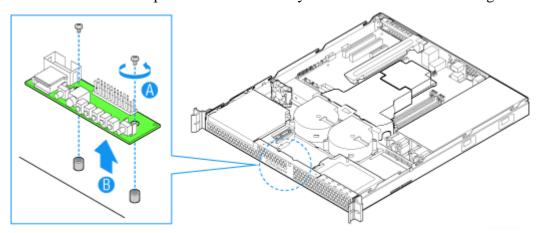


Figure 79: Removing the Front Panel Board

**8.** Insert the replacement front panel board into the server over the two standoffs. Press down gently until the board clicks into place.

- **9.** Use the two screws you removed in step 7 to attach the front panel board to the system.
- **10.** Connect the USB cable and the front panel cable.
- 11. Connect the HDD1 power and data cables.

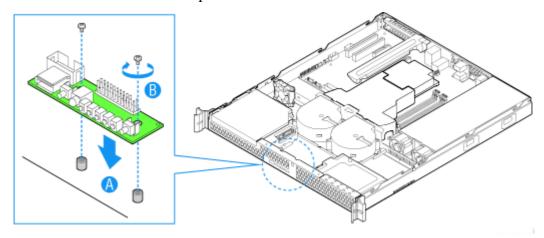


Figure 80: Installing the Front Panel Board

- **12.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.
- **13.** Plug all peripheral devices and the AC power cable into the server.

### Replacing a Cooling Fan

### **A** Warning

This procedure must only be performed by a service representative certified by Bull.

### **⚠** Caution

The fans are NOT hot swappable.

The blower fans can be individually replaced if one of them fails. If a fan in the power supply fails, the power supply must be replaced. Use the steps below to replace a system blower fan or the PCI cooling fan.

■ **Note**: The fans that are integrated into the power supply cannot be replaced separately. If one of the fans in the power supply fails, the power supply must be replaced.

#### Replacing the System Blower Fans

- **1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).
- 2. Disconnect the monitor and peripheral devices from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Remove the processor air duct. Refer to <u>"Removing the Processor Air Duct"</u> on page 93.

**5.** Disconnect the two fan cables from the server board. See letters "A" and "B" in the figure below.

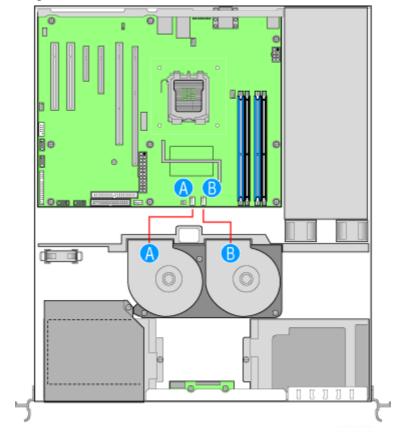


Figure 81: Disconnecting System Blower Fans

**6.** Remove the three screws that hold the fan bracket in place. Save these screws. You will re-install them later. See letter "A" in Figure 82.

- 7. Remove the fan cable from beneath the clip at the front of the fan bracket. See letter "B" in Figure 82.
- **8.** Lift the fan bracket from the server. Lift the bracket at an angle, front of the bracket first, to clear the hard disk drive brackets. See letter "C"in the figure below.

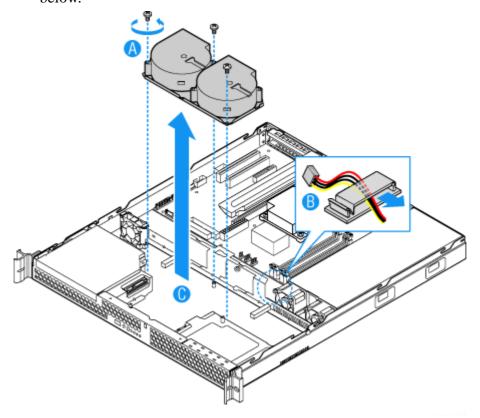


Figure 82: Removing Bracket and System Blower Fans

**9.** Turn the bracket over and remove the two screws that attach the failed fan to the bracket. See letter "A" in Figure 83.



10. Lift the fan from the bracket. See letter "B" in the figure below.

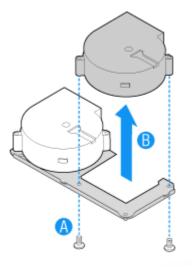


Figure 83: Removing Fan from Fan Bracket

11. Install the replacement fan onto the bracket, using the two screws you removed in step 9.

- **12.** Set the fan assembly into the system. Insert the rear edge first and push the assembly slightly rearward to clear the hard disk drive brackets. Use caution to make sure you do not pinch any cables.
- 13. Route the cable from the fan at the right around the right side of the assembly and under the clip at the front of the fan bracket.
- **14.** Connect the fans to the server board. See letters "A" and "B" in the figure below.

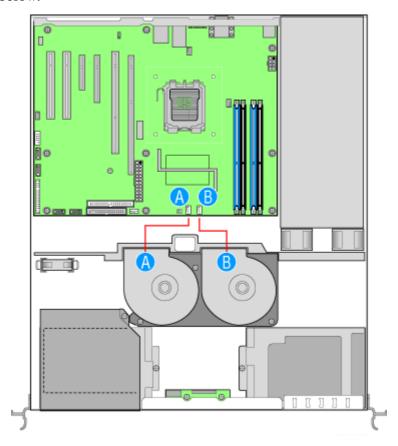


Figure 84: Connecting System Blower Fans

- **15.** Install the processor air duct. Refer to "Installing the Processor Air Duct" on page 94.
- **16.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.
- **17.** Plug all peripheral devices and the AC power cable into the server.

#### Replacing the PCI Cooling Fan

**1.** Make sure the power switches for the computer, video monitor and any peripheral devices are turned OFF and unplug the power cord (see <u>"General Safety Information" on page 86</u>).

- **2.** Disconnect the monitor and peripheral devices from the system.
- **3.** Remove the server cover. Refer to <u>"Removing the Server Cover" on page 91</u>.
- **4.** Disconnect the fan cable from the server board. See letter "A" in the figure below.

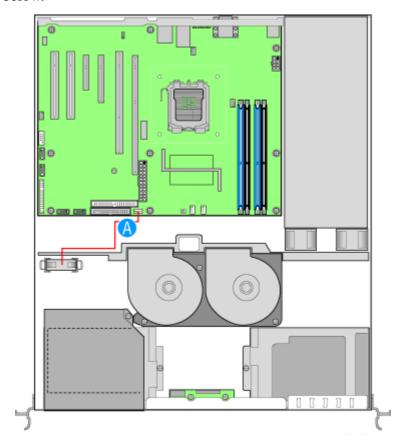


Figure 85: Disconnecting the PCI Cooling Fan

**5.** Lift the fan from the system.

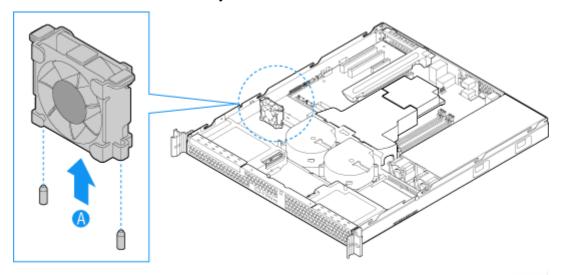


Figure 86: Removing the PCI Cooling Fan

- **6.** Set the replacement fan into place. The label on the fan must face the rear of the system.
- 7. Connect the fan cable to the server board. See letter "A" in Figure 85.
- **8.** Replace the server cover. Refer to <u>"Installing the Server Cover" on page 92</u>.
- **9.** Plug all peripheral devices and the AC power cable into the server.

### **Cable Routing**

When you add or remove components from your server, make sure your cables are routed correctly before reinstalling the server cover. Use caution to make sure no cables or wires are pinched and that the airflow from the fans is not blocked. Use the figures below to determine the correct cable routing.

For readability, separate figures for power cable routing and data cable routing are included below. Make sure all necessary power and data cables are connected and routed as shown. Dashed lines in the drawings indicate a location where a cable is routed beneath a component and each connector end is labeled with the same letter. For example, the PCI cooling fan cable is labeled with the letter "C" both where it connects to the server board and at the PCI cooling fan itself.

#### **Power Cable Routing**

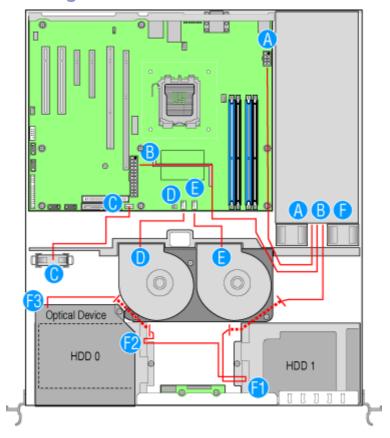


Figure 87: Power Cable Routing

A. Processor power	D. Right system blower fan	
B. Main power	E. Left system blower fan	
C. PCI cooling fan	F. Drive power daisy cable  - F1: connector closest to power supply to HDD1  - F2: center connector to HDD0  - F3: end connector to optical drive	

■ Note: The power cable to the two hard drives and the optical drive is a single daisy chain cable. To make the diagram above more clear, where the connectors attach to components, the labels "F1", "F2", and "F3" are used. The end at the power supply itself is labeled "F"

#### **Data Cable Routing**

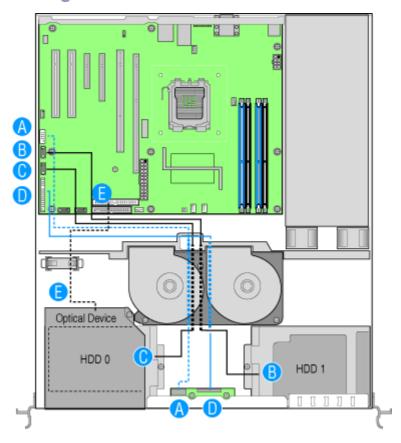


Figure 88: Data Cable Routing

A.	Front panel USB	D.	Front panel
B.	SATA 0 to HDD0	E.	Optical drive
C.	SATA 1 to HDD1		

## Installing and Using Utilities

Please setup the server using the ExpressBuilder disc both when setting it up for the first time, and when you make changes to its configuration.

#### With the ExpressBuilder CD you can:

- Install the Operating System, using the Express Setup.
- Create a support disk; this disk will be used to manually install a Microsoft operating system.
- Install utilities, such as management software for Windows (NEC ESMPRO etc.). Windows-based applications are installed via the Master Control menu.

Note: Some of the utilities mentionned above may not be available on your server.

■ Read the on-line documentation (Windows systems only).

Note: Some of the features can be performed remotely using a cross cable (COM) or LAN.

#### Software End-User License Agreement

Carefully read the terms and conditions of the Software End User License Agreement printed on the ExpressBuilder disc sleeve.

#### **Utilities**

All the utilities described in the pages hereafter are not available on your server. Most depend on your configuration.

For instance, amid the several RAID configuration and management utilities listed, only the ones relevant to your RAID hardware (card or chipset) will be available.

### **ExpressBuilder**

### (Microsoft® Windows® Server™ 2003)

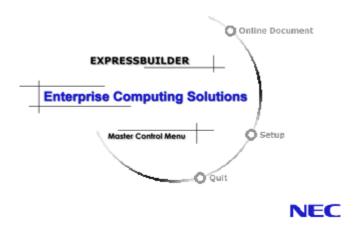
ExpressBuilder is an automated software integration tool that helps simplify the process of installing and configuring your system. It provides a flexible, guided installation process for system administrators to install Microsoft® Windows Server<sup>TM</sup> 2003.

To install other operating systems, please contact your service representative for more information on the operating systems certified on the system.

Note: Before using ExpressBuilder for initial setup, complete the hardware configuration.

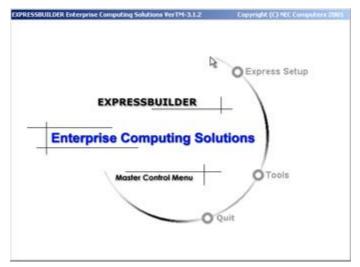
ExpressBuilder includes two distinct programs:

■ Express Setup. See "Installing Microsoft Windows Server 2003" on page 161.



#### Windows-based

This program is called "Master Control Menu" and runs under the Microsoft Windows system (Windows 95 or later and Windows NT 4.0 or later). You can install the several applications and read the documentation from this menu.



### ExpressBuilder for Windows-Based (Master Control Menu)

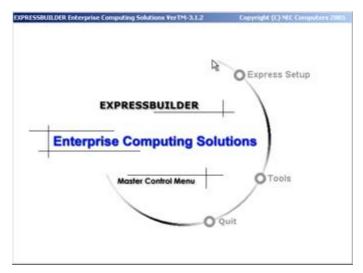
The Master Control Menu is used to,

- Read the User's Guide or the other documents,
- Update the system, and
- Install the management software.



- Master Control Menu requires Microsoft Windows 95 (or later) or Windows NT 4.0 (or later).
- Some documents are provided in the PDF format. Use the Adobe Acrobat Reader to read these documents.

Insert the ExpressBuilder disc into the optical disc drive, the Master Control Menu appears on the screen automatically. If the Autorun function is invalid in your system, run the \MC\1ST.EXE file in the disc directly. Some items are grayed-out when the logon user does not have administrator authority, or if the item is not proper for the system.



To use Master Control Menu,

- Click on [Online Document], [Setup] or [Quit], or
- Click the right mouse button on Master Control Menu window.

# Intel® Advanced Management Technology (AMT) Web Interface

#### Introduction

This computer is provided with the ability to be managed out-of-band, even when it is powered off, using a chipset based on Intel's *Active Management Technology* (AMT). This management is accessible through any web browser.

#### Configuring the AMT IP Address

Before accessing this management facility it is necessary to configure the AMT chip with an IP address.

This out-of-band address must be different than any other IP address configured within the operating system of the computer.

To configure the IP address, follow the steps below:

- 1. Boot the server, and enter the BIOS Setup utility.
- 2. Depending on your configuration,
  - Select the *Server Management* screen, or
  - select the *Advanced* screen, and then the *Management Configuration* screen.
- **3.** Move to the *Enter AMTBx Setup* entry and select *Enabled* (see below).
- **4.** Save these changes and reboot the server. The server will boot into the *AMT BIOS Extension* screen.



Figure 89: AMT BIOS Extension screen

**5.** Enter the required password. The default password is *admin*.

**6.** Before accessing other options in this menu, you need to change the *admin* password to a new password.

Please keep in mind that you will need a strong password. A strong password will be something like "Intel@98". It needs at least 8 characters, including a capital letter, a number and a special character like !, @, #, \$, %, ^, &, \*. In this case, you can use "Intel@99". Goto the first option of "Change Password" to change it. After changing the password, you will be able to access all other available options.

- **7.** Select the *TCP/IP* option and enter the appropriate IP address details. (if required, you can also disable this interface or have its' IP address allocated automatically using DHCP).
- **8.** Reboot the server. .

#### Accessing the AMT interface

Access to the AMT features in done through a web browser, via the following URL:

http://ip-address:16992

When connected, the computer will prompt for a password. The password previously configured in the AMT BIOS screen was for the *admin* user ID. Login using this name and enter the required password. The *System Status* screen is displayed.

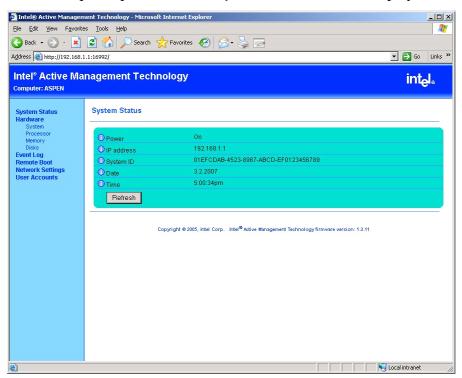


Figure 90: System Status screen

#### Viewing hardware details

Select **Hardware** to view the status of the system.

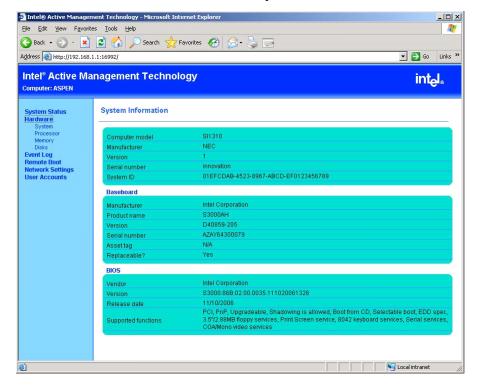


Figure 91: Hardware System Information screen

Details of certain hardware components are also available:

#### Processor

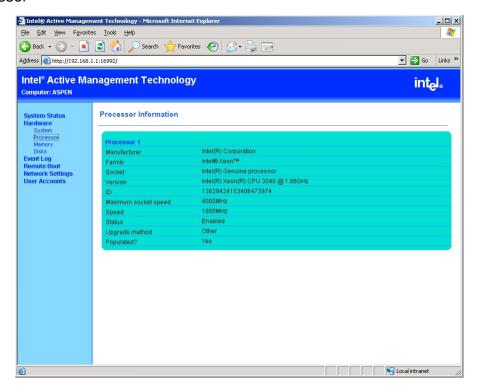


Figure 92: Processor screen

#### Memory

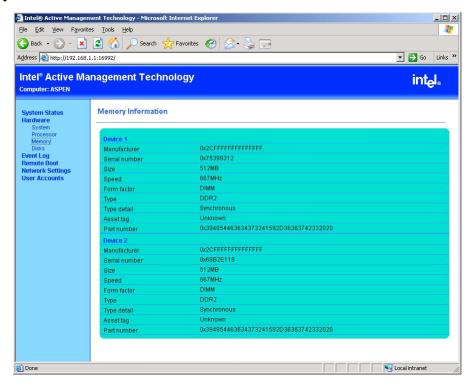


Figure 93: Memory screen

#### Disks

Select **Disks** to see the status of any IDE or SCSI disks installed in the system.

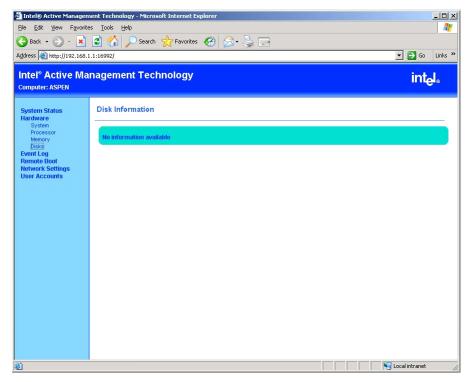


Figure 94: Disks screen

#### **Event log**

Select Event Log to view historical information on hardware events.

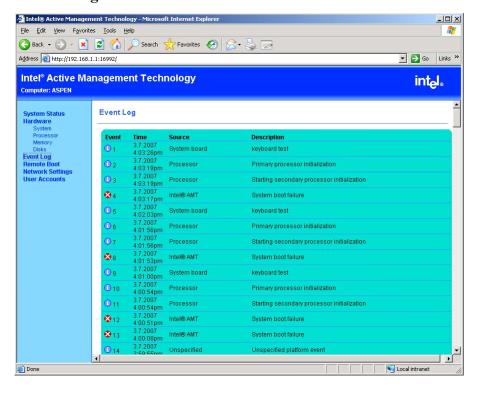


Figure 95: Event Log screen

#### Power management

Select **Remote Boot** to power on and off the computer.

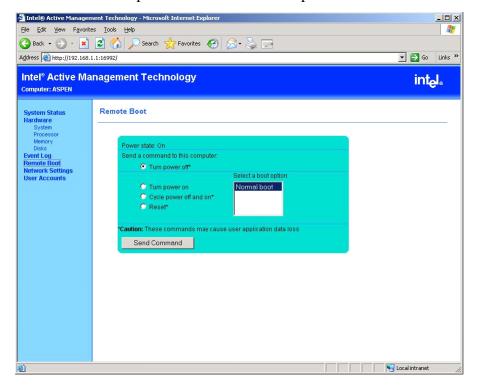


Figure 96: Power Management screen

Power management works independently of any operating system that may be running on the computer at the time. If you select to power off the system, the operating system will not be shut down gracefully. Effectively, this will be like removing the power plug.

#### **Network Settings**

Select **Network Settings** to change the TCP/IP network settings of the AMT chipset.

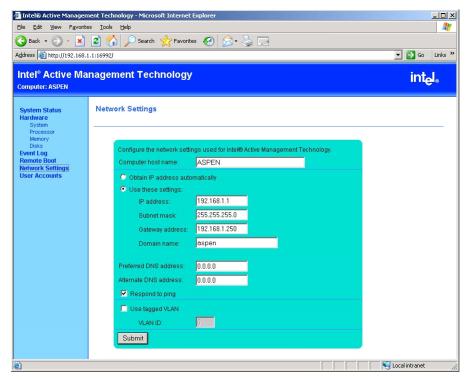


Figure 97: Network Settings screen

Any changes to these settings are likely to result in the loss of the web browser connection.

#### User accounts

In addition to the default *admin* account, it is possible to create other user accounts with different access controls.

To create a new account:

1. Press the New...button.

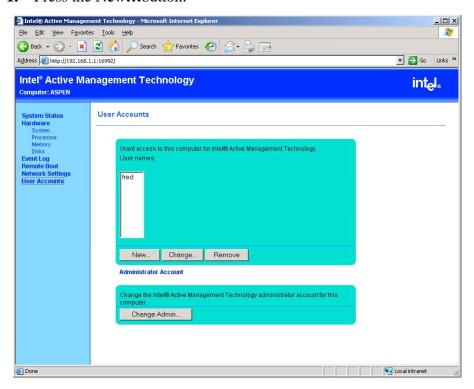


Figure 98: User Accounts screen

2. Enter the name and password, and select the permissions granted to this user.

3. Press Submit.

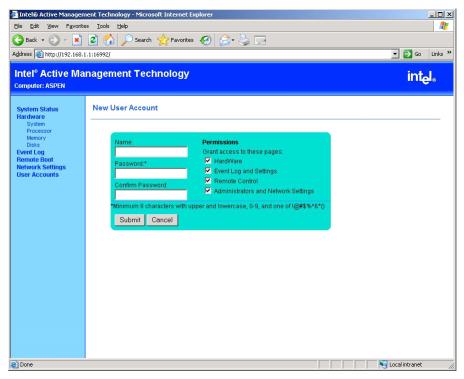


Figure 99: New User Account screen

If you create a user with restricted permissions, these will be visible when that user logs in. For example, if a user logs in with restrictions only allowing access to hardware details, the web browser will show lock icons in front of the options that cannot be selected.

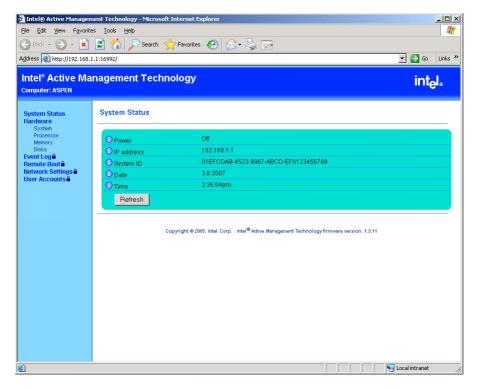


Figure 100: Accessing a restricted user account

# Intel Matrix Storage Manager (Windows Interface)

The Intel Matrix Storage Console allows the management of the RAID drives and volumes in a user-friendly interface.

For more information on using the Intel Matrix Storage Console, refer to the Intel Matrix Storage Console Online Help or to the User's Guide included on the ExpressBuilder disc.

# Installing the Operating System

Depending on your configuration, there are several ways to re-install an operating system on your system.

- "Microsoft® Windows® 2000, Microsoft® Windows® Server 2003, Microsoft® Windows® XP: Express Setup" on page 155.
- "Microsoft® Windows® VistaTM" on page 156
- "Other Operating Systems" on page 156

Note: the available operating systems are systemdependent. The operating systems available for your system are detailed in the next chapter(s). You may also contact your service representative for more information.

## **⚠** Caution

Before installing the operating system, adjust the system date and time by using the BIOS setup utility "SETUP".

## Microsoft<sup>®</sup> Windows<sup>®</sup> 2000, Microsoft<sup>®</sup> Windows<sup>®</sup> Server 2003, Microsoft<sup>®</sup> Windows<sup>®</sup> XP: Express Setup

#### About Express Setup

"Express Setup" contained in your ExpressBuilder disc is intended for the initial setup of the system. Its automatic installation mode guides the user easily through the process by detailing specific hardware features and providing screen prompts for software selection and configuration. The program loads the utilities and drivers, applies RAID settings, partitions the disk, and installs the desired operating system.

## **A** Caution

Express Setup is intended for the initial setup of the system. Therefore, it clears the contents of the hard disk.

Express Setup configures your system and installs the operating system. After a few tasks are completed, all that remains to be done is to remove the ExpressBuilder disc and set the Windows disc, input a product ID number, and acknowledge the license agreement.

For the other operating systems, Express Setup initializes the target disk(s), creates the maintenance partition, and installs the various maintenance utilities from the ExpressBuilder disc to lead your system to ready-to-install for the desired operating system.

Express Setup uses the "Configuration Diskette". The Configuration Diskette is a floppy disk that includes the configuration information for the system setup used in the automatic installation mode. Express Setup will perform all the process of the setup using the information in the floppy disk. During this procedure, you do not have to be in front of the BULL NovaScale server to verify the state of the setup. Also, using the same Configuration Diskette used before allows you to re-setup your system with the same condition as before.

Express Setup includes two types of installation method:

#### Quick start

Quick start uses the Configuration Diskette on which the configuration parameters for system setup were pre-loaded before starting the Express Setup. The configuration parameters are loaded by using the Configuration Diskette Creator.

#### Normal start

Normal start is used to create the Configuration Diskette after starting the Express Setup.



■ You can create the Configuration Diskette in advance using the "Configuration Diskette Creator" included in Express-Builder.

■ If you create the Configuration Diskette in advance, you can abbreviate the items that is necessary to input or select during Express Setup. (You can also create or modify the setup information restored in Configuration Diskette during Express Setup.) If you have a computer other than your system that is running with Windows 95/98/Me/XP, Windows NT 3.51 or later, or Windows 2000, Windows Server 2003, we recommend you to edit setup information from the computer in advance using Configuration Diskette Creator.

## Microsoft<sup>®</sup> Windows<sup>®</sup> Vista™

Use the Microsoft Windows Vista disc to reinstall the operating system. Refer to the specific chapter for more information.

#### **Other Operating Systems**

Please contact your service representative for more information on supported operating systems.

### **Microsoft Windows Server 2003**

This subsection provides information on installing Microsoft® Windows® Server 2003 Standard Edition / Enterprise Edition in the server. Read instruction in this section before proceeding with the installation.

Note: If you install Windows Server 2003 without using Express Setup, "Installing Microsoft Windows Server 2003" on page 175.

#### Installation Notice

Read these precautions before installing Windows Server 2003.

#### Supported Operating System on this Model

The server supports the following edition: Microsoft Windows Server 2003 Standard Edition/Enterprise Edition (hereinafter, referred to as "Windows Server 2003")

If you wish to install another operating system, contact your sales dealer or the maintenance service representative.

#### **BIOS Settings**

Before installing Windows Server 2003, check that the BIOS specification of the hardware is correct.

#### NEC ESMPRO Agent

On Windows Server 2003 systems, the NEC ESMPRO Agent needs the necras.sys driver. To install the necras.sys, run the System update from ExpressBuilder disc.

#### Windows Server 2003

Express Setup can install the Windows Server 2003 operating system. However, note the following restrictions:



Before starting the installation, complete all the process of adding the optional device and the setup of the BULL NovaScale server mainframe (BIOS and optional board specification)

Another documentation for the installation of Windows Server 2003 is attached to the other software package sold separately. Refer to this document when installing Windows Server 2003 on this model.

After completing Express Setup, see "Setup for Solving Problems" described later to specify the settings for trouble recovery such as "Specifying Memory Dump".

#### Installing on the Mirrored Volume

If you want to install Windows Server 2003 on the volume that is mirrored using "Disk Management", disable the mirroring before operating the installation to set back to the basic disk, and enable the mirroring again after the installation has completed.

Creating, invalid, delete mirror volume can be operated from "Disk Management" in "Computer Management".

#### **Connecting a Magneto-Optical Device**

Connect the magneto-optical device after the operating system has been successfully installed.

#### **Connecting Medias such as DATs**

Connect any drives that are not mandatory after the operating system has been successfully installed.

#### **Connecting Hard Disk Drive**

Connect the data disk after the operating system has been successfully installed...

If you create multiple logical drives in your system, <u>"Reinstallation to Multiple Logical drives" on page 182</u>.

#### **Creating Partition Size**

The minimum size for the partition where the system is to be installed can be calculated from the following formula.

Size necessary to install the system + Paging File Size + Dump File Size

Size necessary to install the system= 2900 MB

Paging File Size (Recommended)= Mounted Memory Size  $\times$  1.5

Dump file Size= Mounted Memory Size + 12 MB

## **⚠** Caution

- The above paging file size is necessary for collecting debug information (memory dump). If you set the default value of paging file size smaller than the 'recommended' value, the accurate debug information (memory dump) may not be collected.
- The maximum paging file size which can be set on one partition is 4095 MB. If the above paging file size exceeds 4095 MB, specify 4095 MB for the paging file size.

- The maximum dump file size for the system with more than 2 GB memory mounted is '2048 MB + 12 MB'.
- If you install any application program or the like, add necessary space to the partition to install these programs.

For example, if the mounted memory size is 512 MB, the minimally required partition size will be calculated by the above formula as follows:

$$2900 \text{ MB} + (512 \text{ MB} * 1.5) + (512 \text{ MB} + 12 \text{ MB}) = 4192 \text{ MB}$$

#### Re-installing to the hard disk which has been upgraded to Dynamic Disk

You cannot re-install Windows Server 2003 with the current partition of the hard disk upgraded to Dynamic Disk.

If you want to keep the current partition, re-install the system as described in "Installing Microsoft Windows Server 2003" on page 175.

#### About the Maintenance Partition (area displayed as "MAINTE P")

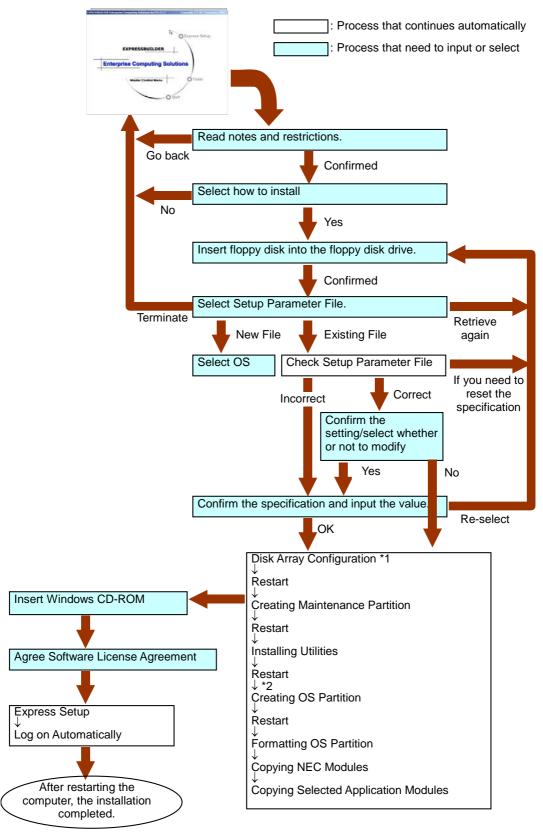
The maintenance partition (used for server maintenance) is reserved in the head of Hard Disk Drive (size of approximately 50MB).

This area is used for saving some maintenance utilities.

Do not delete the maintenance partition.

#### Setup Flow

This section visually describes the flow of the setup operated by Express Setup.



The process is operated only when Disk Array Controller Board is connected and the configuration is specified. If you select [Others], the process is completed here.

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#### **Installing Microsoft Windows Server 2003**

Express Setup proceeds the setup by specifying the necessary information on the wizard. You can also save the setup information created on the wizard in a floppy disk as a setup file.

Note: Prepare a floppy disk to use as Configuration Disk if you want to save the parameters or use the drivers located on the "OEM-Disk for Mass Storage Device" that ships with optional boards. When using the floppy disk, the Express setup can continue the setup without any need for you to specify the parameters.

**1.** Turn the power of peripheral devices on, and then turn on the server.



- If you operate installing Windows Server 2003 with a Magneto-Optical device connected, the installation may not be complete successfully. In such a case, detach the MO device and then re-install the system from the beginning.
- Connect the hard disk drive on which the operating system is not going to be installed (data hard disk drive) after installing the operating system.
- If you create multiple logical drives in your system, refer to <u>"Re-installing the Operation System" on page 182.</u>
- **2.** Insert ExpressBuilder disc into the optical device drive.
- **3.** Ensure that the floppy disk drive is empty.
- **4.** Press the RESET switch or press **Ctrl**, **Alt**, and **Delete** to reboot from ExpressBuilder. (You may also turn off and then on again to reboot the server.) The system boots from the disc and ExpressBuilder starts.
- 5. Click [Express Setup]. When asked if you intend to use a Configuration Diskette or parameters file, choose either Yes or No.
- **6.** Read the on-screen message carefully and click [OK].

Note: If an operating system is already installed on the hard disk, you will be prompted to confirm that you want to proceed with the installation.

7. The message "Insert Configuration Diskette" appears. If applicable, insert "Configuration Diskette" into floppy disk drive and click [OK].

Note: If you do not have "Configuration Diskette", insert a blank floppy disk formatted by 1.44 MB into the floppy disk drive and click [OK].

#### [Using the specified Configuration Diskette]

The Setup File included in "Configuration Diskette" is displayed.

**a.** Select the Setup File name to use during the installation.

Note: If there is any problem that can not be modified in the Setup File you selected, the message to set another "Configuration Diskette" appears. In such case, verify the floppy disk you inserted.

After the Setup File is specified, the message "Are you sure you want to modify the information?" is displayed.

- **b.** If you want to edit the information file, click [Modify]. If you do not want to edit the information file and continue the installation, click [Skip].
  - Click [Modify]. Go to step 8.
  - Click [Skip]. Go to step 9.

#### [Using Blank disk]

- **a.** Click the box under [Setup File Name: (A)] or press **A**. The input box appears.
- **b.** Input a file name. and click [Use]
- **c.** [Operating System to Install] appears. The OS supported by the computer is displayed in the list.
- **d.** Select [Windows Server 2003] you want to install from the list box.
- **8.** Verify the contents specified during OS installation.

If Disk Array Controller Board is connected to the server mainframe, the [Configure RAID] screen appears. Verify the specification, modify if necessary, and then click [Next].

Next, [Basic Information] screen appears. Verify the specification, modify if necessary, and then click [Next]. ("Supported Computer" shown in the screen differs according to the model.)

After that, click [Next], [Back], or [Help] on the screen to continue. Modify the specification each time if necessary.

## **⚠** Caution

Reserve the partition to install the OS more than the minimally required size.

If you select "Use Existing Array" at "New/Existing RAID Configuration", the information included in the first partition (excluding maintenance partition) will all be formatted and deleted. The information included in the other partition will be retained. The figure below describes the partition which information will be deleted when maintenance partition exists.

First Partition	Second	Third	Fourth
<maintenance partition=""></maintenance>	Partition	Partition	Partition
Retained	Deleted	Retained	Retained

- You can not re-install the system with the existing partition that is upgraded to Dynamic Disk remained. Do not select "Use Existing Array" at "New/Existing RAID Configuration".
- If you specify other than 4095 MB for the "Installing Partition", it is necessary to convert to NTFS.
- If "Use Existing Array" at "New/Existing RAID Configuration" is selected but the partition other than the one to install Windows Server 2003 does not exist (excluding maintenance partition), Express Setup will reserve the maximum area of the hard disk to install Windows Server 2003.
- You cannot go to the next screen if the specification is incorrect.

#### Notes:

- If you click [Cancel] in [Basic Information] screen, the screen will go back to select the Setup File. [Cancel] exists only in [Basic Information] screen.
- If you click [OK] in [Role of Computer] screen, the setup automatically selects default value for the later specification to continue the installation.

Once all the specifications are reviewed, the system reboots.

- **9.** Copy the modules for the optional mass storage driver.

  If you want to install the optional mass storage driver, insert the floppy disk corresponding to the mass storage driver into floppy disk drive and follow the message to operate the installation.
- **10.** Follow the message and take the ExpressBuilder disc and Configuration Diskette out of the optical device drive, and insert Windows Server 2003 disc

into the optical device drive.

[Software License Agreement] screen appears.

11. Read the contents carefully and click [I agree.] or press **F8** if you do agree. If you do not agree, click [I disagree] or press **F3**.

## **⚠** Caution

- If you do not agree to this agreement, the setup terminates and Windows Server 2003 will not be installed.
- If "NetWare Gateway (and Client) Service" is specified to install, the window to specify the details of "NetWare Gateway (and Client) Service" pops up on the first logon. Specify the appropriate value.

The Setup using Express Setup has completed.

#### Installing and Setting Device Drivers

Follow these steps to install and configure the device drivers.

#### **PROSet**

PROSet is a utility that verifies the function of network contained in network driver.

Using PROSet enables the following items:

- Verify detailed information of the adapter.
- Diagnose loop back test, packet transmission test and so on.
- Setup of teaming.

Configuring several network adapters as one team provides the server a tolerant environment on any trouble and enhance throughput between the switches.

PROSet is necessary to utilize these features.

#### To install PROSet:

- 1. Insert the ExpressBuilder disc into the optical device drive.
- 2. The [Windows Explorer] dialog starts.
  - \* Procedure with the standard start menu

Click Start menu and click [Windows Explorer].

\* Procedure with the classic start menu

Click Start menu, point to [Programs], [Accessories] and click [Windows Explorer].

**3.** Run "PROSet.exe" in the following directory.

DriveLetter:\WINNT\DOTNET\BC5\PROSet\WS03XP32

The [Intel(R) PROSet - InstallShield Wizard] dialog starts.

- 4. Click [Next].
- **5.** Choose "I accept the terms in the license agreement" and click [Next].
- **6.** Choose "Typical" and click [Next].
- 7. Click [Install].
- **8.** When [InstallShield Wizard Completed] window is displayed, click [Finish].
- **9.** Restart the system.

#### Network Driver

Specify the details of network driver.

One standard network driver that is mounted will be installed automatically, but the link speed and duplex mode need to be specified manually.

#### [When PROSet is not installed]

- 1. The [Local Area Connection Properties] dialog box is displayed.
  - \* Procedure with the standard start menu
    - **a.** Click Start menu, Click [Control Panel], Click [Network Connections], and Click [Local Area Connection].
  - \* Procedure with the classic start menu
    - **a.** Click Start menu, Click [Settings] and Click [Network Connections]. The [Network Connections] dialog box is displayed.
    - **b.** Right-click [Local Area Connection] and click [Properties] from popup menu.
- **2.** Click [Configure].
  - The property dialog box for network adapter is displayed.
- **3.** Click the [Advanced] and specify the [Link Speed & Duplex] value the same as the value specified for HUB.
- **4.** Click [OK] on the property dialog box for network adapter.

#### [When PROSet is installed]

- **1.** The [Intel PROSet] dialog box appears.
  - \* Procedure with the standard start menu
    - Click Start menu, point to [Control Panel] and click [Intel PROSet].
  - \* Procedure with the classic start menu
    - **a.** Click Start menu, point to [Settings] and click [Control Panel].
    - **b.** Double-click [Intel(R) PROSet] on the [Control Panel] window.
- 2. Click [(Network Adapter Name)] in the list.
- **3.** Click the [Speed] and specify the [Link Speed & Duplex Settings] value the same as the value specified for HUB.
- **4.** Click [Apply] and click [OK].

Also, add or delete any protocols and services if necessary.

You can process in the property dialog box for local area network which can be displayed from [Network and Dial-up Connection].

Note: We recommend you to add [Network Monitor] at [AddingServices]. [Network Monitor] can monitor the frame (or the packet)that the computer installing [Network Monitor] sends or receives. This tool is valuable when analyzing network trouble. For information on how to install the tool, see the "Setting for Solving Problems" described later in this chapter.

#### Optional Network Board Driver

If you want to use an optional Network Board (Gigabit adapter), the network driver will be installed automatically. Therefore, the driver attached to the Network board should not be used.

If you want to use an optional Network Board, install the driver stored in ExpressBuilder disc.

In case of using a 100 MB adapter

"Drive Letter:\WINNT\DOTNET\BC5\PRO100\WS03XP32"

If the installation procedure is not clear, refer to the installation procedure described in the section "Installation of the Optional Network Board Driver".

#### **Installing the Optional Network Board Driver**

- 1. Start Device Manager.
- **2.** Click [Network adapters] and Double-Click [(Network Adapter Name)]. [(Network Adapter Name) Properties] is displayed.

Note: [(Intel(R) PRO/1000...)] is the name of On-Board adapter. All other names show the Optional Network Board.

- **3.** Click the [Driver] tab and click [Update Driver...]. [Hardware Update Wizard] is displayed.
- **4.** Select the [Install from a list or specific location(Advanced)] radio button and click [Next].
- **5.** Select the [Search for the best driver in these locations] radio button and check off the [Search removable media (floppy, CD-ROM...)] check box.

**6.** Check the [Include this location in the search] check box and when using a 100 MB adapter, specify

[Driveletter:\WINNT\DOTNET\BC5\PRO1000\WS03XP32]

- 7. Click [Next].
- **8.** Click [Finish].

#### Adapter Fault Tolerance (AFT)/Adaptive Load Balancing (ALB)

Adapter Fault Tolerance (AFT) is a feature that creates a group containing more than one adapter and converts the process of the working adapter to the other adapter in the group when any trouble occurred on that adapter.

Adaptive Load Balancing (ALB) is a feature that creates a group containing more than one adapter and enhance the through put by operating packet transmission from the server by all the adapters.

This feature includes AFT feature.

## **⚠** Caution

- AFT/ALB setup must be operated after installing the drivers and restarting the system.
- All the adapters specified as a group of Adapter Teaming must exist on the same LAN. If they are connected to the separate switches, they will not work normally.

#### If you want to use AFT/ALB feature:

- **1.** Double-click [Intel(R) PROSet Wired] on the [Control Panel] dialog box. The [Intel(R) PROSet for Wired Connections] dialog box appears.
- **2.** Put the mouse cursor on "Intel(R) PRO/1000 MT Dual Port Network Connection" in the list and right-click. Pull-down menu appears.
- **3.** Select [Add to Team>] and then click [Create New Team...]. The [Teaming Wizard] dialog box appears.
- **4.** Select "Adapter Fault Tolerance" or "Adaptive Load Balancing" and click [Next].
- **5.** Check the adapter to join the team and click [Next].
- **6.** Click [Finish].
- 7. The setup will go back to [Intel(R) PROSet for Wired Connections] dialog box, so click [OK].
- **8.** Restart the system.

#### Installing SCSI Controller Driver

To install SCSI controller driver low profile (ini-A101U2W):

1. Click on [Start] menu and [Control Panel] and [Administrative Tools] and [Computer Management].

- 2. Start [Device Manager].
- **3.** Double click the SCSI Controller driver which Device Manager lists as unknown device.
- **4.** Click [Update Driver].
- **5.** When the "Update Device Driver Wizard" appears, select "Install from a list or specific location [Advanced]" and click [Next].
- **6.** Select "Don't search. I will choose the driver to install" and click [Next].
- 7. Click [Have Disk..].
- **8.** Insert "Windows Server 2003 OEM-DISK for ExpressBuilder" into the floppy disk drive, enter "a:\" into "copy manufacturer's file from:" and click [OK].
- **9.** Specify the following driver and click [Next]: The installation of the driver is completed.
- **10.** Restart the system according to the message on the screen.

#### Installing RAID Controller Driver

To additionally install the SecuRAID 114 or SecuRAID 321 in a system containing Windows 2003, connect the controller and take the following steps to install the driver:

- 1. When the [Found New Hardware Wizard] dialog box appears, click [Next].
- **2.** When the [Install Hardware Device Drivers] dialog box appears, select [Search for a suitable driver for my device (Recommended)], and click [Next].
- **3.** When the [Locate Driver Files] dialog box appears, select [Floppy disk drives], insert "Windows Server 2003 OEM-DISK for ExpressBuilder" into the floppy disk drive, and click [Next].
- **4.** When the [Driver Files Search Results] dialog box appears, click [Next].

Copying of the driver is completed, and the [Completion of the new hardware detection wizard] dialog box below appears. Click [Complete].

#### Graphics Accelerator Driver

Update Graphics Accelerator Driver mounted in standard.

- 1. Insert the ExpressBuilder disc into the optical disc drive.
- **2.** Click Start menu, point to [Programs], [Accessories] and click [Windows Explorer]
- **3.** Run "SETUP.EXE" in the following directory. <Drive Letter>:\N8115-02\VIDEO\RADEON7000\W2K3\SETUP.EXE
  - \*Install the graphics accelerator driver in the following directory if you communicate your server with the remote KVM console. (Optional advanced remote management card must be installed in your server to use the remote KVM console.)

<Drive Letter>:\N8115-02\VIDEO\RADEON7000\SETUP.EXE

**4.** Follow the message to continue the installation.

Remove the ExpressBuilder disc from the optical disc drive, follow the onscreen directions and restart the system.

Available switch options for Windows Server 2003 Boot.ini file.

Many different switches will be available if you edit Boot.ini file. For the available switch options, refer to the following information:

■ Microsoft Knowledge Base - Article ID: 833721

"Available switch options for the Windows XP and the Windows Server 2003 Boot.ini files"

If your system has a memory capacity in excess of 4GB in its installing, adding /PAE switch in Boot.ini file will enable the system to be installed with over 4GB of memory.

However, the Microsoft operating system products which support /PAE switch option are limited.

Refer to the following article in Microsoft Knowledge Base to check the supported products.

■ Microsoft Knowledge Base - Aritcle ID: 291988

"A description of the 4GB RAM tuning feature and the Physical Address Extension switch"

Below is the example on how to add /PAE switch to Boot.ini file.

- 1. Click [Start], point to [Settings], and then click [Control Panel].
- **2.** In [Control Panel], double-click [System].
- **3.** Click the [Advanced] tab, and then click [Settings] under [Setup and Recovery].
- **4.** Under [System Setup], click [Edit] to open [Boot.ini].
- **5.** Add "/PAE" to [Operating Systems] section in [Boot.ini] file, and then save it. <Example of Boot.ini file>

[boot loader]

timeout=30

default=multi(0)disk(0)rdisk(0)partition(2)\WINDOWS

[operating systems]

multi(0)disk(0)rdisk(0)partition(2)\WINDOWS="Windows Server 2003, Standard" /fastdetect

multi(0)disk(0)rdisk(0)partition(2)\WINDOWS="Windows Server 2003, Standard, PAE" /fastdetect /PAE

C:\CMDCONS\BOOTSECT.DAT="Microsoft Windows Recovery Console" / cmdcons

This is the end of editing Boot.ini file.

■ **Note**: If you choose one of the items in the "Default operating system" drop-down list box in [Setup and Recovery] group box, you can make your system start automatically from the switch you specified.

#### **Setting for Solving Problems**

Setup the following issue in advance so that your computer can recover from any trouble precisely and as soon as possible when it should occur.

#### Memory Dump (Debug Information)

This section describes the procedures for collecting memory dump (debug information) in the server.

## **⚠** Caution

- The staff of maintenance service representative is in charge of collecting memory dump. Customers need only to specify the memory dump.
- If any trouble occur after specifying the process below, the message to inform that the system is in short of virtual memory may appear, but continue to start the system. If you restart the system in such case, memory dump may not be stored correctly.

Follow the procedure below to specify.:

- 1. Select [Control Panel] and click [System]. The [System Properties] dialog box is displayed.
- **2.** Select [Advanced] tab.
- **3.** Click [Settings] on the [Startup and Recovery] group box.

## **⚠** Caution

- To specify "Complete Memory Dump" to write the debug information is recommended.

  If the installed memory size is larger than 2 GB "Complete
  - If the installed memory size is larger than 2 GB, "Complete Memory Dump" cannot be specified, then specify "Kernel Memory Dump" instead.
- Specify the drive where there is a free area more than the size of "the memory capacity installed on the server + 12 MB".

- In case the installed memory size exceeds 2 GB due to the added memory, change the write debugging information to [Kernel Memory Dump] before adding memory. The size of debugging information (memory dump) to be taken also changes due to adding memory. Verify the size of the empty space in the debugging information (memory dump) write destination drive.
- **4.** Specify "Complete memory dump" and modify [Dump file:] in the [Write debugging information] group box.

e.g.Write the debug information in D drive in the file named MEMORY.DMP.

#### D:\MEMORY.DMP

- **5.** Click [Settings] on the [Performance] group box.
  - The [Performance Options] window is displayed.
- **6.** Click [Advanced] tab on the [Performance Options] window.
- 7. Click [Change] on the [Virtual memory] group box.
- **8.** Modify [Initial Size] in the [Paging file size for selected drive] box to the value larger than [Recommended], and click [Set].

## **⚠** Caution

- Be sure to create memory dump with the size described above on the OS partition. If [Default Size] of the paging file is specified to the value smaller than "Recommended" value, the correct debug information (memory dump) may not be collected.
- For more information on "Recommended" value, see "Partition Size to be Created" described earlier.
- To prepare for the situation when any trouble occurred, we recommend you to press dump switch to verify that the dump will be collected normally in advance.
- In case the memory is expanded, re-specify the paging file to suit the new memory size.
- 9. Click [OK].

The message to restart the system may appear according to the modified specification. In such case, follow the message to restart the system.

#### Windows Dr. Watson

Windows Dr. Watson is a debugger for application errors. If any application error is detected, Dr. Watson diagnoses the server and logs diagnostic information (log).

Follow the procedure below and specify Dr. Watson to collect diagnostic information.:

1. Click [Run] on Start menu.

**2.** Type "drwtsn32.exe" in the [Open] box, and click [OK]. The [Dr. Watson for Windows] dialog box appears.

**3.** Specify the location to store the diagnostic information in the [Log File Path] box.

The diagnostic information will be stored with the file name "DRWTSN32.LOG".

**Note**: You cannot specify network pass. Specify the pass on local computer.

**4.** Specify the location of crash dump file in the [Crash Dump] box.

**Note**: "Crash Dump File" is a binary file that can be read with Windows Debugger.

- **5.** Check the following check box on the [Option] box.
  - ☐ Dump Symbol Table
  - ☐ Dump All Thread Contexts
  - ☐ Add To Existing Log File
  - ☐ Create Crash Dump File

For more information on each function above, refer to Online Help.

6. Click [OK].

#### Network Monitor

Using Network Monitor helps you to investigate and manage with network trouble. To use Network Monitor, you need to restart the system after the installation has completed, so we recommend to install Network Monitor before any network trouble may occur.

- 1. Point to [Settings] from Start menu and click [Control Panel]. The [Control Panel] dialog box is displayed.
- **2.** Double-click [Add/Remove Programs].

The [Add/Remove Programs] dialog box is displayed.

**3.** Click [Add/Remove Windows Component].

The [Windows Components Wizard] dialog box is displayed.

**4.** Check the [Management and Monitoring Tools] check box of the component ON and click [Next].

- **5.** If the setup asks to install the disk, insert Windows Server 2003 disc into the optical device drive and click [OK].
- **6.** Click [Complete] in the [Windows Component Wizard] dialog box.
- 7. Click [Close] in the [Add/Remove Application] dialog box.
- **8.** Close the [Control Panel] dialog box.

To start Network Monitor, point to [Program]  $\rightarrow$  [Administrative Tools] and click [Network Monitor].

For information on how to operate Network Monitor, refer to Online Help.

#### Installing Maintenance Utilities

Various maintenance utilities are contained in your ExpressBuilder disc.

#### **Updating the System**

Update the system in the situation below:

- Modified system configuration.
- Recovered the system using recovery process.

Log on to the system with the account that has administrative authority (e.g. Administrator) and insert the ExpressBuilder disc into the optical device drive.

[Setup Software] in [Master Control Menu] screen is displayed, right-click the item. Click [Update the System] from the menu and the setup will start. Follow the onscreen instructions.

## Making Backup Copies of System Information

The system information includes the current BIOS settings and any specific information for the server.

Save the information after completing the system setup.

Without the backup data, you will not be able to recover the information.

You can save the information by the following process.

- 1. Set the ExpressBuilder disc in the optical device drive and reboot the system.
- **2.** Select [Tools].
- **3.** Select [Off-line Maintenance Utility].
- **4.** Select [System Information Management].
- **5.** Insert a diskette in the floppy disk drive.
- **6.** Select [Save].

#### **Exceptional Setup**

This section explains how to setup the server by the exceptional way. You usually do not have to do as follows. If you want to install other boards by using a driver floppy disk, set the server as follows. Detailed information is provided in the manual of the mass storage device.

#### Installation of mass storage device not supported by Express Setup

If you would like to install the OS when the system has new mass storage device not supported by ExpressBuilder, you have to setup as follows.

- **1.** Read the manual supplied with the mass storage device before setting the server.
- **2.** If the mass storage device is disk array controller, configure the RAID system before running the ExpressBuilder.
- **3.** Boot the system from ExpressBuilder disc.

4.

- (a) When the message "Do you want to use the parameters file..." appears, select "Yes".
- (b) When the dialog of Disk array configuration appears, check "Use Existing Array"
- (c) Check "Apply OEM-FD for Mass storage device"
- **5.** Copy the driver for the mass storage device in the Express Setup.
- **6.** Insert the FD attached the mass storage device into the FD drive.
- 7. Follow the on-screen instructions to continue the Express Setup.

# Installing Microsoft Windows Server 2003

This section describes the procedures for installing Windows Server 2003 without using Express Setup tool.

## **Before Installing Windows Server 2003**

Please read carefully the following information BEFORE beginning your Windows Server 2003 Installation.

#### Installing Service Pack

You can install the Service Pack on the system. When the Service Pack is not delivered with your system, prepare it by yourself.

#### **Updating System**

If you change the configuration of the system, update your system with the ExpressBuilder disc delivered with your system.

## Re-installing to the Hard Disk which has been upgraded to Dynamic Disk

If you want to leave the existing partition when installing the system on the hard disk upgraded to Dynamic Disk, note the following issue:

- Do not select the partition where the operating system had been installed as the partition to install the operating system newly.
- Select "Use the current File System" for the format of operating system partition.

### Manual Installation when the Disk Array Controllers are Connected

If you keep the disk array controllers connected during installation process, po-up messages may appear. This does not affect on system behavior. Click [YES] and continue the isntallation.

## Magneto-Optical device

If you specify the file system as NTFS with a MO Device connected during the installation, the file system will not be converted normally. Disconnect the MO device and restart the installation from the beginning.

#### **Partition Size**

The minimum required partition size for installation of Windows Server 2003 is:

- 2900 MB + Paging file size + Dump file size
- Paging file size (recommended) = installed memory \* 1.5
- Dump file size = Installed memory size + 12 MB

## **A** Caution

- The above paging file size is necessary for collecting debug information (memory dump). If you set the default value of paging file size smaller than the 'recommended' value, the accurate debug information (memory dump) may not be collected.
- The maximum paging file size which can be set on one partition is 4095 MB. If the above paging file size exceeds 4095 MB, specify 4095 MB for the paging file size.
- The dump file size for a system with more than 2 GB memory installed is '2048 MB + 12 MB'.

For example, if installed memory size is 512 MB, the minimum required partition size is:

2900 MB + (512 MB \* 1.5) + (512 MB + 12 MB) = 4192 MB.

Dividing into the partition of the recommended size into multiple disks as written below will solve problem that it cannot be reserved in one disk.

- 1. Set the "Size required for installation + Paging file size".
- **2.** See Appendix F and set that debugging information (equivalent to the dump file size) is to be written to a separate disk.

(If the disk does not have enough free space to enable the file size to be written, then after installing the system using the "Size required for installation + Paging file size," install an additional new disk.)

## Installing Microsoft Windows Server 2003

You will need the following for Windows Server 2003 installation:

- ExpressBuilder disc
- Microsoft Windows Server 2003 Standard Edition (disc)
- User's Guide
- Getting Started
- Windows Server 2003 OEM-DISK for ExpressBuilder

Before installing, create Windows Server 2003 OEM-DISK for ExpressBuilder.

#### Creating "Windows 2003 OEM-DISK for ExpressBuilder"

You can create Windows 2003 OEM-DISK for ExpressBuilder with the following two procedures:

## Creating from the menu which appears when running this Server with ExpressBuilder

Use this procedure if you have only this Server to create Windows 2003 OEM-DISK for ExpressBuilder.

- If you have only this Server to create Windows Server 2003 OEM-DISK for ExpressBuilder, use this procedure.
  - **1.** Prepare a 3.5-inch floppy disks.
  - **2.** Turn on your Server.
  - **3.** Insert the ExpressBuilder disc in the optical device drive.
  - **4.** Press the **RESET** switch or press **Ctrl** + **Alt** + **Delete** to reboot the server.(You may also turn off and then on again to reboot the server.)

    The system will boot from the disc and ExpressBuilder starts.
  - **5.** Select [Create Support Disk] from [Tools].
  - **6.** Select [Windows Server 2003 OEM-DISK for ExpressBuilder] from [Create Support Disk] menu.
  - 7. Insert a diskette in the floppy disk drive according to the on-screen instruction. Windows Server 2003 OEM-DISK for ExpressBuilderwill be created.
  - **8.** Write-protect and label the diskette, then keep it in a safe place.

#### Creating Windows 2003 OEM-DISK from [Master Control Menu]

Use this procedure if Windows Server 2003 or Windows 2000 can be operated on this Server.

[Master Control Menu] runs on the following operating systems.

- Windows Server 2003
- Windows 2000
- Windows Me/98/95
- Windows NT 4.0
- Windows XP

You can create Windows Server 2003 OEM-DISK for ExpressBuilder from [Master Control Menu], if you have the computer on which one of the above operating system operates.

Follow the steps below:

- **1.** Prepare a 3.5-inch floppy disks.
- **2.** Run the operating system.
- **3.** Insert the ExpressBuilder disc in the optical device drive. [Master Control Menu] is displayed.
- **4.** Click [Setup] with left mouse button and click [Make OEM-DISK] and then [for Windows Server 2003].

**Note**: You can do the same operation using the menu displayed by a right-click.

- **5.** Insert the floppy disk into the floppy disk drive according to the message. Windows Server 2003 OEM-DISK for ExpressBuilder will be created.
- **6.** Write-protect and label the diskette, then keep it safely.

#### Windows Server 2003 Clean Installation

This section explains how to perform a clean installation of Windows Server 2003.

- **1.** Turn the system on.
- 2. Insert the Windows Server 2003 disc in the optical device drive.
- 3. Press Ctrl + Alt + Delete to reset the system.

After a bootable operating system has been installed on the hard disk, press **Enter** while the message "Press any key to boot from CD..." is displayed at the top of the screen.

If no bootable operating system exists on the hard disk, this step is unnecessary. The Windows Server 2003 setup screen will be displayed.

If the screen is not displayed, **Enter** was not pressed properly.

Retry after turning the system off then on again.

- **4.** If the RAID controller (including embedded HostRAID feature) or SCSI controller is installed, press **F6** in a few seconds when the window is in one of the following states:
  - "Setup is inspecting your computer's hardware configuration..." is displayed.
  - A screen with a solid blue background is displayed.

Note: There is no visible indication on screen when F6 has been pressed.

**5.** When the following message is displayed, press **S**.

Setup could not determine the type of one or more mass storage devices installed in your system, or you have chosen to manually specify an adapter.

Currently, Setup will load support for the following mass storage devices.

The following message is displayed.

Please inert the disk labeled
manufacturer-supplied hardware support disk
into Drive A:

\*Press ENTER when ready.

**6.** Insert the Windows Server 2003 OEM-DISK for ExpressBuilder into the floppy drive, and press **Enter**.

SATA Model: A list of mass storage devices is displayed.

SCSI Model: Select the [Adaptec Ultra320 SCSI Cards (WinXP/Server 2003 IA-32)] and press **Enter**.

- 7. Select the proper SCSI Adapter and press **Enter**.
- **8.** Follow the on-screen instructions to complete the installation.
- **9.** After installation is completed, be sure to follow the procedures described in "Driver Installation and Advanced Settings" and "Updating the System" later in this guide.

#### Upgrade installation

Procedures below upgrade the installed Windows 2000 to Windows Server 2003.

- **1.** Power on the system and start Windows 2000.
- 2. Log on as an administrator.
- **3.** Insert the Windows Server 2003 disc into the optical device drive. [Select an operation] dialog box is displayed.

**Note**: If the [Select an operation] dialog box does not appear, start \SETUP.EXE from optical device drive.

- **4.** Select [Install Windows Server 2003]. A dialog box asks to select the upgrade or clear installation.
- **5.** Select "Upgrade (recommended)" and click **Next**.

Follow the messages and continue.

The system will restart after copying the files.

Note: You can leave the Windows Server 2003 disc in the optical device drive.

**6.** If the RAID controller (including embedded HostRAID feature) is installed, press **F6** while the message "Setup is inspecting your computer's hardware configuration..." is displayed.

Note: There is no visible indication on screen when F6 has been pressed.

7. When the following message is displayed, press S.

Setup could not determine the type of one or more mass storage devices installed in your system, or you have chosen to manually specify an adapter. Currently, Setup will load support for the following mass storage devices.

The following message is displayed.

Please insert the disk labeled

manufacturer-supplied hardware support disk

into Drive A:

\*Press ENTER when ready.

**8.** Insert the Windows Server 2003 OEM-DISK for ExpressBuilder in the floppy disk drive, and press **Enter**.

A list of mass storage devices is displayed.

SCSI Model: Select the [Adaptec Ultra320 SCSI Cards (WinXP/Server 2003 IA-32)] and press **Enter**.

- **9.** If the optional board is installed, select the proper SCSI Adapter and press **Enter**.
- **10.** Follow the on-screen instructions.
- 11. Update the system.
- **12.** Install the driver and make detailed settings.

#### ■ SCSI controller

The following message may appear on the display during the upgrade installation to Windows Server 2003. In this case;

Please type D:/i386 and click OK. (D: CD-Drive)

Insert disk

The file 'adpu160m.sys' on Adaptec Windows 2000 Family Manager set V1.12 S2 is needed.

- Type the path where the file is located, and then click OK.
- If PROSET II is already installed, uninstall the PROSET II before upgrading.

If the teaming function is enabled, disable the function before uninstalling PROSET II.

- During upgrade installation, [Disk Insert] dialog box may be displayed. If it is displayed, click **Cancel**.
- When the upgrade installation is completed, [Device Driver Wizard] dialog box may be displayed.

If it is displayed, click **Cancel**, then update the system.

## Reinstallation to Multiple Logical drives

This section describes the procedure for reinstalling the operation system if the multiple logical drives exist.

#### Before Re-installing the Operation System

Be sure to make backup copies before re-installing the operation system just in case.

#### Re-installing the Operation System

- 1. Start the clean installation following the procedure described in this guide.
- **2.** Specify the partition in which you want to install the operating system when the following message appears:

The following list shows the existing partitions and unpartitioned space on this computer.

Use the UP and DOWN ARROW keys to select an item in the list.

- \* Cannot modify the drive letter of your system or boot volume. Confirm the proper drive letter is assigned and then, continue the setup.
- **3.** Continue the clean installation following the procedure described earlier in this chapter.
  - \* The drive letter of the re-installed system may differ from the one of the previous system. If you need to modify the drive letter, follow the procedure "Modifying the Drive Letter".

#### Modifying the Drive Letter

Be careful that the drive letter of the system or boot volume cannot modify with the following procedure.

- 1. Click Start menu, right-click [My Computer], and specify [Manage] to start [Computer Management].
- **2.** Specify the [Disk Management] in the left side of the window.
- **3.** Right-click the volume you want to modify the drive letter and specify the [Change Drive Letter and Path...].
- 4. Click [Yes].
- **5.** Choose the [Assign a drive letter] and specify the drive letter you want to assign.
- **6.** Click [OK].
- 7. If the following message appears, click [Yes]:

Changing the drive letter of a volume may cause programs to no longer run.

Are you sure you want to change this drive letter?

**8.** Close the [Computer Management].

## **Updating the System**

To ensure normal system operation you should update your system using the following procedures.

- 1. Logon to the system using the administrator account or other account which is a member of the Administrators group.
- **2.** Insert the ExpressBuilder disc into the optical device drive. [Master Control Menu] is displayed on the screen.
- 3. Click [Setup] with left mouse button and click U [Update system] section.
- **4.** Follow the on-screen instructions to continue system update.
- **5.** Click [Restart Computer] to restart the system.
- **6.** Remove the ExpressBuilder disc from the optical device drive immediately after clicking [Restart Computer].

## **A** Caution

If you change the configuration of the system (by adding or removing hardware or Operating system software components) or repair the system, you must run the system update again.

## **Driver Installation and Device Settings**

This section describes how to install and setup various standard drivers mounted on the device.

For information on installing and setting up a driver that is not described in this section, please refer to the document delivered with the driver.

#### **PROSet**

PROSet is a utility that checks the function of network contained in network driver.

Using PROSet enables the following items:

- Verify detailed information of the adapter.
- Diagnose loop back test, packet transmission test and so on.
- Setup of teaming.

Configuring several network adapters as one team provides the server a tolerant environment on any trouble and enhance throughput between the switches.

PROSet is necessary to use these features.

#### To install PROSet:

- 1. Insert the ExpressBuilder disc into the optical device drive.
- **2.** The [Windows Explorer] dialog starts.
  - **a.** In the case of the standard start menu, click Start menu and click [Windows Explorer].
  - **b.** In the case of the classic start menu, click Start menu, point to [Programs], [Accessories] and click [Windows Explorer].
- **3.** Run "PROSet.exe" in the following directory:
  - <Optical Disc DriveLetter>:\WINNT\DOTNET\BC1\PROSet\WS03XP32
    The [Intel(R) PROSet InstallShield Wizard] dialog starts.
- **4.** Click [Next].
- **5.** Choose "I accept the terms in the license agreement" and click [Next].
- **6.** Choose "Typical" and click [Next].
- 7. Click [Install].
- **8.** When [InstallShield Wizard Completed] window is displayed, click [Finish].
- **9.** Restart the system.

#### **Network Driver**

Specify the details of network driver.

One standard network driver that is mounted will be installed automatically, but the link speed and duplex mode need to be specified manually.

#### [When PROSet is not installed]

1. The [Local Area Connection Properties] dialog box is displayed.

■ Procedure with the standard start menu: click Start menu, [Control Panel], [Network Connections], and [Local Area Connection].

- Procedure with the classic start menu:
  - **a.** Click Start menu, Click [Settings] and Click [Network Connections]. The [Network Connections] dialog box is displayed.
  - **b.** Right-click [Local Area Connection] and click [Properties] from popup menu.
- **2.** Click [Configure]. The property dialog box for network adapter is displayed.
- **3.** Click [Advanced] and specify the [Link Speed & Duplex] value the same as the value specified for HUB.
- 4. Click [OK] on the property dialog box for network adapter.

#### [When PROSet is installed]

- **1.** The [Intel PROSet] dialog box is displayed.
  - Procedure with the standard start menu: click Start menu, point to [Control Panel] and click [Intel PROSet].
  - Procedure with the classic start menu:
    - **a.** Click Start menu, point to [Settings] and click [Control Panel].
    - **b.** Double-click [Intel(R) PROSet] on the [Control Panel] window.
- 2. Click [(Network Adapter Name)] in the list.
- **3.** Click [Speed] and specify the [Link Speed & Duplex Settings] value the same as the value specified for HUB.
- **4.** Click [Apply] and click [OK].

Also, add or delete any protocols and services if necessary.

You can operate the process on the property dialog box for local area network which can be displayed from [Network and Dial-up Connection].

Note: We recommend you to add [Network Monitor] at [AddingServices]. [Network Monitor] can monitor the frame (or the packet) that the computer installing [Network Monitor] sends or receives. This tool is valuable when analyzing network trouble. For information on how to install the tool, see the "Setup for TroubleProcess" later in this document.

#### Re-install the Network Driver

The network driver will be installed automatically.

## **Graphics Accelerator Driver**

Update Graphics Accelerator Driver Mounted in Standard.

- 1. Insert the ExpressBuilder disc into the optical disc drive.
- **2.** Click Start menu, point to [Programs], [Accessories] and click [Windows Explorer]
- **3.** Run "SETUP.EXE" in the following directory.

<Optical disc drive Letter>:\WINNT\VIDEO\RADEON7000\W2K3\SETUP.EXE

\*Install the graphics accelerator driver in the following directory if you communicate your server with the remote KVM console. (Optional advanced remote management card must be installed in your server to use the remote KVM console.)

<Optical disc Drive Letter>:\N8115-02\VIDEO\RADEON7000\SETUP.EXE

- **4.** Follow the message to continue the installation.
- **5.** Remove the ExpressBuilder disc from the optical disc drive, follow the direction on the screen and restart the system.

## Installing SCSI Controller Driver

If you use SCSI controller driver, install it according to the following procedure:

- **1.** Start [Device Manager] from [Start] menu  $\rightarrow$  [Control Panel]  $\rightarrow$  [Administrative Tools]  $\rightarrow$  [Computer Management].
- **2.** Double-click the SCSI Controller driver which Device Manager lists as unknown device.
- **3.** Click [Update Driver].
- **4.** When the "Update Device Driver Wizard" appears, select "Install from a list or specific location [Advanced]" and click [Next].
- **5.** Select "Don't search. I will choose the driver to install" and click [Next].
- **6.** Click [Have Disk..].
- 7. Insert "Windows Server 2003 OEM-DISK for ExpressBuilder" into the floppy disk drive, enter "a:\" into "copy manufacturer's file from:" and click [OK].
- **8.** Specify the relevant driver and click [Next].

The installation of the driver is completed.

Restart the system according to the message appeared on the screen.

## Installing RAID Controller Driver

To additionally install a RAID controller in a system containing Windows 2003, connect the controller and take the following steps to install the driver:

1. When the [Found New Hardware Wizard] dialog box appears, click [Next].

**2.** When the [Install Hardware Device Drivers] dialog box appears, select [Search for a suitable driver for my device (Recommended)], and click [Next].

- **3.** When the [Locate Driver Files] dialog box appears, select [Floppy disk drives], insert "Windows Server 2003 OEM-DISK for ExpressBuilder" into the floppy disk drive, and click [Next].
- **4.** When the [Driver Files Search Results] dialog box appears, click [Next].
- **5.** Copying of the driver is completed, and the [Completion of the new hardware detection wizard] dialog box below appears. Click [Complete].

## Available Switch Options for Windows Server 2003 Boot.ini File

Many different switches will be available if you edit Boot.ini file.

For the available switch options, refer to the following information:

■ Microsoft Knowledge Base - Article ID: 833721

"Available switch options for the Windows XP and the Windows Server 2003 Boot.ini files"

If your system has a memory capacity in excess of 4GB in its installing, adding /PAE switch in Boot.ini file will enable the system to be installed with over 4GB of memory.

However, the Microsoft operating system products which support /PAE switch option are limited.

Refer to the following article in Microsoft Knowledge Base to check the supported products.

■ Microsoft Knowledge Base - Aritcle ID: 291988

"A description of the 4GB RAM tuning feature and the Physical Address Extension switch"

Below is the example on how to add /PAE switch to Boot.ini file.

- 1. Click [Start], point to [Settings], and then click [Control Panel].
- **2.** In [Control Panel], double-click [System].
- **3.** Click the [Advanced] tab, and then click [Settings] under [Setup and Recovery].
- **4.** Under [System Setup], click [Edit] to open [Boot.ini].
- **5.** Add "/PAE" to [Operating Systems] section in [Boot.ini] file, and then save it.

<Example of Boot.ini file>

[boot loader]

timeout=30

default=multi(0)disk(0)rdisk(0)partition(2)\WINDOWS

[operating systems]

multi(0)disk(0)rdisk(0)partition(2)\WINDOWS="Windows Server 2003, Standard" /fastdetect

multi(0)disk(0)rdisk(0)partition(2)\WINDOWS="Windows Server 2003, Standard, PAE" /fastdetect /PAE

C:\CMDCONS\BOOTSECT.DAT="Microsoft Windows Recovery Console" / cmdcons

This is the end of editing Boot.ini file.

Note: If you choose one of the items in the "Default operating system" drop-down list box in [Setup and Recovery] group box, you can make your system start automatically from the switch you specified.

# **Setting for Collecting Memory Dump (Debug Information)**

Set for collecting memory dump.

# System Security

To help prevent unauthorized entry or use of the system, the system may include several security features, both hardware and software.

## **Security with Mechanical Locks and Monitoring**

### Front Bezel Lock

Lock the front bezel (optional) to prevent unauthorized access to the inside of the chassis.



Figure 101: Front Door Lock (A)

Note: the keys can be found on the front panel.

## Software Locks via the BIOS Setup Utility

The BIOS Setup Utility provides security features to prevent unauthorized or accidental access to the system. Once the security measures are enabled, you can access the system only after you enter the correct password(s). For example:

- Set and enable a supervisor password.
- Set and enable a user password.

## **Using Passwords**

You can set either the user password, the supervisor password, or both passwords. If only the user password is set, you:

- Must enter the user password to enter BIOS Setup.
- Must enter the user password to boot the system if Password on Boot is enabled in the BIOS Setup.

## Maintenance

This chapter describes the daily maintenance of the system and precautions when relocating or storing the system.

## **Making Backup Copies**

We recommend you make backup copies of your valuable data stored in hard disks of the system on a regular basis. For backup storage devices suitable for the system and backup tools, consult with your sales agent.

Also make a backup copy of the disk array configuration data if your system is in the array configuration. When your hard disks have been auto-rebuilt due to a failure, it is recommended to make a backup copy of the configuration data. To make a backup copy of the configuration data, use the configuration utility that is resident in the FLASH memory on the optional disk array controller board. Refer to the manual supplied with the board.

## **Cleaning**

Clean the system on a regular basis to keep the system in a good shape.

## **A** Warning

- Do not disassemble, repair, or alter the system.
- Do not look into the optical device drive.
- Do not remove the lithium battery.
- Disconnect the power plug before working with the system.

## **⚠** Caution

- Avoid installation in extreme temperature conditions.
- Make sure to complete board installation.

## Cleaning the External Surfaces of the system

## **⚠** Caution

- To avoid altering the material and color of the system, do not use volatile solvents such as thinner and benzene to clean the system.
- The power receptacle, the cables, the connectors on the rear panel of system, and the inside of the system must be kept dry. Do not moisten them with water.

For daily cleaning, wipe the external surfaces of the system with a dry soft cloth If stains remain on the surfaces:

1. Make sure that the system is off-powered (the POWER/SLEEP lamp goes off).

- **2.** Unplug the power cord of the system from a power outlet.
- **3.** Wipe off dust from the power cord plug with a dry cloth.
- **4.** Soak a soft cloth in neutral detergent that is diluted with cold or lukewarm water, and squeeze it firmly.
- **5.** Rub off stains on the system with the cloth prepared in Step 4.
- **6.** Soak a soft cloth in water, squeeze it firmly, wipe the system with it once again.
- **7.** Wipe the system with a dry cloth.
- **8.** Wipe off dust from the fan exhaust opening on the rear of the system with a dry cloth.

## Cleaning the Interior of the system

One important item in a good maintenance program is regular and thorough cleaning of the interior of the system, especially around the motherboard.

Dust buildup inside the system can lead to several problems. As dust acts as a thermal insulator, a buildup can prevent proper system cooling. Excessive heat will shorten the life of system components. Also, dust may contain conductive or corrosive materials that can cause short circuits or corrosion of electrical contacts.

How often you should clean the interior of the system depends on the environment in which it is located. For most office environments, you probably should clean the system every 12 months. For more severe environments, clean the interior every 6 months.

To clean the interior of the system, you will need a small vacuum cleaner (with plastic tipped nozzle and electrostatic protection), a computer grade canned air, and a small brush.

## **A** Warning

Unplug all power cords before performing any maintenance. Voltage is present inside the system and display unit even after the power is turned off. All voltage is removed only when the power cord is unplugged.

## **⚠** Caution

Do not use the brush made of chemical fabric, or the cleaning material that will generate an electrostatics.

To clean the interior of the system:

**1.** Turn off the system and unplug all power cables.

- **2.** Remove the logic cover and the drive cover.
- **3.** Use a small brush to loosen any dust and debris on the mother board.
- **4.** Use computer grade canned air to blow dust off components on the motherboard.
- **5.** Use a small vacuum cleaner with plastic tip to vacuum out dust and debris from the interior of the system.
- **6.** Reinstall the logic cover and the drive cover.
- **7.** Reconnect all power cables and turn on the system.

## Cleaning the Keyboard

- **1.** Power off the system and peripheral devices. The POWER/SLEEP lamp is off.
- **2.** Wipe the keyboard surface with a dry cloth.

## Cleaning the Mouse

The mouse operation depends on the degree of smoothness of the internal ball rotation. To keep the mouse ball clean, use the mouse in a place with little dust.

#### To clean the Mouse:

- 1. Prepare cold or lukewarm water, neutral detergent, alcohol, two dry soft clothes, and cotton swabs.
- **2.** Power off the system. The POWER/SLEEP lamp goes off.
- **3.** Turn the mouse upside down, and rotate the mouse ball cover counter clockwise to remove it.
- **4.** Take out the ball from the mouse. Cover the bottom of the mouse with your hand, and turn your hand holding the mouse (the mouse is on your palm with the button upward). The mouse ball is released onto your palm.
- **5.** Soak a soft cloth in neutral detergent that is diluted with cold or lukewarm water, and squeeze it firmly.
- **6.** Rub off stains on the mouse ball. Softly wipe the mouse ball with the cloth prepared in Step 5.
- **7.** Wipe the mouse ball with a dry soft cloth.
- **8.** Wipe three small rollers inside the mouse with a cotton swab soaked with alcohol. Wipe stains slowly and carefully by rotating rollers with the tip of the cotton swab.
- **9.** Blow out any dust from the mouse. Protect your eyes from the dust.
- **10.** Put the mouse ball back into the mouse.
- 11. Place the mouse ball cover, and rotate it clockwise until it is locked.

## Cleaning an Optical Drive and Optical Disc

A dust-accumulated tray or a dusty optical drive may cause the device not to read data correctly.

### To Clean an Optical Drive:

**1.** Power the system. The POWER/SLEEP lamp is lit.

**2.** Press the optical drive tray Open/Close button on the front of the optical drive. The tray opens.

**3.** Hold the disc and take it out from the tray.

**Mote**: Do not touch the signal side of the disc with your hand.

**4.** Wipe the tray with a dry soft cloth.



Do not wipe the lens of the optical drive. Doing so may damage the lens and may cause a malfunction of the drive.

**5.** Push on the tray front to close the tray.

#### To clean an Optical Disc Drive:

Wipe the signal side of the disc with a dry soft cloth.

## **⚠** Caution

- Wipe disks from the center to the outside.
- Use only a specific disc cleaner if necessary. Cleaning a disc with record spray/cleaner, benzene, or thinner causes damage to the disk contents. At worst, inserting the disk into the system may cause failure.

## **Care and Handling**

Use the following guidelines to properly handle and care for your system.



Protect the system from extremely low or high temperatures. Let the system warm (or cool) to room temperature before using it.



Keep the system away from magnetic forces.



Keep the system dry. Do not wash the system with a wet cloth or pour fluid into it.



Protect the system from being bumped or dropped.



Check the system for condensation. If condensation exists, allow it to evaporate before powering on the system.



Keep the system away from dust, sand, and dirt.

# Solving Problems

This chapter helps you identify and solve problems that may occur during system installation or while using your system. The first section of this chapter tells you how to reset your system in the event of problems. The next few sections provide troubleshooting checklists and procedural steps that help you isolate specific system problems. The last section includes BIOS and system user information.

## **A** Warning

The DC push-button on/off switch on the front panel does not turn off completely the system AC power. +5vdc is present on the system board whenever the AC power cord is connected between the system and an AC outlet. Before doing the procedures in this manual, make sure that your system is powered off and unplug the AC power cords from the back of the chassis.

Not disconnecting power before opening your system can result in personal injury and equipment damage

## **⚠** Caution

Running your system with the cover removed can damage your system components.

For proper cooling and airflow, always replace the covers before powering on your system.

## **Static Precautions**

An electrostatic discharge (ESD) can damage disk drives, option boards, and other components. You can provide some ESD protection by wearing an anti-static wrist strap attached to chassis ground when handling system components.

Electronic devices can be easily damaged by static electricity. To prevent damage, keep them in their protective packaging when they are not installed in your system.

## **Troubleshooting Guide**

This section provides you a guide to identify a problem and locate its source.

## **A** Warning

The system power and any peripheral devices should be turned off before connecting or disconnecting peripheral devices to or from the system.

Otherwise, you could permanently damage the system or peripheral devices.

- 1. Turn off the system and any peripheral devices. Disconnect all external peripherals from the system, except for the keyboard and monitor. The system's power cord must be plugged into a grounded electrical outlet.
- 2. Make sure your keyboard and monitor are properly connected to the system. Turn the monitor on, then adjust its brightness and contrast controls to suit your preference (see your monitor's documentation).
- **3.** Turn the system on. If the power indicator does not light up, but the system seems to be operating normally, the indicator may need replacement.
- **4.** Monitor the power-on self test (POST) execution. Each time you turn on the system, the POST checks the system board, memory, keyboard, and certain peripheral devices.
- **5.** Check the following during the POST:
  - (Error Message Line 1)
  - **■** (Error Message Line 2)
  - $\blacksquare$  Press <F1> to continue,
  - <DEL> to enter Setup
  - You should note the error and press **F1** to resume the boot-up process, or **DEL** to enter Setup.
- **6.** Errors that prevent the boot process from continuing (fatal errors) are communicated by a series of audible beeps. If this type of error occurs, record the information and refer to the Error Messages: Beep Codes section.

## System Viewers

Monitor the occurrence of fault with the Remote Manager (NEC ESMPRO, ASWM or another utility, depending on your system) during the system operation.

Especially take note on whether any alert is reported to the Remote Manager on the management PC.

## Lamps

The system includes lamps to indicate the system states by a variety of colors and display patterns on the front panel, hard disk drive, and power supply.

Refer to "Rear View" on page 19 for more information.

## **Problems at initial System Start-up**

Problems that occur at initial system start-up are often caused by incorrect installation of components or incorrect configuration. Hardware failure is a less frequent cause.

- Are all cables properly connected and secure?
- Is AC power available at the wall outlet?
- Are the configuration settings correct in Setup? Are all drivers properly installed?
- Are all the expansion cards fully seated in their slots on the motherboard?
- Are all DIMMs installed correctly?
- Is the processor fully seated in its socket on the motherboard?
- Are switches and jumpers on the system board correct (if they have been changed from their original default settings)?
- Are all jumper and switch settings on optional add-on cards and peripheral devices set correctly? Check the documentation included with these devices for details. Ensure that there are no system resource conflicts between hardware components. (For example, two add-on cards could inadvertently share the same interrupt, resulting in a conflict.)
- Are adapter cards and disk drives correctly installed?
- Is the keyboard properly connected to the system and is it connected in the right PS/2 port?
- Is a bootable diskette installed in your system's floppy drive A:? (if a floppy disk drive is intalled).
- Is the hard disk properly formatted or defined?
- Is the operating system properly loaded? Check the operating system documentation.

# Problems After the System Has Been Running Correctly

After the system hardware and software have been running correctly, problems can indicate equipment failure. Use the checklist below to try and correct the situation.

If the problem recurs after you have checked these items, refer to <u>"Troubleshooting Guide" on page 199.</u>

- If you are running software from a diskette or CD, try using a new copy.
- If you are running software from a hard disk drive, make sure that all of the necessary files are installed. There may be a problem with the copy on the hard disk. Reinstall the software on the hard disk and try again.
- If problems appear intermittently, there may be a loose cable, dirt in the keyboard (if keyboard input is incorrect), or other random component failures.
- A transient voltage spike, power cut, or brownout may have occurred. Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and the system not responding to user commands. If necessary, exit any open applications and shut down your system power. Reboot the system, then load the software and try again.
- Voltage spikes can occasionally cause the heads of the disk drive to contact the disk. This can corrupt or destroy data files. If you are experiencing voltage spikes on the AC electrical power line, install an uninterruptible power supply between the power outlet and the system's power cord.

## **Problems Running New Application Software**

Problems occurring when you run new application software are usually related to the software. Faulty equipment is much less likely, especially if other software runs correctly. Use the checklist below to see if the situation may be easily corrected. If the problem persists after you have checked these items, contact the software vendor's customer service.

- Does the system meet the minimum hardware requirements for the software? Refer to the software documentation.
- Is the software an authorised copy? Unauthorised copies often do not work. Obtain an authorised copy of the software.
- If you are running the software from a CD or diskette, is it a good copy?
- If you are running the software from a CD, is the disc scratched or dirty?
- Is the software correctly installed? Were all necessary procedures followed and files installed?
- Are the correct device drivers installed?
- Is the software correctly configured for the system?
- Are you using the software correctly?

## **Problems and Suggestions**

Contact your Authorised Service Representative if the suggested actions do not solve the problem.

**Table 7: Problems and Suggestions** 

What to do	What to do
Application software problems	Make sure all cables are installed correctly.
	Verify that your system hardware configuration is set correctly. In Setup, check the values against the system settings that you previously recorded. If an error is evident (wrong type of drive specified, for example), make the change in Setup and reboot the system. Record your change.
	Make sure the software is properly configured for the system. Refer to the software documentation for information. Try a different copy of the software to see if the problem is with the copy you are using.  If other software runs correctly on the system, contact the vendor of the failing software.
Characters on screen are distorted or incorrect	Make sure the brightness and contrast controls are properly adjusted. Make sure the monitor's video signal cable and power cables are properly installed. (Shut down system power before reconnecting cables.) Make sure your monitor is compatible with the video mode you have selected. (Check your monitor's documentation.)
Characters do not appear on screen	Make sure the monitor is plugged in and turned on. Are the brightness and contrast controls properly adjusted? Make sure that the video signal cable is properly connected. (Turn the system power off before reconnecting cables). Make sure your system's video adapter card is installed, enabled. Reboot the system.
CMOS RAM settings are wrong	If system settings stored in CMOS RAM change for no apparent reason (for example, the time of day is in error), the backup battery may no longer have enough power to maintain the settings. Replace the battery.
Diskette drive light does not go on when drive is in use or is tested by POST.	Make sure the power and signal cables for the drive are properly installed.  Check that the drive is properly configured and enabled in Setup.
Hard drive light does not go on when drive is in use or is tested by POST.	Make sure the power and signal cables for the drive are properly installed. Make sure the front panel connector is securely attached to the system board headers. Check that the drive is properly configured and enabled in Setup. Check the drive manufacturer's manual for proper configuration for remote hard disk drive activity.
	If your HDDs are plugged onto a PCI card, this is normal. The LED will light only when detecting activity on the optical drives.
Power on light does not go on	If the system is operating normally, check the connector between the system board and the front panel. If OK, the light may be defective.

## Problems with the System

#### Fail to power on the system:

- Is the system is properly supplied with power?
  - Check if the power cord is connected to a power outlet (or UPS) that meets the power specifications for the system.
  - Check the power cord for broken shield or bent plugs.
  - Make sure the power breaker for the connected power outlet is on.
  - If the power cord is plugged to a UPS, make sure the UPS is powered and it outputs power. See the manual that comes with the UPS for details.
- Did you press the POWER/SLEEP switch?
  - Press the POWER/SLEEP switch on the front of the system to turn on the power (the POWER/SLEEP lamp lights).

### Fail to power off the system

- Is the power switch enabled?
  - Restart the system and start the BIOS setup utility

#### No screen display appears and beep occurs.

- Is the DIMM board installed securely?
  - Check whether the DIMM board is inserted into the mating connector securely.
  - Make sure the jumper switches have been returned to their original positions after CMOS clearing. for the positions of the jumper switches.

#### POST fails to complete:

- Is the DIMM board installed?
  - At least two DIMM boards are required for operation.
- Is the memory size large?
  - The memory check may take a few seconds if the memory size is large. Wait for a while.
- Did you perform any keyboard or mouse operation immediately after you started the system?
  - If you perform any keyboard or mouse operation immediately after start-up, POST may accidentally detect a keyboard controller error and stops proceeding.
     In such a case, restart the system once again. Do not perform any keyboard or mouse operation until the BIOS start-up message appears when you restart the system.
- Does the system contain appropriate memory boards or PCI devices?

- Operation of the system with unauthorized devices is not guaranteed.

#### Fail to access to internal or external devices (or such devices fail to operate):

- Are cables properly connected?
  - Make sure that the interface cables and power cord are properly connected. Also make sure that the cables are connected in the correct order.
- Is the power-on order correct?
  - When the system has any external devices connected, power on the external devices first, then the system.
- Did you install drivers for connected optional devices?
  - Some optional devices require specific device drivers. Refer to the manual that comes with the device to install its driver.
- Is BIOS configuration correct?
  - Some devices connected to the serial or parallel port may require I/O port address or operation mode settings. Refer to the manual that comes with the board for details to make correct settings.

#### The keyboard or mouse fails to operate:

- Is the cable properly connected?
  - Make sure that the cable is connected to the correct connector on the rear of the system.
  - The keyboard or mouse does not operate if it is connected when the system is powered (not applicable to USB devices). Power of the system first and connect it properly.
- Are the system drivers installed?
  - Refer to the manual that comes with your OS to check that the keyboard and mouse drivers are installed. (These drivers are installed along with the OS.)
     Some OS's allow you to change the keyboard and mouse settings. Refer to manual that comes with your OS to check that the keyboard and mouse settings are correct.

#### Fail to access (read or write) to the floppy disk:

- Does the floppy disk drive contain a floppy disk?
  - Insert a floppy disk into the floppy disk drive until it clicks.
- Is the floppy disk write-protected?
  - Place the write-protect switch on the floppy disk to the "Write-enabled" position.
- Is the floppy disk formatted?

- Use a formatted floppy disk or format the floppy disk in the floppy disk drive. Refer to the manual that comes with the OS for formatting a floppy disk.

#### Fail to access to the disc:

- Is the disc properly set in the disc drive tray?
  - The tray is provided with a holder to secure the disc. Make sure that the disc is placed properly in the holder.
- Is the disc applicable to the system?
  - The disc for Macintosh is not available for use.
  - For the disk which does not conform to the CD standard, the playback of such a disk with the CD drive is not guaranteed.

#### Inserted the correct disc but an error message is displayed:

The CD-ROM is not inserted or the wrong CD-ROM is inserted. Please insert the correct CD-ROM. OK

- Is the data side of the disc dirty or injured?
  - Take the disc out of the disc drive, check that it is not dirty or injured, reset and click [OK].

#### Fail to access the hard disk

(Refer to the documentation supplied with the disk array controller.)

- Is the hard disk applicable to the system?
  - Operation of any device that we do not authorize is not guaranteed.
- Is the hard disk properly installed?
- Is the hard disk properly configured?

#### Fail to access the (internal or external) SCSI devices:

- Is the SCSI device applicable to the system?
  - Operation of any SCSI device that we do not authorize is not guaranteed.
- Is the cable connection changed?
- Are SCSI devices properly configured?
  - When the system has external SCSI devices connected, devices settings, including SCSI ID and terminator, are required. Refer to the manual that comes with the SCSI device for details.
- Is cable length exceeded?
  - Refer to the manual that comes with the SCSI device for details.

- Are the optional SCSI controllers properly configured?
  - When the system has an optional SCSI controller installed and SCSI devices connected to it, use the POST Setup utility that comes with the optional SCSI controller for proper configuration. See the manual that comes with the optional SCSI controller for details.

#### The system is not found on the network:

- Is the LAN cable connected?
  - Make sure to connect the LAN cable to the network port on the rear of the system. Also make sure that the LAN cable to use conforms with the network interface standard.
- Is the BIOS configuration correct?
  - The internal LAN controller may be disabled with the BIOS SETUP utility of the system. Check the setting with the BIOS SETUP utility.
- Have the protocol and service already configured?
  - Install the distinctive network driver for the system. Make sure that the protocol, such as TCP/IP, and services are properly specified.
- Is the transfer speed correct?
  - Open the network property dialog box in control panel to specify the "Link Speed & Duplex" value the same as the value specified for HUB.

#### Wake on LAN does not start from standby state.

- Is Hub set to Auto-Negotiation? Or, Is the client set to Auto-Negotiation/optimum speed?
  - For both hub and client, Wake on LAN does not start from the standby state if the speed is fixed to 1000Mbps.

### **Problems with Windows Server 2003**

#### A log appears and no network cable is connected to the network port:

When network cable is not connected with a port, a log (see the example below) may be found in event log. But this has no affect on the behavior of Lan driver.

Event ID: 6 Source: E100B Type: Error

Description: Hardware failure detected.

*Machine:* (Name of your system)

Lan: 100BASE

Solution: Connect a network cable in a port and then reboot the system or change the [Smart Power Down] value to "Off", the log will not be found in event log any more.

#### The system displays the message below and fails to log on:

This copy of Windows must be activated with Microsoft before you can continue. You cannot log on until you activate Windows. To shut down the computer click Cancel.

In Windows Server 2003, the above message will be displayed if you use the operating system without executing the license authentication. Select "Yes", and execute the procedure for license authentication.

### Cannot install the operating system correctly.

■ Did you check the notes on installing the operating system?

During installation, the following warning is registered in the System Log of the Event Viewer:

Error detected on the device \Device\CdRom0 during the paging operation.

- There is no problem on this issue.

#### Fail to start the OS:

- Is a floppy disk in the floppy disk drive?
  - Take out the floppy disk and restart the system.
- Is the ExpressBuilder disc in the disc drive?
  - Take out the ExpressBuilder disc and restart the system.
- Is the OS broken?
  - Use the recovery process to recover the system.

#### The OS presents unstable operation:

- Did you update the system?
  - Installing a network drive after installation of the OS may cause unstable operation. Use the ExpressBuilder disc to update the system.

The system does not restart automatically when a stop error occurs, though the system is adjusted to automatically restarting:

- When the system does not restart automatically, restart it manually.

The system restarts automatically when a stop error occurs, though the system is NOT adjusted to automatically restarting:

- There is no problem about this issue. Check the System Event Log to check that STOP error occurred.

#### Cannot turn the power OFF at the blue screen:

- If you want to turn off the power at the blue screen, execute forced shutdown (forced shutdown: continue to press POWER/SLEEP switch for 4 seconds). The power will not be turned off if you press the switch for less than 3 seconds.

The PXE boot (network boot) fails or the system is not found on the network:

- Is the cable connected properly?
  - Connect the proper cable to the network port on the rear of the server. In addition, make sure that the used cable conforms to the network interface standard.
- Is BIOS configuration correct?
  - The internal LAN controller may be disabled with the CMOS Setup utility of the system. Check the setting with the BIOS setup utility.
- Have the protocol and service already configured?
  - Install the distinctive network driver for the system. Make sure that the protocol, such as TCP/IP, and services are properly specified.
- Is the transfer speed correct?
  - Open the network property dialog box in control panel to specify the link speed and duplex value the same as the value specified for HUB.

## **Problems with ExpressBuilder**

When the system does not boot from the ExpressBuilder disc, check the following:

- Did you set the ExpressBuilder during POST and restart the system?
  - If you do not set the ExpressBuilder during POST and restart the system, an error message will appear or the OS will boot.
- Is BIOS configuration correct?
  - The boot device order may be specified with the CMOS Setup utility of the system. Use the CMOS Setup utility to change the boot device order to boot the system from the disc drive first.
    - <Menu to check: [Boot]>
- Has an error message appeared?
  - When an error occurs while the ExpressBuilder is in progress, the following message appears. After this message appears, check the error and take the appropriate corrective action according to the message listed in the table below.

**Table 8: Error Messages** 

Message	Cause and Solution
This machine is not supported	This ExpressBuilder version is not designed for this system. Execute the ExpressBuilder on the compliant system.
Hard disk access error	The hard disk is not connected or has failed. Check whether the hard disk is correctly connected.

**Table 8: Error Messages (Continued)** 

Message	Cause and Solution
NvRAM access error	An access to the non-volatile memory (NvRAM) has failed.
The system-specific information does not exist on the baseboard. Please restore the backup data or write the data by using [System Information Management] of the Off-line Maintenance Utility. Only the authorized personnel are allowed to do this operation.	The system-specific information can't be acquired on the mother board.

## **Problems with Express Setup**

Following message appears when you try to install Express Setup to the hard disk that has smaller capacity than the specified partition size:

"The specified partition size has exceeded the capacity of the hard disk. The setup created the partition at the maximum size that can be reserved on the hard disk. Setup will continue the process."

Then the system displays the OK button.

- It is not an abnormal condition. Press Enter to continue the installation.
- The message "Press R to retry" can not be displayed correctly when copying the files from disc or checking disc:
  - Press R. When the message appears again even if you press R, restart the Express Setup from the beginning. In case the same result occurred after the restart of installation, contact Maintenance Service Company and ask them to check the disc drive.
- **Express Setup terminated and asks to input setup information.** 
  - There are some errors on the specified setup information. Follow the instruction to input the correct value. It is not necessary to cancel the installation.
- Specified to join the Domain, but the system is installed as Workgroup.
  - When the setup fails to join the Domain during the installation, it will install the system as Workgroup. Open [System] in Control Panel to specify joining the Domain.
- Entered the incorrect Product ID/CD key.
  - Even if you entered the incorrect Product ID/CD key, Express Setup will start. However, the setup will stop and asks you to re-enter the correct value. Also in this case, input request will occur when rebooting after GUI setup completed during Express Setup. If these 2 inputs are done correctly, there is no problem on Windows setup.
- Unable to specify the details of Network adapter.

- In Express Setup, you can not specify the details of Network adapter. Specify them from Control Panel after starting Windows.

## **Problems with Disk Array Configuration**

Refer to the manual supplied with the RAID controller.

#### **Problems with Master Control Menu**

The master control menu fails to appear:

- Is your system Windows NT 4.0 or later, or Windows 95 or later?
  - The disc Autorun feature is supported by Windows NT 4.0 and Windows 95. The older versions do not automatically start from the disc.
- Is Shift pressed?
  - Setting the disc with Shift pressed down cancels the Autorun feature.

## **Problems with Disk Array Configuration**

Refer to the manual that comes with the disk array controller for any trouble occurring with the disk array in this system.

## **Collecting Event Log**

This section describes on how to collect the log of various events that occurred on the system.

## **⚠** Caution

If STOP error, system error, or stall occurred, follow the procedure below after restarting the system.

- 1. Click [Management Tool]: [Event Viewer] from the Control Panel.
- 2. Select the type of the log to collect.

  On [Application Log], the events related to the running application is archived.

  On [Security Log], the events related to the security is archived. On [System Log], the events occurred at the item which configures Windows system is archived.
- **3.** Click [Save as...] in the [Run] menu.
- **4.** Input the file name of archived log in the [File Name] box.
- 5. Select the type of the log file you want to save in the [File Type] list box and click [OK].

For more information, refer to Windows Online Help.

## **Collecting Configuration Information**

This section describes how to collect the information on hardware configuration and inside specification.

In order to collect information, "Diagnostic Program" is used.

## **⚠** Caution

If STOP error, system error, or stall occurred, follow the procedure below after restarting the system.

- 1. Point to [Settings] in Start menu, and click [Control Panel]. The [Control Panel] dialog box appears.
- **2.** Double-click [Management Tool], and double-click [Computer Management]. The [Computer Management] dialog box appears.
- **3.** Click [System Tool]: [System Information].
- **4.** Click [Save as System Information File] in the [Operation] menu.
- **5.** Enter the file name to save in the [File Name] box.
- 6. Click [Save].

## **Collecting Dr. Watson Diagnostic Information**

Dr. Watson collects diagnostic information related to application errors. The location to save the information can be specified as you like.

# Memory Dump (depending on your configuration)

If an error occurs, the dump file should be saved to acquire necessary information.

If you saved the dump to DAT, write down that it is saved as "NTBackup" or "ARCServe" on the label. You can specify the location to save the diagnostic information as you like...

## **A** Caution

- Consult with your sales agent before dumping the memory. Dumping the memory while the system is in process may affect the system operation.
- Restarting the system due to an error may display a message indicating insufficient virtual memory. Ignore this message and proceed. Restarting the system may result in dumping improper data.

## If You Need Assistance

If you have a problem with your computer, first review the sections of <u>"Solving Problems" on page 198</u>.

Note: Refer to the warranty booklet delivered with your system to find out how to contact the local office in your country.

For technical support such as BIOS upgrades, consult our Web site at the following address: <a href="http://www.nec-computers.com">http://www.nec-computers.com</a>.

## **Error Messages**

This section details the POST error codes and messages, and the meaning of the diagnostic LEDs colour combinations.

#### **POST Error Messages**

Whenever a recoverable error occurs during POST, BIOS displays a message on the video display screen and causes the speaker to beep as the message appears. BIOS also issues a beep code (one long tone followed by two short tones) during POST if the video configuration fails or if an external ROM module does not have the correct checksum.

The BIOS indicates errors by writing an error code to the PS/2-standard logging area in the Extended BIOS Data Area, and by displaying a message on the screen, which is sometimes preceded by the POST Error Code. The error code will also be logged to the Event Logging area.

The Response section in the following table is divided into two types:

- Pause: the message is displayed in the Error Manager screen, an error is logged to the SEL, and user input is required to continue. The user can take immediate corrective action or choose to continue booting.
- Halt: the message is displayed in the Error Manager screen, an error is logged to the SEL, and the system cannot boot unless the error is resolved. The user needs to replace the faulty part and restart the system.

Error message	Response
CMOS date / time not set	Pause
Configuration cleared by jumper	Pause
Configuration default loaded	Pause
Password check failed	Halt
PCI resource conflict	Pause
Insufficient memory to shadow PCI ROM	Pause
Processor 01 thermal trip error on last boot	Pause

**Table 9: POST Error Messages and Handling** 

#### **POST Error Beep Codes**

The following table lists POST error beep codes. Prior to system Video initialization, BIOS uses these beep codes to inform users on error conditions. The beep code is followed by a user visible code on the diagnostic LEDs.

**Table 10: POST Error Beep Codes** 

Beeps	Error Message	Description
3	Memory error	System halted because a fatal error related to the memory was detected.

## **POST Error Pause Option**

For POST error(s) that are listed as Pause, the BIOS enters the error manager and waits for the user to press an appropriate key before booting the operating system or entering BIOS Setup.

The user can override this option by setting POST Error Pause to disabled in the BIOS Setup utility Main menu page. If POST Error Pause is set to disabled, the system will boot the operating system without user-intervention. The default value is set to enabled.

#### Diagnostic LEDs

During the system boot process, BIOS executes several platform configuration processes, each of which is assigned a specific hex POST code number. As each configuration routine is started, the BIOS will display the POST code on the POST code diagnostic LEDs found on the back edge of the server board. To assist in troubleshooting a system hang during the POST process, the diagnostic LEDs can be used to identify the last POST process to be executed.

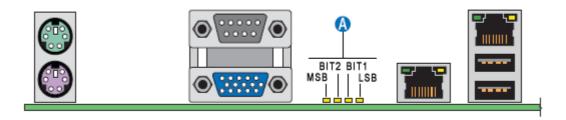


Figure 102: Diagnostic LEDs (A)

Each POST code is represented by a combination of colors from the four LEDs. The LEDs are capable of displaying three colors: green, red, and amber.

	8	Bh	4	h	2	!h	1	lh
LEDs	Red	Green	Red	Green	Red	Green	Red	Green
ACh	1	1	0	1	1	0	0	0
Result	An	nber	Green		Red		Off	
	М	SB					L	SB

**Table 11: POST Progress Code LED Example** 

**Table 12: Diagnostic LEDs Codes** 

Check Point	Diagnostic LED Decoder (G=green; R=red; A=amber)		amber)	Description		
	MSB			LSB		
Host Processor						
0x10h	OFF	OFF	OFF	R	Power-on initialization of the host processor (bootstrap processor)	
0x11h	OFF	OFF	OFF	Α	Host processor cache initialization	
0x12h	OFF	OFF	G	R	Starting application processor initialization	
0x13h	OFF OFF G A		Α	SMM initialization		
Chipset						
0x21h	OFF	OFF	R	G	Initializing a chipset component	
Memory	Memory					
0x22h	OFF	OFF	Α	OFF	Reading configuration data from memory (SPD on DIMM)	
0x23h	OFF	OFF	Α	G	Detecting presence of memory	
0x24h	OFF	G	R	OFF	Programming timing parameters in the memory controller	

**Table 12: Diagnostic LEDs Codes (Continued)** 

Decoder (G=green; R=red; A=amber) MSB LSB	Check Point	Diagnostic LED		U	Description	
Carrel   C	Oncok i onit				Description	
Ox25h		(G=green; R=red; A=amber)		mber)		
0x26h         OFF         G         A         OFF         Optimizing memory controller settings           0x27h         OFF         G         A         G         Initializing memory, such as ECC init           0x28h         G         OFF         R         OFF         Testing memory           PCI Bus           0x50h         OFF         R         OFF         R         Enumerating PCI busses           0x51h         OFF         R         OFF         A         Allowing allocations to PCI busses           0x52h         OFF         R         G         R         Hot plug PCI controller initialization           0x53h         OFF         R         G         R         Hot plug PCI controller initialization           0x53h         OFF         R         G         R         Reserved for PCI bus           0x54h         OFF         A         OFF         R         Reserved for PCI bus           0x55h         OFF         A         G         R         Reserved for PCI bus           0x58h         G         R         OFF         A         Reserved for PCI bus           0x59h         G         R         OFF         A         Reserved for PCI bus		MSB			LSB	
0x27h       OFF       G       A       G       Initializing memory, such as ECC init         0x28h       G       OFF       R       OFF       Testing memory         PCI Bus         0x50h       OFF       R       OFF       R       Enumerating PCI busses         0x51h       OFF       R       OFF       A       Allowing allocations to PCI busses         0x52h       OFF       R       G       R       Hot plug PCI controller initialization         0x53h       OFF       R       G       R       Reserved for PCI bus         0x54h       OFF       A       OFF       R       Reserved for PCI bus         0x55h       OFF       A       G       R       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         USB         0x57h       OFF       A       G       R       Reserved for PCI bus         USB         0x58h       G       R       OFF       A       Reserved for PCI bus         0x59h       G       R       OFF       A       Reserved for PCI bus         0x5bh       G       R       G	0x25h	OFF	G	R	G	Configuring memory parameters in the memory controller
Disable   G	0x26h	OFF	G	Α	OFF	Optimizing memory controller settings
PCI Bus  0x50h	0x27h	OFF	G	Α	G	Initializing memory, such as ECC init
0x50h       OFF       R       OFF       R       Enumerating PCI busses         0x51h       OFF       R       OFF       A       Allowing allocations to PCI busses         0x52h       OFF       R       G       R       Hot plug PCI controller initialization         0x53h       OFF       R       G       A       Reserved for PCI bus         0x54h       OFF       A       OFF       R       Reserved for PCI bus         0x55h       OFF       A       G       R       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         USB       Ox57h       OFF       A       G       R       Resetting USB bus         0x59h       G       R       OFF       A       Reserved for USB devices         ATA / ATAPI / SATA         0x59h       G       R       OFF       A       Reserved for USB devices         ATA / ATAPI / SATA         0x58h       G       R       G       R       Begin PATA / SATA bus initialization         0x59h       G       R       G       R       Resetting SMBUS         0x5Ch       G       A       OFF       R	0x28h	G	OFF	R	OFF	Testing memory
0x51h       OFF       R       OFF       A       Allowing allocations to PCI busses         0x52h       OFF       R       G       R       Hot plug PCI controller initialization         0x53h       OFF       R       G       A       Reserved for PCI bus         0x54h       OFF       A       OFF       R       Reserved for PCI bus         0x55h       OFF       A       G       R       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         0x57h       OFF       A       G       R       Reserved for PCI bus         0x58h       G       R       OFF       A       Reserved for PCI bus         0x58h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x50h       G       R       G       R       Reserved for DIs Bus         0x5Dh       G       R       G       R	PCI Bus					
Ox52h OFF R G R Hot plug PCI controller initialization  Ox53h OFF R G A Reserved for PCI bus  Ox54h OFF A OFF R Reserved for PCI bus  Ox55h OFF A OFF A Reserved for PCI bus  Ox56h OFF A G R Reserved for PCI bus  Ox57h OFF A G A Reserved for PCI bus  Ox57h OFF A G A Reserved for PCI bus  Ox58h G R OFF R Resetting USB bus  Ox58h G R OFF A Reserved for USB devices  ATA / ATAPI / SATA  Ox5Ah G R G R Begin PATA / SATA bus initialization  Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Ch G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R Resetting the video controller (VGA)  Ox71h OFF R R Resetting the video controller (VGA)  Ox72h OFF R A Resetting the video controller (VGA)  Ox72h OFF R R R RESEtting the video controller (VGA)  Ox78h G R R R R RESEtting the video controller (VGA)  Ox78h G R R R R RESEtting the video controller (VGA)  Ox78h G R R R R RESEtting the video controller (VGA)  Ox79h G R R R R RESETTING the video controller (VGA)  Ox70h G R R R R RESETTING the video controller (VGA)  Ox70h G R R R R RESETTING the video controller (VGA)  Ox70h G R R R R RESETTING the video controller (VGA)  Ox70h G R R R R RESETTING the console controller  Ox70h G R R R R RESETTING the console controller  Ox70h G R R R R RESETTING the console controller  Ox70h G R R R R RESETTING the keyboard	0x50h	OFF	R	OFF	R	Enumerating PCI busses
0x53h       OFF       R       G       A       Reserved for PCI bus         0x54h       OFF       A       OFF       R       Reserved for PCI bus         0x55h       OFF       A       G       R       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         0x57h       OFF       A       G       A       Reserved for PCI bus         0x58h       G       R       OFF       R       Reserved for PCI bus         0x58h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x59h       G       R       OFF       R       Reserved for PCI bus         0x54h       G       R       G       R       Reserved for PCI bus         0x55h       G       R       G       R       Reserved for USB devices         0x5Dh       G       R       A       Reserved for ATA	0x51h	OFF	R	OFF	Α	Allowing allocations to PCI busses
0x54h       OFF       A       OFF       R       Reserved for PCI bus         0x55h       OFF       A       OFF       A       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         0x57h       OFF       A       G       A       Reserved for PCI bus         USB         0x58h       G       R       OFF       R       Resetting USB bus         0x59h       G       R       OFF       A       Reserved for USB devices         ATA / ATAPI / SATA         0x5Ah       G       R       G       R       Begin PATA / SATA bus initialization         0x5Bh       G       R       G       A       Reserved for ATA         SMBUS         0x5Ch       G       R       G       R       Resetting SMBUS         0x5Dh       G       A       OFF       A       Reserved for SMBUS         Local Console         0x70h       OFF       R       R       Resetting the video controller (VGA)         0x72h       OFF       R       A       Resetting the video controller (VGA)         Remote Console	0x52h	OFF	R	G	R	Hot plug PCI controller initialization
0x55h       OFF       A       OFF       A       Reserved for PCI bus         0x56h       OFF       A       G       R       Reserved for PCI bus         0x57h       OFF       A       G       A       Reserved for PCI bus         USB         0x58h       G       R       OFF       R       Resetting USB bus         0x59h       G       R       OFF       A       Reserved for USB devices         ATA / ATAPI / SATA         0x5Ah       G       R       G       R       Begin PATA / SATA bus initialization         0x5Bh       G       R       G       A       Reserved for ATA         SMBUS         0x5Ch       G       A       OFF       R       Resetting SMBUS         0x5Dh       G       A       OFF       A       Reserved for SMBUS         Local Console         0x70h       OFF       R       R       R Resetting the video controller (VGA)         0x72h       OFF       R       A       R Enabling the video controller (VGA)         0x78h       G       R       R       R       R Enabling the console controller         0x74h <td< td=""><td>0x53h</td><td>OFF</td><td>R</td><td>G</td><td>Α</td><td>Reserved for PCI bus</td></td<>	0x53h	OFF	R	G	Α	Reserved for PCI bus
0x56h       OFF       A       G       R       Reserved for PCI bus         0x57h       OFF       A       G       A       Reserved for PCI bus         USB       0x58h       G       R       OFF       R       Resetting USB bus         0x59h       G       R       OFF       A       Reserved for USB devices         ATA / ATAPI / SATA         0x5Ah       G       R       G       R       Begin PATA / SATA bus initialization         0x5Bh       G       R       G       A       Reserved for ATA         SMBUS         0x5Ch       G       A       OFF       R       Resetting SMBUS         0x5Dh       G       A       OFF       A       Reserved for SMBUS         Local Console         0x70h       OFF       R       R       R Resetting the video controller (VGA)         0x72h       OFF       R       A       Disabling the video controller (VGA)         0x72h       OFF       R       R       Resetting the console controller         0x78h       G       R       R       R       R Enabling the console controller         0x74h       G       R       A <td>0x54h</td> <td>OFF</td> <td>Α</td> <td>OFF</td> <td>R</td> <td>Reserved for PCI bus</td>	0x54h	OFF	Α	OFF	R	Reserved for PCI bus
USB  Ox58h G R OFF R Resetting USB bus  Ox59h G R OFF A Reserved for USB devices  ATA / ATAPI / SATA  Ox5Ah G R G R G R Begin PATA / SATA bus initialization  Ox5Bh G R G R G R Begin PATA / SATA bus initialization  Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R Resetting the video controller (VGA)  Ox71h OFF R R R A Disabling the video controller (VGA)  Ox72h OFF R A Resetting the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller  Ox79h G R R R A Disabling the console controller  Ox7Ah G R R R R Resetting the console controller  Keyboard (PS2 or USB)  Ox90h R OFF R R Resetting the keyboard	0x55h	OFF	Α	OFF	Α	Reserved for PCI bus
USB  Ox58h G R OFF R Resetting USB bus  Ox59h G R OFF A Reserved for USB devices  ATA / ATAPI / SATA  Ox5Ah G R G R Begin PATA / SATA bus initialization  Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R Resetting the video controller (VGA)  Ox71h OFF R R A Disabling the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller  Ox79h G R R R A Disabling the console controller  Ox7Ah G R R R R Resetting the console controller  Ox7Ah G R R R R Resetting the console controller  Keyboard (PS2 or USB)  Ox90h R OFF R R R Resetting the keyboard	0x56h	OFF	Α	G	R	Reserved for PCI bus
Ox58h G R OFF R Resetting USB bus Ox59h G R OFF A Reserved for USB devices  ATA / ATAPI / SATA  Ox5Ah G R G R Begin PATA / SATA bus initialization Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R R Resetting the video controller (VGA) Ox72h OFF R A R Enabling the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller Ox79h G R R R A Disabling the console controller Ox79h G R R R A Disabling the console controller Ox79h G R R R A Disabling the console controller Ox7Ah G R R R R Resetting the console controller Ox7Ah G R R R R Resetting the console controller Ox7Ah G R R R R Resetting the console controller  Keyboard (PS2 or USB) Ox90h R OFF OFF R R Resetting the keyboard	0x57h	OFF	Α	G	Α	Reserved for PCI bus
Ox59h G R OFF A Reserved for USB devices  ATA / ATAPI / SATA  Ox5Ah G R G R Begin PATA / SATA bus initialization  Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R R Resetting the video controller (VGA)  Ox71h OFF R R A Disabling the video controller (VGA)  Ox72h OFF R A R Enabling the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller  Ox79h G R R A Disabling the console controller  Ox7Ah G R A R Enabling the console controller  Ox7Ah G R A R Enabling the console controller  Keyboard (PS2 or USB)  Ox90h R OFF OFF R R Resetting the keyboard	USB	JSB				
ATA / ATAPI / SATA   Ox5Ah G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R Resetting the video controller (VGA)  Ox72h OFF R A Resetting the video controller (VGA)  Ox72h OFF R A R Enabling the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller  Ox79h G R R A Disabling the console controller  Ox79h G R R R R Resetting the console controller  Ox7Ah G R R R R Enabling the console controller  Keyboard (PS2 or USB)  Ox90h R OFF OFF R R Resetting the keyboard	0x58h	G	R	OFF	R	Resetting USB bus
0x5Ah       G       R       G       R       Begin PATA / SATA bus initialization         0x5Bh       G       R       G       A       Reserved for ATA         SMBUS         0x5Ch       G       A       OFF       R       Resetting SMBUS         0x5Dh       G       A       OFF       A       Reserved for SMBUS         Local Console         0x70h       OFF       R       R       Resetting the video controller (VGA)         0x71h       OFF       R       R       A       Disabling the video controller (VGA)         0x72h       OFF       R       A       Resetting the video controller (VGA)         Remote Console         0x78h       G       R       R       R       Resetting the console controller         0x79h       G       R       R       A       Disabling the console controller         0x7Ah       G       R       A       R       Enabling the console controller         Keyboard (PS2 or USB)         0x90h       R       OFF       OFF       R       Resetting the keyboard	0x59h	G	R	OFF	Α	Reserved for USB devices
Ox5Bh G R G A Reserved for ATA  SMBUS  Ox5Ch G A OFF R Resetting SMBUS  Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R R Resetting the video controller (VGA)  Ox71h OFF R R A Disabling the video controller (VGA)  Ox72h OFF R A R Enabling the video controller (VGA)  Remote Console  Ox78h G R R R R Resetting the console controller  Ox79h G R R A Disabling the console controller  Ox79h G R R R A Disabling the console controller  Ox7Ah G R R R R Enabling the console controller  Ox7Ah G R R R R Resetting the console controller  Ox7Ah Resetting the console controller  Ox7Ah Resetting the console controller	ATA / ATAPI / SATA					
SMBUS  0x5Ch G A OFF R Resetting SMBUS  0x5Dh G A OFF A Reserved for SMBUS  Local Console  0x70h OFF R R R R Resetting the video controller (VGA)  0x71h OFF R R A Disabling the video controller (VGA)  0x72h OFF R A R Enabling the video controller (VGA)  Remote Console  0x78h G R R R R Resetting the console controller  0x79h G R R A Disabling the console controller  0x74h G R R R R Resetting the console controller  0x7Ah G R R R R Resetting the console controller  Keyboard (PS2 or USB)  0x90h R OFF OFF R Resetting the keyboard	0x5Ah	G	R	G	R	Begin PATA / SATA bus initialization
0x5Ch       G       A       OFF       R       Resetting SMBUS         0x5Dh       G       A       OFF       A       Reserved for SMBUS         Local Console         0x70h       OFF       R       R       R       Resetting the video controller (VGA)         0x71h       OFF       R       R       A       Disabling the video controller (VGA)         0x72h       OFF       R       A       R       Enabling the video controller (VGA)         Remote Console         0x78h       G       R       R       R Resetting the console controller         0x79h       G       R       A       R Enabling the console controller         0x7Ah       G       R       A       R Enabling the console controller         Keyboard (PS2 or USB)         0x90h       R       OFF       OFF       R       Resetting the keyboard	0x5Bh	G	R	G	Α	Reserved for ATA
Ox5Dh G A OFF A Reserved for SMBUS  Local Console  Ox70h OFF R R R R Resetting the video controller (VGA)  Ox71h OFF R R A Disabling the video controller (VGA)  Ox72h OFF R A R Enabling the video controller (VGA)  Remote Console  Ox78h G R R R Resetting the console controller  Ox79h G R R A Disabling the console controller  Ox74h G R A R Enabling the console controller  Keyboard (PS2 or USB)  Ox90h R OFF OFF R Resetting the keyboard	SMBUS					
Local Console  0x70h	0x5Ch	G	Α	OFF	R	Resetting SMBUS
0x70h       OFF       R       R       R       R Resetting the video controller (VGA)         0x71h       OFF       R       R       A       Disabling the video controller (VGA)         0x72h       OFF       R       A       Reabling the video controller (VGA)         Remote Console         0x78h       G       R       R       R       Resetting the console controller         0x79h       G       R       R       A       Disabling the console controller         0x7Ah       G       R       A       R       Enabling the console controller         Keyboard (PS2 or USB)         0x90h       R       OFF       OFF       R       Resetting the keyboard	0x5Dh	G	Α	OFF	Α	Reserved for SMBUS
0x71h       OFF       R       R       A       Disabling the video controller (VGA)         0x72h       OFF       R       A       R       Enabling the video controller (VGA)         Remote Console         0x78h       G       R       R       R       Resetting the console controller         0x79h       G       R       A       Disabling the console controller         0x7Ah       G       R       A       R       Enabling the console controller         Keyboard (PS2 or USB)         0x90h       R       OFF       OFF       R       Resetting the keyboard	Local Console					
0x72h OFF R A R Enabling the video controller (VGA)  Remote Console  0x78h G R R R Resetting the console controller  0x79h G R R A Disabling the console controller  0x7Ah G R A R Enabling the console controller  Keyboard (PS2 or USB)  0x90h R OFF OFF R Resetting the keyboard	0x70h	OFF	R	R	R	Resetting the video controller (VGA)
Remote Console  0x78h	0x71h	OFF	R	R	Α	Disabling the video controller (VGA)
0x78h       G       R       R       R       Resetting the console controller         0x79h       G       R       R       A       Disabling the console controller         0x7Ah       G       R       A       R       Enabling the console controller         Keyboard (PS2 or USB)         0x90h       R       OFF       OFF       R       Resetting the keyboard	0x72h	OFF	R	Α	R	Enabling the video controller (VGA)
0x79h G R R A Disabling the console controller 0x7Ah G R A R Enabling the console controller  Keyboard (PS2 or USB)  0x90h R OFF OFF R Resetting the keyboard	Remote Console					
0x7Ah G R A R Enabling the console controller  Keyboard (PS2 or USB)  0x90h R OFF OFF R Resetting the keyboard	0x78h	G	R	R	R	Resetting the console controller
Keyboard (PS2 or USB)  0x90h R OFF OFF R Resetting the keyboard	0x79h	G	R	R	Α	Disabling the console controller
0x90h R OFF OFF R Resetting the keyboard	0x7Ah	G	R	Α	R	Enabling the console controller
· ,	Keyboard (PS2 or	r USB)				
0x91h R OFF OFF A Disabling the keyboard	0x90h	R	OFF	OFF	R	Resetting the keyboard
• The state of the	0x91h	R	OFF	OFF	Α	Disabling the keyboard
0x92h R OFF G R Detecting the presence of a keyboard	0x92h	R	OFF	G	R	Detecting the presence of a keyboard
0x93h R OFF G Enabling the keyboard	0x93h	R	OFF	G		Enabling the keyboard
0x94h R G OFF R Clearing keyboard input buffer	0x94h	R	G	OFF	R	Clearing keyboard input buffer
0x95h R G OFF A Instructing keyboard controller to run Self Test (PS2 only)	0x95h	R	G	OFF	Α	Instructing keyboard controller to run Self Test (PS2 only)
Mouse (PS2 or USB)	Mouse (PS2 or US	SB)				
0x98h A OFF OFF R Resetting the mouse	0x98h	Α	OFF	OFF	R	Resetting the mouse
0x99h A OFF OFF A Detecting the mouse	0x99h	Α	OFF	OFF	Α	Detecting the mouse
0x9Ah A OFF G R Detecting the presence of a mouse	0x9Ah	Α	OFF	G	R	Detecting the presence of a mouse

**Table 12: Diagnostic LEDs Codes (Continued)** 

Check Point	Diagnostic LED			Description	
Officer 1 officer	Decoder (G=green; R=red; A=amber)			Becompact	
			mber)		
	MSB			LSB	
0x9Bh	Α	OFF	G	Α	Enabling the mouse
Fixed Media					
0xB0h	R	OFF	R	R	Resetting fixed media device
0xB1h	R	OFF	R	Α	Disabling fixed media device
0xB2h	R	OFF	А	R	Detecting presence of a fixed media device (IDE hard drive detection, etc.)
0xB3h	R	OFF	Α	Α	Enabling/configuring a fixed media device
Removable Media	a				
0xB8h	Α	OFF	R	R	Resetting removable media device
0xB9h	Α	OFF	R	Α	Disabling removable media device
0xBAh	A	OFF	А	R	Detecting presence of a removable media device (IDE CD-ROM drive detection, etc.)
0xBCh	Α	G	R	R	Enabling/configuring a removable media device
Boot Device Selection					
0xD0	R	R	OFF	R	Trying boot device selection
0xD1	R	R	OFF	Α	Trying boot device selection
0xD2	R	R	G	R	Trying boot device selection
0xD3	R	R	G	Α	Trying boot device selection
0xD4	R	Α	OFF	R	Trying boot device selection
0xD5	R	Α	OFF	Α	Trying boot device selection
0xD6	R	Α	G	R	Trying boot device selection
0xD7	R	Α	G	Α	Trying boot device selection
0xD8	Α	R	OFF	R	Trying boot device selection
0xD9	Α	R	OFF	Α	Trying boot device selection
0xDA	Α	R	G	R	Trying boot device selection
0xDB	Α	R	G	Α	Trying boot device selection
0xDC	Α	Α	OFF	R	Trying boot device selection
0xDE	Α	Α	G	R	Trying boot device selection
0xDF	Α	Α	G	Α	Trying boot device selection
Pre-EFI Initializat	ion (PEI	) Core			
0xE0h	R	R	R	OFF	Started dispatching early initialization modules (PEIM)
0xE2h	R	R	Α	OFF	Initial memory found, configured, and installed correctly
0xE1h	R	R	R	G	Completed dispatching an PEIM
0xE3h	R	R	Α	G	Reserved for initialization module use (PEIM)
Driver eXecution	Driver eXecution Environment (DXE) Core			re	
0xE4h	R	Α	R	OFF	Entered EFI driver execution phase (DXE)
0xE5h	R	Α	R	G	Started dispatching drivers
0xE6h	R	Α	Α	OFF	Started connecting drivers
0xEBh	Α	R	Α	G	Started dispatching a driver
0xECh	R	Α	Α	OFF	Completed dispatching a driver
DXE Drivers					
0xE7h	R	Α	Α	G	Waiting for user input

**Table 12: Diagnostic LEDs Codes (Continued)** 

Check Point	Diagnostic LED Decoder (G=green; R=red; A=amber)		ımber)	Description	
	MSB			LSB	
0xE8h	Α	R	R	OFF	Checking password
0xE9h	Α	R	R	G	Entering BIOS setup
0xEAh	Α	R	Α	OFF	Flash update
0xEEh	Α	Α	Α	OFF	Calling Int 19. One beep unless silent boot is enabled
0xEFh	Α	Α	Α	G	Reserved for DXE Drivers use
Runtime Phase /	EFI Ope	rating S	System I	Boot	
0xF4h	R	Α	R	R	Entering sleep state
0xF5h	R	Α	R	Α	Exiting sleep state
0xF8h	А	R	R	R	Operating system has requested EFI to close boot services (ExitBootServices ( ) has been called)
0xF9h	Α	R	R	А	Operating system has switched to virtual address mode (SetVirtualAddressMap ( ) has been called)
0xFAh	А	R	А	R	Operating system has requested the system to rest (ResetSystem ( ) has been called)
Pre-EFI Initializat	ion Mod	lule (PE	IM) / Re	covery	
0x30h	OFF	OFF	R	R	Crisis recovery has been initiated because of a user request
0x31h	OFF	OFF	R	А	Crisis recovery has been initiated by software (corrupt flash)
0x34h	OFF	G	R	R	Loading Crisis recovery capsule
0x35h	OFF	G	R	Α	Handing off control to the crisis recovery capsule
0x3Fh	G	G	Α	Α	Unable to complete crisis recovery

## **BIOS Setup Utility**

The BIOS Setup Utility is used to change system configuration parameters. The utility is resident in the system FLASH memory and does not require a diskette or an operating system present to run.

## **Using the BIOS Setup Utility**

You access the BIOS Setup utility when you turn on or reboot your system. To run the BIOS Setup Utility, perform the following procedure:

- 1. Power-on or reboot the system. "Press <F2> to enter SETUP" displays.
- **2.** Press **F2**. The BIOS Setup Utility starts and the Main Menu is displayed. The menu bar at the top of the Main Menu lists the following selections:

Use the arrow keys to select a menu or an item on a displayed menu. Press the value keys (listed in the table below) to cycle through the allowable values for the selected field. Use the Exit menu's "Save Changes" selection to save the current values on all the menus.

To display a submenu, position the cursor on a selection that has a submenu and press **ENTER**. An arrow precedes selections with submenus.

Refer to the following table for information on the keys that you use with BIOS Setup. These keys are also listed at the bottom of the Setup menu.

**Table 13: BIOS Setup Keys** 

Key	Function in Setup Menu			
F1	Get Help about an item.			
ESC	The <esc> key provides a mechanism for backing out of any field. This key will undo the pressing of the Enter key.</esc>			
	When the <esc> key is pressed while editing any field or selecting features of a menu, the parent menu is re-entered.</esc>			
	When the <esc> key is pressed in any sub-menu, the parent menu is re-entered.</esc>			
	When the <esc> key is pressed in any major menu, the exit confirmation window is displayed and the user is asked whether changes can be discarded. If "No" is selected and the <enter> key is pressed, or if the <esc> key is pressed, the user is returned to where he/she was before <esc> was pressed, without affecting any existing any settings. If "Yes" is selected and the <enter> key is pressed, setup is exited and the BIOS returns to the main System Options Menu screen.</enter></esc></esc></enter></esc>			
Left or right arrow keys	The left and right arrow keys are used to move between the major menu pages.  The keys have no affect if a sub-menu or pick list is displayed.			

**Table 13: BIOS Setup Keys (Continued)** 

Key	Function in Setup Menu
Up or down arrow keys	The up/down arrow is used to select the previous/next value in a pick list, or the previous/next option in a menu item's option list. The selected item must then be activated by pressing the <enter> key.</enter>
-	The minus key on the keypad is used to change the value of the current item to the previous value. This key scrolls through the values in the associated pick list without displaying the full list.
+	The plus key on the keypad is used to change the value of the current menu item to the next value. This key scrolls through the values in the associated pick list without displaying the full list.
Enter	The <enter> key is used to activate sub-menus when the selected feature is a submenu, or to display a pick list if a selected option has a value field, or to select a sub-field for multi-valued features like time and date. If a pick list is displayed, the <enter> key will select the currently highlighted item, undo the pick list, and return the focus to the parent menu.</enter></enter>
Tab	The <tab> key is used to move between fields. For example, <tab> can be used to move from hours to minutes in the time item in the main menu.</tab></tab>
F9	Load default configuration values.
F10	Save configuration values and exit.

## **BIOS Setup Configuration Settings**

The BIOS Setup Configuration tables show the default settings for the BIOS Setup Utility and provide a place for you to record any changes you make to these settings. Recommended values are bold in the following tables.

## **Main Menu**

**Table 14: Standard BIOS Features Menu** 

Feature	Choices or Display Only	Description	Your Setting
BIOS Version	Display only	Information only. Displays the BIOS version.	
		yy = major version	
		xx = minor version	
		zzzz = build number	
BIOS Build Date		Information only. Displays the BIOS build date.	
Quiet Boot	Enabled	If enabled, BIOS splash screen is displayed.	
	Disabled	' '	
		If disabled, BIOS POST messages are displayed.	
POST Error Pause	Enabled	If enabled, the system will wait for user intervention on critical POST	
	Disabled	errors.	
		If disabled, the system will boot with no intervention, if possible.	
System Date	[MM/DD/YYYY]	Month valid values are 1 to 12.	
		Day valid values are 1 to 31.	
		Year valid values are 1998 to 2099.	
System Time	[HH:MM:SS]	Hours valid values are 0 to 23.	
		Minutes valid values are 0 to 59.	
		Seconds valid values are 0 to 59.	

Note: The BIOS may display more options that presented here.

## **Advanced Menu**

**Table 15: Advanced Menu** 

Feature	Choices or Display Only	Description	Your Setting
Processor	Press Enter	Press Enter to open the submenu	
Memory	Press Enter	Press Enter to open the submenu	
IDE Controller	Press Enter	Press Enter to open the submenu	
Serial Port	Press Enter	Press Enter to open the submenu	
USB Configuration	Press Enter	Press Enter to open the submenu	
PCI	Press Enter	Press Enter to open the submenu	
Power	Press Enter	Press Enter to open the submenu	
Boot configuration	Press Enter	Press Enter to open the submenu	
Hardware Health Configuration	Press Enter	Press Enter to open the submenu	

#### Processor Submenu

**Table 16: Processor Submenu** 

Feature	Choices or Display Only	Description	Your Setting
Processor Family	Display only	Family designation of the processor	
Core Frequency	Display only	Frequency at which processors currently run.	
System Bus Frequency	Display only	Current frequency of the processor system bus.	
L2 Cache RAM	Display only		
CPUID Register	Display only		
Intel(R) EM64T			
Enhanced SpeedStep	<b>Enabled</b> Disabled	Enables or disables Enhanced Intel SpeedStep® Technology on the processors.  Select <b>Enabled</b> to allow the OS to reduce the power consumption.	
Execute Disable Bit	<b>Enabled</b> Disabled	When disabled, forces the XD feature flag to always return 0	
Virtualization Technology	Enabled Disabled	When enabled, a Virtual Machine Monitor can utilize the additional hardware capabilities provided by Intel® Virtualization Technology	

## Memory Submenu

**Table 17: Memory Submenu** 

Feature	Choices or Display Only	Description	Your Setting
Total Memory	Display only	Information only. The amount of memory available in the system in the form of installed FBDIMMs, in units of MB or GB.	
Current Configuration	Display only	Displays one of the following:  - Single-channel Mode: System memory is functioning in a special, reduced efficiency mode.  - Dual-channel Mode	
Memory Channel A Slot 0 Memory Channel A Slot 1 Memory Channel B Slot 0 Memory Channel B Slot 1	Display only	Displays the state of each DIMM socket present on the board. Each DIMM socket field reflects one of the following possible states:  - Size info: there is a DIMM installed on this slot and the size information is displayed.  - Not installed: there is no DIMM installed on this slot.	
Memory Correction	Non-ECC ECC	Select either ECC or Non-ECC depending on the installed memory type.	

#### IDE Controller Submenu

**Table 18: IDE Controller Submenu** 

Feature	Choices or Display Only	Description	Your Setting
Onboard PATA Controller	<b>Enabled</b> Disabled	Enables or disables the onboard Parallel ATA controller.	
Onboard SATA Controller	Enabled Disabled	When enabled, the SATA contoller can be configured in IDE, RAID, or AHCI Mode. RAID and AHCI modes are mutually exclusive.	
SATA Mode	Enhanced Legacy	In Legacy Mode, BIOS can enumerate only four drives. It provides four options to choose a mix of SATA and PATA drives.  In Enhanced Mode, the BIOS is not limited to legacy PATA fourdrive limitations, and can enumerate the two PATA drives and four SATA drives (totaling six drives), and can list/boot to the remaining two SATA drives.  RAID Mode is supported only when SATA Mode is selected	

**Table 18: IDE Controller Submenu (Continued)** 

Feature	Choices or Display Only	Description	Your Setting
Configure SATA as RAID	Enabled	This mode can be selected only when the SATA controller is in	
	Disabled	Enhanced Mode.	
SATA RAID OPROM	LSI Intel Matrix Storage	Select the onboard RAID chipset of your choice.  - LSI: support for RAID0, RAID1 and RAID10 under Microsoft Windows and Linux.  - Intel Matrix Storage: support for RAID0, RAID1, RAID5, and RAID10 under Microsoft Windows.  Refer to "RAID Support" on page 29 for more information.	
Primary IDE Master		Information only.	
Primary IDE Slave		Information only.	
SATA 0		Information only.	
SATA 1		Information only.	
SATA 2		Information only.	
SATA 3		Information only.	

#### Serial Ports Submenu

**Table 19: Serial Ports Submenu** 

Feature	Choices or Display Only	Description	Your Setting
COM1 Enable	Enabled	Enables or disables COM1	
	Disabled	port.	
Address	3F8h	Selects the base I/O address for COM1.	
	2F8h		
	3E8h		
	2E8h		
IRQ	3	Selects the Interrupt Request line for COM1.	
	4	line for COMT.	

#### USB Configuration Submenu

**Table 20: USB Configuration Submenu** 

Feature	Choices or Display Only	Description	Your Setting
Module version		USB driver version.	
USB Devices Enabled		Shows the number of USB devices in the system.	
<total devices="" in="" system="" usb=""></total>			

Table 20: USB Configuration Submenu (Continued)

Feature	Choices or Display Only	Description	Your Setting
USB Controller	<b>Enabled</b> Disabled	When <b>Disabled</b> , all of the USB controllers will be turned off and inaccessable by the OS.	
Legacy USB Support	Enabled Disabled Auto	Enables the Legacy USB support.  The <b>Auto</b> option disables the legacy support if no USB devices are connected.	
Port 60/64 Emulation	Enabled  Disabled	Enables the I/O Port 60h/64h emulation support.  This should be enabled for the complete USB Legacy support for non-USB aware operating systems.	
USB 2.0 Controller	<b>Enabled</b> Disabled	When <b>Disabled</b> , all the USB2.0 controllers will be turned off and inacessable by the operating system.	

#### PCI Submenu

Table 21: PCI Submenu

Feature	Choices or Display Only	Description	Your Setting
Intel(R) 82573V GbE	<b>Enabled</b> Disabled	Enables or disables the Intel (R) 82573V primary network controller	
Intel(R)82541PI GbE	<b>Enabled</b> Disabled	Enables or disables the Intel (R) 82541PI GbE primary network controller	

#### Power Submenu

Table 22: Power Submenu

Feature	Choices or Display Only	Description	Your Setting
After Power Failure	Power Off Last state	Determines the mode of operation if a power loss occurs.	
	Power On	On Stays off: the system will remain off once the power is restored.	
		Last State: restores the system to the same state it was on before the power failed.	
Wake on LAN from S5	Power Off Power On	Determines the action taken when the system power is off and a PCI Power Management wake up event occurs.	

#### **Boot Configuration**

**Table 23: Boot Configuration Submenu** 

Feature	Choices or Display Only	Description	Your Setting
NumLock	On	Turns the keyboard numlock on	
	Off	or off.	

#### Hardware Health Configuration

Table 24: Hardware Health Configuration Submenu

Feature	Choices or Display Only	Description	Your Setting
Hardware Monitor	Press Enter	Press Enter to open the submenu	
Auto Fan Control	<b>Enabled</b> Disabled	Enables or disables the auto fan control.  When <b>Enabled</b> , the fan speed will be adjusted automatically according to the temperature.  When <b>Disabled</b> , all the fans will run at full speed.	

#### Hardware Monitor Screen

**Table 25: Hardware Monitor Screen** 

Feature	Choices or Display Only	Description	Your Setting
CPU Temperature			
System Temperature			
DIMM Temperature			
Fan1 Speed		N/A	
Fan2 Speed		Left Blower Fan	
Fan3 Speed		Right Blower Fan	
Fan4 Speed		PCI Fan	
Fan5 Speed		N/A	
Fan6 Speed		N/A	
+1.5V			
+Vccp		Processor core voltage	
Vcc			
+5V			
+12V			
VTR		3.3V standby	
VBAT		Battery voltage	

## **Boot Options Menu**

**Table 26: Boot Options Menu** 

Feature	Choices or Display Only	Description	Your Setting
Boot Timeout	10 Any figure	Sets the default timeout value before system boot.  The 656535 value will disable the timeout completely.	
Boot Option #N	EFI Shell List of the boot devices	Sets the system boot order.	

## Security Menu.

**Table 27: Security Menu** 

Feature	Choices or Display Only	Description	Your Setting
Administrator Password	Installed Not Installed	Indicates whether the administrator password is set (display only).	
User Password	Set Not Installed	Indicates whether the user password is set (display only).	
Admin Password	Up to 7 alphanumeric characters	Press Enter to display the supervisor password entry screen. With the supervisor password, all SETUP menus are available for access. This option is available only when you log into the SETUP utility with the supervisor password.	
User Password	Up to 7 alphanumeric characters	Press Enter to display the user password entry screen. With a user password, only certain menus are accessible. This option is available only if the Supervisor Password is set.	

## Server Management Menu

**Table 28: Server Management Menu** 

Feature	Choices or Display Only	Description	Your Setting
Clear System Event Log	Enabled <b>Disabled</b>	Clear System Event Log. Will reset to Disabled after reboot	
Event Logging	<b>Enabled</b> Disabled	Enables or disables the Event Logging.	
ECC Event Logging	<b>Enabled</b> Disabled	Enables or disables the ECC Event Logging.	
Event Log Area Status		Information only.	
O/S Boot WD Timer	<b>Enabled</b> Disabled	If enabled, starts a BIOS timer (watchdog) which can only be shut off by Intel Management Software after the operating system loads. Helps determine that the operating system successfully loaded or resets the system.	
ASF Support	Enabled <b>Disabled</b>		
Boot to Network	Enabled <b>Disabled</b>	Enables or disables the Boot to Network (PXE).	
View Event Log	Press Enter	View the system event log	
Console Redirection	Press Enter		
System Information	Press Enter		

#### Console Redirection Submenu

**Table 29: Console Redirection submenu** 

Feature	Choices or Display Only	Description	Your Setting
Console redirection	Disabled Serial1 Serial2	Enables and disables the ability of the system to redirect screen data across serial connection.	
Flow Control	None RTS/CTS	Sets the handshake protocol the BIOS should expect from the remote console redirection application	
Baud Rate	9.6K 19.2K 36.4K 57.6K 115.2K	Sets the communication speed for the redirection data	
Terminal Type	VT100 VT100+ VT-UTF8 PC-ANSI	Sets the character formatting for the console redirection screen	

## System Information Submenu

Table 30: System Information submenu

Feature	Choices or Display Only	Description	Your Setting
System Information	Display only		
Manufacturer	Display only		
Product Name	Display only		
Version	Display only		
Serial Number	Display only		
UUID	Display only		
Server Board Information	Display only		
Manufacturer	Display only		
Product Name	Display only		
Version	Display only		
Serial Number	Display only		
Chassis Information	Display only		
Manufacturer	Display only		
Version	Display only		
Serial Number	Display only		
Asset Tag	Display only		

## Boot Manager Menu

Allows you to boot the system using one of the items listed in the menu.

## Error Manager Menu

The Error Manager Menu displays any errors encountered during POST.

#### Exit Menu

You can make the following exit selections on the Main Menu. Select an option using the up or down arrow keys, then press <Enter> to execute the option.

You must select one of the items from the menu or menu bar to exit.

**Table 31: Exit Menu** 

Choices	Description
Save Changes and Exit	Exits after writing all modified Setup item values to NVRAM.
	F10 key can be used for this operation.
Discard Changes and Exit	Reads previous values of all Setup items from NVRAM and exits the BIOS Setup.
	ESC key can be used for this operation.
Save Changes	Saves all modified Setup item values to NVRAM.
Discard Changes	Reads previous values of all Setup items from NVRAM.
Restore Defaults	Load default values for all SETUP items.
	F9 key can be used for this operation.
Save User Default Values	Saves current values so that they can be restored later.
	Settings will be reset to factory defaults if the ocnfiguration is cleared.
Restore User Default Values	Restores previously saved user default values.

## **Updating BIOS**

The update utility allows you to update the BIOS stored in the flash memory. The code and data in the update file include the following:

- On-board system BIOS, including the recovery code, BIOS Setup Utility, and strings.
- On-board video BIOS, and other option ROMs for devices embedded on the server board

#### Preparing for the Update

The steps below explain how to prepare to update the BIOS, including how to record the current BIOS settings and how to obtain the update utility.

Note: In the unlikely event that a BIOS error occurs during the BIOS update process, a recovery process may need to be followed to return the system to service.

#### Recording the Current BIOS Settings

- 1. Boot the computer and press <F2> when you see the message: Press <F2> Key if you want to run SETUP
- **2.** Write down the current settings in the BIOS Setup program.

Note: Do not skip step 2. You will need these settings to configure your computer at the end of the procedure.

#### Obtaining the Update

Download the latest Boot CD from the Bull support web site:

http://support.bull.com

Note: Review the instructions and release notes that are provided in the readme file on the Boot CD before attempting a BIOS update. The release notes contain critical information regarding jumper settings, specific fixes, or other information to complete the update.

#### **Updating the BIOS**

**1.** Insert the Boot CD and restart your system.

**2.** Choose your system on the displayed menu, and follow the on-screen instructions. The BIOS update starts.



Do not power down the system during the BIOS update process! The system will reset automatically when the BIOS update process is completed.

- **3.** Press F2 to enter the BIOS Setup utility.
- **4.** In the BIOS Setup utility, press F9 to load the setup defaults.
- **5.** Press F10 to save the changes and exit the BIOS Setup utility.

## **How to Identify BIOS Revision Level**

To identify your system's current BIOS revision level, perform the following procedure:

- Power-on or reboot the system.
   "Press <F2> to enter SETUP" is displayed.
- 2. Press **F2**.
- 3. In the Main menu, check the value that appears in the BIOS Version field.

## **Recovering BIOS**

If at any point in time the BIOS appears to malfunction, clear the CMOS to return to a default configuration. If this does not help, process with the BIOS recovery as described below.

- **1.** Move the BIOS jumper to pins 2-3. The other BIOS is used to boot.
- **2.** Update the BIOS.
- **3.** Power off the server.
- **4.** Remove the A/C power.
- **5.** Move the BIOS Bank Select jumper to the Normal position.
- 6. Plug in AC power.
- 7. Wait for thirty seconds and power on.

For more information on the BIOS Recovery jumper, refer to <u>"Recovering the BIOS"</u> on page 24.

# **Specifications**

**Table 32: Bull NovaScale R410 Specifications** 

Item		Description		
Cabinet design	1	Rack		
Chipset		Intel® 3000		
CPU Type		Intel <sup>®</sup> Pentium <sup>®</sup> 4, Intel <sup>®</sup> Pentium <sup>®</sup> D Xeon <sup>®</sup> 3000 series	D, Intel® Celeron D or an Intel®	
	Number of processors	1 (max: 1)		
	Packaging	Socket LGA775		
Memory	Minimum	512 MB		
	Maximum	8 GB (4x2GB)		
	Connectors	4 slots		
	Memory module	DDR2 533 or DDR2 667		
	Error check	ECC		
Floppy Disk Di	rive	No		
Hard Disk	Technology	S-A	TA	
Drive	RPM	7200	10000	
External accessible bays	5.25-inch bay	1 slot		
Hard Disk Drive bays	Non Hot-swap	2 slots		
External	Keyboard	PS/2 (1 port)		
interface	Mouse	PS/2 (1 port)		
	USB	2.0 (3 ports - 1 on the front, 2 on the rear)		
	Serial	FIFO compatible (1 port)		
	Network	RJ-45 (2 ports)		
	VGA	Standard VGA connector (1 port)		
I/O bus	PCI-E x8	1 slot (on the PCI riser card)		
LAN	On board Intel®	10/100/1000 Fast Ethernet support		
	82573E	Compliant with IEEE 802.3 (10BASE-T, 100BASE-TX, 1000BASE-T) specifications		
		IAMT support		
	On board Intel®	10/100/1000 Fast Ethernet support		
	82541PI	Compliant with IEEE 802.3 (10BASE-T, 100BASE-TX, 1000BASE-T) specifications		
Video	-	On-board ATI ES1000 video controller with 16MB		
BIOS	Award BIOS	ISA Flash ROM 4 MB		
		Power On Self Test (POST)		
External dimer	nsions	42,9 (height) × 431,8 (width) mm × 508 (depth)		
Weight		9 Kg		

**Table 32: Bull NovaScale R410 Specifications (Continued)** 

Item		Description
Power supply (depending on your configuration)		350W
		Input voltages 110 to 220 V +/-10%
		50/60Hz +/- 1Hz
Environmental	Temperature	10 to 35°C
requirements	Humidity	20 to 80% RH (no condensation)

# **Equipment Log**

Use this equipment log form to record pertinent information about your system. You will need some of this information to run the System Setup Utility. Be sure to update the equipment log when you add options.

Record the model and serial numbers of the system components, dates of component removal or replacement, and the name of the vendor from whom the component was purchased. Be sure to record the same information for any components added to the system, such as a power supply, hard disk drives, add-in boards, or printers.

Record the model and serial numbers of the unit and system board. The model and serial numbers of the system unit are recorded on a label attached to the rear of the unit.

The location of serial numbers on add-in boards, hard disk drives, and external equipment, such as video displays or printers, varies from one manufacturer to another. Literature accompanying these products should illustrate or describe the location of model and serial numbers.

## **Hardware**

Main Unit					
	Model name	Serial No.		Date installed	
CPU				I	
#1	Clock	Serial No.		Date installed	
Memory			1		
#3, #4	Size	Serial No.		Date installed	
#1, #2	Size	Serial No.		Date installed	
Monitor					
	Туре	Model name		Serial No.	
				Date installed	
Fixed SATA	Hard Disks				
#1	Туре		Serial No.		
	Capacity		Date installed		
	Type number				
#2	Туре		Serial No.		
	Capacity		Date installed		
	Type number			•	
5.25-inch De	evice #1				
	Size	Capacity		Serial No.	
	Model name	Type number		Date installed	
PCI-E 8x Slo	ot				
	Model name			Serial No.	
				Date installed	
Printer					
	Model name			Serial No.	
	Manufacturer	 		Date installed	
External USI	B Device 1				
	Model name	 		Serial No.	
	Manufacturer			Date installed	
External USI	B Device 2				
	Model name			Serial No.	
	Manufacturer	 		Date installed	
External USI	B Device 3				
	Model name			Serial No.	
	Manufacturer			Date installed	

External USB Device 4					
	Model name		Serial No.		
	Manufacturer		Date installed		
External Serial	External Serial Device 1				
	Model name		Serial No.		
	Manufacturer		Date installed		

## **Software**

Firmware version					
os	Apply	Name:		Version	
Application of RUR media		Name:		Version	
File system	FAT	HPFS	NTFS		
	Others (	•			)
Bundled software installed					
Licensed software installed					
Application running when a failure occurred					

